Satellite Imagery in a Nuclear Age

Phillip J. Baines
Verification Research Officer
Department of Foreign Affairs & International Trade
125 Sussex Drive,
Ottawa, Ontario
Canada K1A 0G2

Introduction

About 35,000 years ago, Homo Sapiens in their migration out of Africa encountered Neanderthals in southwestern France near the little town of Foix. Recent archeological excavations there have revealed some fascinating differences in behaviour between two competing lines of human evolution. While the established Neanderthals were content to forage in the valley floors and live in cliff-side dwellings, it has been discovered that the migrating Homo Sapiens had a predilection to situate their camps on central mounds in the valley floors from which they could survey the surrounding land in all directions. Figure 1 shows one illustrative site called, Mount Ipf, located in southern Germany. Archaeologists surmise that our direct ancestors choose these hilltop sites to sight game for hunting and to defend themselves against attacks by competing species. The subsequent extinction of the Neanderthals and the survival of Homo Sapiens may well have hinged on our ancestors exploiting such high vistas during the Stone Age. In the Nuclear Age, such panoramas are no longer provided by geological features. They are instead provided by remote sensing instruments flown on airborne and spaceborne platforms. The views afforded by these remote sensors have become no less important for the survival of Homo Sapiens in the Nuclear Age.

The Electromagnetic Spectrum

Remote sensing is the extraction of information from electromagnetic energy collected at a distance from the area of observation. Throughout the Nuclear Age, remote sensors have been built to detect electromagnetic emissions over the entire spectrum between high frequency radio and gamma ray wavelengths. Many of these systems were first developed for airborne platforms, but since the launch of the Corona reconnaissance satellites in the 1960's, many of these sensors systems have migrated to satellite platforms. A similar transition from the military to civilian to commercial systems is also in full swing. This year, for example, will see the launch of a commercial satellite system offering 1 metres resolution imaging that is better than

* The opinions expressed in this paper are those of the author and do not necessarily reflect those of the Department of Foreign Affairs and International Trade or the Government of Canada.
the national technical means of several world powers. (A resolution of 1 metres is the ability to discern an object of 1 metres length on the ground.)

Figure 2 illustrates the electromagnetic spectrum, the atmospheric attenuation, the solar emission and the instrument operating regions for the single Environmental Satellite (ENVISAT) mission of the European Space Agency. Civilian satellite imagery suitable for nuclear monitoring exploits the microwave, the infrared and the visible spectral regions. At frequencies below P-Band, the spatial resolution of imaging sensors suffers and at higher frequencies than ultraviolet, atmospheric attenuation reduces the available signal strength for imaging. This paper gives illustrative examples of satellite imagery for potential use in a cooperative nuclear monitoring role. A representative nuclear site known as the Bruce Nuclear Generating Station in Canada is the subject matter to illustrate the capability of satellite imagery past, current and anticipated. Figure 3 is a publicity aerial photograph of the Ontario Hydro Bruce Nuclear Generating Station located near Kincardine, Ontario. The site contains the Bruce A and Bruce B nuclear generating stations, the Bruce heavy water plants and a decommissioned Douglas Point nuclear generating station.

Microwave Imagery

Sensors in this region of the electromagnetic spectrum must provide their own source of illumination of the Earth as the Sun does not radiate strongly in this band. One such microwave sensor is the Synthetic Aperture Radar (SAR) that transmits short pulses of microwave energy and synthesizes an image from the reception of the backscattered energy as the satellite moves relative to the Earth. The main advantage of synthetic aperture radar systems over optical cameras is that they can operate in both day and night conditions. SAR sensors can also "see" through clouds to provide the ability to operate in all weather conditions. Under some ideal conditions, SAR sensors may even penetrate the surface to reveal certain subterranean features. Table 1 lists select satellite missions carrying SAR payloads that have been or are being built by civilian agencies from Asia, Europe and the Americas. The National Aeronautics and Space Agency (NASA) of the United States first launched the SEASAT mission in 1978. The best system in operation today is the Canadian Space Agency's RADARSAT-1 mission that offers a resolution of 8 metres.

Polarization is the direction the electric or E-field assumes when electromagnetic radiation propagates. Polarization may be linear, in which case the E-field maintains a static orientation, or circular, in which case the E-field rotates in either clockwise or counterclockwise directions. Elliptical polarizations are also possible. In SAR terminology, the polarization is denoted by two letters: the first letter denotes the orientation of the transmitted pulses and the second letter denotes the orientation of the received pulses. Generally, manmade objects on land show up better in horizontally-transmitted-horizontally-received (HH) polarization images whereas ocean features show up better in vertically-transmitted-vertically-received (VV) polarization images. Backscattered radiation from features on the ground rotates the polarization of the incident electromagnetic energy to varying degrees. Four components are required to obtain the full scattering matrix: HH, HV, VH, and VV. Future missions like the European ENVISAT
Advanced SAR instrument (ASAR) and the Japanese Advanced Land Observation Satellite (ALOS) VSAR system will allow the user to select either horizontal or vertical polarization combinations. The Canadian RADARSAT-2 system, however, can sense the full scattering matrix by transmitting alternate pulses of horizontal and vertical polarizations and simultaneously receiving both horizontal and vertical polarizations. This will provide additional information from which to discriminate features in the images. For example, commando or antisubmarine nets may not be seen around military harbours unless the polarization is optimally selected to reveal their presence.

Current SAR imagery is unlike regular photographic images and has been described by some as mounds of salt sprinkled upon black velvet. In SAR imagery, bright returns emanate from features that have edges and corners whereas dark returns come from flat, smooth surfaces. Thus buildings produce bright regions whereas asphalt roads and smooth water surfaces appear dark. Figure 4 compares an 8 metres resolution RADARSAT-1 image with a 5.8 metres resolution optical image from the Indian Remote Sensing Satellite (IRS-1C). The combination of SAR and optical imagery allows the user to extract more information than from any image taken alone. Interpretation of SAR imagery requires more skill and training than the interpretation of optical imagery but the day/night all weather capability is judged necessary for time critical observations. Consistent cloud covers in equatorial regions and seasonal darkness in polar regions require the use of SAR imagery for monitoring purposes. As the SAR performance in spatial resolution improves, the imagery will take on the aesthetics of regular photographs, but the real value of the imagery will come from additional signal processing.

**Thermal Infrared Imagery**

Thermal infrared (TIR) is the next band that is exploited for remote sensing of the Earth. This band lying between 8 and 14 micrometres is associated with the radiation or emission of heat. Table 2 lists select civilian satellite missions that carry instruments sensitive in the thermal infrared band. The best available system today is the National Aeronautics and Space Administration’s (NASA) LANDSAT Thematic Mapper (TM) with a single thermal infrared band between 10.4-12.5 micrometres. In the thermal infrared band the Thematic Mapper has a resolution of 120 metres as compared to a visible resolution of 30 metres. The TM sensor is sensitive enough and calibrated with sufficient accuracy to determine land surface temperature differences of 8 degrees Kelvin. The future NASA instrument Advanced Spaceborne Thermal Emission Reflection Radiometer (ASTER) flying on the Earth Orbiting Science (EOS AM-1) mission will have five bands in the thermal infrared region, a resolution of 90 metres and will be able to discern land surface temperature differences of 1 degrees Kelvin. Figure 5 is a false colour Thematic Mapper image of the Bruce nuclear generating station site showing thermal infrared, green and blue bands displayed as red, green and blue. In the cold Lake Huron waters offshore of the Bruce B facility, the thermal plume caused by heat discharged from the plant with four reactors in operation can be seen without enhancement. Thermal imagery can work in day or night conditions and is susceptible to weather effects of fog, cloud, haze or smoke. The best time for viewing occurs when the temperature differences between the background and the features of interest are at a maximum. This generally occurs in the period immediately
before dawn. Thermal images can help in the detection of some underground features like steam, water and fuel pipelines. Seasonal temperature differences may also be exploited to discern important features like seepage from water mains observed in imagery taken during the winter months.

Visible Near Infrared Imagery

Observing reflected energy from solar illumination in the visible band is the most exploited form of satellite imagery. Here satellite imagery is panchromatic (grey) or multispectral (colour). The typical multispectral bands are red, green and blue. For example, the Orbview-3 spacecraft spectral bands are:

- panchromatic: 450-900 nm
- blue: 450-520 nm
- green: 520-600 nm
- red: 630-690 nm
- near IR: 760-900 nm.

Visible satellite imagery can only view areas in the sunlit hours and cannot see through clouds, fog or smoke.

Table 2 lists select satellite missions carrying visible near infrared optical payloads that have been or are being built by commercial enterprises from Asia, Europe and the Americas. The SPOT spacecraft of French, Belgian and Spanish investors was the first commercial remote sensing satellite system in 1986. The Spot system provides a resolution of 10 metres panchromatic and 20 metres multispectral. The best system in operation today is the Indian Space Research Organization's (ISRO) Indian Remote Sensing Satellite (IRS-1C) mission. It provides 5.8 metres panchromatic resolution and 23 metres multispectral resolution capability. Figure 6 contrasts a SPOT-2 and IRS-1C panchromatic image of the Bruce B nuclear generating station. At 10 metres resolution a large facility like Bruce can be clearly detected. Features associated with nuclear power generation at smaller facilities can be detected at 5 metres resolution.

Later in 1998, the Satellite Imaging Company of the United States will launch the first Ikonos satellite with 1.0 metres panchromatic and 4.0 metres multispectral resolution. Both EarthWatch Inc. and OrbImage Co. corporations should follow with similar satellites in 1999. These systems will offer on a commercial basis, access to imagery that had been available to only the superpowers in the 1970's, and better than or equivalent to what either the French or the Chinese military reconnaissance systems can provide today. Figure 7 contrasts an IRS-1C and an airborne 1:50,000 scale orthophoto simulating a 1 metre resolution panchromatic image of the Bruce B nuclear generating station. At 1 metres resolution the facility can be precisely identified as a nuclear facility and construction details of the buildings can be discerned readily.
Hyperspectral Imagery

With the spatial resolution of satellite imagery below 1 metres, the future of commercial satellite imagery lies in increased spectral resolution systems. Whereas current multispectral satellite sensors may provide a mere 3 to 6 channels in the visible to medium wave infrared regions, new systems are coming on-line offering hundreds of channels. The commercial OrbView-4 spacecraft, for example, will have a hyperspectral sensor with 280 channels spanning the region from visible to medium wave infrared wavelengths as illustrated in Figure 8. The rational for the utility of hyperspectral systems lies in the different responses that vegetation, soils and camouflage netting have when viewed in different spectral regions. The value of the surface reflectances in narrow (10.3 nanometres) bands can provide a means to discriminate various substances on the surface of the Earth. This information can help in discerning crop types in mixed fields, mineral outcrops, and healthy or diseased vegetation. Applications such as crop management, drug interdiction, mineral exploration and non-proliferation verification can be envisaged for hyperspectral imaging.

Ahead of spaceborne development of hyperspectral systems, airborne platforms have been developed and flown to prove the new remote sensing concepts. Two such sensors are the Compact Airborne Spectrographic Imager (CASI) operating in the visible near infrared band (430 to 870 nm), and the Short Wave Infrared Full Spectrum Imager (SFSI) operating in the shortwave infrared band (1220 to 2420 nm). Figure 9 illustrates a spectral unmixing analysis of the SFSI instrument overflight of Cuprite, Nevada.

Hyperspectral image processing begins first with correcting the measured spectral response of the imager for atmospheric effects to reproduce spectral reflectances at the surface of the Earth. Hyperspectral image processing then relies on the method of unconstrained linear unmixing. In linear unmixing the spectrum of each pixel is expressed as a linear combination of N end-member spectra. The end of the process produces fractional abundance maps of the end-members throughout the image.

End-members are typically chosen from the image itself. A principle components analysis is performed on the reflectance cube and scatter plots made of pairs of principle components. The end-members are chosen from those pixels occurring in the extremities of the scatter plots, often called the "purist pixels." Comparison of the end-member spectra with spectral libraries can readily identify the surface materials. In the case shown in Figure 9, the three end-members are alunite, kaolinite and buddingtonite associated with hyperthermal alterations common in the Cuprite region.

Hyperspectral imaging can also be applied to environmental operations associated with nuclear clean-ups. A commercial probe called ESSI Probe I flew over the Polygon nuclear test site in Kazakhstan in the search for precious metals. Extrapolation of hyperspectral imaging to non-proliferation verification applications becomes apparent in this context.
Beyond Blue Wavelengths?

On a more speculative note, remote sensing can be defined as "Astronomy performed in the wrong direction." What then are the prospects for using civilian astronomical satellites for nuclear monitoring purposes? Beyond blue wavelengths lie ultraviolet, X-ray and gamma ray radiations. Part of the reason why life exists on Earth is because the atmosphere is so good at blocking out these ionising forms of radiation. Ozone plays a particular role in blocking out ultraviolet radiation just as the density of oxygen, nitrogen, argon and lighter ions and atoms in the Earth's atmosphere protect us against harmful cosmic X-ray and gamma ray emissions. Of the three forms of energy, cosmic gamma rays are the most penetrating giving the average person a radiation dose of 0.4 mSv a year. Similarly, the magnitude of atmospheric attenuation, the current detector sensitivities, and the lack of telescopic gains at these frequencies have forced astronomers in these regions to launch their telescopes into outer space. Such state-of-the-art facilities include the International Ultraviolet Explorer (IUE), the Advanced X-Ray Astronomical Facility (AXAF), and the Compton Gamma Ray Observatory (CGRO). The question of research interest is whether these facilities could detect signatures associated with nuclear activity if they were to be pointed at the Earth?

Potential Safeguards Applications

The capability of commercial satellites affords individuals, corporations, governments and international organizations to apply the imagery to a variety of problems. In its mission to provide effective and efficient verification of Safeguards Agreements, the International Atomic Energy Agency (IAEA) could adopt commercial satellite imagery as an appropriate tool to fulfil this mission. Indeed paragraph 6 of the INF/CIRC 153 Safeguards Agreements mandates the Agency to "take full account of technological developments" in the performance of its mission. The Strengthened Safeguards Agreements of INF/CIRC 540 expand the scope of declarations, inspection access, and the access to data to verify the state declarations on a country wide basis. Potential Safeguards roles of high resolution commercial satellite imagery could therefore include: declaration correctness determinations, use as on-site inspection aids, and declaration completeness determinations for detecting undeclared activity. More distant applications could include providing monitoring for physical protection of permanent waste storage sites and environmental monitoring performed by hyperspectral imaging.

Conclusions

Increasingly, high resolution satellite imaging systems are becoming available from multiple and diverse sources with capabilities useful for answering security questions. With increased supply, data availability and data authenticity may be assured. In a commercial market a supplier can ill afford the loss in market share that would result from any falsification of data. Similarly, rising competitors willing to sell imagery of national security sites will decrease the tendency to endure self-imposed restrictions on sales of those sites. International organizations operating in the security interests of all nations might also gain preferential access. Costs for imagery will also fall to the point were individuals can afford purchases of satellite images.
It is becoming increasingly apparent that satellite imagery is more than a picture. Information extraction by advanced signal processing and image processing techniques will provide increasingly valuable information. Polarization information in SAR imagery and spectral information in hyperspectral imagery are two examples of this trend. The result of this trend will force organizations to retain specialized staff and centralize operations as opposed to authorizing widely dispersed use by generalized staff in order to maximize the utility of available imagery.

Increasingly, international organizations will find utility in exploiting satellite imagery for solving international security problems. Housed within international organizations possessing competent staff, procedures, and "shared destiny" stakes in resolving compliance discrepancies, the use of satellite imagery may provide a degree of stability in a world in which individuals, non-government organizations and governments may choose to exploit the available information for political gain. The use of satellite imagery outside these international organizations might not necessarily be aimed at seeking mutually beneficial solutions for international problems.
References


4. Copyright Ontario Hydro Corporate Archives.


Table 1 Select Synthetic Aperture Radar (SAR) Satellites

<table>
<thead>
<tr>
<th>Year</th>
<th>Satellite</th>
<th>Agency</th>
<th>Band</th>
<th>Polarization</th>
<th>Resolution (m)</th>
<th>Swath (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>SEASAT</td>
<td>NASA</td>
<td>L</td>
<td>HH</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>1991</td>
<td>ERS-1,2</td>
<td>ESA</td>
<td>C</td>
<td>VV</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>1991</td>
<td>ALMAZ-1</td>
<td>NPO</td>
<td>S</td>
<td>HH</td>
<td>15</td>
<td>40</td>
</tr>
<tr>
<td>1992</td>
<td>JERS-1</td>
<td>NASA</td>
<td>L</td>
<td>HH</td>
<td>18</td>
<td>75</td>
</tr>
<tr>
<td>1995</td>
<td>RADARSAT-1</td>
<td>CSA</td>
<td>C</td>
<td>HH</td>
<td>8</td>
<td>45</td>
</tr>
<tr>
<td>1998</td>
<td>ALMAZ-2</td>
<td>NPO</td>
<td>S</td>
<td>HH</td>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td>1999</td>
<td>ENVISAT</td>
<td>ESA</td>
<td>C</td>
<td>HH,VV</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>2001</td>
<td>RADARSAT-2</td>
<td>MDA</td>
<td>C</td>
<td>QUAD</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>2002</td>
<td>ALOS</td>
<td>NASDA</td>
<td>L</td>
<td>HH,VV</td>
<td>10</td>
<td>70</td>
</tr>
</tbody>
</table>

Table 2 Select Thermal Infrared (TIR) Satellites

<table>
<thead>
<tr>
<th>Year</th>
<th>Satellite</th>
<th>Agency</th>
<th>No. of TIR Bands</th>
<th>Resolution (m)</th>
<th>LSaT (K)</th>
<th>Swath (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>LANDSAT-4,5</td>
<td>NASA</td>
<td>1</td>
<td>120</td>
<td>8</td>
<td>185</td>
</tr>
<tr>
<td></td>
<td>TM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>LANDSAT-7</td>
<td>NASA</td>
<td>1</td>
<td>60</td>
<td>8</td>
<td>185</td>
</tr>
<tr>
<td></td>
<td>ETM+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>CBERS IR-MSS</td>
<td>China</td>
<td>1</td>
<td>160</td>
<td>?</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Brazil</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>EOS AM-1</td>
<td>NASA</td>
<td>5</td>
<td>90</td>
<td>1</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>ASTER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3 Select Visible Near Infrared (VNIR) Satellites

<table>
<thead>
<tr>
<th>Year</th>
<th>Satellite</th>
<th>Agency</th>
<th>Resolution (m)</th>
<th>Swath (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pan</td>
<td>MS</td>
</tr>
<tr>
<td>1982</td>
<td>LANDSAT-4,5</td>
<td>NASA</td>
<td>NA</td>
<td>30.0</td>
</tr>
<tr>
<td>1986</td>
<td>SPOT-1,2,3,4</td>
<td>Spot Image Co.</td>
<td>10.0</td>
<td>20.0</td>
</tr>
<tr>
<td>1991</td>
<td>KOSMOS</td>
<td>Russia</td>
<td>2.0</td>
<td>20.0</td>
</tr>
<tr>
<td>1995</td>
<td>IRS-1C,1D</td>
<td>ISRO</td>
<td>5.8</td>
<td>23.0</td>
</tr>
<tr>
<td>1998</td>
<td>IKONOS-1,2</td>
<td>Space Imaging Co.</td>
<td>1.0</td>
<td>4.0</td>
</tr>
<tr>
<td>1998</td>
<td>CBERS</td>
<td>China/Brazil</td>
<td>20.0</td>
<td>20.0</td>
</tr>
<tr>
<td>1999</td>
<td>QUICKBIRD-1,2</td>
<td>EarthWatch Inc.</td>
<td>1.0</td>
<td>3.3</td>
</tr>
<tr>
<td>1999</td>
<td>ORBVIEW-3,4</td>
<td>OrbImage Co.</td>
<td>1.0</td>
<td>4.0</td>
</tr>
<tr>
<td>2002</td>
<td>SPOT-5A,5B</td>
<td>Spot Image Co.</td>
<td>5.0</td>
<td>10.0</td>
</tr>
<tr>
<td>2002</td>
<td>ALOS</td>
<td>NASA</td>
<td>2.5</td>
<td>10.0</td>
</tr>
</tbody>
</table>
Figure 3  Bruce Nuclear Generation Station Oblique Air Photo
Figure 4 shows a comparison of high-resolution radar images to IRS-1C panchromatic images for the Bruce NUCLEAR POWER DEVELOPMENT SITE. The images are displayed at a 1 to 1 ground coverage scale. The left side of the figure represents the 26 May 97 Radarsat-1 fine-2 far, 8 metre resolution, while the right side represents the 8 September 97 IRS-1C panchromatic 5 metre resolution.
BRUCE NUCLEAR POWER DEVELOPMENT SITE

LANDSAT-5 TM FALSE COLOUR COMPOSITE IMAGE USING BANDS 6/1/2. 7 MAY 1997

FACILITY STATUS
BRUCE A NGS - INACTIVE
BRUCE B NGS - 100% POWER
BRUCE HWP - INACTIVE
DOUGLAS PT NGS - INACTIVE

No Thermal Emission Activity

Water Turbulence From Bruce B NGS Exhaust With Thermal Emission Signature

FIGURE 5
BRUCE NUCLEAR POWER DEVELOPMENT SITE

SPOT-2 TO IRS-1C PANCHROMATIC IMAGE RESOLUTION COMPARISON

ENLARGEMENT (X 2) OF BRUCE 'B' NGS

Vacuum Building

Powerhouse

Switch Yard

Water Treatment Bldg

2 X Standby Generators

Vacuum Building

Powerhouse

Switch Yard

Water Treatment Bldg

2 X Standby Generators

14 JUNE 97 SPOT-2 10 METRE

8 SEPT 97 IRS-1C 5 METRE

FIGURE 6
BRUCE NUCLEAR POWER DEVELOPMENT SITE

IRS-1C TO SIMULATED IKONOS PANCHROMATIC IMAGE RESOLUTION COMPARISON SHOWN AT A 1 TO 1 GROUND COVERAGE SCALE

ENLARGEMENT (X 2) OF BRUCE 'B' NGS

Vacuum Building

Powerhouse

Switch Yard

Water Treatment Bldg

2 X Standby Generators

8 SEPT 97 IRS-1C 5 METRE

16 APR 95 AIR PHOTO 1 METRE

FIGURE 7
Figure 8 ORBVIEW-4 Hyperspectral Imaging
MINERAL EXPLORATION
Spectral Unmixing of SFSI Imagery
Cuprite, Nevada, June 21 1996

Endmember Spectra

RGB
Alunite
Kaolinite
Buddingtonite

Figure 9 SFSI Hyperspectral Image of Cuprite, Nevada
The States Parties to this Treaty:

DESERING to contribute to the realization of the purposes and principles of the Charter of the United Nations;

DETERMINED to take concrete action which will contribute to the progress towards general and complete disarmament of nuclear weapons, and to the promotion of international peace and security;

REAFFIRMING the desire of the Southeast Asian States to maintain peace and stability in the region in the spirit of peaceful coexistence and mutual understanding and cooperation as enunciated in various communiques, declarations and other legal instruments;

RECALLING the Declaration on the Zone of Peace, Freedom and Neutrality (ZOPFAN) signed in Kuala Lumpur on 27 November 1971 and the Programme of Action on ZOPFAN adopted at the 26th ASEAN Ministerial Meeting in Singapore in July 1993;
CONVINCED that the establishment of a Southeast Asia Nuclear Weapon-Free Zone, as an essential component of the ZOPFAN, will contribute towards strengthening the security of States within the Zone and towards enhancing international peace and security as a whole;

REAFFIRMING the importance of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) in preventing the proliferation of nuclear weapons and in contributing towards international peace and security;

RECALLING Article VII of the NPT which recognizes the right of any group of States to conclude regional treaties in order to assume the total absence of nuclear weapons in their respective territories;

RECALLING the Final Document of the Tenth Special Session of the United Nations General Assembly which encourages the establishment of nuclear weapon-free zones;

RECALLING the Principles and Objectives for Nuclear Non-Proliferation and Disarmament, adopted at the 1995 Review and Extension Conference of the Parties to the NPT, that the cooperation of all the nuclear-weapon States and their respect and support for the relevant protocols is important for the maximum effectiveness of this nuclear weapon-free zone treaty and its relevant protocols; and

DETERMINED to protect the region from environmental pollution and the hazards posed by radioactive wastes and other radioactive material;

HAVE AGREED as follows:

**Article 1**

**USE OF TERMS**

For the purposes of this Treaty and its Protocol:

(a) "Southeast Asia Nuclear Weapon-Free Zone", hereinafter referred to as the "Zone", means the area comprising the territories of all States in Southeast Asia, namely, Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam, and their respective continental shelves and Exclusive Economic Zones (EEZ);

(b) "territory" means the land territory, internal waters, territorial sea, archipelagic waters, the seabed and the sub-soil thereof and the airspace above them;

(c) "nuclear weapon" means any explosive device capable of releasing nuclear energy in an uncontrolled manner but does not include the means of transport or delivery of such device if separable from and not an indivisible part thereof;

(d) "station" means to deploy, emplace, implant, install, stockpile or store;

(e) "radioactive material" means material that contains radionuclides above clearance or exemption levels recommended by the International Atomic Energy Agency (IAEA);

(f) "radioactive wastes" mean material that contain or are contaminated with radionuclides at concentrations or activities greater than clearance levels recommended by the IAEA and for which no use is foreseen; and
CONVINCED that the establishment of a Southeast Asia Nuclear Weapon-Free Zone, as an essential component of the ZOPFAN, will contribute towards strengthening the security of States within the Zone and towards enhancing international peace and security as a whole;

REAFFIRMING the importance of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) in preventing the proliferation of nuclear weapons and in contributing towards international peace and security;

RECALLING Article VII of the NPT which recognizes the right of any group of States to conclude regional treaties in order to assume the total absence of nuclear weapons in their respective territories;

RECALLING the Final Document of the Tenth Special Session of the United Nations General Assembly which encourages the establishment of nuclear weapon-free zones;

RECALLING the Principles and Objectives for Nuclear Non-Proliferation and Disarmament, adopted at the 1995 Review and Extension Conference of the Parties to the NPT, that the cooperation of all the nuclear-weapon States and their respect and support for the relevant protocols is important for the maximum effectiveness of this nuclear weapon-free zone treaty and its relevant protocols; and

DETERMINED to protect the region from environmental pollution and the hazards posed by radioactive wastes and other radioactive material;

HAVE AGREED as follows:

Article 1
USE OF TERMS

For the purposes of this Treaty and its Protocol:

(a) "Southeast Asia Nuclear Weapon-Free Zone", hereinafter referred to as the "Zone", means the area comprising the territories of all States in Southeast Asia, namely, Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam, and their respective continental shelves and Exclusive Economic Zones (EEZ);

(b) "territory" means the land territory, internal waters, territorial sea, archipelagic waters, the seabed and the sub-soil thereof and the airspace above them;

(c) "nuclear weapon" means any explosive device capable of releasing nuclear energy in an uncontrolled manner but does not include the means of transport or delivery of such device if separable from and not an indivisible part thereof;

(d) "station" means to deploy, emplace, implant, install, stockpile or store;

(e) "radioactive material" means material that contains radionuclides above clearance or exemption levels recommended by the International Atomic Energy Agency (IAEA);

(f) "radioactive wastes" mean material that contain or are contaminated with radionuclides at concentrations or activities greater than clearance levels recommended by the IAEA and for which no use is foreseen; and
(g) "dumping" means
(1) any deliberate disposal at sea, including seabed and subsoil insertion, of radioactive wastes or other matter from vessels, aircraft, platforms or other man-made structures at sea, and
(2) any deliberate disposal at sea, including seabed and subsoil insertion, of vessels, aircraft, platforms or other man-made structures at sea, containing radioactive material, but does not include the disposal of wastes or other matter incidental to, or derived from the normal operations of vessels, aircraft, platforms or other man-made structures at sea and their equipment, other than wastes or other matter transported by or to vessels, aircraft, platforms or other man-made structures at sea, operating for the purpose of disposal of such matter or derived from the treatment of such wastes or other matter on such vessels, aircraft, platforms or structures.

Article 2
APPLICATION OF THE TREATY

1. This Treaty and its Protocol shall apply to the territories, continental shelves, and EEZ of the States Parties within the Zone in which the Treaty is in force.

2. Nothing in this Treaty shall prejudice the rights or the exercise of these rights by any State under the provisions of the United Nations Convention on the Law of the Sea of 1982, in particular with regard to freedom of the high seas, rights of innocent passage, archipelagic sea lanes passage or transit passage of ships and aircraft, and consistent with the Charter of the United Nations.

Article 3
BASIC UNDERTAKINGS

1. Each State Party undertakes not to, anywhere inside or outside the Zone:
   (a) develop, manufacture or otherwise acquire, possess or have control over nuclear weapons;
   (b) station or transport nuclear weapons by any means; or
   (c) test or use nuclear weapons.

2. Each State Party also undertakes not to allow, in its territory, any other State to:
   (a) develop, manufacture or otherwise acquire, possess or have control over nuclear weapons;
   (b) station nuclear weapons; or
   (c) test or use nuclear weapons.

3. Each State Party also undertakes not to:
   (a) dump at sea or discharge into the atmosphere anywhere within the Zone any radioactive material or wastes;
   (b) dispose radioactive material or wastes on land in the territory of or under the jurisdiction of other States except as stipulated in Paragraph 2 (e) of Article 4; or
   (c) allow, within its territory, any other State to dump at sea or discharge into the atmosphere any radioactive material or wastes.

4. Each State Party undertakes not to:
   (a) seek or receive any assistance in the commission of any act in violation of the provisions of Paragraphs 1, 2 and 3 of this Article; or
   (b) take any action to assist or encourage the commission of any act in violation of the provisions of Paragraphs 1, 2 and 3 of this Article.
Article 4

USE OF NUCLEAR ENERGY FOR PEACEFUL PURPOSES

1. Nothing in this Treaty shall prejudice the right of the States Parties to use nuclear energy, in particular for their economic development and social progress.

2. Each State Party therefore undertakes:
   (a) to use exclusively for peaceful purposes nuclear material and facilities which are within its territory and areas under its jurisdiction and control;
   (b) prior to embarking on its peaceful nuclear energy programme, to subject its programme to rigorous nuclear safety assessment conforming to guidelines and standards recommended by the IAEA for the protection of health and minimization of danger to life and property in accordance with Paragraph 6 of Article III of the Statute of the IAEA;
   (c) upon request, to make available to another State Party the assessment except information relating to personal data, information protected by intellectual property rights or by industrial or commercial confidentiality, and information relating to national security;
   (d) to support the continued effectiveness of the international non-proliferation system based on the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) and the IAEA safeguard system; and
   (e) to dispose radioactive wastes and other radioactive material in accordance with IAEA standards and procedures on land within its territory or on land within the territory of another State which has consented to such disposal.

3. Each State Party further undertakes not to provide source or special fissionable material, or equipment or material especially designed or prepared for the processing, use or production of special fissionable material to:
   (a) any non-nuclear-weapon State except under conditions subject to the safeguards required by Paragraph 1 of Article III of the NPT; or
   (b) any nuclear-weapon State except in conformity with applicable safeguards agreements with the IAEA.

Article 5

IAEA SAFEGUARDS

Each State Party which has not done so shall conclude an agreement with the IAEA for the application of full scope safeguards to its peaceful nuclear activities not later than eighteen months after the entry into force for that State Party of the Treaty.

Article 6

EARLY NOTIFICATION OF A NUCLEAR ACCIDENT

Each State Party which has not acceded to the Convention on Early Notification of a Nuclear Accident shall endeavour to do so.

Article 7

FOREIGN SHIPS AND AIRCRAFT

Each State Party, on being notified, may decide for itself whether to allow visits by foreign ships and aircraft to its ports and airfields, transit of its airspace by foreign aircraft, and navigation by foreign ships through its territorial sea or archipelagic waters and overflight of foreign aircraft above those waters in a manner not governed by the rights of innocent passage, archipelagic sea lanes passage or transit passage.
Article 8

ESTABLISHMENT OF THE COMMISSION FOR
THE SOUTHEAST ASIA NUCLEAR WEAPON-FREE ZONE

1. There is hereby established a Commission for the Southeast Asia Nuclear Weapon-Free Zone, hereinafter referred to as the "Commission".

2. All States Parties are ipso facto members of the Commission. Each State Party shall be represented by its Foreign Minister or his representative accompanied by alternates and advisers.

3. The function of the Commission shall be to oversee the implementation of this Treaty and ensure compliance with its provisions.

4. The Commission shall meet as and when necessary in accordance with the provisions of this Treaty including upon the request of any State Party. As far as possible, the Commission shall meet in conjunction with the ASEAN Ministerial Meeting.

5. At the beginning of each meeting, the Commission shall elect its Chairman and such other officers as may be required. They shall hold office until a new Chairman and other officers are elected at the next meeting.

6. Unless otherwise provided for in this Treaty, two-thirds of the members of the Commission shall be present to constitute a quorum.

7. Each member of the Commission shall have one vote.

8. Except as provided for in this Treaty, decisions of the Commission shall be taken by consensus or, failing consensus, by a two-thirds majority of the members present and voting.

9. The Commission shall, by consensus, agree upon and adopt rules of procedure for itself as well as financial rules governing its funding and that of its subsidiary organs.

Article 9

THE EXECUTIVE COMMITTEE

1. There is hereby established, as a subsidiary organ of the Commission, the Executive Committee.

2. The Executive Committee shall be composed of all States Parties to this Treaty. Each State Party shall be represented by one senior official as its representative, who may be accompanied by alternates and advisers.

3. The functions of the Executive Committee shall be to:
   (a) ensure the proper operation of verification measures in accordance with the provisions on the control system as stipulated in Article 10;
   (b) consider and decide on requests for clarification and for a fact-finding mission;
   (c) set up a fact-finding mission in accordance with the Annex of this Treaty;
   (d) consider and decide on the findings of a fact-finding mission and report to the Commission;
   (e) request the Commission to convene a meeting when appropriate and necessary;
   (f) conclude such agreements with the IAEA or other international organizations as referred to in Article 18 on behalf of the Commission after being duly authorized to do so by the Commission; and
   (g) carry out such other tasks as may, from time to time, be assigned by the Commission.

4. The Executive Committee shall meet as and when necessary for the efficient exercise of its functions. As far as possible, the
Executive Committee shall meet in conjunction with the ASEAN Senior Officials Meeting.

5. The Chairman of the Executive Committee shall be the representative of the Chairman of the Commission. Any submission or communication made by a State Party to the Chairman of the Executive Committee shall be disseminated to the other members of the Executive Committee.

6. Two-thirds of the members of the Executive Committee shall be present to constitute a quorum.

7. Each member of the Executive Committee shall have one vote.

8. Decisions of the Executive Committee shall be taken by consensus or, failing consensus, by a two-thirds majority of the members present and voting.

Article 10
CONTROL SYSTEM

1. There is hereby established a control system for the purpose of verifying compliance with the obligations of the States Parties under this Treaty.

2. The Control System shall comprise:
   (a) the IAEA safeguards system as provided for in Article 5;
   (b) report and exchange of information as provided for in Article 11;
   (c) request for clarification as provided for in Article 12; and
   (d) request and procedures for a fact-finding mission as provided for in Article 13.

Article 11
REPORT AND EXCHANGE OF INFORMATION

1. Each State Party shall submit reports to the Executive Committee on any significant event within its territory and areas under its jurisdiction and control affecting the implementation of this Treaty.

2. The States Parties may exchange information on matters arising under or in relation to this Treaty.

Article 12
REQUEST FOR CLARIFICATION

1. Each State Party shall have the right to request another State Party for clarification concerning any situation which may be considered ambiguous or which may give rise to doubts about the compliance of that State Party with this Treaty. It shall inform the Executive Committee of such a request. The requested State Party shall duly respond by providing without delay the necessary information and inform the Executive Committee of its reply to the requesting State Party.

2. Each State Party shall have the right to request the Executive Committee to seek clarification for another State Party concerning any situation which may be considered ambiguous or which may give rise to doubts about compliance of that State Party with this Treaty. Upon receipt of such a request, the Executive Committee shall consult the State Party from which clarification is sought for the purpose of obtaining the clarification requested.

Article 13
REQUEST FOR A FACT-FINDING MISSION

A State Party shall have the right to request the Executive Committee to send a fact-finding mission to another State Party.
in order to clarify and resolve a situation which may be considered ambiguous or which may give rise to doubts about compliance with the provisions of this Treaty, in accordance with the procedure contained in the Annex to this Treaty.

Article 14
REMEDIAL MEASURES

1. In case the Executive Committee decides in accordance with the Annex that there is a breach of this Treaty by a State Party, that State Party shall, within a reasonable time, take all steps necessary to bring itself in full compliance with this Treaty and shall promptly inform the Executive Committee of the action taken or proposed to be taken by it.

2. Where a State Party fails or refuses to comply with the provisions of Paragraph 1 of this Article, the Executive Committee shall request the Commission to convene a meeting in accordance with the provisions of Paragraph 3(e) of Article 9.

3. At the meeting convened pursuant to Paragraph 2 of this Article, the Commission shall consider the emergent situation and shall decide on any measure it deems appropriate to cope with the situation, including the submission of the matter to the IAEA and, where the situation might endanger international peace and security, the Security Council and the General Assembly of the United Nations.

4. In the event of breach of the Protocol attached to this Treaty by a State Party to the Protocol, the Executive Committee shall convene a special meeting of the Commission to decide on appropriate measures to be taken.

Article 16
SIGNATURE, RATIFICATION, ACCESSION, DEPOSIT AND REGISTRATION

1. This Treaty shall be open for signature by all States in Southeast Asia, namely, Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.

2. This Treaty shall be subject to ratification in accordance with the constitutional procedure of the signatory states. The instruments of ratification shall be deposited with the Government of the Kingdom of Thailand which is hereby designated as the Depositary State.

3. This Treaty shall be open for accession. The instruments of accession shall be deposited with the Depositary State.

4. The Depositary State shall inform the other States Parties to this Treaty on the deposit of instruments of ratification or accession.

5. The Depositary State shall register this Treaty and its Protocol pursuant to Article 102 of the Charter of the United Nations.

Article 16
ENTRY INTO FORCE

1. This Treaty shall enter into force on the date of the deposit of the seventh instrument of ratification and/or accession.

2. For States which ratify or accede to this Treaty after the date of the seventh instrument of ratification or accession, the Treaty shall enter into force on the date of deposit of its instrument of ratification or accession.
Article 17
RESERVATIONS

This Treaty shall not be subject to reservations.

Article 18
RELATIONS WITH OTHER INTERNATIONAL ORGANIZATIONS

The Commission may conclude such agreements with the IAEA or other international organizations as it considers likely to facilitate the efficient operation of the control system established by this Treaty.

Article 19
AMENDMENTS

1. Any State Party may propose amendments to this Treaty and its Protocol and shall submit its proposals to the Executive Committee, which shall transmit them to all the other States Parties. The Executive Committee shall immediately request the Commission to convene a meeting to examine the proposed amendments. The quorum required for such a meeting shall be all the members of the Commission. Any amendment shall be adopted by a consensus decision of the Commission.

2. Amendments adopted shall enter into force 30 days after the receipt by the Depositary State of the seventh instrument of acceptance from the States Parties.

Article 20
REVIEW

Ten years after this Treaty enters into force, a meeting of the Commission shall be convened for the purpose of reviewing the operation of the Treaty. A meeting of the Commission for the same purpose may also be convened at anytime thereafter if there is consensus among all its members.

Article 21
SETTLEMENT OF DISPUTES

Any dispute arising from the interpretation of the provisions of this Treaty shall be settled by peaceful means as may be agreed upon by the States Parties to the dispute. If within one month, the parties to the dispute are unable to achieve a peaceful settlement of the dispute by negotiation, mediation, enquiry or conciliation, any of the parties concerned shall, with the prior consent of the other parties concerned, refer the dispute to arbitration or to the International Court of Justice.

Article 22
DURATION AND WITHDRAWAL

1. This Treaty shall remain in force indefinitely.

2. In the event of a breach by any State Party of this Treaty essential to the achievement of the objectives of the Treaty, every other State Party shall have the right to withdraw from the Treaty.

3. Withdrawal under Paragraph 2 of Article 22 shall be effected by giving notice twelve months in advance to the members of the Commission.

IN WITNESS WHEREOF, the undersigned have signed this Treaty.

DONE at Bangkok, this fifteenth day of December, one thousand nine hundred and ninety-five, in one original in the English language.
For Brunei Darussalam:

Haji Hassanal Bolkiah
Sultan of Brunei Darussalam

For the Kingdom of Cambodia:

Samdech Krom Preah
NORODOM RANARIDDH
First Prime Minister

Samdech
HUN SEN
Second Prime Minister

For the Republic of Indonesia:

SOEHARTO
President

For the Lao People's Democratic Republic:

KHAMTAY SIPHANDONE
Prime Minister

For Malaysia:

DR. MAHATHIR BIN MOHAMAD
Prime Minister

For the Union of Myanmar:

SENIOR GENERAL THAN SHWE
Chairman of the State Law and Order Restoration Council and Prime Minister

For the Republic of the Philippines:

FIDEL V. RAMOS
President

For the Republic of Singapore:

GOH CHOK TONG
Prime Minister

For the Kingdom of Thailand:

RANHARN SILPA-ARCHA
Prime Minister

For the Socialist Republic of Vietnam:

VO VAN KIET
Prime Minister
ANNEX

PROCEDURE FOR A FACT-FINDING MISSION

1. The State Party requesting a fact-finding mission as provided in Article 13, hereinafter referred to as the “requesting State”, shall submit the request to the Executive Committee specifying the following:
   (a) the doubts or concerns and the reasons for such doubts or concerns;
   (b) the location in which the situation which gives rise to doubts has allegedly occurred;
   (c) the relevant provisions of the Treaty about which doubts of compliance have arisen; and
   (d) any other relevant information.

2. Upon receipt of a request for a fact-finding mission, the Executive Committee shall:
   (a) immediately inform the State Party to which the fact-finding mission is requested to be sent, hereinafter referred to as the “receiving State”, about the receipt of the request; and
   (b) not later than 3 weeks after receiving the request, decide if the request complies with the provisions of Paragraph 1 and whether or not it is frivolous, abusive or clearly beyond the scope of the Treaty. Neither the requesting nor receiving State Party shall participate in such decisions.

3. In case the Executive Committee decides that the request does not comply with the provisions of Paragraph 1, or that it is frivolous, abusive or clearly beyond the scope of the Treaty, it shall take no further action on the request and inform the requesting State and the receiving State accordingly.

4. In the event that the Executive Committee decides that the request complies with the provisions of Paragraph 1, and that it is not frivolous, abusive or clearly beyond the scope of the Treaty, it shall immediately forward the request for a fact-finding mission to the receiving State, indicating, inter alia, the proposed date for sending the mission. The proposed date shall not be later than 3 weeks from the time the receiving State receives the request for a fact-finding mission. The Executive Committee shall also immediately set up a fact-finding mission consisting of 3 inspectors from the IAEA who are neither nationals of the requesting nor receiving State.

5. The receiving State shall comply with the request for a fact-finding mission referred to in Paragraph 4. It shall cooperate with the Executive Committee in order to facilitate the effective functioning of the fact-finding mission, inter alia, by promptly providing unimpeded access of the fact-finding mission to the location in question. The receiving State shall accord to the members of the fact-finding mission such privileges and immunities as are necessary for them to exercise their functions effectively, including inviolability of all papers and documents and immunity from arrest, detention and legal process for acts done and words spoken for the purpose of the mission.

6. The receiving State shall have the right to take measures to protect sensitive installations and to prevent disclosures of confidential information and data not related to this Treaty.

7. The fact-finding mission, in the discharge of its functions, shall:
   (a) respect the laws and regulations of the receiving State;
   (b) refrain from activities inconsistent with the objectives and purposes of this Treaty;
   (c) submit preliminary or interim reports to the Executive Committee; and
   (d) complete its task without undue delay and shall submit its final report to the Executive Committee within a reasonable time upon completion of its work.

8. The Executive Committee shall:
   (a) consider the reports submitted by the fact-finding mission and reach a decision on whether or not there is a breach of the Treaty;
   (b) immediately communicate its decision to the requesting State and the receiving State, and
   (c) present a full report on its decision to the Commission.

9. In the event that the receiving State refuses to comply with the request for a fact-finding mission in accordance with Paragraph 4, the requesting State through the Executive Committee shall have the right to request for a meeting of the Commission. The Executive Committee shall immediately request the Commission to convene a meeting in accordance with Paragraph 3 (e) of Article 9.
ANNEX 3
PROTOCOL TO THE TREATY ON SOUTHEAST ASIA
NUCLEAR WEAPON-FREE ZONE

The States Parties to this Protocol,

DESIRING to contribute to efforts towards achieving
general and complete disarmament of nuclear weapons, and
thereby ensuring international peace and security, including in
Southeast Asia;

NOTING the Treaty on the Southeast Asia Nuclear Weapon-
Free Zone;

AGREED as follows:

1. Article 1

Each State Party undertakes to respect the Treaty on the
Southeast Asia Nuclear Weapon-Free Zone, hereinafter referred
to as the "Treaty", and not to contribute to any act which
constitutes a violation of the Treaty or its Protocol by States
Parties to them.

2. Article 2

Each State Party undertakes not to use or threaten to use
nuclear weapons against any State Party to the Treaty. It further
undertakes not to use or threaten to use nuclear weapons within
the Southeast Asia Nuclear Weapon-Free Zone.

3. Article 3

This Protocol shall be open for signature by the People's
Republic of China, France, the Russian Federation, the United
Kingdom of Great Britain and Northern Ireland and the United
States of America.

4. Article 4

Each State Party undertakes, by written notification to the
Depositary State, to indicate its acceptance or otherwise of any
alteration to its obligation under the Protocol that may be brought
about by the entry into force of an amendment to the Treaty
pursuant to Article 19 thereof.

5. Article 5

This Protocol is of a permanent nature and shall remain in
force indefinitely, provided that each State Party shall, in
exercising its national sovereignty, have the right to withdraw
from this Protocol if it decides that extraordinary events, related
to the subject-matter of this Protocol, have jeopardized its
supreme national interests. It shall give notice of such
withdrawal to the Depositary State twelve months in advance.
Such notice shall include a statement of the extraordinary events
it regards as having jeopardized its supreme national interests.

6. Article 6

This Protocol shall be subject to ratification.

7. Article 7

This Protocol shall enter into force for each State Party on
the date of its deposit of its instrument of ratification with the
Depositary State. The Depositary State shall inform the other
States Parties to the Treaty and to this Protocol on the deposit of
instruments of ratification.

IN WITNESS WHEREOF the undersigned, being duly
authorized by their Governments, have signed this Protocol.
DONE at Bangkok this fifteenth day of December, one thousand nine hundred and ninety-five, in one original in the English language.
Pelindaba Text of the African Nuclear-Weapon-Free Zone Treaty

(Note: This electronic version is reproduced from UN General Assembly document A/50/426)

The Parties to this Treaty

Guided by the declaration on the Denuclearization of Africa, adopted by the Assembly of Heads of State and Government of the Organization of African Unity (hereinafter referred to as OAU) at its first ordinary session, held at Cairo from 17 to 21 July 1964 (AHG/Res. 11(1)), in which they solemnly declared their readiness to undertake, through an international agreement to be concluded under United Nations auspices, not to manufacture or acquire control of nuclear weapons,

Guided also, by the resolutions of the fifty-fourth and fifty-sixth ordinary sessions of the Council of Ministers of OAU, held at Abuja from 27 May to 1 June 1991 and at Dakar from 22 to 28 June 1992 respectively, (CM/Res. 1342 LIV) and CM/Res. 195 (LVI)), which affirmed that the evolution of the international situation was conducive to the implementation of the Cairo Declaration, as well as the relevant provisions of the 1986 OAU Declaration on Security, Disarmament and Development,

Recalling United Nations General Assembly resolution 3472 B (XXX) of 11 December 1975, in which it considered nuclear-weapon-free zones one of the most effective means for preventing the proliferation, both horizontal and vertical, of nuclear weapons,

Convinced of the need to take all steps in achieving the ultimate goal of a world entirely free of nuclear weapons, as well as of the obligations of all States to contribute to this end,

Convinced also that the African nuclear-weapon-free zone will constitute an important step towards strengthening the non-proliferation regime, promoting cooperation in the peaceful uses of nuclear energy, promoting general and complete disarmament and enhancing regional and international peace and security.

Aware that regional disarmament measures contribute to global disarmament efforts,

Believing that the African nuclear-weapon-free zone will protect African States against possible nuclear attacks on their territories,

Noting with satisfaction existing NWFZs and recognizing that the establishment of other NWFZs, especially in the Middle East, would enhance the security of States Parties to the African NWFZ,

Reaffirming the importance of the Treaty on the Non-Proliferation of Nuclear Weapons (hereinafter referred to as the NPT) and the need for the implementation of all its provisions,

Desirous of taking advantage of article IV of the NPT, which recognizes the inalienable right of all States Parties to develop research on, production and use of nuclear energy for peaceful purposes without discrimination and to facilitate the fullest possible exchange of equipment, materials and scientific and technological information for such purposes,

Determined to promote regional cooperation for the development and practical application of nuclear energy for peaceful purposes in the interest of sustainable social and economic development of the Africa continent,

Determined to keep Africa free of environmental pollution by radioactive wastes and other radioactive matter,

Welcoming the cooperation of all States and governmental and non-governmental organizations for the attainment of these objectives,

Have decided by this Treaty to establish the African NWFZ and hereby agree as follows:

Article 1
Definition/Usage of terms

For the purpose of this Treaty and its Protocols:

(a) "African nuclear-weapon-free zone" means the territory of the continent of Africa, islands States members of OAU and all islands considered by the Organization of African Unity in its resolutions to be part of Africa;

(b) "Territory" means the land territory, internal waters, territorial seas and archipelagic waters and the airspace above them as well as the sea bed and subsoil beneath;

(c) "Nuclear explosive device" means any nuclear weapon or other explosive device capable of releasing nuclear energy, irrespective of the purpose for which it could be used. The term includes such a weapon or device in unassembled and partly assembled forms, but does not include the means of transport or delivery of such a weapon or device if separable from and not an indivisible part of it;

(d) "Stationing" means implantation, emplacement, transport on land or inland waters, stockpiling, storage, installation and deployment;

(e) "Nuclear installation" means a nuclear-power reactor, a nuclear research reactor, a critical facility, a conversion plant, a fabrication plant, a reprocessing plant, an isotope separation plant, a separate storage installation and any other installation or location in or at which fresh or irradiated nuclear material or significant quantities of radioactive materials are present.

(f) "Nuclear material" means any source material or special fissionable material as defined in Article XX of the Statute of the International Atomic Energy Agency (IAEA) and as amended from time to time by the IAEA.

Article 2

Application of the Treaty

1. Except where otherwise specified, this Treaty and its Protocols shall apply to the territory within the African nuclear-weapon-free zone, as illustrated in the map in annex I.

2. Nothing in this Treaty shall prejudice or in any way affect the rights, or the exercise of the rights, of any state under international law with regards to freedom of the seas.

Article 3

Renunciation of nuclear explosive devices

Each Party undertakes:

(a) Not to conduct research on, develop, manufacture, stockpile or otherwise acquire, possess or have control over any nuclear explosive device by any means anywhere;

(b) Not to seek or receive any assistance in the research on, development, manufacture, stockpiling or acquisition, or possession of any nuclear explosive device;

(c) Not to take any action to assist or encourage the research on, development, manufacture, stockpiling or acquisition, or possession of any nuclear explosive device.

Article 4

Prevention of stationing of nuclear explosive devices

1. Each Party undertakes to prohibit, in its territory, the stationing of any nuclear explosive device.
2. Without prejudice to the purposes and objectives of the treaty, each party in the exercise of its sovereign rights remains free to decide for itself whether to allow visits by foreign ships and aircraft to its ports and airfields, transit of its airspace by foreign aircraft, and navigation by foreign ships in its territorial sea or archipelagic waters in a manner not covered by the rights of innocent passage, archipelagic sea lane passage or transit passage of straits.

Article 5

Prohibition of testing of nuclear explosive devices

Each Party undertakes:

(a) Not to test any nuclear explosive device;
(b) To prohibit in its territory the testing of any nuclear explosive device;
(c) Not to assist or encourage the testing of any nuclear explosive device by any State anywhere.

Article 6

Declaration, dismantling, destruction or conversion of nuclear explosive devices and the facilities for their manufacture

Each Party undertakes:

(a) To declare any capability for the manufacture of nuclear explosive devices;
(b) To dismantle and destroy any nuclear device that it has manufactured prior to the coming into force of this Treaty;
(c) To destroy facilities for the manufacture of nuclear explosive devices or, where possible, to convert them to peaceful uses;
(d) To permit the International Atomic Energy Agency (hereinafter referred to as IAEA) and the Commission established in article 12 to verify the processes of dismantling and destruction of the nuclear explosive devices, as well as the destruction or conversion of the facilities for their production.

Article 7

Prohibition of dumping of radioactive wastes

Each Party undertakes:

(a) To effectively implement or to use as guidelines the measures contained in the Bamako Convention on the Ban of the Import into Africa and Control of Transboundary Movement and Management of Hazardous Wastes within Africa in so far as it is relevant to radioactive waste;
(b) Not to take any action to assist or encourage the dumping of radioactive wastes and other radioactive matter anywhere within the African nuclear-weapon-free zone.

Article 8

Peaceful nuclear activities

1. Nothing in this Treaty shall be interpreted as to prevent the use of nuclear sciences and technology for peaceful purposes.
2. As part of their efforts to strengthen their security, stability and development, the Parties undertake to promote individually and collectively the use of nuclear science and technology for economic and social development. To this end they undertake to establish and strengthen mechanisms for cooperation at the bilateral, subregional and regional levels.

3. Parties are encouraged to make use of the programme of assistance available in IAEA and, in this connection, to strengthen cooperation under the African Regional Cooperation Agreement for Research, Training and Development Related to Nuclear Science and Technology (hereinafter referred to as AFRA).

**Article 9**

*Verification of Peaceful Uses*

Each Party undertakes:

(a) To conduct all activities for the peaceful use of nuclear energy under strict non-proliferation measures to provide assurance of exclusively peaceful uses;

(b) To conclude a comprehensive safeguards agreement with IAEA for the purpose of verifying compliance with the undertakings in subparagraph (a) of this article;

(c) Not to provide source or special fissionable material, or equipment or material especially designed or prepared for the processing, use or production of special fissionable material for peaceful purposes to any non-nuclear-weapon State unless subject to a comprehensive safeguards agreement concluded with IAEA.

**Article 10**

*Physical protection of nuclear materials and facilities*

Each Party undertakes to maintain the highest standards of security and effective physical protection of nuclear materials, facilities and equipment to prevent theft or unauthorized use and handling. To that end each Party, inter alia, undertakes to apply measures of physical protection equivalent to those provided for in the Convention on Physical Protection of Nuclear Material and in recommendations and guidelines developed by IAEA for that purpose.

**Article 11**

*Prohibition of armed attack on nuclear installations*

Each Party undertakes not to take, or assist, or encourage any action aimed at an armed attack by conventional or other means against nuclear installations in the African nuclear-weapon-free zone.

**Article 12**

*Mechanism for compliance*

1. For the purpose of ensuring compliance with their undertakings under this Treaty, the Parties agree to establish the African Commission on Nuclear Energy (hereinafter referred to as the Commission) as set out in annex III.

2. The Commission shall be responsible inter alia for:

   (a) Collating the reports and the exchange of information as provided for in article 13;

   (b) arranging consultations as provided for in annex IV, as well as convening conferences of Parties on the concurrence of simple majority of State Parties on any matter arising from the implementation of the Treaty;

   (c) Reviewing the application to peaceful nuclear activities of safeguards by IAEA as
elaborated in annex II;

(d) Bringing into effect the complaints procedure elaborated in annex IV;

(e) Encouraging regional and sub-regional programmes for cooperation in the peaceful uses of nuclear science and technology;

(f) Promoting international cooperation with extra-zonal States for the peaceful uses of nuclear science and technology.

3. The Commission shall meet in ordinary session once a year, and may meet in extraordinary session as may be required by the complaints and settlement of disputes procedure in annex IV.

Article 13

Report and exchanges of information

1. Each Party shall submit an annual report to the Commission on its nuclear activities as well as other matters relating to the Treaty, in accordance with the format for reporting to be developed by the Commission.

2. Each Party shall promptly report to the Commission any significant event affecting the implementation of the Treaty.

3. The Commission shall request the IAEA to provide it with an annual report on the activities of AFRA.

Article 14

Conference of Parties

1. A Conference of all Parties to the Treaty shall be convened by the Depositary as soon as possible after the entry into force of the Treaty to, inter alia, elect members of the Commission and determine its headquarters. Further conferences of State Parties shall be held as necessary and at least every two years, and convened in accordance with paragraph 2 (b) of article 12.

2. The Conference of all Parties to the Treaty shall adopt the Commission's budget and a scale of assessment to be paid by the State Parties.

Article 15

Interpretation of the Treaty

Any dispute arising out of the interpretation of the Treaty shall be settled by negotiation, by recourse to the Commission or another procedure agreed to by the Parties, which may include recourse to an arbitral panel or to the International Court of Justice.

Article 16

Reservations

This Treaty shall not be subject to reservations.

Article 17

Duration

This Treaty shall be of unlimited duration and shall remain in force indefinitely.
Article 18

Signature, ratification and entry into force

1. This Treaty shall be open for signature by any State in the African nuclear-weapon-free zone. It shall be subject to ratification.

2. It shall enter into force on the date of deposit of the twenty-eighth instrument of ratification.

3. For a signatory that ratifies this Treaty after the date of the deposit of the twenty-eighth instrument of ratification, it shall enter into force for that signatory on the date of deposit of its instrument of ratification.

Article 19

Amendments

1. Any amendments to the Treaty proposed by a Party shall be submitted to the Commission, which shall circulate it to all Parties.

2. Decision on the adoption of such an amendment shall be taken by a two-thirds majority of the Parties either through written communication to the Commission or through a conference of Parties convened upon the concurrence of a simple majority.

3. An amendment so adopted shall enter into force for all parties after receipt by the Depositary of the instrument of ratification by the majority of Parties.

Article 20

Withdrawal

1. Each Party shall, in exercising its national sovereignty, have the right to withdraw from this Treaty if it decides that extraordinary events, related to the subject matter of this Treaty, have jeopardized its supreme interests.

2. Withdrawal shall be effected by a Party giving notice, which includes a statement of the extraordinary events it regards as having jeopardized its supreme interest, twelve months in advance to the Depositary. The Depositary shall circulate such notice to all other parties.

Article 21

Depositary functions

1. This Treaty, of which the Arabic, English, French and Portuguese texts are equally authentic, shall be deposited with the Secretary-General of OAU, who is hereby designated as Depositary of the Treaty.

2. The Depositary shall:

   (a) Receive instruments of ratification;

   (b) Register this Treaty and its Protocols pursuant to Article 102 of the Charter of the United Nations;

   (c) Transmit certified copies of the Treaty and its Protocols to all States in the African nuclear-weapon-free zone and to all States eligible to become party to the Protocols to the Treaty, and shall notify them of signatures and ratification of the Treaty and its Protocols.

Article 22
Status of the annexes

The annexes form an integral part of the Treaty. Any reference to this Treaty includes the annexes.

In witness whereof the undersigned, being duly authorized by their Governments, have signed this Treaty.

---

Annex II

Safeguards of the International Atomic Energy Agency

1. The safeguards referred to in subparagraph (b) of the article 9 shall in respect of each Party be applied by the International Atomic Energy Agency as set forth in an agreement negotiated and concluded with the Agency on all source or special fissionable material in all nuclear activities within the territory of the Party, under its jurisdiction or carried out under its control anywhere.

2. The Agreement referred to in paragraph 1 above shall be, or shall be equivalent in its scope and effect to, the agreement required in connection with the Treaty on the Non-Proliferation of Nuclear Weapons ([INFCIRC/153 corrected). A party that has already entered into a safeguards agreement with the IAEA is deemed to have already complied with the requirement. Each Party shall take all appropriate steps to ensure that the Agreement referred to in paragraph 1 is in force for it not later than eighteen months after the date of entry into force for that Party of this Treaty.

3. For the purpose of this Treaty, the safeguards referred to in paragraph 1 above shall have as their purpose the verification of the non-diversion of nuclear material from peaceful nuclear activities to nuclear explosive devices or for purposes unknown.

4. Each Party shall include in its annual report to the Commission, in conformity with art. 13, for its information and review, a copy of the overall conclusions of the most recent report by the International Atomic Energy Agency on its inspection activities in the territory of the Party concerned, and advise the Commission promptly of any change in those conclusions. The information furnished by a Party shall not be, totally or partially, disclosed or transmitted to third parties, by the addressees of the reports, except when that Party gives its express consent.

---

Annex III

African Commission on Nuclear Energy

1. The Commission established in article 12 shall be composed of twelve Members elected by Parties to the Treaty for a three-year period, bearing in mind the need for equitable geographical distribution as well as to include Members with advanced nuclear programmes. Each Member shall have one representative nominated with particular regard for his/her expertise in the subject of the Treaty.

2. The Commission shall have a Bureau consisting of the Chairman, the Vice-Chairman and the Executive Secretary. It shall elect its Chairman and Vice-Chairman. The Secretary-General of the Organization of African Unity, at the request of Parties to the Treaty and in consultation with the Chairman, shall designate the Executive Secretary of the Commission. For the first meeting a quorum shall be constituted by representatives of two thirds of the Members of the Commission. For that meeting decisions of the Commission shall be taken as far as possible by consensus or otherwise by a two-thirds majority of the Members of the Commission. The Commission shall adopt its rules of procedure at that meeting.

3. The Commission shall develop a format for reporting by States as required under articles 12 and 13.
4. (a) The budget of the Commission, including the costs of inspections pursuant to annex IV to this Treaty, shall be borne by the Parties to the Treaty in accordance with a scale of assessment to be determined by the Parties;

(b) The Commission may also accept additional funds from other sources provided such donations are consistent with the purposes and objectives of the Treaty.

---

**Annex IV**

*Complaints procedure and settlement of disputes*

1. A Party which considers that there are grounds for a complaint that another Party or a Party to Protocol II is in breach of its obligations under this Treaty shall bring the subject matter of the complaint to the attention of the Party complained of and shall allow the latter thirty days to provide it with an explanation and to resolve the matter. This may include technical visits agreed upon between the Parties.

2. If the matter is not so resolved, the complaint Party may bring this complaint to the Commission.

3. The Commission, taking account of efforts made under paragraph 1 above, shall afford the Party complained of forty-five days to provide it with an explanation of the matter.

4. If, after considering any explanation given to it by the representatives of the Party complained of the Commission considers that there is sufficient substance in the complaint to warrant an inspection in the territory of that Party or territory of a party to Protocol III, the Commission may request the International Atomic Energy Agency to conduct such inspection as soon as possible. The Commission may also designate its representatives to accompany the Agency's inspectorate team.

(a) The request shall indicate the tasks and objectives of such inspection, as well as any confidentiality requirements;

(b) If the Party complained of so requests, the inspection team shall be accompanied by representatives of that party provided that the inspectors shall not be thereby delayed or otherwise impeded in the exercise of their functions;

(c) Each Party shall give the inspection team full and free access to all information and places within each territory that may be deemed relevant by the inspectors to the implementation of the inspection;

(d) The Party complained of shall take all appropriate steps to facilitate the work of the inspection team, and shall accord them the same privileges and immunities as those set forth in the relevant provisions of the Agreement on the Privileges and Immunities of the International Atomic Energy Agency.

(e) The International Atomic Energy Agency shall report its findings in writing as quickly as possible to the Commission, outlining its activities, setting out relevant facts and information as ascertained by it, with supporting evidence and documentation as appropriate, and stating its conclusions. The Commission shall report fully to all States Parties to the Treaty giving its decision as to whether the Party complained of is in breach of its obligations under this Treaty;

(f) If the Commission considers that the Party complained of is in breach of its obligations under this Treaty, or that the above provisions have not been complied with, States Parties to the Treaty shall meet in extraordinary session to discuss the matter;

(g) The States Parties convened in extraordinary session may as necessary, make
recommendations to the Party held to be in breach of its obligations and to the Organization of African Unity. The Organization of African Unity may, if necessary, refer the matter to the United Nations Security Council;

(h) The costs involved in the procedure outlined above shall be borne by the Commission. In the case of abuse, the Commission shall decide whether the requesting State Party should bear any of the financial implications.

5. The Commission may also establish its own inspection mechanism.

---

Protocol I

The Parties to this Protocol

Convinced of the need to take all steps in achieving the ultimate goal of a world entirely free of nuclear weapons as well as the obligations of all States to contribute to this end,

Convinced also that the African Nuclear-Weapon-Free Zone Treaty, negotiated and signed in accordance with the Declaration on the Denuclearization of Africa (AHG/Res. II(1) of 1964, resolutions CM/Res. 1342(LIV) of 1991 and CM/Res. 1395(LVI) Rev. 1 of 1992 of the Council of Ministers of the Organization of African Unity and United Nations General Assembly Resolution 48/86 of 16 December 1993, constitutes an important measure towards ensuring the non-proliferation of nuclear weapons, promoting cooperation in the peaceful uses of nuclear energy, promoting general and complete disarmament, and enhancing regional and international peace and security,

Desirous of contributing in all appropriate manners to the effectiveness of the Treaty,

Have agreed as follows:

Article 1

Each Protocol Party undertakes not to use or threaten to use a nuclear explosive device against:

(a) Any Party to the Treaty; or

(b) Any territory within the African nuclear-weapon-free zone for which a State that has become a Party to Protocol III is internationally responsible as defined in annex I.

Article 2

Each Protocol Party undertakes not to contribute to any act that constitutes a violation of the Treaty or of this Protocol.

Article 3

Each Protocol Party undertakes, by written notification to the Depositary, to indicate its acceptance or otherwise of any alteration to its obligation under this Protocol that may be brought about by the entry into force of an amendment to the Treaty pursuant to article 19 of the Treaty.

Article 4

This Protocol shall be open for signature by China, France, the Russian Federation, the United Kingdom of Great Britain and Northern Ireland and the United States of America.

Article 5

This Protocol shall be subject to ratification.
Article 6

This Protocol is of a permanent nature and shall remain in force indefinitely, provided that each Party shall, in exercising its national sovereignty, have the right to withdraw from this Protocol if it decides that extraordinary events related to the subject-matter of this Protocol, have jeopardized its supreme interests. It shall give notice of such withdrawal to the Depositary twelve months in advance. Such notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests.

Article 7

This Protocol shall enter into force for each State on the date of its deposit with the Depositary of its instrument of ratification or the date of entry into force of the Treaty, whichever is later.

In witness whereof the undersigned, being duly authorized by their Governments, have signed this Protocol.

Protocol II

The Parties to this Protocol

Convinced of the need to take all steps in achieving the ultimate goal of a world entirely free of nuclear weapons as well as the obligations of all States to contribute to this end,

Convinced also that the African Nuclear-Weapon-Free Zone Treaty, negotiated and signed in accordance with the Declaration on the Denuclearization of Africa (AHG/Res. 11(1) of 1964, resolutions CM/Res. 1342(LIV) of 1991 and CM/Res. 1395(LVI)/Rev. 1 of 1992 of the Council of Ministers of the Organization of African Unity and United Nations General Assembly resolution 48/86 of 16 December 1993, constitutes an important measure towards ensuring the non-proliferation of nuclear weapons, promoting cooperation in the peaceful uses of nuclear energy, promoting general and complete disarmament, and enhancing regional and international peace and security,

Desirous of contributing in all appropriate manners to the effectiveness of the Treaty,

Bearing in mind the objective of concluding a treaty banning all nuclear test,

Have agreed as follows

Article 1

Each Protocol Party undertakes not to test or assist or encourage the testing of any nuclear explosive device anywhere within the African nuclear-weapon-free zone.

Article 2

Each Protocol Party undertakes not to contribute to any act that constitutes a violation of the Treaty or of this Protocol.

Article 3

Each Protocol Party undertakes, by written notification to the Depositary, to indicate its acceptance or otherwise of any alteration to its obligation under this Protocol that may be brought about by the entry into force of an amendment to the Treaty pursuant to article 20 of the Treaty.

Article 4

This Protocol shall be open for signature by China, France, the Russian Federation, the United Kingdom of Great Britain and Northern Ireland and the United States of America.
Article 5

This Protocol shall be subject to ratification.

Article 6

This Protocol is of a permanent nature and shall remain in force indefinitely, provided that each Party shall, in exercising its national sovereignty, have the right to withdraw from this Protocol if it decides that extraordinary events, related to the subject-matter of this Protocol have jeopardized its supreme interests. It shall give notice of such withdrawal to the Depositary twelve months in advance. Such notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests.

Article 7

This Protocol shall enter into force for each State on the date of its deposit with the Depositary of its instrument of ratification or the date of entry into force of the Treaty, whichever is later.

In witness whereof the undersigned, being duly authorized by their Governments, have signed this Protocol.

Protocol III

The Parties to this Protocol

Convinced of the need to take all steps in achieving the ultimate goal of a world entirely free of nuclear weapons as well as the obligations of all States to contribute to this end,

Convinced also that the African Nuclear-Weapon-Free Zone Treaty, negotiated and signed in accordance with the Declaration on the Denuclearization of Africa (AHG/Res. 11(1)) of 1964, resolutions CM/Res. 1342(LIV) of 1991 and CM/Res. 1395(LVI)/Rev.1 of 1992 of the Council of Ministers of the Organization of African Unity and United Nations General Assembly resolution 48/86 of 16 December 1993, constitutes an important measure towards ensuring the non-proliferation of nuclear weapons, promoting cooperation in the peaceful uses of nuclear energy, promoting general and complete disarmament, and enhancing regional and international peace and security,

Desirous of contributing in all appropriate manners to the effectiveness of the Treaty,

Have agreed as follows:

Article 1

Each Protocol Party undertakes to apply, in respect of the territories for which it is de jure or de facto internationally responsible situated within the African nuclear-weapon-free zone, the provisions contained in articles 3, 4, 5, 6, 7, 8, 9 and 10 of the Treaty and to ensure the application of safeguards specified in annex II of the Treaty.

Article 2

Each Protocol Party undertakes not contribute to any act that constitutes a violation of the Treaty or of this Protocol.

Article 3

Each Protocol Party undertakes, by written notification to the Depositary, to indicate its acceptance or otherwise of any alterations to its obligation under this Protocol that may be brought about by the entry into force of an amendment to the Treaty pursuant to article 20 of the Treaty.
Article 4
This Protocol shall be open for signature by France and Spain.

Article 5
This Protocol shall be subject to ratification.

Article 6
This Protocol is of a permanent nature and shall remain in force indefinitely provided that each Party shall, in exercising its national sovereignty have the right to withdraw from this Protocol if it decides that extraordinary events, related to the subject-matter of this Protocol, have jeopardized its supreme interests. It shall give notice of such withdrawal to the Depositary twelve months in advance. Such notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests.

Article 7
This Protocol shall enter into force for each State on the date of its deposit with the Depositary of its instrument of ratification or the date of entry into force of the treaty, whichever is later.

In witness whereof the undersigned, being duly authorized by their Governments have signed this Protocol.
South Pacific Nuclear Free Zone Treaty [Treaty of Rarotonga]

[Opened for signature 6 August 1985, entered into force 11 December 1986]

Preamble

The Parties to this Treaty
United in their commitment to a world at peace,
Gravely concerned that the continuing nuclear arms race presents the risk of nuclear war which would have devastating consequences for all people,
Convinced that all countries have an obligation to make every effort to achieve the goal of eliminating nuclear weapons, the terror which they hold for humankind and the threat which they pose to life on earth,
Believing that regional arms control measures can contribute to global efforts to reverse the nuclear arms race and promote the national security of each country in the region and the common security of all,
Determined to ensure, so far as lies within their power, that the bounty and beauty of the land and sea in their region shall remain the heritage of their peoples and their descendants in perpetuity to be enjoyed by all in peace,
Reaffirming the importance of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) in preventing the proliferation of nuclear weapons and in contributing to world security,

Noting, in particular, that Article VII of the NPT recognises the right of any group of States to conclude regional treaties in order to assure the total absence of nuclear weapons in their respective territories,

Noting that the prohibitions of emplacement and emplacement of nuclear weapons on the sea-bed and the ocean floor and in the subsoil thereof contained in the Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Sea-Bed and the Ocean Floor and in the Subsoil Thereof apply in the South Pacific,

Noting also that the prohibition of testing of nuclear weapons in the atmosphere or under water, including territorial waters or high seas, contained in the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water applies in the South Pacific,

Determined to keep the region free of environmental pollution by radioactive wastes and other radioactive matter,

Guided by the decision of the Fifteenth South Pacific Forum at Tuvalu that a nuclear free zone should be established in the region at the earliest possible opportunity in accordance with the principles set out in the communiqué of that meeting,

Have agreed as follows:

Article 1

Usage of terms

For the purposes of this Treaty and its Protocols:
(a) ‘South Pacific Nuclear Free Zone’ means the areas described in Annex 1 as illustrated by the map attached to that Annex;
(b) ‘territory’ means internal waters, territorial sea and archipelagic waters, the sea-bed and subsoil beneath, the land territory and the airspace above them;
(c) ‘nuclear explosive device’ means any nuclear weapon or other explosive device capable of releasing nuclear energy, irrespective of the purpose for which it could be used. The term includes such a weapon or device in unassembled and partly assembled forms, but, does not include the means of transport or delivery of such a weapon or device if separable from and not an indivisible part of it;
(d) ‘stationing’ means emplacement, emplacement, transportation on land or inland waters, stockpiling, storage, installation and deployment.

Article 2

Application of the Treaty

1. Except where otherwise specified, this Treaty and its Protocols shall apply to territory within the South Pacific Nuclear Free Zone.
2. Nothing in this Treaty shall prejudice or in any way affect the rights, or the exercise of the right, of any State under international law with regard to freedom of the seas.

Article 3

Renunciation of nuclear explosive devices

Each Party undertakes:
(a) not to manufacture or otherwise acquire, possess or have control over any nuclear explosive device by any means anywhere inside or outside the South Pacific Nuclear Free Zone;
(b) not to seek or receive any assistance in the manufacture or acquisition of any nuclear explosive device;
(c) not to take any action to assist or encourage the manufacture or acquisition of any nuclear explosive device by any State.

Article 4

Peaceful nuclear activities

Each Party undertakes:
(a) not to provide source or special fissionable material, or equipment or material especially designed or prepared for the processing, use or production of special fissionable material for peaceful purposes to:
(i) any non-nuclear-weapon State unless subject to the safeguards required by Article III. 1 of the NPT, or
(ii) any nuclear-weapon State unless subject to applicable safeguards agreement with the International Atomic Energy Agency (IAEA).
Any such provision shall be in accordance with strict non-proliferation measures to provide assurance of exclusively peaceful non-explosive use;
(b) to support the continued effectiveness of the international non-proliferation system based on the NPT and the IAEA safeguards system.

Article 5

Prevention of stationing of nuclear explosive devices

1. Each Party undertakes to prevent in its territory the stationing of any nuclear explosive device.
2. Each Party in the exercise of its sovereign right remains free to decide for itself whether to allow visit by foreign
Article 6
Prevention of testing of nuclear explosive devices
Each Party undertakes:
(a) to prevent in its territory the testing of any nuclear explosive device;
(b) not to take any action to assist or encourage the testing of any nuclear explosive device by any State.

Article 7
Prevention of dumping
1. Each Party undertakes:
(a) not to dump radioactive wastes and other radioactive matter at sea anywhere within the South Pacific Nuclear Free Zone;
(b) to prevent the dumping of radioactive wastes and other radioactive matter by anyone in its territorial sea;
(c) not to take any action to assist or encourage the dumping by anyone of radioactive wastes and other radioactive matter at sea anywhere within the South Pacific Nuclear Free Zone;
(d) to support the conclusion as soon as possible of the proposed Convention relating to the protection of the South Pacific Nuclear Free Zone; and its Protocol for the prevention of pollution of the South Pacific region by dumping, with the aim of precluding dumping at sea of radioactive wastes and other radioactive matter by anyone anywhere in the region.
2. Paragraphs 1 (a) and 1 (b) of this Article shall not apply to areas of the South Pacific Nuclear Free Zone in respect of which such a Convention and Protocol have entered into force.

Article 8
Control system
1. The Parties hereby establish a control system for the purpose of verifying compliance with their obligations under this Treaty.
2. The control system shall comprise:
(a) reports and exchange of information as provided for in Article 9;
(b) consultations as provided for in Article 10 and Annex 4 (1);
(c) the application to peaceful nuclear activities of safeguards by the IAEA as provided for in Annex 2;
(d) a complaints procedure as provided for in Annex 4.

Article 9
Reports and exchanges of information
1. Each Party shall report to the Director of the South Pacific Bureau for Economic Co-operation (the Director) as soon as possible any significant event within its jurisdiction affecting the implementation of this Treaty. The Director shall circulate such reports promptly to all Parties.
2. The Parties shall endeavour to keep each other informed on matters arising under or in relation to this Treaty. They may exchange information by communicating it to the Director, who shall circulate it to all Parties.
3. The Director shall report annually to the South Pacific Forum on the status of this Treaty and matters arising under or in relation to it, incorporating reports and communications made under paragraphs 1 and 2 of this Article and matters arising under Articles 8 (2) (d) and 10 and Annex 2 (4).

Article 10
Consultations and review
Without prejudice to the conduct of consultations among Parties by other means, the Director, at the request of any Party, shall convene a meeting of the Consultative Committee established by Annex 3 for consultation and co-operation on any matter arising in relation to this Treaty or for reviewing its operation.

Article 11
Amendment
The Consultative Committee shall consider proposals for amendment of the provisions of this Treaty proposed by any Party and circulated by the Director to all Parties not less than three months prior to the convening of the Consultative Committee for this purpose. Any proposal agreed upon by consensus by the Consultative Committee shall be communicated to the Director, who shall circulate it for acceptance to all Parties. An amendment shall enter into force thirty days after receipt by the depository of acceptances from all Parties.

Article 12
Signature and ratification
1. This Treaty shall be open for signature by any Member of the South Pacific Forum.
2. This Treaty shall be subject to ratification. Instruments of ratification shall be deposited with the Director who is hereby designated depository of this Treaty and its Protocols.
3. If a member of the South Pacific Forum whose territory is outside the South Pacific Nuclear Free Zone becomes a Party to this Treaty, Annex 1 shall be deemed to be amended so as to require at least the territory of that Party within the boundaries of the South Pacific Nuclear Free Zone. The delineation of any area added pursuant to this paragraph shall be approved by the South Pacific Forum.

Article 13
Withdrawal
1. This Treaty is of a permanent nature and shall remain in force indefinitely, provided that in the event of a violation by any Party of a provision of this Treaty or of the spirit of the Treaty, every other Party shall have the right to withdraw from the Treaty.

NUCLEAR-WEAPON-FREE ZONES
ships and aircraft to its ports and airfields, transit of its airspace by foreign aircraft, and navigation by foreign ships in its territorial sea or archipelagic waters in a manner not covered by the rights of innocent passage, archipelagic sea lane passage or transit passage of straits.
2. Withdrawal shall be effected by giving notice twelve months in advance to the Director who shall circulate such notice to all other Parties.

Article 14

Reservations

This Treaty shall not be subject to reservations.

Article 15

Entry into force

1. This Treaty shall enter into force on the date of deposit of the eighth instrument of ratification.
2. For a signatory which ratifies this Treaty after the date of deposit of the eighth instrument of ratification, the Treaty shall enter into force on the date of deposit of its instrument of ratification.

Article 16

Depository functions


IN WITNESS WHEREOF the undersigned, being duly authorized by their Government, have signed this Treaty.

DONE at Rarotonga, this sixth day of August, One thousand nine hundred and eighty-five, in a single original in the English language.

ANNEX 1

South Pacific Nuclear Free Zone

A. The area bounded by a line—

(1) commencing at the point of intersection of the Equator by the maritime boundary between Indonesia and Papua New Guinea;
(2) running thence northerly along that maritime boundary to its intersection by the outer limit of the exclusive economic zone of Papua New Guinea;
(3) thence generally north-easterly and south-easterly along that outer limit to its intersection by the Equator;
(4) thence east along the Equator to its intersection by the meridian of Longitude 163 degrees East;
(5) thence north along that meridian to its intersection by the parallel of Latitude 3 degrees North;
(6) thence east along that parallel to its intersection by the meridian of Longitude 171 degrees East;
(7) thence north along that meridian to its intersection by the parallel of Latitude 4 degrees North;
(8) thence east along that parallel to its intersection by the meridian of Longitude 180 degrees East;
(9) thence south along that meridian to its intersection by the Equator;
(10) thence east along the Equator to its intersection by the meridian of Longitude 165 degrees West;
(11) thence north along that meridian to its intersection by the parallel of Latitude 5 degrees 30 minutes North;
(12) thence east along that parallel to its intersection by the meridian of Longitude 154 degrees West;
(13) thence south along that meridian to its intersection by the Equator;
(14) thence east along the Equator to its intersection by the meridian of Longitude 115 degrees West;
(15) thence south along that meridian to its intersection by the parallel of Latitude 60 degrees South;
(16) thence west along that parallel to its intersection by the meridian of Longitude 115 degrees East;
(17) thence north along that meridian to its southernmost intersection by the outer limit of the territorial sea of Australia;
(18) thence generally northerly and easterly along the outer limit of the territorial sea of Australia to its intersection by the meridian of Longitude 136 degrees 45 minutes East;
(19) thence north-easterly along the geodesic to the point of Latitude 10 degrees 50 minutes South, Longitude 139 degrees 12 minutes East;
(20) thence north-easterly along the maritime boundary between Indonesia and Papua New Guinea to where it joins the land border between those two countries;
(21) thence generally northerly along that land border to where it joins the maritime boundary between Indonesia and Papua New Guinea, on the northern coastline of Papua New Guinea; and
(22) thence generally northerly along that boundary to the point of commencement.

B. The areas within the outer limits of the territorial seas of all Australian islands lying westward of the area described in paragraph A and north of Latitude 60 degrees South, provided that any such areas shall cease to be part of the South Pacific Nuclear Free Zone upon receipt by the depository of written notice from the Government of Australia stating that the areas have become subject to another treaty having an object and purpose substantially the same as that of this Treaty.

ANNEX 2

IAEA Safeguards

1. The safeguards referred to in Article 8 shall in respect of each Party be applied by the IAEA as set forth in an agreement negotiated and concluded with the IAEA on all source or special fissionable material in all peaceful nuclear activities within the territory of the Party, under its jurisdiction or carried out under its control anywhere.

2. The agreement referred to in paragraph 1 shall be, or shall be equivalent in its scope and effect to, an agreement required in connection with the NPT on the basis of the material reproduced in document INFCIRC/153 (Corrected) of the IAEA. Each Party shall take all appropriate steps to ensure that such an agreement is in force for it not later than eighteen months after the date of entry into force for that Party of this Treaty.

3. For the purposes of this Treaty, the safeguards referred to in paragraph 1 shall have as their purpose the verification of the non-diversion of nuclear material from peaceful nuclear activities to nuclear explosive devices.

4. Each Party agrees upon the request of any other Party to transmit to that Party and to the Director for the information of all Parties a copy of the overall
conclusions of the most recent report by the IAEA on its inspection activities in the territory of the Party concerned, and to advise the Director promptly of any subsequent findings of the Board of Governors of the IAEA in relation to those conclusions for the information of all Parties.

ANNEX 3
Consultative Committee

1. There is hereby established a Consultative Committee which shall be convened by the Director from time to time pursuant to Articles 10 and 11 and Annex 4 (2). The Consultative Committee shall be constituted of representatives of the Parties, each Party being entitled to appoint one representative who may be accompanied by advisers. Unless otherwise agreed, the Consultative Committee shall be chaired at any given meeting by the representative of the Party which last hosted the meeting of Heads of Government of Members of the South Pacific Forum. A quorum shall be constituted by representatives of half the Parties. Subject to the provisions of Article 11, decisions of the Consultative Committee shall be taken by consensus or, failing consensus, by a two-thirds majority of those present and voting. The Consultative Committee shall adopt such other rules of procedure as it sees fit.

2. The costs of the Consultative Committee, including the cost of special inspections pursuant to Annex 4, shall be borne by the South Pacific Bureau for Economic Co-operation. It may seek special funding should this be required.

ANNEX 4
Complaints Procedure

1. A Party which considers that there are grounds for a complaint that another Party is in breach of its obligations under this Treaty shall, before bringing such a complaint to the Director, bring the subject-matter of the complaint to the attention of the Party complained of and shall allow the latter reasonable opportunity to provide it with an explanation and to resolve the matter.

2. If the matter is not so resolved, the complainant Party may bring the complaint to the Director with a request that the Consultative Committee be convened to consider it. Complaints shall be supported by an account of evidence of breach of obligations known to the complainant Party. Upon receipt of a complaint the Director shall convene the Consultative Committee as quickly as possible to consider it.

3. The Consultative Committee, taking account of effort made under paragraph 1, shall afford the Party complained of a reasonable opportunity to provide it with an explanation of the matter.

4. If, after considering any explanation given to it by the representatives of the Party complained of, the Consultative Committee decides that there is sufficient substance in the complaint to warrant a special inspection in the territory of that Party or elsewhere, the Consultative Committee shall direct that such special inspection be made as quickly as possible by a special inspection team of three suitably qualified special inspectors appointed by the Consultative Committee in consultation with the complainant and complainant Parties, provided that no national of either Party shall serve on the special inspection team. If so requested by the Party complained of, the special inspection team shall be accompanied by representatives of that Party. Neither the right of consultation on the appointment of special inspectors, nor the right to accompany special inspectors, shall delay the work of the special inspection team.

5. In making a special inspection, special inspectors shall be subject to the direction only of the Consultative Committee and shall comply with such directives concerning tasks, objectives, confidentiality and procedures as may be decided upon by it. Directives shall take account of the legitimate interests of the Party complained of in complying with its other international obligations and commitments and shall not duplicate safeguards procedures to be undertaken by the IAEA pursuant to agreements referred to in Annex 2(1). The special inspectors shall discharge their duties with due respect for the laws of the Party complained of.

6. Each Party shall give to special inspectors full and free access to all information and places within its territory which may be relevant to enable the special inspectors to implement the directives given to them by the Consultative Committee.

7. The Party complained of shall take all appropriate steps to facilitate the special inspection, and shall grant to special inspectors privileges and immunities necessary for the performance of their functions, including inviolability for all papers and documents and immunity from arrest, detention and legal process for acts done and words spoken and written, for the purpose of the special inspection.

8. The special inspectors shall report in writing as quickly as possible to the Consultative Committee, outlining their activities, setting out relevant facts and information as ascertained by them, with supporting evidence and documentation as appropriate, and stating their conclusions. The Consultative Committee shall report fully to all Members of the South Pacific Forum, giving its decision as to whether the Party complained of is in breach of its obligations under this Treaty.

9. If the Consultative Committee has decided that the Party complained of is in breach of its obligations under this Treaty, or that the above provisions have not been complied with, or at any time at the request of either the complainant or complained of Party, the Parties shall meet promptly at a meeting of the South Pacific Forum.

PROTOCOL 1

The Parties to this Protocol
Noting the South Pacific Nuclear Free Zone Treaty (the Treaty)
Have agreed as follows:

Article 1

Each Party undertakes to apply, in respect of the territories for which it is internationally responsible situated within the South Pacific Nuclear Free Zone, the prohibitions contained in Articles 3, 5 and 6, in so far as they relate to the manufacture, stationing and testing of any nuclear explosive device within those territories, and the safeguards specified in Article 8(2)(c) and Annex 2 of the Treaty.
Article 2

Each Party may, by written notification to the depository, indicate its acceptance from the date of such notification of any alteration to its obligations under this Protocol brought about by the entry into force of an amendment to the Treaty pursuant to Article 11 of the Treaty.

Article 3

This Protocol shall be open for signature by the French Republic, the United Kingdom of Great Britain and Northern Ireland and the United States of America.

Article 4

This Protocol shall be subject to ratification.

Article 5

This Protocol is of a permanent nature and shall remain in force indefinitely, provided that each Party shall, in exercising its national sovereignty, have a right to withdraw from this Protocol if it decides that extraordinary events, related to the subject matter of this Protocol, have jeopardized its supreme interests. It shall give notice of such withdrawal to the depository three months in advance. Such notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests.

Article 6

This Protocol shall enter into force for each State on the date of its deposit with the depository of its instrument of ratification.

IN WITNESS WHEREOF the undersigned, being duly authorized by their Governments, have signed this Protocol.

DONE at Suva, this Eighth day of August, One thousand nine hundred and eighty-six, in a single original in the English language.

PROTOCOL 3

The Parties to this Protocol
Noting the South Pacific Nuclear Free Zone Treaty (the Treaty)
Have agreed as follows:

Article 1

Each party undertakes not to test any nuclear explosive device anywhere within the South Pacific Nuclear Free Zone.

Article 2

Each Party may, by written notification to the depository, indicate its acceptance from the date of such notification of any alteration to its obligations under this Protocol brought about by the entry into force of an amendment to the Treaty pursuant to Article 11 of the Treaty or by the extension of the South Pacific Nuclear Free Zone pursuant to Article 12(3) of the Treaty.

Article 4

This Protocol shall be open for signature by the French Republic, the People’s Republic of China, the Union of Soviet Socialist Republics, the United Kingdom of Great Britain and Northern Ireland and the United States of America.

Article 5

This Protocol shall be subject to ratification.
Article 5

This Protocol is of a permanent nature and shall remain in force indefinitely, provided that each Party shall, in exercising its national sovereignty, have a right to withdraw from this Protocol if it decides that extraordinary events, related to the subject matter of this Protocol, have jeopardized its supreme interests. It shall give notice of such withdrawal to the depository three months in advance. Such notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests.

Article 6

This Protocol shall enter into force for each State on the date of its deposit with the depository of its instrument of ratification.

IN WITNESS WHEREOF the undersigned, being duly authorised by their Governments, have signed this Protocol.

DONE at Suva, this Eighth day of August, One thousand nine hundred and eighty-six, in a single original in the English language.
SECRETARIAT OF THE WORKSHOP

Scientific Secretary: J. Priest
Head, Safeguards and Non-Proliferation Policy Section
Division of External Relations

Scientific Secretary: J. Vidaurre-Henry
Head, Section for Safeguards Training
Division of Technical Services

Technical Co-ordinator: C. Coolbaugh
Section for Safeguards Training
Division of Technical Services

Workshop Organizer: C. Floh
Section for Safeguards Training
Division of Technical Services

Workshop Organizer: R. Perricos
Section for Conference Services
Division of External Relations