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**Nuclear Illusions:
Argentina and Brazil**

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Pragmatic steps toward ideal objectives



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List of Abbreviations

ABACC	Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials
CNEA	National Commission on Nuclear Energy (Argentina)
CNEN	National Atomic Energy Commission (Brazil)
CNPQ	National Research Council (Brazil)
DOE	Department of Energy (US)
EURATOM	European Atomic Energy Community
HEU	Highly-enriched uranium
IAEA	International Atomic Energy Agency
IPEN	Institute for Energy and Nuclear Research, University of Sao Paolo (Brazil)
LEU	Low-enriched uranium
MERCOSUR	Southern Cone Common Market
mt	metric tons
MTCR	Missile Technology Control Regime
MWe	Megawatt electric
NPT	Nuclear Non-Proliferation Treaty
OPANAL	Agency for the Prohibition of Nuclear Weapons in Latin America
PNE	Peaceful nuclear explosion
PT	Democratic Workers' Party (Brazil)
SCCC	Joint System for Accounting and Control of Nuclear Materials
UF ⁶	Uranium Hexafluoride

Preface

The decision of over 170 states in May 1995 to extend the Nuclear Non-Proliferation Treaty (NPT) indefinitely was a major victory in international efforts to halt the spread of nuclear weapons. Although many non-nuclear states expressed dissatisfaction with the actions of the nuclear weapon states, in the end an overwhelming majority of countries concluded that the treaty served important national and regional security interests and therefore merited indefinite extension. The non-nuclear states also insisted on a strengthened review process intended to nudge the NPT's nuclear signatories toward fulfillment of their Article VI commitment to nuclear disarmament. Five-year review conferences, at which the progress of the nuclear powers toward meeting certain "yardsticks," are now mandatory. These "yardsticks" include the completion of a Comprehensive Test Ban Treaty (CTBT), a ban on fissile material production for military purposes, and "systematic and progressive efforts to reduce nuclear weapons globally."

Other developments in 1995 offer evidence that international attitudes regarding the acquisition or possession of nuclear weapons may be undergoing a profound change. In addition to extending the NPT, many countries have been willing to support tough measures aimed at dismantling nuclear programs in Iraq and North Korea. The nearly universal condemnation of the resumption of nuclear testing by France and China suggests that the reassertion of nuclear status in the future will entail a higher political price than during the Cold War.

Efforts to reduce the risks associated with nuclear weapons have suffered setbacks as well, however. Progress in US-Russian strategic arms control has stalled due to domestic political developments in both countries, and the future of the START II accord appears increasingly uncertain in Russia. Following decades of strong support for a comprehensive test ban treaty and a global ban on producing new fissile material for nuclear weapons, India and Pakistan are now backpedaling on earlier commitments in order to preserve the nuclear option.

At this crucial point in the evolution of international attitudes toward nuclear weapons, it is important to remember that the spread of nuclear weapons is neither inevitable nor irreversible. Although attention has tended to focus on notable failures of the non-proliferation regime, in fact a number of states in recent years have taken the unprecedented step of abandoning their nuclear ambitions. While the evolution of nuclear forbearance in countries such as Argentina, Brazil, South Africa, and Sweden involved a unique constellation of domestic and international factors, these cases share an important common theme. In each instance, key policy makers' perceptions of the

benefits and risks associated with the acquisition or possession of nuclear weapons changed significantly, such that nuclear weapons came to be viewed more as burdens than as assets in the pursuit of security and other important national objectives.

In his study of nuclear forbearance in Argentina and Brazil, John Redick demonstrates how early bilateral nuclear policy cooperation *in opposition to the global non-proliferation regime* over time paved the way for the two states' acceptance of multilateral non-proliferation mechanisms. Although neither country ever possessed nuclear weapons nor sufficient nuclear materials to produce them, both had significant nuclear facilities with military potential. In addition, the two countries subscribed to independent nuclear policies that put them in fundamental opposition to the global non-proliferation regime. However, rather than succumbing to a costly and potentially dangerous nuclear competition, Argentina and Brazil abandoned their unique "nuclear theology" and integrated their respective nuclear programs into a bilateral control and inspection regime.

External factors initially drove Argentina and Brazil toward cooperation in nuclear policy, but important political and economic changes at home ultimately convinced the two countries to abandon their nuclear ambitions and join the non-proliferation regime. As Redick notes, the roots of the bilateral nuclear confidence-building process can be found in the two countries' concerted resistance to the pressure of the United States and other technically advanced countries to join the global non-proliferation regime. A process of ad hoc nuclear policy coordination began in the late 1960s and early 1970s, when the two nations refused to join the Nuclear Non-Proliferation Treaty and to accept the obligations of the Tlatelolco Treaty establishing a nuclear weapon-free zone in Latin America. Although Argentina and Brazil were divided by a history of regional rivalry and conflict, they were united in their determination to resist external dictate. Over time, pressure from the international community intensified and the economic and diplomatic costs of their respective nuclear programs increased. The resolution of bilateral disputes in the Rio de la Plata region, and the return of civilian governments in the mid-1980s in both countries accelerated and consolidated the process of nuclear confidence-building.

Although domestic factors contributed significantly to the evolution of this bilateral nuclear confidence-building process, Redick concludes that the future of the Argentine-Brazilian commitment to the non-proliferation regime will be greatly influenced by the support and actions of the nuclear-weapon states. While the two countries' commitment to non-nuclear status at present appears solid, continued international support and assistance for the bilateral inspection regime will be essential.

In addition, Redick argues, tangible progress in arms control and disarmament by the nuclear weapon states will be important to sustain support for non-proliferation in both states. "Failure of the nuclear weapon states to progress toward nuclear disarmament," he concludes, "or the implementation of unilateral policies ... over time could undermine the political commitment to non-proliferation in Argentina and Brazil."

This study is the second in a series examining decisionmaking in countries that have chosen to back away from the nuclear threshold. Using a common framework of analysis, the studies in the series seek to assess the relative influence of international, regional, and domestic factors in helping to change perceptions of the utility and/or the cost of nuclear weapons, and to examine closely the implementation and verification of decisions to forego the development of nuclear capabilities. The cases are authored by experts with extensive expertise in non-proliferation issues and, importantly, in the domestic and regional politics of the countries under review.

The series is part of the Henry L. Stimson Center's Project on Eliminating Weapons of Mass Destruction, which seeks to encourage a national and international debate on the long-term nuclear future. The project is based on the premise that the end of the Cold War, dissolution of the Soviet Union, and grave dangers of proliferation provide both reason and opportunity to reexamine fundamental assumptions regarding the relative benefits and risks associated with weapons of mass destruction. Through research and public education efforts, the Center seeks to explore the obstacles to, and implications of, the progressive elimination of all nuclear, chemical, and biological weapons from all states, and to consider measures that might bring all states closer toward that goal.

A central focus of the project's research efforts are evolving national and international perceptions of the benefits, costs, and risks associated with weapons of mass destruction. Understanding the motivations for proliferation in the post-Cold War environment is essential to this task. Equally important, however, is an examination of cases of nuclear forbearance, which may hold valuable lessons for future non-proliferation efforts.

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Nuclear Illusions: Argentina and Brazil

Latin America's two leading nations have devoted considerable resources to nuclear development. Both have achieved significant progress toward independent mastery of the nuclear fuel cycle with potential military applications. Moreover, until recently, their nuclear development has been accompanied by a nuclear theology grounded in rejection of the basic tenets of the non-proliferation regime. Specifically, the two nations opposed the Nuclear Non-Proliferation Treaty (NPT) and full-scope International Atomic Energy Agency (IAEA) safeguards, and refused to fully accept the obligations of the Tlatelolco Treaty establishing a Latin American nuclear weapon-free zone.

These policies have now been reversed; the illusion of an “independent” nuclear policy appears to have been discarded and both nations have apparently embraced the non-proliferation regime. The reversal in nuclear policies resulted from domestic political change and the evolution of Argentine-Brazilian relations. Nuclear confidence-building and rapprochement proceeded as part of a broad improvement of Argentine economic, political, and military relations beginning in the late 1970s. The return of civilian governments in the early to mid-1980s in both nations hastened the process. Enlightened presidents utilized the sensitive nuclear issue to stimulate and reinforce cooperation in both areas. While restrictive foreign export policies enhanced the difficulty and expense of the Argentine and Brazilian nuclear programs, they also reinforced the nationalistic nuclear theology of victimization by the advanced nations. Alternatively, the promise of positive inducements, including increased foreign investment and access to advanced technology, encouraged domestic forces to press for change in long-cherished nuclear policies.

This paper examines the background, implementation, and verification procedures of these dramatic policy reversals. It assesses the factors which led to the repudiation of long-held nuclear policies, and discusses their permanency.

Nuclear Activities

The revision of Argentine and Brazilian nuclear policy occurred as a result of a lengthy nuclear confidence-building process. This process began in the mid-sixties during the negotiations of the Treaty of Tlatelolco (1964-67), accelerated following a 1979 agreement resolving certain river/energy related issues in the Rio de la Plata area, deepened with reintroduction of democratic governments in both nations in the early 1980s, and culminated in the dramatic 1991 Foz de Iguazú Declaration on the Common Nuclear Policy of Brazil and Argentina.

Argentina

The nuclear programs of both Argentina and Brazil began in the 1950s, stimulated in part by the US Atoms for Peace program. Argentina's National Commission on Nuclear Energy (CNEA) was created on 31 May 1950, by the decree of Juan Peron. Soon after its initiation, the CNEA became the subject of considerable dispute due to the actions of Austrian World War II emigrant, Ronald Richter, who had carried out nuclear research in Nazi Germany. Peron supported Richter in the establishment of an expensive laboratory on an island in Neuquen Province near the Andean resort town of Bariloche. In a March 1951 press conference, Peron announced to the world that Richter had, in effect, achieved controlled nuclear fusion. It was also widely speculated that an Argentine nuclear bomb might emerge from Richter's experiments. Gradually, thanks in part to opposition within the CNEA, Richter was revealed as a charlatan, and dismissed in November 1952.¹ This ignominious beginning nonetheless focused national attention on the Argentine nuclear energy program, which eventually became the most advanced in Latin America.

Argentina operates one of the few gaseous diffusion *enrichment* facilities not situated in an advanced nuclear nation. The "Pilcaniyeu" facility, located approximately one hour to the east of Bariloche, was announced in 1983, following the tragic Falkland/Malvinas War.² The United States and other Western intelligence agencies were unaware of the nature of the facility at the time of its announcement by former CNEA president, Admiral Carlos Castro Madero (the Pilcaniyeu site was originally misinterpreted as a reprocessing facility). As Pilcaniyeu was an indigenously constructed facility, Argentina had no legal requirement to submit it to IAEA safeguards. Consequently, there was considerable international concern that Argentina would choose to enrich uranium beyond 20 percent to a weapons-grade level. Although designed to enrich uranium to at least 20 percent, according to most US and Argentine sources, Pilcaniyeu has been beset by budget cuts and operational problems and has never reached that level.³ The purpose of this facility, according to Argentine authorities, was to produce low-enriched uranium (LEU) for the nation's research reactors, for possible export, and to mix with other fuel for use in the country's nuclear power reactors.⁴ The initial uranium hexafluoride (UF⁶) feedstock for Pilcaniyeu was reportedly supplied by

¹ J.A. Sabato, "Energía Atomica en Argentina," *Estudios Internacionales*, Santiago, Chile, vol. 29 (October-December 1968).

² The Pilcaniyeu enrichment facility is described with accompanying pictures in CNEA publications, including *Nuclear Energy in Argentina*, Presidency of the Nation, CNEA, 1994; and *El Desarrollo Nuclear en la Argentina*, CNEA, 1994.

³ Some question whether Pilcaniyeu has in fact ever produced enriched uranium anywhere close to the 20 percent level. In the view of former *Nucleonics Week* correspondent Richard Kessler, Pilcaniyeu has only enriched small amounts of uranium at very low levels (author's interview with Richard Kessler, 23 April 1994, Buenos Aires). According to some US government sources, Argentina has, as part of recent cut backs in the nuclear program, permanently discarded plans to enrich up to 20 percent.

⁴ Author's interview with CNEA President Admiral Carlos Castro Madero, 12 October 1989, Montevideo, Uruguay.

China in 1981.⁵ US government authorities who have visited Pilcaniyeu on various occasions privately downgrade the quality and military potential of the facility. US authorities, however, have frequently underestimated both the quality and pace of the Argentine nuclear program.

The 1983 Pilcaniyeu announcement by CNEA President Admiral Castro Madero clearly was timed to serve certain political objectives. Argentina was still suffering from the psychological effects of the Falkland/Malvinas War, and the Pilcaniyeu achievement helped to rebuild national pride. Newly elected Radical President Raul Alfonsin was known to be less supportive of the nuclear program than the previous military leaders, and the Pilcaniyeu announcement (reported to Alfonsin privately by Castro Madero several days prior to the public release) may have had a preemptive element to it.

Whatever the potential military threat of the Pilcaniyeu facility, there is little doubt that the announcement of its existence had an important impact on policy makers in the United States and elsewhere. More than any other Argentine nuclear facility, the unsafeguarded, indigenous, gaseous diffusion enrichment facility was interpreted as evidence of military intent.

In addition to experience with enrichment technologies, Argentina also developed considerable practical experience with reprocessing technology, having successfully operated a lab-scale facility from 1969 to 1973 at Ezeiza in the Buenos Aires suburbs. Construction of a somewhat larger facility at the same location was begun in the late 1970s. The stated objective was to gain mastery over reprocessing techniques for future use, including the possible recycling of plutonium as fuel for the nation's nuclear power plants.⁶ After several delays the facility was scheduled for start-up in the early 1990s, but was abruptly curtailed in March 1990 by CNEA president Manuel Mondino. The public rationale for the reversal was the dire economic condition confronting the nation; the practical reason was the desire of newly elected President Carlos Saúl Menem to reach accommodation with the United States, Canada, Germany, and other nuclear-supplier nations. Menem, a Peronist, had received a considerable electoral mandate in his victory over Radical Party candidate Eduardo Angeloz in the presidential election of 1989. Menem moved aggressively to undertake a number of financial reforms, including opening the economy to foreign investment. Terminating the reprocessing facility, long a bone of contention with the United States, fit Menem's broader objectives of coordinating Argentine financial and diplomatic relations with Western industrialized nations.

⁵ Leonard S. Spector, *Nuclear Exports: The Challenge of Control* (Washington, DC: Carnegie Endowment for International Peace, April, 1990), 5.

⁶ Author's interview with CNEA president Carlos Castro Madero, 12 October 1989, Montevideo, Uruguay.



Figure 1: Nuclear Program Facilities in Argentina

The decision on reprocessing also fit well with Argentina's evolving nuclear relationship with Brazil. While Brazil had previously developed a small lab-scale reprocessing facility, its plans for a larger German-supplied reprocessing unit had been postponed. Moreover, preparations were well underway in the foreign ministries of both nations for two head-of-state meetings (in July and November 1990), which were to achieve historic nuclear cooperation agreements. Had Argentina persisted in completing its reprocessing facility, the Brazilian leadership would have been pressured to follow suit, and the delicate nuclear relationship could have been adversely affected.

Argentina has two operating nuclear power plants. Atucha I, situated near Buenos Aires and commissioned in 1974, is a 364 megawatt electric (MWe) facility supplied by West Germany. The nation's second nuclear power plant, Embalse, is a 600 MWe unit supplied by Canada and located in Cordoba. It began operation in 1983. A 692 MWe German-designed facility, Atucha II, is situated adjacent to Buenos Aires Province and scheduled for completion in 1996.⁷ All of Argentina's nuclear power plants use natural uranium as fuel and heavy-water as a moderator and coolant. Argentina constructed a small experimental heavy-water plant adjacent to the Atucha I nuclear power plant, and a larger Swiss-supplied industrial-scale facility at Arroyito in the interior province of Neuquen. The Arroyito facility was opened by President Menem on 20 April 1993, and produced a small amount of heavy-water in 1994. Its planned capacity is 250 metric tons (mt) per year, which is considerably below the requirements of the Embalse nuclear power unit or Atucha II, when it comes on line.

Argentina's attempt to acquire heavy-water technology created certain frictions with the United States during the Carter administration. After protracted negotiations with Canada and West Germany, Argentina announced in October 1979 its decision to award its third power reactor (Atucha II) to West Germany, and an accompanying heavy-water production facility to a Swiss company. While a number of factors contributed to the selection of Germany over Canada, a principal factor was Canadian (and US) insistence on Argentine acceptance of full-scope safeguards. German officials had reportedly led US and Canadian officials to believe they would require full-scope safeguards, thus mitigating Argentine leverage to exploit competition among suppliers. Rather late in the negotiations, the Germans declared that full-scope safeguards would be required only on a package arrangement (reactor plus heavy-water unit), but not on the reactor alone. Argentine authorities correctly read the signals, split the order, and avoided full-scope safeguards.⁸

⁷ *Nuclear Energy in Argentina.*

⁸ Following the Argentine decision, Carter administration officials pressured the Germans and the Swiss to require very tight IAEA safeguards on the arrangement and, in 1980, held up shipment of US-supplied low-enriched uranium for Argentine research reactors. When Germany gave indications of bowing to US pressure, Argentina reacted by sending a high-level CNEA delegation to the Soviet Union to explore the possibility of Soviet supply of low-enriched uranium, and by reopening discussions with Canada regarding the supply of its next nuclear power plant order. Confronted by the Soviet move into Afghanistan and Argentine grain sales to the U.S.S.R., the Carter administration approved shipment of low-enriched uranium to Argentina in June 1980, despite the

Argentina's acquisition of heavy-water technology was important not only because it gave that country access to a key component of the nuclear fuel cycle (with military implications) but also due to the impact of the entire experience on German nuclear export policy, particularly related to Argentina and Brazil. The US-German friction over the heavy-water nuclear power plant order, augmented by earlier disagreements over a 1975 German nuclear contract with Brazil (discussed below), helped pave the way for a gradual change in German policy. As the principal supplier of advanced nuclear equipment to both Argentina and Brazil, Germany was well-positioned to influence nuclear policy in both nations. In the 1980s German nuclear policy evolved from a position of exploiting commercial advantage at the expense of non-proliferation objectives, to that of firmly advocating non-proliferation goals (culminating in a 1990 decision to require full-scope safeguards on all nuclear relationships by 1995). This was an important contributing factor to the decisions by both Argentina and Brazil to change their nuclear policies.

Brazil

Brazil's early involvement with nuclear energy, like that of Argentina, began on a low note in the early 1950s. In 1951, partly in response to the publicity surrounding the Argentine/Richter fiasco, Brazil created a nuclear research program under its National Research Council (CNPQ). In 1953 a Brazilian naval admiral acting under the authority of the National Research Council was sent to West Germany to purchase surreptitiously several ultracentrifuges developed by Nazi scientists.⁹ The operation was discovered by British occupation officials and, with the assistance of US authorities, delivery of the equipment was delayed for many years. Eventually the centrifuges were sent; they currently reside unused in an institute in Sao Paulo. The event, however, was a harbinger of later Brazilian interest in, and development of, gas centrifuge technology. In 1955 the United States and Brazil signed an Atoms for Peace agreement for nuclear cooperation, and in the following year President Kubitschek created the National Atomic Energy Commission (CNEN).

In contrast to Argentina, Brazil's nuclear effort has been divided between a civilian-led program under IAEA safeguards, and an indigenous unsafeguarded "parallel" program dominated by the military. The former includes a 624 MWe Westinghouse light-water nuclear power plant (Angra I), purchased from the United States in 1971,

fact that a 10 March 1980 deadline mandated by the Nuclear Non-Proliferation Act of 1978 had passed. However, reflecting the deep divisions in the Carter administration regarding Argentina, the US government prohibited a US firm from obtaining a contract for nuclear services a few months later. (The contract was subsequently awarded to a German firm in August 1980.) Argentine authorities subsequently contracted with the Soviet Union for heavy-water (supplementing heavy-water obtained without safeguards from China) for its nuclear power facilities, until its Swiss-supplied unit became functional. These, and other instances, illustrate how Argentine authorities adroitly managed to take advantage of commercial rivalries and variations in non-proliferation policies among the major suppliers to gain independent access to advanced nuclear technology.

⁹ Juan E. Guglielmelli, "Argentina, Brasil y la Bomba Atomica," *Estrategia*, Buenos Aires (September-October, 1974).

which commenced commercial operation in 1984. As part of the civil nuclear program, Brazil also signed a massive commercial agreement with West Germany on 27 June 1975, whereby Brazil agreed to purchase two 1300 MWe light-water reactors, with an option for six more units. As part of the arrangement, West Germany agreed to supply Brazil with a complete nuclear package of fuel fabrication, reprocessing, and a “nozzle” type enrichment facility. This represented the first sale of the complete nuclear fuel cycle, and one of the largest transfers of nuclear technology to a developing nation. While the arrangement incorporated more extensive IAEA safeguards than any previous commercial arrangement,¹⁰ the principal conclusion of most experts at the time was that Brazil would be free to develop its own indigenous equipment and material as a result of knowledge gained from the agreement.¹¹ The arrangement also included a replication clause, which stipulated that for a period of twenty years a facility built in Brazil and using physical or chemical processes similar to those supplied by Germany would be subject to IAEA safeguards. Most experts considered this clause as unworkable in practice.

The Brazilian government's rationale for the purchase emphasized that nuclear power was necessary to meet the anticipated national demands for electricity. The effects of the oil crisis, which had begun in 1974, were threatening to derail the Brazilian economic boom, and a significant investment in nuclear power could help assure that the nation's projected energy needs could be met. The acquisition of enrichment and reprocessing technology was also viewed as providing a psychological and tangible boost to Brazil in its nuclear rivalry with Argentina. Finally, the Brazilian leadership envisioned the entire project as affirming Brazil's promised role as a great power on the global stage.

The 1975 agreement contributed to the initiation of a number of controversial non-proliferation initiatives by the Carter administration; it also exacerbated a schism between the Brazilian scientific community and the government. Most of the scientific community had opposed the government's earlier decision to purchase a light-water power reactor fueled by slightly enriched uranium, preferring instead heavy-water technology, as adopted by Argentina and India. The scientific community was even more outspoken in its criticism of the 1975 Brazilian-German arrangement, which it viewed as locking the nation into long-term dependency on foreign suppliers, rather than

¹⁰ This included a Brazilian commitment not to use any nuclear equipment, installations, or materials, including relevant technical information, for production of nuclear weapons or nuclear explosives; to re-export equipment, installations or materials, including relevant technical information, only to those nations that are covered by IAEA safeguards; to continue safeguards beyond the fifteen-year lifetime of the German-Brazilian agreement; to guarantee the physical security of all (imported) facilities and materials. (Letter from Dr. Niels Hansen, Chargé d'Affairs, Embassy of the Federal Republic of Germany to the United States, *New York Times*, 7 July 1975.)

¹¹ Norman Gall, “Atoms for Brazil, Dangers for All,” *Foreign Policy*, no. 23 (Summer 1976), 155-201; David J. Myers, “Brazil's Reluctant Pursuit of the Nuclear Option,” *Orbis*, vol. 27, no. 4 (Winter 1984); Leonard S. Spector, *Nuclear Proliferation Today* (New York: Vantage Books, 1984), 235-269.

encouraging a self-sufficient nuclear program.¹² The split between the scientific community and the Brazilian government represents another sharp distinction between the Argentine and Brazilian nuclear programs. In Brazil much of the scientific establishment remained estranged from the nuclear program, whereas the Argentine nuclear program generally enjoyed the support of scientists and most other elements of society.

The amount of advanced nuclear technology actually transferred to Brazil's civilian-led nuclear program as a result of the 1975 agreement is, on the surface, unimpressive. The first German power plant (Angra II) is scheduled for completion in December 1998, following excessive delays and huge cost overruns. Angra III is in limbo, with only a small amount of the construction completed, and a highly uncertain future.¹³ No additional nuclear power plants are expected to be ordered until well into the next century, if at all. The pilot-scale reprocessing plant was canceled, and only the initial stage of the unproven jet-nozzle enrichment facility located near Rio de Janeiro was completed. Moreover, while the German-Brazilian nuclear cooperation agreement was renewed in 1990 for five years, its continuation beyond 1995 is opposed by some groups in Brazil.

There is, however, some evidence that Brazil's "parallel" effort—the semi-surreptitious second track of the nuclear program—benefitted significantly from foreign technology (principally German). The program was initiated in the late seventies during the administration of General Ernesto Geisel (1974-78), and reached full flower under the leadership of General Joao Baptista Figueiredo (1978-85). The program was "coordinated" by CNEN President Rex Nazareth Alves, who was closely associated with the military and General Figueiredo. Nazareth Alves reportedly administered a series of secret CNEN bank accounts used to funnel money into the parallel program and, it was charged, to purchase foreign (principally German) technology.¹⁴ "Dr. Rex" (as he is known among his admiring CNEN colleagues) emphasized many years later that the parallel program was consistently portrayed unfairly abroad, particularly in the United States. According to him, the true purpose of the program was to fully explore all energy options at a time when the nation confronted a series of difficult circumstances. The focus of the parallel program, he maintained, was very broad, but the nuclear element

¹² That differences still exist between the government and the scientific community on the correct approach for the nuclear program was emphasized by a high-level CNEA official, who justified the decision for light-water technology on the basis of the financial benefits ("most electricity for the investment"); the successful experience of the United States, Great Britain, Germany and France with this technology; and the fact that Argentina, with its natural uranium technology, is still dependent on foreign sources for heavy-water. [Author's interview with Laercio Antonio Vinhas, Director of Radioprotecao e Seguranca Nuclear, CNEN, 28 April 1994, Rio de Janeiro (hereafter noted as author's interview with CNEN official Vinhas)].

¹³ *Nuclear Engineering International* (July/August 1994); *Nucleonics Week* (21 April 1994).

¹⁴ Author's interview with Rex Nazareth Alves, 29 April 1994, Rio de Janeiro (hereafter noted as author's interview with Rex Nazareth Alves).

was pursued in secret to avoid both internal criticism and externally imposed barriers to Brazil's access to advanced technology.¹⁵

According to most objective assessments, the parallel program had several dimensions. The most important was a navy-led project to produce enriched uranium via the gas centrifuge process for use in nuclear submarines. This navy program included a lab-scale gas centrifuge facility at the Institute for Energy and Nuclear Research (IPEN) at the University of Sao Paulo, which successfully enriched a small amount of uranium beginning in late 1986, an accomplishment that was publicly announced in September 1987. Following this achievement, the navy initiated development of a pilot-scale gas centrifuge facility (Aramar) in Ipero, near Sao Paulo, which is currently enriching uranium to approximately 3 – 4 percent.¹⁶ According to the former Brazilian Secretary of Science and Industry, Jose Goldemberg, the origin of the navy's gas centrifuge program can be indirectly traced to the 1975 agreement. Under pressure from the United States, the Germans substituted the unproven jet-nozzle enrichment technology for gas centrifuge technology. Taking its cue, in part, from the voracious criticism of the jet-nozzle process within the scientific community, the navy quietly initiated its own gas centrifuge special program (funded by diverting money from a rotating procurement fund designed for purchase of naval equipment).¹⁷

The navy also operated a lab-scale reprocessing facility at IPEN for several years in the mid-eighties, which separated a small amount of plutonium. According to Brazilian authorities, this facility ceased operation at approximately the same time as the Argentine Ezeiza facility (1989). The navy's plan to build a pilot reprocessing facility at the same location, to date, has not been implemented. In addition, the Brazilian army was in the early stages of work on a large graphite-moderated reactor at the time Brazilian nuclear policy shifted (1990-91). In the view of some experts, this army-led project had the most serious potential for military application.¹⁸

A final, and as yet not fully explained, element of the Brazilian parallel program is the apparent nuclear test site in the jungle of north-central Brazil (Cachimbo). Constructed in the early to mid-eighties by an element of the army on an air force base, Project Solimoes consisted of one or more deep shafts with the configuration of an underground test site. Information regarding this site first reached the Brazilian press in

¹⁵ Ibid.

¹⁶ Author's interview with CNEN official Vinhas.

¹⁷ Author's notes of Jose Goldemberg's address to Workshop on Nuclear Non-Proliferation, Institute for Science and International Security, 14 January 1994 (hereafter referred to as Goldemberg address).

¹⁸ Jose Goldemberg describes the Brazilian army program as a dedicated military program, whereas the navy and air force programs were viewed as far more ambiguous in their objectives (Goldemberg address). See also Spector, *Nuclear Ambitions*, 252. The embryonic air force laser enrichment program underway at the Aerospace Technical Center in San Jose dos Campos had made little progress at the time Brazilian nuclear policy was revised (early 1990s). The low-level research effort continues with limited funding [Foreign Broadcast Information Service (FBIS), Latin America, 25 April 1994].

1986, and was immediately denied by Brazilian authorities.¹⁹ In subsequent years, various explanations have been advanced to account for the Cachimbo shafts. Former CNEN president Rex Nazareth Alves claims the Cachimbo shaft was simply a test site for nuclear waste anticipated from the nation's nuclear power program. The secret nature of the shaft, situated on a remote military base, he explained, was necessitated by the need to avoid challenges by environmental groups.²⁰ Other explanations offered by various sources have suggested that the site was part of mineral exploration efforts, or that it was designed to test non-nuclear components of a nuclear explosive device.

Brazilian and US government authorities subsequently have confirmed that Brazil lacked sufficient material for a nuclear explosive device at the time the Cachimbo shaft was constructed or might have been utilized.²¹ In 1990, in a highly publicized visit to the site, Brazilian President Fernando Collor de Mello symbolically closed the shaft, but this failed to resolve questions regarding Cachimbo. Considerable ambiguities remain, not only regarding the dimension and depth of the shaft, but also the ultimate objective of those military elements that constructed it.²² Was Cachimbo a “Lone Ranger” effort undertaken by a rogue army group without the knowledge or sanction of the military government, or was it a part of a more coordinated program, having as its ultimate objective the detonation of an Indian-style peaceful nuclear explosion (PNE)? In the view of Jose Goldemberg, the military leadership was probably aware of the construction of the Cachimbo shaft in the mid-eighties but did not explicitly approve it. He questions just how serious an effort it was, given the apparent lack of the supporting infrastructure that normally would have accompanied preparation of a nuclear test site (telecommunications, etc). The great amount of national and international attention focused on Cachimbo, he believes, was in part due to Collor's highly symbolic action of “closing” the shaft. This action, however, was precipitated principally by Collor's concern that the military was undercutting his authority.²³

¹⁹ Spector, *Nuclear Ambitions*, 245.

²⁰ Author's interview with Rex Nazareth Alves.

²¹ Author's interview with CNEN official Vinhas; author's interview with US government official, 26 April 1994, Brasilia; Goldemberg address.

²² US government officials continue to view the Cachimbo incident as highly sensitive, and are reluctant to discuss the issue in any depth. This has the effect of lending some credibility to Brazilian journalistic accounts providing explicit, if sensational, information about the Brazilian nuclear weapons program. See, for example, Tania Malheiros, *Brasil a Bomba Oculta, O Programa Nuclear Brasileiro* (Rio de Janeiro: Gryphus, 1993), particularly pages 111-119; “Una Verba Atomica”, *Veja* (14 August 1994).

²³ Goldemberg address. In the view of Rex Nazareth Alves, the Collor action was political grandstanding, as the president was fully aware it was not a nuclear test site. (Author's interview with Rex Nazareth Alves.) Of interest, however, was the admission by the former CNEN president (who succeeded Nazareth Alves during the Collor administration), Jose Luiz de Santana Carvalho, that Cachimbo was undoubtedly a nuclear test site, and that Argentina had constructed a similar test site. (Author's interview with Jose Luiz de Santana Carvalho, Brasilia, 2 April 1992.) Argentine nuclear energy commission and foreign ministry sources have consistently denied the existence in Argentina of a nuclear test site, or any shaft similar to Cachimbo.

In 1988, prior to Collor assuming office, the rejuvenated Brazilian congress adopted a new constitution which incorporated a specific clause limiting nuclear activities to peaceful purposes and requiring express congressional approval.²⁴ Stimulated by increasing revelations regarding the parallel program (especially the secret funding), the Brazilian congress began a long process of opening the nuclear program to public scrutiny and gaining a voice in national nuclear policy.

At approximately the same time (August 1988), President Sarney and his military allies restructured the nuclear program by transferring the sensitive technology and facilities received from Germany to the authority of CNEN. Previously, this authority had been exercised by the state-owned companies of NUCLEBRAS and NUCLEN (owned 75 percent by NUCLEBRAS and 25 percent by a German consortium, KWU), which had the responsibility of overseeing the transfer of nuclear know-how to Brazil.²⁵ Because the CNEN had worked closely with the Brazilian military leadership in nurturing the unsafeguarded parallel program, the restructuring decision deepened the concerns of some that sensitive German technology was being transferred into the parallel program, despite the non-replication clause of the 1975 agreement.

In 1987 a West German intelligence service report provided detailed information on the parallel program, which helped to precipitate a West German parliamentary investigation. In a 1987 report that received significant publicity in both Brazil and Germany, the parliamentary group concluded that there had been significant leakage from the safeguarded program to the unsafeguarded parallel program. Of particular concern was the possibility that the German-supplied equipment and plans for the Resende nozzle enrichment unit were being used in the unsafeguarded gas centrifuge Ipero facility, whose successful operation was subsequently announced by President Sarney in September 1987. As Leonard Spector has noted, while the two enrichment techniques are quite different, both plants use uranium hexafluoride (UF⁶) gas in the enrichment cascades, and operational experience gained at the safeguarded facility would be of considerable benefit in operating the unsafeguarded facility. Subsequent reports by the German government confirmed its earlier concerns that Brazilian authorities were using equipment and information intended for Resende in the Ipero facility. Rex Nazareth Alves, however, denied that a transfer of material or equipment between the two programs had occurred and noted specifically that the German transfer of nozzle enrichment technology for Resende did not involve UF⁶. Jose Goldemberg indicated that his investigations of the parallel program, conducted in 1990 at the request of President Collor, revealed little evidence of transfer of foreign technology.²⁶

²⁴ For the relevant text of the revision of the Brazilian constitution, see FBIS, *Nuclear Developments*, 28 April 1988.

²⁵ Ivano Humbert Marchosi, CNEN, "Brazilian Nuclear Development Program," paper presented to the American Nuclear Society, Executive Conference, Pan American Technical Exchange, 8-11 April 1979, Hollywood, Florida.

²⁶ Spector, *Nuclear Ambitions*, 253-259; author's interview with Rex Nazareth Alves; Goldemberg address.

In 1990 an internal report prepared by the so-called “Pronen Commission” recommended the continuation and deepening of the parallel nuclear program then underway at the various military facilities. President Collor received the report but refused to approve what would have amounted to a long-term and costly nuclear development program for the nation.²⁷ In early 1991 a commission of the Brazilian congress released a significant report that strongly criticized the prevailing secrecy of the parallel program and urged that it be decentralized and opened to civilian control with congressional oversight.

In the meantime, President Collor had appointed a talented group of civilians to the CNEN, with instructions to reform from within, or “democratize,” the agency, and to gain administrative control of the parallel military program. In an interview in mid-1992, CNEN president Jose Luiz de Santana Carvalho optimistically described various initiatives then underway to “demilitarize the CNEN” and instill civilian control over the parallel program. He noted that the CNEN planned to gain budgetary authority over the parallel program and would eventually end the military's practice of submitting its own, often imprecise, budget requests to congress. In order to further encourage congressional oversight of national nuclear activities, the administration was proposing creation of a joint congressional committee (analogous to the former Joint Committee on Atomic Energy of the US Congress). In addition, newly appointed CNEN officials responsible to the president were said to be directly involved with many elements of the parallel program, and it was expected that the agency would have complete control within two years. The CNEN president also noted, however, that the parallel program was not being terminated but rather reoriented. The important point, he emphasized, was that all national nuclear facilities were now being monitored by CNEN's own national safeguard system.²⁸

In a similar fashion, the director of CNEN's national safeguard program, Dr. Anselmo Paschoa, also emphasized that all “44 national nuclear facilities” were now being fully monitored, and that his officials had full access to all facilities. He noted that his program had spent over a year conducting investigations to determine the initial inventory, and was convinced that they had accounted for all significant quantities of nuclear material. Some unaccounted nuclear material, located at one of the military installations, was described as “an honest error.”²⁹

In the ensuing two years following the assumption of office by Interim-President Itamar Franco on 29 December 1992, transformation of the parallel program continued.

²⁷ *Nucleonics Week* (28 November 1991).

²⁸ The parallel program was described as being “3/4 under CNEN's control.” The army's 25 MWe graphite reactor project was described as canceled, but other programs, including the navy's Aramar enrichment program, would continue. (Author's interview with Jose Luiz de Santana Carvalho, Brasilia, 2 April 1992.)

²⁹ Author's interview with CNEN official Dr. Anselmo Paschoa, 1 April 1992, Rio de Janeiro.

Some of the reformers brought in by former President Collor have left government service (Goldemberg, Paschoa, Carvalho), and some work continues on development of sensitive technologies.³⁰ With the election of Fernando Henrique Cardoso in October 1994, the changes in the nuclear program initiated during the Collor administration appear to have been consolidated. Moreover, military resistance has been generally coopted through the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC), discussed more fully below.

Background: Nuclear Confidence-building in the Southern Cone

Nuclear stability in the Southern Cone is an important end-product of a long and complex Argentine-Brazilian relationship. As traditional rivals, the two countries' development of nuclear programs in the 1960s did contribute to suspicions and, in time, could have resulted in military competition and conflict. There were, however, countervailing elements in their relationship that encouraged mutual restraint, policy coordination, and eventually, significant nuclear cooperation.

History of Argentine-Brazilian Relations

Competition and rivalry, rather than direct military conflict, traditionally have defined the Argentine-Brazilian relationship. In the past, the focus of the rivalry and competition has been the buffer areas that form the present-day countries of Uruguay, Paraguay, and southern Bolivia. Other contentious issues have included basic boundary disputes, hydro-electric and water conflicts on the Rio de la Plata, competition for export markets and political influence throughout South America, and overlapping boundary claims in Antarctica. Geopolitical frames of reference have affected military thinking in both nations as well. While antagonism and distrust have characterized the relationship, Argentine-Brazilian rivalry also has been relatively muted, low key, and non-ideological.

The principal territorial dispute between Argentina and Brazil has its roots in the region's colonial past. Argentina was originally part of the Spanish Vice-Royalty of La Plata, but separated from the mother country in 1810. Brazil achieved independence from Portugal in 1822. The most significant military conflict between the two nations occurred from 1825 to 1828 in the buffer area of present-day Uruguay. The final settlement brokered by Great Britain resulted in the creation of Uruguay, jointly guaranteed by Argentina and Brazil.³¹

³⁰ Brazil reportedly was considering building a new industrial-scale gas centrifuge facility near Rio de Janeiro to supply enriched uranium for the Angra I and II power reactors. The facility, if built, will use indigenously-produced centrifuges of the sort now operating at the navy's Ipero plant, and will not be operated by the military. [*Nuclear Fuel* (26 September 1994)]. At the time of this writing (mid-1995), however, these plans appear to be on hold.

³¹ Hubert Herring, *A History of Latin America* (New York: Alfred A. Knopf, 1961), 626-627.

The conflict over the Uruguayan territory was a catalyst for domestic turmoil and political change in both countries. In Argentina, the Caudillo leader Juan Manuel de Rosas assumed control in 1829 and, over the next twenty-five years, established the centralized foundation of the Argentine nation in Buenos Aires.³² During the same period, Brazil was concentrating on resolving internal revolts in its southern provinces (areas composed of modern-day Paraguay and southern Bolivia). In 1852 Brazil, in an effort to regain some of its lost Uruguayan territory, allied with elements in Uruguay and Paraguay and with provincial Argentine forces led by Jose de Urquiza and defeated the Argentine leader Rosas.³³ Seven years later, Argentina and Brazil resolved some of their territorial differences with a treaty awarding additional portions of Uruguay to Brazil.

Argentina and Brazil were again engaged in conflict in the War of the Triple Alliance from 1864 to 1870. In this tragic conflict, however, the two nations allied with Uruguay to defeat Paraguay, which suffered a significant loss in population and territory. Continued Argentine-Brazilian border clashes in the Misiones region (which includes Iguazú Falls) led to an 1895 arbitration by US President Grover Cleveland in Brazil's favor.

In subsequent decades the two countries repeatedly found themselves on opposite sides. In World War I, Brazil became the only South American nation to enter the conflict against Germany, whereas Argentina, under the leadership of the Radical Party, remained neutral. In the bloody Chaco War (1932-35) between Paraguay and Bolivia, Argentina and Brazil were on opposite sides (Argentina backing Paraguay; Brazil and Chile supporting Bolivia). During World War II, Brazil, under the leadership of Gettulo Vargas, became closely linked to the United States and the United Kingdom by declaring war against Germany and committing troops to the Allied cause. The Brazilian "hump" became a principal US military staging area for the African campaign. Argentina, then led by Juan Peron, remained neutral throughout the war, although there was much pro-Nazi sentiment within the Argentine military.

Argentine-Brazilian competition is often viewed as a continuation of the historic Spanish-Portuguese competition in the Americas. As leader of the Spanish-speaking Latin American countries, Argentina focused its foreign policy on containing the expansion of the Portuguese-speaking Brazilians. According to this interpretation, Portugal's colonial alliance with Great Britain (which contributed to Portuguese success in the Americas) had its later analog in the close Brazilian-US relationship.³⁴ Brazil's

³² Herring, 736-737.

³³ Benjamin Keen and Mark Wasserman, *A History of Latin America*, third ed. (Boston: Houghton Mifflin Co., 1988), 192.

³⁴ Jack Child, *Geopolitics and Conflict in South America* (Stanford: Praeger Special Studies, 1985), 98-99.

skillful expansion of its southern and Western borders and close World War II coordination with the United States enhanced Argentine concern.

Considering their shared historical legacy, the development of nuclear programs in the 1960s might have been expected to exacerbate traditional Argentine-Brazilian rivalry and distrust. This was not the case, however, as is illustrated in the following analysis of the origin and negotiation of the Latin American nuclear-weapon-free zone agreement.

Argentina, Brazil, and the Negotiation of the Tlatelolco Treaty

In 1961, one year prior to the Cuban Missile Crisis, only two Latin American nations, Brazil and Cuba, supported a UN General Assembly resolution calling for the creation of an African nuclear weapon-free zone. All other Latin American nations joined the United States in opposing, or abstained on, the resolution, which nonetheless was supported by the majority of UN membership. Brazil's support of the African initiative was an early affirmation of a more independent foreign policy. Under the leadership of President Joao Goulart (who assumed office after Janio Quadros resigned in August 1961), Brazil began to move away from its traditional close identification with US foreign policy. In September 1962 Brazil proposed the creation of a Latin American nuclear weapon-free zone, and the following November was joined by Bolivia, Chile, and Ecuador in the introduction of a draft resolution for this purpose before the UN General Assembly. In April 1963 the Presidents of Brazil, Mexico, Chile, Bolivia, and Ecuador proposed that formal negotiations begin among the Latin American nations. In November 1963 the UN General Assembly overwhelmingly supported the Latin American nuclear weapon-free zone proposal. Negotiations commenced in Mexico City and resulted three years later in the signing of the Treaty of Tlatelolco.³⁵

Argentina did not initially support the Brazilian initiative and only reluctantly joined its Latin American colleagues at the United Nations in supporting the nuclear weapon-free zone proposal. During the UN General Assembly discussions, the Argentine representative strongly cautioned that a nuclear weapon-free zone could freeze Latin American states into a permanent state of nuclear inferiority.³⁶ Argentina at that time had the region's most advanced nuclear program and was developing plans for full, independent mastery of the nuclear fuel cycle. The Latin American nuclear weapon-free zone was viewed with suspicion because Argentine officials felt that the initiative could interfere with the development of an indigenous nuclear option.

³⁵ The principal documentation of the Tlatelolco Treaty negotiations may be found in Alfonso Garcia Robles, *El Tratado de Tlatelolco*, Guanajuato, El Colegio de Mexico, 1967.

³⁶ UN General Assembly, *Official Records*, 1335th Meeting, 13 November 1963, 122.

Brazil's support of a Latin American nuclear weapon-free zone proved short-lived, however. In April 1964 General Castelo Branco overthrew President Goulart in a military coup, and those elements favoring a more traditional style of Brazilian foreign policy regained control of the government. The new military leadership moved quickly to distance itself from certain features of the previous "independent" foreign policy and hardened the Brazilian position with respect to the ongoing Tlatelolco negotiations.³⁷ A position of non-alignment and support for the nuclear weapon-free zone, it was felt, would compromise Brazil's ability to develop into a great world power.

Brazil's foreign policy shift resulted in a shared posture with Argentina on many points during the Mexico-based negotiations between 1964 and 1967. Coordination of nuclear issues deepened with the August 1966 coup in Argentina, in which General Juan Carlos Onganía ousted President Illia, and following the election of Marshall Costa E. Silva by a purged and subservient Brazilian congress in October 1966. As the Tlatelolco negotiations neared completion, Argentina and Brazil were increasingly at odds with the majority of Latin American nations on such issues as peaceful nuclear explosions, the transportation of nuclear explosive devices through the zone by the nuclear weapon states, the entry-into-force process, and treaty reservations.

The PNE issue was particularly difficult, as both Argentina and Brazil were fully committed to retaining their complete freedom to develop nuclear technology in the future. Following the election of Costa E. Silva, PNEs became almost an article of faith in Brazilian domestic politics. The United States, Great Britain, and the Soviet Union communicated to the Latin American negotiators that PNEs could not be permitted under the nuclear weapon-free zone treaty. The result was a treaty that the Latin American parties interpreted differently regarding the legality of PNEs. Argentina and Brazil shared the view that the Tlatelolco Treaty permitted parties to carry out nuclear explosions for peaceful purposes, including devices similar to nuclear weapons. Mexico and the majority of other Latin nations interpreted Tlatelolco as prohibiting PNEs until it became possible to distinguish between peaceful and warlike nuclear explosive devices. Argentina and Brazil maintained their advocacy of PNEs until 1990, at which point they jointly declared their support of a ban on all nuclear testing.³⁸

³⁷ The independent foreign policy is better understood as a position between neutralism and the Cold War combatants rather than full non-alignment. From 1961 to 1964, it manifested itself through Brazil's reluctance to take strong anti-Castro action, lack of enthusiasm for inter-American cooperation, and support for the nuclear weapon-free zone. Following the 1964 military coup, the Brazilian leadership sought to return to its more traditional foreign policy approach of measured, careful expansion of influence in Latin America, and close cooperation with the United States. See E. Bradford Burns, "Tradition and Variation in Brazilian Foreign Policy," *Journal of Inter-American Studies* (April 1967).

³⁸ The 1990 shift in the Argentine and Brazilian postures toward PNEs was not included in the proposed amendments to the Tlatelolco Treaty. Thus far, neither country has explicitly reversed previously-stated positions that PNEs are legal under the Tlatelolco Treaty. For all practical purposes, however, the issue is moot, and both nations currently support a comprehensive test ban agreement and have rejected PNEs as part of their 1991 bilateral nuclear agreement.

The two countries were also at odds with the majority of Latin American nations on other issues. Argentina and Brazil argued for a complete prohibition on the transportation of nuclear weapons through the zone by nuclear weapon states. The majority of the Latin American states, in response to US and British pressure, prevailed with the view that the decision should be left to each state in the free exercise of its sovereignty.³⁹ Argentina and Brazil also supported a very strict entry-into-force formula that required ratification by all Latin American states, completion of formal guarantees by nuclear weapon states and by those having territorial interests in the Americas, and conclusion of bilateral safeguard agreements with the IAEA. Had the Argentine-Brazilian formula prevailed, the Tlatelolco Treaty would have been dead on arrival. Instead, the Mexican delegate, Alfonso Garcia Robles, engineered a compromise (advanced earlier by Chile), whereby states could waive the aforementioned provisions and allow the treaty to enter into force for their territory.⁴⁰

Argentina and Brazil also found common cause over another contentious Tlatelolco issue: treaty “reservations.” Under Article 29, the Tlatelolco Treaty can be amended when approved by two-thirds of the Contracting Parties present and voting. Reservations, by which a nation might alter the intent of the treaty when ratifying, are prohibited by the Latin American parties (Article 27) and by the nuclear weapon states (which are required to ratify an additional protocol). In order to assure the adherence of the nuclear weapon states, it was ultimately agreed, over Argentine and Brazilian objections, that such states could include “interpretive statements” accompanying their protocol ratification.⁴¹ The net result of permitting interpretive declarations was to inject an informal mechanism for reservations by the nuclear weapon states. Ultimately, the United States, Great Britain, and France all used this procedure to advance their interpretation on such controversial issues as PNEs and the transportation of nuclear weapons through the zones.

As a result of the compromises achieved on these issues, the Latin American nations were successful in completing negotiations for the nuclear weapon-free zone treaty on 14 February 1967. Argentina and Brazil nonetheless concluded that the resulting treaty was potentially prejudicial to their interests and chose not to become

³⁹ COPREDAL was the Preparatory Commission for the Denuclearization of Latin America, the body that negotiated the Tlatelolco Treaty in Mexico City between 1964 and 1967. See COPREDAL/76, 14 February 1967, 8.

⁴⁰ The Chilean proposal can be found in COPREDAL/OAT/3, August 7, 1966, 7. The resulting treaty provision is Article 28, Paragraph 2.

⁴¹ Brazil and Argentina sought to prevent the basic tenets of the treaty from being altered in a manner that might be prejudicial to their interests. To this end Brazil, in particular, sought to promote the special status of “signatory states” (defined as those that had ratified Tlatelolco without waiving the provisions of Article 28, Paragraph 1). Brazil attempted to allow signatory states to have a co-equal role with Contracting Parties (i.e., those states for which the treaty is in force) in the amendment process. (COPREDAL/GT. 1/Rev, February 6, 1967, 14). This was resisted by the majority of Latin American nations, with the result being a provision (Article 6) allowing for a meeting of all the signatories to consider questions that could affect the treaty, including possible amendments. Thus, a signatory state (such as Brazil or Chile) had a mechanism to advise on amendments, but the decision was the responsibility of the Contracting Parties.

Contracting Parties for over twenty-five years. The Tlatelolco negotiating process, however, had a subtle but important impact on Argentine-Brazilian relations in the nuclear policy area. For the first time, two suspicious rivals discussed fully and frankly the most sensitive issues of nuclear policy and reached common positions. In doing so, Argentina and Brazil were opposing the view of the majority of other Latin American nations, which they perceived as susceptible to pressure by the nuclear weapon states.

The then on-going NPT negotiations also contributed to Argentine-Brazilian nuclear policy coordination. Between late 1966 and early 1967, the basic outline of the joint US-Soviet draft of the NPT was clear, and Brazil and Argentina decided to reject the agreement, which they perceived as unequal and discriminatory. Consequently, the two Latin American nations also sought to assure that objectionable features imposed on the NPT by the nuclear weapon states were not in the Tlatelolco Treaty.⁴² The coordination of nuclear policy by Argentina and Brazil relative to the NPT and during the Tlatelolco negotiations was a first substantive step in a lengthy nuclear confidence-building process.

Nuclear Confidence and Cooperation (1964-89)

In the period following the conclusion of the Tlatelolco Treaty and the NPT (1967-74), Argentine and Brazilian nuclear policies continued to converge into a common front against what was viewed as an imposed nuclear order. In particular, there was growing resentment in both nations against nuclear supplier cooperation among the advanced nations to restrict nuclear exports.⁴³ Such efforts were viewed as direct threats to their independence and their development objectives.

In 1975 relations between the United States and Brazil began to deteriorate as a result of the strong US opposition to the German-Brazilian nuclear arrangement, discussed above. The US-Brazilian relationship already had become somewhat strained in the early 1970s due to Costa e Silva's assertive nuclear policy. Following a direct initiative by President Jimmy Carter to prevent the transfer of German reprocessing and enrichment technology (by sending Vice President Walter Mondale to West Germany in January 1977), the US-Brazilian relationship worsened considerably.

The US-Brazilian split over nuclear issues encouraged enhanced Argentine-Brazilian nuclear cooperation. While suspicion and competition remained a major feature of their relationship (particularly as regards water and energy rights in the Rio de

⁴² For example, the failure of the NPT to explicitly permit detonation of PNEs or to provide security guarantees to non-nuclear weapon states was viewed as an important weakness by Argentina and Brazil, thus accounting for their strong support of Tlatelolco Treaty Article 18 ("explosions for peaceful purposes") and for their insistence on binding protocols of support by the nuclear weapon states.

⁴³ The meetings in London of nuclear supplier nations, convened in secret by US Secretary of State Kissinger, were particularly offensive to Argentine and Brazilian sensitivities. The meetings began in 1974, and agreement on export guidelines was reached in September 1977.

la Plata area), there was nonetheless strong Argentine support of the Brazilian right to acquire advanced nuclear technology. In January 1977, shortly after the Mondale discussions in Germany, the Argentine and Brazilian foreign ministries issued a joint communique stressing the importance of nuclear policy cooperation and the initiation of systematic technological exchanges between the two countries' respective nuclear energy commissions.⁴⁴

These technical exchanges between the CNEA and CNEN were to prove central to the nuclear rapprochement process between Argentina and Brazil. The nuclear energy commission officials began to develop personal linkages and familiarity with their counterparts over a period of years. These exchanges and contacts, in turn, helped to pave the way for later development of the joint Argentine-Brazilian Accounting and Control System (SCCC) and the administrative machinery (ABACC).⁴⁵

By the late 1970s, Argentina was also engaged in an increasingly bitter dispute with the United States over Washington's objection to Argentine purchase of its third power reactor and a heavy-water production facility without accepting full-scope safeguards. Argentina's earlier support of Brazil over the 1975 German arrangement was reciprocated, resulting in enhanced coordination of nuclear policy.

In 1979 the two nations took a highly significant initiative by signing a treaty establishing a framework for managing their energy and water disputes in the Rio de la Plata area. This step removed the most contentious obstacle to improved bilateral relations and helped stimulate the beginning of regional economic cooperation and integration. The following year, the two nations signed a number of bilateral agreements, including a small, but symbolically important, agreement for nuclear fuel cycle cooperation. Under the agreement, Argentina provided Brazil uranium concentrate and zirconium used for fabrication of nuclear reactor fuel elements, and a Brazilian-German company (based in Brazil) assumed responsibility for construction of a major portion of the pressure vessel for the third Argentine power reactor vessel.

In the early to mid-1980s, both Latin American nations returned to civilian leadership, a development that accelerated and deepened their nuclear relationship. The return of civilian rule also helped to redirect the relationship from confrontation to eventual accommodation with the non-proliferation regime. In Argentina, the return to democracy was precipitated, in part, by the 1982 Falkland/Malvinas War, which

⁴⁴ Embaixada do Brazil (Embassy of Brazil), *Boletim Especial* (17 January 1977).

⁴⁵ Interviews by the author of Argentine and Brazilian officials suggest that the concept of the SCCC and ABACC developed initially from officials within the nuclear energy commissions and grew out of the work of a joint standing committee on nuclear policy established in the mid-1980s (see notes 51, 52).

discredited the military government.⁴⁶ President Alfonsín assumed office on 10 December 1983, and moved quickly to initiate discussions on nuclear issues with the incoming civilian administration in Brazil. As Alfonsín was assuming office, the Argentine nuclear energy commission, under the leadership of Admiral Carlos Castro Madero, announced the development of a gaseous diffusion enrichment facility. While the announcement came as a surprise to many nations, Argentine authorities had briefed their Brazilian counterparts in advance, thus enhancing the level of mutual confidence.

The timing and manner of the announcement of the enrichment plant suggest several possible motives. One informed observer believes that CNEA President Castro Madero wished to exert pressure on incoming President Alfonsín, who had little interest in the nuclear program. By informing Alfonsín just prior to the public announcement, Castro Madero may have been seeking to obtain the President-elect's support for the nuclear program and to assure his continued tenure as CNEA president. Castro Madero, however, described the announcement as stimulated in part by a desire to boost the national morale, which had been damaged by the Malvinas War.⁴⁷

In February 1985 President Alfonsín and Brazilian President-elect Tancredo Neves met and reportedly agreed to deepen cooperation on nuclear policy and the nuclear fuel cycle, and to work toward the eventual goal of a joint nuclear inspection arrangement.⁴⁸ For Alfonsín, cooperation with Brazil served a number of purposes, both domestic and foreign. The new civilian government was seeking measures to distinguish itself from the previous military regime, to develop a more cooperative Argentine relationship with other Latin American nations, and to end the nation's diplomatic and economic isolation, which was a legacy of the South Atlantic war. For the Brazilian leadership, enhanced cooperation with Argentina presented an opportunity to widen export markets, to reduce commercial dependency on the United States, and to improve relations with traditionally suspicious Spanish-speaking neighbors.⁴⁹

⁴⁶ There are differing interpretations as to the impact of the Falkland War on Argentine-Brazilian relations. According to some interpretations, the conflict produced strains on the relationship due to a perception by many Brazilians that the Argentine invasion was reckless and foolhardy (Child, 103). Others note that Brazil provided Argentina with reconnaissance aircraft during the conflict and gave diplomatic support to Argentina's position at the OAS. This support, while limited, was nonetheless appreciated and encouraged further progress on nuclear cooperation. [Monica Hirst, Hector Eduardo Bucco, "Nuclear Cooperation in the Context of the Program for Argentine-Brazilian Integration and Cooperation," Paul Leventhal and Sharon Tanzer, eds., *Averting a Latin American Nuclear Arms Race* (London: Nuclear Control Institute, MacMillan, 1992)]

⁴⁷ Author's interview with Richard Kessler, 23 April 1974, Buenos Aires. Author's interview with CNEA President Castro Madero, 12 October 1989, Montevideo, Uruguay.

⁴⁸ *Nucleonics Week* (14 March 1985).

⁴⁹ Paulo S. Wrobel, "Brazil-Argentina Nuclear Relations: An Interpretation," unpublished manuscript, Argentina-Brazil Nuclear Non-Proliferation Project, University of Virginia, October 1993, 20.

Brazilian President-elect Neves died prior to assuming office, and his successor, Jose Sarney, was unable to support the proposed nuclear inspection arrangement.⁵⁰ As an appointed president, Sarney lacked a political base of support and was dependent to a considerable degree on the Brazilian military, which was disinclined to support a formal inspection arrangement at the time. Sarney nonetheless favored continuation of nuclear cooperation, and the two presidents met at Iguazú Falls in November 1985 and established a Joint Committee on Nuclear Policy. This committee, composed of the foreign ministers and high-level representatives from the nuclear energy commissions, became a source of continuous contact and discussion on nuclear policy and non-proliferation issues.⁵¹ In July 1986 Alfonsín and Sarney signed a major trade agreement committing their nations to the phased elimination of trade barriers and the creation of a Southern Cone Common Market (MERCOSUR). The nuclear component of the agreement included joint cooperation on nuclear safety in the event of an accident. A subsequent presidential meeting in December 1986 resulted in agreements for joint research on breeder reactors and for what was described as “the development of safeguard techniques in view of commitments assumed by both parties with the IAEA.”⁵²

In 1987 Brazil announced successful operation of its indigenous gas centrifuge facility at the navy facility (Aramar) near Sao Paulo. The achievement was psychologically and symbolically important to the Brazilians, as it put them on par with Argentina, which had inaugurated a gaseous diffusion facility four years earlier. As with the earlier inauguration of the Argentine unit, Brazilian authorities made sure that their Argentine colleagues were notified well in advance of the official announcement.⁵³ This advance notice, and the head-of-state meetings, prepared the way for a dramatic invitation from President Alfonsín to President Sarney to visit the unsafeguarded Pilcaniyeu gaseous diffusion facility. The visit, which took place in July 1987, was a highly significant confidence-building measure and was viewed by both nations as an important step toward making their nuclear programs mutually transparent. Sarney was accompanied by fifteen officials from the Brazilian foreign ministry and nuclear energy

⁵⁰ President Neves died on 21 April 1985. Jose Sarney succeeded him and served until 15 March 1990, at which point Fernando Collor de Mello assumed office.

⁵¹ The Joint Committee later became a permanent Standing Committee and continued to serve as a useful forum for discussion on nuclear issues. Ultimately, the Permanent Committee evolved into the Commission of ABACC, which is composed of representatives from the foreign ministries and nuclear energy commissions.

⁵² Although foreign observers failed to recognize it at the time, the two nations, in fact, were engaged in discussions directed toward the development of the Joint System for Accounting and Control of Nuclear Materials (SCCC) as well as the agreement for full-scope IAEA safeguards. The Joint or Permanent Standing Committee played an important role in this effort.

⁵³ The notification was in the form of a personal letter from President Sarney to Alfonsín. The result was that, when the official Brazilian announcement occurred in September 1987, the Argentine government gave its warm, enthusiastic congratulations in what appeared to be a well-choreographed procedure. See Paulo S. Wrobel, “Brazil, the Non-Proliferation Treaty and Latin America as a Nuclear Weapon-Free Zone,” Unpublished PhD dissertation, Kings College, University of London, August, 1991, 79.

commission. Discussions reportedly focused on the desirability of institutionalizing and regularizing the process.⁵⁴

The timing of the Argentine initiative was particularly significant because between late 1986 and early 1987 information about the alleged Brazilian nuclear test site (Cachimbo) was first coming to light. Argentine authorities apparently were not briefed on this issue, and the Brazilian government continued officially to deny the existence of the test site until 1990, when President Collor made his deliberately public visit. The important point is that, from 1986 on, Argentine authorities were well aware of Cachimbo's existence and of the particular sensitivities of the situation as it pertained to Brazilian civil-military relations. That Argentine authorities chose not to allow it to derail nuclear rapprochement is testimony to their commitment to the process.⁵⁵

The process of cooperation intensified over the coming months, surviving a change of government in Argentina. In April 1988 Sarney reciprocated by inviting Alfonsín and his advisors to the official inauguration of the Aramar gas centrifuge facility.⁵⁶ The following November, Sarney and Brazilian government officials toured the Ezeiza pilot reprocessing facility near Buenos Aires.⁵⁷ Alfonsín was succeeded as President of Argentina by the Peronist Carlos Menem in July 1989. One month later, Menem met with Sarney in Brazil and agreed on additional measures of nuclear cooperation.⁵⁸ Even more significant than the agreements themselves, Menem was clearly committed to a break with his party's nationalistic traditions, emphasizing instead continued economic and political coordination with Brazil, including nuclear cooperation.

In Brazil, the political landscape was undergoing dramatic transformation as well. Sarney's fifth and final year as president was nearing an end, and a rapidly deteriorating economy was undercutting his already weak public support. As an appointed, rather than an elected president, he was forced to rely on the military for support against an increasingly active congress. Congress had already asserted its authority in 1988 by requiring a clause in the nation's new constitution mandating that the nuclear program be limited to peaceful purposes. In response, Sarney had

⁵⁴ *Nucleonics Week* (27 August 1987, 10 September 1987).

⁵⁵ See note 23.

⁵⁶ According to some reports, Argentine nuclear energy commission officials had previously visited the Brazilian lab-scale gas centrifuge facility at IPEN at the University of Sao Paulo on the occasion of its first successful operation. See *Nucleonics Week* (23 July 1987).

⁵⁷ As noted above, both the Argentine and Brazilian reprocessing facilities were curtailed at approximately the same time the following year (1989). Argentine officials have stated to the author that the bilateral relationship dictated the timing of the decisions.

⁵⁸ The two presidents agreed to exempt from import duties equipment and materials being exchanged for the Atucha II (Argentine) and Angra II (Brazilian) nuclear power plants under construction and to accelerate joint breeder reactor research and development. [*Latin American Weekly Report* (7 September 1989); *Nucleonics Week* (12 October 1989)].

reorganized the administration of the nuclear program by removing the CNEN from the Ministry of Mines and Energy and having it report directly to the office of the presidency. Moreover, as part of the reorganization, Sarney and his military allies united the autonomous and official programs under the CNEN (i.e., executive branch) authority. In effect, this was an effort to accommodate congressional concern regarding the nuclear program without actually losing control over the program itself.

On 17 December 1989 the situation changed dramatically with the victory in a run-off election of Fernando Collor de Mello over left-of-center Lula da Silva of the Democratic Workers' Party (PT). Upon taking office on 15 March 1990, Collor moved quickly to gain control of the nuclear program by appointing individuals loyal to him and favoring openness, accountability to congress, and effective internal accounting and control procedures. Collor also restructured the Strategic Affairs Secretariat to reduce the military's influence over the nuclear program.

With the fortuitous election of two dynamic and popular presidents, both committed to economic reform, increased foreign investment, and the reduction of the military's influence, the stage was set for a significant new step in the Argentine-Brazilian relationship. Consolidation of Southern Cone economic and political cooperation was seen as mutually advantageous. Both presidents recognized that dramatic new nuclear cooperation initiatives could serve to accelerate economic and political coordination. The result was a distinctive set of new agreements creating a bilateral accounting and control system, and the integration of both nations into the nuclear non-proliferation regime.

Implementation of Latin American Non-Proliferation Verification Systems

On 29 November 1990 Presidents Menem and Collor de Mello met at the historic border area of Iguazú Falls and reached a significant agreement, in principle, on a wide range of nuclear policy and non-proliferation issues.⁵⁹ In the resulting Foz de Iguazú Declaration on the Common Nuclear Policy, the two leaders formally renounced nuclear weapons and established a framework for the implementation of a bilateral nuclear accounting and inspection arrangement and of full-scope IAEA safeguards. The presidents also agreed to adhere to the nuclear weapon-free zone agreement through amendments (advanced in concert with Chile) to the Tlatelolco Treaty. In yet another significant innovation, the long-held option of developing peaceful nuclear explosives was explicitly abandoned by both nations.

⁵⁹ The November 1990 Iguazú Falls meeting was preceded by a July 1990 meeting of the two presidents in Buenos Aires. At the Buenos Aires meeting, nuclear issues were discussed and referred to the Permanent Standing Committee, which subsequently helped prepare final proposals for the November meeting.

The Bilateral Agreement

The 1990 Foz de Iguazú Declaration on the Common Nuclear Policy was implemented at a July 1991 foreign ministers' meeting in Guadalajara, Mexico. At that meeting, the two nations agreed to create the Joint System for Accounting and Control of Nuclear Materials (SCCC) and the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC). The SCCC and ABACC commenced operation on 12 December 1991 following the ratification of the Bilateral Agreement by both nations.

ABACC's principal responsibility is to administer the SCCC in order to verify that all nuclear materials and facilities under the jurisdiction of Argentina and Brazil are not diverted to nuclear weapons or nuclear explosive devices.⁶⁰ ABACC is overseen by a Commission of four members, two designated by each government.⁶¹ The ABACC Secretariat is headquartered in downtown Rio de Janeiro and directed by a Secretary, a position that alternates annually between Argentina and Brazil. ABACC's first secretary was Carlos Feu Alvim da Silva, a former professor of physics at the Federal University of Minas Gerais and a protégée of former Minister of Science and Technology, Jose Goldemberg. ABACC's second secretary was Jorge A. Coll, former Director of International Projects and a member of the Directorate of the Argentine Nuclear Energy Commission (CNEA). In 1995 Feu Alvim da Silva became Secretary and Coll, Deputy Secretary.

The ABACC Secretariat is composed of ten professionals divided equally between the two nations: a secretary, deputy secretary, two planning and evaluation officers, two operations officers, two technical support officers, and two accounting officers.⁶² Sixty inspectors (approximately 30 from each nation) are selected from a list prepared by the Commission. Inspectors are drawn from the nuclear energy commissions and nuclear utilities of the two nations. The team for each specific inspection is selected by the ABACC Secretary and must include at least one national from the other state. In practice, nationals of Argentina inspect Brazilian facilities, and Brazilians inspect

⁶⁰ Argentina and Brazil also incorporated into their Bilateral Agreement a specific prohibition regarding the testing of nuclear explosive devices, bearing in mind that at present no technical distinction can be made between nuclear explosive devices for peaceful purposes and weapons. See Marco A. Marzo, Alfredo L. Biaggio, and Ana C. Raffo, "Nuclear Co-Operation in South America: the Brazilian-Argentina Common System of Safeguards," *IAEA Bulletin*, vol. 36, no. 3 (1994), 31. This formalization of Argentine and Brazilian adherence to a no-PNE pledge was even more significant because neither country has, as yet, reversed its earlier interpretation of the Tlatelolco Treaty as permitting PNEs.

⁶¹ The four commission members until recently have been composed of the presidents of the respective nuclear energy commissions and a high-ranking foreign ministry official responsible for nuclear policy. In late 1994, in the context of the privatization of its nuclear energy commission (CNEA), Argentina appointed Dr. Dan Jacobo Beninson to ABACC's Commission. Beninson is a long-time member of CNEA's inner leadership executive board and a respected hard-liner who reportedly was directly involved in the development of ABACC. Like former CNEA president Castro Madero, Beninson favored eventual full-scope IAEA safeguards and bilateral nuclear cooperation with Brazil as a way of preserving the vitality of the nation's nuclear program and permitting access to advanced Western nuclear technology.

⁶² Carlos Feu Alvim and Ana Claudia Raffo, "ABACC and the Exclusively Peaceful Uses of Nuclear Energy," paper presented at the Conference on Regional Approaches to Nuclear Non-Proliferation: the Latin American Case, sponsored by the Argentine-Brazilian Nuclear Non-Proliferation Project, 1 February 1995, Washington, DC.

Argentine facilities. Because of extensive previous cooperation between the Argentine and Brazilian nuclear energy commissions in the late seventies and eighties, considerable mutual confidence and rapport have developed among their respective officials. This foundation of trust has proved of significant benefit in developing the reciprocal inspection process.⁶³

The basic provisions of the Bilateral Agreement are found in Article 1, in which “The parties agree to use for exclusively pacific purposes the nuclear materials and facilities subjected to their jurisdiction and control.” The two nations also agree to refrain from the “testing, use, manufacture, production or acquisition, by any means, of any nuclear weapon; and the receipt, storage, installation, placement or any form of possession of any nuclear weapon.”⁶⁴ In conducting the inspections and other procedures stipulated for the application of the SCCC, ABACC reports any abnormalities to the Commission, which may then call upon the offending party to correct the situation. Serious evidence of non-compliance by either party enables the other to abrogate the agreement and to notify the Secretary General of the United Nations and the Secretary General of the Organization of American States (Article 19).

The Bilateral Agreement also includes an Annex, which delineates further the scope of the SCCC. Among the points of interest is Annex Article 4, which notes that nuclear material used for propulsion, such as highly-enriched uranium for nuclear submarines, may be removed from SCCC control (i.e., be excluded from ABACC inspection or verification of record-keeping) while being used for that purpose. This provision of the agreement resulted in a degree of ambiguity as to whether indigenous facilities being used to produce militarily sensitive nuclear materials (such as Brazil's Aramar gas centrifuge or Argentina's Pilcaniyeu gaseous diffusion facility) could be designated as falling outside of ABACC's responsibility at certain times. This potential loophole in the Bilateral Agreement underscored the need for a more comprehensive arrangement with the multilateral non-proliferation regime, a weakness that was later addressed through the Quadripartite Agreement with the IAEA.

At the time the Bilateral Agreement entered into force, it was recognized that the success of the SCCC and ABACC was dependent upon the effective administration of national nuclear control and accounting systems. Under the SCCC process, the national authorities provide ABACC with an initial inventory of all nuclear materials under their jurisdiction and design information on all nuclear facilities. ABACC inspectors then carry out initial design verification and inventory inspections. As a result of the *design verification* inspections, the ABACC secretariat prepares a separate facility attachment

⁶³ Author's interview with Deputy ABACC Secretary, Dr. Jorge Coll, ABACC Headquarters, Rio de Janeiro, Brazil, 28 April 1994.

⁶⁴ Accord between the Federative Republic of Brazil and the Argentine Republic for the Exclusively Pacific Uses of Nuclear Energy, FBIS, Latin America, 12 September 1991.

for each nuclear installation in both nations. The attachments define how and when ABACC inspectors are to have access to the nuclear facilities.⁶⁵ These facility attachments are submitted, through the national authorities, to operators of each facility for their concurrence. As a result of the *initial inventory* inspections, ABACC establishes a baseline against which all its subsequent measurements and accounting efforts are measures. Consequently, correct and complete design and initial inventory information providing full details on nuclear installations and on locations and amounts of nuclear material is critical to the SCCC process.

The transition from military to civilian leadership in both countries was accompanied by a broadening of responsibility and accountability for nuclear materials to include civil authorities.⁶⁶ In Argentina, the transition was accomplished around 1986 during the Alfonsín administration, as the newly-elected president moved to obtain control over the highly independent nuclear energy commission. During the subsequent Menem administration, the coordination of the national nuclear accounting and control system with the emerging ABACC system has proceeded quite smoothly. In Brazil, the process of establishing effective civilian accounting and control of nuclear materials has been considerably slower and more complex. Brazil did not achieve a full accounting of all nuclear material until about 1992, during the Collor administration when civilian authorities from the nuclear energy commission (CNEN) gained access to military (parallel program) facilities.⁶⁷ The result was a high degree of mutual confidence in both nations that national authorities had located and accounted for all nuclear material as jointly declared in their initial inventory to ABACC. What was not determined—and may never be—was the *origin* of all nuclear material imported from abroad.

Both the independence of the ABACC Secretariat and the professionalism of the inspectors could influence the long-term effectiveness of the Bilateral Agreement. The two governments exercise their oversight of ABACC through the Commission, currently comprised of representatives from the foreign ministries and nuclear energy commissions. The ABACC Secretary, whether Argentine or Brazilian, reports directly to the Commission. ABACC personnel have emphasized that, thus far, they have been able to carry out their responsibilities and have been provided with adequate resources. As governments and priorities change in the future, however, it will be important to note

⁶⁵ Facility attachments detail the accounting and control procedures for each nuclear facility, establish the frequency and type of scheduled inspection, and describe what the operator must do to maintain records, reports and measurements for ABACC inspectors (*ABACC News*, Rio de Janeiro, Brazil, January-April 1993).

⁶⁶ This is not to suggest that the military governments failed to provide for safety and security of nuclear material under their control. Such systems as did exist for accounting and control, however, were closely held military prerogatives from which civil authorities were largely excluded (particularly in Brazil).

⁶⁷ Despite having overcome military resistance to obtain access to parallel program nuclear facilities, Brazilian civil authorities strongly favored retaining a distinct national accounting and control system separate from the emerging ABACC system. Their concern was that operation of ABACC would weaken the national system by drawing off limited financial and human resources (author's interview with Dr. Anselmo Paschoa, former Director of the National Nuclear Safeguards Program, CNEA, 1 April 1992, Rio de Janeiro, Brazil. See also note 28).

the composition of the Commission, and how, if at all, its relationship with the ABACC Secretariat changes.

In contrast to the ABACC Secretariat personnel, inspectors are, in effect, on loan to ABACC. While inspectors report to the ABACC Secretary when “on the job,” their ultimate allegiance is to the nuclear energy commission or national facilities from which they are drawn. This procedure is not necessarily a weakness, however, since the nationals of one country inspect facilities in the other nation, and thus have an incentive to carry out their responsibilities in a highly effective manner.

The Four Party Agreement (Quadripartite Agreement)⁶⁸

The 1991 Bilateral Agreement establishing the SCCC and ABACC was a highly significant step in nuclear confidence-building. Argentine and Brazilian leaders believed that successful implementation of the bilateral verification and inspection procedures would assure the mutual transparency of their nuclear programs and promote growing cooperation in a range of economic and political areas. This bilateral arrangement, however, was not sufficient assurance for key nuclear supplier nations such as Germany, Canada, and the United States, which continued to emphasize to Argentine and Brazilian officials the need for full-scope IAEA safeguards.⁶⁹ In response to this pressure, Argentina and Brazil began formal negotiations with the IAEA in March 1991. The negotiations were completed on 21 November 1991 and the agreement signed on 13 December 1991 in a formal ceremony in Vienna witnessed by Presidents Collor de Mello and Menem.

While the negotiations with the IAEA were still underway, Argentina and Brazil completed their Bilateral Agreement, creating a new international organization, the ABACC. Consequently, the ABACC became the fourth party to the agreement, which was concluded on the basis of IAEA Statute Article III, 5. The latter permits the IAEA “to establish and administer safeguards...and to apply safeguards at the request of the parties to any bilateral or multilateral arrangement....”⁷⁰ In a covering memorandum of 25 November 1991 IAEA Director General Hans Blix described the Quadripartite Agreement as comprehensive and fully compatible with the Tlatelolco Treaty and covering “all nuclear materials in all nuclear activities within the territories of Argentina

⁶⁸ The complete title of the Quadripartite Agreement is the “Agreement Between the Republic of Argentina, the Federative Republic of Brazil, the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials and the International Atomic Energy Agency for the Application of Safeguards.” The full text of the Quadripartite Agreement can be found in the IAEA Document Gov/2557, 25 November 1994. Following the agreement’s entry into force in March 1994, the IAEA also issued the document as an information circular: INFCIRC/435, March 1994.

⁶⁹ Author’s interviews with Argentine and Brazilian governmental officials.

⁷⁰ Quadripartite Agreement, INFCIRC/435.

and Brazil under their control anywhere.”⁷¹ The Argentine congress completed ratification in August 1992, and the Brazilian congress in February 1994, allowing the agreement to enter into force on 4 March 1994.

The Four Party Agreement is explicitly modeled on the EURATOM-IAEA Safeguards Agreement (INFCIRC/193) concluded in 1977.⁷² That agreement provides for safeguards in Western European nations similar to those incorporated in INFCIRC/153, the IAEA's model agreement for NPT parties. Under the EURATOM-IAEA agreement, EURATOM acts as the principal authority, collecting and verifying accounting reports in member states, which are then sent to the IAEA in Vienna. IAEA inspectors are not present at all inspections of facilities of EURATOM members. Both EURATOM and the IAEA have separate responsibilities, moreover, for verification and inspections (which may include routine as well as special inspections). IAEA and EURATOM officials conduct their inspections at “strategic points” in a facility, where it is possible to measure movement of nuclear material, and undertake joint inspections at certain bulk handling facilities involving large quantities of fissile material (i.e., enrichment, fuel fabrication plants, etc.).⁷³

Under the Four Party Agreement, ABACC is the principal safeguard authority, sharing certain responsibilities with the IAEA. As with the EURATOM-IAEA agreement, ABACC and the IAEA may work in joint teams to inspect some facilities with the objective of reaching independent conclusions. While ABACC has the lead position as regards verification and inspections, the IAEA's core responsibility and authority is explicit. The IAEA's right of access to Argentine and Brazilian nuclear facilities is delineated in several provisions of the Four Party Agreement. Articles 1-2 (Basic Undertakings) require all parties to accept the IAEA's obligation to ensure that safeguards are applied:

on all nuclear material in all nuclear activities within the territories of the States Parties, under their jurisdiction or carried out under their control anywhere, for the exclusive purpose of verifying that such material is not diverted to nuclear weapons or other nuclear explosive devices.⁷⁴

⁷¹ Ibid.

⁷² The European Atomic Energy Community (EURATOM) entered into force when the European Community came into being on 1 January 1958. The overall objective of EURATOM was to coordinate civil nuclear energy development in the European Community and to administer a regional nuclear safeguards system.

⁷³ See W. A. Higinbotham and Helen M. Hunt, “Nuclear Confidence-Building: Models for a Bilateral Safeguards Verification Regime,” Paul Leventhal and Sharon Tanzer, eds., *Averting a Latin American Nuclear Arms Race* (London: MacMillan, 1992), 120-123; and Lawrence Scheinman, *The International Atomic Energy Agency and World Nuclear Order* (Washington, DC: Resources for the Future, 1987), 160.

⁷⁴ Quadripartite Agreement, INFCIRC/435.

Article 8 (Agency Inspectors) notes that the IAEA will seek ABACC's concurrence on the designation of inspectors. Repeated refusals to accept the IAEA's recommendations, such that inspectors are impeded, will be referred to the Agency's Board of Governors for action. Under Article 13 (Special Procedures), Argentina and Brazil may temporarily remove nuclear material from safeguards while it is being used specifically for a submarine. This article is based on INFCIRC/153, Paragraph 14, pertaining to "non-proscribed military activity," which allows temporary non-application of safeguards to nuclear material when in actual use in a nuclear propulsion reactor. The article does *not* state that facilities producing the enriched fuel for a submarine can be temporarily removed from safeguards. Consequently, the Four Party Agreement has removed a potential weakness in the Bilateral Agreement.

Article 14 (Measures in Relation to Verification of Non-Diversion) provides another important vehicle for IAEA oversight of ABACC's operation. The IAEA Board of Governors may call upon ABACC and the state parties to take remedial action without delay if there is reason to believe that nuclear materials are being diverted to weapons or explosive devices. The IAEA may initiate such action when deemed necessary. It need not first subject the matter to the dispute resolution process described in Article 22 if the matter is considered urgent. The importance of Article 14 is that it accords the IAEA the authority to precipitate action if ABACC is judged to be insufficiently vigilant, or unable to act due to interference by the national parties.

The most controversial portions of the Quadripartite Agreement deal with "Special Inspections."⁷⁵ Under Article 71, special inspections may be undertaken by the Agency to verify special reports that may be requested from ABACC if there is reason to suspect that nuclear material is missing (as defined in Article 66). Special inspections also may be undertaken if the Agency determines that information obtained as a result of routine inspections is not sufficient for it to fulfill its responsibilities.⁷⁶ Under these circumstances, the Agency has the authority to "obtain access, in agreement with the State Party concerned and ABACC, to information or locations in addition to those locations" covered in ad hoc or routine inspections (Article 75). Should the States Parties or ABACC not agree to the Agency's request for information or access to key facilities, arbitration may be undertaken. If, however, the Agency determines that action "is essential and urgent," it need not wait for the arbitration process, but may require ABACC and the parties to cooperate without delay.

⁷⁵ The Quadripartite Agreement defines three types of inspections that may be undertaken by the IAEA: ad hoc, routine, and special. Ad hoc inspections (Article 69) were used by the Agency to verify the initial reports on all nuclear material provided by ABACC to the IAEA. Routine inspections (Article 70) are standard IAEA inspections conducted at strategic points in facilities. Safeguards are placed at points where nuclear material is most easily measured, not necessarily where diversion is most likely (see Darryl Howlett, "Regional Nuclear Cooperation and Non-Proliferation Arrangements: Models From Other Regions", Programme for Promoting Nuclear Non-Proliferation, Papers from the twelfth PPNN Core Group Meeting, Shizuka, Japan, 28-29 November 1992). The strategic points for routine inspections are delineated in the subsidiary arrangements among the Agency, ABACC, and the states parties. Special inspections, implying extraordinary initiatives that might be undertaken by the Agency if there is suspicion of diversion, became a particularly sensitive issue in Brazil and nearly prevented congressional ratification of the Quadripartite Agreement.

⁷⁶ If the IAEA's routine inspections reveal a problem, the first step will be to request an explanation from ABACC. If ABACC's explanation is judged insufficient, then the Agency has the right to conduct a special inspection. This is the same process as defined in INFCIRC/153, Paragraph 73.

The special inspection provisions of the Four Party Agreement may be understood in the context of the Agency's recent reassessment of its statutory authority. Under IAEA Statute Article 12, A.6, the Agency may "send into the territory of the recipient state or states inspectors...who shall have access at all times to all places and data and to any person..." Stung by the Iraq experience and emboldened by the ongoing negotiations with North Korea, the Agency adopted a highly expansive interpretation of its special inspection prerogatives under the Four Party Agreement. While special inspections were not considered license for fishing expeditions, there is no disputing the fact that Argentina and Brazil granted broad legal authority to the Agency under the Quadripartite Agreement.⁷⁷

In sum, the Four Party Agreement enhances and deepens the non-proliferation commitments assumed by Argentina and Brazil through the Bilateral Agreement. The legal obligations undertaken by the two nations are nearly identical and are fully equivalent to the NPT (INFCIRC/153). Indeed, as Argentine and Brazilian policy makers frequently note, the cumulative effect of the Bilateral and Quadripartite obligations exceed those of the NPT.⁷⁸

Current Status and Future of the Verification System

ABACC began its verification activities with receipt of complete initial inventory information from Argentina and Brazil in September 1992. Material samples from each country were then analyzed by ABACC-designated national laboratories situated in the other state. By late 1992 ABACC also had received design information on all declared nuclear installations. Design verification and initial inventory inspections were carried out by ABACC officials in 1993 following agreed procedures (i.e., Argentine inspectors checking Brazilian units, and Brazilian inspectors observing Argentine facilities). By late 1993 ABACC had begun development of facility attachments that define accounting and control procedures and the type and frequency of inspections for each nuclear installation in both countries. This process was completed by mid-1994.⁷⁹

Initial inspections of nuclear materials began in 1993 and were concentrated on indigenous Argentine and Brazilian facilities not previously subjected to IAEA safeguards. These facilities included Argentina's Pilcaniyeu gaseous diffusion enrichment facility near Bariloche and Brazil's gas centrifuge facility situated at the Aramar Research Center (Ipero) near

⁷⁷ Yet another interesting portion of the Quadripartite Agreement is Article 82, which notes that a limited number of unannounced routine inspections can be carried out by the Agency. These surprise inspections, while random, are expected to conform to a general pattern to be developed in consultation with ABACC. This article is similar to INFCIRC/153, Paragraph 84. In addition, it is notable that the IAEA and EURATOM have implemented (through subsidiary arrangements) a limited number of unannounced inspections of European enrichment facilities. Such an inspection pattern may be developed for the Argentine and Brazilian enrichment facilities.

⁷⁸ See, for example, Julio C. Carasales, "Non-Proliferation and the NPT", *La Prensa*, Buenos Aires (3 March 1995), as reproduced in FBIS, Latin America, 10 March 1995.

⁷⁹ *ABACC News*, Rio de Janeiro, Brazil, January-April, May-August 1993. Author's interview of ABACC officials at ABACC headquarters, Rio de Janeiro, Brazil, 28 April 1994.

Sao Paulo. By late 1993, ABACC officials reported that they were undertaking bi-monthly inspections of the enrichment units.⁸⁰

The development of facility attachments for the two enrichment units by ABACC, and later by the IAEA, proved to be somewhat difficult. While the amount of enriched uranium in both facilities is small, the plants are capable of increasing their output and elevating their enrichment level above 20 percent. Consequently, the type and frequency of inspections are significant. In theory, the Argentine gaseous diffusion facility was expected to be more difficult to monitor than Brazil's centrifuge unit. Nuclear material remains within the Argentine unit for extended periods, resulting in inventory build-ups, whereas measurements of the centrifuge unit can be undertaken as material enters and leaves the facility. According to some reports, Brazilian naval authorities at the Aramar facility initially demanded only partial perimeter monitoring by both ABACC and the IAEA and, in turn, Argentine officials called for similar verification efforts at Pilcaniyeu.⁸¹

With the entry into force of the Four Party Agreement on 4 March 1994, formal coordination of the ABACC and IAEA verification systems began.⁸² The status of safeguards applied by ABACC to all Argentine and Brazilian facilities at that time is illustrated in Table 1.

By mid-1994, ABACC had sent initial inventory reports of all nuclear material and design information questionnaires on all nuclear facilities in both states to the IAEA. By the end of 1994, ABACC also had submitted nearly all facility attachments for nuclear installations to the Agency. In June 1994, following the IAEA's receipt of this information, the two agencies began a series of initial joint inspections of key facilities in both nations.⁸³ These inspections were completed by late November 1994, leaving a number of issues pertaining to three reactors and an enrichment facility still to be resolved in 1995. These are not considered to be serious obstacles to an arrangement acceptable to all parties of the Quadripartite Agreement.

The broad cooperative relationship between ABACC and the Agency currently under development ultimately may have far greater importance than such potentially intrusive measures as special inspections. Over time, the staff of both ABACC and the IAEA will develop familiarity and mutual confidence in the performance of their respective professional responsibilities. It is expected that this professional work experience will result in an efficient,

⁸⁰ Author's interview of ABACC officials at ABACC headquarters, Rio de Janeiro, Brazil, 28 April 1994.

⁸¹ *Nuclear Fuel* (26 September 1994). ABACC officials noted at a later point that this matter had been resolved in a manner acceptable to both ABACC and the IAEA (author's interview with ABACC Secretary, Dr. Carlos Feu Alvim, 1 February 1995, Washington, DC).

⁸² Informal coordination and cooperation between ABACC and the IAEA began almost immediately after ABACC commenced operation (June 1992).

⁸³ *Ibid.* See also FBIS, *Proliferation Issues* (19 August 1994), 19; FBIS, *Latin America*, 25 August 1994.

Table 1

ABACC Safeguards by Facility (March 1994)

<u>TYPE</u>	<u>ARGENTINA</u>	<u>BRAZIL</u>	<u>TOTAL</u>
Conversion facilities	7	1	8
Enrichment facilities	1	2	3
Fuel fabrication facilities	3	1	4
Power reactors	2	1	3
Research reactors	5	3	8
R&D facilities	1	3	4
Critical/sub critical units	0	3	3
Storage facilities	3	2	5
LOFs* on fuel research	3	5	8
LOFs on reprocessing research	0	1	1
LOFs analytical laboratory	3	2	5
Other LOFs	11	7	18
TOTAL	39	31	70

*Locations Outside Facilities: any place where the nuclear material is used or kept in quantities equal or less than 1 effective kilogram.

cost-effective division of responsibilities between the two organizations. An accompanying protocol to the Four Party Agreement emphasizes:

The need for ABACC and the Agency each to reach its own independent conclusions (Protocol Article 1, A);

The need to coordinate to the extent possible the activities of ABACC and the Agency for the optimum implementation of this Agreement, and in particular to avoid unnecessary duplication of ABACC's safeguards (Protocol, Article 1, B);

When performing their activities, ABACC and the Agency shall work jointly, wherever feasible, in accordance with compatible safeguards criteria of the two organizations (Protocol Article 1, C).⁸⁴

A Liaison Committee composed of representatives from the Agency, ABACC, and the two States Parties will meet annually to review safeguards procedures or on an emergency basis in the event of problems relating to safeguards applications. In addition, ABACC Deputy Secretary Jorge Coll has noted the evolving practice by which Agency and ABACC inspectors meet before and after each joint inspection to discuss the detailed inspection plan, activities for each facility, the distribution of tasks, instruments, logistics, and follow-up actions.⁸⁵ ABACC officials, as well as Argentine and Brazilian government representatives, privately express the hope that eventually (within five years) ABACC will assume nearly all inspection functions, with the Agency's role reduced to providing general oversight.

Discarding Nuclear Illusions

Argentina and Brazil are now, for all practical purposes, legally committed to the nuclear non-proliferation regime. (See Table 2.) The cumulative effect of the Bilateral and Quadripartite Agreements and the Tlatelolco Treaty is mutual confidence and assurance for the international community. Change has been difficult, however, and the motivations for the eventual policy shift in both nations defy simple explanations. Moreover, integration into the regime is an ongoing process and, in the case of Brazil, there are still a few remaining steps to be taken.

Integration into the Regime

The Tlatelolco Treaty and the Nuclear Non-Proliferation Treaty provide the most visible and current indicators of Argentine-Brazilian commitment to the non-proliferation regime. The two countries are closely coordinate with respect to the Tlatelolco Treaty. Their policies differ, however, as regards the NPT.

Tlatelolco Treaty. Both nations are now full Contracting Parties to the Tlatelolco Treaty (i.e. those for whom the treaty is in force). This was accomplished as a result of amendments to the treaty proposed by the presidents of Argentina, Brazil, and Chile in February 1992. The amendments focused on the responsibilities of the Agency for the Prohibition of Nuclear Weapons in Latin America (OPANAL), established in Mexico City to administer the application

⁸⁴ Quadripartite Agreement, IAEA INFCIRC/435.

⁸⁵ Author's interview with ABACC Deputy Secretary Jorge Coll, 12 January 1995, Cancun, Mexico. See also Jorge A. Coll, "La Contribución de ABACC a los Usos Pacíficos de la Energía Nuclear," in *Memoria, Seminario la no Proliferación: Puntos de Vista de América Latina y el Caribe*, Conference Report, OPANAL, Mexico City, January 1995. ABACC personnel also note certain advantages ABACC inspectors may have relative to EURATOM inspectors: (1) high *motivation* due to a friendly competition for excellence between personnel from the two nations; (2) *training*, due to the fact that ABACC inspectors are often experienced nuclear facility operators; and (3) *familiarity*, due to years of cooperation, exchanges between the two nuclear energy commissions, and monitoring of the installations, and also because the inspectors know each other.

Table 2

Argentine and Brazilian Non-Proliferation Arrangements

	<u>Argentina</u>	<u>Brazil</u>
Bilateral Agreement (ABACC, SCCC)	Yes (December 1991)	Yes (December 1991)
Quadripartite Agreement (full-scope IAEA safeguards)	Yes (March 1994)	Yes (March 1994)
Tlatelolco (Amended Version)	Yes (January 1994)	Yes (May 1994)
NPT	Yes (February 1995) Participated in Extension Conference	No Observer at Extension Conference
MTCR	Yes (1993)	Applied by decree to exports, not imports, since 1994. Plan to join in 1995.
NSG	Yes (1994)	No (But growing interest)
Nuclear export controls	By decree , April 1992 (Subsequently by law , 1994)	Partly applied by decree , August 1994. Law pending before congress since 1992.

of the Tlatelolco Treaty. Directed toward Tlatelolco Articles 14, 15, 16, 19, and 20, the amendments had the effect of partly substituting the IAEA for OPANAL in conducting verification and inspection activities under the Treaty. While the purpose of the amendments was to facilitate Argentine and Brazilian adherence, OPANAL was not fully removed from verification responsibilities. Rather, under the amended Article 16, *operational* responsibility for special (challenge) inspections was vested solely in the IAEA. OPANAL's role remains

potentially important, as such inspections are to be triggered by a request to the IAEA by a Tlatelolco party with the concurrence of OPANAL's Council.

Another important amendment change was to reduce the amount and type of information that Tlatelolco parties must provide OPANAL. Under a modification of Article 14, Paragraph 2, Tlatelolco parties need only provide OPANAL with information relevant for the activities of that agency, while providing complete information, as required, to the IAEA. This change gave Argentina (and Brazil) greater assurance that industrial secrets would be protected.⁸⁶

The proposed amendments were approved by the other Contracting Parties to the Tlatelolco Treaty on 26 August 1992. It was then necessary for the Argentine congress to ratify the treaty and the Brazilian and Chilean congresses to ratify the amendments. All other Tlatelolco parties then had to ratify the amended version.⁸⁷

The Argentine congress completed ratification (over strong Radical Party opposition in the Senate) in March 1993. Brazil's congress completed ratification on 16 May 1994, and the Brazilian foreign minister deposited the ratification instruments with OPANAL on 30 May 1994.⁸⁸

As Contracting Parties, Argentina and Brazil began almost immediately to play an active role in Tlatelolco Treaty operations. Brazil, for example, assumed a leadership role in efforts to gain Cuban adherence.⁸⁹ In a July 1994 visit to Cuba, Brazilian foreign minister Celso Amorin

⁸⁶ The Tlatelolco amendments that allowed Argentina and Brazil to join Tlatelolco are discussed by the author in "Tlatelolco and Regional Non-Proliferation Initiatives," in *Memoria, Seminario la No Proliferación*, and "Creación de Confianza Nuclear en la América Latina," *Revista Occidental, Estudios Latino Americanos*, vol. 10, no. 3 (1993). The text of the amendments may be found in IAEA Information Circular, INFCIRC/411, 12 July 1993.

⁸⁷ Argentina signed Tlatelolco soon after its negotiation in 1967 but did not complete ratification. During the regime of former General/President Videla, the Argentine government announced its intent to ratify Tlatelolco. This was to occur on the occasion of a 1978 visit by Videla to Washington, DC, for a meeting with President Carter. Owing to strong disagreements over human rights and pending nuclear sales, the military government reversed its position, to the regret of the foreign ministry and some in the nuclear energy commission (author's interview with former Argentine Ambassador to the UN and US, Carlos Ortiz de Rozas, Buenos Aires, 22 April 1994). Following the return to civilian rule with the election of Raul Alfonsín in 1983, there was a second effort to complete ratification. Opposition by both Peronists and Radical congressional representatives again prevented a policy change. [For a succinct exposition of the Argentine rationale for opposing Tlatelolco ratification, see Julio Carasales, "The Future of Tlatelolco 20 Years after its Signature," *Disarmament*, no. 11, (Winter 1987-1988).] In contrast to Argentina, Brazil and Chile ratified Tlatelolco but used the provisions of Article 28 to prevent the agreement from coming into force for their territory. While not a Contracting Party (i.e., "those for whom the treaty is in force"), Brazil's ratification was not without significance. Throughout the period of military domination (from 1964 to the mid-1980s) Brazilian policy makers insisted that the nation would take no actions contrary to the objectives of the agreement. It is nonetheless worth reemphasizing that the Brazilian government continued to interpret Tlatelolco as permitting peaceful nuclear explosions and quite probably would have used Tlatelolco Article 18 as justification for its nuclear explosive project in Cachimbo, had that project been completed.

⁸⁸ Chile signed the Tlatelolco Treaty in 1967 and ratified (subject to the restrictions of Article 28) the accord in October 1974. Chile's posture on Tlatelolco (and the NPT) was dependent primarily on that of its rival, Argentina. Consequently, Chile became a Contracting Party of Tlatelolco six months after Argentine ratification (in November 1993).

⁸⁹ Since 1967, Cuba had been the most important Tlatelolco holdout, refusing to sign or ratify the agreement so long as the United States remained in Guantanamo, and US-Cuban relations remained unchanged. Repeated efforts by the OPANAL General Secretary and Mexican and Soviet diplomats had failed to change this Cuban position. At the 1991 Guadalajara meeting (at which Argentina and Brazil announced their intent to join Tlatelolco and create a bilateral nuclear inspection arrangement), however, President Fidel Castro announced that, if all other Latin American nations adhered to the treaty, Cuba would join as well.

delivered a personal letter to President Fidel Castro from Brazilian President Itamar Franco, in which Franco noted that Brazil had joined Tlatelolco and urged that Cuba do the same. The following month, Castro announced in a letter to Itamar Franco Cuba's intention to follow through with its commitment to sign Tlatelolco.⁹⁰ Cuba signed the agreement in a ceremony held in Havana on 25 March 1995.⁹¹ Brazil's posture of encouraging Cuba's reintegration into the American community contrasted sharply with Argentina's position. President Menem continued to align Argentine policy close to the US on Cuba and did not work with Brazil and Mexico to encourage Cuban adherence to Tlatelolco.

On other issues relating to Tlatelolco, however, Argentina and Brazil have continued close policy coordination. For example, in a situation highly reminiscent of the Tlatelolco negotiations of the mid-sixties, Argentina and Brazil found themselves at odds with the majority of Tlatelolco parties at the March 1995 meeting of the OPANAL General Conference in Vina del Mar, Chile. The principal disagreement was due to the desire by most parties (especially Chile, Columbia, Mexico, Peru, and Uruguay) that Tlatelolco's responsibilities should continue to evolve, even though the nuclear weapon-free zone is now virtually complete.⁹² Argentina and Brazil resisted suggestions that OPANAL's purview be expanded to include all weapons of mass destruction, and that it assume new responsibilities with respect to peaceful applications. On nuclear verification, the two Latin American nations favored a minimal role for OPANAL and emphasized that any new responsibilities should be entrusted to the IAEA or ABACC.⁹³

Differences pitting Argentina and Brazil against most other Latin American nations will no doubt continue in future biannual meetings of OPANAL's General Conference. Argentina and Brazil are likely to remain supportive of Tlatelolco but are clearly more comfortable with ABACC for bilateral, and the IAEA for multilateral, verification and inspection procedures.

Nuclear Non-Proliferation Treaty (NPT). Opposition to the “discriminatory” and “unequal” NPT has long been an article of faith shared by Argentina and Brazil. The NPT (and the Nuclear Suppliers Group) symbolized the frozen state of unjust international power

According to Cuban Vice Foreign Minister Jorge Bolanos: “It was Brazil that started the initiative of the treaty. Even more important, Brazil has had a stance toward Cuba of strengthening and developing relations” (FBIS, Latin America, 14 September 1994).

⁹⁰ FBIS, Latin America, 30 August 1994.

⁹¹ Cuba attended its first OPANAL meeting as a Tlatelolco signatory in Vina del Mar, Chile, in late March 1995. At the meeting, Cuban delegates emphasized a condition for Cuba remaining in the treaty: an end to US threats to Cuban security, and assurances that the US was not transporting nuclear weapons through the zone.

⁹² As of June 1995, there were twenty-nine Contracting Parties and four signatories (Cuba, Guyana, St. Kitts and Nevis, and St. Lucia) to the Tlatelolco Treaty. Six Contracting Parties and one signatory had approved the amendments. Thus far, the fact that some states adhere to the original treaty and others are parties to the amended version, has had no practical affect on Tlatelolco's operation (except in the arcane minds of legal purists). There is a potential for future confusion as regards the challenge or special inspections dimension of the original treaty, which has been discarded in the amendments.

⁹³ I am indebted to Ben Sanders of PPNN for a summary of the Vina del Mar OPANAL meeting (personal letter, 31 March 1995). See also FBIS, Latin America, 29 March 1995. For an exposition on an enhanced OPANAL role from the perspective of the OPANAL Secretariat, see Enrique Roman-Morey, “Latin America's Treaty of Tlatelolco: Instrument for Peace and Development,” *IAEA Bulletin*, vol. 37 (1995).

relationships that Argentina and Brazil deeply resented. Their common stand against the NPT contributed to mutual confidence and nuclear cooperation. Argentina, however, has since abandoned its opposition and ratified the NPT; it even played an active role in the 1995 NPT Review and Extension Conference. Brazil, thus far, has chosen to remain aloof from the NPT.

Although Argentine foreign ministry officials throughout 1993 warned of a policy shift, there was still considerable international surprise when President Menem announced on 3 December 1993 his intent to seek congressional ratification of the NPT.⁹⁴ This dramatic reversal of Argentine policy was politically possible due to Menem's personal popularity and the solid Peronist support in congress. The treaty was formally submitted to congress on 7 July 1994, approved on 22 December 1994, and deposited on 10 February 1995, in Washington, DC.

The official rationale for the shift in policy focused on two principal points:⁹⁵ (1) a basic change in the international situation; and (2) the growing international acceptance of the NPT. On the first point, it was argued that the end of the Cold War, the reduced threat of nuclear war, and significant nuclear arms control progress by the superpowers were all positive developments that required a rethinking of Argentina's traditional independent foreign policy. On the second point, Argentine officials emphasized the adherence of France, South Africa, Ukraine, and China, all of which had previously been harsh critics of the NPT. Officials maintained that, increasingly, "a large majority of the countries with which Argentina shares fundamental values are now part of the NPT." Alternatively, those nations remaining outside the NPT were described as "involved in a regional and political context that is significantly different from that of our country."⁹⁶

In the congressional debate, most of the Radical Party opposed ratification, emphasizing the following points: the NPT violates the internationally acceptable norm of equality of nations; membership in the NPT will not lead to easier access to peaceful uses of nuclear energy or other advanced technologies; and participation in the NPT Review and Extension conference will not provide any particular benefit to Argentina.⁹⁷

⁹⁴ President Menem, in a luncheon address to the Japan National Press Club, announced that Argentina would sign the NPT and participate in the Review and Extension Conference [*Nucleonics Week* (9 December 1993)]. Argentine foreign ministry officials had fully briefed their Brazilian counterparts prior to the announcement and emphasized that Argentine-Brazilian nuclear relations would in no way be affected by Argentina's NPT membership.

⁹⁵ Analysis of the Argentine rationale for NPT ratification is derived primarily from discussions with Enrique de la Torre, Director General of International Safety, Nuclear and Space Issues, Ministry of External Relations, 20 April 1994, Bariloche, Argentina, and with Julio C. Carasales, former Argentine Ambassador to the Committee on Disarmament and OAS, 1 February 1995, Washington, DC. See also: Enrique de la Torre, "Argentine Position Towards the NPT," *Revista Argentina Nuclear*, CNEA, Buenos Aires, Argentina (October-November 1994); Julio C. Carasales, "Non-Proliferation and the NPT," *La Prensa*, Buenos Aires, Argentina, (3 March 1995); FBIS, Latin America, 10 March 1995. For the most comprehensive articulation of the Argentine rationale for opposing the NPT, see the earlier book by Julio C. Carasales, *El Desarme de los Desarmados, Argentina y el Tratado de no Proliferacion de Armas Nucleares* (Buenos Aires, Argentina: Editorial Pleamar, 1987).

⁹⁶ Enrique de la Torre, "Argentine Position Towards the NPT."

⁹⁷ Congreso Nacional, Camara de Senadores, Sesiones Ordinarias de 1994, Anexo al Orden del Día No 703, 14 October 1994. In the debate before the Senate International Relations Committee on NPT ratification, the opposing Radical Party senators ended their presentation by quoting Julio Carasales' earlier book title: "...the true significance of the NPT is disarming the disarmed"

In response, foreign ministry officials denied the discriminatory nature of the NPT. Rather than discrimination, the NPT was seen as a recognition of the factual situation that had prevailed at the time the NPT was negotiated. Those states that had detonated nuclear weapons prior to 1 January 1967, they argued, had assumed different obligations under the UN Charter than non-nuclear weapon states. The difficulties Argentina had previously encountered in achieving access to peaceful nuclear energy and advanced technology, it was argued, were a result of being outside the non-proliferation regime. After the change in Argentine policy, new agreements for nuclear cooperation had been signed with France, the United States, and other Western nations. Moreover, it was emphasized, signing the NPT implied no additional obligations beyond those previously assumed by Argentina through the Bilateral and Quadripartite Agreements.⁹⁸ In the words of Argentine Foreign Minister Guido de Tella:

The signing of the NPT will earn our country international confidence and openness in our nuclear activities, and will contribute to consolidating the international high standing we have built up for ourselves concerning non-proliferation. Besides, it will facilitate and boost exchange of new technologies with countries that are more developed in this area. It will also enable us to have greater clout when the renewal of the NPT is discussed, so as to be able to include more stringent provisions for the disarmament of nuclear countries.⁹⁹

Argentina was an active participant in the NPT Review and Extension Conference (17 April - 12 May 1995). Argentina supported indefinite extension of the treaty, as well as the South African proposal designed to enhance the review process.¹⁰⁰ Throughout the conference, Argentina sought to use its newly established non-proliferation credentials to assume a position of principled leadership, expressing support for the NPT while encouraging the nuclear weapons states to move more quickly on nuclear disarmament. Following the Extension Conference, Argentina continued to seek a non-proliferation leadership position at the United Nations. In July 1995 Argentina's UN Ambassador Emilio Cardenas proposed that the UN Security Council be empowered with new non-proliferation responsibilities. While well received by most of the

(author's translation).

⁹⁸ "Argentina Accesses the Non-Proliferation Nuclear Weapons treaty," Embassy of Argentina press release, 10 February 1995; Enrique de la Torre, "Argentine Position Towards the NPT." See also "Joint Statement Argentine-US Consultations on Security, Non-Proliferation and Arms Control Issues," 22 March 1995, Meeting of US and Argentine foreign ministry and defense officials in Buenos Aires, Argentina; Fernando Petrella, Argentine Vice Foreign Minister, *Telam*, Buenos Aires, 10 February 1995 [FBIS, Latin America, 15 February 1995].

⁹⁹ Guido di Tella, "We do not Want to be Outcasts," *Clarín*, Buenos Aires, 23 February 1994 [FBIS, Latin America, 1 March 1994]; Petrella, *Telam* (10 February 1995).

¹⁰⁰ "Government Supports Indefinite NPT Extension," *Telam*, Buenos Aires, 18 April 1995 [FBIS, Latin America, 19 April 1995]. The South African proposal linked indefinite NPT extension to strengthened political commitments by the nuclear weapon states to eliminate nuclear weapons as monitored by a more aggressive periodic review process [*Nucleonics Week* (11 May 1995)].

nuclear weapon states, China, India, and Pakistan expressed varying degrees of opposition to the Argentine proposal.¹⁰¹

Brazil's posture toward the NPT has evolved quite slowly. Interim President Itamar Franco (December 1992 to January 1995) did not demonstrate the same aggressive non-proliferation leadership as his predecessor, Fernando Collor de Mello. Franco deferred to the foreign ministry on most nuclear issues, and exerted little personal effort in the difficult congressional debates over ratification of the Quadripartite Agreement and the Tlatelolco Treaty amendments.

The election of former Economics Minister Fernando Henrique Cardoso as President on 3 October 1994 appeared to enhance prospects for NPT ratification. While Cardoso had been instrumental in deflecting German pressure to ratify the NPT in late 1993, he was widely perceived as being particularly sensitive to the need for a change in the nation's independent nuclear posture.¹⁰² During the Franco administration, he worked closely with the Secretary of Strategic Affairs, Admiral Cesar Flores, to lobby congress for ratification of key non-proliferation agreements. Immediately following his election, but prior to his inauguration, Cardoso pledged to study the possibility of signing the NPT. In a pre-inaugural visit to Argentina in November 1994, Cardoso appeared to be leaning toward ratification, both in response to Argentine encouragement and as a means of gaining support to become a permanent member of the UN Security Council.¹⁰³

Following his inauguration in early 1995, however, Cardoso appeared to draw back from an early NPT ratification decision. The newly appointed foreign minister, Luiz Felipe Lampreia, announced that Brazil would not seek ratification of the NPT prior to the April 1995 Extension Conference but would attend as an observer. In language reminiscent of that employed by Argentina to justify its NPT policy shift, Lampreia emphasized that, with the end of the Cold War and the East-West conflict, the international situation had changed. The NPT, he noted, was still a discriminatory treaty that had not curbed the nuclear arms race, but, Lampreia noted, "We are not dogmatic on this issue."¹⁰⁴

¹⁰¹ FBIS, Latin America, 28 July 1995.

¹⁰² During an 7-8 October 1993 visit to Brazil, German Foreign Minister Klaus Kinkel publicly and explicitly called for Brazilian ratification of the NPT ("we would be glad if Brazil signed the NPT soon"). While expressing appreciation for Brazil's evolving non-proliferation posture, including signing the Quadripartite Agreement, Kinkel noted in a meeting with Cardoso Bonn's strong preference that bilateral nuclear cooperation between the two countries be monitored within the NPT framework. Cardoso, in turn, argued that Brazil had fulfilled the earlier German requirement that it assume full-scope IAEA safeguards by August 1995, had agreed to other non-proliferation agreements, and consequently NPT ratification at this time was unnecessary (FBIS, Latin America, 8 October 1993; FBIS, Proliferation Issues, 8 December 1993). While German and US diplomats in Brazil later downplayed the direct nature of German pressure (author's interview with German embassy official, Brasilia, 26 April 1994; and US embassy official, Brasilia, 26 April 1994), this is contradicted by the public record. German officials were not subtle in linking financial support for nuclear cooperation to continued progress on non-proliferation, and the message was understood by Brazilian authorities, including finance minister and future president Cardoso.

¹⁰³ FBIS, Latin America, 7 November and 9 November 1994.

¹⁰⁴ FBIS, Latin America, 1 February 1995.

The NPT was a principal item of discussion in a high-profile visit to Brazil by US Arms Control and Disarmament Agency Director, John Holum, in March 1995. US officials hoped that the new Brazilian administration might be persuaded to shift its position and participate in the Extension Conference one month later. While Brazilian officials did not change their opposition, the visit helped pave the way for a state visit by President Cardoso to Washington, DC, in late April 1995 for discussions with President William Clinton.¹⁰⁵ The two presidents agreed to regularize consultations on non-proliferation and other arms control issues, and to work toward completion of a major new agreement on nuclear cooperation. The nuclear agreement proposed by the United States was referred by President Cardoso to the Strategic Affairs Secretariat and the Brazilian Nuclear Energy Commission (CNEN) for comment. The two agencies approved the agreement with the United States in July 1995, and the final negotiation of the agreement will be concluded by the foreign ministry. In addition, President Cardoso sent a revised bill regulating export of sensitive technologies to the Brazilian congress in July 1995. The latter action is designed to facilitate Brazil's formal entry into the Missile Technology Control Regime (MTCR) in late 1995.¹⁰⁶

The Cardoso administration appears to be moving, slowly, toward NPT ratification. Bilateral, regional, and international factors support this conclusion. On the bilateral level, the Brazilian leadership desires to continue nuclear policy cooperation and coordination with Argentina, and this requires a compatibility in positions on major international agreements and obligations. Concurrently, Brazil does not wish Argentina to derive comparative advantages owing to its more cooperative non-proliferation posture.¹⁰⁷ On the regional level, Brazil does not wish to be seen as the only Latin American nation, other than Cuba, which is rejecting the NPT. On the international level, remaining aloof is perceived as possibly interfering with Brazil's desire to assume a more active leadership position, notably as a permanent member of an enlarged UN Security Council. The United States, in turn, is seeking to accommodate the Cardoso administration as much as possible on nuclear and space issues, mindful that the new president is preoccupied with difficult negotiations with the Brazilian congress on constitutional reform and economic restructuring.¹⁰⁸

¹⁰⁵ ACDA Director Holum met with Brazilian Foreign Ministry Secretary General Sebastiao do Rego Barros and a team of advisors on nuclear and space issues. Following the meeting, do Rego Barros noted that "even though we may differ with the US on the subject, Brazil does not violate the NPT. We have enough credentials in terms of non-proliferation of nuclear weapons to make it unnecessary to sign the treaty." In turn, Holum stated that he was confident that "Brazil will some day ratify the treaty" because its members "play a leading role. This is important for Brazil because of its leadership in Latin America" (FBIS, Latin America, 23 March 1995).

¹⁰⁶ Luiz Felipe Lampreia (Brazilian Minister of External Relations), "Access to Technology, Non-Proliferation, and Foreign Policy," *Folha de Sao Paulo*, 23 July 1995 (text supplied by the Brazilian Embassy, Washington, DC).

¹⁰⁷ Brazilian spokesmen emphasize: "...We have reached a point at which mutual confidence is so solid that the Argentine and the Brazilian positions vis a vis the NPT at this point do not in any way bear on their mutual commitments in the nuclear sphere." (Remarks by Antonio Mena Gonsalves, Minister Counselor, Brazilian Embassy, to the Conference on Regional Approaches to Nuclear Non-Proliferation: The Latin American Case, 1 February 1995, Washington, DC.) Nevertheless, some Brazilian officials are concerned that Argentina might gain certain advantages with key supporters of the non-proliferation regime, such as the United States and Germany, with which Brazil enjoys particularly close nuclear and financial relations.

¹⁰⁸ The United States' inclination toward accommodation with Brazil was quite evident with the June 1995 decision by the Clinton administration not to apply sanctions relative to a sale of certain advanced rocket technology from Russia to Brazil in apparent violation of the Missile Technology Control Regime (MTCR). At the time of the sale, Russia was an MTCR member and

In the final analysis, Brazil's insistence on remaining outside the NPT is more symbolic than substantive. Brazil is now fully committed to the nuclear non-proliferation regime through full-scope IAEA safeguards. If Brazil adheres fully to the MTCR and, eventually, to the Nuclear Suppliers' guidelines as well, it will have taken on substantive additional responsibilities. These steps represent an important transition for Brazil, and NPT membership appears as an inevitable final step in due time.

Motivations and Implications

In discarding nuclear illusions and integrating into the non-proliferation regime, Argentina and Brazil have undergone a profound and highly significant policy reversal. The significance of this reversal is often overlooked when compared to the seemingly more dramatic turnabout by South Africa, a nation that constructed and subsequently dismantled nuclear weapons in the 1980s.¹⁰⁹ According to available public information, neither Argentina nor Brazil ever produced or obtained sufficient nuclear material to produce nuclear weapons, although both had indigenous facilities with a military potential. What Argentina and Brazil did have—and are currently discarding—is a well-honed and widely articulated nuclear theology. This nuclear theology defined an independent nuclear policy fundamentally opposed to the non-proliferation regime.

For nearly three decades Argentine and Brazilian policy makers were outspoken in their criticism of the non-proliferation regime at all available international fora, including the UN, the IAEA, and the Geneva Conference on Disarmament. While eschewing nuclear weapons, both nations had carefully positioned themselves to be legally free to develop and detonate so-called peaceful nuclear explosives. Moreover, this theology had been widely accepted by many sectors of society in both nations and had become deeply rooted in the two countries' political cultures. In contrast to South Africa at the time its nuclear weapons were developed and subsequently discarded, the Argentine and Brazilian political structures were distinctly more complex. Whereas South African nuclear policy was tightly controlled by a small elite in an apartheid dictatorship, Argentine and Brazilian nuclear policies (even during the military regimes) were more deeply rooted in their respective political cultures. The nuclear theology was widely embraced by articulate and influential sectors of Argentine and Brazilian society, including military and civilian politicians, intellectuals, foreign ministry officials, and scientists. The interweaving of the nuclear issue with other widely shared societal objectives, especially national development goals, accounts for the broad appeal of the nuclear belief system. When the process of nuclear reversal began in Argentina and Brazil, it was much more profound and pervasive than

Brazil was not (although the latter had agreed to abide by the MTCR guidelines regarding exports, but not purchases). The issue is, in effect, academic because Brazil plans to join MTCR following passage of legislation by the Brazilian congress, expected in late 1995. The transfer of advanced rocket technology similar to the Russian-Brazilian arrangement is permissible among members under the MTCR guidelines. (See "U.S. Waives Objection to Russian Missile Technology Sale to Brazil," *Washington Post*, 8 June 1995.)

¹⁰⁹ See J. W. Villers, Rojar Jardine, and Mitchell Reiss, "Why South Africa Gave up the Bomb", *Foreign Affairs*, vol. 72, no. 5 (November-December 1993), 98-109; David Albright, "South Africa's Secret Nuclear Weapons", *ISIS Report*, Washington, DC, May 1994.

in South Africa and, as such, may have greater relevance to other complex political systems as in India and Pakistan.

The factors that motivated Argentina and Brazil to change, and eventually reverse, their nuclear policies may be traced primarily, but not exclusively, to their evolving bilateral relationship. As noted above, the process began in the mid-1960s during the negotiation of the Tlatelolco Treaty. The two nations developed parallel positions on nuclear issues somewhat at variance with those of other Latin American nations and eventually declined to join the nuclear weapon-free zone in 1967. This ad hoc coordination of nuclear policies continued with mutual rejection of the NPT following its completion in 1968, and deepened in the mid-1970s in reaction to the creation of the Nuclear Suppliers Group. In addition, beginning in the mid-seventies, both countries were continuously engaged in protracted disputes with the United States and other technically advanced countries regarding the transfer of nuclear material and equipment. These shared perceptions and experiences served to mute their historic competition and suspicions and to create a shared perception of victimization by the advanced nations, which both countries saw as determined to prevent their development of nuclear technology.

Following resolution of their most serious bilateral disputes in the Rio de la Plata region in 1979, the relationship developed into active nuclear cooperation. Gradually, shared opposition to the NPT and to the non-proliferation regime evolved into a nuclear confidence-building process designed to make their programs mutually transparent. In embracing nuclear confidence-building, the two nations avoided an economically ruinous nuclear competition that could have assumed a military dimension and endangered the peace and security of all of Latin America.

Domestic political change was clearly a critical factor in accelerating and deepening the nuclear rapprochement. The re-emergence of civilian leadership in the mid-1980s in both nations advanced and consolidated nuclear cooperation, which had begun earlier under military governments. Under civilian leadership, economic and trade issues assumed a larger place in the bilateral relationship. Domestic change also introduced an additional political dynamic, as the civilian leadership sought to restrain the military by integrating the nuclear programs into a bilateral control and inspection regime.

Strong presidential leadership was an extremely important factor in pacing cooperation and building nuclear trust. As noted earlier, Raul Alfonsin and Jose Sarney initiated a series of reciprocal presidential visits to indigenously-built unsafeguarded nuclear installations from 1987 to 1988. While this had enormous symbolic importance to both nations as a confidence-building measure, the visits had other interesting implications. The decision to open previously secret installations to foreign officials was a dramatic affirmation of presidential authority over the wishes of some military officials. It also clearly implied that, while a systematized inspection process might be possible, it would be crafted primarily in a bilateral, rather than a regional (Tlatelolco) or multilateral (NPT), context.

The strong personal commitment by two (then) popular presidents, Fernando Collor de Mello and Carlos Menem, produced in one stroke the remarkable set of agreements in 1990 that effectively ended the two countries' independent nuclear policies. To do so, however, they needed the acquiescence or support of important domestic sectors, including the foreign and finance ministries, the military, and the scientific establishment.

In both nations the *foreign ministry* became, over time, committed to comprehensive bilateral cooperation on economic and political issues. More than any other sector, the foreign ministries were sensitive to the diplomatic costs of their nations' independent nuclear policies and consequently worked to convince some in the military and in the nuclear energy commission of the need for change. Speaking in May 1995, Carlos Menem's foreign minister, Guido di Tella, emphasized the isolation which the nation had experienced:

Six years ago we still projected the image of a crazy country at the brink of suicide. That image was projected to the entire world, including our neighbors, who chose to stay at arms length.

I think people do not realize the level of abnormality that Argentina exhibited only a few years ago. For twenty five years we defended the right to our own nuclear development while other countries that already had the bomb renounced their programs. Why in the world would we want to have the bomb?¹¹⁰

The Brazilian foreign ministry, Itamaraty, was also aware of the diplomatic and financial penalties of their nation's resistance to the non-proliferation regime. Brazil, however, did not experience the same level of isolation that Argentina had suffered following its humiliating military defeat in the Falkland/Malvinas War. The pressure exerted by the Brazilian foreign ministry for change in the nuclear policy consequently was less intense than that of its Argentine counterpart. Nonetheless, the highly professional, tightly disciplined Itamaraty placed considerable value on foreign policy continuity and the preservation of historic relationships. Itamaraty was never fully comfortable with the US-Brazilian split, which developed in the mid-seventies over nuclear and other issues. When, in the 1980s, it became apparent to Itamaraty that Western European nations (Germany, France, and the United Kingdom) were in the process of joining the United States and Canada in requiring full-scope IAEA safeguards, their support for change increased. Increasingly, Itamaraty came to accept the view that maintenance of the independent nuclear policy would seriously jeopardize their relations with nations that could affect another, more central, policy objective: achieving world stature and leadership for Brazil. Developing a bilateral nuclear accord with Argentina would help deflect international pressure to adhere to the NPT and avoid a debilitating nuclear competition in the Southern Cone.

¹¹⁰ FBIS, Latin America, 22 May 1995.

The *finance ministries*, and some corporate interests, in both Argentina and Brazil also came to view the nuclear policies as an impediment to foreign investment and trade. By the mid-eighties protectionist policies were being discarded, and leaders in both nations were implementing new programs to open their economies to foreign investment. Access to advanced Western technology was viewed as essential to modernize the two economies and to promote development objectives. As the potential economic penalties resulting from rejection of the non-proliferation regime became more apparent, the financial and business sectors challenged the wisdom of the independent nuclear policies.¹¹¹

Change in the Argentine and Brazilian nuclear policies could not have occurred without the acquiescence of the *military*. In Argentina the process proved less difficult due to the discrediting of the military and the transition to democracy following the 1982 Falkland/Malvinas War. Since the early 1960s, the Argentine nuclear program had been the purview of the navy, but with the election of President Alfonsín in 1983 and the retirement of CNEA president Admiral Carlos Castro Madero, a significant shift toward civilian control was initiated.¹¹²

In Brazil the process moved more slowly because the Brazilian military's involvement in the nuclear program was more pervasive. Both the army and the navy (and, to a lesser extent, the air force) were involved in the parallel program and strongly resisted efforts to exert civilian accounting and control. Such control was eventually achieved during the Collor de Mello administration in the early 1990s.¹¹³

The return of civilian government in both countries in the mid-eighties provides only a partial explanation for the acquiescence of the military to the change in nuclear policy. Previous military-led governments had supported security cooperation, including coordination of nuclear policies. Indeed, it was a visit by Brazilian military President Joao Baptista de Figueiredo to Argentina in early 1980 that solidified agreements in nuclear, economic, and military areas.

Ironically, the 1982 war in the South Atlantic may have enhanced the military's inclination for security cooperation, owing to a common understanding of security interests in the region. A shared lesson of the war was their vulnerability in the South Atlantic due to the weakness of the Inter-American Defense System. Thus the Argentine and Brazilian military

¹¹¹ The growing involvement of the finance ministries in nuclear policy became quite evident from the mid-1980s on in congressional debates over ratification of various non-proliferation agreements (Bilateral, Quadripartite, Tlatelolco, etc.). In most cases, the finance minister joined the foreign minister in lobbying for congressional support.

¹¹² Admiral Castro Madero was the last military president of the CNEA. While a navy officer, Castro Madero was also a respected nuclear engineer who, in the view of many observers (including the author), opposed development of nuclear weapons as detrimental to a strong civil nuclear program. Castro Madero was committed to independent development of the nuclear fuel cycle, but believed a nuclear weapons program would enhance Argentina's isolation from advanced nuclear technology. Ultimately Castro Madero became a strong supporter of Argentine adherence to full-scope IAEA safeguards.

¹¹³ Until the late 1980s, the Brazilian parallel program operated with its own separate procurement network buried in the military budgets. In the view of Jose Goldemberg, even Brazil's military presidents were not fully knowledgeable as to the extent of the parallel program, and there was no systematic control from the top (Goldemberg address).

increasingly viewed bilateral and sub-regional cooperation as a means to achieve security and avoid interference by external powers.¹¹⁴ The Argentine military supported the Brazilian proposal for a zone of peace in the South Atlantic, and joint meetings of military staff were initiated to discuss shared strategic interests in an area which had traditionally been the object of geo-political competition. The relevant point is that by the mid-1980s the Argentine and Brazilian military were engaged in institutional bridge-building due to shared security concerns. Consequently, continued nuclear competition was viewed as counterproductive, and nuclear cooperation became an acceptable policy option.¹¹⁵

Finally, some military figures in both countries came to oppose the independent nuclear programs because they viewed such programs as potentially siphoning limited resources from other preferred priorities. With the advent of civilian governments in the mid-1980s, military budgets came under greater scrutiny. As appropriations were reduced, the military, particularly in Brazil, began to question the considerable costs of investing in nuclear technology having little discernable utility to national security needs.

The support of most of the *scientific community* in both Argentina and Brazil also contributed to a change in nuclear policy. Increasingly, scientists, both in and out of government, concluded that continuation of independent nuclear policies would result in permanent denial of advanced technology from the United States and Western Europe. While scientists in both nations embraced the need for a national nuclear program, their justification was not based on a military/security rationale. Rather, the nuclear program was supported as important to independent national development and economic advancement.¹¹⁶

In Argentina the scientific community generally supported the Menem government's commitment to the non-proliferation regime, although there was opposition within the nuclear sector to the 1994 restructuring of the CNEA and the privatization of the nation's nuclear power plants.¹¹⁷ In Brazil most of the scientific community favored the signing of the Quadripartite Agreement establishing full-scope IAEA safeguards. Opening the nation's nuclear program to international inspections, they argued, would end the discrimination that had prevented Brazil's

¹¹⁴ This is discussed in detail by Virginia Gamba-Stonehouse, "Argentina and Brazil," in *Security with Nuclear Weapons? Difficult Perspectives on National Security*, Regina Cowen Karp, ed. (New York: Oxford University Press, 1991), 237-238.

¹¹⁵ Following the 1990 nuclear agreements, military cooperation extended to annual visits by chiefs of staff, joint sea maneuvers, and co-production of certain conventional weapons systems.

¹¹⁶ In Brazil much of the scientific establishment was somewhat alienated from the nuclear program due to the military government's decision in the early 1960s to opt for light-water nuclear power technology rather than heavy-water technology. Heavy-water technology of the sort adopted by Argentina was viewed as permitting greater independence from foreign suppliers. Many Brazilian nuclear scientists who initially opposed the military government's choice of nuclear technology later became strong opponents of the parallel military program through such organizations as the Brazilian Physical Society.

¹¹⁷ CNEA President Manuel Mondino resigned in August 1994 to protest "the breaking up of the CNEA." [*Nucleonics Week* (20 October 1994); FBIS, Latin America, 1, 7, and 15 September 1994.]

access to advanced technology.¹¹⁸ Some managers and laborers in the Brazilian nuclear industry and some technicians working on military nuclear projects opposed the Quadripartite Agreement, expressing concern that advanced foreign technology would disadvantage the domestic nuclear industry. This opposition, however, is best understood as a reaction to the general restructuring and downsizing that the Brazilian nuclear industry has experienced in the last several years and to cutbacks in the navy-led nuclear submarine program, rather than as concerted opposition to the non-proliferation regime.¹¹⁹

While bilateral relations and domestic issues were the principal motivating factors for change in Argentine and Brazilian nuclear policy, *international pressure* clearly contributed to the process. External pressure stimulated early Argentine-Brazilian coordination in opposition to the non-proliferation regime—a process that eventually led to active nuclear cooperation and the Bilateral Agreement. External pressure was also instrumental in promoting a receptive climate for foreign investment, and in encouraging domestic forces that viewed the independent nuclear policies as an impediment to advanced Western technology. Reinforcing this perspective was the consistent pressure of those nuclear supplier nations having particular influence in the two Latin American nations: Germany, the United States, and Canada. In this regard, the 1990 German decision to require full-scope IAEA safeguards within five years as a condition of continual supply of nuclear material and technology was of particular importance.

International factors, however, were also influential in helping undercut the theology that had long sustained the independent nuclear policies in both nations. Substantial strategic nuclear arms control progress by the nuclear weapon states, progress toward a comprehensive nuclear test ban, NPT adherence by China and France, and NPT ratification by the former Soviet republics and South Africa all helped support the views of those in Argentina and Brazil who believed the illusory nuclear policies should be discarded.

Lessons of the Argentine-Brazilian Nuclear Experience

The Argentine-Brazilian success suggests that even fundamentally suspicious rivals can achieve detente and cooperation in controlling nuclear technology. Nuclear cooperation, however, cannot advance in a vacuum, divorced from other bilateral issues. In the Southern Cone, nuclear rapprochement proceeded in the context of an overall improvement in economic, political, and military relations.

To be sure, ongoing political controversies (such as prevailed between Argentina and Brazil in the Rio de la Plata area) had to be resolved before there could be substantial nuclear cooperation and trust. Yet the Argentine-Brazilian experience also demonstrates how the nuclear

¹¹⁸ “CNEN, Scientists Favor Quadripartite Accord,” (FBIS, Latin America, 29 April 1994.) Among those urging ratification of the Quadripartite Agreement were the CNEN president, current and past presidents of the Brazilian Physical Society, the former president and counsel member of the Brazilian Society for the Progress of Science, the heads of the University of Sao Paulo’s Applied Physics Department and Experimental Physics Department.

¹¹⁹ “Nuclear Industrial Complex Reorganizing,” FBIS, Latin America, 25 February 1994.

issue can be used effectively as a leading wedge to stimulate and reinforce cooperation in other areas. There is ample evidence that, beginning in the late 1970s, the leadership in both nations used the nuclear issue to help pace the broader rapprochement process.

Presidential leadership and the support of key sectors of society are clearly important to the process of nuclear confidence-building. The Argentine-Brazilian experience suggests that bilateral nuclear restraint can be achieved notwithstanding the type of regime (civilian or military). The transition to a civilian-led democratic regime, however, can certainly hasten the process and help assure its acceptability and permanence.

External political and financial pressure in the form of rewards rather than penalties can enhance prospects for change in nuclear policy. The conclusion of some observers that effective implementation of export controls by nuclear supplier countries was the principal reason for the reversal in Argentine and Brazilian nuclear policy is simplistic. Restrictive foreign export policies did contribute to the difficulty and expense of the Argentine and Brazilian nuclear programs. Rather than encouraging a change, however, such policies tended to reinforce a sense of victimization and provided fuel for the nationalistic nuclear theology. Ultimately, change came from within Argentina and Brazil, rather than being imposed from the outside. The Argentine and Brazilian leadership concluded that their nuclear policies conflicted with national development objectives, including increased foreign investment, access to advanced technology, and bilateral and regional economic cooperation. There was also an expectation that reversal of the independent nuclear policies would result in Argentina and Brazil joining other advanced nations in defining the non-proliferation rules and the sharing of mutual benefits. Had the United States, Germany, and other advanced nations given principal emphasis to punitive measures, those elements supporting change in Argentina and Brazil would have been undermined.

The contribution of certain nuclear confidence-building processes is an important legacy of the Argentine-Brazilian nuclear experience. Technical exchanges between their nuclear energy commissions beginning in the mid-seventies and throughout the eighties facilitated rapport and cooperation. This earlier cooperation helped lay the technical foundation for ABACC, which draws its inspectors from the nuclear energy commissions. The early technical exchanges nurtured joint nuclear research and safety projects, which also contributed to familiarity and mutual confidence. As technical cooperation took on a political dimension in the mid-1980s, the two countries created a standing joint nuclear policy committee composed of representatives from the foreign ministry and the nuclear energy commissions, a model that later evolved into the Commission which oversees ABACC. Other confidence-building processes included advance notification of significant civil nuclear activities having potential security implications and the reciprocal head-of-state visits to nuclear facilities.

Finally, and of greatest significance, the Argentine-Brazilian experience underscores the importance of bilateral or regional machinery as a supplement or alternative to multilateral machinery. ABACC illustrates how bilateral machinery can be tailored to the needs of the affected parties, rather than adapted from a multilateral system. An indigenously-created

verification system may prove more politically acceptable than one perceived as “imposed” by more powerful nations. In the Argentine-Brazilian case, the creation of the bilateral accounting and inspection system (SCCC) also served the profoundly useful political objective of legitimizing a substantive policy reversal. It provided political cover for the Argentine and Brazilian leadership as they set about discarding their independent nuclear theology and entering the non-proliferation regime (through the Quadripartite Agreement that established full-scope IAEA safeguards).

The ABACC model may be particularly suitable to situations in which one or more parties distrusts the global non-proliferation system and resists full-scope IAEA safeguards. In the Argentine-Brazilian model, the bilateral machinery (ABACC) assumes the principal responsibility for administration of the control system and for inspections, while the IAEA preserves carefully defined prerogatives, including the right to conduct special inspections if necessary.

The ABACC model also demonstrates that bilateral or regional machinery may have over certain advantages over global machinery. Information, including the results of inspections, can go directly to governments via the ABACC Commission, rather than being filtered through the more circumspect reporting procedures of the IAEA. This procedure may produce more timely reporting of inspections at the regional level, resulting in a higher degree of confidence by the affected parties. ABACC officials also suggest several reasons why ABACC inspectors are likely to be more effective than their IAEA counterparts: (1) higher *motivation*, owing to the fact that inspectors are from two neighboring countries, rather than from many countries; (2) *better training*, as ABACC inspectors are drawn from the nuclear energy commissions and the installations being safeguarded; and (3) *familiarity and mutual rapport* derived from years of technical exchanges and cooperation between the nuclear energy programs.¹²⁰

Finally, the ABACC experience suggests that, over time, financial considerations will mandate effective cooperation between regional and multilateral non-proliferation mechanisms. As ABACC officials observed in April 1993:

The application of safeguards at the regional level, as handled by ABACC, demands a financial and human effort from the nations involved, which, in the case of Argentina and Brazil, has grown to an appreciable size. The safeguards efforts of ABACC should thus be integrated with those of the IAEA, in order to make the safeguards applied more effective, without placing an excessive burden on the countries involved. This demands effective coordination of activities by both agencies and both countries,

¹²⁰ Interview with ABACC official at ABACC headquarters, Rio de Janeiro, 28 April 1994.

allowing ABACC and the IAEA to reach independent conclusions while avoiding unnecessary duplication of safeguard efforts.¹²¹

Conclusion

How permanent is the Argentine-Brazilian commitment to a non-proliferation status? Assuming continued good bilateral relations, and in the absence of an unforeseen security threat to either nation, the outlook is promising—but not certain. The potency and durability of the Argentine-Brazilian commitment will be greatly affected by the *support and actions* of those nations with advanced nuclear programs and the nuclear weapon states.

Support could take the form of direct assistance for the Argentine-Brazilian nuclear process. The United States, through the Department of Energy (DOE), is providing useful assistance to ABACC on nuclear material control, accounting, verification, and advanced containment and surveillance technologies. A 1994 DOE-ABACC agreement has resulted in visits by ABACC personnel to US nuclear laboratories, seminars hosted in Argentina, and the provision of some equipment. Assistance of a more limited nature has been given to ABACC by France, the United Kingdom, EURATOM, and the European Union. Support is also now being provided by nations with advanced nuclear programs directly to the Argentine and Brazilian nuclear energy commissions. After years of inactivity, the United States, France, Germany, and Canada in the last several years have signed agreements for nuclear cooperation with the two nuclear energy commissions.

In a similar vein, Argentina and Brazil have been encouraged by the advanced nuclear nations to join the Nuclear Suppliers' Group, the Missile Technology Control Regime, and other similar international arrangements. Active engagement in such organizations will yield important psychological dividends in both nations. Helping design and implement the rules of the nuclear road over time will enhance the comfort level of Argentine and Brazilian policy makers with the non-proliferation regime.

Support of a different nature, however, is also needed if the significant non-proliferation progress accomplished by Argentina and Brazil (and other nations) is to be consolidated and extended. Such support must be in the form of tangible progress toward nuclear arms control and disarmament by the nuclear weapon states. The Principles and Objectives for Nuclear Non-Proliferation and Disarmament, which formed the basis for the indefinite extension of the NPT in May 1995 establish a benchmark for measuring such progress.¹²² Among the yardsticks are a number of nuclear disarmament measures with strong international support, including a comprehensive nuclear test ban treaty and a convention banning production of fissionable

¹²¹ *ABACC News*, January/April 1995.

¹²² 1995 Review and Extension Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, NPT/Conf. 1195/L.5, 9 May 1995.

material. Successful conclusion of these and other nuclear disarmament measures is very important to the leaders of Argentina, Brazil, and other nations which have taken politically difficult steps to reverse long-held policies and assume a non-proliferation status. Failure of the nuclear weapon states to progress toward nuclear disarmament, or the implementation of unilateral policies as represented by some dimensions of the US “counterproliferation” policy over time could undermine the political commitment to non-proliferation in Argentina and Brazil.¹²³

In discarding unproductive nuclear policies and establishing a unique bilateral non-proliferation verification mechanism, Argentina and Brazil have made a remarkable contribution to regional and international peace and security. Their historic accomplishment merits careful study, wide praise, and strong support by the entire international community.

¹²³ Argentine and Brazilian policy makers favoring the abandonment of the independent nuclear policies have successfully argued that, in joining the non-proliferation regime, their nations will be part of a *multilateral* effort to prevent proliferation of nuclear weapons. The conversion process from the independent nuclear theology to the multilateral non-proliferation regime is fragile and can be undermined if other nations fail to provide support for the regime. The undertaking of unilateral measures, including the use of force as suggested by the US counter-proliferation policy, may weaken the new commitment in Argentina, Brazil, and elsewhere to the non-proliferation regime. Unilateral initiatives may undercut those who have supported the policy change in Argentina and Brazil and strengthen the hand of those who oppose the regime as discriminatory. For a thoughtful assessment of the possible impact of the US counterproliferation policy on the Argentine and Brazilian leadership, see Paulo Wrobel, “Counter-proliferation: A View from South America,” in Mitchell Reiss and Harold Muller, eds., *International Perspectives of Counterproliferation*, Working Paper No. 99, Woodrow Wilson International Center for Scholars, Washington, DC, January 1995.

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Dr. Redick is the author of numerous articles and studies which have appeared in professional journals and periodicals. Recent publications include: "Nuclear Rapprochement: Argentina, Brazil and the Non-Proliferation Regime," (with Carasales and Wrobel), the *Washington Quarterly*, Vol. 18, January 1995; "Regional Nuclear Restraint in the Middle East," *Middle East Insight*, January 1995; "Tlatelolco and Regional Non-Proliferation Initiatives," *Seminario La No Proliferacion: Puntos de Vista de America Latina y el Caribe*, Memoria, OPANAL, Mexico City, January, 1995; "Latin America's Emerging Nuclear Consensus," *Arms Control Today*, March 1994; "Nuclear Weapon Free Zones in a Changing International Environment," J.B. Poole, R. Guthrie, Editors, *Verification 1994*, Vertic, London, 1994; and "Argentina-Brazil Nuclear Non-Proliferation Initiatives," *PPNN Issue Review*, No. 3, January 1994, United Kingdom.

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