IUCN's new Director-General holds a PhD degree from the State University of New York College of Environmental Sciences and Forestry at Syracuse, NY, in natural resources management and economics with special studies in tropical forestry. He has been a member of a number of scientific expeditions, including ones to the upper Amazon (1959–60) and to Venezuela (1962) to prepare a management plan for the then little-known Canaima National Park.

Dr Miller is a licenced pilot and certified SCUBA diver, and is fluent in Spanish. He replaces Dr Lee Merriam Talbot, who resigned recently and now comments: 'As outgoing Director-General, I am happy to extend a warm welcome and best wishes to my very able successor and respected colleague, Dr Kenton Miller. I know that he will enjoy, as I have, the warm and productive working relationships with the IUCN membership and with the individuals who make up all the other components of IUCN's global network.'

Declaration by the Canadian Pugwash Group*

A quarter-of-a-century ago a small group of 22 distinguished scientists from 10 East–West countries assembled in Pugwash, Nova Scotia, on the invitation of Mr Cyrus Eaton, to seek ways of ending the Cold War, preventing a hot war, and avoiding a nuclear holocaust. They were inspired by the Russell–Einstein Manifesto pointing to the dangers of a nuclear war that could put an end to the human race.

That meeting gave its name to the Pugwash Movement, which has spread around the world and now encompasses some 2,000 scientists from 75 countries.

Today, on the invitation of Canadian Pugwash, another small group of scientists, including signers of the Russell–Einstein Manifesto and participants in the first Pugwash Conference, have gathered in Pugwash to commemorate the 25th Anniversary of that first meeting. There follows the statement adopted by the Canadian Pugwash Group:

During the intervening years, the nuclear peril facing the nations and the peoples of the world has escalated and is now much greater than it was 25 years ago. Nine multilateral treaties and thirteen bilateral American–Soviet treaties and agreements on arms limitation have failed to halt the arms race which continues to escalate. The arms race, and in particular the nuclear arms race, is proceeding in a more dangerous way than ever before. The threat it poses to human survival knows no parallel in all history.

Increasing numbers of scientists and the public realize that peace and security cannot be found in the vast and continuing accumulation of weapons of destruction or in the current concepts of deterrence. Unfortunately, however, others, including some in positions of authority, speak of fighting, surviving, and even winning, a 'limited' nuclear war, a protracted nuclear war, or an all-out nuclear war. We believe that these illusions verge on insanity and can only lead to a mad race to oblivion.

We agree with and fully support the declaration of 1978 of the United Nations General Assembly's First Special Session on Disarmament: 'Removing the threat of world war—a nuclear war—is the most acute and urgent task of the present day. Mankind is confronted with a choice: we must halt the arms race and proceed to disarmament or face annihilation.'

There now exist some 50,000 nuclear weapons whose destructive power is more than one million times greater than the bomb that destroyed Hiroshima. Not only is the number of weapons increasing but, what is worse, the nuclear arms race is now mainly a qualitative race rather than a quantitative one. The rapid pace of technological innovation and the development of new, more accurate, and more devastating, weapon systems so far exceeds the slow pace of arms control and disarmament negotiations as to make a mockery of the efforts to halt and reverse the arms race. The threat of nuclear annihilation, either by design or as a result of accident, desperation, miscalculation, or panic, grows greater year by year.

In these circumstances, the only sure way of halting the nuclear arms race is by freezing the testing, production, and deployment, of all nuclear weapons and their delivery vehicles by the two superpowers. Such a freeze is a necessary first step to major reductions in the stockpiles of these weapons and towards the goal of their eventual elimination. Indeed, a reduction in the number of nuclear weapons and their delivery systems, without a freeze, could be meaningless. The modernization of older weapon systems, and the development of ever-more-horrible and threatening new ones, could completely negate the effect of any reduction in numbers. A technological freeze is as necessary as numerical reductions, and even more urgent. Moreover, if small nuclear delivery vehicles, such as cruise missiles, are produced and deployed in large numbers, it will be extremely difficult, if not impossible, to verify their limitation and reduction. Thus, time is indeed running out on efforts to halt and reverse the nuclear arms race.

Recently there have been several hopeful developments as people all over the world have become alerted to the dangers of the nuclear arms race. Millions have rallied to demand a stop to the arms race, and a great human cry for a nuclear freeze is surging around the world.

Another hopeful development is the growing demand that additional Governments pledge** not to be the first to use nuclear weapons. Declarations of no-first-use by all the nuclear weapon powers would be tantamount to declarations never to use these weapons. We believe that any imbalance in conventional forces is not of such dimensions as to prevent the making of no-first-use pledges: the making of such pledges, however, could be more readily agreed to if there were agreement on mutually balanced conventional forces in Europe.

It is also encouraging that several scientific inventors of some of the most sophisticated nuclear weapon systems ever conceived by the mind of Man now oppose their use and urge their abolition.

In the light of these developments, we believe that the scientists of the world—and particularly those who are members of the Pugwash Movement—have a duty to help inform and educate the governments and peoples of the world about the dangers of the nuclear arms race, and to explore ways of improving international security in order to avoid a nuclear war.

The members of the Canadian Pugwash Movement, and the distinguished guests invited to join them at this

* On the 25th Anniversary of the holding of the First Pugwash Conference at Pugwash, Canada, in July 1957.

** Such pledges were made by China in 1964 and by the USSR during the Second U.N. Special Session on Disarmament in 1982.

25th Anniversary Commemorative Meeting at Pugwash, Canada, call on the Pugwash Movement and the scientists of the world to intensify their efforts and to rededicate their energies and activities to the abolition of the threat of nuclear war and to the establishment of a just and secure world order.

Nuclear Power is Considered Essential to Development

Nuclear power is considered essential to meeting the growing demands for electricity, particularly in developing nations, where the needs are greatest. It 'may make a positive contribution to the quality of life'—even to the extent of decreasing the 'rate of degradation of the environment.' And, contrary to popular belief, the harm that is caused to health and the environment by its waste products or through nuclear accidents—such as in the US case of the Three Mile Island core-melt—is 'low relative to other sources,' and certainly no greater than that of the other energy-producing fuels, such as oil and coal.

These statements are made in a report published recently by the International Atomic Energy Agency (IAEA) and the World Health Organization (WHO), which addresses 'environmental issues that may be encountered by states that choose to develop the nuclear power option.' Entitled *Nuclear Power, the Environment and Man**, the publication's main point is that nuclear power is a viable alternative, and a necessary complement to fossil fuels.

Oil, coal, and natural gas, are now the conventional sources of energy—with oil and gas making up 70% of the world's total energy consumption—but their use has always depended upon a balancing of benefits and risks, the report points out: 'If the world is to develop, with goods and welfare shared more widely and more equitably, high energy demands will require the utilization of a wide variety of appropriate sources of energy, including nuclear power.' Another reason is that oil and gas 'may be exhausted in the next few decades,' and coal, 'while plentiful, is often difficult to mine and distribute.' Although there are about 2,100 coal deposits known throughout the world, the eleven largest are located in just three countries —the Federal Republic of Germany, the Soviet Union, and the United States.

Unprecedented Demand for Electricity

It is the growth in urban populations, particularly those that make up the 'mammoth conglomerations now forming in the developing countries,' which is creating the unprecedented demand for energy. In India, the annual energy consumption in urban areas *per caput*, the report says by way of example, 'is almost seven times that of the rural communities.'

While energy is essential for 'food production, for domestic and industrial heating or cooling, for electrical production, for transport, and for many other processes,' it is needed most to generate electricity. According to figures cited, the population of Mexico City is expected to rise to 30 millions by the year 2000, and that of Bombay, Cairo, Jakarta, and Seoul, to between 15 and 20 millions each. There are also expected to be 400 cities of more than a million inhabitants each in the developing world.

As a result of such rampant urbanization, the report says, the share of electricity in total energy is expected to double, from 16% to 32%, in the Third World by the end of this century. For developed countries, it is expected to increase from 31% to 46%. 'In some countries,' the report adds, 'no alternative exists which can replace nuclear power as a means of meeting future energy demands.'

Renewable and Nuclear Sources of Energy

What are called 'renewable sources of energy'—as, for instance, energy from the oceans, from the sun, and from wind—are also being exploited to help to satisfy the world hunger for fuel. But, with the exception of hydro-energy, these 'have been slow in developing because of the high level of capital expenditure required,' the report of the two agencies says. Even the development of hydro-power is 'limited to those geographical areas where conditions are suitable for building reservoirs.' As for solar energy, 'its use has not developed as rapidly as had been hoped,' the report admits: 'It is increasingly used for heating family houses rather than for electrical production.'

All told, there are 272 nuclear power reactors now in operation and 236 more under construction, or a total of 508, in 30 countries, developed and otherwise. Of the overall total, 154 are in the United States, where there are 75 in operation and 79 under construction; there are 60 in the Soviet Union (35 and 25, respectively), 56 in France (30 and 26), and 42 in the United Kingdom (32 and 10).

With little in the way of sources of conventional energy of their own, Belgium, Bulgaria, Finland, France, Japan, Sweden, and Switzerland, are already relying heavily on nuclear energy for electricity. 'The share of nuclear power for the generation of electricity in those countries ranges up to 30% or more, and may grow to 70 or 80% by the year 2000,' the report says. While most of the plants—475—are in industrialized countries, 33 are in 9 developing countries. The Republic of Korea, for instance, has 1 in operation and 8 under construction; India has 4 and 4; and China has 3 and 3, respectively.

Nuclear plants generate electricity from the heat that it produced following the splitting of the nuclei of atoms of heavy materials. Uranium is the principal fuel. Yet another advantage of nuclear power is that is uses less fuel than other sources. 'About 200 tonnes of uranium fuel are required to operate a 1-GW(e)—one gigawatt of electricity—power plant for a year,' the report says, 'whereas a fossil-fuelled plant of this capacity requires about 2 million tonnes of anthracite coal or 9 million barrels of oil.'

Wastes and an Accident

Even though nuclear wastes are regarded as a major problem, the report points out that disposal in 'underground repositories' has been under study for more than two decades. For high-level radioactive wastes, the method most generally accepted is burial, from 500 to 1,000 metres deep, in 'stable geological formations'—as for instance salt deposits or crystalline rock. According to estimates cited, 'less than 800 hectares of a salt deposit would be adequate to dispose of all high-activity ...

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* Edited by a 7-members' board under the chairmanship of Sir Edward Pochin, this publication of 196 pages, complete with charts, tables, and photographs of nuclear plants around the world, is available for 200 Austrian Schillings—from IAEA, Division of Publications, Vienna, Austria.—Ed.