105th Congress, 1st Session – – – – – – – – – – – – – House Document 105–161

COOPERATION CONCERNING PEACEFUL USES OF NUCLEAR ENERGY BETWEEN THE UNITED STATES AND BRAZIL

MESSAGE

FROM

THE PRESIDENT OF THE UNITED STATES

TRANSMITTING

THE TEXT OF A PROPOSED AGREEMENT FOR COOPERATION BETWEEN THE GOVERNMENT OF THE UNITED STATES OF AMERICA AND THE GOVERNMENT OF THE FEDERATIVE REPUBLIC OF BRAZIL CONCERNING PEACEFUL USES OF NUCLEAR ENERGY WITH ACCOMPANYING ANNEX AND AGREED MINUTE, PURSUANT TO 42 U.S.C. 2153(d)

OCTOBER 30, 1997.—Message and accompanying papers referred to the Committee on International Relations and ordered to be printed

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U.S. GOVERNMENT PRINTING OFFICE

59–011 WASHINGTON : 1997

To the Congress of the United States:

I am pleased to transmit to the Congress, pursuant to sections 123 b. and 123 d. of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2153(b), (d)), the text of a proposed Agreement for Cooperation Between the Government of the United States of America and the Government of the Federative Republic of Brazil Concerning Peaceful Uses of Nuclear Energy, with accompanying annex and agreed minute. I am also pleased to transmit my written approval, authorization, and determination concerning the agreement, and the memorandum of the Director of the United States Arms Control and Disarmament Agency with the Nuclear Proliferation Assessment Statement concerning the agreement. The joint memorandum submitted to me by the Secretary of State and the Secretary of Energy, which includes a summary of the provisions of the agreement and various other attachments, including agency views, is also enclosed.

The proposed agreement with Brazil has been negotiated in accordance with the Atomic Energy Act of 1954, as amended by the Nuclear Non-Proliferation Act of 1978 and as otherwise amended. In my judgment, the proposed agreement meets all statutory requirements and will advance the nonproliferation and other foreign policy interests of the United States. The agreement provides a comprehensive framework for peaceful nuclear cooperative between the United States and Brazil under appropriate conditions and controls reflecting a strong common commitment to nuclear nonproliferation goals.

The proposed new agreement will replace an existing United States-Brazil agreement for peaceful nuclear cooperation that entered into force on September 20, 1972, and by its terms would expire on September 20, 2002. The United States suspended cooperation with Brazil under the 1972 agreement in the late 1970s because Brazil did not satisfy a provision of section 128 of the Atomic Energy Act (added by the Nuclear Non-Proliferation Act of 1978) that required full-scope International Atomic Energy Agency (IAEA) safeguards in nonnuclear weapon states such as Brazil as a condition for continued significant U.S. nuclear exports.

On December 13, 1991, Brazil, together with Argentina, the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABAAC) and the IAEA signed a quadrilateral agreement calling for the application of full-scope IAEA safeguards in Brazil and Argentina. This safeguards agreement was brought into force on March 4, 1994. Resumption of cooperation would be possible under the 1972 United States-Brazil agreement for cooperation. However, both the United States and Brazil believe it is preferable to launch a new era of cooperation with a new agreement that reflects, among other things:

—An updating of terms and conditions to take account of intervening changes in the respective domestic legal and regulatory frameworks of the Parties in the area of peaceful nuclear cooperation;

—Reciprocity in the application of the terms and conditions of cooperation between the Parties; and

Additional international nonproliferation commitments entered into by the Parties since 1972.

—Over the past several years Brazil has made a definitive break with earlier ambivalent nuclear policies and has embraced wholeheartedly a series of important steps demonstrating its firm commitment to the exclusively peaceful uses of nuclear energy. In addition to its full-scope safeguards agreement with the IAEA, Brazil has taken the following important nonproliferation steps.

—It has formally renounced nuclear weapons development in the Foz do Iguazsu declaration with Argentina in 1990;

—It has renounced "peaceful nuclear explosives" in the 1991 Treaty of Guadalajara with Argentina;

—It has brought the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (Treaty of Tlatelolco) into force for itself on May 30, 1994;

—It has instituted more stringent domestic controls on nuclear exports and become a member of the Nuclear Suppliers Group; and

—It has announced its intention, on June 20, 1997, to accede to the Nuclear Non-Proliferation Treaty (NPT).

The proposed new agreement with Brazil permits the transfer of technology, material, equipment (including reactors), and components for nuclear research and nuclear power production. It provides for U.S. consent rights to retransfers, enrichment, and reprocessing as required by U.S. law. It does not permit transfers of any sensitive nuclear technology, restricted data, or sensitive nuclear facilities or major critical components thereof. In the event of termination key conditions and controls continue with respect to material and equipment subject to the agreement.

From the U.S. perspective, the proposed new agreement improves on the 1972 agreement by the addition of a number of important provisions. These include the provisions for full-scope safeguards; perpetuity of safeguards; a ban on "peaceful" nuclear explosives using items subject to the agreement; a right to require the return of items subject to the agreement in all circumstances for which U.S. law requires such a right; a guarantee of adequate physical security; and rights to approve enrichment of uranium subject to the agreement and alteration in form or consent of sensitive nuclear material subject to the agreement.

I have considered the views and recommendations of the interested agencies in reviewing the proposed agreement and have determined that its performance will promote, and will not constitute an unreasonable risk to, the common defense and security. Accordingly, I have approved the agreement and authorized its execution and urge that the Congress give it favorable consideration.

Because this agreement meets all applicable requirements of the Atomic Energy Act, as amended, for agreements for peaceful nuclear cooperation, I am transmitting it to the Congress without exempting it from any requirement contained in section 123 a. of that

Act. This transmission shall constitute a submittal for purposes of both sections 123 b. and 123 d. of the Atomic Energy Act. The Administration is prepared to begin immediately the consultations with the Senate Foreign Relations and House International Relations Committees as provided in section 123 b. Upon completion of the 30-day continuous session period provided for in section 123 b., the 60-day continuous session provided for in section 123 d. shall commence.

WILLIAM J. CLINTON.

THE WHITE HOUSE, *October 30, 1997.*

AGREEMENT FOR COOPERATION BETWEEN
THE GOVERNMENT OF THE UNITED STATES OF AMERICA
AND THE GOVERNMENT OF THE FEDERATIVE REPUBLIC OF BRAZIL
CONCERNING PEACEFUL USES OF NUCLEAR ENERGY

The Government of the United States of America and the Government of the Federative Republic of Brazil (hereinafter referred to as "the Parties");

Considering their close cooperation in the development, use and control of peaceful uses of nuclear energy pursuant to their Agreement for Cooperation Concerning Civil Uses of Atomic Energy signed July 17, 1972 (hereinafter referred to as "the Previous Agreement");

Reaffirming their commitment to ensuring that the international development and use of nuclear energy for peaceful purposes are carried out under arrangements which will to the maximum possible extent further the objectives of the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean and its Protocols ("Treaty of Tlatelolco");

Affirming their support of the objectives of the International Atomic Energy Agency ("IAEA") and their desire to promote full implementation of the Treaty of Tlatelolco;

Desiring to cooperate in the development, use and control of peaceful uses of nuclear energy; and

Mindful that peaceful nuclear activities must be undertaken with a view to protecting the international environment from radioactive, chemical and thermal contamination;

Have agreed as follows:

ARTICLE 1 - DEFINITIONS

For the purposes of this Agreement:

(A) "Byproduct material" means any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material;

(B) "Component" means a component part of equipment or other item, so designated by agreement of the parties;

(C) "Equipment" means any reactor, other than one designed or used primarily for the formation of plutonium or uranium 233, or any other item so designated by agreement of the parties;

(D) "High enriched uranium" means uranium enriched to twenty percent or greater in the isotope 235;

(E) "Low enriched uranium" means uranium enriched to less than twenty percent in the isotope 235;

(F) "Major critical component" means any part or group of parts essential to the operation of a sensitive nuclear facility;

(G) "Material" means source material, special nuclear material, byproduct material, radioisotopes other than byproduct material, moderator material, or any other such substance so designated by agreement of the parties;

(H) "Moderator material" means heavy water or graphite or beryllium of a purity suitable for use in a reactor to slow down high velocity neutrons and increase the likelihood of further fission, or any other such material so designated by agreement of the parties;

(I) "Peaceful purposes" include the use of information, material, equipment and components in such fields as research, power generation, medicine, agriculture and industry but do not include use in, research on or development of any nuclear explosive device, or any military purpose;

(J) "Person" means any individual or any entity subject to the jurisdiction of either party but does not include the parties to this Agreement;

(K) "Reactor" means any apparatus, other than a nuclear weapon or other nuclear explosive device, in which a self-sustaining fission chain reaction is maintained by utilizing uranium, plutonium or thorium or any combination thereof;

(L) "Restricted data" means all data concerning (1) design, manufacture or utilization of nuclear weapons, (2) the production of special nuclear material, or (3) the use of special nuclear material in the production of energy, but shall not include data of a party which it has declassified or removed from the category of restricted data;

(M) "Sensitive nuclear facility" means any facility designed or used primarily for uranium enrichment, reprocessing of nuclear fuel, heavy water production, or fabrication of nuclear fuel containing plutonium;

(N) "Sensitive nuclear technology" means any information (including information incorporated in equipment or a component) which is not in the public domain and which is important to the design, construction, fabrication, operation or maintenance of any sensitive nuclear facility, or other such information which may be so designated by agreement of the parties;

(O) "Source material" means (1) uranium, thorium, or any other material so designated by agreement of the parties, or (2) ores containing one or more of the foregoing materials in such concentration as the parties may agree from time to time;

(P) "Special nuclear material" means (1) plutonium, uranium 233, or uranium enriched in the isotope 235, or (2) any other material so designated by agreement of the parties.

ARTICLE 2 - SCOPE OF COOPERATION

1. The parties shall cooperate in the use of nuclear energy for peaceful purposes in accordance with the provisions of this Agreement and their applicable treaties, national laws, regulations and license requirements.

2. Transfer of information, material, equipment and components under this Agreement may be undertaken directly between the parties or through authorized persons. Such transfers shall be subject to this Agreement and to such additional terms and conditions as may be agreed by the parties.

3. Material, equipment and components transferred from the territory of one party to the territory of the other party, whether directly or through a third country, will be regarded as having been transferred pursuant to the Agreement only upon confirmation, by the appropriate government authority of the recipient party to the appropriate government authority of the supplier party, that such material, equipment or components will be subject to the Agreement.

ARTICLE 3 - TRANSFER OF INFORMATION

1. Information concerning the use of nuclear energy for peaceful purposes may be transferred. Transfers of information may be accomplished through various means, including reports, data banks, computer programs, conferences, visits, and assignments of staff to facilities. Fields which may be covered include, but shall not be limited to, the following:

(A) Development, design, construction, operation, maintenance and use of reactors, and reactor experiments;

(B) The use of material in physical and biological research, medicine, agriculture and industry;

(C) Fuel cycle studies of ways to meet future world-wide civil nuclear needs, including multilateral approaches to guaranteeing nuclear fuel supply and appropriate techniques for management of nuclear wastes;

(D) Safeguards and physical protection of materials, equipment, and components;

(E) Radiation protection, including safety and environmental considerations; and

(F) Assessing the role nuclear power may play in national energy plans.

2. This Agreement does not require the transfer of any information which the parties are not permitted under their respective treaties, national laws, and regulations to transfer.

3. Restricted data shall not be transferred under this Agreement.

4. Sensitive nuclear technology shall only be transferred under this Agreement as provided for by an amendment to this Agreement.

ARTICLE 4 - TRANSFER OF MATERIAL, EQUIPMENT AND COMPONENTS

1. Material, equipment and components may be transferred for applications consistent with this Agreement. Any special nuclear material transferred under this Agreement shall be low enriched uranium, except as provided in paragraphs 4

and 5. Sensitive nuclear facilities and major critical components shall only be transferred under this Agreement as provided for by an amendment to this Agreement.

2. Low enriched uranium may be transferred for use as fuel in reactor experiments and in reactors, for conversion or fabrication, or for such other purposes as may be agreed by the parties.

3. The quantity of special nuclear material transferred under this Agreement shall not at any time be in excess of that quantity the parties agree is necessary for any of the following purposes: use in reactor experiments or the loading of reactors, the efficient and continuous conduct of such reactor experiments or operation of such reactors, and the accomplishment of other purposes as may be agreed by the parties.

4. Small quantities of special nuclear material may be transferred for use as samples, standards, detectors, targets and for such other purposes as the parties may agree. Transfers pursuant to this paragraph shall not be subject to the quantity limitations in paragraph 3.

5. Special nuclear material other than low enriched uranium and material contemplated under paragraph 4 may, if the parties agree, be transferred for specified applications where technically and economically justified.

ARTICLE 5 - STORAGE AND RETRANSFERS

1. Plutonium and uranium 233 (except as contained in irradiated fuel elements), and high enriched uranium, transferred pursuant to this Agreement or used in or produced through the use of material or equipment so transferred shall only be stored in a facility to which the parties agree.

2. Material, equipment and components transferred pursuant to this Agreement and any special nuclear material produced through the use of any such material or equipment shall not be transferred to unauthorized persons or, unless the parties agree, beyond the recipient party's territorial jurisdiction.

ARTICLE 6 - REPROCESSING AND ENRICHMENT

1. Material transferred pursuant to this Agreement and material used in or produced through the use of material or equipment so transferred shall not be reprocessed unless the parties agree.

2. Plutonium, uranium 233, high enriched uranium and irradiated source or special nuclear material, transferred pursuant to this Agreement or used in or produced through the use of material or equipment so transferred, shall not be altered in form or content, except by irradiation or further irradiation, unless the parties agree.

3. Uranium transferred pursuant to this Agreement or used in any equipment so transferred shall not be enriched after transfer to twenty percent or greater in the isotope 235 unless the parties agree.

ARTICLE 7 - PHYSICAL PROTECTION

1. Adequate physical protection shall be maintained with respect to source or special nuclear material and equipment transferred pursuant to this Agreement and special nuclear material used in or produced through the use of material or equipment so transferred.

2. The parties agree to the levels for the application of physical protection set forth in the Annex to this Agreement, which may be modified by mutual consent of the parties without amending this Agreement. The parties shall maintain adequate physical protection measures in accordance with these levels. These measures shall as a minimum provide protection comparable to the recommendations set forth in IAEA Document INFCIRC/225/Rev. 3 concerning the physical protection of nuclear material, or in any revision of that document agreed to by the parties.

3. The adequacy of physical protection measures maintained pursuant to this article shall be subject to review and consultations by the parties periodically and whenever either party is of the view that revised measures may be required to maintain adequate physical protection.

4. Each party shall identify those agencies or authorities having responsibility for ensuring that levels of physical protection are adequately met and having responsibility for coordinating response and recovery operations in the event of unauthorized use or handling of material subject to this article. Each party shall also designate points of contact within its national authorities to cooperate on matters of out-of-country transportation and other matters of mutual concern.

5. The provisions of this article shall be implemented in such a manner as to avoid undue interference in the parties' nuclear activities and so as to be consistent with prudent

management practices required for the economic and safe conduct of their nuclear programs.

ARTICLE 8 - NO EXPLOSIVE OR MILITARY APPLICATION

1. Cooperation under this Agreement shall be based upon the following obligations:

(A) For Brazil, not to detonate a nuclear explosive device, and

(B) For the United States, not to detonate a nuclear explosive device using material, equipment or components subject to this Agreement.

2. Material, equipment and components transferred pursuant to this Agreement and material used in or produced through the use of any material, equipment or components so transferred shall not be used for any nuclear explosive device, for research on or development of any nuclear explosive device, or for any military purpose.

ARTICLE 9 - SAFEGUARDS

1. Cooperation under this Agreement shall require the application of IAEA safeguards with respect to all nuclear material in all nuclear activities within the territory of Brazil, under its jurisdiction or carried out under its control anywhere. Implementation of the safeguards agreement between Brazil, the Argentine Republic, the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials, and the IAEA, signed at Vienna December 13, 1991, shall be considered to fulfill this requirement.

2. Source or special nuclear material transferred to Brazil pursuant to this Agreement and any source or special nuclear material used in or produced through the use of material, equipment or components so transferred shall be subject to safeguards in accordance with the safeguards agreement specified in paragraph 1 of this Article.

3. Source or special nuclear material transferred to the United States pursuant to this Agreement and any source or special nuclear material used in or produced through the use of any material, equipment or components so transferred shall be subject to the agreement between the United States of America and the IAEA for the application of safeguards in the United States of America, done at Vienna November 18, 1977, entered into force December 9, 1980.

4. If either party becomes aware of circumstances which demonstrate that the IAEA for any reason is not or will not be applying safeguards in accordance with the agreement as provided for in paragraph 2 or paragraph 3, to ensure effective continuity of safeguards the parties shall immediately enter into arrangements with the IAEA or between themselves which conform with IAEA safeguards principles and procedures and the coverage required by paragraph 2 or paragraph 3, and which provide assurance equivalent to that intended to be secured by the system they replace.

5. Each party shall take such measures as are necessary to maintain and facilitate the application of safeguards provided for under this Article.

6. Each party shall ensure the maintenance of a system of accounting for and control of source and special nuclear material transferred pursuant to this Agreement and source and special nuclear material used in or produced through the use of any material, equipment or components so transferred. The procedures for this system shall be comparable to those set forth in IAEA document INFCIRC/153 (corrected), or in any revision of that document agreed to by the parties.

7. Upon the request of either party, the other party shall report or permit the IAEA to report to the requesting party on the status of all inventories of material subject to this Agreement.

8. The provisions of this article shall be implemented in such a manner as to avoid undue interference in the parties' nuclear activities and so as to be consistent with prudent management practices required for the economic and safe conduct of their nuclear programs.

ARTICLE 10 - MULTIPLE SUPPLIER CONTROLS

If any agreement between either party and another nation or group of nations provides such other nation or group of nations rights equivalent to any or all of those set forth under Article 5 or 6 with respect to material, equipment or components subject to this Agreement, the parties may, upon request of either of them, agree that the implementation of any such rights will be accomplished by such other nation or group of nations.

ARTICLE 11 - CESSATION OF COOPERATION

1. If either party at any time following entry into force of this Agreement:

(A) does not comply with the provisions of Article 5, 6, 7, 8, or 9, or

(B) terminates, abrogates or materially violates a safeguards agreement with the IAEA,

the other party shall have the rights to cease further cooperation under this Agreement, suspend this Agreement, or terminate this Agreement and to require the return of any material, equipment and components transferred under this Agreement and any special nuclear material produced through their use.

2. If either party exercises its rights under this Article to require the return of any material, equipment or components, it shall, after removal from the territory of the other party, reimburse the other party for the fair market value of such material, equipment or components.

ARTICLE 12 - TERMINATION OF PREVIOUS AGREEMENT

1. The Previous Agreement shall terminate on the date this Agreement enters into force.

2. Cooperation initiated under the Previous Agreement shall continue in accordance with the provisions of this Agreement. The provisions of this Agreement shall apply to material and equipment subject to the Previous Agreement.

ARTICLE 13 - CONSULTATIONS AND ENVIRONMENTAL PROTECTION

1. The parties undertake to consult at the request of either party regarding the implementation of this Agreement and the development of further cooperation in the field of peaceful uses of nuclear energy.

2. The parties shall consult, with regard to activities under this Agreement, to identify the international environmental implications arising from such activities and shall cooperate in protecting the international environment from radioactive, chemical or thermal contamination arising from peaceful nuclear activities under this Agreement and in related matters of health and safety.

ARTICLE 14 - ENTRY INTO FORCE, DURATION, AND AMENDMENT

1. This Agreement shall enter into force on the date on which the parties exchange diplomatic notes informing each other that they have completed all applicable requirements for its

entry into force, and shall remain in force for a period of thirty (30) years. This term may be extended for such additional periods as may be agreed between the parties in accordance with their applicable requirements.

2. Notwithstanding the suspension, termination or expiration of this Agreement or any cooperation hereunder for any reason, Articles 5, 6, 7, 8, 9, and 11 shall continue in effect so long as any material, equipment or components subject to these Articles remains in the territory of the party concerned or under its jurisdiction or control anywhere, or until such time as the parties agree that such material, equipment or components are no longer usable for any nuclear activity relevant from the point of view of safeguards.

3. At the request of either party, the parties shall consult on whether to amend this Agreement or to replace it with a new agreement.

IN WITNESS WHEREOF the undersigned, being duly authorized, have signed this Agreement.

DONE at Brasilia, this 14th day of October 1997, in duplicate, in the English and Portuguese languages, both texts being equally authentic.

FOR THE GOVERNMENT OF THE UNITED STATES OF AMERICA:

FOR THE GOVERNMENT OF THE FEDERATIVE REPUBLIC OF BRAZIL:

ANNEX

Pursuant to paragraph 2 of Article 7, the agreed levels of physical protection to be ensured by the competent national authorities in the use, storage and transportation of the materials listed in the attached table shall as a minimum include protection characteristics as below:

Category III

Use and storage within an area to which access is controlled.

Transportation under special precautions including prior arrangements among sender, recipient and carrier, and prior agreement between entities subject to the jurisdiction and regulation of supplier and recipient states, respectively, in case of international transport specifying time, place and procedures for transferring transport responsibility.

Category II

Use and storage within a protected area to which access is controlled, i.e., an area under constant surveillance by guards or electronic devices, surrounded by a physical barrier with a limited number of points of entry under appropriate control, or any area with an equivalent level of physical protection.

Transportation under special precautions including prior arrangements among sender, recipient and carrier, and prior agreement between entities subject to the jurisdiction and regulation of supplier and recipient states, respectively, in case of international transport, specifying time, place and procedures for transferring transport responsibility.

Category I

Material in this category shall be protected with highly reliable systems against unauthorized use as follows:

Use and storage within a highly protected area, i.e., a protected area as defined for category II above, to which, in addition, access is restricted to persons whose trustworthiness has been determined, and which is under surveillance by guards who are in close communication with appropriate response forces. Specific measures taken in this context should have as their objective the detection and prevention of any assault, unauthorized access or unauthorized removal of material.

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Transportation under special precautions as identified above for transportation of categories II and III materials and, in addition, under constant surveillance by escorts and under conditions which assure close communication with appropriate response forces.

TABLE: CATEGORIZATION OF NUCLEAR MATERIAL[e]

Material	Form	Category I	Category II	Category III
1. Plutonium [a, f]	Unirradiated [b]	2 kg or more	Less than 2 kg but more than 500 g	500 g or less [c]
2. Uranium-235 [d]	Unirradiated [b]			
	- uranium enriched to 20% 235 U or more	5 kg or more	Less than 5 kg but more than 1 kg	1 kg or less [c]
	- uranium enriched to 10% 235 U but less than 20%		10 kg or more	Less than 10 kg [c]
	- uranium enriched above natural, but less than 10% 235 U			10 kg or more
3. Uranium-233	Unirradiated [b]	2 kg or more	Less than 2 kg but more than 500 g	500 g or less [c]

[a] All plutonium except that with isotopic concentration exceeding 80% in plutonium-238.

[b] Material not irradiated in a reactor or material irradiated in a reactor but with a radiation level equal to or less than 100 radsrhour at one meter unshielded.

[c] Less than a radiologically significant quantity is exempted.

[d] Natural uranium, depleted uranium and thorium and quantities of uranium enriched to less than 10% not falling in Category III should be protected in accordance with prudent management practice.

[e] Irradiated fuel should be protected as Category I, II or III nuclear material depending on the category of the fresh fuel. However, fuel which by virtue of its original fissile material content is included as Category I or II before irradiation should only be reduced one Category level, while the radiation level from the fuel exceeds 100 rads/h at one meter unshielded.

[f] The State's competent authority should determine if there is a credible threat to disperse plutonium malevolently. The State should then apply physical protection requirements for category I, II or III of nuclear material, as it deems appropriate and without regard to the plutonium quantity specified under each category herein, to the plutonium isotopes in those quantities and forms determined by the State to fall within the scope of the credible dispersal threat.

AGREED MINUTE

During the negotiation of the Agreement for Cooperation between the United States of America and Brazil Concerning Peaceful Uses of Nuclear Energy ("Agreement") signed today, the following understandings, which shall be an integral part of the Agreement, were reached.

Coverage of Agreement

For the purposes of implementing the rights specified in Articles 5 and 6 with respect to special nuclear material produced through the use of nuclear material transferred pursuant to the Agreement and not used in or produced through the use of equipment transferred pursuant to the Agreement, such rights shall in practice be applied to that proportion of special nuclear material produced which represents the ratio of transferred material used in the production of the special nuclear material to the total amount of material so used, and similarly for subsequent generations.

Safeguards

If either party becomes aware of circumstances referred to in paragraph 4 of Article 9, either party shall have the rights listed below, which rights shall be suspended if both parties agree that the need to exercise such rights is being satisfied by the application of IAEA safeguards under arrangements pursuant to paragraph 4 of Article 9:

(1) To review in a timely fashion the design of any equipment transferred pursuant to the Agreement, or of any facility which is to use, fabricate, process, or store any material so transferred or any special nuclear material used in or produced through the use of such material or equipment;

(2) To require the maintenance and production of records and of relevant reports for the purpose of assisting in ensuring accountability for material transferred pursuant to the Agreement and any source material or special nuclear material used in or produced through the use of any material, equipment or components so transferred; and

(3) To designate personnel, in consultation with the other party, who shall have access to all places and data necessary to account for the material in paragraph 2, to inspect any equipment or facility referred to in paragraph

1, and to install any devices and make such independent measurements as may be deemed necessary to account for such material. Such personnel shall, if either party so requests, be accompanied by personnel designated by the other party.

FOR THE GOVERNMENT OF THE UNITED STATES OF AMERICA:

FOR THE GOVERNMENT OF THE FEDERATIVE REPUBLIC OF BRAZIL:

THE WHITE HOUSE

WASHINGTON

October 9, 1997

Presidential Determination
No. 98-2

MEMORANDUM FOR THE SECRETARY OF STATE
THE SECRETARY OF ENERGY

SUBJECT: Presidential Determination on the Proposed Agreement for Cooperation Between the Government of the United States of America and the Government of the Federative Republic of Brazil Concerning Peaceful Uses of Nuclear Energy

I have considered the proposed Agreement for Cooperation Between the Government of the United States of America and the Government of the Federative Republic of Brazil Concerning Peaceful Uses of Nuclear Energy, along with the views, recommendations, and statements of the interested agencies.

I have determined that the performance of the agreement will promote, and will not constitute an unreasonable risk to, the common defense and security. Pursuant to section 123 b. of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2153(b)), I hereby approve the proposed agreement and authorize you to arrange for its execution.

The Secretary of State is authorized and directed to publish this determination in the Federal Register.

William J. Clinton

UNITED STATES ARMS CONTROL AND DISARMAMENT AGENCY
Washington, D.C. 20451

THE DIRECTOR

JUL 29 1997

MEMORANDUM FOR THE PRESIDENT

SUBJECT: Views and Recommendations on the Proposed Agreement for Cooperation Between the Government of the United States of America and the Government of the Federative Republic of Brazil Concerning Peaceful Uses of Nuclear Energy

As required by Section 123 a. of the Atomic Energy Act, I am submitting to you my views and recommendations on the Proposed Agreement for Cooperation Between the Government of the United States of America and the Government of the Federative Republic of Brazil Concerning Peaceful Uses of Nuclear Energy. The Arms Control and Disarmament Agency participated in the negotiation of this agreement. The Nuclear Proliferation Assessment Statement required by the Act is being transmitted to you separately. I strongly support the proposed Agreement.

Brazil has transformed its policies over the past decade from a country that had refused to embrace the nuclear nonproliferation regime to one that has: accepted International Atomic Energy Agency (IAEA) safeguards on all its nuclear activities; brought into force the Latin American regional treaty that prohibits the acquisition of nuclear weapons (Treaty of Tlatelolco); joined the Nuclear Suppliers Group (NSG); and most recently announced its intention to accede to the Nuclear Non-Proliferation Treaty.

The proposed agreement reinforces a key principle of U.S. nuclear export policy which is to offer more expansive civil nuclear benefits to countries which support strong nuclear nonproliferation policies. U.S.-Brazilian nuclear cooperation has been virtually moribund since 1978 when the United States adopted upgraded conditions for its nuclear exports -- conditions which then-Brazilian leaders would not accept. Brazil's current leaders have a genuine commitment to the renunciation of nuclear weapons and have demonstrated and reinforced that commitment through the steps noted above.

The proposed agreement contains all the safeguards, guarantees and consent rights required by law to guard against the misuse of U.S. supply. Moreover, it is also worth noting that the expanded controls in the new agreement will cover not only all future nuclear exports, but also equipment and nuclear material supplied by the United States to Brazil prior to 1978 under previous agreements for cooperation.

The fact that Brazil is a recent adherent to global nuclear nonproliferation norms, including nuclear export principles, suggests that Brazil's political leadership must exercise considerable diligence to ensure compliance with these new commitments. Brazilian officials have assured us that they have taken and will continue to implement the steps necessary to ensure that all entities under their control, including the military, will conform with Brazil's international obligations. Moreover, while we are concerned about Brazil's January 1996 civil nuclear cooperation agreement with India (which predated Brazil's NSG membership), it is clear that Brazilian officials intend to implement this agreement in full conformance with Brazil's NSG obligations. Finally, while Brazil's full-scope safeguards agreement did not come into force until 1994, we have no reason to believe that Brazil has provided the IAEA with anything less than a full accounting of all nuclear material and activities required to be declared under this safeguards agreement.

In conclusion, the scope and depth of the nuclear and other nonproliferation policies adopted by Brazil over the past few years demonstrates its commitment to responsible nonproliferation behavior. Entry into force of the proposed Agreement will serve important foreign policy and national security interests of the United States with particular emphasis on nuclear nonproliferation goals. I recommend that you approve the proposed Agreement; that you determine that the performance of the proposed Agreement will promote, and will not constitute an unreasonable risk to, the common defense and security; and that you authorize the signature of the proposed Agreement.

John D. Holum

UNITED STATES ARMS CONTROL AND DISARMAMENT AGENCY
Washington, D.C. 20451

JUL 29 1997

THE DIRECTOR

MEMORANDUM FOR THE PRESIDENT

SUBJECT: Nuclear Proliferation Assessment Statement for the Proposed Agreement for Cooperation between the Government of the United States of America and the Government of the Federative Republic of Brazil Concerning Peaceful Uses of Nuclear Energy.

As required by section 123 a. of the Atomic Energy Act of 1954, as amended, I am submitting to you an unclassified Nuclear Proliferation Assessment Statement (attached) with respect to the Proposed Agreement for Cooperation Between the Government of the United States of America and the Government of the Federative Republic of Brazil Concerning Peaceful Uses of Nuclear Energy. After providing background information on the nuclear programs and nuclear nonproliferation policies of Brazil (Part I), this statement examines the applicable legal requirements (Part II), relevant policy issues (Part III), and arrives at certain conclusions (Part IV).

Beginning in 1990, Brazil took several steps to renounce formally the acquisition of nuclear weapons culminating with adherence to the Latin American Nuclear Weapons Free Zone Treaty in 1994. In June 1997, President Cardoso announced that he was submitting the Nuclear Non-Proliferation Treaty to the Brazilian Congress with a recommendation for approval. Brazil is a strong supporter of other elements of the nuclear nonproliferation regime, including the safeguards system of the International Atomic Energy Agency and the export principles of the Nuclear Suppliers Group. The proposed Agreement will be the fourth cooperation agreement between the United States and Brazil and will supersede the current agreement concluded in 1972. The proposed Agreement will place our civil nuclear cooperation with Brazil on a stable, long-term basis, and is an appropriate response to the dramatic and responsible steps taken by Brazilian leaders in recent years to embrace nuclear nonproliferation principles.

I have concluded that the proposed Agreement meets all statutory requirements. Further, I have reached a favorable assessment of the adequacy of the safeguards and other control mechanisms and the peaceful use assurances contained in the proposed Agreement to ensure that any assistance furnished thereunder will not be used to further any military or nuclear explosive purpose.

John D. Holum

Attachment:
As stated

NUCLEAR PROLIFERATION ASSESSMENT STATEMENT

Pursuant to Section 123 a. of the
Atomic Energy Act of 1954, as amended,
With Respect to the Proposed Agreement for Cooperation
Between the Government of the United States of America
and the Government of the Federative Republic of Brazil
Concerning Peaceful Uses of Nuclear Energy

This Nuclear Proliferation Assessment Statement relates to the proposed Agreement for Cooperation between the Government of the United States of America and the Government of the Federative Republic of Brazil Concerning Peaceful Uses of Nuclear Energy. This agreement for cooperation (which is hereinafter called the "proposed Agreement") is concurrently being submitted to the President for his authorization for execution.

Section 123 a. of the Atomic Energy Act of 1954, as amended ("Atomic Energy Act"), provides that a Nuclear Proliferation Assessment Statement shall "analyze the consistency of the text of the proposed Agreement for cooperation with all the requirements of this Act, with specific attention to whether the proposed Agreement is consistent with each of the criteria set forth in this subsection" and address the "adequacy of the safeguards and other control mechanisms and the peaceful use assurances contained in the agreement for cooperation to ensure that any assistance furnished thereunder will not be used to further any military or nuclear explosive purpose." With this statutory mandate in mind, this assessment statement begins with background on the nuclear program and policies of Brazil (Part I); describes the nature and scope of cooperation contemplated in the proposed Agreement (Part II A), and reviews the applicable substantive requirements of the Nuclear Non-Proliferation Act (NNPA) and the Atomic Energy Act and how they are met by the proposed Agreement (Part II B); discusses other nonproliferation policy issues pertinent to this case (Part III); and then sets forth the assessment, conclusions, views and recommendations of the United States Arms Control and Disarmament Agency, as contemplated by Section 123 a. of the Atomic Energy Act (Part IV).

NUCLEAR PROLIFERATION ASSESSMENT STATEMENT

I. BACKGROUND

A. Nuclear Program of Brazil

Brazil has an extensive nuclear infrastructure, a significant portion of which has been obtained from U.S., German and other sources. Like Argentina, with which it was locked in a competition for regional power and international prestige, Brazil sought a sophisticated civil nuclear program (including enrichment and reprocessing facilities). Unlike its rival, which pursued indigenous development as far as possible, Brazil sought to acquire its nuclear infrastructure largely from outside suppliers.

Brazil's first foray into the nuclear fuel cycle came in 1945, when the government of President Vargas secretly agreed to export thorium from its huge natural reserves solely to the United States or U.S.-approved consignees. In 1951, Brazil founded a nuclear research program under the National Research Council (Conselho Nacional de Pesquisas - CNP), partly in reaction to the sensational (and entirely spurious) claim by Argentine President Peron that his scientists had carried out controlled thermonuclear fusion. Two years later, the CNP's President concluded a secret deal with German scientists to purchase three gas centrifuges; seized by customs officials, the components were shipped years later to a research institute in Sao Paulo, where they were installed for short-lived training purposes and later reverse-engineered for the development of Brazilian models.

During the early years, Brazil's nuclear organizations were subject to the vicissitudes of abrupt changes in governments in quick succession. While Brazil had four Presidents in a year-and-a-half (August 1954- January 1956), the CNP went through three chiefs in less than a year. In 1955, an Atomic Energy Commission was established under the CNP to better focus on nuclear matters; however, the AEC was supplanted the next year by a National Commission of Nuclear Energy (Comissao Nacional de Energia Nuclear - CNEN) which was separate from the CNP and answered directly to the Brazilian President.

In addition to changes at the top, there were disagreements from below as to the most appropriate direction for Brazil's nuclear development. Several groups favored taking advantage of the country's abundant thorium (and to a lesser extent, uranium) reserves to develop an indigenous, independent research and power program centered around natural-uranium and the use of thorium in reactors. Other factions, however, were more interested in building upon the warm U.S.-Brazil relationship during World War II and taking advantage of U.S. technical sophistication in civil nuclear energy, with a particular interest in acquiring research and commercial light-water reactors. Either approach would mean assuming dependence on the U.S.

for the enriched uranium fuel for these reactors. Ultimately, Brazil would contract for four U.S.-supplied or -designed research and power reactors by 1971 (see section I. B, below).

Changes in governments, however, continued to undercut the progress of the program. From 1961-1964, the administrations of President Qadros and then President Goulart reoriented Brazil's reactor program toward the acquisition of natural uranium-fueled reactors being developed by the French. However, the military regime that came to power after the 1964 coup re-directed the nuclear program back to light-water reactors, resulting in four years of lost effort and investment in the French option.

In 1971, Brazil contracted with the U.S. firm Westinghouse for a 626 MW(e) safeguarded pressurized-water reactor (PWR) fueled by U.S.-supplied low-enriched uranium (LEU). Construction began on the "Angra-1" reactor in 1972 at the Angra Dos Reis nuclear power station on the South Atlantic coast, some 130 km southwest of Rio de Janeiro. Startup of the reactor, however, lagged far behind the original schedule, owing to numerous construction and financial problems, including serious fires and geological instability at the site. The reactor did not begin actual commercial operation until 1985. The problems besetting Angra I have continued; technical difficulties (some endemic to the design) have allowed only intermittent operation, earning Angra I the sobriquet "the Firefly" from local residents.

In 1974 the United States removed some guarantees for the long-term supply of nuclear fuel to many of its foreign customers including Brazil. The guarantees had been part of the contract between Westinghouse Electric Corporation and the Brazilian government for the construction of the Angra-1 nuclear power plant. Brazil, counting heavily on nuclear power in its long-term development plans, was deeply disturbed by the U.S. action and began to seek its enriched uranium fuel--and additional nuclear facilities --from other sources. Combined with the oil shocks of 1973 (fully 80% of Brazilian oil was imported, though most of its electricity was produced by hydropower), its competition for technological prestige with Argentina, and the perception that a technologically-developed country controlled its own destiny and security, Brazil sought to establish a sophisticated civil nuclear energy infrastructure as soon as possible. In 1975, Brazil stunned the world with the announcement of the "nuclear deal of the century" with West Germany for the supply of facilities for a complete nuclear fuel cycle, including two reactors (with the option of purchasing six more), plans for uranium processing, conversion, and enrichment and reprocessing plants. The latter facilities caused a strong U.S. reaction; even though all the facilities would be under international safeguards, the transfer of such sensitive technology that could be used to produce weapons-grade uranium and plutonium (especially to a country that had denounced the Nuclear Non-Proliferation Treaty (NPT) and had not brought the Treaty of Tlatelolco into force) promised to open the floodgates to similar deals for other countries and threatened to swamp the nascent global nuclear nonproliferation regime. The deal was premised on Brazil's progressively obtaining the necessary capability to manufacture its own

reactors. Brazil could in the end have acquired a completely independent scientific, technological and industrial nuclear power infrastructure--one that could easily support a nuclear weapons program if channeled in that direction.

Compared with its original scope, the German-Brazil deal has produced only modest results. Construction of the two reactors to be provided under the agreement is significantly behind schedule and has greatly exceeded the original cost projections. Over $4.5 billion has been spent on the 1300 MW PWR Angra-2 reactor, with at least another $1.3 billion required to finish construction. Funds for Angra-3 have been reallocated by the Congress to Angra-2 construction and in January 1993, President Itamar Franco announced the indefinite suspension of the Angra-3 project. The German "Becker" jet-nozzle enrichment process proved unworkable in practice, and only a small pilot cascade was built at the Resende Nuclear Energy Complex, located approximately 145 km northwest of Rio de Janeiro; the jet-nozzle plant has subsequently been shut down. Unable to enrich enough fuel for the Angra-1 reactor, Brazil continues to obtain enriched uranium from the German-Netherlands-U.K. enrichment consortium URENCO, which converts Brazilian-origin yellowcake into uranium hexaflouride, enriches it, and fabricates it into fuel pellets. In September 1990, the German government announced that "current and future" nuclear exports would be approved only if full-scope safeguards were in effect in the recipient country. This policy reversal put additional pressure on Brazil to accept IAEA safeguards for all its nuclear facilities.

Concern over dependency on foreign equipment and material and the restrictions of international safeguards attached to the German transfers impelled the military government in 1979 to create an autonomous "parallel" program to develop the nuclear fuel cycle, separate from the German deal and outside of international safeguards. Under the stewardship of the Navy, which had plans to construct a nuclear-powered submarine, the program initially focussed on developing a small light-water reactor for submarine propulsion and an indigenous uranium enrichment capability using ultracentrifuges as a more reliable alternative to the unproven German jet-nozzle technology. Soon, however, all three services had active nuclear research programs, with CNEN as a nominal coordinator and supplemental financier; the Army began development of a large graphite-moderated reactor (which would be well-suited for production of weapons-grade plutonium), while the Air Force delved into breeder reactors and laser enrichment technologies.

The Navy's Special Projects Commission (Comissao de Projetos Especiais da Marinha - COPESP) in Sao Paulo first conducted laboratory-scale experiments on centrifuge enrichment at the Institute for Energy and Nuclear Research (IPEN) facility at the University of Sao Paulo; in 1987, the government announced that it had enriched uranium to 1% U_{235} on a laboratory scale using the centrifuge method. Subsequently, COPESP began construction of a pilot enrichment plant at Aramar in Ipero, near Sao Paulo; in 1989, it was announced that the first "module" of the

plant had produced small amounts of 20%-enriched U_{235}. The Navy continued to expand the plant, with plans to install several thousand individual, indigenously produced centrifuge units for a capability of producing several thousand kilograms per year of 5%-enriched LEU outside of international safeguards. Currently, the Aramar facility has approximately 1050 centrifuges installed, producing LEU only on a pilot scale. Plans are underway to develop an industrial scale uranium enrichment facility over the next few years. (See page I-6)

After the return of civilian government in 1985, reports surfaced in the Brazilian press in 1986 that the military had constructed a nuclear test site at an Air Force base in the Cachimbo Province in north-central Brazil. The Government of then-President Sarney denied the reports, but his successor, Fernando Collor de Mello, made a highly publicized visit to the site to confirm its purpose and to close the site, symbolically shoveling dirt into the test shaft. At the time the shaft was constructed in the early 1980's Brazil did not possess enough unsafeguarded fissile material to manufacture a nuclear explosive.

In 1988, the Brazilian Congress approved a new Constitution which mandated that all nuclear activities were to be conducted for peaceful purposes. Under the civilian Sarney and Collor administrations, the Brazilian Government took several significant steps to increase transparency in the activities of the parallel program and ultimately to terminate it. One example was the Sarney Government's arrangement for a tour of the sensitive Aramar enrichment facility by Argentine President Alfonsin in 1988, building upon earlier efforts with Argentina to foster mutual nuclear cooperation and transparency (discussed in more detail in Section C below). Under President Collor, the parallel program lost its privileged funding status; the Air Force enrichment and the Army's graphite reactor programs were quick casualties of the government's new spending priorities and were terminated altogether.

The nuclear submarine development effort seems to have stalled indefinitely, owing to technical difficulties (including a mismatch between the size of the prototype reactor and that of the submarine's hull) and a shortage of funds; the nuclear sub project has already reportedly consumed over $670 million, and would require at least another $500 million to reach prototype stage. The immediate priority has become the production of an indigenously-constructed conventional sub. Brazil has participated in the construction of three conventional subs for the Navy in a joint partnership with Germany, with an eye to increasing Brazilian capability to produce its own conventional submarines. In February 1996 the Navy Minister Mauro Cesar Rodrigues Pereira announced that the Navy had given up its plan to build a nuclear submarine for the time being due to lack of funds. Nonetheless, in April 1996 a Navy official said if the Navy received the necessary funds, a reactor prototype would be ready by 2003 and a submarine completed by 2008. COPESP continues to operate the 100-watt IPEN "zero-power" research reactor at the Aramar facility, which was constructed as a research platform for a submarine propulsion reactor.

In late 1991, Brazil and Argentina signed a joint comprehensive safeguards agreement with the IAEA; the agreement entered into force for both countries in March 1994. All of Brazil's nuclear activities, including those under the former parallel program, are now under IAEA and bilateral safeguards arrangements.

In the early 1990's Brazil's nuclear program suffered a drastic cutback in funds which led to an almost complete standstill in efforts to introduce the nuclear fuel cycle on an industrial scale. Construction at Angra-2 was interrupted, and the Angra-1 plant was shut down repeatedly for safety reasons. The CNEN's investment budget was cut from $46 million at the end of the 1980's to $12 million at the end of 1992. Revitalization of Brazil's nuclear program began in 1995. In that year the Secretary of Strategic Affairs (SAE) Ambassador Ronaldo Sardenberg began a wide-ranging program to restructure and reorient Brazil's nuclear activities in the areas of nuclear safety, research in the fields of nuclear medicine, agriculture, and industry, personnel training and nuclear reactors and metallurgy. Work was started on the project to overhaul the IEAR-1 reactor - increasing the power of the reactor from two to five megawatts to increase the production of radioisotopes used in nuclear medicine. The pace of construction at the Angra-2 nuclear power plant was increased and work began to improve the reliability of the Angra-1 plant. Angra-2 is expected to be completed by 1998 and to go into regular operation during the first half of 1999. Normal production has resumed at Angra-1 and it is operating between 93 and 94 percent of its 600-megawatts capacity.

Currently the state-owned Nuclear Industries of Brazil (INB) executes two stages of the nuclear fuel cycle in Brazil: uranium mining and conversion to yellowcake and the fabrication and assembly of fuel elements. Brazil has the world's fifth-largest uranium reserves: approximately 300,000 metric tons. Of that total, 100,000 metric tons are in the Lagoa Real province, where a new plant for the production of yellowcake is planned for 1998. Currently Brazilian yellowcake is enriched and fabricated into fuel pellets in Europe by URENCO. The uranium pellets are then returned to the INB's Fuel Element Plant in Resende, Rio de Janeiro, to be processed and loaded into fuel rods. According to press reports, the INB's Fuel Element Plant has a nominal capacity to process 100 metric tons of uranium and fabricate 145 fuel elements annually. In February 1997 the Brazilian press reported that this year the INB will begin production of enriched uranium powder and pellets when it installs two complete production lines: one for reconverting uranium hexafluoride into powder and the other for transforming the latter into pellets. With this new capability, only two stages of the nuclear fuel cycle will continue to be implemented abroad: the conversion of yellowcake into uranium hexafluoride and its isotopic enrichment.

Another fuel cycle project announced in 1996 was an agreement between INB and the Navy for construction of an industrial scale enrichment plant using the ultracentrifuge process. In December 1996 the Brazilian press reported that the Navy's Aramar Experimental Center

(CEA), which has enriched uranium since 1988, dedicated a new uranium processing plant. The new plant, when completed, will double CEA's uranium enrichment capacity. The plant will be operating at full capacity within three years following the installation of three new cascades of ultracentrifuges developed to process uranium. According to Rear Admiral Ivan Aquino Vianna, director of CEA, the Argentine Government has expressed interest in acquiring enriched uranium from Brazil to operate Argentina's research reactors.

In January 1996, during President Cardoso's visit to India, Brazil and India signed a Memorandum of Understanding (MOU) on nuclear cooperation. The MOU contains general provisions for the exchange of information, people, material, and equipment. An annex lists specific cooperation projects in the areas of radiation protection, food irradiation, agriculture, nuclear medicine, and research and development regarding the thorium nuclear fuel cycle. It has been estimated that Brazil accounts for nearly 30 percent of the world's thorium reserves, which would be capable of generating 350,000 megawatts in nuclear power. India holds a leading position in the area of thorium research and began operation of the world's first U_{233}-powered reactor in October 1996. (U_{233} is produced through the irradiation of thorium) The annex also includes a reference to "nuclear energy generating equipment" which could refer to reactors, and allows for "other fields of cooperation of mutual interest." In May 1997 the U.S. received assurances that the MOU would be implemented in strict compliance with the NSG guidelines.

B. Nuclear Cooperation with the United States

As noted in the previous section, U.S.-Brazil interaction on nuclear matters dates back to the 1940's. In 1955, Brazil signed a nuclear cooperation agreement with the U.S. under the Atoms for Peace program. Under the agreement, Brazil received its first research reactor in 1957, a Babcock and Wilcox five Megawatt (thermal) pool-type research reactor fueled by U.S.-supplied highly-enriched uranium (HEU). Called the IEAR-1, the reactor is located at the Institute of Nuclear and Energy Research (IPEN) in Sao Paulo. Brazil purchased a second research reactor in 1958, a General Atomic Triga 250 kw(t) tank-type research and training reactor, which became operational in 1960 in Belo Horizonte at the Center for the Development of Nuclear Technology (CDTN). A third research reactor, the REIN-1, was designed by the U.S. Argonne National Laboratory and constructed by a Brazilian firm, began operations in 1965. The REIN-1 reactor is fueled with 20 percent enriched uranium and is Brazil's first domestically produced reactor. A new agreement for peaceful nuclear cooperation was concluded in 1965, under which Brazil purchased its first (and thus far, sole) operating nuclear power reactor (see preceding section). Under the aegis of this agreement, Brazil concluded its contract with Westinghouse for the Angra-1 power reactor in 1971.

In 1972, Brazil and the U.S. concluded a third cooperation agreement that superseded the 1965 agreement. The 1972 agreement, which expires on September 19, 2002, would in turn be

superseded by the entry-into-force of the new Agreement. The 1972 agreement, while authorizing the transfer of nuclear equipment and technology such as reactors, was concluded primarily to supply Angra-1's requirements for enriched uranium fuel. As noted earlier, when the U.S. in 1974 removed guarantees for the supply of nuclear fuel, Brazil sought other sources for its enriched fuel needs.

In May 1976, CNEN signed an Agreement for the Exchange of Technical Information and Cooperation in Regulatory and Safety Research with the U.S. Nuclear Regulatory Commission (NRC); the agreement was renewed in 1982, in 1989, and in 1994. Several Brazilian nuclear officials have visited the NRC for brief discussion on nuclear safety issues, but the agreement has been dormant for years. In 1990 and again in 1995 CNEN proposed revitalizing the agreement however no specific projects have been agreed upon.

The U.S. Department of Energy (DOE) signed an agreement with CNEN in September 1995 to facilitate cooperation on nuclear safeguards. This agreement provides for cooperation in the areas of nuclear material control, accountancy, verification, physical protection, and advanced containment and surveillance technologies for nuclear safeguards. Since then, Brazil has worked with the U.S. Los Alamos National Laboratory and the IAEA to successfully reestablish the IAEA's knowledge of the inventory of fuel at Angra-I to compensate for a break in IAEA surveillance due to an equipment failure. U.S. experts have also worked with Brazilian safeguards personnel on upgrading Brazilian nondestructive measurement capabilities and to develop new measurement procedures. Future areas of cooperation under the agreement include advanced training workshops, field trials for remote safeguard monitoring of nuclear materials, environmental safeguards monitoring technical exchanges, and support for enrichment plant safeguards.

The IEAR-1 is the only Brazilian research reactor that was fueled with U.S.-supplied HEU. The Brazilians have cooperated with the Reduced Enrichment for Research and Test Reactors (RERTR) Program, and the reactor is now almost fully converted to LEU. Only a handful of HEU elements remain in the core, and these should be used up and replaced in the next two years. A DOE/State/ACDA team visited Sao Paulo in July 1996 and learned that the Brazilians are anxious to participate in DOE's research reactor spent fuel return program. However, they were not able to join in the initial shipment from South America in September 1996 because of transport licensing and fuel corrosion problems. Some of the HEU fuel has not been out of the reactor for the three years required for safe shipment, and the number of elements available in September 1996 was too small to warrant an entire shipping cask. There are also some corroded elements that will require special handling and which could not be made ready in time for the initial shipment. Assuming that these problems will be resolved it is likely that Brazil will begin shipping spent HEU fuel back to the U.S. sometime in the next two years and will have returned all of it before the expiration of the spent fuel return program in 2006.

C. Nuclear Nonproliferation Policy of Brazil

The Government of Brazil has implemented an impressive series of comprehensive nuclear nonproliferation policies in the last seven years.

In 1990 and 1991, the Argentine and Brazilian governments signed a series of agreements that signaled a serious commitment to dedicate their nuclear programs to exclusively peaceful purposes. In September 1990, then President Collor revealed that Brazil had indeed sought to build nuclear explosives, and that unsafeguarded parts of their program had been central to the effort. Collor claimed that no explosive devices had been built. In November 1990, President Collor and Argentine President Menem declared that both countries would create a bilateral nuclear safeguards inspections regime, conclude a comprehensive international safeguards agreement with the International Atomic Energy Agency, and bring the Treaty on the Prohibition of Nuclear Weapons in Latin America and the Caribbean (The Treaty of Tlatelolco) into force for their territories. With the Argentine-Brazilian bilateral safeguards treaty (July 1991) and the entry-into-force of the Treaty of Tlatelolco (May 1994) and the Quadripartite Safeguards Agreement (March 1994), Brazil has now accomplished all of these goals.

In 1988 Brazil and Argentina began a process of bilateral confidence-building and transparency measures in the nuclear field which included reciprocal visits to nuclear facilities, the creation of a bilateral experts commission to foster further cooperation, and agreement on bilateral reporting system of accounting and control. By February 1991, both countries had given the other an accounting of their nuclear materials and facilities. In July 1991, Brazil and Argentina signed an Agreement for the Exclusively Peaceful Use of Nuclear Energy (the Treaty of Guadalajara). This agreement created a bilaterally-staffed and -financed, legally-independent safeguards and inspections organization, the Brazilian- Argentine Agency of Accounting and Control of Nuclear Materials (ABACC). Brazil and Argentina committed themselves to "submit all the nuclear materials in all nuclear activities carried out in their territories or anywhere under their jurisdiction or control" to the Common System of Accounting and Control administered by the new organization.

Both countries also used the Agreement to renounce their previous position that parties to the Treaty of Tlatelolco retained the prerogative to conduct peaceful nuclear explosions:

> "Bearing in mind that at present no technical distinction can be made between nuclear devices for peaceful purposes and those for military purposes, the Parties also undertake to prohibit and prevent in their respective territories, and to abstain from carrying out, promoting or authorizing, directly or indirectly, or from participating in any way in, the testing, use, manufacture, production or acquisition by any means of any

nuclear explosive device while the above-mentioned technical limitation exists."

Brazil and Argentina subsequently negotiated a full-scope safeguards agreement with the IAEA, granting the IAEA authority to inspect all nuclear facilities in both countries. According to Article 2(a) of the Agreement, the IAEA:

> "...shall have the right and the obligation to ensure that safeguards will be applied, in accordance with the terms of this agreement, on all nuclear material in all nuclear activities within the territories of the State 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."

This accord was approved by the IAEA Board of Governors in December 1991 and signed by all four parties shortly thereafter. Brazil completed its ratification in February 1994, and both countries brought the Quadripartite Safeguards Agreement into force in early March 1994. The IAEA is fully exercising its rights to apply safeguards to all nuclear material in Brazil, while seeking to resolve some facility-specific problems such as reaching an agreement with Brazil on an approach to safeguarding the Aramar enrichment plant.

In August 1992 Brazil, Argentina, Chile, and Mexico proposed amendments to the Treaty of Tlatelolco to address Brazilian and Argentine concerns over the protection of commercial information and to designate the IAEA as having sole responsibility to conduct special inspections. The Organization for the Prohibition of Nuclear Weapons in Latin America (OPANAL), the Treaty's implementing organization, retained the authority to ask the IAEA to conduct a special inspection, upon the request of a Treaty member. The amendments were unanimously adopted at a special general conference of all the Contracting Parties to the Treaty held in Mexico City on August 26, 1992.

Brazil, Argentina, and Chile announced at the Conference their intention to ratify the amendments and waive the Treaty into force for their territories simultaneously. However, the political crises surrounding President Collor delayed Brazilian legislative approval of the amendments. Argentina preferred to wait to bring Tlatelolco into force until Brazil completed ratification of the amendments; ultimately, however, Argentina and Chile brought Tlatelolco into force at an OPANAL special general conference on January 18, 1994. Brazil followed suit and became a party to the Treaty of Tlatelolco on May 30, 1994. Brazil has assumed an international legal commitment not to test, use, manufacture, produce or acquire nuclear weapons; and not to permit the storage, installation, or deployment of any nuclear weapons within their territorial jurisdictions.

Brazilian President Cardoso signed a comprehensive export control decree on April 12, 1996 regulating the export of sensitive equipment, including nuclear materials and equipment. The decree incorporated the Nuclear Suppliers Group (NSG) Guidelines and Annexes (including the dual-use list) into Brazil's export control system. This action occurred immediately prior to Brazil's induction into the membership of the NSG.

Brazil's January 1996 decision to engage in nuclear cooperation with India has raised concerns, given India's large unsafeguarded nuclear program. As a member of the NSG, Brazil has pledged not to provide nuclear fuel cycle equipment, material or technology to countries like India which do not have full-scope IAEA safeguards. We have raised this matter with Brazilian officials and they have provided assurances that their nuclear cooperation with India will be carried out in full conformance with Brazil's NSG obligations. At present, Brazil does not appear to have engaged in any cooperative activities with India that are inconsistent with that pledge.

On 20 June 1997 President Cardoso formally requested that the Congress authorize Brazil to join the NPT. In announcing this action President Cardoso said it "reflects the people's rejection of the atomic bomb and their endorsement of peaceful coexistence among nations." Accession to the NPT will reverse decades of Brazilian opposition to the treaty and allow them to participate even more credibly and effectively in international nonproliferation efforts.

II. COMPLIANCE WITH STATUTORY REQUIREMENTS

As will be shown below, the proposed Agreement meets the applicable requirements of the Atomic Energy Act, as amended, (hereinafter the Act) and the Nuclear Non-Proliferation Act (hereinafter the NNPA). Section 123 a. of the Act, as amended by Section 401 of the NNPA, requires new or amended agreements for cooperation to include the terms, conditions, duration, nature and scope of the cooperation.

The nature and scope of the cooperation authorized by the proposed Agreement is described in Section A below. The most pertinent terms and conditions of the cooperation authorized by the proposed Agreement are discussed in Sections B, C, D, and E below.

The duration of the proposed Agreement is thirty years from the date of its entry into force and is extendable by agreement of the parties.

A. Nature and Scope of Cooperation

(1) Permitted Cooperation

Article 2 of the proposed Agreement describes in general terms the kinds of cooperative activity envisaged: the use of nuclear energy for peaceful purposes and the transfer of information, material, equipment and components. Such cooperation is to be in accordance with the proposed Agreement and the applicable treaties, national laws, regulations and license requirements of the parties. Article 4, Paragraph 1 of the proposed Agreement provides that material, equipment and components may be transferred for applications consistent with the proposed Agreement. Paragraph 4 of Article 4 provides that small quantities of special nuclear material, such as plutonium and high-enriched uranium, may be transferred for use as samples, standards, detectors, targets and for such other purposes as the parties may agree. In addition, Article 4, paragraph 5 provides that special nuclear material other than low enriched uranium and the material contemplated under paragraph 4 may be transferred for specified applications where technically and economically justified.

Article 8 of the proposed Agreement requires that material, equipment and components transferred pursuant to the proposed Agreement, as well as material used in or produced through the use of any material, equipment or components so transferred, shall not be used for any nuclear explosive device, for research on or development of any nuclear explosive device, or for any military purpose. Further, Article 8 enjoins Brazil not to detonate a nuclear explosive device, and obligates the United States not to detonate such a device that uses material, equipment or components subject to this Agreement. Article 9 of the proposed Agreement provides that cooperation under the proposed Agreement shall require the application of International Atomic Energy Agency (hereinafter IAEA) safeguards with respect to all nuclear activities within the territory of the Federative Republic of Brazil, under its jurisdiction or carried out under its control

anywhere, while stipulating that this requirement shall be deemed fulfilled by implementation of the safeguards agreement among, Brazil, Argentina, ABACC, and the IAEA.

(2) Types of Cooperation Not Authorized

The proposed Agreement excludes certain types of cooperation from its scope and provides that amendment of the proposed Agreement would be required for certain other types of cooperation. Thus:

Article 3, Paragraph 3, of the proposed Agreement provides that restricted data, as defined in Article 1(L) of the proposed Agreement, shall not be transferred under the proposed Agreement. (In addition, Article 3, Paragraph 2, provides that neither party is required to transfer any information which it is not permitted to transfer.)

Article 3, Paragraph 4, of the proposed Agreement provides that sensitive nuclear technology, as defined in Article 1(N) of the proposed Agreement, shall not be transferred under this agreement unless provided for by an amendment to this agreement.

Article 4, Paragraph 1, of the proposed Agreement provides that neither party shall transfer sensitive nuclear facilities, as defined in Article 1(M) of the proposed Agreement, and major critical components thereof, as defined in Article 1(F), unless the agreement is amended to permit such transfer.

B. Specific Requirements for Agreements for Cooperation

Section 123 a. of the Atomic Energy Act sets forth nine specific requirements which must be met in an agreement for cooperation. These are set forth below, with a description and explanation of the provisions of the proposed Agreement which address each requirement.

(1) Duration of Safeguards

Subparagraph (1) of Section 123 a. of the Act requires:

> a guaranty by the cooperating party that safeguards as set forth in the agreement for cooperation will be maintained with respect to all nuclear materials and equipment transferred pursuant thereto, and with respect to all special nuclear material used in or produced through the use of such nuclear materials and equipment, so long as the material or equipment remains under the jurisdiction or control of the cooperating

party, irrespective of the duration of other provisions in the agreement or whether the agreement is terminated or suspended for any reason.

This provision is designed to require the application of safeguards with respect to items subject to the proposed Agreement and to provide protection against any termination of such safeguards. Article 9 of the proposed Agreement and the Agreed Minute appended to the proposed Agreement satisfy this requirement.

Article 9, Paragraph 2 of the proposed Agreement provides that "source or special nuclear material transferred to Brazil pursuant to this Agreement and any source or special nuclear material used in or produced through the use of material, equipment or components so transferred shall be subject to safeguards in accordance with the safeguards agreement specified in paragraph 1 of this article." (The agreement specified in paragraph 1 is the safeguards agreement among Brazil, Argentina, ABACC, and the IAEA)

Article 9, Paragraph 4 of the proposed Agreement provides further assurance of the continued applicability of safeguards by requiring that "if either party becomes aware of circumstances which demonstrate that the IAEA for any reason is not or will not be applying safeguards in accordance with the agreement as provided for in paragraph 2 or paragraph 3, to ensure effective continuity of safeguards the parties shall consult and immediately enter into arrangements with the IAEA or between themselves which conform with IAEA safeguards principles and procedures and the coverage required by paragraph 2 or paragraph 3, and which provide assurance equivalent to that intended to be secured by the system they replace."

Also, the "Safeguards" paragraph of the Agreed Minute appended to the proposed Agreement provides that "if either party becomes aware of circumstances referred to in paragraph 4 of Article 9, either party shall have the rights listed below, which rights shall be suspended if both parties agree that the need to exercise such rights is being satisfied by the application of IAEA safeguards under arrangements pursuant to paragraph 4 of Article 9:

(1) To review in a timely fashion the design of any equipment transferred pursuant to the Agreement, or of any facility which is to use, fabricate, process, or store any material so transferred or any special nuclear material used in or produced through the use of such material or equipment;

(2) To require the maintenance and production of records and of relevant reports for the purpose of assisting in ensuring accountability for material transferred pursuant to the Agreement and any source material or special nuclear material used in or produced through the use of any material, equipment or components so transferred; and

> (3) To designate personnel, in consultation with the other party, who shall have access to all places and data necessary to account for the material in paragraph 2, to inspect any equipment or facility referred to in paragraph 1, and to install any devices and make such independent measurements as may be deemed necessary to account for such material. Such personnel shall, if either party so requests, be accompanied by personnel designated by the other party.

Article 9, Paragraph 5 of the proposed Agreement reinforces all of this by providing that "each party shall take such measures as are necessary to maintain and facilitate the application of safeguards provided for under this Article."

With respect to continuation of safeguards, Article 14, Paragraph 2 of the proposed Agreement states that "notwithstanding the termination or expiration of this agreement or any cessation of cooperation hereunder for any reason, Articles 5, 6, 7, 8, 9 and 11 shall continue in effect so long as any material, equipment or components subject to these Articles remains in the territory of the party concerned or under its jurisdiction or control anywhere, or until such time as the parties agree that such material, equipment, or components are no longer usable for any nuclear activity relevant from the point of view of safeguards."

Article 9, Paragraphs 6 and 7, also require each Party to maintain an accounting and control system for nuclear material and to provide, or allow the IAEA to provide upon request of the other Party, status reports on inventories of material subject to the proposed Agreement.

(2) Full-Scope Safeguards

Subparagraph (2) of Section 123 a. of the Act requires:

> in the case of non-nuclear-weapon states, a requirement, as a condition of continued United States nuclear supply under the agreement for cooperation, that IAEA safeguards be maintained with respect to all nuclear materials in all peaceful nuclear activities within the territory of such state, under its jurisdiction, or carried out under its control anywhere.

Article 9, Paragraph 1 of the proposed Agreement meets this requirement by providing that cooperation under the proposed Agreement shall require the application of IAEA safeguards "with respect to all nuclear activities within the territory of Brazil, under its jurisdiction or carried out under its control anywhere. Implementation of the safeguards agreement between Brazil, the Argentine Republic, the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials, and the IAEA, signed at Vienna December 13, 1991, shall be considered to fulfill this requirement."

(3) No Military or Explosive Use

Subparagraph (3) of Section 123 a. of the Act requires:

> ...a guaranty by the cooperating party that no nuclear materials and equipment or sensitive nuclear technology to be transferred pursuant to such agreement, and no special nuclear material produced through the use of any nuclear materials and equipment or sensitive nuclear technology transferred pursuant to such agreement, will be used for any nuclear explosive device, or for research on or development of any nuclear explosive device, or for any other military purpose.

Article 8, paragraph 2 and Article 3, Paragraph 4 of the proposed Agreement, respectively, satisfy this requirement by requiring that:

> material, equipment and components transferred pursuant to this agreement and material used in or produced through the use of any material, equipment or components so transferred shall not be used for any nuclear explosive device, for research on or development of any nuclear explosive device, or for any military purpose.
>
> Sensitive nuclear technology shall not be transferred under this Agreement unless provided for by an amendment to this Agreement.

(4) Right of Return

Subparagraph (4) of Section 123 a. of the Act requires:

> ...a stipulation that the United States shall have the right to require the return of any nuclear materials and equipment transferred pursuant thereto and any special nuclear material produced through the use thereof if the cooperating party detonates a nuclear explosive device or terminates or abrogates an agreement providing for IAEA safeguards.

Article 11 of the proposed Agreement meets this requirement by providing:

> 1. If either party at any time following entry into force of this agreement:
>
> (A)does not comply with the provisions of Article 5, 6, 7, 8, or 9, or

(B) terminates, abrogates or materially violates a safeguards agreement with the IAEA,

the other party shall have the rights to cease further cooperation under this Agreement, suspend this Agreement, or terminate this Agreement and to require the return of any material, equipment and components transferred under this Agreement and any special nuclear material produced through their use.

2. If Brazil detonated a nuclear explosive device, it would be in noncompliance with Article 8 and the right of return would be triggered pursuant to Article II, paragraph 1(A).

(5) Retransfer

Subparagraph (5) of Section 123 a. of the Act requires:

a guaranty by the cooperating party that any material or any Restricted Data transferred pursuant to the agreement for cooperation and...any production or utilization facility transferred pursuant to the agreement for cooperation or any special nuclear material produced through the use of any such facility or through the use of any material transferred pursuant to the agreement, will not be transferred to unauthorized persons or beyond the jurisdiction or control of the cooperating party without the consent of the United States.

Section 109 of the Act, as amended by Section 309 of the NNPA, requires that recipient nations also agree to obtain United States approval before retransferring any components, items and substances exported from the United States which the Nuclear Regulatory Commission (NRC) has found to be of "significance for nuclear explosive purposes." The NRC has identified a series of such components, items and substances in regulations set forth in 10 CFR Part 110 which are subject to this retransfer requirement.

Article 5, Paragraph 2 and Article 3, Paragraph 3 of the proposed Agreement, respectively, satisfy the requirements of Sections 123 a. and 109 of the Act by providing that:

Material, equipment and components transferred pursuant to this Agreement and any special nuclear material produced through the use of any such material or equipment shall not be transferred to unauthorized persons or, unless the parties agree, beyond the recipient party's territorial jurisdiction.

Restricted data shall not be transferred under this Agreement.

The exercise of this particular United States control with respect to "special nuclear material produced through the use of nuclear material transferred pursuant to the Agreement and not used in or produced through the use of equipment transferred pursuant to the Agreement" is limited by the rule of proportionality set out under "Coverage of the Agreement" in the Agreed Minute appended to the proposed Agreement. That section confirms that the retransfer requirements of Article 5 shall be applied in such cases to "that proportion of special nuclear material produced which represents the ratio of transferred material used in the production of the special nuclear material to the total amount of material so used, and similarly for subsequent generations."

(6) Physical Security

Subparagraph (6) of Section 123 a. of the Act requires:

> a guaranty by the cooperating party that adequate physical security will be maintained with respect to any nuclear material transferred pursuant to such agreement and with respect to any special nuclear material used in or produced through the use of any material, production facility, or utilization facility transferred pursuant to such agreement.

Article 7, Paragraph 1 of the proposed Agreement satisfies this requirement by requiring that:

> Adequate physical protection shall be maintained with respect to source or special nuclear material and equipment transferred pursuant to this Agreement and special nuclear material used in or produced through the use of material or equipment so transferred.

With respect to the meaning of "adequate," Section 127 (3) of the Act provides that physical security measures shall be deemed adequate if they provide a level of protection equivalent to that required by regulations promulgated by the NRC establishing levels of physical protection. (See NNPA Section 304 (d); 10 CFR 110.43.)

Article 7, Paragraph 2 of the proposed Agreement satisfies this test by providing that:

> The parties agree to the levels for the application of physical protection set forth in the Annex to this Agreement, which may be modified by mutual consent of the parties without amending this Agreement. The parties shall maintain adequate physical protection measures in accordance with these levels. These measures shall as a minimum provide protection comparable to the recommendations set forth in IAEA Document INFCIRC/225/Rev. 3 concerning the physical

protection of nuclear material, or in any revision of that document agreed to by the parties.

(7) Reprocessing, Enrichment or Other Alteration

Subparagraph (7) of Section 123 a. of the Act requires:

...a guaranty by the cooperating party that no material transferred pursuant to the agreement for cooperation and no material used in or produced through the use of any material, production facility, or utilization facility transferred pursuant to the agreement for cooperation will be reprocessed, enriched or (in the case of plutonium, uranium 233, or uranium enriched to greater than twenty percent in the isotope 235, or other nuclear materials which have been irradiated) otherwise altered in form or content without the prior approval of the United States.

Article 6 of the proposed Agreement satisfies these requirements by providing the following:

1. Material transferred pursuant to this Agreement and material used in or produced through the use of material or equipment so transferred shall not be reprocessed unless the parties agree.

2. Plutonium, uranium 233, high enriched uranium and irradiated source or special nuclear material, transferred pursuant to this Agreement or used in or produced through the use of material or equipment so transferred, shall not be altered in form or content, except by irradiation or further irradiation, unless the parties agree.

3. Uranium transferred pursuant to this Agreement or used in any equipment so transferred shall not be enriched after transfer to twenty percent or greater in the isotope 235 unless the parties agree.

The controls in Article 6 of the proposed Agreement are subject to the proportionality provision in the Agreed Minute appended to the proposed Agreement.

(8) Storage

Subparagraph (8) of Section 123 a. of the Act requires:

...a guaranty by the cooperating party that no plutonium, no uranium 233, and no uranium enriched to greater than twenty

> percent in the isotope 235, transferred pursuant to the agreement for cooperation, or recovered from any source or special nuclear material so transferred or from any source or special nuclear material used in any production facility or utilization facility transferred pursuant to the agreement for cooperation, will be stored in any facility that has not been approved in advance by the United States.

Article 5, Paragraph 1 of the proposed Agreement fulfills this requirement by providing that:

> Plutonium and uranium 233 (except as contained in irradiated fuel elements), and high enriched uranium, transferred pursuant to this Agreement or used in or produced through the use of material or equipment so transferred shall only be stored in a facility to which the parties agree.

The storage control provided for in Article 5, Paragraph 1, of the proposed Agreement is subject to the proportionality provision in the Agreed Minute appended to the proposed Agreement.

(9) Sensitive Nuclear Technology

Subparagraph (9) of Section 123 a. of the Act requires:

> a guaranty by the cooperating party that any special nuclear material, production facility, or utilization facility produced or constructed under the jurisdiction of the cooperating party by or through the use of any sensitive nuclear technology transferred pursuant to such agreement for cooperation will be subject to all the requirements specified in this subsection.

Article 3, Paragraph 4 of the proposed Agreement satisfies this requirement by precluding transfers of sensitive nuclear technology unless provided for by an amendment to the proposed Agreement.

C. NNPA Section 402 -- Additional Requirements

Section 402(a) of the NNPA requires that:

> Except as specifically provided in any agreement for cooperation, no source or special nuclear material hereinafter exported from the United States may be enriched after export without the prior approval of the United States for such enrichment.

As discussed earlier, Article 6, Paragraph 3 of the proposed Agreement satisfies this restriction by providing that "uranium transferred pursuant to this Agreement or used in any equipment so transferred shall not be enriched after transfer to twenty percent or greater in the isotope U_{235} unless the parties agree." Thus, the proposed Agreement authorizes enrichment up to 20 percent in the isotope U_{235} without further agreement of the parties.

Section 402 (b) of the NNPA requires that:

> In addition to other requirements of law, no major critical component of any uranium enrichment, nuclear fuel reprocessing, or heavy water production facility shall be exported under any agreement for cooperation...unless such agreement for cooperation specifically designates such components as items to be exported pursuant to the agreement for cooperation.

Article 4, Paragraph 1 of the proposed Agreement satisfies this provision by requiring that "...sensitive nuclear facilities and major critical components shall only be transferred under this Agreement as provided for by an amendment to this Agreement." The definition of "sensitive nuclear facility" in Article 1 (M) of the proposed Agreement encompasses the facilities described in Section 402 (b) of the NNPA.

D. NNPA Section 307 -- Conduct Resulting in Termination of Nuclear Exports

Section 307 of the NNPA added Section 129 to the Atomic Energy Act, which prohibits exports of nuclear materials and equipment or sensitive nuclear technology to countries that engage in proscribed activities. The activities in Section 129(1) include detonation of a nuclear explosive, violation or termination of IAEA safeguards or engaging in activities involving source or special nuclear material having direct significance for the manufacture or acquisition of nuclear explosive devices and having failed to take steps in the judgment of the President representing sufficient progress toward terminating such activities.

Certain activities in the Brazilian nuclear program including the admitted construction of a nuclear test site at a Brazilian Air Force Base, resulted in a determination by President Clinton on October 27, 1995, that Brazil has engaged in activities having direct significance for the manufacture of nuclear explosives as set forth in Section 129 (1)(D). However, the President also determined that Brazil had "taken steps that represent sufficient

progress toward terminating such activities." Among such steps, cited earlier in the NPAS, were the decision to close the test site and more importantly Brazil's acceptance of comprehensive nuclear nonproliferation commitments.

Section 129 (2)(C) also prohibits the export of nuclear materials and equipment or sensitive nuclear technology to any nation or group of nations that has entered into an agreement...for the transfer of reprocessing equipment, materials, or technology to the sovereign control of a non-nuclear-weapon state except in connection with an international fuel cycle evaluation in which the United States is a participant or pursuant to a subsequent agreement or understanding to which the United States subscribes.

Building upon a technical cooperation agreement signed in 1990, Argentina and Brazil decided to cooperate in a "tandem fuel cycle" project to tie together the fuel cycles of both countries. At the 1992 General Congress of Nuclear Energy in Rio de Janeiro, CNEA and IPEN officials presented papers on their tandem fuel cycle concept. Spent fuel from Brazil's Angra pressurized water reactor would be transferred to Argentina to be reprocessed (what the two nuclear agencies referred to as "coprocessing," but which the U.S. considers functionally indistinguishable from reprocessing) with the resultant uranium-plutonium mixture to be fabricated into mixed-oxide fuel for Argentina's power reactors.

This joint project had been pursued openly by both countries, with no evidence of non-peaceful intent. However, the U.S. was concerned that such cooperation could trigger sanctions under Section 129(2)(C) that would prohibit U.S. civil nuclear exports to Argentina and Brazil. The U.S. expressed this concern to both Brazil and Argentina in 1994, and received high-level assurances from both governments that such cooperation would cease. In addition to these assurances, the U.S. has reason to believe that cooperation in support of this "tandem fuel cycle" project has indeed ceased.

The President made a determination on October 27, 1995, that Brazil had entered into a reprocessing agreement with Argentina as stipulated in Section 129(2)(C). However, the President also made the determination, according to the provisions and procedures for Congressional review under Section 129, that cessation of such exports would be seriously prejudicial to the achievement of United States nonproliferation objectives or otherwise jeopardize the common defense and security..." Brazil's nonproliferation policies and behavior since 1990 and assurances provided by the Brazilian Government that such cooperation would cease provided a basis for the President to waive Section 129 sanctions in this circumstance.

E. NNPA Section 309 -- Components, Items, and Substances

Section 309 of the NNPA amended Section 109 of the Act to empower the Nuclear Regulatory Commission (NRC) to designate certain component parts, items and substances

which, because of their significance for nuclear explosive purposes, should be subject to its licensing authority. Such licenses would be granted only upon a finding that (a) IAEA safeguards will be applied to such component, substance or item, (b) the component, substance or item(s) will not be used for any nuclear explosive device or for research on or development of any nuclear explosive device, and (c) that no such component, substances or item will be retransferred without U.S. consent.

The NRC in its regulations (10 CFR Part 110) has identified certain reactor components and two substances--heavy water and nuclear grade graphite--as subject to these criteria. The Atomic Energy Act does not require that such exports be transferred under an agreement for cooperation. However, they may be so transferred and thus be subject to all the relevant provisions of the agreement. The first two criteria noted above are met because of the language in Articles 8, Paragraph 2 and Article 9, Paragraph 2. The third criterion (retransfer) is satisfied by Article 5, paragraph 2 of the proposed Agreement. Those provisions of Articles 5, 8, and 9 cover inter alia "components" and "material." Material is defined in Article 1(G) as including "moderator material" which in turn is defined in Article 1 (H) as including heavy water and nuclear grade graphite.

III. OTHER NONPROLIFERATION POLICY ISSUES

Any decision by the United States to engage in nuclear cooperation with a given nation involves a number of nonproliferation policy considerations in addition to the legal rights, guarantees, and safeguards contained in the applicable agreement for cooperation. These considerations could relate in a given case to such matters as scope and terms of the cooperation envisaged under such an agreement, the precedent-setting implications of particular provisions of such an agreement, the degree to which extending nuclear cooperation may foster other nonproliferation efforts, the general role of the state concerned in nonproliferation efforts, and a number of other issues. These issues will vary from case to case. This section of the assessment statement addresses policy issues of this kind that relate to the proposed Agreement.

A. Scope of Cooperation/Weapons-Usable Material

The scope of cooperation permitted by the proposed Agreement extends to the transfer of nuclear material, equipment (including reactors), and components for both nuclear research and nuclear power production. The proposed Agreement does not provide for transfers of any sensitive nuclear technology or facilities as defined by the NNPA. It provides for the transfer of potentially large quantities of low-enriched uranium if the parties agree it is necessary for the purposes set forth in the agreement. Small quantities (i.e., grams) of plutonium or highly enriched uranium may be transferred for use as samples, standards, detectors, targets, and for other peaceful purposes as the parties may agree.

The proposed Agreement does not prohibit the transfer of large quantities of plutonium and highly enriched uranium, but does specify that any such transfers must be economically and technically justified. ACDA does not believe there are any current or foreseeable civil nuclear projects in Brazil where the supply of more than gram quantities of plutonium or highly enriched uranium would be justified on such grounds. Moreover, the United States does not encourage the civil use of plutonium, and U.S. law now does not permit the export of highly enriched uranium as fuel for reactors - unless inter alia the reactor operator has agreed to convert to the use of LEU when such LEU becomes available.

The provisions of the proposed Agreement shall apply to nuclear material and equipment that were transferred under the existing U.S.-Brazil agreement for cooperation. One significant consequence of this "fold-in" provision is that U.S. consent rights will expand to cover any nuclear material used in, or produced through the use of the U.S.-supplied Angra-1 power reactor - including nuclear material not supplied by the United States.

ACDA is satisfied with the scope of the proposed Agreement. Given fifteen years of Brazilian-Argentine peaceful cooperation and confidence-building, the formation of a bilateral nuclear inspection agency with Argentina, the entry-into-force of a comprehensive safeguards agreement that opens all Brazilian facilities to IAEA inspection, the entry-into-force of the Treaty of Tlatelolco for Brazil, Brazil's induction into the NSG, and President Cardoso's recent announcement that Brazil intends to join the NPT, ACDA concludes that Brazil does not now nor will in the foreseeable future have any motivation or significant capability to engage in a clandestine nuclear weapon development program.

B. Tlatelolco and NPT Considerations

Preventing the further spread of nuclear weapons is a major U.S. national security and foreign policy goal, and the NPT continues to play a unique and irreplaceable role in international efforts to erect legal and political barriers to such nuclear weapons proliferation. The Treaty of Tlatelolco serves a similar function in that it establishes a regional nuclear weapon-free zone in Latin America, enjoining parties:

> ...to use exclusively for peaceful purposes the nuclear material and facilities which are under their jurisdiction, and to prohibit and prevent in their respective territories...the testing, use, manufacture, production or acquisition by any means whatsoever of any nuclear weapons...directly or indirectly, on behalf of anyone else or in any other way, and...the receipt, storage, installation, deployment and any form of possession of any nuclear weapons, directly or indirectly...by anyone on their behalf or in any other way.

The Treaty of Tlatelolco also requires Parties to institute full-scope safeguards on all nuclear material in their territories to verify their commitments. The U.S. Government considers these commitments under the Treaty of Tlatelolco to be the equivalent of those assumed by NPT non-nuclear-weapon state parties, and has, as a matter of policy, granted Tlatelolco parties the same preferential treatment as it does NPT parties when engaging in peaceful nuclear cooperation.

Brazil was a participant in the drafting of the Treaty of Tlatelolco, which grew out of a 1962 Brazilian initiative in the United Nations General Assembly during the Cuban missile crisis. It signed the Treaty in 1967 and ratified it in 1968. Brazil refused for many years to waive the Treaty's entry into force provisions and bring the treaty into force for itself. Instead it chose to wait until all other regional states (particularly Argentina) were prepared to do so. As for the NPT, Brazil had long criticized the NPT as codifying a discriminatory system of nuclear haves and have-nots and conspiring against the interests

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would be limited to reactor components, low-enriched uranium fuel, and perhaps gram quantities of other nuclear material for research purposes. In addition, the U.S. DOE has been assisting Argentina, Brazil, ABACC and the IAEA in safeguards applications and training. Familiarity with Brazil's nuclear program and safeguards approaches gives a high degree of confidence about the adequacy of IAEA safeguards under the proposed Agreement to ensure that any assistance provided thereunder is not used for military or nuclear explosive purposes.

D. Other Considerations

When assessing nonproliferation factors in connection with a civil nuclear cooperation agreement, it is appropriate to go beyond the specific terms of such an agreement to consider a country's general commitment to nonproliferation. It is true that Brazil has in the past not fully shared Western perspectives and standards for responsible nonproliferation behavior. Brazil was firmly determined to maintain the independence of significant portions of its nuclear activities from outside scrutiny and for many years resisted the full application of safeguards to its activities. Moreover, the disclosure of the nuclear weapons test site a few years ago demonstrated that some in the military wished to leave open the option to develop nuclear weapons.

However, it is also true that Brazil has made great strides to transform its nuclear policies and has fully embraced global norms of responsible nonproliferation behavior. ACDA believes that the scope and depth of the nuclear and other nonproliferation policies that the Government of Brazil has put into effect in the last seven years demonstrate its commitment to responsible nonproliferation behavior.

ACDA believes that the proposed Agreement will support these developments in Brazilian politics. The Agreement will increase the scope and intensity of interaction between U.S. Government and Brazilian nuclear safety, export control, and materials control personnel at all levels. It will thereby increase the transparency of Brazilian activities, routinize consultations and cooperation across the full range of nuclear-related issues, and foster the transmission of U.S. nonproliferation norms, procedures and systems of regulation and control.

IV - 1

IV. Conclusion

On the basis of the analysis in this assessment statement and all pertinent information of which the Agency is aware, the United States Arms Control and Disarmament Agency has arrived at the following assessment, conclusions, views and recommendations:

1. The safeguards and other control mechanisms and the peaceful use assurances contained in the proposed Agreement are adequate to ensure that any assistance furnished thereunder will not be used to further any military or nuclear explosive purpose.

2. The proposed Agreement meets all the substantive requirements of the Atomic Energy Act and the NNPA.

3. Execution of the proposed Agreement would be compatible with the nonproliferation program, policy and objectives of the United States.

4. It is recommended that the President determine that the performance of the proposed Agreement will promote, and will not constitute an unreasonable risk to, the common defense and security; and that the President approve and authorize the execution of the proposed Agreement.

S/S 9717733

DEPARTMENT OF STATE
WASHINGTON

October 3, 1997

MEMORANDUM FOR: THE PRESIDENT

FROM: Strobe Talbott
Acting Secretary of State
Elizabeth A. Moler
Acting Secretary of Energy

SUBJECT: Proposed Agreement for Cooperation Between the Government of the United States of America and the Government of the Federative Republic of Brazil Concerning Peaceful Uses of Nuclear Energy

The United States has negotiated a new, updated agreement for peaceful nuclear cooperation with Brazil. This memorandum recommends that you sign the determination, approval and authorization at Attachment 1, which, pursuant to section 123 b. of the Atomic Energy Act of 1954, as amended, sets forth: (1) your approval of the proposed agreement; (2) your determination that performance of the proposed agreement will promote, and will not constitute an unreasonable risk to, the common defense and security; and (3) your authorization for execution of the agreement.

If you authorize execution of the agreement, it will be signed by representatives of the United States and Brazil. Afterward, in accordance with sections 123 b. and d. of the Act, it will be submitted to both Houses of Congress. A draft letter of transmittal to the Congress is at Attachment 2 for your signature. (This letter will be held until after the agreement is signed.) The agreement must lie before Congress for 90 days of continuous session. Unless a joint resolution of disapproval is enacted, the agreement may thereafter be brought into force.

The text of the proposed agreement is at Attachment 3. It includes an agreed minute, which is an integral part of the agreement. A summary of basic provisions is at Attachment 4. The proposed agreement provides a comprehensive framework for peaceful nuclear cooperation between the United States and Brazil under appropriate conditions and controls reflecting a strong common commitment to nuclear non-proliferation. The agreement has an initial

term of 30 years and may be extended by agreement of the parties in accordance with their applicable requirements.

The proposed agreement permits the transfer of technology, material (including low enriched uranium), equipment (including reactors), and components for both nuclear research and nuclear power purposes. It does not permit transfers of any sensitive nuclear technology or facilities. In our judgment the proposed agreement meets all requirements for new agreements for peaceful nuclear cooperation set forth in section 123 a. of the Atomic Energy Act of 1954, as amended by the Nuclear Non-Proliferation Act (NNPA) of 1978.

The agreed minute contains certain important understandings relating to implementation of the agreement, including provisions regarding the implementation of safeguards and US fallback safeguards rights.

Section 407 of the NNPA directs that the United States seek to include in agreements for peaceful nuclear cooperation provisions for identifying environmental implications and protection of the international environment. Article 13 of the proposed agreement satisfies these provisions.

In accordance with the provisions of section 123 of the Atomic Energy Act, the proposed agreement was negotiated by the Department of State, with the technical assistance and concurrence of the Department of Energy and in consultation with the Arms Control and Disarmament Agency (ACDA). The views and recommendations of the Director of ACDA are at Attachment 5. A Nuclear Proliferation Assessment Statement concerning the proposed agreement is being submitted to you separately by the Director of ACDA. The proposed agreement has also been reviewed by the members of the Nuclear Regulatory Commission. Their views are at Attachment 6.

The proposed agreement with Brazil would replace and update an existing agreement that entered into force in 1972. US cooperation with Brazil under the 1972 agreement was suspended in the late 1970s owing to Brazil's inability to satisfy a requirement of US law that non-nuclear weapon state cooperating partners such as Brazil accept IAEA safeguards on all their nuclear activities ("full-scope safeguards") as a condition for continued significant US nuclear supply. Brazil has now brought into force and is implementing a full-scope safeguards agreement with the IAEA.

Resumption of cooperation under the existing US-Brazil agreement for cooperation would be possible, but both the United States and Brazil believe it is preferable to have a

new agreement completely satisfying, as the proposed agreement does, the current legal and policy criteria of both parties.

The moment is appropriate to conclude a new agreement and resume peaceful nuclear cooperation with Brazil because in recent years the Brazilian Government has taken important steps to improve its approach to nuclear non-proliferation, both in terms of its own nuclear program and in terms of a new and highly responsible approach to nuclear export control. In addition to its agreement with the IAEA for full-scope safeguards, Brazil has:

-- Formally renounced nuclear weapons development in the Foz do Iguazu declaration with Argentina in 1990;

-- Renounced "peaceful nuclear explosives" in the 1991 Treaty of Guadalajara with Argentina;

-- Brought the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (Treaty of Tlatelolco) into force for itself on May 30, 1994;

-- Instituted more stringent domestic controls on nuclear exports and become a member of the Nuclear Suppliers Group; and

-- Announced its intention, on June 20, 1997, to accede to the Nuclear Non-Proliferation Treaty (NPT).

A more detailed discussion of these and other significant actions that Brazil has taken to demonstrate its break with past ambivalent nuclear policies and its firm commitment to nuclear non-proliferation is provided in ACDA's Nuclear Proliferation Assessment Statement.

In our judgment, the agreement text as initialed at Brasilia on March 1, 1996 meets all US statutory requirements and will serve important US non-proliferation and other foreign policy interests. We recommend, therefore, that you determine, pursuant to section 123 b. of the Atomic Energy Act of 1954, as amended, that performance of the agreement will promote, and will not constitute an unreasonable risk to, the common defense and security; and that you approve the agreement and authorize its execution.

RECOMMENDATION

That you sign the determination, approval and authorization at Attachment 1 and the transmittal to Congress at Attachment 2. (The transmittal will be held until the agreement itself is signed.)

ATTACHMENTS

1. Draft Determination, Approval and Authorization
2. Draft Transmittal to the Congress (To be held until after the agreement is signed)
3. Proposed Agreement for Cooperation Between the Government of the United States of America and the Government of the Federative Republic of Brazil Concerning Peaceful Uses of Nuclear Energy
4. Summary of Basic Provisions of the Agreement
5. Views and Recommendations of the Director of the Arms Control and Disarmament Agency
6. Views of the Members of the Nuclear Regulatory Commission

SUMMARY OF BASIC PROVISIONS OF THE AGREEMENT FOR COOPERATION BETWEEN THE GOVERNMENT OF THE UNITED STATES OF AMERICA AND THE GOVERNMENT OF THE FEDERATIVE REPUBLIC OF BRAZIL CONCERNING PEACEFUL USES OF NUCLEAR ENERGY, WITH ANNEX AND AGREED MINUTE

Article 1 contains definitions.

Article 2 sets forth the scope of cooperation in the use of nuclear energy for peaceful purposes. It provides that transfers of information, material, equipment and components may be undertaken subject to the agreement and to such additional terms and conditions as may be agreed by the parties. It also provides that material, equipment or components transferred between the parties for peaceful purposes will be regarded as having been transferred pursuant to the agreement only upon confirmation by the recipient party that such item or items are to be subject to the terms of the agreement.

Article 3 provides for the transfer of information in a variety of fields involving the peaceful uses of nuclear energy. Restricted data may not be transferred under the agreement. Sensitive nuclear technology may not be transferred under the agreement unless the agreement is amended to provide for such transfer.

Article 4 provides the basic enabling framework for the transfer of material, equipment and components. With some stated exceptions, including small quantities for use as samples, standards, detectors, targets and such other purposes as may be agreed, transfers of special nuclear material to Brazil will be limited to low enriched uranium, which may be transferred for use as fuel in reactors or reactor experiments, for conversion or fabrication or for such other purposes as may be agreed. No sensitive nuclear facilities or major critical components of such facilities may be transferred unless the agreement is amended to provide for such transfers. This article further provides that the quantity of special nuclear material transferred shall not at any time be in excess of quantities that the parties agree are necessary for specified purposes. Transfers of small quantities of special nuclear material are not subject to this limitation.

Article 5 requires the parties' agreement (1) on facilities for the storage of plutonium and uranium 233 (except in irradiated fuel elements) or high enriched uranium transferred pursuant to the agreement or used in or produced through the use of material or equipment so transferred; and (2) for the retransfer of any material, equipment or components so transferred and special nuclear material

produced through the use of material or equipment so transferred. The agreed minute states that the consent rights specified in article 5 with respect to special nuclear material produced through the use of nuclear material transferred, and not used in or produced through the use of equipment transferred, shall in practice be applied to that proportion of produced special nuclear material which represents the ratio of transferred material used in its production to the total amount of material so used.

Article 6 requires the parties' agreement (1) for the reprocessing of material transferred pursuant to the agreement and material used in or produced through the use of any material or equipment so transferred; (2) for the alteration in form or content, except by irradiation or further irradiation, of plutonium, uranium 233, high enriched uranium or irradiated source or special nuclear material so transferred or produced; and (3) for the enrichment to 20 percent U-235 or more of uranium so transferred or used in any equipment so transferred. The agreed minute states that the consent rights specified in article 6 with respect to special nuclear material produced through the use of nuclear material transferred, and not used in or produced through the use of equipment transferred, shall in practice be applied to that proportion of produced special nuclear material which

represents the ratio of transferred material used in its production to the total amount of material so used.

Article 7 requires each party to maintain adequate physical protection measures, in accordance with levels of protection set forth in the Annex to the agreement, with respect to all material and equipment subject to the agreement. The measures applied shall, as a minimum, provide protection comparable to that set forth in the current version of IAEA document INFCIRC/225 concerning the physical protection of nuclear material as agreed to by the parties. The Annex describes physical security levels applicable with respect to the use, storage and transport of nuclear materials classified as categories I (requiring the most stringent levels of protection), II and III. The parties agree to consult concerning the adequacy of these physical security measures and to identify agencies or authorities responsible for physical security. The provisions of this article shall be implemented in such a way as to avoid undue interference in the parties' nuclear activities and to be consistent with prudent management.

Article 8 contains a guarantee by each party that no material, equipment or components subject to the agreement will be used for any nuclear explosive device, for research on or development of any nuclear explosive device, or for any

military purpose. It also provides that cooperation under the agreement will be based on an obligation by Brazil not to detonate a nuclear explosive device, and on an obligation by the United States not to detonate a nuclear explosive device using any item subject to the agreement.

Article 9 requires application of IAEA safeguards with respect to all nuclear activities within the territory of Brazil, under its jurisdiction or carried out under its control anywhere. This article further requires source or special nuclear material transferred pursuant to the Agreement and source or special nuclear material used in or produced through the use of material, equipment or components so transferred to be subject to the two parties' respective safeguards agreements with the IAEA. This article also contains provisions for fall-back safeguards. The agreed minute sets forth certain rights each party will have in the event IAEA safeguards are not being applied. Article 9 also requires each party to take measures to maintain and facilitate the application of safeguards. This article requires each party to maintain a material accounting and control system, the details of which shall be comparable to those set forth in IAEA document INFCIRC/153 (corrected). Upon the request of either party, the other party shall report or permit the IAEA to report on the status of all inventories of material subject to the agreement. The

article's provisions, finally, are to be implemented so as to avoid undue interference in the parties' nuclear activities and consistent with prudent management.

Article 10 provides that if an agreement between either party and another nation or group of nations provides such other nation or group of nations rights equivalent to any or all those set forth under articles 5 or 6 with respect to material, equipment or components subject to the agreement, the parties may, upon the request of either, agree that implementation of such rights will be accomplished by the other nation or group of nations.

Article 11 accords each party the right to cease cooperation, suspend or terminate the agreement, and require the return of any material, equipment or components transferred under the agreement and any special nuclear material produced through their use if the other party does not comply with article 5, 6, 7, 8, or 9, or terminates, abrogates or materially violates a safeguards agreement with the IAEA. In the event a return is required by one party, the other party shall be reimbursed for fair market value.

Article 12 provides for termination of the previous agreement and application of the provisions of the new agreement to material and equipment subject to the previous agreement.

Article 13 provides for consultations at the request of either party regarding the implementation of the agreement and the development of further cooperation in the peaceful uses of nuclear energy. It also provides that the parties shall consult on the environmental implications of activities under the agreement, and cooperate in protecting the international environment from radioactive, chemical or thermal contamination arising from such activities and in related matters of health and safety.

Article 14 establishes a 30 year term for the agreement, which may be extended by agreement of the parties in accordance with their applicable requirements. In the event of termination or expiration of the agreement, articles 5, 6, 7, 8, 9 and 11 shall continue in effect so long as items subject to the agreement remain in the territory, under the jurisdiction or under the control of the party concerned, or until the parties agree that such items are no longer usable for any nuclear activity relevant from the point of view of safeguards. This article also provides for consultations on amendment or replacement of the agreement.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

CHAIRMAN

September 24, 1997

The President
The White House
Washington, DC 20500

Dear Mr. President:

In accordance with the provisions of Section 123 of the Atomic Energy Act, as amended, the Nuclear Regulatory Commission has reviewed the proposed Agreement for Cooperation with Brazil and supporting draft documents. It is the view of the Commission that the proposed Agreement includes all of the provisions required by Section 123 of the Atomic Energy Act, as amended. The Commission therefore recommends that you make the requisite statutory determination, approve the Agreement, and authorize its execution.

Respectfully,

Shirley Ann Jackson

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