

TEXT OF PROPOSED AGREEMENT FOR COOPERATION
BETWEEN THE GOVERNMENT OF THE U.S. AND
THE REPUBLIC OF SOUTH AFRICA CONCERNING
PEACEFUL USES OF NUCLEAR ENERGY

COMMUNICATION

FROM

THE PRESIDENT OF THE UNITED STATES

TRANSMITTING

THE TEXT OF AN AGREEMENT BETWEEN THE GOVERNMENT OF
THE UNITED STATES OF AMERICA AND THE REPUBLIC OF
SOUTH AFRICA FOR COOPERATION IN THE PEACEFUL USES OF
NUCLEAR ENERGY, PURSUANT TO 42 U.S.C. 2153(d); AUG. 1, 1946,
CH. 724, TITLE I, SEC. 123 (AS AMENDED BY PUBLIC LAW 109-
401, SEC. 104(e)); (120 STAT. 2734)



SEPTEMBER 2, 2022.—Referred to the Committee on Foreign Affairs and
ordered to be printed

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THE WHITE HOUSE,
Washington, September 1, 2022.

Hon. NANCY PELOSI,
Speaker of the House of Representatives,
Washington, DC.

DEAR MADAM SPEAKER: I am pleased to transmit to the Congress, pursuant to subsections 123 b. and 123 d. of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2153(b), (d)) (the “Act”), the text of an Agreement to Extend the Agreement for Cooperation between the United States of America and the Republic of South Africa Concerning Peaceful Uses of Nuclear Energy (the “Agreement”). I am also pleased to transmit my written approval, authorization, and determination concerning the Agreement and an unclassified Nuclear Proliferation Assessment Statement (NPAS) concerning the Agreement. In accordance with section 123 of the Act, a classified annex to the NPAS, prepared by the Secretary of State, in consultation with the Director of National Intelligence, summarizing relevant classified information, will be submitted to the Congress separately. The joint memorandum submitted to me by the Secretaries of State and Energy and a letter from the Chair of the Nuclear Regulatory Commission stating the views of the Commission are also enclosed. An addendum to the NPAS containing a comprehensive analysis of the export control system of the Republic of South Africa with respect to nuclear-related matters, including interactions with other countries of proliferation concern and the actual or suspected nuclear, dual-use, or missile-related transfers to such countries, pursuant to section 102A(w) of the National Security Act of 1947 (50 U.S.C. 3024(w)), is being submitted separately by the Director of National Intelligence.

The Agreement has been negotiated in accordance with the Act and other applicable law, and will be executed once the Republic of South Africa completes its required domestic process authorizing such execution. In my judgment, it meets all applicable statutory requirements and will advance the nonproliferation and other foreign policy interests of the United States of America.

The Agreement extends for 4 years the Agreement for Cooperation between the United States of America and the Republic of South Africa Concerning Peaceful Uses of Nuclear Energy, done at Pretoria on August 25, 1995 (the “1995 Agreement”), which will expire by its terms on December 4, 2022. The 1995 Agreement contains all of the provisions required by subsection 123 a. of the Act. It provides a comprehensive framework for peaceful nuclear cooperation with the Republic of South Africa based on a mutual commitment to nuclear nonproliferation. It permits the transfer of material, equipment (including reactors), components, and information for nuclear research and nuclear power production. It does not permit the transfer of Restricted Data and does not permit the

transfer of sensitive nuclear technology unless provided for by an amendment. Low enriched uranium may be transferred for use as reactor fuel and in reactor experiments, and small quantities of special nuclear material, including 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. Through the 1995 Agreement, the United States commits to endeavor to take necessary and feasible actions to ensure a reliable supply of nuclear fuel to the Republic of South Africa.

In the event of termination or expiration of the 1995 Agreement, key nonproliferation conditions and controls will continue in effect as long as any material, equipment, or components subject to the 1995 Agreement remain 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.

The Republic of South Africa is an advocate for peaceful uses of nuclear technology and a global leader on disarmament issues. Prior to joining the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) in July 1991, the Republic of South Africa possessed a fully developed nuclear weapons program. Shortly after adhering to the NPT, Pretoria submitted an initial nuclear material inventory declaration to the International Atomic Energy Agency (IAEA), which included all material from its then-dismantled nuclear weapons. In March 1993, Pretoria publicly acknowledged the existence of its former nuclear weapons program (something it had not been legally required to do) and afterward cooperated with the IAEA to verify complete dismantlement. The Republic of South Africa has in force a Comprehensive Safeguards Agreement and Additional Protocol with the IAEA. As a uranium producer and commercial nuclear energy generator, the Republic of South Africa is an active member of the Nuclear Suppliers Group and continues to take international nuclear safety and security requirements into account in its own domestic nuclear policy. A more detailed discussion of the Republic of South Africa's domestic civil nuclear activities and its nuclear nonproliferation policies and practices is provided in the NPAS and its classified annex.

I have considered the views and recommendations of the interested departments and agencies in reviewing the 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.

This transmission shall constitute a submittal for purposes of both subsections 123 b. and 123 d. of the Act. My Administration is prepared to begin immediately consultations with the Senate Foreign Relations Committee and the House Foreign Affairs Committee, as provided in subsection 123 b. Upon completion of the 30 days of continuous session review provided for in subsection 123 b.,

the 60 days of continuous session review provided for in subsection
123 d. shall commence.
Sincerely,

JOSEPH R. BIDEN, Jr.

DRAFT US Note

The Embassy of the United States of America presents its compliments to the Department of International Relations and Cooperation of the Republic of South Africa and has the honor to refer the Department to recent conversations between our two governments concerning the proposed extension of the Agreement for Cooperation between the United States of America and the Republic of South Africa concerning Peaceful Uses of Nuclear Energy, done at Pretoria August 25, 1995 (the "Agreement for Cooperation"). The Agreement for Cooperation entered into force on December 4, 1997 and will expire by its terms on December 4, 2022.

Pursuant to Article 13, paragraph 1 of the Agreement for Cooperation, the Embassy, on behalf of the Government of the United States of America, proposes to extend the Agreement for Cooperation for an additional 4-year period.

If the foregoing proposal is acceptable to the Government of the Republic of South Africa, the Embassy proposes that this Note together with the Department's affirmative Note in reply shall constitute an agreement between our two governments to extend the Agreement for Cooperation, that shall enter into force on the date of the later note in an exchange of diplomatic notes between the parties

indicating that they have completed all applicable requirements for its entry into force.

The Embassy of the United States of America avails itself of this opportunity to renew to the Department of International Relations and Cooperation of the Republic of South Africa the assurances of its highest consideration.

Pretoria,

[date]

DRAFT RSA Response Note

The Department of International Relations and Cooperation of the Republic of South Africa presents its compliments to the Embassy of the United States of America and has the honor to acknowledge receipt of the Embassy's Note no. XXX dated XXXXX, concerning the proposed extension of the Agreement for Cooperation between the Republic of South Africa and the United States of America concerning Peaceful Uses of Nuclear Energy, done at Pretoria August 25, 1995, which reads as follows:

“The Embassy of the United States of America presents its compliments to the Department of International Relations and Cooperation of the Republic of South Africa and has the honor to refer the Department to recent conversations between our two governments concerning the proposed extension of the Agreement for Cooperation between the United States of America and the Republic of South Africa concerning Peaceful Uses of Nuclear Energy, done at Pretoria August 25, 1995 (the “Agreement for Cooperation”). The Agreement for Cooperation entered into force on December 4, 1997 and will expire by its terms on December 4, 2022.

Pursuant to Article 13, paragraph 1 of the Agreement for Cooperation, the Embassy, on behalf of the Government of the United States of America,

proposes to extend the Agreement for Cooperation for an additional 4-year period.

If the foregoing proposal is acceptable to the Government of the Republic of South Africa, the Embassy proposes that this Note together with the Department's affirmative Note in reply shall constitute an agreement between our two governments to extend the Agreement for Cooperation, that shall enter into force on the date of the later note in an exchange of diplomatic notes between the parties indicating that they have completed all applicable requirements for its entry into force.

The Embassy of the United States of America avails itself of this opportunity to renew to the Department of International Relations and Cooperation of the Republic of South Africa the assurances of its highest consideration.

Pretoria,

[date]"

The Department of International Relations and Cooperation of the Republic of South Africa has the honor to inform the Embassy that the Government of the Republic of South Africa agrees with the proposals set forth above. The

Embassy's Note together with this Note in reply shall constitute an agreement between our two governments to extend the Agreement for Cooperation, that shall enter into force on the date of the later note in an exchange of diplomatic notes between the parties indicating that they have completed all applicable requirements for its entry into force.

The Department of International Relations and Cooperation of the Republic of South Africa avails itself of this opportunity to renew to the Embassy of the United States of America the assurances of its highest consideration.

Pretoria,

[date].

THE WHITE HOUSE
WASHINGTON

August 25, 2022

Presidential Determination
No. 2022-21

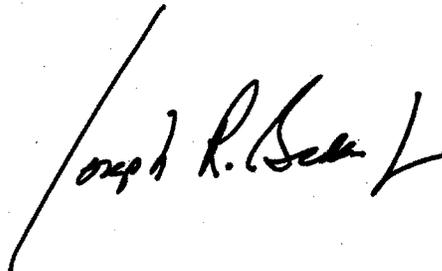
MEMORANDUM FOR THE SECRETARY OF STATE
THE SECRETARY OF ENERGY

SUBJECT: Presidential Determination on the Proposed Agreement to Extend the Agreement for Cooperation between the United States of America and the Republic of South Africa Concerning Peaceful Uses of Nuclear Energy.

I have considered the proposed Agreement to Extend the Agreement for Cooperation between the United States of America and the Republic of South Africa Concerning Peaceful Uses of Nuclear Energy (the "proposed Agreement"), along with the views, recommendations, and statements of the interested departments and agencies.

I have determined that the performance of the proposed 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 the Secretary of State to arrange for its execution.

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

A handwritten signature in black ink, appearing to read "Joseph R. Biden". The signature is written in a cursive style with a long, sweeping underline that extends to the left.

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NUCLEAR PROLIFERATION ASSESSMENT STATEMENT

Pursuant to Subsection 123 a. of the Atomic Energy Act of 1954, as Amended, with Respect to the Proposed Agreement between the Government of the United States of America and the Government of the Republic of South Africa to Extend the Agreement for Cooperation Concerning Peaceful Uses of Nuclear Energy

A. INTRODUCTION

This Nuclear Proliferation Assessment Statement (NPAS) relates to the proposed Agreement between the Government of the United States of America and the Government of the Republic of South Africa to Extend the Agreement for Cooperation Concerning Peaceful Uses of Nuclear Energy (the proposed Agreement). The Agreement for Cooperation between the United States of America and the Republic of South Africa Concerning Peaceful Uses of Nuclear Energy was done at Pretoria August 25, 1995, and entered into force on December 4, 1997 (the 1995 Agreement). The 1995 Agreement has a duration of 25 years and is set to expire by its terms on December 4, 2022. The two governments are engaged in negotiations for a successor peaceful nuclear cooperation agreement, but due to time constraints, determined to extend the 1995 Agreement for a period of four years to avoid a gap in coverage while negotiations on the successor agreement continue. The proposed Agreement will be effected by an exchange of diplomatic notes, which will be exchanged following the President's approval and authorization. A second exchange of notes would bring the proposed Agreement into force following completion of the congressional review period for the United States of America and any domestic procedures for the Republic of South Africa. The Secretary of State and Secretary of Energy are jointly submitting the proposed Agreement to the President for his approval, along with a letter from the Chairman of the U.S. Nuclear Regulatory Commission stating that the Commission finds that the proposed Agreement includes all of the provisions required by law and provides a sufficient framework for civil nuclear cooperation.

Subsection 123 a. of the Atomic Energy Act of 1954, as amended (the Act), provides that an NPAS be submitted by the Secretary of State to the President on each agreement for cooperation concluded pursuant to that section. Pursuant to subsection 123 a., the NPAS must analyze the consistency of the text of the proposed Agreement with all the requirements of the Act, with specific attention to whether the proposed Agreement is consistent with each of the criteria set forth in that subsection. The NPAS must also address the adequacy of the safeguards and

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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.

With this statutory mandate in mind, this NPAS (a) provides background information on South Africa's civil nuclear program, ongoing U.S.-South African civil nuclear energy cooperation, South Africa's civil nuclear energy cooperation with other countries, South Africa's nonproliferation policies, and South Africa's export controls (Part II); (b) describes the nature and scope of the cooperation in the 1995 Agreement, which would be extended by the proposed Agreement (Part III); (c) reviews the applicable substantive requirements of the Act and the Nuclear Nonproliferation Act of 1978 (NNPA) and details how they will be met by the proposed Agreement (Part IV); and (d) addresses the adequacy of the safeguards and other control mechanisms and the peaceful use assurances contained in the 1995 Agreement and sets forth the net assessment and conclusions of the Department of State as contemplated by subsection 123 a. of the Act (Part V).

**B. SOUTH AFRICA'S NUCLEAR ACTIVITIES AND
NONPROLIFERATION POLICIES**

A. History of South African Civil Nuclear Activities

South Africa is the only nuclear power-producing country on the African continent. Prior to joining the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) in July 1991, South Africa possessed a fully developed nuclear weapons program. The government concluded the required comprehensive safeguards agreement with the International Atomic Energy Agency (IAEA) in September 1991 and submitted its initial nuclear material inventory declaration to the IAEA. Upon joining the NPT, Pretoria also cooperated with IAEA inspectors in line with Pretoria's strict interpretation of its legal obligations. In March 1993, Pretoria publicly acknowledged the existence of its former nuclear weapon program (something it had not legally been required to do). Thereafter, Pretoria strengthened its cooperation with the IAEA to ensure both the completeness of its nuclear material inventory declaration and also the full dismantlement of its former nuclear weapons.

South Africa has extensive civil nuclear energy infrastructure, including two French-built power reactors, a U.S.-built research reactor, uranium mining, fuel conversion and fabrication plants, storage facilities, and waste depositories. South Africa has highly trained scientific and engineering personnel. It decommissioned

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its former enrichment facility and currently has no operational uranium enrichment or spent fuel reprocessing facilities. South Africa is a strong advocate for peaceful uses of nuclear technology and nuclear disarmament.

As one of the eight nations that drafted the IAEA's founding statute in 1957, South Africa has a long-established working relationship with the IAEA, including enacting safeguards obligations under a Comprehensive Safeguards Agreement (CSA) and an Additional Protocol.

South Africa's civil nuclear energy relationship with the United States is supported by the 1995 Agreement and the Agreement Between the Government of the United States of America and the Government of the Republic of South Africa on Cooperation in Research and Development of Nuclear Energy, which was signed at Vienna on September 14, 2009, and entered into force that same day. The Nuclear Regulatory Commission also maintains a bilateral arrangement for the exchange of technical information and cooperation on nuclear safety matters with South Africa's National Nuclear Regulator, originally signed in 1994 and subsequently renewed in 5-year increments, most recently in 2019.

South Africa produces roughly 20-25 percent of the world's supply of the molybdenum-99 (Mo-99) medical radioisotope. Although it presently does not enrich or fabricate its own nuclear reactor fuel, the country has significant uranium reserves and retains technical expertise in many aspects of the nuclear fuel cycle. In 2008-09, South Africa indicated that it was contemplating the reintroduction of its uranium enrichment and fuel manufacturing capabilities for economic reasons. Although it did not go forward with this decision, more recently it has also explored building additional nuclear reactors for electricity generation, conducted feasibility studies, and signed various memoranda of understanding (MOUs) with other countries. None of these MOUs or studies has yet resulted in a South African governmental decision to add nuclear infrastructure, and the government has revised its net nuclear power generating targets downward because of budgetary considerations and other factors.

I. Nuclear Science and Technology Base

In 1948, South Africa established the Atomic Energy Board to regulate the production of and trade in uranium, and later amendments to its mandate allowed for conducting research and development in nuclear technology. It was later renamed the Atomic Energy Corporation (AEC), with the AEC's main facility being the South African Fundamental Atomic Research Installation (SAFARI-1),

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which underwent construction with U.S. assistance in 1961 and first achieved criticality in 1965. The Nuclear Energy Act (Act 46 of 1999) restructured the former AEC to establish the state-owned South African Nuclear Energy Corporation (Necsa). Necsa's main goals are to undertake and promote research and development in the fields of nuclear energy, radiation sciences, and technology; to process source material, special nuclear material and restricted material; and to cooperate with persons in matters falling within these functions. Necsa runs a learning academy that provides participants with professional and technical skills for working in the country's nuclear industry. Necsa also works with educational bodies to assist them with facilities necessary for teaching and encourages its personnel to use their experience and know-how for research towards higher degrees.

Created in 1948, the Council for Scientific and Industrial Research (CSIR) in Pretoria is a national institute, which historically has included focus on nuclear research. CSIR constructed a cyclotron, which became operational in 1955; however, by 1980, all of its nuclear functions were transferred to the National Accelerator Centre.

The iThemba Laboratory for Accelerator Based Sciences (iThemba LABS) is the largest multidisciplinary national research facility in South Africa. The lab is the largest accelerator facility in the southern hemisphere and is the country's particle accelerator center. Through various research groups, such as the Accelerator Mass Spectrometry group and the Material Research group, iThemba LABS caters specifically to postgraduate students and young researchers.

All South African universities have nuclear science courses, with introduction to nuclear science being a first-year requirement for many students pursuing degrees in physics and chemistry. Through its SAFARI-1, Necsa provides education and training to college students, including those pursuing PhD and master's degrees.

In 2005, the South African government and the Russian Joint Institute for Nuclear Research signed a MOU that expanded the scientific and technological research opportunities within the country. A multilateral agreement with the International Atomic Energy Agency (IAEA) has allowed South African students and professionals to work with foreign nuclear professionals. In 2013, the European Atomic Energy Community (EURATOM) signed a nuclear cooperation agreement with the Government of South Africa to foster scientific cooperation

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and trade between EURATOM and South Africa. This agreement entered into force in September 2021.

South Africa initiated research and development on small modular high-temperature gas-cooled reactor technology in 1993, which is based on pebble-bed modular reactor (PBMR) technology but cut funding for the project in 2010 in the wake of the global economic downturn and the absence of investment partners for South Africa's electricity utility Eskom. If financial considerations allow, South Africa may revisit the research and development of this technology in the future.

II. Nuclear Fuel Cycle Policies and Plans

South Africa's uranium reserves have been an important strategic asset since the 1940s. Due to international embargoes and its early clandestine weapons program, South Africa historically sought self-sufficiency and eventually achieved all aspects of the nuclear fuel cycle, either through domestic mining, research and development, and production, or through the assistance of U.S. or other international partners. South Africa still maintains uranium extraction capabilities at many of its mining sites but presently uses foreign suppliers for nuclear fuel conversion, enrichment, and fuel fabrication.

Prior to South Africa's 1994 governmental transition, the primary mission of the AEC in the 1970s and 1980s was to develop an indigenous nuclear fuel cycle for powering nuclear power plants and for providing material for nuclear weapons. Starting after the dismantling of South Africa's weapons program, the post-apartheid government changed the AEC's focus from using aspects of its nuclear fuel cycle to achieve strategic national security goals to domestic energy supply and commercial sales goals.

In 1999, South Africa's parliament passed two pieces of legislation critical to creating a modern framework for nationally managing all aspects of its fuel cycle for peaceful uses of nuclear energy. First, as mentioned earlier in section I, the Nuclear Energy Act (Act No. 46 of 1999) restructured the former AEC into Necsa, creating a wholly owned state entity responsible for nuclear energy research and development, implementation of South Africa's safeguards agreements with the IAEA, and oversight of radioactive waste and irradiated fuel. The second, the National Nuclear Regulator Act (Act No. 47 of 1999), modernized South Africa's regulatory capability by establishing the National Nuclear Regulator, or NNR.

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South Africa's draft nuclear energy policy of 2007 envisioned an ambitious expansion of nuclear fuel cycle capabilities, including a return to conversion, enrichment, fuel fabrication, and reprocessing of used fuel for energy security. The plan called for construction of a new 5 to 10 million separative work units (SWU) per year centrifuge enrichment plant built in partnership with British, French, or Russian vendors.

Another draft national plan in 2012 called for an 1,800 ton per year uranium conversion plant, a 1.3 million SWU per year enrichment plant, and a 200 ton per year uranium fuel fabrication plant, all established at one fuel cycle site beginning in 2016. Conversion would possibly involve either recommissioning an old plant from the AEC era or a new international joint venture beginning in 2026. Enrichment would be centrifuge-based, possibly with an international partner, and fuel fabrication was to be in partnership with the new nuclear plant vendor.

Although its own October 2019 internal review specifies only 2500 MW of future electric capacity from nuclear energy sources, South Africa has at various times shown interest in reestablishing domestic uranium enrichment capabilities to benefit local industry and reduce dependence on foreign partners.

One nuclear fabrication area in which South Africa remains involved is medical radioisotope production at its SAFARI-1 research reactor, from which it supplies approximately 20-25 percent of the world's Mo-99 needs. South Africa maintains a consolidated storage and materials chain of custody at the National Radioactive Waste Disposal Facility (NRWDF) at Vaalputs for expended reactor fuels or targets from medical radioisotope production. Both Necsa and state energy utility Eskom pay fees based upon the amounts of radioactive materials sent to the NRWDF for disposal. These fees, plus those assessed against hospital or industrial producers, go to support a radioactive waste management fund originally established as part of South Africa's Radioactive Waste Management Policy and Strategy of 2005.

III. Exploration, Mining, and Milling

Estimates place South Africa's uranium ore deposits in the top five largest in the world. Other information suggests the country may contain as much as ten percent of the world's total supply.

Large-scale uranium ore extraction from gold mine slurries began in 1951. The Nuclear Fuels Corporation of South Africa (NUFCOR) consolidated these

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operations in 1967. Today, the company is a subsidiary of Anglo Gold Ashanti. In addition to NUFCOR/Anglo Gold Ashanti, the two other large uranium producers in South Africa are Uranium One and First Uranium. At different times, Électricité de France (EDF)/Areva, Australian-backed, and Russia-backed exploration companies have also considered setting up uranium processing plants in South Africa's Karoo region. AngloGold Ashanti and Palabora Mining Company own the majority of the approximately 400 gold mining tailing and dumps from which uranium oxide is extracted. These dams and dumps are in the Witwatersrand area of Gauteng province.

The single largest uranium recovery effort in Africa is located at the Randfontein mine in Gauteng, also known as the "Ezulwini project." Established in 2007, the mine has an inferred uranium output of 83,969 tons and averages 674 tons of output annually. Main recovery operations are located approximately 50 miles west of Johannesburg in Gauteng province. Since 2010, South Africa's combined uranium ore production has been less than 1,000 tons each year, despite some analysis indicating that countrywide production could be increased to as high as 5,000 tons per year.

In addition to gold mining and uranium ore recovery, South Africa has an active heavy metal and mineral extraction industry. The country has the highest reserves of thorium in Africa, making it a potential source of nuclear fuel for prototype thorium-based reactor designs. South Africa is also the world's largest supplier of vanadium, used as an alloy metal in tool steels. Additionally, South Africa has produced approximately 40 percent of the world's supply of zircon, which is a source of zirconium metal used in nuclear fuel cladding.

IV. Conversion, Enrichment, and Fuel Fabrication

South Africa's state energy utility Eskom procures conversion, enrichment, and fuel fabrication services from international suppliers, with approximately half of the enrichment service provided by the commercial firm Tenex, in Russia.

During the AEC era prior to 1994, the country operated its own 1,200 ton per year uranium conversion facility, while enrichment was conducted at the Valindaba Y-Plant (completed in 1975), also referred to as "Pelindaba East." The enrichment methodology used at Y-Plant consisted of an indigenously developed uranium hexafluoride aerodynamic separation process (ASP) dubbed "Helikon" that was based on a German design. Several decades later, South Africa explored

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privatizing this ASP technology; however, this marketing effort was never commercially realized.

At the height of operations, Y-Plant produced an estimated total of 990 kg of 68 percent high enriched uranium (HEU) before local enrichment efforts ended. Y-Plant was later dismantled under IAEA supervision. Construction of a larger, semicommercial "Z-Plant" enrichment site at Pelindaba commenced in the late 1970s with full production achieved by 1988. This plant could supply 300,000 SWU per year and supplied 3.25 percent enriched uranium for the Koeberg nuclear reactor complex during the period when South Africa was unable to procure reactor fuel because of international sanctions. The Z-Plant proved to be uneconomical and was closed in 1995.

South Africa initially embarked on building the SAFARI-1 research reactor at Pelindaba to produce plutonium; however, the project was abandoned in 1969 in favor of continuing HEU enrichment. The official IAEA General Conference Report from 1993 determined that the amount of HEU produced by the pilot enrichment plant was consistent with the declared scope of the nuclear weapons program and all such material was accounted for appropriately. Although South Africa still has legacy HEU from its dismantled nuclear weapons, no HEU is presently used for commercial power in the country.

Starting in 1983, in addition to an ASP based enrichment process, South Africa pursued a molecular laser isotope separation (MLIS) enrichment process and signed a Cooperation on Molecular Laser Isotope Enrichment partnership with the French firm Cogema SA (now Orano/Areva). This joint commercial development partnership did not prove profitable and eventually fell victim to budget cuts in 1997.

In addition to its conversion and enrichment capabilities, South Africa at one time did possess its own fuel fabrication capability. In the 1980s and 1990s, South Africa's BEVA fuel fabrication plant supplied 330 pressurized water reactor fuel assemblies for the Koeberg nuclear power reactors. Later, during the period when South Africa was developing its PBMR concept in conjunction with the United States, a larger PBMR fuel production facility was planned for Pelindaba, and 9.6 percent enriched uranium fuel pebbles were test-manufactured and shipped to the United States and Russia for verification.

Today, South Africa's nuclear enrichment and fabrication is limited to its medical radioisotope production, which was formerly HEU-based. The National

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Nuclear Security Administration (NNSA) has worked closely with South Africa to help it convert its HEU-based Mo-99 medical isotope production process to one using low enriched uranium (LEU) fuel and targets instead. Since 2010, South Africa has supplied Mo-99 radioisotopes for medical uses to more than 50 countries, roughly 20-25 percent of the world's supply.

V. Nuclear Research Reactors

Constructed at the Pelindaba site in 1961, the SAFARI-1 is the only nuclear research reactor in South Africa. With help from the United States and the United Kingdom, the reactor reached criticality in 1965. The United States originally provided uranium fuel enriched to 93 percent while the United Kingdom agreed to receive the irradiated fuel for reprocessing, until U.S. shipments were suspended in 1975. In 2005, Necsa began financing the conversion of SAFARI-1 from HEU to LEU; this process was completed in 2009. Necsa reported that the conversion was in line with international norms to reduce proliferation risks. Necsa noted that this conversion would enable South Africa to promote South African products as non-proliferation compliant, to request preferential treatment in key markets such as the United States, and to expand production in international joint ventures. Today, SAFARI-1 is a leader in neutron transmutation doping of silicon and, as mentioned before, one of the top five global producers of Mo-99.

SAFARI-1 has operated for over 50 years, but it will likely reach its end of life around 2030. In September 2021, the South African cabinet approved the construction of a "multipurpose reactor," and in February 2022, Necsa issued a request for information from potential suppliers. A new research reactor, a dedicated isotope production reactor (DIPR), has been proposed by Necsa and its subsidiary NTP Radioisotopes. DIPR would be used for isotope production and other as yet undefined activities. After DIPR's operations begin, SAFARI-1 would focus on research and development and would be a back-up to DIPR.

VI. Nuclear Power

In the last few decades, South Africa has changed its national energy policy multiple times. The country relies primarily on coal for its electricity supply; its goals and resources for nuclear power have been either expanded or contracted based upon budgetary and political considerations. In the last few years, South Africa's failure to modernize its conventional power plants has led to nationwide rolling blackouts, which has placed additional emphasis on maintaining South Africa's nuclear infrastructure. Even with these added stressors, South Africa

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officially curtailed its planned expansion into PBMR technology in 2010 after close to 20 years of planning and negotiations. South Africa's most recent Integrated Resource Plan (IRP), approved in 2019, specifies only 2500 MW of electric capacity from nuclear energy sources, with the remainder of its electricity provided through coal, solar, wind, and by other renewable and nonrenewable sources.

In addition to the SAFARI-1 research reactor, South Africa has two Framatome (EDF/Areva)-designed, CP-1 model, 900 MWe-class, dual-unit pressurized water reactor installations, Koeberg-1 and -2. These reactors are located along South Africa's southwestern coast at the Koeberg Nuclear Power Station and were connected to the national power grid in 1984 and 1985, respectively, after approximately ten years of construction. South Africa's sole national power generation company, Eskom, operates the Koeberg Nuclear Power Station as part of its portfolio of power generation facilities. Its affiliated company, Eskom Holdings SOC, also manages South Africa's membership in international nuclear energy producer organizations such as the World Association of Nuclear Operators and in the World Nuclear Association.

As of 2017, these reactors produced approximately five to seven percent of South Africa's electricity and remain the only commercial energy nuclear reactors in Africa. Their total installed capacity is 1860 MW; in 2020, the two units delivered a net energy of 13,252 GWh. (Eskom, the country's only electricity utility company, is assessed to have a total installed output capacity of 44,145 MW annually.) This power generation was initially supported by a dedicated domestic fuel element manufacturing facility that began operations in 1987, but this domestic facility was later shuttered after South Africa switched to procuring nuclear fuel from international vendors. The 2019 IRP contains provisions for extending Koeberg-1 and -2's design life and safety controls for an additional 20 years, until 2044 and 2045, respectively.

National interest in PBMR technology was initially an outgrowth of an Eskom research project that began in 1993. This project resulted in Eskom forming a wholly independent "Pebble Bed Modular Reactor Pty Ltd" subsidiary to handle the technology's introduction and commercialization. The PBMR itself was a high-temperature gas-cooled reactor design that provided for both electricity generation (through a steam turbine or direct cycle) and processing heat for industrial applications. Starting in 1999, the South African government, U.S. company Westinghouse Electric Company (Westinghouse), the Industrial Development Corporation of South Africa, and Eskom invested a total of R9.244

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billion (about US\$ 1.3 billion) in the project, including an original 400 MWt direct (Brayton) cycle unit design and a follow-on 200 MWt (80 MWe) steam cycle version. However, operations were suspended in 2010 in the wake of the global economic downturn.

Despite the aborted PBMR effort, South Africa remains a member of the Generation IV International Forum (GIF), having signed the GIF Charter in July 2001 and its Framework Agreement¹ in 2015. The country is also a member of IAEA's Innovative Nuclear Reactors and Fuel Cycles (INPRO) project working group, and South Africa's Department of Mineral Resources and Energy is designated as the country's implementing agent and is a member of INPRO's Steering Committee. South Africa has expressed interest in an advanced high-temperature 50 MWe pilot reactor to potentially be built in the mid-2020s, with a scaled-up 150 MWe follow-on in the 2030s. This design proposal would be a molten salt reactor with pebble-style reactor fuel, with exhaust gas driving a super-heated steam cycle.

In February 2013, South Africa became the first African nuclear power generating country to host the IAEA's Integrated Nuclear Infrastructure Review (INIR) mission. The South African government asked the IAEA to conduct an INIR mission to comprehensively review its nuclear infrastructure and identify areas for improvement in preparation to inviting bids for the proposed new build project. Based on INIR findings and recommendations, South Africa has received training and other assistance from the IAEA, the United States, and other partners.

VII. Radioactive Waste Management

To establish and coordinate its national nuclear waste program, South Africa promulgated a Radioactive Waste Management Policy and Strategy in 2005, prior to its accession to the IAEA's Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management in 2007. Shortly after, South Africa further formalized its radioactive waste management efforts by passing the National Radioactive Waste Disposal Institute (NRWDI) Act of 2008 (Act 53) that consolidated storage and materials chain of custody at the NRWDF. Necsa manages this facility, located at the previously established Vaalputs site. In 2014, the site's nuclear waste management responsibility was

¹ *The Framework Agreement for International Collaboration on Research and Development of Generation IV Nuclear Energy Systems*

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further transferred to the NRWDI, although Necsa continued to carry out the site's day-to-day operation.

Per the 2008 NRWDI Act (Act 53), NRWDI manages radioactive waste on a national basis and operates the low-level waste disposal facility at Vaalputs. It also designs and implements disposal solutions for all levels of nuclear waste; develops compliant safety, operational, and technical criteria for acceptance and disposal; assesses and inspects waste; and issues disposal certificates.

At Vaalputs, low- or intermediate-level nuclear waste is transported by road in steel and concrete containers to be disposed of in shallow landfill trenches, either in metal drums or in concrete containers, depending on waste classification. Used reactor fuel is also stored at Koeberg, in special pools equipped with high-density racking. Some low- and intermediate-level hospital, industry, and Necsa radioactive waste is also disposed of at the Pelindaba site. Depending on the nature of the waste, both dry and wet storage methods are used; NRWDI began procuring HI-STAR 100 dual-purpose casks in 2018 to aid in this storage effort.

B. Cooperation with the United States

Prior to the 1995 Agreement, the two countries had a close working relationship in nuclear science and technology. Under the auspices of the U.S. Atoms for Peace program, the United States provided South Africa with the 20 MWe SAFARI-1 research reactor (constructed by U.S. firm Allis-Chalmers) and the 93 percent enriched HEU fuel through the Agreement for Cooperation Between the Government of the United States of America and the Government of the Union of South Africa Concerning the Civil Uses of Atomic Energy signed at Washington July 8, 1957.

In the 1960s, while engaged in civil nuclear cooperation with the United States, South Africa began to explore the idea of "peaceful nuclear explosions" (PNE) for mining. The extent of how and to what degree PNE concepts later contributed to South Africa's covert nuclear weapons program remains unknown.

After 1993, when South Africa renounced nuclear weapons, the U.S. and South Africa began working closely to develop a concept PBMR for potential commercial nuclear energy use. U.S. and South African scientists and engineers collaborated on design concepts for a reactor using PBMR technology to provide additional electricity-generating capacity. Starting in 1999, the South African government, Westinghouse, the Industrial Development Corporation of South

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Africa, and Eskom invested a total of R9.244 billion (about US\$ 1.3 billion) in the project, before it was ultimately canceled in 2010.

More recently, in 2009, the United States and South Africa signed and brought into force the Agreement Between the Government of the United States of America and the Government of the Republic of South Africa on Cooperation in Research and Development of Nuclear Energy. This agreement facilitated collaboration in research and development of advanced technologies for improving the cost, safety, and proliferation resistance of nuclear power systems. Specific objectives of the agreement included research and development of advanced nuclear energy systems, developing advanced concepts and scientific breakthroughs in nuclear fission and reactor technology to expand peaceful uses of nuclear energy, and promoting and maintaining both countries' nuclear science and engineering infrastructure to sustain the development and use of nuclear energy.

The NNSA has worked closely with South Africa to help it convert its HEU-based Mo-99 isotope production process to one using LEU instead. The United States has since authorized exports of LEU to South Africa for the purposes of medical isotope production. South Africa has supplied Mo-99 radioisotopes derived from LEU for medical uses to more than 50 countries.

C. Cooperation with Other Countries and Organizations

In addition to its agreements with the United States and the IAEA, South Africa has established relationships with many other advanced nuclear technology suppliers. As of 2016, South Africa had concluded official nuclear cooperation agreements with Algeria, Argentina, China, France, Japan, the Republic of Korea, the Russian Federation, Saudi Arabia, and the United States. Since 2011, the South African government has also continued exploring international engagement options for nuclear power technology. South Africa's Department of Mineral Resources and Energy has issued requests for proposals to international vendors, including Rosatom (Russia), EDF/Areva (France), Korea Electric Power Corporation (Republic of Korea), State Nuclear Power Technology Corporation Limited (SNPTC) (China), and Westinghouse (United States). South Africa also supports the ability of all states to develop nuclear energy for peaceful purposes, consistent with Article IV of the NPT. This support has resulted in nuclear-related diplomatic partnerships with India, Brazil, and various other governments in the Non-Aligned Movement.

I. People's Republic of China

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South Africa concluded a 2003 technical and scientific cooperation agreement with the People's Republic of China, which encompassed ten major projects contributing to mutual economic enhancement, including the peaceful use of nuclear energy and mining. A decade later, both countries established a 2014 memorandum for the possible utilization of Chinese nuclear technology in South Africa. Afterward, Necsa and the China National Nuclear Corporation concluded an agreement for and South Africa's Standard Bank Group, the Industrial and Commercial Bank of China, and SNPTC agreed to explore financing for the development of new nuclear power plants. Also in November 2015, South Africa's NNR established a formal relationship with China's National Nuclear Safety Administration. As of 2020, the two countries were working on renewing a ten-year strategic partnership agreement to replace the one that was expiring. This new agreement included provisions for continued cooperation in science and technology, including nuclear energy-related matters.

II. France and the United Kingdom

South Africa signed a bilateral nuclear cooperation agreement with France in 2014. This agreement included provisions for continued cooperation in "skills development, localization of nuclear technology, and research and development." The two have also signed an agreement on Cooperation on Molecular Laser Isotope Enrichment. South Africa and the United Kingdom do not presently have a bilateral nuclear cooperation agreement. However, South Africa's Necsa embarked on a joint venture with the United Kingdom's Amersham, Ltd. to import medical radioisotopes.

III. Russia

In 2014, South Africa's Eskom utility signed an intergovernmental agreement with Russia's Rosatom and its subsidiaries that involved purchasing Russian pressurized water reactor (VVER) power plants. The government also concluded two MOUs with Russia to provide personnel training and enhance public awareness in South Africa of nuclear energy. These agreements also specified nuclear waste management support and included financial assistance for up to eight Russian VVER reactors totaling 9.6 GW of power generation capacity to be in place by 2030. However, after a series of legal challenges, in April 2017 the South African High Court ruled the agreement with Rosatom unconstitutional. There were also allegations of significant corruption associated with the Russian bid.

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D. Nonproliferation Policies

South Africa is a strong advocate for peaceful uses of nuclear technology and a global leader on disarmament issues. South Africa is the only country that has manufactured nuclear weapons and then dismantled its nuclear weapon program. The government originally established its undeclared weapons program primarily because of its increasing international isolation over its apartheid policy and perceived security threats from a Soviet-backed Angolan-Cuban coalition over disputed territory in Namibia. Subsequent diplomatic agreements to end the conflict with Angola and Cuba, the collapse of the Soviet Union, and the advent of a progressive, reformist regime under President F.W. de Klerk led to the weapons program's abolishment in the early 1990s.

I. Nuclear Safeguards

South Africa participated in early multilateral nuclear policymaking. It was one of the eight member nations that drafted the IAEA's original founding statute in 1957.

Not long after it signed the NPT in 1991, South Africa concluded a CSA with the IAEA (IAEA Information Circular INFCIRC/394) to allow periodic technical inspections and international verification of its nuclear program. After South Africa acknowledged the existence of its former nuclear weapons program in 1993 and enhanced its transparency with the IAEA, by September 1993, the IAEA General Conference had accepted South Africa's declarations on the dismantlement and destruction of equipment for its nuclear weapons, on transfer of dual-use equipment and facilities to non-nuclear or civilian nuclear uses, and on destruction of two test shafts under IAEA supervision. The IAEA said it was reasonable to conclude that South Africa's declared production of HEU were consistent with what its enrichment plant could have produced. South Africa brought into force an Additional Protocol to its CSA in 2002.

II. Nuclear Regulations and Statutes

As discussed earlier, South Africa first codified its nuclear policies in its Atomic Energy Act of 1948. This legislation established the Atomic Energy Board, later renamed the AEC, overseeing national uranium mining, sales, and other related activities. National nuclear policy further expanded in 1963 through passage of the Nuclear Installations Act, which specified nuclear-related licensing

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procedures. Later passage of the Nuclear Energy Act in 1982 charged the AEC with responsibility for all nuclear matters including uranium enrichment and added an amendment creating an autonomous Council for Nuclear Safety (CNS), to further oversee licensing and other activities.

The country operated under these laws until 1999, when the follow-on Nuclear Energy Act (Act 46) and National Nuclear Regulator Act (Act 47) transformed CNS into the NNR, maintaining it as an independent statutory organization with a board of directors appointed by the South African Minister of Energy. The Nuclear Energy Act granted NNR regulatory control over safety of nuclear installations, radioactive waste, irradiated nuclear fuel, and the mining and processing of radioactive ores and minerals. Additionally, the NNR served to protect persons, property, and the environment from the harmful effects (i.e., nuclear damage) arising from exposure to ionizing radiation. The act created the South African Minister of Minerals and Energy to manage nuclear power generation, radioactive waste, and the government's international nuclear commitments. The AEC was also restructured as Necsa, a state corporation, responsible for most nuclear energy matters including waste and safeguards, but not power generation. The Department of Environmental Affairs exercises additional regulatory oversight, including nuclear-related environmental assessment.

Regulatory policymaking in South Africa has focused on articulating a national vision for the continued integration of nuclear energy, technology, and resource extraction. The 2008 Nuclear Energy Policy outlined expanding all phases of the country's nuclear energy program, but cautioned, "prospecting and mining of uranium ore and the use of uranium (or other relevant nuclear materials) as a primary resource of energy must be regulated and managed for only peaceful purposes." More broadly, South Africa's 2019 IRP specifies its 2500 MW electric capacity goals from nuclear, renewable, and nonrenewable energy sources.

South Africa participated in the IAEA's first INIR mission on the continent. The INIR is designed to evaluate a country's nuclear infrastructure and identify safety and security enhancements. Subsequently, with U.S. assistance, South Africa has participated in and hosted training seminars and workshops on physical protection, the design basis threat, and nuclear security detection architecture.

Coordination over nuclear security infrastructure and related matters happens via the Nuclear Security Committee, comprising officials from the NNR, the South African Police Service, the State Security Agency, nuclear industry

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operators, and other organizations. The Priority Crimes Litigation Unit, another South African enforcement body with nuclear-related responsibilities, prosecutes nonproliferation-related matters in coordination with the Government Sector Security Council, chaired by the South African Police Service. South Africa's National Strategic Intelligence Act (Act 39) of 1994 requires personnel who are involved in different aspects of its nuclear programs to undergo security background checks before being granted physical or informational access to sensitive state-owned sites or facilities.

E. Export Controls

In 1993, South Africa enacted its Non-proliferation of Weapons of Mass Destruction Act (Act 87) to serve as the basis for its domestic nonproliferation programs. The act provided for control over weapons of mass destruction by establishing a supervisory council, determining what "objects and functions" were proliferation-related, and prescribing specific methods for nonproliferation management and control.

By 1995, the inaugural South African Council for the Non-proliferation of Weapons of Mass Destruction was chartered under the South African Ministry of Trade and Industry to identify those goods that should be controlled, to register persons who have custody of controlled goods, and to issue import and export permits for dual-use items. According to Government Notice 20 published in 2010, dual-use exports are defined as, "materials, equipment, assemblies, parts and components, test and production equipment, software, and technology." Private South African citizens were found to have transferred dual-use nuclear technology illegally to the nuclear weapons-related procurement network of A.Q. Khan over a period ending in 1995 and to have supplied Libya's uranium enrichment efforts until 2003. The South African government subsequently investigated and prosecuted most of these traffickers and criminal elements.

South Africa further supports nonproliferation through its implementation of UN Security Council Resolution 1540, which seeks to prevent nonstate actors from gaining access to nuclear, chemical, or biological weapons and their means of delivery.

South Africa contributes to the IAEA's Enhanced Effort to Combat Illicit Trafficking in Nuclear and Radiological Materials by supporting ongoing programs to recover, consolidate, and return disused and orphaned radioactive sources throughout Africa. For this effort, Necsa developed a mobile hot cell facility,

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thereby providing developing countries with specialized and secure storage for highly radioactive medical and orphan sources. South Africa has also participated in bilateral and multilateral nonproliferation programs with the U.S. State Department Export Control and Related Border Security Assistance program to receive legal and regulatory framework assistance and export licensing and enforcement training.

South Africa is a participant in the Nuclear Suppliers Group (NSG) and has incorporated NSG nonproliferation guidelines into various domestic laws, including Sections 34 and 35 of its Nuclear Energy Act (1999) that governs "Export of Trigger Lists items" and "Transfer of nuclear technology, including information, technical data, technical assistance, and training." It has also incorporated NSG guidelines in the Non-Proliferation of Weapons of Mass Destruction (NPWMD) Act (Act 87) of 1993. South Africa joined the Missile Technology Control Regime in 1995.

C. ANALYSIS OF THE PROPOSED AGREEMENT

The 1995 Agreement will expire by its terms on December 4, 2022. The proposed Agreement would extend the 1995 Agreement for an additional 4-year period, until December 4, 2026, to provide the time necessary for the United States and South Africa to complete negotiation of a new agreement. The proposed Agreement is in the form of an exchange of diplomatic notes between the Government of the United States of America and the Government of the Republic of South Africa and would enter into force on the date of the later note in a subsequent exchange of diplomatic notes between the Parties indicating that they have completed all applicable requirements for its entry into force.

The proposed Agreement would extend the 1995 Agreement, which established the conditions for U.S. civil nuclear energy trade with South Africa. In general, as set forth in Articles 2 through 4 of the 1995 Agreement, and in accordance with the parties' respective treaties, national laws, regulations, and license requirements, the parties (directly or through authorized persons) may transfer material, equipment, components, and information under the proposed Agreement.

Article 4 of the 1995 Agreement provides that material, equipment, and components may be transferred for applications consistent with the Agreement. LEU may be transferred for use as reactor fuel and in reactor experiments, and small quantities of special nuclear material, including plutonium and high enriched

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uranium, may be transferred for use as samples, standards, detectors, targets and for such other purposes as the parties may agree. Article 4(5) of the 1995 Agreement sets forth the commitment of the United States to endeavor to ensure a reliable supply of nuclear fuel to the Republic of South Africa.

Restricted Data may not be transferred under the 1995 Agreement and sensitive nuclear technology may not be transferred unless provided for by an amendment to the Agreement. Sensitive nuclear facilities and major critical components thereof may not be transferred under the 1995 Agreement.

In the event of termination or expiration of the 1995 Agreement, key nonproliferation conditions and controls will continue in effect as long as any material, equipment, or components subject to the 1995 Agreement 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 items are no longer usable for any nuclear activity relevant from the point of view of safeguards. According to the 1995 Agreement, prior approval is required for the parties to retransfer material, equipment, and components transferred under the 1995 Agreement and any special nuclear material produced through the use of such material or equipment.

D. REQUIREMENTS OF THE ATOMIC ENERGY ACT AND NUCLEAR NONPROLIFERATION ACT

A. Requirements of the Atomic Energy Act

The proposed Agreement would extend the 1995 Agreement, which satisfactorily meets the applicable requirements of the Act. Subsection 123 a. of the Act sets forth nine specific requirements that must be met in most agreements for cooperation. As described below, eight of those requirements are relevant with respect to the 1995 Agreement.

(1) Application in Perpetuity of Safeguards: Pursuant to subsection 123 a.(1) of the Act, the Republic of South Africa, as the "cooperating party," must provide a guaranty:

that safeguards as set forth in the agreement for cooperation will be maintained with respect to all nuclear materials and equipment transferred pursuant [to the agreement], 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 Republic of South

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

The "safeguards as set forth in the agreement" are found in Article 9 of the 1995 Agreement and the Agreed Minute to the 1995 Agreement, and the guaranty that they will be maintained in perpetuity is found in Article 13(2) of the 1995 Agreement.

Article 9 stipulates that (a) cooperation under the 1995 Agreement shall require the application of IAEA safeguards with respect to all nuclear activities within the territory, under the jurisdiction, or under the control of South Africa; (b) source or special nuclear material transferred to South Africa pursuant to the 1995 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 Agreement between South Africa and the IAEA for the application of safeguards in connection with the Treaty on the Non-Proliferation of Nuclear Weapons, which was signed on September 16, 1991; and (c) in the event the South Africa-IAEA safeguards agreement is not being applied, South Africa is to immediately enter into equivalent arrangements with the IAEA or the United States to establish equivalent safeguards arrangements (fall-back safeguards). The requirement for creation of fall-back safeguards is further amplified in the Agreed Minute to the 1995 Agreement, which establishes certain rights the United States would have in that situation. Those rights would include the right to review in a timely fashion the design of any transferred equipment or relevant facilities, to require maintenance and production of records and reports to assist in ensuring accountability for covered material, and to designate personnel for inspection visits.

Both the primary safeguards requirements and the requirement to create fall-back safeguards would, according to Article 13(2) of the 1995 Agreement, continue in effect so long as any material, equipment, or components subject to the Agreement remains in the territory of South Africa or under its jurisdiction or control, unless the parties agree that it is no longer usable for any nuclear activity relevant from the point of view of safeguards. These requirements would therefore survive termination of the 1995 Agreement. This provision removes any ambiguity over whether the expiration of the proposed Agreement would have the effect of lifting South Africa's safeguards obligations.

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(2) “Full-scope” Safeguards: Subsection 123 a.(2) of the Act requires, as a condition of continued U.S. nuclear supply under an agreement for cooperation, maintenance by the cooperating party – if, like South Africa, it is a “non-nuclear-weapon state” under the Treaty on the Non-proliferation of Nuclear Weapons (NPT) – of IAEA safeguards on all nuclear material in all peaceful nuclear activities in the state or under its jurisdiction or control. Article 9(1) of the 1995 Agreement satisfies this requirement. It provides that “Cooperation under this Agreement shall require the application of IAEA safeguards with respect to all nuclear activities within the territory of South Africa, under its jurisdiction or carried out under its control anywhere.”

(3) No Explosive or Military Use: Subsection 123 a.(3) of the Act requires that agreements include a guaranty that no nuclear material, equipment, or sensitive nuclear technology, and no special nuclear material produced from such transferred items, will be used for any nuclear explosive device, for research on or development of any nuclear explosive device, or for any other military purpose. Article 8 of the 1995 Agreement satisfies this requirement. Like many other U.S. nuclear cooperation agreements, it includes an even broader guaranty than is required under the Act; it applies to not just special nuclear material, but also source material, moderator material, and byproduct material, as well as equipment and components transferred under the Agreement, and to special nuclear material, source material, moderation material, and byproduct material used in or produced through transferred items or material.

With respect to sensitive nuclear technology or material produced through such technology, a specific guaranty of no explosive or military use is not required because no such technology is authorized to be transferred. Article 3(4) provides that sensitive nuclear technology may not be transferred under the 1995 Agreement unless provided for by an amendment to the Agreement.

(4) Right of Return: Subsection 123 a.(4) of the Act requires that agreements provide that the United States has a right to require the return of any nuclear materials and equipment transferred pursuant to an agreement for cooperation and any special nuclear material produced through the use of such transferred items in the event of a nuclear detonation by the cooperating party or its termination or abrogation of an IAEA safeguards agreement. Article 11 of the 1995 Agreement satisfies this requirement. Indeed, as is true in many existing agreements, the right to require return set forth in Article 11 applies not only to situations as required in the Act, but also to situations in which South Africa does not comply with the storage, retransfer consent, enrichment or reprocessing

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consent, physical protection, or safeguards requirements of the 1995 Agreement. The United States would be required to reimburse South Africa for the fair market value of any returned items, but such a condition is consistent with the Act's requirement. The right of return in Article 11 would also survive termination of the 1995 Agreement.

(5) Retransfer Consent: Subsection 123 a.(5) of the Act requires agreements to include a guaranty that certain transferred items – material, Restricted Data, and production or utilization facilities (i.e., reactors and certain major component parts of reactors) – and any special nuclear material produced through use of such material or facilities will not be transferred to unauthorized persons or beyond the jurisdiction or control of the cooperating party without U.S. consent. According to Article 3(3), Restricted Data cannot be transferred under the 1995 Agreement. Article 5 of the 1995 Agreement includes the necessary guaranty for all other required items.

(6) Physical Security: Subsection 123 a.(6) of the Act requires agreements to include a guaranty that “adequate physical security” will be maintained with respect to any nuclear material transferred pursuant to an agreement for cooperation and any special nuclear material used in or produced through the use of nuclear material, production facility, or utilization facility transferred. The term “adequate physical security” is not defined in section 123, but section 127(3) of the Act says that physical security measures shall be deemed adequate if they “provide a level of protection equivalent to that required by the applicable regulations.” The Nuclear Regulatory Commission, in regulations set forth at 10 C.F.R. § 110.44, requires that physical security measures in recipient countries provide protection at least comparable to the current IAEA recommendations, published at INFCIRC/225/Revision 5.

Article 7 of the 1995 Agreement meets this requirement. It requires maintenance of “adequate” physical protection with respect to transferred source or special nuclear material and equipment, as well as special nuclear material used in or produced from it, and further sets forth that compliance requires application of measures in accordance with levels at least equivalent to the IAEA INFCIRC/225/Revision 2 recommendations and any subsequent revisions agreed to by the parties. In light of this provision, during the negotiation of the proposed Agreement the heads of the United States and South Africa delegations confirmed application of INFCIRC/225/Revision 5 by both of their governments.

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(7) Enrichment/Reprocessing/Alteration Consent: Subsection 123 a.(7) of the Act requires a guaranty that no material transferred pursuant to an agreement for cooperation or used in or produced through the use of any material, production facility, or utilization facility transferred pursuant to the agreement “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.” This requirement is met by Article 6 of the 1995 Agreement.

For enrichment, Article 6 establishes that uranium transferred pursuant to the 1995 Agreement or used in transferred equipment shall not be enriched unless the parties agree. (As in all other U.S. 123 agreements, the enrichment rule specifies uranium rather than “any material” because in common usage the term “enrichment” refers only to the increase of the isotope uranium 235 beyond the amount that exists in nature.)

For reprocessing, Article 6 also establishes that material transferred pursuant to the 1995 Agreement, and material used in or produced through the use of transferred material or equipment, can only be reprocessed if the parties agree.

Finally, with respect to alteration in form or content, the 1995 Agreement provides that plutonium, U-233, high enriched uranium, and irradiated source or special nuclear material transferred pursuant to the agreement or used in or produced through the use of transferred material or equipment shall not be altered in form or content without agreement of the parties except by irradiation or re-irradiation.

(8) Storage: Subsection 123 a.(8) of the Act requires agreements for cooperation to include a guaranty that specified nuclear materials – plutonium, uranium 233, and high enriched uranium – transferred under the agreement or recovered from nuclear material that was transferred or used in transferred equipment will only be stored in facilities approved in advance by the United States. Article 5(1) of the 1995 Agreement contains this guaranty.

(9) Sensitive Nuclear Technology: Section 123 a.(9) of the Act addresses the need for a guaranty applicable to certain situations that may result when sensitive nuclear technology is transferred pursuant to an agreement for cooperation. This requirement is not applicable to the 1995 Agreement because,

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according to Article 3(4), sensitive nuclear technology shall not be transferred under the 1995 Agreement.

B. Requirements of the Nuclear Non-Proliferation Act

The proposed Agreement, which extends the 1995 Agreement, satisfies the applicable requirements of the NNPA. Sections 402 and 407 of the NNPA address the content of agreements for peaceful nuclear cooperation.

I. Major Critical Components

Section 402(b) of the NNPA precludes the transfer under an agreement for cooperation of component parts determined to be essential to the operation of a uranium enrichment, nuclear fuel reprocessing, or heavy water production facility unless the agreement specifically designates such components as items to be exported. Article 4(1) of the 1995 Agreement specifies that "sensitive nuclear facilities" and "major critical components" shall not be transferred. The definition of "sensitive nuclear facility" in Article 1(N) of the 1995 Agreement encompasses the facilities described in Section 402(b) of the NNPA, and "major critical component" is defined in Article 1(F) of the 1995 Agreement as any part or group of parts essential to the operation of such a facility.

II. Environment

Section 407 of the NNPA urges the inclusion in agreements for cooperation of provisions for cooperation in protecting the environment from radioactive, chemical, or thermal contamination arising from peaceful nuclear activities. Article 12(2) of the 1995 Agreement provides for consultation about such environmental implications and cooperation in protection of the international environment as well as in related matters of health and safety. In addition, the preamble to the 1995 Agreement includes a provision indicating that the parties are mindful that peaceful nuclear activities must be undertaken with a view to protecting the international environment from radioactive, chemical, and thermal contamination.

The proposed Agreement thus satisfies all the substantive requirements specified for agreements for cooperation by the Act and the NNPA.

V. CONCLUSION

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The proposed Agreement, which would extend the 1995 Agreement for four years, satisfies the substantive requirements of U.S. law. The 1995 Agreement has been a successful framework for mutually beneficial civil nuclear energy cooperation between the two countries, and an extension will provide an avenue for continued collaboration on nuclear nonproliferation goals while negotiations on a subsequent agreement continue.

On the basis of the analysis in this NPAS and all pertinent information of which it is aware, the Department of State has arrived at the following assessment and conclusions.

1. The safeguards and other control mechanisms and the peaceful use assurances in the 1995 Agreement, which would be extended by 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 1995 Agreement, which would be extended by the proposed Agreement, meets all the legal requirements of the Act and the NNPA.
3. Execution of the proposed Agreement would be compatible with the nonproliferation program, policy, and objectives of the United States.

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August 3, 2022

MEMORANDUM FOR THE PRESIDENT

FROM: Antony Blinken
Jennifer Granholm *Antony Blinken*

SUBJECT: (U) Proposed Agreement to Extend the Peaceful Nuclear Cooperation Agreement with the Republic of South Africa

(U) The Agreement for Cooperation between the United States of America and the Republic of South Africa Concerning Peaceful Uses of Nuclear Energy, signed at Pretoria on August 25, 1995, and entered into force on December 4, 1997, (the 1995 Agreement) will expire by its terms on December 4, 2022. The two governments have therefore negotiated a proposed Agreement to Extend the 1995 Agreement (the Agreement). If you so authorize, the Agreement will be signed and, in accordance with subsections 123 b. and d. of the Atomic Energy Act of 1954, as amended (the Act), be sent to lie before Congress for review for 90 days of continuous session. Unless a joint resolution of disapproval is enacted, the Agreement may then be brought into force.

(U) The 1995 Agreement permits the transfer of material, equipment, components, and information for nuclear research and nuclear power production, supports U.S. nonproliferation, foreign policy, and commercial interests, and satisfies all requirements of U.S. law. Therefore, pursuant to the Act, we recommend that you determine that the Agreement will promote, and will not constitute an unreasonable risk to, the common defense and security, and that you approve it and authorize its execution.

(U) A discussion of the Republic of South Africa's civil nuclear program and its nuclear nonproliferation policies and practices is in the Nuclear Proliferation Assessment Statement (NPAS) and the classified annex to the NPAS submitted separately. The Director of National Intelligence is submitting separately an addendum to the NPAS on the Republic of South Africa's export control system

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with respect to nuclear-related matters. The Nuclear Regulatory Commission also is submitting its views separately.

Recommendation

(U) That you sign the determination at Tab 1 and the transmittal letter to Congress at Tab 2.

Attachments:

Tab 1 – Draft Presidential Determination

Tab 2 – Draft transmittal letter to the Congress (to be held until after the Agreement is signed)

Tab 3 – Text of Proposed Agreement to Extend the Agreement for Cooperation between the United States of America and the Republic of South Africa Concerning Peaceful Uses of Nuclear Energy

Tab 4 – Nuclear Proliferation Assessment Statement

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CHAIRMAN

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

July 28, 2022

The President
The White House
Washington, DC 20500

Dear Mr. President:

In accordance with the provisions of Section 123 of the Atomic Energy Act of 1954, as amended, the Nuclear Regulatory Commission reviewed the proposed 4-year extension to the current Agreement for Cooperation between the Government of the United States of America and the Government of the Republic of South Africa Concerning Peaceful Uses of Nuclear Energy. It is the view of the Commission that the proposed extension to the current Agreement meets all of the provisions required by law and provides a sufficient framework for continued civilian nuclear cooperation between the United States and the Republic of South Africa. The Commission therefore recommends that you make the requisite positive statutory determination, approve the proposed 4-year extension to the current Agreement, and authorize its execution.

Respectfully,

A handwritten signature in black ink, appearing to read "C. T. Hanson".

Christopher T. Hanson

