



INTERNATIONAL  
ATOMIC  
ENERGY  
AGENCY

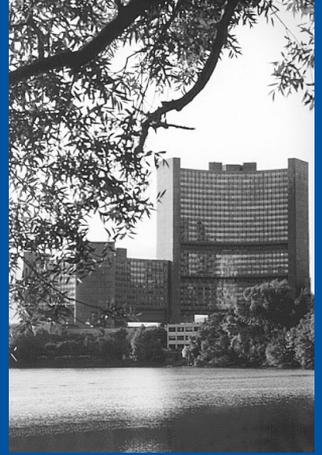
Personal Reflections



A fortieth anniversary publication



The 'temporary' headquarters of the IAEA in the Grand Hotel, on the Ringstrasse in central Vienna. The Agency remained there for some twenty years, until 1979.



In 1979, the Austrian Government and the City of Vienna completed construction of the Vienna International Centre (VIC), next to the Donaupark, which became the permanent home of the IAEA and other UN organizations. Austria generously made the buildings and facilities at the VIC available at the 'peppercorn' rent of one Austrian Schilling a year.



INTERNATIONAL  
ATOMIC ENERGY AGENCY:

PERSONAL REFLECTIONS



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## P R E F A C E

by the Director General of the IAEA

This set of personal recollections reflect a variety of views from twenty-five people who have played major roles in shaping the policies of the IAEA or have made notable contributions to its work at different periods of its history. They provide individual insights — often from a rarely available insider's perspective — into particular aspects of the development of an international organization and thus complement the History of the IAEA written by David Fischer.

It is worth recalling that the IAEA occupies a special place amongst organizations in the United Nations family in that part of its work is directly related to peace and security in the world through the verification of commitments by States to use nuclear material and installations exclusively for peaceful purposes. It has direct access to the Security Council and it reports directly each year to the General Assembly. This 'safeguards' responsibility is combined with a mandate to promote the peaceful uses of nuclear energy — in such fields as a nuclear power, nuclear and radiation safety, and applications of radiation and isotope techniques in agriculture, human health and hydrology.

The articles in this collection illustrate some of the complexities involved in the work of an international organization, where the Governing Bodies consist of over a hundred Member States, with different levels of industrial development, different political outlooks and different interests in the benefits of nuclear energy or concerns about the spread of nuclear weapons.

The views expressed in the articles are those of the individual authors and do not necessarily represent the views of the IAEA or of its Member States.

I would like to take this opportunity to pay special tribute to my predecessor as Director General of the IAEA, Sigvard Eklund, to whose outstanding leadership over a period of twenty years much of the successful development of the IAEA is due — a fact that clearly emerges from the contributions in this book. We hope that he will ensure that his own rich recollections will be published.

I would like to thank all the authors of the articles in this book for their contributions, which I trust readers will find as enjoyable as I have.

A handwritten signature in black ink, appearing to read 'Hans Blix', written in a cursive style.

Hans Blix



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THE ORIGINS OF  
THE INTERNATIONAL  
ATOMIC ENERGY AGENCY

Bertrand Goldschmidt

*Bertrand GOLDSCHMIDT*, French pioneer of nuclear energy, was born in 1912 and educated in Paris. After graduating from the Ecole de Physique et de Chimie, he was recruited in 1933, the year before her death, by Marie Curie, as her personal assistant at the Institut du Radium, Paris. Research Associate at this laboratory from 1934 to 1940, he obtained his PhD in 1939.

Dismissed in December 1940 from his position at Paris University by application of the anti-Semitic laws of the Vichy Government, he managed to leave for the USA, where he joined the Free French Forces, who seconded him to the United Kingdom Department of Scientific and Industrial Research in 1942. He was first posted to Glenn Seaborg's team at the Metallurgical Laboratory in Chicago, where he contributed to the identification of the long lived fission products and the extraction of plutonium. Transferred to Montreal in November 1942 to the newly formed Anglo-Canadian Atomic project, firstly as section leader in its Chemistry Division, then in 1945 as Head of this Division, he was responsible for the elaboration of one of the first industrial extraction processes for plutonium.

Returning to France in early 1946, he participated in the founding of the Commissariat à l'Energie Atomique, and was in charge of its Chemistry Division until 1960, and from 1954 to 1978 of its International Relations Division.

In 1956, as head of the French delegation to the International Atomic Energy Agency's Statute Conference, he was responsible, with the Swiss delegate Ambassador August Lindt, for Article XII on safeguards, which was accepted as a compromise by the deadlocked conference. From the creation of the Agency in 1957, he was for 23 years the French Governor on its Board as well as a member of its Scientific Advisory Committee. He was Chairman of the Board of Governors in 1980.

He was from 1955 to 1970 the French member of the Scientific Advisory Committee to the UN Secretary General, as well as the French delegate at the 1975-1978 conference establishing the London guidelines and from 1978 to 1980 at the International Nuclear Fuel Cycle Evaluation conference.

He was finally, from 1982 to 1986, Scientific Advisor to the Nuclear Energy Agency of the OECD in Paris.

Co-laureate of the 'Atoms for Peace Award' in 1967, he is the author of several books on the history of atomic energy published in many countries.



On 23 October 1956 in New York, 81 member countries of the United Nations Organization or of its specialized agencies adopted the Statute of the International Atomic Energy Agency, which was to go into formal operation before the end of 1957. A major step towards world-wide control of nuclear energy thus came to be taken more than ten years after the idea of establishing such control had been launched — the first tentative efforts, from 1946 to 1948, having ended in failure. The account which follows is an attempt to retrace this ‘prehistory’ of the IAEA.

### THE POLICY OF SECRECY

Three months after the end of the Second World War, on 15 November 1945, the heads of the US, British and Canadian Governments, meeting in Washington, decided to adopt a policy of secrecy in the nuclear field until a system had been established for the effective international control of the new and formidable source of power. By also deciding to buy up all available uranium, they thus created a perfect policy of non-proliferation based on blocking the transfer of the two things essential for nuclear development: the technical knowledge and uranium, both of which are widely dispersed in the world today.

A month later, the Soviet Union accepted an Anglo-American proposal to establish within the United Nations an atomic energy commission consisting of the 11 countries represented on the Security Council, and Canada. On 24 January 1946, the United Nations approved the establishment of such a commission.

### THE ACHESON-LILIENTHAL REPORT

In March 1946, on the initiative of the US Secretary of State, a group of prominent persons — presided over by David Lilienthal, later the first Chairman of the US Atomic Energy Commission, and including also Robert Oppenheimer and three industrialists — was entrusted with the task of studying the problem of the peaceful development of nuclear energy and the elimination of nuclear weapons. The study led to a report which was almost as revolutionary at the political level as nuclear energy was at the technical level. The report centred on the idea — which was later encountered again in the proposals made by President Carter — that in the atomic age no security

system based on agreements banning nuclear weapons or even on safeguards and inspections will work. In the report, it was proposed that all operations which were dangerous from the point of view of nuclear weapons development be placed outside the competence of individual States and entrusted to a single international authority. An international administrative body would own, operate and develop the nuclear industry on behalf of all nations. The international authority would be the owner of nuclear ores and fuels, would carry out research (even in the field of nuclear explosives) and would operate nuclear fuel fabrication plants and nuclear power reactors, while international inspectors would be responsible for discovering any clandestine activities which took place.

#### THE DEBATE AT THE UNITED NATIONS

Under Secretary of State Dean Acheson backed the draft report, which was presented almost without change, on 14 June 1946, at the inaugural session of the United Nations Atomic Energy Commission by the US delegate Bernard Baruch. One political clause had been inserted — it concerned abolition of the veto in respect of immediate sanctions against a nation seriously violating the treaty which was proposed. In the US proposal, the authority was called the International Atomic Development Authority, because its purpose was to control nuclear energy worldwide.

The transition from national to international controls would take place in stages still to be specified, the last stage being accompanied by the surrender of nuclear weapons to the international control agency.

From the outset, the Soviet Union, supported by Poland, was against the US plan; it demanded as a preliminary step the unconditional prohibition of nuclear weapons, later accepting the idea of periodic international inspections but not subscribing to the principles of international ownership and management, which it regarded as an unacceptable limitation on national sovereignty.

The negotiations continued during the autumn of 1946. For the first time, delegations contained scientists as well as diplomats, the former becoming advisers to the latter. The first headquarters of the United Nations were at Lake Success, about an hour's drive from New York, symbolically located in the reconverted part of an armaments factory which was still in operation. During the long drive we had time to initiate the diplomats into the mysteries of the atom and of nuclear fission.

Despite initial disagreement, Baruch wanted to go ahead and forced a vote; this took place on 30 December 1946, the result being ten in favour and two — the Soviet Union and Poland — abstaining. Four days before — as we learned only several years later — the first Soviet atomic reactor had gone into operation. The Soviet Union had decided to place its trust in its technicians and not to negotiate from a position of weakness.

### THE MAJORITY PLAN

The US plan, which had become known as ‘the plan of the majority’, was studied in detail throughout 1947 by experts from the Western countries under the amused gaze of the Soviet representative, who emphasized from time to time the obvious faults of the theoretical structure to which this exercise was leading, for at that time there was no chance of the Soviet Union’s joining in.

Even within the majority group, agreement was sometimes difficult to achieve. For example, many meetings were devoted to the question of whether or not uranium ore still in the ground should belong to the future international control agency. Under pressure from Belgium and Brazil, it was finally agreed that uranium and thorium producing countries should remain the owners of ore in the ground; ore would become the property of the international control agency only after extraction. At the same time, the international control agency would be empowered to impose each year quotas for the extraction of ore or for the production of fissionable materials, which would belong to it together with the reactors in which they were produced and — naturally — the isotopic separation and irradiated fuel reprocessing plants.

It was decided that the international control agency should have the sole right to manufacture nuclear explosives, so that it would be in the forefront in this field also and hence in a better position to detect any prohibited activities. At no time, however, was a study made of the question of the crucial transition period during which the USA would be handing over its nuclear weapons gradually to the international control agency prior to the stage of universally controlled nuclear disarmament.

It was during these meetings, in 1947, that Oppenheimer gave us his views about the future of nuclear energy. He predicted that electricity generation on an experimental basis would start within five years, that a number of nuclear power plants would be built in industrialized regions where electricity is expensive during the next 10–20 years and that large scale development would begin after 30–50 years. His predictions have proved to be remarkably accurate.

## FAILURE OF THE UN ATOMIC ENERGY COMMISSION

After two years' work and over 200 meetings, the UN Atomic Energy Commission informed the Security Council, in 1948, that it had reached an impasse and discontinued its work. The first attempts to achieve international nuclear disarmament had failed and humanity's last chance of living in a world without the atomic bomb disappeared.

In the ensuing years, from 1949, the US nuclear monopoly disappeared. From 1951 onward, the negotiations on nuclear controls were linked with those on traditional disarmament. There was no more talk about the International Atomic Development Authority, the idea of international ownership and management becoming more difficult to put into practice as the world's uranium resources increased and further countries embarked upon large national nuclear programmes. Moreover, the safeguards against all diversion of fissile materials which were to have been applied by the international control agency became far less important, for atomic bomb stockpiles were increasing steadily and a substantial fraction of them could always be concealed when controlled worldwide disarmament was being established.

So the direction of the discussions on nuclear disarmament changed and, as in the case of conventional disarmament, attention focused on the transitional stages and the various prohibitions covering the use, manufacture and stockpiling of nuclear weapons which would accompany the gradual establishment of safeguards.

The surprising speed with which the Soviet Union was catching up in the nuclear field (and in particular its breakthrough into the thermonuclear field in 1953), the British explosion of 1952 and the French decision — of the same year — to build large plutonium producing reactors fuelled with the uranium recently discovered in France itself made it clear that the Soviet Union and the United Kingdom had reached the most advanced stages of industrial nuclear technology and that France would do the same fairly soon.

The demonstration of the relative ineffectiveness of the policy of secrecy, the risk that a system of international nuclear co-operation and commerce would be established without the Anglo-Saxon powers — excluded by their own rigorous laws — and, above all, the desire to "initiate a process of détente and disarmament" induced the USA to change its policy quite suddenly at the end of 1953.

PRESIDENT EISENHOWER'S  
PROPOSAL

In his famous speech of 8 December 1953 before the UN General Assembly, President Eisenhower, just back from the Bermuda Summit Conference between the USA, the United Kingdom and France, after describing the balance of terror which was becoming the principal element in the relations between the two largest of the major powers, again proposed the establishment of an international agency for atomic energy, to which the countries most advanced in the nuclear field would contribute natural uranium and fissionable materials drawn from their national stockpiles. The agency would be created under the auspices of the United Nations and would be responsible for the materials entrusted to it. These materials — available initially in only small amounts — would serve to promote the peaceful applications of atomic energy, especially electricity generation, and would be distributed and used in such a way as to yield the greatest benefit for all. The new agency would have control powers limited to verification of the peaceful utilization of the materials which it would be responsible for receiving, storing and redistributing. Such a 'bank' would have to be absolutely secure against attack or theft; for the first time, nuclear terrorism — about which so much is talked today — was mentioned in an official document.

Such an embryo international authority for atomic energy would assume even greater importance with the increase in the contributions of the countries most interested, of which Eisenhower stated that as a prerequisite the Soviet Union must be a part.

For the first time since the Second World War, a plan for nuclear détente was not characterized by the opposing demands of the two major nuclear powers — the US demand that the Soviet Union throw itself open to international inspections and the Soviet demand for the prohibition and destruction of nuclear weapons.

SOVIET-US DIALOGUE  
(1954-1955)

At the end of 1953, the Soviet Union agreed to discuss the Eisenhower proposal directly with the USA through diplomatic channels. Initially, however,

the Soviet Government was very reluctant: it insisted on prior solemn renunciation of the use of the hydrogen bomb and of other weapons of mass destruction and espoused the US arguments of 1946, pointing out that the production of energy for peaceful purposes could not be distinguished arbitrarily from the production of materials usable for military purposes and that a country could not engage in one without engaging in the other.

Later, at the end of 1954, the Soviet Union subordinated discussions on the future international agency for atomic energy to the conclusion of an agreement on nuclear weapons; it proposed a meeting of Soviet and US experts to consider the technical possibility of preventing the diversion to military uses of fissionable materials originally intended for non-military uses and ways of making such materials unsuitable for military uses without detracting from their non-military value. A meeting of experts from the main nuclear powers took place in Geneva in September 1955, but no solution was found.

The Soviet reluctance did not prevent the USA from preparing and submitting to the Soviet Union several successive drafts of the statute of the future agency, drawn up after consultations with the main nuclear powers and the principal producers of uranium: Australia, Belgium, Canada, France, Portugal, South Africa and the United Kingdom. In the summer of 1954, the US Government relaxed its internal nuclear legislation and authorized the placing of nuclear know-how and materials at the disposal of other countries provided that they were used only for peaceful purposes. It also announced its decision to go ahead with the establishment of the new agency, even without the Soviet Union.

In the autumn of 1954, the UN General Assembly urged a continuation of negotiations and decided on holding — under United Nations auspices — a large technical conference on the peaceful uses of atomic energy, designed to lift the veil of atomic secrecy to a great extent. The conference took place in August 1955 in Geneva, with the success about which we all know and with the full participation of the Soviet Union.

Soon after the conference, the Soviet Government announced its willingness to participate in the future agency, to transfer fissionable materials to it and to accept as a basis for discussion the third draft statute prepared by the US Government in March 1955. The discussion of principles thus ended, to be followed by a period of a year during which the final statute text was arrived at in the course of two conferences, held at the beginning and end of 1956 in Washington and New York, respectively.

## CONFERENCE IN WASHINGTON

In 1955, the UN General Assembly entrusted the USA with the organization — in Washington — of a conference of the 12 countries most interested in the creation of the new agency. The countries invited to participate were those which had been consulted over the drafts of the statute plus the Soviet Union, Czechoslovakia, Brazil and India. The conference took place in February and March 1956. The discussions centred on the draft of March 1955, which had been circulated the following summer to the 84 member countries of the United Nations and its specialized agencies for comments.

The US delegation was headed by Ambassador Gerald Wadsworth, the deputy representative of the USA to the United Nations; Belgium was represented by its Commissaire à l'Énergie Atomique, Mr. Ryckmans, former Governor of the Congo, who was to play a major role as conciliator during the negotiations; India was represented by its brilliant Chairman of the Atomic Energy Commission, Dr. Homi Bhabha, whose love of art and music was to tip the scales in favour of Vienna rather than Geneva as the future headquarters city of the new agency. All the other countries were represented by their ambassadors in Washington, who included Georgy Zaroubin (Soviet Union) and Maurice Couve de Murville (France).

A feature of the negotiations, which lasted four weeks, was the conciliatory attitude of the Soviet Union. The type of organization which emerged from the negotiations was to have the role of a broker rather than a banker and possess very broad control powers which would apply both to agreements for the transfer of materials which had been placed at the new agency's disposal and — above all — to bilateral or multilateral agreements the parties to which wished the new agency to verify their non-military character. With regard to the latter type of agreement it was decided, despite Soviet opposition, that the associated safeguards costs should be borne by the new agency, since the safeguards would be contributing to the maintenance of world peace.

The Indian delegation, while accepting safeguards on special fissionable materials (enriched uranium and plutonium), opposed safeguards on natural uranium. The only delegation to take this line, it put forward the view that safeguards on natural uranium would divide the countries of the world into two categories: on one hand, countries which did not have uranium deposits on their territory or had not been able to acquire uranium through commercial channels, which would be subject to constant controls in the industrial area — the only one they could develop; on the other hand, countries with a

military nuclear programme, which could benefit from such a programme as regards industrial secrecy since they had uncontrolled materials available which could be switched to non-military uses.

The most difficult question, and one which required negotiations through diplomatic channels even after the Washington conference had ended, concerned the new agency's 'board of directors' — the Board of Governors.

The intransigence of the uranium and thorium producers, whose output was kept secret and absorbed entirely by the military programmes of the Anglo-Saxon nuclear powers, the demands of India and the Soviet Union for very broad geographical representation and the desire to accommodate both the industrialized and the developing countries were not easy to reconcile with a small Board membership in the interests of efficiency.

The compromise reached in April 1956 was that the Board should have 23 members, consisting of the five nuclear powers (the USA, the Soviet Union, the United Kingdom, France and Canada), four producers of source materials (Belgium, Portugal, Poland and Czechoslovakia) who would have a seat on the Board every second year, one provider of technical assistance and at least one member — almost always two in fact — from the following geographical areas: Latin America, Western Europe, Eastern Europe, Africa and the Middle East, South Asia, South East Asia and the Pacific, and the Far East. It was the first time that the expression 'equitable geographical distribution' had been replaced by a list of geographical areas in the statute of a United Nations agency. Most other important questions — such as the respective roles of the various organs of the new agency, the relationship between it and the United Nations, and the financial regulations — had been resolved unanimously.

## CONFERENCE IN NEW YORK

At last, on 23 September 1956, the draft Statute was presented to a gathering of 81 countries at the Headquarters of the United Nations. It was decided that a two thirds majority would be necessary for amending the Statute, so that the final version adopted on 23 October did not differ much from the text which had been drafted in Washington six months previously.

Most proposed amendments were withdrawn or did not obtain the two thirds majority necessary for acceptance. That was particularly so in the case

of the fundamental amendments proposed by the Soviet Union and its allies: admission of the People's Republic of China as a founder member; demands for additional guarantees that the sovereignty of States would be respected; budgetary limitations; a demand that a three quarters majority be required in financial matters; a proposal that the agency should be able to acquire installations and equipment only if they were provided in the form of gifts.

On several occasions, the delicate equilibrium achieved in Washington was invoked as a reason for not adopting proposed amendments, such as those concerning the composition of the Board of Governors and the financial regulations.

### THE ARTICLE XII BATTLE

The most controversial issue was that of the scope of safeguards. The principle of safeguards was criticized by many countries (several of them from the Third World) which tried to exempt natural uranium. They likened safeguards to neo-colonialism, pointing out that in general the nuclear weapons powers would be exempted since, owing to their advanced stage of development, they would never have to request the assistance of the new agency.

India spearheaded the opposition to a very strict application of safeguards and France, which I represented, supported it by proposing a relaxation of safeguards on natural uranium and urging that safeguards should not be so severe as to deter future member countries from turning to the new agency for help.

India's position was stated clearly by Dr. Bhabha, who enjoyed great personal prestige. He was opposed above all to a perpetuation of safeguards applied to successive generations of nuclear materials, which was very likely to occur in the case of his country, which possessed nuclear materials but needed assistance in order to embark on a nuclear programme. He pointed to the illusory nature of strict safeguards and emphasized that any aid in the nuclear field — be it training opportunities or nuclear materials — was potentially military aid since it might allow a country to switch resources to a military programme. At the Conference, he proposed that the new agency give assistance only to those countries which did not have military programmes — defined as programmes in the field of nuclear and thermonuclear explosives and radiological weapons, but not including military nuclear propulsion.

Lastly, the point on which the Indian delegate stated that he would be most intransigent, to the extent of categorical opposition, was the new agency's right under Article XII.A.5, in respect of all facilities subjected to its safeguards, "to decide on the use of all special fissionable materials recovered or produced as a by-product and to require that such special fissionable materials be deposited with the Agency, except for those quantities which the Agency allows to be retained for specified non-military purposes under continuing Agency safeguards." Such power in the hands of the new agency might well give it too strong a hold on a country's economy if the latter were based on nuclear power generation following an effort to which the new agency had contributed only in the initial stages.

Negotiations took place throughout the Conference between the US and the Indian delegations. The US delegation, which had consulted the Secretary of State and had his backing, refused to modify its position to any appreciable extent.

On 19 October 1956, the day the Conference was to end with a vote on Article XII, the Soviet Union, which had not yet declared its position, joined its allies, which had come out clearly on the side of India. Seeing that the vote might lead to an impasse or to approval of the US line by a slight majority, I and my Swiss colleague, Minister August Lindt, permanent observer at the United Nations, decided to table a compromise amendment. This amendment, the form of which was modified slightly the day after it had been tabled, gave a country the right to retain, from the fissionable materials which it had produced, those quantities which it considered necessary for its research activities and for fuelling the nuclear reactors which it already possessed or was constructing.

The US delegation requested 48 hours for reflection and the matter was put before Secretary of State John Foster Dulles and US Atomic Energy Commission Chairman Admiral Lewis Strauss. After discussions which lasted throughout Sunday 21 October and in which the Canadian delegation's influence worked in favour of acceptance of the compromise, while the British delegation tended to be intransigent, the three Anglo-Saxon delegations accepted the Franco-Swiss proposal, to which the Indian delegation agreed in its turn at the beginning of the night. The Indian delegation, in recognition of the way in which we had helped it, stopped pressing its proposal that the new agency should assist only countries which did not have a military programme.

The next day Article XII was voted on and adopted unanimously, but for one abstention, at a session during which the main Anglo-Saxon powers

— among others — expressed their gratitude to the Swiss and French delegations.

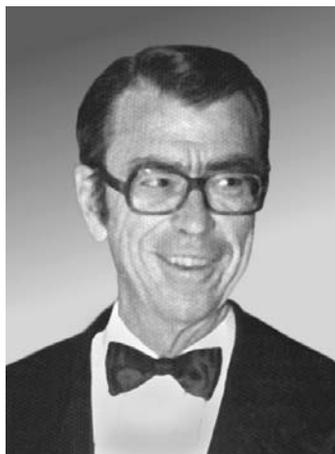
A failure of the Conference had thus been narrowly avoided and the last obstacle to the establishment of the International Atomic Energy Agency and its safeguards, fundamental elements in the present world policy of non-proliferation, had been overcome.



GREAT EXPECTATIONS  
A Diplomat's Recollections of  
the Birth and Early Years of  
the IAEA

Donald B. Sole

*Donald B. SOLE* was born and educated in Grahamstown, a small university city in South Africa. With an MA in History he joined the South African Diplomatic Service in 1938 and shortly after the beginning of the Second World War was assigned to London, where he served as Political Secretary to the High Commissioner. In this capacity he was a delegate to various Commonwealth wartime and post-war conferences, the UN Preparatory Commission and first General Assembly sessions, UNRRA, WHO, ILO, the Inter-Allied Reparations Agency and the Council of Foreign Ministers. In 1947, he was placed in charge of the Political Division of the Department of Foreign Affairs and was also instrumental in setting up the Scientific Council and Commission for Technical Co-operation in Africa South of the Sahara. During a spell at the Paris Embassy in 1953–1954, he was a delegate to WHO and UNESCO conferences and UN General Assembly sessions, which led to his appointment as head of South Africa's UN Mission in 1955. In this capacity he was a delegate to the conferences in Washington and New York which drafted the IAEA Statute. In 1957, he was accredited to Austria and also as IAEA Governor and Resident Representative, serving in 1959–1960 as the first freely elected Chairman of the Board of Governors (his two predecessors had respectively been nominees of the USA and the USSR). There followed a further posting to Pretoria as Undersecretary, later Deputy Secretary, for Foreign Affairs. His diplomatic career was rounded off by assignments as Ambassador to Bonn (1969–1977) and Washington (1977–1982). Subsequent to retirement, he was appointed to the Board of Directors of several South African corporations, including Sasol (the 'oil from coal' corporation) and the Atomic Energy Corporation.



He is a recipient of South Africa's highest civil decoration — OMS(G), the Order for Meritorious Services in Gold.

In addition to numerous published articles, he has written an autobiography, *This Above All*.

**M**y first acquaintance with nuclear energy matters was acquired during the Second World War. I was stationed at South Africa House in London, this being my first diplomatic assignment. Whenever General Smuts, the South African Prime Minister, visited London during the war he was treated as a member of the British War Cabinet. His Cabinet boxes were delivered about 7 a.m. each morning to South Africa House. He authorized me to open these boxes, go through the papers and note what he should personally read when the relevant documents were submitted to him at his hotel, usually when he was breakfasting in his suite. One such document was concerned with what was later popularly known as the 'Manhattan Project'. Hence I was possibly the first South African to learn of this enterprise.

On a later visit to war-time London (May 1944), arrangements were made for Smuts to meet Professor Nils Bohr, who had been spirited out of occupied Denmark. On the morning of the planned get-together I received a call at South Africa House from Smuts' son (his ADC) saying that his father would not be in time to fulfil this engagement as he was still held up in discussions at General Eisenhower's headquarters outside London. If I could not contact Bohr would I please hurry along to the Hyde Park Hotel (where Smuts always stayed when in London) and be there to receive and look after the Professor until Smuts' return. Thus it was that I, with only one year's university physics, had the privilege of spending nearly forty fascinating minutes talking to the distinguished Danish scientist, while waiting for my Prime Minister to arrive. Smuts was even more fascinated with Bohr, whom he regarded as the greatest living scientist after Einstein. Little did I think, in those dramatic war-time days, that much of my later career would be concerned with the peaceful uses of nuclear energy.

It was nearly twelve years later before I became actively involved, for the first time, in international negotiations on nuclear energy matters. This was my participation, when head of South Africa's Permanent Mission to the United Nations in New York, in the conference convened in Washington in February 1956 to draft a statute for the establishment of an International Atomic Energy Agency, pursuant to President Eisenhower's "Atoms for Peace" programme, which had been launched with great fanfare in a speech to the United Nations General Assembly. The participating countries were the four atomic powers (France, the USSR, the United Kingdom and the USA), the other main producers of uranium in the Western world (Canada, South Africa, Australia and Belgium — in respect of the Congo), two Soviet satellites who were also producers (Czechoslovakia and Poland) plus Brazil to represent Latin

America and India to represent Asia. This conference had been preceded by earlier diplomatic exchanges, led by the USA, with the Australian, Belgian, Canadian, French, South African and United Kingdom Governments, in which I personally had no role. The Americans had also experienced major difficulties in persuading the Soviets to participate in the Washington conference. We were informed that it was only an American threat to go ahead with the conference without the Russians which finally persuaded them to take part on the understanding that their two satellites would also be represented.

The American delegation had a very effective diplomat in the person of Gerry Wadsworth which enabled them to achieve their prime objectives. It was for me a fascinating phenomenon that with one notable exception, Dr. Homi Bhabha<sup>1</sup>, the distinguished Indian nuclear scientist, the top level negotiations for the formulation of a constitution for what would become a highly technical agency were conducted by diplomats and not scientists.

The leader of our delegation was Jack Holloway, Ambassador in Washington (a former Treasury official), but as his ambassadorial duties took up a great deal of his time, most of the lobbying, the wheeling and dealing with other delegations, was delegated to me as deputy leader. Head Office had sent over no scientific expert, so I had to develop my own nuclear expertise by intensive reading. The Americans seemed in my view to regard South Africa as almost expendable but to show special interest in the Indian delegation. At one stage I feared that South Africa might be sold down the drain, but fortunately I was able to establish a good personal relationship with Dr. Bhabha. This relationship was facilitated by the fact that the deputy leader of the Indian delegation was Arthur Lall, head of the Indian Mission to the United Nations, whom I knew well from our association as regular participants in the meetings of the Commonwealth United Nations group in New York. I was favoured by an additional factor: the leader of the French delegation was Ambassador Maurice Couve de Murville, whom I had known during the war when he was a leading member of the Free French administration established in London by General de Gaulle. Another member of the French delegation was the nuclear scientist Bertrand Goldschmidt, in charge of the external liaison division of the French Commissariat à l'Énergie Atomique, with whom I became firm friends, a friendship which has remained constant to this day. Goldschmidt was a great help in teaching me, a diplomat, to understand Bhabha, his fellow nuclear scientist.

<sup>1</sup> He later perished tragically in an Air India crash in the Alps.

My major concern in the drafting of the IAEA Statute was to secure for South Africa a seat on the Governing Body of the new agency. The formula finally adopted for establishing the composition of the Board of Governors of the IAEA was largely the product of Bhabha's initiative, based on a prior understanding and tentative agreement reached with the South African delegation. It in effect guaranteed both countries a permanent seat on the Board of Governors as long as each continued to be — India in the region of South Asia, South Africa in the region of Africa and the Middle East — the member most advanced in the technology of atomic energy, including the production of source materials.<sup>2</sup> I felt that this was a considerable triumph, in tremendous contrast to the role to which we were assigned at the United Nations, but I failed to foresee and make provision against what I considered to be unconstitutional action to deprive us of our position in the Agency.<sup>3</sup>

This conference was a memorable one for me in two other respects: it gave me my first insight into the remarkable degree of compartmentalization which existed then (and still exists) in the US State Department. Secondly, it was my first experience of negotiating with the Russians since the euphoric days of the wartime alliance when I had negotiated the agreement for establishing a Soviet consular mission in South Africa. I learnt that if, as a South African, you are both firm and fair in your attitude towards the Soviet Union, the Russians would fully respect you and treat you accordingly in terms of the understanding agreed upon, irrespective of what they might say in public for propaganda purposes.

It was this conference which was to launch me on my long association with the IAEA and with nuclear energy generally, an association which was to last until my retirement from the Board of the South African Atomic Energy Corporation in June 1995, nearly thirty years later. It was this conference which also launched David Fischer, Second Secretary in our Washington Embassy, in the same direction. He took an active part in this conference, in the wider conference which followed in New York in September (see below)

<sup>2</sup> The phrase "including the production of source materials" was my addition, designed to strengthen South Africa's claims arising from her position as a major producer of uranium.

<sup>3</sup> In June 1977, 21 years later, South Africa lost its seat on the Board of Governors, being replaced by Egypt — an action that was unconstitutional since there is no question that South Africa was (and still is) "the member most advanced in the technology of atomic energy, including the production of source materials" in the region in question.

and in 1956 was seconded to the IAEA Secretariat in Vienna. He subsequently left the South African foreign service to join the IAEA as an international civil servant and rose steadily in the IAEA hierarchy to finish up as head of the Agency's Division of External Relations with Assistant Director General status and the reputation of being the personal confidant of successive Directors General. I had recommended that his application for secondment be acceded to, arguing that it was important to have a South African in a key echelon of the IAEA Secretariat, but the head of my Department always held this recommendation against me when Fischer resigned from our service, contending that I had thereby been party to the loss of one of our most promising foreign service officers, who would have done better serving South Africa as ambassador in one of our more important missions.

The twelve-nation discussions in Washington were followed by the so-called Statute Conference convened to approve, in final definitive form, the draft constitution and terms of reference of the IAEA drawn up in Washington. The Statute Conference was open to all members of the United Nations and specialized agencies and over 60 States participated. It met at the United Nations Headquarters in September and the opening of the General Assembly was accordingly postponed for a month (the General Assembly normally opens on the third Tuesday in September each year). The new Ambassador in Washington had been appointed leader of our delegation, but could devote little time to these duties (apart from delivering our opening speech) because he had to attend on the Minister of Finance who was participating in the World Bank and International Monetary Fund (IMF) meetings in Washington and having the usual financial discussions with bankers in New York. Consequently, as deputy leader of the delegation, most of the speeches and nearly all the lobbying were my responsibility. My success lay in the fact that in spite of the pressures against South Africa as a pariah State, which were implicit in any conference including the full United Nations membership meeting at the United Nations Headquarters, I was nevertheless able to retain, without diminution or amendment, South Africa's prestigious position in the IAEA which we had achieved in the Washington talks.

I was assisted by the fact that there was overall consensus amongst the twelve nations not to tolerate any major amendments to the draft on which they had agreed in Washington. In this respect one saw in New York the beginnings of the growing understanding between the USA and the USSR as to their joint responsibilities as the two super-nuclear-powers vis-à-vis the newly established Agency.

The IAEA Statute as formulated in Washington and adopted in New York was very much the product of this understanding, but to the South African mind it was over-elaborate and in one major respect so impracticable as to be almost utopian. This was the section dealing with the supply of materials to the Agency (Articles IX and XIII). We could not visualize materials being supplied to the Agency except on commercial terms; we doubted whether the Agency would be financed by its members to an extent enabling it to purchase materials; we did not think that the Russians would be willing to supply materials; we knew that South Africa would not be prepared to donate source material to the Agency; we did not believe that the Agency Secretariat would or should be qualified to act as a broker in the market for nuclear materials. But we kept these reservations to ourselves. We had attained our primary objective — a seat on the Board of Governors — and it would have been folly to do or say anything that might prejudice our standing in this respect.

Moreover, a great deal of euphoria was engendered by the success of the Statute Conference. The general atmosphere was one of “great expectations” and this sentiment was enhanced by the successes achieved by the Preparatory Commission set up by the New York conference to make the practical arrangements for the formal establishment of the Agency. These successes were due overwhelmingly to the ability and personality of the Commission’s executive head, Paul Jolles, whose selection was a master-stroke. As a Swiss, Dr. Jolles created the necessary perception of neutrality as between the two superpowers. As an administrator, he was in a class of his own. As a diplomat, he was outstanding. As an economist and businessman, as his subsequent career revealed, he was out of the top drawer. As an individual, he was admired and respected by all who had contact with him. His achievement in assembling a crew of key officials and laying the foundations of the IAEA Secretariat was beyond praise. Had it been politically feasible, every member of the eighteen-nation Preparatory Commission apart from the US representative, whose hands were tied, would have welcomed his appointment as the Agency’s Director General.

In the course of the General Assembly session which followed the Statute Conference, the South African Minister of Foreign Affairs decided to adopt a confrontational stance vis-à-vis the United Nations and downgrade South Africa’s representation at the New York Headquarters to the rank of First Secretary. I was to be withdrawn as Head of Mission and was to be transferred to Vienna to open a new diplomatic mission in that city where I would be accredited both to Austria and to the new Agency. I was to serve on the

Preparatory Commission as long as it was sitting in New York and should then proceed to Vienna via South Africa, arriving in time for the resumption of the Preparatory Commission sessions in the Austrian capital.

My assignment in Vienna lasted until November 1961. Throughout this period I represented South Africa on the Board of Governors and led South Africa's delegation to the annual General Conferences.

The Agency commenced its life at a juncture when hopes were very high indeed that nuclear energy would prove to be the panacea for most of the world's energy problems. It was an era of growing superpower rivalry but not to the extent of undermining their willingness to co-operate in "Atoms for Peace" programmes. Moreover, there was a natural inclination to act in concert to prevent or at least limit the spread of nuclear weapons capability. In the IAEA, the Soviets, while constantly jockeying for position, were accordingly prepared to work together with the USA on essentials. The seeds that had been planted during the Statute Conference accordingly began to flower.

It was this need, on the part of the two superpowers, to have an understanding on essentials which enabled the Agency to surmount the problems created by the choice of its first Director General. Because the Americans had taken the initiative in setting up the Agency, they claimed the right to appoint the first Director General. But the man chosen was a political appointee, not a nuclear scientist. Sterling Cole had very little nuclear background and no experience of international politics. It was something of a saving grace that the Soviet Governor and head of his country's atomic authority at that time, Vassily Emelyanov, was a kindly, gentle individual, not at all inclined to cross swords with anyone.

It was accepted United Nations practice that the Security Council 'veto powers' — France, the United Kingdom, the USA and the USSR (China was not a member of the Agency) — should each be entitled to a top post in the Agency Secretariat. Sterling Cole's principal aide in the establishment, whom he was said to have personally recruited, was fellow American John Hall.

Nuclear scientists of the principal atomic countries normally led delegations to the General Conference, but on the Board of Governors they were very much in the minority. Only the USSR and France were represented by top nuclear scientists in the persons of Emelyanov and Goldschmidt, respectively. Belgium, Poland and the United Kingdom were represented by senior officials of their nuclear energy departments. The US Governor was Robert McKinney, a political appointee, who was a newspaper proprietor from Santa Fe, New Mexico. He was later replaced by Henry D. Smyth, a leading nuclear scientist

from Princeton. Most of the other Governors were diplomats, e.g. those for Australia, Brazil and Czechoslovakia, some States, like Egypt, having separate missions accredited to the IAEA, other Governors like myself having dual accreditation to the IAEA and Austria. Two of my colleagues on the Board subsequently became well known figures on the international scene. Ismael Fahmy became Foreign Minister of Egypt, resigning when he fell out with Sadat because the Egyptian President, under Jimmy Carter's prodding, reached an accommodation with Prime Minister Begin of Israel. Leonid Zamyatin, who frequently deputized for Emelyanov as Governor, was for many years the Kremlin's spokesman on foreign affairs, thereafter serving as Soviet Ambassador to the Court of St. James.

My participation in the conduct of the Board of Governors naturally concentrated on political, procedural, organizational, administrative and budgetary issues, where I was certain of my own expertise. On nuclear energy items I took part only when I had carefully researched the subject and was sure of my facts. This had the effect that I was believed to have a much more extensive knowledge of nuclear matters than was in fact the case. In this fashion my reputation as one of the Board's most competent and well informed Governors steadily grew.

One of the most political and at the same time highly technical issues which I had to handle was the question of safeguards. Since inspection of any kind involved a derogation from sovereignty, the whole issue was highly political. The political factors were accentuated by the fact that the four nuclear powers (this was before China and India had exploded their bombs) insisted that no safeguards should be applied to any part of their own peaceful nuclear installations,<sup>4</sup> while pressing for the most rigid application of safeguards to the installations of the non-nuclear powers. The Americans, with Soviet backing, for a long time argued that source material, even in the form of uranium bearing ore, should be subject to safeguards. If this thesis were to have been carried to its logical conclusion, it would have involved making South Africa's gold mines subject to international safeguards, since our uranium production was, to an overwhelming extent, a by-product of our gold production. For obvious reasons I fought this proposition in its entirety but in the process I drifted into a situation where I was recognized as the leader of those members of the non-nuclear countries represented on the Board of Governors — South Africa, India, Pakistan, Argentina, Brazil — which had the most reservations about

<sup>4</sup> This attitude was modified very much later.

the rigidity of the safeguards system which the IAEA, under US direction, and with Soviet backing, sought to apply. It should perhaps be emphasized that there was never any objection on our part to the application of health and safety measures, but only to the imposition of excessive safeguards against diversion to military purposes, because of the inherent discrimination in this respect against those non-nuclear powers seeking to develop their own peaceful nuclear programmes. Our opposition would have been disarmed had the nuclear powers agreed from the beginning to place their own peaceful nuclear facilities under Agency safeguards. It was interesting that at this time Canada gave full support in the IAEA for the application of the most stringent safeguards, but it was Canada who was at least partly responsible for the transfer to India of materials and technology that enabled India at a much later date to explode a nuclear bomb.

Thus it came about that I became the South African expert on safeguards and retained this position for some years until the Atomic Energy Board in South Africa had developed its own expertise and trained its own experts. In my case, the expertise had to be self-acquired, based on extensive reading and intense discussion with the experts of the IAEA and of other countries who attended the meetings of the committees set up by the IAEA to deal with this subject. The exchanges of view with David Fischer were particularly valuable.

In 1959, I was unanimously elected Chairman of the Board. The first Chairman had been the representative of Czechoslovakia (as the Soviet Union nominee) and the second had been the representative of Brazil (as the US nominee). (It was an accepted convention that none of the four atomic powers, France, the United Kingdom, the USA and the USSR, would fill the Chairmanship.) I was also the first Chairman to be resident in Vienna. Afterwards this became the accepted practice.

During my year of office as Chairman, the time available for performance of my duties as Envoy to Austria was very much limited as I took my duties as Chairman very seriously. I made it my objective to base the Board's decisions on consensus, rather than on votes. To this end, whereas in the past Board papers had been drawn up and circulated by the Secretariat without the Chairman having participated in their drafting, I insisted that no Board paper should be issued unless and until I was satisfied that it was in a form best suited to reaching Board consensus. I thus took part in the drafting of all the more important papers. To begin with, this alienated not only the Director General and some of his staff, but also the US delegation, which had come to rely on the built-in

Western majority on the Board of Governors. But after a couple of Board sessions, the success of my strategy was freely conceded. Having ensured that the item to be discussed was documented in a fashion appropriate to effective discussion, at the end of the debate I was usually able, from the Chair, to make a summing up which was recorded, without objection, as the decision of the Board as reached by consensus. The use of this technique shortened the decision making procedure to a considerable extent, minimized political or ideological differences, promoted a sense of teamwork and induced a spirit of compromise, all of which gave the Board of Governors the reputation of being the best run executive body of any member of the United Nations family other than the IMF.

Towards the end of my term of office, I was approached quite independently by both the USA and the USSR with an enquiry whether I would be available to stand for re-election. I reminded each in turn that the Board's rules of procedure provided that a retiring Chairman could not be immediately re-elected and that unanimous consent was required to waive any rule of procedure. Both the American and Russian Governors undertook to do their best to secure this unanimous approval. In the event, they established that all the Governors were agreeable except the Governor for India: he would have to obtain the endorsement of his Government before a formal decision could be recorded. New Delhi, however, declined to concur, no doubt influenced by non-IAEA considerations flowing from the long standing political dispute between India and South Africa. So the proposal was never formally tabled. I learnt afterwards that if the Ministry of External Affairs in New Delhi had referred the matter to Homi Bhabha as head of the Indian Atomic Energy Commission, he would certainly not have withheld his consent, but the External Affairs Ministry took the decision without any consultation with the Atomic Energy Commission.

I do believe that my Chairmanship helped to restore the Agency to a more even keel after the stormy passage it had experienced during its first two years. The Agency began to buckle down to doing the job for which it was created; it started to win respect from other organizations in the United Nations family and its member governments became more satisfied with the progress it was achieving. This meant that when Sterling Cole's four year term of office came to an end his successor, Sigvard Eklund, the Swedish nuclear scientist, had something of a foundation on which to build a worthwhile edifice. Dr. Eklund's nomination had been pushed very hard by the French, who had to overcome numerous American reservations as well as

convince the Russians that he would fill the bill. In this respect Sweden's political neutrality was an even more important perception than Switzerland's neutrality had been in the appointment of Paul Jolles, especially since the Soviets had some justification for arguing that, as in the case of the Board Chairmanship, since the USA had appointed the first Director General, the USSR should be entitled to appoint the second Director General. The wisdom of the French choice was fully vindicated. Dr. Eklund served five successive terms, a total of twenty years. For me it was a real privilege, in my subsequent spells on the Board of Governors, after I had left Vienna, to work closely with him and to earn his personal friendship and respect.

Forty years on, when I view what the IAEA is achieving today, it is with pride and satisfaction that I recall my role in its birth and early years.

FROM THE EAST RIVER TO  
THE DANUBE

Preparatory Commission  
and First Years in Vienna

Paul Jolles



*Paul JOLLES* was born in Berne, Switzerland, on 25 December 1919. He served as Executive Secretary of the Preparatory Commission and then as Deputy Director General in the International Atomic Energy Agency from 1956 to 1961.

He undertook law studies at the Universities of Berne and Lausanne, and then graduate work at Harvard University, USA, where he obtained a PhD in political science in 1945. He served in the Swiss diplomatic service at the Embassy in Washington from 1943 to 1949. In 1951, he transferred from the Foreign Ministry to the Ministry of Economic Affairs in Berne. He acted as a delegate of the Federal Government for Trade Agreements in 1961 and subsequently became Head of the Division of Commerce with the rank of Ambassador and State Secretary for Foreign Economic Affairs (1979–1984). Paul Jolles was involved in numerous international negotiations, in particular the conclusion of the Free Trade Agreement with the European Community, consultations about the participation of Switzerland in European integration, and the conclusion of bilateral and multilateral trade and development agreements. He also fulfilled a number of other international functions. Since 1984, his activities have been in the private sector (Chairman of Nestlé S.A. (1984–1990) and other board memberships) as well as in the academic and cultural fields. He has produced numerous publications and holds an honorary professorship.

**A**mong the countries which initially had no voice in the shaping of the Agency until the Statute Conference in October 1956, to which the States members of specialized agencies were also invited, was Switzerland, which was not a member of the United Nations. It nevertheless had from the beginning a decisive interest in the realization of this international project for two obvious reasons. First because of the severe limitations of its domestic energy resources and great dependence on imports, even after harnessing every drop of water from snowfall, rain and ice in the Alps for the production of hydroelectricity. During the Second World War, the Swiss were painfully aware of how easily their economic life could be strangled by any interruption of fuel supplies. A long lasting energy source requiring a minimum of space seemed an ideal solution to reduce this political vulnerability. Second, because of the lack of natural resources and the consequent reliance on manufactured exports of advanced technology, in particular power plant equipment, electrical machinery and instruments, it was of vital importance for Switzerland's competitive position in rapidly expanding markets during the period of European reconstruction and industrial development of Third World countries to keep abreast of new developments in these key sectors. Participation in the research effort for the peaceful uses of nuclear technologies was therefore both a scientific challenge and an economic necessity. The acquisition of enriched nuclear materials was indispensable. However, such supplies were subject to periodic inspection and verification of their uses by a foreign nuclear power to an extent which could become embarrassing for a small, neutral country.

The early negotiations on a nuclear supply agreement with the USA ran into a serious snarl, which could only be resolved by common agreement to turn these inspections over to a multinational team under the authority of the UN agency about to be created. August (Gus) Lindt, the Swiss Permanent Observer to the UN, played an active part, together with a French scientist, Bertrand Goldschmidt, in the wording of the safeguards article at the Statute Conference and helped avoid a crisis on this issue. When no further delays were anticipated, new difficulties arose over the selection of the Executive Secretary of the IAEA Preparatory Commission. Consensus was finally reached between the East and the West on the appointment of a distinguished foreign minister of a smaller European State, but this nominee was not found acceptable to one member because of the colonial past of his country. At this stage of general confusion, Ambassador Lindt suddenly sensed that a neutral Swiss candidate, surprising as this might seem, could have a chance of breaking the ultimate deadlock provided that he be immediately available.

I was in Geneva participating in a working group about Swiss entry into GATT and was totally unaware of the cable exchanged between the astute Swiss Observer to the United Nations in New York and our Government. When I was called to see Mr. Petitpierre, the Swiss Foreign Minister, my name had already been proposed to the UN. As a civil servant with some diplomatic experience, I was apparently the only one who could be seconded at once, but was told not to worry because my chances were probably nil because of lack of seniority. Should I make a fool of myself by even asking for a draft copy of the Agency's Statute from the library? Fortunately I did and had some reading material on the comfortable transatlantic flight next day, besides wondering what Christmas present I could buy in New York for my newly wed bride.

Those were the reasons why I found myself suddenly in the front hall of the UN building with the sole nuclear qualification of having organized a visit to Switzerland of a delegation from the European Nuclear Energy Agency (ENEA) of the Organization for European Economic Co-operation in Paris, apart from my previous difficult negotiating experience in Washington. Being unexpectedly installed in a spacious office on the eighth floor provided a fascinating view for a landlocked Swiss onto the busy maritime traffic on the East River, and a new perspective for work in international co-operation.

Having studied at Harvard and been posted in Washington, I knew of course the prominent silhouette of the UN building on the New York skyline; as an art lover I had even noticed the sculpture by Barbara Hepworth in the middle of the circular driveway, but I had never ventured inside; nor had I ever lived in a vast glass beehive. I needed help to understand the functions of the dining rooms, the sudden noisy commotion in the conference areas, the solemnly hushed calm on the 38th floor (where the UN Secretary General had his suite) and the process of international digestion of such brand new food-for-thought as the atomic energy problem. But Ralph Bunche, Dag Hammarskjöld's right hand man, whom I had known in his previous position in Washington, smiled reassuringly at this newcomer and told him that we would all call each other by our first names, except the Secretary General, who should always be addressed by his title, and that I should relax because he had assigned his best man, Brian Urquhart, to be my alter ego. And that he was, indeed, in the most competent, firm but discreet, and loyal fashion. It took no time to realize that Mr. Hammarskjöld himself was obviously the most outstanding personality in the house, broad-minded and culturally interested, inviting each Saturday all the deputies at work to lunch, before leaving on his

walk through the contemporary art galleries in Manhattan to further stimulate his mind. What a treat for a notoriously studious Swiss eager to pierce the mysteries of world politics.

My first task of recruiting a small multinational staff for the Preparatory Commission (without my having the benefit of UN experience of the customary procedures) turned out to be full of pitfalls. The national mix was simple enough — citizens from the nuclear powers, the developing and newly industrializing countries, and some smaller States from the Old World, if possible without colonial heritage. Choosing only a few and sometimes better candidates than those recommended by their governments was considered as much a misdemeanour as not using up all the budget for such posts. We were a team of less than a dozen when we had covered all essential functions, closely knit, and filled with a common motivation. In addition to Urquhart, there were: Robert von Mehren, an American friend from Harvard Law School, who started his career as a clerk at the US Supreme Court and then joined the first law firm specializing in atomic energy legislation; Andrei Galagan, his Russian counterpart, seconded from the Ukraine Mission, visibly enjoying the respect of much more senior Soviet officials, and a man who without contradicting Soviet policies freely joined our reasonings as an active, internationally minded colleague and who when recalled from Vienna, disappeared tragically; David Fischer, seconded from the South African Mission, the most convinced and historically minded internationalist and trusted political advisor in our team; Mario Bancora, a young Argentinian nuclear scientist, keeping us abreast of atomic fundamentals we didn't know; and Hubert de Laboulaye, a French nuclear scientist who later was appointed as one of the three scientific Deputy Directors General (DDG) of the initial Agency staff. Then there were insiders from the UN Secretariat, including Paddy Bolton from Britain, who joined the Agency permanently for his later career; and Uly Schiller, originally from Prague, who knew all the ropes, filtered my outside contacts and telephones, and stoically drew all the complaints. We were convinced we were placed at a point of decisive human progress. We sat around the table and laughed heartily when the representative of an obscure NGO came to warn us of popular distrust of atomic energy as it neglected ecological problems and ignored fears of uncontrollable radiation which could endanger the highly valued reproductive function of man.

Then came the task of choosing the headquarters site (the choice had narrowed down to Copenhagen or Vienna), which was of course a political decision for the Board of Governors and the General Conference. The

competition was fierce, but in a matter of weeks the relocation had to be organized and the necessary infrastructure found and agreed with the Austrian Government, and suitably adjusted to our needs in preparation for the first General Conference of the Agency scheduled to take place as early as October 1957. Again I was reassured: the worldwide experience of the UN Headquarters teams was at our disposal. An advance mission would survey the situation, determine the critical points, set the groundwork in motion, give the necessary directives and monitor progress. Meanwhile, I could choose the most convenient and relaxing family travel by sea. But suddenly I was given a friendly hint: "Don't wait any longer, take charge of the operations in Vienna as soon as possible." The cultural shock from working and living in New York to adapting to life in Vienna, still scarred from the war years and the occupation, was greater than anticipated by us. Austria had only recently regained her national sovereignty. Hosting the headquarters of an organization of the UN family meant international recognition and a guarantee for the new State. The goodwill of the Austrian Government was overwhelming, but the traditional structures of an old imperial power had to be recognized and respected as well.

Some anecdotal recollections are relevant here to illustrate the fact that moving from the rhythm of the New World into the culture and history of the Old required a greater mental and moral adjustment than a tourist's rubber-neck tour. In our search for contiguous and centrally located office facilities, we were shown the Music Academy in Vienna. When our small delegation entered on tiptoes into the classrooms, the pupils were neither awed nor disturbed, but went on playing with obvious enjoyment and at public concert standard. When we looked for a suitably large meeting hall for our General Conference and realized that only a theatre or concert hall would do, we were shown the premises of the Akademietheater. We barged into a rehearsal and were politely introduced by our guide from the Foreign Ministry, emphasizing the importance of our mission for Austria. Here we were thrown out at once by the director who shouted: "Can't you see that we are working?" In an ancient 'palais', a beautiful painting of Kaiser Franz Josef, Emperor of Austria-Hungary, caught my eye. "I am so glad," said the curator when he noticed my interest, "because our youngsters have lost all sense of history. Imagine! I was asked by a high-school boy which past president of Austria was it a portrait of."

While everything was done to open access for the members of the IAEA to the cultural heritage and events of Vienna, the opera and the concert halls, the negotiations for a headquarters building proved initially a more difficult

task. The assignment of Karl Gruber, an energetic former Foreign Minister of Tyrolian origin, to the Agency for all matters concerning relations with the host Government was an excellent move. He understood the reasons for a city location on the Ring instead of a rehabilitation centre in the picturesque environment of suburban Grinzing and generously provided the former Grand Hotel. At the same time an experienced press officer of the Government, Paul Fent, was seconded to the Secretariat and helped us understand the intricacies of a coalition government. It was thanks to him that the Agency projected from the start a favourable image to both parties. Important ceremonial events like the handing over of the key to the expensively renovated and electronically equipped conference hall were always performed twice — first with the Foreign Minister, Leopold Figl (Conservative) and then with the Secretary of State, Bruno Kreisky (Social Democrat).

Soon, the Agency became a centre of attraction and being recruited as a secretary, a nurse or a chauffeur was quite in keeping with the dignity associated with aristocratic titles. Being vaccinated by a Habsburg or driven to the airport by a Thurn und Taxis was no surprise. The greatest success, however, was the Headquarters Agreement negotiated with the legal advisor of the Foreign Office and later President of Austria, Rudolf Kirchschläger, providing for a tax-free commissary for members of the diplomatic missions and the Secretariat. The number of embassies accredited to the IAEA increased at once!

This was fine as far as it went, but has the Agency after its harmonious and locally useful integration into the city of Vienna been able to live up to the expectations of its international mission? These were of course initial years, but a number of positive developments are worth recalling and were confirmed and expanded in the messages to the 10th anniversary in 1966–1967 (special annex to the *IAEA Bulletin* of September 1966):

- The constitution and consolidation of a new team at political and secretariat level bent on international co-operation at a period of increasing East/West and North/South tension. This was particularly relevant at the level of the Scientific Advisory Committee, composed of eminent persons in atomic energy research. The young Agency had to face turbulence in the wake of fundamental changes in world politics. Khrushchev passed through Vienna triumphantly while Molotov languished there; Western Europe was concentrating on bridging its internal divisions between a European Community and a Free Trade

- organization. In the United Nations, the newly independent developing countries were pressing for increasing assistance and new technologies. All this led to a period of active international negotiations in the field of atomic energy — bilaterally, regionally and globally. Universal standards in this particular field were indispensable. The discussion of unrealistic requests from developing countries for reactor projects in their capitals or for disproportionate radiation sources for the use of isotopes in agriculture or medicine did not lead to venomous exchanges thanks to the possibility of an independent clarification of the appropriate uses and risks of the new technologies in an international forum. The suspicions of political manipulation by the North were overcome.
- The multinational Secretariat was small enough at that time to favour personal contact across the board and thus promote respect for individual reactions due to different cultural identities.
  - Safeguards procedures took time to be elaborated to everybody's satisfaction. Even Switzerland got accustomed to useful bilateral contacts with experienced US inspectors (which provided additional technical knowledge for its own senior research staff) and had to be reminded of its original concern to replace verification by a single nuclear power with multilateral safeguards procedures. When the USA and Switzerland turned over inspection to the IAEA, we were reconciled to this by the appointment of a Swiss Inspector General at the Deputy Director General level of the Agency.
  - Three of the Deputy Directors General were scientists and thus technology was a focus for discussion. The first satellite was shot into space at the beginning of the first General Conference of the Agency. The usefulness of the international exchange of scientific knowledge was evidenced by the Atomic Energy Conferences and Exhibitions in Geneva in 1955 and 1958, shortly before and after the Agency's creation.
  - The boundaries between the interests of private industry and the setting of internationally agreed standards were tested. Accidents in atomic power plants began to be investigated, but a convention providing for the reporting of near-accidents, as was being done at the International Civil Aviation Organization, proved impossible during my time. It was, however, negotiated in 1986 after the Chernobyl catastrophe. In the meantime, the IAEA and ENEA had set up a nuclear incident reporting system to which by the mid-1980s nearly all operators of nuclear reactors were submitting reports.

- The development of new reactor technology remained largely within national or regional industrial contexts, but an international laboratory for services such as the calibration of nuclear instruments, measurements of fallout for the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and so on, was built at Seibersdorf.
- Finally, the IAEA defined affirmatively its position within the UN family, where several other organizations were pursuing nuclear programmes in their particular fields. The interagency agreement negotiated with FAO, for instance, strengthened the central and co-ordinating role of the IAEA. Since conflicts of competence arise from interministerial quarrels in national governments, such agreements helped promote better co-ordination in the capitals. Even more important, this agreement with FAO eventually led to the creation of the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, setting a unique precedent in the UN family for the successful pooling of the expertise of two agencies.



THE IAEA  
AS I REMEMBER IT

William H. Barton



*William H. BARTON, C.M., LL.D.* was born in Winnipeg, Manitoba, on 10 December 1917. He was educated in Vancouver and graduated from the University of British Columbia in 1940. After serving in the Canadian Army in the Second World War, he retired in 1946 with the rank of major. He then worked for the Defence Research Board of Canada until 1952, when he transferred to the Department of External Affairs. His assignments included: Counsellor in the Canadian Embassy in Vienna (1956–1960); Counsellor and later Minister in the Canadian Mission to the United Nations, New York (1961–1964); Assistant Undersecretary of State for External Affairs (1970); Ambassador and Permanent Representative of Canada to the United Nations, Geneva (1972–1976); and Ambassador and Permanent Representative of Canada to the United Nations, New York (1976–1980). He served on the Security Council of the United Nations from 1977 to 1978. After retirement in 1980, he served, at the request of the Government, as Chairman of the Board of Directors of the Canadian Institute for International Peace and Security. He was awarded an Honorary Doctorate of Laws from Mount Allison University in 1978, and was made a Member of the Order of Canada in 1994.

As one who was “present at the creation” it is hard to believe that forty years have gone by since the International Atomic Energy Agency came into being. During those forty years the Agency has earned a respected place in the world community as the authoritative centre for dealing with all international aspects of the peaceful uses of atomic energy, at the same time seeking to ensure that it is not used for any military purpose. It is appropriate, at this time, to see that the Agency’s history is well recorded, not only in official records, but also in the personal recollections of those who lived through the early days. This contribution to the history of the Agency falls into the latter category, and because it is written without reference to documentation, I feel free to tell of events as I remember them, and not necessarily as they may actually have happened.

My association with what was to become the Agency began shortly after President Eisenhower made his historic speech to the General Assembly of the United Nations in December 1953, advocating action by the world community to further develop the peaceful uses of atomic energy. Early in 1954, the US Government invited, representatives of Canada, France and the United Kingdom to go to Washington to discuss the initial proposals for the establishment of an international organization, under the aegis of the United Nations. The objective of our discussions was the creation of a new agency to facilitate participation by all member states of the United Nations or the specialized agencies in the peaceful uses of atomic energy. Our specific goal was the preparation of a draft statute for this agency, which when completed would be submitted to a general conference of prospective member states for adoption.

At subsequent meetings the group was enlarged to include a number of additional participants, based on their involvement in atomic energy affairs, either through active programmes or the possession of raw materials. My memory is uncertain, but I recall that the group included Australia, Belgium, Brazil, Czechoslovakia, India, Portugal, South Africa and the Soviet Union. The negotiations proceeded slowly, with vigorous arguments over every clause.

At our initial session, when only the original four were present, we came to the conclusion that a governing body of 11 members was about right. Needless to say, that did not go down well in the larger negotiating group, and as the months passed we saw it grow to 13, then to 16 and finally, I think, to 23, which ensured that pretty well every delegation at the drafting conference would be assured of election to the proposed Board of Governors.

There was also a great deal of argument over the question of safeguards, with the Western participants anxious to see that the provisions of the Statute provided adequately for a safeguards regime, and India, with the support of the USSR and Czechoslovakia, holding out for maximum permissiveness. Eventually, these and other points at issue were resolved and in the middle of 1956 the negotiating group presented a draft statute for the proposed new agency for consideration by the Statute Conference, which met at UN Headquarters in New York. The Conference approved the Statute in October 1956, and it came into force in July 1957.

I had been selected to be the new Counsellor of the Canadian Embassy in Vienna, with primary responsibility for Canadian relations with the yet-to-be-established agency, and because I was supposed to be getting ready to leave for Vienna I was not part of the Canadian delegation to the Statute Conference. However, I was able to get to New York to attend some of the debates. I was also able to sit in on the Security Council discussions on the Middle East crisis, and to commiserate with Sir Pierson Dixon, the United Kingdom representative, who was under heavy fire. It was my first chance to see the Security Council in action and I was greatly impressed. Little did I imagine that 21 years later I would be presiding over it.

As recommended in the draft Statute, the new agency was to be similar to already existing UN specialized agencies but, in approving the document, the Statute Conference stipulated that, because of the dangerous potential of nuclear energy, the new organization should be responsible to the General Assembly itself, rather than to the Economic and Social Council as was the case for the specialized agencies, and would report as necessary to the Security Council.

In retrospect, I think that the Statute, as approved, has served the purposes of the international community admirably, and has stood the test of time. But it is useful to recall that at the time of its adoption the UN consisted of fewer than 60 members, and that Africa and Asia were represented by only a handful of countries. One cannot help but wonder what the Statute would look like if it were to be negotiated in the UN of today.

As the debate in the UN was drawing to a close the Barton family arrived in Vienna. My job was to serve as Counsellor of the Embassy, but with the additional responsibility of being the resident officer representing Canada with the new organization, and serving as Deputy Governor. When formal meetings of the Board of Governors were to be held our Ambassador from Geneva, Max Wershof, would attend as the Governor. Arriving in the late

autumn of 1956, we had time to settle into our new home and become familiar with regular embassy duties before the first members of the Agency staff appeared on the ground in May 1957.

Sterling 'Stub' Cole, a former US Congressman from New York who had served as Chairman of the Joint (Senate–House) Committee on Atomic Energy, was to be the first Director General. His nickname described him to a 'T'. He was a short, hard working driver who had little or no international experience and had to learn his job from scratch. He found that steering a course when confronted by an often divided Board of Governors was intimidating, but he never failed to keep an even disposition and never lost patience even under attack.

His chief lieutenant was Paul Jolles, from Switzerland. Paul was an ideal deputy, a strong organizer with a superb ability to see that strategic needs were met and essential tasks were accomplished promptly. The very efficient Secretary of the Board was Paddy Bolton, from the United Kingdom.

By the summer of 1957, most of the countries destined to serve on the Preparatory Commission for the first General Conference also had their representatives in place. After forty years, my memory of those colleagues is uneven, but for some individuals it is as vivid as ever.

Harold Vedeler, of the USA, was a kindly professorial type of man who was nearing the end of his career. 'Mike' Michaels, of the United Kingdom, was an assertive career public servant. He could be counted on to be 'front and centre' in any debate but was good natured and friendly with all his colleagues.

'Zammy' Zamyatin, as deputy to Vassily Emelyanov, was a vigorous proponent of the Soviet position. He was said to have been a tank commander in the Second World War and it seemed to me that he demonstrated many of the qualities I would expect a tank commander to have. He later was to be the head of Tass, and Soviet ambassador to the United Kingdom. Ismael Fahmy, of Egypt, was a chap who had the difficult role of sharing the responsibility, with only a few colleagues, of defending the interests of the developing world. In later life he became Foreign Minister of his country. His principal allies included Balachandra Rajan of India, known to all as 'Ball'. Rajan had gone to university in the United Kingdom and could outdo all of us in debate and in his ability to use the English language as a weapon. I believe he ended up as a Professor of English somewhere in Canada.

Brazil was ably represented by Carlos Bernardes, a diplomat's diplomat, who did yeoman service in helping to bridge the differences between the

Western representatives and those of the developing countries, usually backed by the Soviet and Czech delegates.

South Africa was represented by Don Sole. He was an experienced diplomat, friendly but serious in manner, who did his best to point out South Africa's contributions to technical assistance in southern Africa. His task was a lot less difficult in the Agency of the late 1950s and early 1960s than would be the case later on when African representation increased to its present size, and world condemnation of apartheid became more vocal.

The members of the Preparatory Commission, which was succeeded by the Board of Governors after the first General Conference, found some difficulty in learning to work together, but over time they came to adapt to the problems and personalities of their colleagues. The first Chairman was Pavel Winkler, of Czechoslovakia. He tried manfully to maintain a chairman's impartiality, and usually succeeded.

The first General Conference of delegations of all Member States of the Agency was held in Vienna's Konzerthaus. The heads of most national atomic energy programmes attended as nominal heads of their delegations, and elections were held to appoint the members of the first Board of Governors. The recommendations of the Preparatory Commission and the Secretariat of the Agency were subjected to review, and new directions for the Agency were approved. It was the first 'shareholders' meeting I had ever attended, and I found the round of meetings and accompanying social events exciting. But like most such meetings there were no real surprises and the novelty soon wore off.

My recollection of the notables who attended the General Conference is dim, but I remember Lewis Strauss, the head of the US delegation, because his dominating personality impressed itself on everyone. The French representative was Francis Perrin, who occupied a special position so far as we Canadians were concerned because he had served at Chalk River during the war. The Soviet delegate was Academician Emelyanov, an eminent figure in his country's nuclear programme.

When the General Conference was over, the Board of Governors got down to work. The first tasks of the Board were to deal with administrative and procedural matters, including the creation of certain positions in the Secretariat which involved political considerations, such as who should head the Safeguards Division. After lengthy discussion, a meeting of minds was finally reached and the first head of Safeguards was appointed — a Canadian.

The Board then turned its attention to mechanisms for providing technical assistance to developing countries. In the late 1950s, development assistance was a relatively new concept. The assumption of the developed countries was that it would take the form of technical advice, with minimal financial involvement, and within a safeguards regime to ensure no diversion to military purposes. If our preoccupation with safeguards appears excessive, it is useful to remember that in the late 1950s the Cold War was at its height, the hydrogen bomb had just appeared in the arsenals of the USA and the Soviet Union and peaceful nuclear explosions were still considered a potentially useful tool in large engineering projects.

India and Egypt, with the support of the Latin American members of the Board, and the Soviet and Czech delegates when their special interests did not interfere, fought hard to ensure that the conditions for Agency assistance were as free from onerous requirements as possible. As I recall, I think my own concerns were primarily related to questions of accountability. It seemed to me that their proposals paid insufficient attention to ensuring that resources provided by the Agency were used to the best advantage for the purposes intended. Arguments were lengthy and acrimonious, but in the end were usually resolved to the satisfaction of most of the members of the Board.

With the benefit of forty years of hindsight, I think that by and large the arguments of the delegates from the developing countries had much to commend them, and it was good that the final decisions of the Board gave them their due.

The single event that impressed itself most prominently in my memory was the first test of the safeguards role of the Agency. Japan took the lead by asking the Agency to procure, on its behalf and under Agency safeguards, a consignment of uranium — if I recall correctly it was three tons. The Agency acted on the Japanese request by calling for sealed tenders.

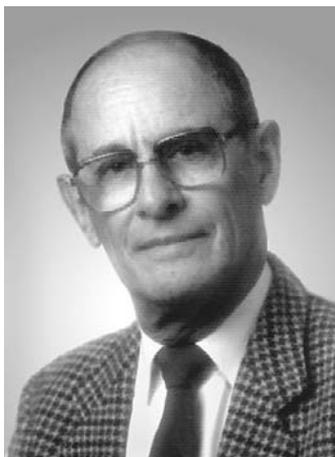
The Canadian Government saw this as an important test of the safeguards procedures and also of the role of Canada as a source of fissionable materials, and decided to offer to fill the order at a price of \$1.00. I can still recall the day the bids were to be opened. All the Governors were present, as well as a number of interested observers from embassies in Vienna. Needless to say, the Canadian bid won. I had considerable effort keeping a poker face until the bids were opened but the surprise was complete. Looking back, I wonder if our efforts really made that much difference. Certainly, in my day, that was the only occasion when the Agency acted as an intermediary. However,

it may have served a useful function in demonstrating that the Agency's safeguards programme was useful, and would have to be accorded respect.

I left Vienna and the IAEA early in 1960, but I still have fond memories of my days with the Board of Governors, and working with the members of the Secretariat. We were all conscious that we were making history, and in spite of the political considerations that lay behind our actions, we wanted to do our bit to ensure the success of the Agency. Over time, the Board learned to pull together and to work as a team. So far as I was concerned, in subsequent UN assignments the Agency, in all its aspects, provided a valuable model of what could be done, and I look back with gratitude to my experiences, both at work and with the companionship of my colleagues at the IAEA.

SAFEGUARDS:  
THE BEGINNINGS

Carlos L. Büchler



*Carlos L. BÜCHLER* was born in Rosario, Argentina, in 1927. He completed his primary and secondary education in Argentina and Uruguay. He received in 1953 a diploma in Telecommunications Engineering from the University of Buenos Aires. He joined the Atomic Energy Commission of Argentina and continued his post-graduate studies in nuclear engineering in Norway and the USA, where in 1956 he was a participant in the first class of the School of Nuclear Science and Engineering, created under President Eisenhower's "Atoms for Peace" programme. From 1956 to 1959, he worked for Argonne National Laboratory near Chicago in the field of research and training reactors, and in 1959 joined the Safeguards Division of the IAEA. He worked in that area until he retired in 1987, when he held a Division Director's position in the Department of Safeguards. He was the first designated safeguards inspector and carried out hundreds of inspections in every continent except Africa. He was an active participant in the development of the Agency's safeguards documents and procedures, and in the negotiation of many safeguards agreements. He is married, and has four children and many grandchildren.

It was on the afternoon of 27 July 1959 that my family and I arrived in Vienna with the Orient Express from Paris. We had then 3.9 children, and I couldn't help wondering if my decision to accept a two year stint with the IAEA had been a wise one. (Today, 37 years later, I know it was the right decision, though for reasons that I could not have anticipated then.) Our arrival, however, was reassuringly pleasant. The sun shone, Vienna was beautiful, and at the Westbahnhof we were met by the Director of the Division of Safeguards (!), who delivered us to a friendly 'Pension' on the Kärntnerring, virtually across the street from the Opera.

So began what was to become my last professional association. I worked for the Agency, always in Safeguards, for the next 28 years, until my retirement in 1987. It was perhaps because I am one of the few staff members who took an active part in the development of safeguards over such a long period that my friend Hans Blix asked me to contribute an essay on the subject. He and I discussed the matter and concluded that it probably was not a good idea for me to attempt a critical assessment of the Agency's safeguards endeavours, and instead I agreed to write a few words about the beginnings of what was to become the most politically significant and publicly prominent of the Agency's programmes.

I shall try to avoid writing a partial autobiography, but it will be hard to keep my personal feelings completely out of this article. Much of what I shall say is based on recollection rather than documentation and therefore is not historically reliable. If I succeed in putting on paper three or four more or less interesting anecdotes on the subject, then I, and perhaps the reader, will be satisfied.

The first days at the Agency were hectic, since apart from getting used to my new working environment I had to see to it that my family was adequately accommodated, as our new offspring was due in only six or seven weeks (he was punctual). I felt quite comfortable in the Agency's international environment, since in my two previous assignments (in Norway and the USA) I had worked under similar circumstances. The new organization had just moved to Kärntnerring 11 (the former Grand Hotel) and was small enough to make it possible to get to know practically everybody. As a bureaucracy it was still flexible and tolerant, and the tone was to find solutions to problems, rather than problems to solutions.

The technical side of my job was new to me. My previous experience was in the field of heat transfer and research reactor design and operation. Safeguards was technically about accounting for nuclear materials and keeping

track of their use and whereabouts. That my experience might not be adequate for that task was a matter of some concern to me, but not for long. I soon discovered that of the five Professionals in the Division only one had direct experience in the areas mentioned above. We were, therefore, true amateurs. But since we had no materials or facilities to which we were required to apply safeguards, that did not constitute an immediate problem. The efforts of this very modestly sized Division went into drafting documents on the regulation of the future application of safeguards. This was not really a technical task, but rather a juridical and (mostly, as I later found out) a political one. The result of our endeavours was a series of documents on the subject which were submitted to the Board of Governors and/or the Scientific Advisory Committee and were subject to innumerable amendments before the first 'safeguards document' (INFCIRC/26) was approved by the Board in January of 1961. It would be superfluous to describe in this paper the details of the gestation of that document; the subject has been more than adequately covered by Paul Szasz in his book *The Law and Practices of the International Atomic Energy Agency* (IAEA Legal Series No. 7, 1970). It is important, however, to emphasize that the deliberations of the Board on the subject were highly controversial and took place in a very tense atmosphere. The ensuing safeguards activities of the Agency pursuant to that document were as a rule only grudgingly accepted by the recipient States. As a matter of fact the entire history of Safeguards is characterized by the struggle between its advocates and its detractors which, in some ways, continues up to this date. As early as May 1958, the Director of the Norwegian Institutt for Atomenergi, Dr. Gunnar Randers, who was later to play an important role in the development of the first safeguards document, wrote in a note to the Director General that "the prospect of international control carries with it only the promise of inconvenience and unpleasantness for national establishments" and that, therefore "the only way to remedy this basic complication is to find possible ways and means of making the system of safeguards and controls attractive by combining them with related services that are highly desirable for both technical and financial reasons from the point of view of national projects." It must be admitted that on the latter recommendation we have, to this date, failed to make much progress.

The drafting efforts of the Safeguards Division were, by the time I arrived on the scene, well under way, and my contribution to that work was minimal. I felt frustrated at being involved in an exercise which was technically amateurish and the political success of which was totally unpredictable.

It is worth mentioning that the atmosphere in the Board of Governors when safeguards issues were discussed was reflected in the Secretariat. We were regarded by the rest of the staff, particularly the group that dealt with technical assistance, as a disruptive element and responsible for delaying action by the Board on the truly important functions of the Agency. There was at the time no Safeguards Department, and the head of the Safeguards Division reported directly to the Director General. The offices of the Division were located on the fifth floor (the elevator only reached the fourth) in what used to be the Grand Hotel staff quarters. Not a very prestigious beginning for what was to become one of the more important Departments of the Agency.

The technical content of our work was, to say the least, disappointing. Apart from some short lived exercises in calculating plutonium production possibilities in research reactors or concerning the feasibility of making nuclear explosives out of irradiated power reactor fuel, little was done. I remember distinctly my astonishment when, in a staff meeting, a senior colleague declared solemnly that an implosion weapon was not feasible since, as everyone knows, metals are incompressible. Such was the technical level of our deliberations. Perhaps as a consequence of this, some of our staff members either returned home or drifted into other Departments of the Agency. For my part, I was released to participate in Preliminary Assistance Missions, and was made responsible for our research programme. This consisted primarily of granting contracts for the development of safeguards instruments and techniques. Characteristic of these efforts, for example, was the development of methods for the non-destructive analysis of irradiated fuel. The dream was to develop an instrument with which, from a distance, one could determine the plutonium contained in an irradiated reactor fuel element. The first technical meeting organized by the Safeguards Division was on this subject and took place, I believe, in 1960, in Herceg Novi, Yugoslavia. The Panel convened to discuss this matter wrote in its report a sentence that started with: "The Panel is optimistic that non-destructive analysis techniques can be developed within a reasonably short time..." The optimism of this Panel was, as we now know, not warranted.

Shortly after the Board sanctioned the first safeguards document I was offered a two-year contract extension. Speculating that the Agency's safeguards activities might increase in quantity and quality, I accepted. As it happened, I was right. The approval by the Board in June 1961 of the 'Inspectors' Document' made the initiation of concrete safeguards activities possible. The beginnings were humble enough, and, as pointed out, efforts were made to

limit the Agency's work in this field. The supply by the Agency of three tons of natural uranium to Japan for use in the JRR-3 reactor was exempted from the application of safeguards at the request of the Japanese Government. This was of course permissible under the agreement, but deprived the Agency of an opportunity to acquire some experience in actual inspection. Something similar happened with the Nora critical facility in Norway. The facility became subject to safeguards by virtue of the supply by the Agency of the nuclear fuel it required (or a portion thereof). The Norwegian Government requested exemption of the facility from safeguards, however, because it had a maximum thermal power capacity of less than 3 MW and thus qualified for exemption under the provisions of INFCIRC/26. The Agency agreed to the exemption, but requested that the facility's design, and consequently its maximum power capacity, be verified by the Agency as a precondition for formalizing the exemption. It was thus that, in February 1962, the Director of the Division of Safeguards and I carried out the Agency's first safeguards inspection. The technical purpose of the inspection, as anyone who is familiar with critical facilities will realize, was easy to achieve. We went through the motions very carefully, however, and followed the obvious conclusion with a rather solemn cable to the Director General which enabled the Board to approve the exemption. The fuel supplied by the Agency also qualified for exemption on account of its quantity, so that the first inspection of the Nora facility was also the last one. It should be noted that these exemptions were optional, not compulsory, and that the decision to request them was taken by a government that in general favoured the Agency's safeguards activities. If the first inspection made by the Agency did not have much technical content, it did have political significance, and received fairly wide press coverage. For the safeguards staff it was certainly a stimulating portent of things to come.

Shortly after this event the USA and the Agency concluded an agreement for the application of Agency safeguards to four reactor facilities. The agreement entered into force on 1 June 1962 and applied to the Brookhaven Graphite Research Reactor, the Brookhaven Medical Research Reactor, the Experimental Boiling Water Reactor (at Argonne National Laboratory near Chicago) and the Piqua Organic Moderated Reactor (at City of Piqua, Ohio). The desire to give the agreement some publicity determined that the first inspection under this agreement should begin on the very day of its entry into force. A complicated set of circumstances dictated that the inspection team should include a non-staff member, who therefore could not, under the existing regulations, be designated as an Agency inspector. I was one of the two

members of the so-called 'ad hoc inspection team', and the inspection lasted two weeks. My feelings at the time were mixed. On the one hand it was a distinction to take part in (and effectively be responsible for) the first inspection of significant facilities. On the other hand, I had misgivings about the curious structure of the team, since my partner was designated as a consultant. I was also fully aware that the agreement was intended purely as a training exercise, and therefore no 'real' inspections were to take place under it. The reception we were given in the USA, however, was reassuring. The atmosphere throughout the inspection was friendly, but businesslike, and gave me grounds to hope that the agreement would after all provide a valuable means of developing our own safeguards procedures. The activities that were to take place under this agreement were not limited to inspections, since they included frequent contact with the safeguards staff of the United States Atomic Energy Commission, who were the only ones who had extensive safeguards and (bilateral) inspection experience. I wish to state for the record that in my view the highly qualified and devoted assistance which we received from our US colleagues under this agreement was essential to the process of developing the Agency's safeguards into a professional and technically respectable activity. We learned from them the theory and practice of nuclear materials accountability, as well as audit and inventory taking procedures. The methods of work which we developed on that basis, though improved through the years, are still in use today.

The agreement with the USA remained in force for a number of years, though the Experimental Boiling Water Reactor and the City of Piqua Reactor were withdrawn from the list, and the Yankee Atomic Power Station added to it. Another agreement of the same nature (i.e. primarily aimed at providing training opportunities for Agency inspectors) was concluded later with the United Kingdom, allowing inspection of the Bradwell nuclear power plant.

Of greater political significance, however, was the transfer to the Agency of the safeguards provided for in bilateral agreements between the USA and the United Kingdom as supplier States and a growing number of Member States who were recipient of nuclear materials and facilities. This process was considerably delayed by the decision of the USA to conclude a co-operation agreement with the countries of the European Community, which provided for safeguards to be applied by the Community's own organization, EURATOM, thus excluding the major part of the European countries from the list of potential Agency 'customers'. In spite of this, the application of safeguards under such 'transfer agreements' constituted the major part of our work

for many years. By the end of 1963, eight safeguards agreements were in force relating to some 24 installations. These figures may seem modest today, but they represented a significant workload given the size and experience (or lack thereof) of our inspectorate and the fact that only 24 months earlier not a single facility had been under Agency safeguards.

On 26 February 1964, the Board of Governors approved provisions to extend the Agency's safeguards system to reactors with a thermal output of more than 100 MW, the limit established in the first safeguards document, INFCIRC/26. This event is the landmark that can be seen as the end of the initial, and perhaps most difficult, phase in the development of safeguards. From this point on a more or less stable rhythm of growth and technical improvement prevailed which continues up to this day. Since this article is meant to describe the beginnings of safeguards, I shall leave the major events in the history, such as the revision of the system in 1966 and its subsequent extension to other types of facilities, as well as the adoption of safeguards procedures to be applied pursuant to the Non-Proliferation Treaty, for someone else's pen.

If I may conclude on a personal note, let me say that to have actively participated in the initial stages of the nearly forty year old Agency safeguards programme, even though frustrating at times, has certainly broadened my perspective and helped me to better appreciate the later developments.

THE FIFTH  
GENERAL CONFERENCE  
OF THE IAEA  
(October 1961)

Oscar A. Quihillalt  
and Carlos L. Büchler



*Oscar A. QUIHILLALT (R. Admiral)* was born in Argentina in 1913. Diplomas from the Naval College (1934) and the Faculty of Exact Sciences, University of Buenos Aires (1944). Post-graduate studies in Sweden (1948). Professor, Faculty of Engineering, University of Buenos Aires (since 1945). Professor, Higher Technical School of the Army (1953). First Director, Bariloche Atomic Center (1954). President, Atomic Energy Commission of Argentina (1955–1973). President of the Argentine Delegation to the Conference on the Statute of the IAEA (New York, 1956). President of the fifth General Conference of the IAEA (1961). Member of the Board of Governors of the IAEA (1959–1973) and its Chairman in 1967–1968. Consultant in Iran for the IAEA in 1974 and later an advisor (1974–1978). President, Nuclar S.A. (Argentina, 1979–1995). Numerous publications and lectures in Argentina and abroad. Co-author of the book *A Vision for the Second Fifty Years of Nuclear Energy* (INSC and ANS, 1996). Several awards and decorations from France, Spain, Germany, Italy, Iran and Brazil. Member of the National Academy of Sciences (President), National Academy of Engineering, Argentine Academy of Sciences of Enterprise (President), Argentine Academy of Music, International Nuclear Energy Academy, International Nuclear Societies Council and European Academy of Science, Art and Humanities.

*Carlos L. BÜCHLER*: see article on ‘Safeguards: The beginnings’.

The fifth General Conference of the IAEA, which took place in October 1961, marked a turning point in the development of the organization which was to remain unparalleled for many years. In fact, the months preceding this Conference and those that followed were witness to a sequence of events which together were to influence the future of the IAEA up to this date. Even though many of those events were not the direct result of the work of the Conference, there can be no doubt that they were related to it.

By far the most (and possibly only) momentous resolution adopted by this Conference was to approve the decision of the Board of Governors to appoint Sigvard Eklund to succeed Sterling Cole as Director General of the Agency. The significance of this decision, and the unusual and adverse circumstances under which it was taken, have moved the authors (the Conference President and his ad hoc secretary), close witnesses of the event, to attempt to describe the most salient aspects of the Conference.

As Sterling Cole's term neared its end, the Agency's effective contributions to the peaceful uses of atomic energy were limited to providing a measure of technical assistance to some of the developing countries and to promoting the exchange of information on certain aspects of nuclear energy. The bilateral arrangements under which much more vigorous programmes took place played at that time a more significant role than that of the IAEA. All pointed to a certain stagnation in the Agency's programme, and there were no signs that the organization was about to acquire a meaningful role in the supply of nuclear materials or in contributing to the wider use of nuclear power.

It would be naive to attribute this state of affairs to shortcomings in the leadership provided by Sterling Cole, or, for that matter, to any other single factor. The strongly anti-Communist foreign policy of the USA led it to channel its technical assistance through bilateral agreements for co-operation in the peaceful uses of atomic energy. This enabled it to control the nature and extent of the assistance much better than if it were supplied through the Agency. The most outstanding example of this is the co-operation agreement between the USA and EURATOM, signed in 1958, which provided for safeguards to be applied by EURATOM (and not the Agency) within the European Community. This agreement, strongly resisted by Cole, was consistent with the US policy of strengthening Western Europe under the umbrella of NATO. Further, the use of the Agency, particularly by the Soviet bloc, as an extension of the stage in which the Cold War was being fought did not improve its effectiveness. The role of the Agency foreseen in the "Atoms

for Peace" programme was beginning to be redefined, and this happened still within the term of President Eisenhower, its mastermind.

Early in 1961, the Board of Governors sanctioned the first safeguards document, which, together with the document on the Agency's inspectors approved in June of the same year and submitted to the forthcoming General Conference for information, constituted the early safeguards system on the basis of which the Agency was to acquire much of the experience that would prove essential for its later role under the Treaty on the Non-Proliferation of Nuclear Weapons.

Also in June of that year, the Board undertook the task of appointing a new Director General, made necessary by the fact that an extension of Sterling Cole's term of office could not find the required support. The task was not easy but, over the sometimes loud objections of the Soviet bloc and of a number of the developing countries, Sigvard Eklund was appointed to the post. The decision was, as required by the Statute, submitted to the fifth General Conference for approval, which it granted on 3 October. Eklund took up his duties on 1 December 1961.

The end of this Conference meant for the Agency the beginning of a new era. After four years of mostly preparatory work, the organization was readying itself for action. The preponderance of technical assistance projects in the Agency's programme decreased, and at the same time its own technical and operational activities started to gain momentum. The new Director General was to show a significantly different managerial attitude, and there can be no doubt that the technical staff of the Agency found it easier to communicate with him than with his predecessor. The working atmosphere in the Agency reflected this change very markedly, even if the Cold War was to rage further in the Board for some time. The change in the attitude of the Soviet Union which took place shortly after this Conference completed the series of events which set the Agency on its new course.

## SETTING THE STAGE

It would probably have been possible to write a fairly accurate description of the proceedings of the fifth General Conference already in June 1961, four months before it was to take place, after the meeting of the Board of Governors in which the election of Eklund was decided upon. Sterling Cole did not campaign for the post as he could not expect support for re-election

from practically any quarter. The US administration was now Democratic, and Cole was a former Republican Senator. Furthermore, he had alienated many governments, especially in Europe, because of his blunt and sometimes highhanded ways. The stage for a conflict on this issue was set by a combination of factors. The circumstances surrounding the election of Sterling Cole as the first Director General were still fresh in the minds of many Governors, in particular from the Soviet Union. At that time the USA, having agreed to the appointment of Harry Brynielsson (largely on the grounds that Sweden was a neutral country and that Brynielsson was a prominent scientist, the latter characteristic being regarded as an essential prerequisite for the job), changed its mind under Congressional pressure and forced through the election of Cole. The Soviet Union finally went along with that choice, but four years later it felt that the second Director General should come from a Socialist country. When its suggestion of a 'troika' (headed by a Bulgarian) to replace the Director General (a proposal it had also made at the UN) failed to prosper, it decided to support the candidate of the Asian and African States, Ambassador Sudjarwo from Indonesia. The tone and aggressive character of the discussion were a clear anticipation of what was to come four months later. The arguments against Eklund were championed by Vassily Emelyanov, the Governor for the Soviet Union, who said that no candidate from a Western country could be considered, especially not from Sweden, which had not commended itself for sponsoring good candidates. He cited Dag Hammarskjöld as an example. He also quoted Eklund as having assured him, during a visit to Moscow, that he would not accept the appointment unless he was supported by both the USA and the Soviet Union. Even after Eklund's appointment had been voted on and approved, arguments against him were voiced when the Board discussed the terms of appointment of the Director General. Several delegations indicated that they would oppose the appointment of Eklund when it was considered at the forthcoming General Conference.

It may be pointed out that the East/West polarization within the Governing Bodies of the Agency was by no means limited to this issue. The safeguards instruments mentioned above, the construction of the Agency's laboratory, and many other questions were settled with the support of most Western countries and against the strong opposition of, inter alia, the Soviet Union. It is against this background of hostility in the Board of Governors that the developments that were to follow, both during and after the fifth General Conference, must be seen.

## THE CONFERENCE

If the events mentioned above which preceded the Conference did not presage an easy and smooth passage, the opening day, 26 September, confirmed such expectations. No sooner had the President (Argentina), the eight Vice-Presidents (France, Ghana, India, Indonesia, Japan, Tunisia, the USSR and the USA), and the required four additional members of the General Committee (Canada, Chile, the United Kingdom and Yugoslavia) been elected, than Emelyanov took the floor to protest against what he saw as a flagrant injustice, detrimental to the activities of the Agency. More than half of the elected members were representatives of countries belonging to military and political blocs led by the USA. A particular group of countries was trying, as usual, to get control of the key positions in an international organization. This was the opening of hostilities which were to pervade the whole period of the Conference. The discussion over the admission of the Republic of the Congo to the Agency, which took place even before the agenda was adopted, provided the representative of the Soviet Union with a further opportunity to chastise the "imperialist powers" for endeavouring to keep in their own hands the Congo's natural resources, including its very large deposits of nuclear materials. They had, he said, shown openly their desire to hinder the establishment of liberty and independence in a young African State. The Republic of the Congo was admitted festively to the Agency, and it is a sad matter of record that only one week earlier Dag Hammarskjöld had died in an airplane accident while on a peace mission to the Congolese province of Katanga. The Cold War raged hot in the Congo, and in Vienna the diplomats were told about how the little Congolese reactor in Leopoldville would contribute to the future of atomic energy in Africa. In his address to the conference which followed, Sterling Cole referred to Dag Hammarskjöld as "a man of tireless energy, brilliant intelligence and unswerving courage, he was both the idol and the ideal of the international civil servants." He has, as such, had no successors. While tribute to Dag Hammarskjöld was paid by many speakers, the Agency paid its respects through a statement by the President at the time when Hammarskjöld's funeral was taking place (where it was represented by the Director General), and by a message of condolence to the King of Sweden.

The fifth General Conference of the IAEA (which lasted two full weeks) had on its agenda only two items of any substance: the appointment of the Director General and an amendment to Article VI.A.3 of the Statute which related to the representation of Member States in the Board of Governors.

The general debate and the consideration of the report of the Board of Governors, item 11 of the Conference's agenda, proceeded with the usual overly verbose statements of every single participating State, and the only significant feature of the debate, apart from its Cold War overtones, was the fact that the two items mentioned above were hardly mentioned. Perhaps ammunition was being saved for the big battle that was to follow.

The amendment of the Statute, which was a proposal adopted by the Board almost unanimously in June, was intended to increase the number of countries which the General Conference elected to the Board from ten to twelve, allocating the two additional seats to the region of Africa and the Middle East, which was thus assured of three seats in the Board. In spite of a few technical and dialectical skirmishes, the proposed amendment was adopted unanimously. It is of some significance that this amendment was to open a period during which the matter of the size and composition of the Board was under more or less constant consideration, and it resulted in an increase in the size of the Board from the initial 23 to 35 members.

The main event of the Conference, namely the debate on the appointment of the Director General, took place in the afternoons of 3 and 4 October. Eklund's nomination by the Board of Governors had been adopted in that body by 17 votes against 3, with 3 abstentions. The 17 countries voting for the nomination represented six of the eight geographical areas contemplated in the Statute. As the debate opened there were three draft resolutions on this item before the Conference: the first one, sponsored by 11 countries which included Indonesia, requested the Board of Governors to reconsider its nomination and to submit to the General Conference a proposal that could be accepted unanimously; the second one, sponsored by three countries, including the Soviet Union, instructed the President to invite Eklund to be present at the debate on the election of the Director General; and the last one, sponsored by nine countries, including the USA, approved the proposal of the Board of Governors and appointed Eklund to the post of Director General.

In short, the Conference rejected the first draft resolution by 42 votes to 22, with 3 abstentions; the second one was abandoned without a vote and the third was adopted by 46 votes to 16, with 6 abstentions. But the debate was not short, and the arguments used in June in the Board of Governors meeting and earlier in the Conference were, almost without exception, repeated. An addition to the palette which is worth mentioning, not because of its weight but because of its quality, is Emelyanov's reference to a letter he said he had received from somebody in Sweden charging Eklund with having passed on

a Swedish 'atomic invention' to a former Harwell scientist and having wrongly dismissed its inventor. This accusation, quickly disclaimed by Brynielsson, who said that "the matter had been thoroughly investigated by the Swedish legal authorities and the charge had been found to be utterly groundless", is revealing of the lengths to which Emelyanov was prepared to go in order to discredit Eklund. After the final vote and the somewhat complicated explanations of their seemingly inconsistent vote by Viet Nam and Senegal, the President declared that consideration of the item was concluded for the time being, and that it would be resumed at a later date to enable the new Director General to take his oath of office before the Conference. The best was yet to come.

It was at the 62nd plenary meeting of the General Conference on Friday, 6 October that Eklund was to take his oath of office. The President introduced the item and indicated that delegates who wished to make statements regarding the event could do so beforehand. Emelyanov took the floor and, after a repeat of his earlier attacks on the USA and Eklund, left the Conference hall, followed by his delegation and that of a significant number of countries supporting his position, announcing that the Soviet Union would have no contact with Eklund, and that he personally would neither speak to him nor answer his letters. Such was the grand finale of this quasi-operatic performance, which was duly celebrated by the press with a flurry of photographic flashes. No General Conference either before or after this would match it for dramatic suspense and heroic performance.

In his closing of the Conference the President said that "he would have liked to be able to say that the discussions had been characterized by a spirit of understanding and collaboration, but unfortunately that had not been the case." This understatement was required by the dignity of the office. It may seem odd that Emelyanov, who once asked for the floor by pounding on his desk, should later tell the President that he had led the discussion in an impartial manner.

The Conference closed at 5.55 p.m. on Friday, 6 October.

## THE AFTERMATH

As the delegates to the Conference walked out of the Hofburg palace, the atmosphere they left behind was pregnant with questions over which at least some of them must have pondered. The questions certainly dealt with

the future of the Agency, about which probably few of the witnesses to this Conference were optimistic.

How could one explain the viciousness of Emelyanov's attacks on Eklund? How could the new Director General do his job if the Soviet Union refused to deal with him? Did Eklund have what it takes to revitalize the organization? If the Agency was condemned to be nothing more than a second class forum for fighting the Cold War, was its creation a political error?

Some of these questions were to be answered very soon, others remain a puzzle up to this date.

Emelyanov must have known which way the vote on Eklund was likely to go, in which case what he had to gain by an all out confrontation is not at all clear, especially if one recalls that the Soviet attitude quickly lost its hostility. It did not take long for Eklund to develop a working relationship with the Soviet Union, which supported him in three successive re-elections. But this could not be anticipated in October 1961.

Eklund managed, within two to three years, to strongly emphasize the technical aspects of the work of the Agency, and to create a more conciliatory atmosphere in the Board of Governors, conducive to an increased operational efficiency. He managed to initiate a number of projects, such as the International Centre for Theoretical Physics in Trieste and the Marine Research Laboratory in Monaco. He persuaded the UN to transfer to the Agency the responsibility for the third Conference on the Peaceful Uses of Atomic Energy, which took place in 1964. In 1967, the Agency declared its readiness to play its role within the framework of the Non-Proliferation Treaty, which was to be opened for signature a year later.

Clearly all this was not the exclusive consequence of Eklund's efforts, but without doubt his vision and prudence were strong contributory factors. By the same token, if the events that took place after October 1961 were not the direct result of the Agency's deliberations, it remains a fact that this one significant decision taken by the Conference was to have a profound influence on the Agency's future.



THE EMERGENCE OF  
THE GROUP OF 77  
AS A MAJOR PLAYER IN  
THE BOARD OF GOVERNORS

Reinhard Loosch

*Reinhard LOOSCH*: Governor for the Federal Republic of Germany on the IAEA Board of Governors from 1972 to 1992, for one term each Vice-Chairman and, in 1987–1988, Chairman of the Board. In the 1980s, he was Chairman and Vice-Chairman of the Committee on Assurances of Supply. He spent most of his professional career in public service devoted to the promotion of international co-operation in science and technology.

Born in 1931 in Stuttgart, Germany, he studied law and economics at Tübingen, Princeton and Bonn Universities and completed his formal education with the Second State Examination in Law in 1959.

After a short period with the Nuremberg office of the German Federal Treasury Administration, he joined, in 1961, the Federal Ministry for Atomic Energy as a junior officer for EURATOM affairs. Posted to the German Representation to the European Communities in Brussels as Counsellor for EURATOM, science and technology from 1965 to 1968, he returned to the Department in Bonn (which eventually became the Federal Ministry for Research and Technology), first as Head of Section and from 1971 to 1992 as Director for International (and, until 1990, Inter-German) Co-operation.

During that time, he was involved in many international negotiations, bilateral commissions and multilateral organizations and conferences throughout the world. Besides representing his country in the Agency, he served, inter alia, as the German delegate in, and for some years chairman of, the OECD Nuclear Energy Agency's Steering Committee, member of the Councils of the European Space Agency and its forerunners ELDO and ESRO, member and chairman of the Steering Committee of the Max von Laue–Paul Langevin Institute at Grenoble, spokesman of the European Governments and ESA in negotiating the International Space Station Agreement, member and vice-chairman of the Consultative Committee of the European Communities' Joint Research Centre, and member and/or chairman of several commissions for co-operation between Germany and other countries in Europe, Africa, the Americas and Asia.

In 1995, he retired from the German civil service after completing a three-year term as Head of the international EUREKA Secretariat in Brussels.

Reinhard Loosch is married, with three children and one grandson, and is a resident of Königswinter in Germany.



## BACKGROUND

At its regular 1972 session, exceptionally held in Mexico City, the IAEA General Conference elected the Federal Republic of Germany to one of the Western European rotational seats on the Board of Governors. A few days later, I was appointed Governor.

In February 1973, I attended my first Board meetings. At that time, the Board consisted of only 25 members; though the second amendment to Article VI of the Agency's Statute which brought the normal number of Governors to 34 had already been adopted by the General Conference, it was not yet in force because the instruments of acceptance by at least two thirds of the Member States were not deposited until later in that year.

My first impression from the proceedings in February 1973 was that the Board was an assembly composed of individuals or even individualists who refused to be forced into a pattern of group dialogue between the various political alliances or blocs which had emerged as a consequence of the Second World War, during the ensuing Cold War or in the intensifying North/South debate. This spirit seemed to be fostered by a number of factors.

Firstly, in the perception prevailing during the early years of the Agency's life until well into the 1970s, the Agency was a primarily technical organization. Despite its important tasks of helping to develop nuclear energy as an essential contribution to the sustainable energy supply policies of the Member States and of ensuring the exclusively peaceful utilization of nuclear energy, it was considered to be basically an apolitical agency, different in character from the United Nations and other members of the United Nations family.

Secondly, and partly as a consequence of this general perception, the IAEA did not start out as, or become, a specialized agency of the United Nations but kept some distance from the United Nations and its 'politics' — organizing its work on the basis of dialogue and arrangements among the different political groups.

Thirdly, the Agency's very existence and the conduct of its activities had been founded on a basic understanding between the USA and the Soviet Union as the leaders of the 'Western' and 'Eastern' worlds and as the nuclear superpowers, both in the military and the civilian sector. This understanding was built on a joint and separate interest to maintain a balance between them and to prevent nuclear proliferation. Therefore, the Cold War that pervaded the whole world was not nearly as visible or important within the Agency as it was elsewhere in international debate at that time.

Fourthly, the discussions in the Board of Governors were dominated by personalities who had been chosen by their governments on the basis of their achievements in nuclear science or their professional involvement in the development of peaceful uses of atomic energy, and who did not consider themselves as primarily diplomatic or political representatives of their countries but rather as people responsible for the advancement of the statutory objectives of the Agency, i.e. in particular the peaceful applications of nuclear energy and techniques, and the avoidance of any harmful consequences of its use.

Of course, the Governors' interventions and actions also showed that they could not remain entirely unaffected by global political trends and tensions or the commonalities of interests which had led to the formation of various political and economic alliances shaping the international debate between West and East as well as between North and South. Many items on the Board's agenda had a bearing on such common interests of groups of countries as the promotion of technology transfer from the more to the less developed countries, or the creation of markets for their nuclear industries. It was also easy to discern, perhaps less often from what was said than from how it was said, that a certain speaker came from a 'socialist' or a 'capitalist' country. However, there was no consistent group behaviour or dynamics among Governors.

So, normally Governors spoke only for themselves or their country. Even the highly concerted Soviet bloc Governors spoke individually, though often in identical terms.

There were only two categories of agenda item where a Governor would give a statement officially on behalf of several Governors or groups of countries. On the one hand, and following directly from the provisions of Article VI of the Statute, certain institutional matters — more often related to the General Conference than to Board business — had to be dealt with jointly by the Governors belonging to the same geographical area. On the other hand, there were cases in which several Member States were formally united with respect to a specific item under discussion, such as happened when the Board had to deal with the Verification Agreement between the Agency, the European Atomic Energy Community and its non-nuclear-weapon members under the Nuclear Non-Proliferation Treaty, or when France, the United Kingdom and the USA had to rebut jointly the then usual complaints by the Soviet Governor about Agency activities carried out in West Berlin.

Naturally, a global division of countries into the various political groups could also be observed in Agency affairs. This categorization was not,

however, expressly acknowledged but at most only tacitly accepted. One example of how this was done was to be found in annual elections of the new Chairman of the Board and his or her two Vice-Chairmen. Tradition had it that the chairmanship rotated among the eight geographical areas defined in Article VI of the Statute, and the right of each area to present the Chairman every eighth year or that group's choice of the nominee has never been challenged. Though this scheme is not based on any explicit provision or legal interpretation of the Statute or the Board's rules of procedure, one could at least deduce a certain argument from the fact that the eight geographical areas serve as a determining parameter for the composition of the Board. However, that the two Vice-Chairmen should belong to other political 'groups' than the Chairman is not even remotely indicated by any statutory paragraph — it just so happened again and again and shows tacit recognition of the facts in international politics, even by a 'technical' agency.

The entry into force of the second amendment to the Statute by which the Board was enlarged in mid-1973 did not change its individualistic style or habits — the only practical difference being that from then on one had to listen to more speeches, potentially up to 34 per item as against a maximum of 25 before.

## GROUPS APPEAR ON THE HORIZON

From around 1976 on, Governors representing developing countries began to demonstrate increasing group cohesion. At first this was not done explicitly, but more and more concerted and even harmonized statements came forth from those Governors, not only on matters with a direct bearing on specific concerns of developing countries, such as the technical assistance programmes of the Agency, but also on other questions which might even have more impact on developed Member States than on developing ones — for instance the budget, the greater part of which is funded by the contributions of the more advanced industrialized countries.

Naturally, some so-called 'political matters', though formally of equal concern to every Member State, evoked particularly strong feelings among some or all of the countries belonging to what was known as the Group of 77 because it was in their region where the action, friction or confrontation showed. The debate on such items clearly helped in producing a more uniform behaviour among the Group of 77 Governors. A typical example was the

debate on the status of South Africa in the Agency, and more specifically the discussion about which Member State should be designated to the Board as “the member most advanced in the technology of atomic energy including the production of source materials in the area of Africa” as defined by Article VI.A.1 of the Statute.

South Africa had been an influential founding member of the Agency and had always been designated from the birth of the Agency until 1976 as the most advanced African Member State to serve on the Board during the following year. Then, in the General Conference session in the autumn of 1976, the Group of 77 succeeded, with the help of other Member States opposed to South African apartheid policies, in bringing about a consensus resolution which requested the Board of Governors to review the traditional annual designation of South Africa in the light of its apartheid régime. Consequently, when the Board proceeded in June 1977 to the designation of Board members for 1977–1978, the Chairman proposed designating Egypt rather than South Africa as the African Member State most advanced in nuclear development. As had been expected — also by the Board Chairman himself — there was immediate opposition, starting with a strong protest from the South African Governor. The ensuing debate revealed a clear pattern: with the exception of Chile, at that time also, like South Africa, the object of widespread moral criticism from the international community, all Governors from developing countries supported the designation of Egypt. So, for political reasons, did all Governors from the Soviet bloc. By contrast, the Governors from the European Community, explicitly acting as a group, and those from the other OECD countries, as well as, of course, South Africa, maintained that Article VI.A of the Statute required, because of its purely legal and technical definitions, the designation of South Africa since this country was undisputedly the most advanced Member State in Africa in terms of atomic energy technology and source material production, and that the statutory provisions left no room for any different judgement on the basis of non-technical, i.e. political, considerations.

The debate showed that in this case of a difference of opinions which obviously were determined by adherence to one or other group of countries, any attempt to seek, in the Board’s tradition, a decision by consensus would be in vain. The roll call vote, initially requested by South Africa, produced a solid majority against the designation of South Africa, the vote being split exactly — apart from Chile’s abstention — along the border line between the Group of 77 and the Socialist group, on the one hand, and the OECD group

on the other. Savouring this success, the Governor for Nigeria, implicitly acting on behalf of the Group of 77, requested another roll call vote, this time on the positive designation of Egypt; the result was, of course, practically the same as before, though in the second vote Japan joined Chile in abstaining.

Thus, possibly for the first time, a vote in the Board had been managed by clear-cut group action, the Group of 77 leading the way.

It was to no one's surprise that, in the following year, the same issue was dealt with in the same way. If there was still some drama, it was only because the US Governor again asked for a roll call vote even though the final outcome was a foregone conclusion. The votes were again cast along group lines except that, this time, Austria and the Republic of Korea, which had not been on the Board a year before (whereas Chile had left the Board in the meantime), abstained together with Japan, and Iran (not on the Board in June 1977) did not participate in the vote.

The results achieved in these instances encouraged the Group of 77 to increase their efforts to organize themselves more tightly, to concert their Governors' action also on matters not concerning specific developing country interests, and to influence the whole course of the Board's debates by introducing, on each item and as early as possible, a statement explicitly "on behalf of the Group of 77."

However, it took the Group of 77 some time until they were able to do this systematically. The success of their efforts often seemed to depend on the *savoir faire* and energy of their acting chairman. It must also be taken into account that in those years, and in stark contrast to the very liberal present practice, Rule 50 of the Board's Provisional Rules of Procedure governing the participation of non-Board members in the Board's discussions was still interpreted and applied narrowly, and so the Group's chairman, being chosen on the basis of rotation among all its members, whether currently serving on the Board or not, might not be able to get the floor and the Group would, therefore, lack an authoritative spokesman in the Board.

That the Vienna Group of 77 lagged behind their counterparts in, for example, New York or Geneva as regards internal cohesion and effective organization was incidentally brought to light by a minor — and in itself unimportant — episode in early 1980. When the Board discussed an item of particular interest to Governors from developing countries, one of their most senior spokesmen requested the Agency's Secretariat to provide him with a list of all Member States belonging to his Group. The Secretariat could not or would not satisfy his request, and at that stage nobody attending that Board

meeting, whether from a developing country or not, and not even the chairmanship of the Group of 77 itself seemed to be in a position to give a precise answer to their colleague.

Nonetheless, and despite a certain uncertainty about the Group's membership among the Member States of the Agency,<sup>1</sup> more and more statements "on behalf of the Group of 77" were made on ever more agenda items.

### THE GROUP OF 77 FORMALLY ENTERS THE STAGE

In 1980 and 1981, the Board's deliberations on two important matters finally led to the effective recognition of political groupings, in particular the Group of 77, as major actors in the Board although no provisions in the Statute or the Board's Provisional Rules of Procedure were altered.

Firstly, the Board had to decide whether and, if so, how the results of the International Nuclear Fuel Cycle Evaluation (INFCE), carried out from 1977 to early 1980 in an ad hoc framework separate from, but actively supported by, the Agency should be further developed within the Agency as the permanent international institution most closely related to the subjects involved in INFCE.

In this respect, the Board's debate did not reveal any particular group pattern because many Member States, whether more advanced in the nuclear field or still in various stages of development, were equally interested in establishing, on the basis of INFCE's findings and conclusions, a reliable code of conduct for international nuclear trade and co-operation, balancing the needs for assured access to nuclear materials, equipment and technology with the desire of many supplier countries to make such access contingent upon mutually accepted non-proliferation conditions. So the Board was able

<sup>1</sup> As regards the strength of the Group of 77 in the Board of Governors (as against the whole membership of the Agency), one can safely assume that since the entry into force of the second amendment to Article VI of the Statute in mid-1973 it has stood at 18 Governors out of 34, thus ensuring a simple majority. This did not change when, in the late 1980s, the People's Republic of China joined the Agency and, by also becoming a member of the Board, raised the number of Governors to the present 35.

to arrive at a fairly quick consensus to take INFCE matters further within the Agency and to set up, to this end, a new Board Committee on Assurances of Supply (CAS) which would be open to all Member States.

When, however, CAS began its work, in the first instance devising its rules and modes of operation, the Group of 77 asserted its role from the very outset and in clear terms. Its members participating in the first meeting of CAS demanded that CAS be directed by a 'Bureau' in which there would be parity between the representatives coming from the 'South' (i.e. the Group of 77) and from the 'North' (comprising the then 24 OECD members and the Socialist countries). They succeeded when CAS decided, and reported to the Board, on a Bureau of four members, two from the Group of 77 (which was also entitled to the CAS chairmanship during its first year of activity and every third year thereafter) and one each from the "countries participating from the [statutory] regions of North America and Western Europe as well as Australia, Japan and New Zealand" and the "Socialist countries". (The cumbersome formula used in the CAS decision for describing the Western-minded countries of the North reflected both their hesitation to be referred to as a 'group' and their consequential embarrassment of not having a succinct collective name.)

Thus, the creation of CAS marked the first time in the life of the Agency that the Member States were formally divided into groups defined by political affinities rather than, like the areas under Article VI.A.1 of the Statute, by mere geographical criteria, and that such groups were given official institutional responsibilities. In fact, it turned out that the influence of the Bureau on the organization of the work of CAS and, indeed, on its substance was much larger than, for instance, that of the Board's bureau (consisting of the Chairman and two Vice-Chairmen, traditionally one each elected from the North-West, the East and the South, this tradition, however, only based on an informal, tacit understanding never recorded anywhere). Therefore, CAS was the first occasion in the Agency where there was formal 'rule by political groups' as exercised before only in the United Nations and some of its specialized agencies.

Some months later, another important subject came onto the Board's agenda that eventually led to expansion of the scope for 'rule by groups'. Towards the end of the fifth term of Dr. Sigvard Eklund as Director General of the Agency, it became clear that he would not be available for further reappointment. The six nominations for his successor did not indicate that, with the possible exception of the Soviet bloc, any effective co-ordination had

taken place before candidatures were announced. In terms of the geographical areas listed in Article VI of the Statute, two nominees each came from the Far East and Western Europe and one each from Latin America and from South East Asia and the Pacific. As regards their distribution among the three political groups recognized in the context of CAS, four were from the Western-minded (OECD) countries and two from the Group of 77. Whether the absence of any candidate from the Socialist countries (or, in statutory terms, Eastern Europe) was the result of a deliberate decision within that group or simply due to a lack of promising candidates may be left to speculation.

When the selection process started, initially through straw ballots in informal meetings among the Governors and, after these had not indicated early success, by voting in formal Board meetings, there was again an apparent absence of co-ordination both within each group or area and between them although numerous bilateral and multilateral consultations had been going on both in Vienna and in capitals around the world. In the first formal ballot on the complete slate of six candidates, the two from the Group of 77 received only ten votes together (out of the Group's nominal voting strength of 18) whereas the four 'Western' nominees collected a total of 23 (as against only 12 Governors representing OECD countries).

In order to narrow down the choice, the Board resorted to successive rounds of voting in which the candidate receiving the least number of votes in any one round was eliminated from further competition. The many ballots taken did not show a clear pattern, let alone well co-ordinated group action, not even when only two candidates remained — one from Western Europe (Mr. Hans Haunschild, Germany) and one from the Group of 77 (Mr. Domingo Siazon, Philippines). These two candidates were either tied or their returns oscillated between a minimum of 12 or 14 and a maximum of 18. Since all ballots were secret, and since intelligence gathered in private conversation with Governors on the margins was sketchy and not at all reliable, the distribution of these votes among the eight geographical areas and three political groups will never be known for sure. However, an analysis of the results of each ballot and the changes from one round to the other (not once did two successive ballots show the same outcome!) leads to the conclusion that neither candidate ever succeeded in obtaining all votes from 'his' group though, purely numerically, the highest scores won by each of them (18) equalled the total voting strength of the Group of 77 and significantly exceeded the number of Governors from OECD countries. So the traditionally individualistic behaviour

of Governors had carried the day and solidarity in supporting one's own candidate was not achieved by the Group of 77 (nor, most probably, by the OECD group since some votes for their candidate must have come from other groups whereas there remain more than reasonable doubts that he enjoyed consistent support from all Governors of his group).

The same picture emerged after the field had been reopened to permit new candidates. Repeated ballots on the new slate (consisting of only two names, Mr. Siazon as the only remaining candidate from the Group of 77 and Dr. Hans Blix from Sweden as a new candidate) did not promise a reasonable likelihood that either candidate could obtain the required two-thirds majority unless new factors emerged.

It was at this juncture that some Governors from the Group of 77 — though not the group as a whole — suggested holding group consultations because the conventional modes of decision making by the Board of Governors, including consultations between the Chairman and individual Governors, was apparently not working. Despite some hesitation about following this suggestion as it would introduce into the Agency a UN-like division of Member States into political groups which had so long been resisted in the Agency and in particular by the Board, the idea was eventually accepted, more out of despair than enthusiasm. A contact group was set up consisting of representatives of the three groups which had been defined in the CAS context and received the Board's mandate to forge a package solution which would permit the appointment of a new Director General in time.

The contact group, guided by the Board's Chairman, got to work immediately, holding many meetings in which intense negotiations took place. It achieved some progress towards an uneasy, somewhat superficial, consensus on some of the elements that had been suggested by the Group of 77 as parts of the package, such as G-77-friendly resolutions to be adopted by the General Conference on increasing the number of Agency staff from developing countries and, in particular, their appointment at senior and policy making levels as well as on ampler and more reliable financing of the Agency's technical assistance operations. On these elements, the unity of purpose and tactical cohesion of the Group of 77 membership and their representatives in the contact group were solid and consistent, which very much impressed the two other groups, prompting them to strengthen their cohesion but also making them ready to compromise with the Group of 77.

Strangely enough, the Group of 77 was not nearly as unified and forceful with regard to the actual problem which had given rise to the unprecedented

establishment of a contact group in the first place, namely the appointment of the new Director General. Whenever the Chairman reported to the Board in formal or informal meetings (and there were plenty of such meetings at ever shorter intervals), the prospects of a two-thirds majority for the remaining G-77 candidate had not improved (nor those for the remaining Western candidate).

It is difficult to determine why this was so because once again all formal and informal votes were secret and for once that secrecy was well kept. An analysis of the widely varying results of the balloting as described above and the thrust of G-77 action in the contact group point, however, to a combination of two factors as providing the most plausible explanation for their performance with regard to the appointment of a Director General. They must have realized that, because of their lack of homogeneity in nuclear development and their different regional and other political affinities, their leading candidate had never been assured of benefiting from their full voting potential. Even when he had obtained, in one or other round, as many votes as there were G-77 countries on the Board, this was due only to temporary support from other groups and/or tactical vote switching which could easily be reversed whenever a two-thirds majority seemed close. On the basis of such reasoning, they had realized that they would not succeed in having one of their own group appointed as Director General at this time and that they should, therefore, use the opportunity to collect the best compensation possible for bowing to the inevitable and for tolerating and even facilitating the choice of a candidate from the 'North'.

This interpretation of events in general and of G-77 behaviour and motivations in particular seems to have been borne out by what happened during the hectic final 24 hours of Board and General Conference meetings in September 1981. Working overtime and well into the weekend in an attempt to utilize the last chance of appointing a new Director General without resorting to an extraordinary General Conference session before the expiry of Dr. Eklund's term of office on 30 November 1981, the General Conference first adopted, by consensus, the resolutions on the staffing of the Agency and the financing of its technical assistance which had been hammered out in the contact group of the Board in response to demands put forward by the Group of 77. Then the Board had another try at the appointment problem. The first ballot on that Saturday afternoon resulted in a by now familiar set of figures: 18 for Dr. Blix, 15 for Mr. Siazon, one invalid vote. This tally showed already that Mr. Siazon again did not command all the

votes of the Governors from the Group of 77. After only a short break, the dice were cast again — and the breakthrough was achieved: Dr. Blix obtained 23 votes (one more than required), leaving Mr. Siazon with only 10, one vote again being invalid.

So in the end, the Group of 77 settled for a package which did not include a Director General from a developing country but which gave them reasonable satisfaction in the form of the two General Conference resolutions mentioned above (on Agency staffing and technical assistance) plus an extra paragraph in the General Conference resolution confirming the appointment of Dr. Blix in which the Conference requested the Board to give particular consideration to candidates from developing areas when proceeding to the choice of the Director General to serve the next term from 1985 to 1989.

For the purposes of this article, the following general conclusions can be drawn from the Board's (and the General Conference's) labours during 1981.

Firstly, the Group of 77 had clearly demonstrated their will and ability to pool their strength by acting in unison when pursuing interests shared by all or most of their members.

Secondly, they had forced the Board to accept their acting as a group when they so wished and to agree to consultations or negotiations between political groups of Member States as an instrument for resolving differences of opinion which cannot be overcome through the procedures which the founding fathers of the Agency had designed and which had been further developed by the Board in its first two dozen years of existence.

Thirdly, despite this demonstration of their power when acting jointly, the Group of 77 were not willing or able to develop their group discipline into automatic and complete solidarity. When the decision sought, such as on the appointment of a new Director General, would benefit one or a few of them more than others, their votes were split from the very beginning to the very end.

#### DEVELOPMENT SINCE 1981

In Board meetings held since 1981, common G-77 action has become a regular feature though, as was already indicated, it has not been automatic or systematic. Increasingly, there have been statements by the chairperson or another representative of the Group of 77 which would cover the agenda item

under consideration for the whole Group, leaving the individual members or the spokespersons for the regional subgroups only the possibility of supportive or complementary but not of contradictory interventions. The delivery of such group statements was facilitated by the growing flexibility which the Board has shown since the late 1980s in the interpretation and application of its Provisional Rules of Procedure, in particular Rule 50 on the right of Member States not represented in the Board to participate in its discussions. As a consequence, the acting chairperson of the Group of 77 has been given the floor whenever he or she asked for it and has often used this opportunity by requesting, and being accepted, to be the first speaker on the agenda item concerned, thus being able to underline the numerical and political weight of the group.

The need for, and benefits from, uniform group action has, however, decreased over the years. Whereas, for instance, the establishment and early activities of CAS were prompted and helped by the then high degree of convergence of opinions within the Group of 77 with respect to the relative weight of supply assurances and non-proliferation concerns in international nuclear trade and co-operation, their views and policies in this respect have since undergone considerable change, in different directions. Only a few of them still accord high priority to assured access to 'Northern' technology, equipment or materials, since most of them no longer rely on nuclear energy for satisfying their demand for electricity, and most of them have made their peace with the Non-Proliferation Treaty, the Nuclear Suppliers' Group Guidelines and, in particular, with full scope Agency safeguards. So CAS, once their first rallying point, has lost its importance for them, both in substance and as a psychological help in reinforcing their spirit of solidarity.

Similarly, the end of the Cold War and the subsequent disappearance of the Socialist group lessened the urge for group action. The same holds true for the elimination of the apartheid regime in South Africa, the fight against which had such a strong effect in forging bonds among the Group of 77 in earlier times. It remains to be seen whether the loss of these incentives for close Group of 77 cohesion will be compensated for by the emergence of other political groups on the Agency scene such as the European Union, possibly including now some other European countries associated with it or working towards entry into the Union.

Even the old battle for parallel development of the Agency's resources for technical assistance and other promotional action, on the one hand, and for safeguards and other regulatory activities, on the other, has lost in intensity,

but certainly the debate will go on and will be re-animated in each budgetary or indicative planning figure cycle.

Altogether it seems that, owing to macropolitical developments in the world and a certain globalization of views and policies on the utilization of nuclear energy, there are fewer and fewer items on the Board's agenda provoking confrontation between groups of countries and thereby calling for consolidated group action.

As regards, in particular, those interests of the Group of 77 which they have traditionally pursued jointly, one of them, i.e. their demand for broader presence of their constituency in all echelons of the Agency's staff, has already been met with increasing success; so it seems that they are content to have repeated, practically every year, the 1981 General Conference resolution on the staffing of the Agency and to monitor the relevant statistics in the Board.

Their quest for the appointment of a Director General from a developing country was kept, rather surprisingly, at low key whenever Dr. Blix's term of office neared completion in 1985, 1989 and 1993. The Group of 77 joined, without any significant debate, the consensus for reappointment, only requesting, and obtaining, on each such occasion a General Conference resolution urging the Board, in terms similar to those of 1981, to give, next time around, particular consideration to suitable candidates from the Group of 77. It was only when Dr. Blix declared in 1996 that he would not be available for another term that the interest of the Group of 77 was brought back to life and led, after an initial phase of uncoordinated nomination of candidates by three developing countries, to new demonstrations of group solidarity.

On the other hand, some perennial items for debate on which developing countries have had strong feelings apparently have not lent themselves to the exercise of group solidarity. With respect to an enlargement of the Board, mainly with the purpose of increasing the number of Governors from the Group of 77, no real consensus, let alone a strong will to pursue the objective collectively, seems to have developed in the group. This holds even more true for the amendment sought for decades by the areas of Africa and the Middle East and South Asia to broaden their representation on the Board. These discussions have, on the contrary, made apparent that there are important differences of interest between the various regional subdivisions within the Group of 77 which have so far prevented a unified approach, the success of which would benefit some of their members or subgroups more than others.

## O U T L O O K

The global political changes and other factors described above tend to diminish the role and prospects of political groups in the future life of the Agency, at least the role and prospects of those groups which became prominent in the Board around 1980, mainly as a result of the initiative of the Group of 77. One, the Socialist group, has disappeared, and many of its former members orient themselves towards, and seek integration into, what used to be known as 'Western' Europe. Other groups are changing their composition, some members of the Group of 77 already having joined, or established close association with, organizations and alliances of industrialized countries such as the OECD, the European Union or the North American Free Trade Association and others are intending to follow their example.

On the other hand, new groups may emerge as major actors in the Board and thereby put individual countries into the second tier. One example is the European Union, whose presidency already now often speaks on behalf, and instead, of the Governors from its member states and which has already agreed on enlargement and on harmonizing its members' external and security policies and eventually unifying them into a common European Union foreign and international policy. Similar developments may take place in the future when economic and/or political alliances such as the Mercado Común Sudamericano or the Association of South-East Asian Nations evolve further.

No matter what the future of political groups in the Board or the Agency as a whole will be, it remains to be registered that during an important phase of the Agency's history the Group of 77 has been a major player and one which, by uniting the forces of its members, could and did significantly influence events which otherwise would have continued to be determined mainly by the industrialized Member States from the 'North' in more or less the same way as they had dominated Agency affairs in the first two decades.

THE IAEA BOARD OF  
GOVERNORS  
DURING THE YEARS 1978–1982

Georges Le Guelte



*Georges LE GUELTE* was born in 1935 in Saint-Denis, France. He received a doctorate in international law and graduated from the Institut d'Etudes Politiques, Paris University.

In 1962, he joined the International Relations Division of the French Commissariat à l'Energie Atomique (CEA), in charge in particular of relations with Latin American, the Middle East, Far East and African countries.

Secretary of the Board of Governors and of the General Conference in the IAEA from 1978 to 1982, he was also, in that capacity, in charge of the secretariat of the International Nuclear Fuel Cycle Evaluation.

Back in France, he was Head of the Industrial Division in the Planning Administration (Commissariat au Plan) from 1982 to 1983. He was appointed in 1983 Deputy Director of the Institut National des Sciences et Techniques Nucléaires, an institution in charge of education and training in nuclear sciences and techniques, in the French education system. He was made responsible for international relations in the French nuclear safety authority in 1988, and in 1989 became Deputy Director of International Relations in the CEA.

Until the mid-1970s, the most active Member States of the IAEA regarded it as a purely technical organization where countries were represented not by diplomats, but by scientists or engineers (the Director General was himself a highly respected physicist), and which was supposed not to get involved in politics, but to carry out its task on a purely scientific or technical basis. That was a mere fiction, however, since the conditions under which peaceful applications of nuclear energy are developed and the respective roles of international organizations and national governments in nuclear safety and the transfer of nuclear technology are basically political matters, and it is very difficult to maintain that the modalities under which the IAEA verifies the implementation of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), which entered into force in 1970, are merely a technical matter. In fact, the fiction meant that there was basic agreement among industrialized countries about the place of multilateral relations in the development of nuclear energy, and whenever a disagreement arose they preferred to settle it outside the IAEA. That pattern was to change at the end of the 1970s and the beginning of the 1980s.

The intrusion of politics, in this case national politics, started in September 1978, with the election of the Chairman of the Board. The Middle East and South Asia area was to provide the candidate, and for several months already the Chairman of the Atomic Energy Organization of Iran, Akbar Etemad, had been receiving unanimous, enthusiastic support. Privately, some people even whispered that the Board chairmanship would provide him with an opportunity to demonstrate his qualifications for the post of Director General, which would be falling vacant in 1981.

By August 1978, however, unrest in Iran had become so serious that neither the Shah nor anyone else seemed to be in control, so that in September the Board elected the representative of another country in the Middle East and South Asia area (Saudi Arabia) as its Chairman. That was an almost unnoticed consequence of the Islamic revolution in Iran, but for the IAEA it had major implications; Akbar Etemad was out of the running for the post of Director General.

During the period 1978–1982, discussions in the Board tended to focus on two issues, technical co-operation and safeguards.

For years, technical co-operation had been considered a secondary activity, with a small budget derived from gifts (called 'voluntary contributions') made by the more wealthy countries. Its objectives had never been precisely defined, and it was therefore a mixture of nuclear energy promotion,

assistance to friendly scientists in developing countries and commercial promotion of nuclear equipment. An equitable allocation between geographic areas seemed more important than the setting of priorities, and assurance that projects would continue to run after the end of direct IAEA involvement did not seem important at all; in any case, it would probably have been difficult to assess the value of IAEA technical assistance projects to developing countries at that time. When the Board started reviewing the whole topic, it would have been useful: to consider how the IAEA could best promote nuclear activities in developing countries and facilitate the harmonization of such activities with national objectives; to specify the education and training and radiation protection requirements for deriving maximum benefit from IAEA technical assistance; and to make sure that transferred equipment was properly maintained and that necessary spare parts were available. None of those issues was even mentioned in the debate, which focused on principles. In order to demonstrate its importance, developing countries demanded the incorporation of technical co-operation into the IAEA's regular budget, financed not from 'voluntary contributions' but from compulsory ones. That would have removed one of the last remaining symbols of the colonial era, charity, and put an end to the agonizing annual haggling over 'voluntary' target figures which did nothing for the dignity of the debates in the Board.

The industrialized countries firmly rejected this demand of the developing countries, which in retaliation demanded that the target figures for technical co-operation contributions be raised, not so as to meet their development needs, but so as to match the IAEA's safeguards budget, although there is clearly no link between safeguards and technical co-operation. As they refused to approve the overall regular budget of the IAEA if this second demand was not met, the technical co-operation budget began to increase dramatically, until after a few years it did match the safeguards budget.

As a result, the industrialized countries had to pay much more than if technical co-operation had been incorporated into the IAEA's regular budget, while their forced generosity was received with resentment and bitterness, and restrictions began to be placed on the safeguards budget for fear of triggering useless increases in technical co-operation expenditures. The most detrimental consequence, however, was to strengthen the solidarity among the IAEA's developing Member States at a time when they were deeply divided over a much more important issue, namely non-proliferation. Moreover, a division between North and South crystallized in the nuclear field, the impression being that developing countries were interested only in

technical co-operation and industrialized countries only in safeguards, which is nonsense. Lastly, it became clear that the most effective stratagem was one closer to blackmail than to negotiation — a lesson which would not be forgotten.

That entire process illustrates the workings of a mechanism which frequently enters into play in decision making at the international level. Each Governor acted in the Board in accordance with his or her instructions, which had been formulated to match what were conceived as the country's interests. The views reflecting global interests, expressed in particular by the Secretariat, were generally met with incomprehension or, in the case of those who understood what was happening, with cynicism or resignation. The addition of national interests resulted in actions very detrimental to the international community as a whole and to each country individually. But nobody was to blame; each of the actors did what he or she had to do.

The major safeguards item on the Board's agenda during the period 1978–1982 was the trilateral safeguards agreement between the non-nuclear-weapon States of the European Community, EURATOM and the IAEA. Having signed the NPT in 1969, the Federal Republic of Germany (FRG) and Italy (and also Japan) had not ratified it until 1975. Negotiation of the trilateral safeguards agreement subsequently took several more years, so that the agreement was approved by the Board only in 1979, more than ten years after the NPT had been signed by the two major non-nuclear-weapon States, members of the European Community and EURATOM. In a sense, the Democratic People's Republic of Korea (DPRK) simply followed their example 20 years later.

There were genuine technical problems, due mainly to the fact that important nuclear facilities and large amounts of nuclear material were present in the FRG, where the nuclear activities encompassed all aspects of the nuclear fuel cycle, so that implementation of the trilateral safeguards agreement would greatly increase the responsibilities of the IAEA and the diversity of the tasks performed by its Department of Safeguards. The main problem, however, was not of a technical nature. Already in 1970, in the Board committee set up to draft a model NPT safeguards agreement (published in IAEA document INFCIRC/153), representatives of the West German nuclear industry had played an important part in restricting the scope of future NPT safeguards to declared nuclear material in declared nuclear activities and confining IAEA inspectors to nuclear material accountancy in 'material balance areas'. Any attempts by the IAEA to follow up possible indications of

undeclared nuclear activities were excluded (an unfortunate consequence of the success in protecting the interests of the German nuclear industry was the ease with which, in the 1980s, Iraq concealed its clandestine nuclear programme). When it came to the safeguarding of all nuclear facilities in the FRG, the same representatives were eager to make sure that the German nuclear industry suffered minimum inconvenience, which meant difficult negotiations, delays in concluding the trilateral safeguards agreement and rather acrimonious exchanges in the Board between, on one hand, the USA and the Soviet Union and, on the other, the FRG and Italy.

After the agreement had been approved, the FRG and Italy (and Japan), which had so far been rather lukewarm in their support for the NPT, became very effective supporters of the NPT and the non-proliferation regime, playing a crucial role in 1995 at the NPT Review and Extension Conference. However, since the Board decided, in 1993, to strengthen the IAEA's safeguards system through the so-called 'Programme 93 + 2', the same interests have resurfaced, the arguments of the 1970s being used in an effort to water down the IAEA Secretariat's proposals for a safeguards system capable of detecting possible indications of undeclared nuclear activities; as in the 1970s, political authorities are proving unable to impose their views in the face of industry concerns, even where global security is at stake.

While the Board was focusing on technical co-operation and safeguards, a number of events in which the Board was not involved profoundly modified the conditions under which nuclear energy was developing in the world; they were to have important consequences for the role of the IAEA. One of those events was the International Nuclear Fuel Cycle Evaluation (INFCE), an exercise which — although now virtually forgotten — mobilized a huge number of experts from more than 60 countries during the period 1977–1980, the IAEA being responsible primarily for logistics and secretariat services. The exercise was initiated by the US Congress in the hope that the principles underlying the 1978 US Non-Proliferation Act would receive strong international support. After the detonation of a nuclear device by India in 1974, public opinion in the USA was misled about how the manufacture of the device had been possible. The prevailing view was that it demonstrated the failure of the existing non-proliferation regime, and the Carter Administration therefore concluded that non-proliferation policy should be based primarily on technical solutions and that the only effective way of preventing the procurement of fissile material for military purposes was to forbid plutonium separation and the enrichment of uranium beyond 20%. The purpose of

INFCE was to examine the various nuclear fuel cycles and demonstrate that, if countries adopted light water reactors and the open cycle, there would be no proliferation of nuclear weapons. Interestingly enough, the same approach became, 15 years later, the basis of the “Agreed Framework” concluded in October 1994 in an effort to resolve the issue of the Democratic People’s Republic of Korea (DPRK).

The USA was opposed by a large but heterogeneous coalition made up of: countries wishing to preserve their right to an independent civilian nuclear policy, such as the United Kingdom, the FRG and Japan; nuclear threshold countries, such as India, Pakistan, Argentina and Brazil; France, which at that time supported the views expressed by the first two groups of countries; the Soviet Union, which was not really sorry to be opposing the USA; and a number of countries which did not think it would be any easier to persuade India to abandon its heavy water reactors and reprocessing facilities than to convince it to accede to the NPT. At that time, moreover, the international press reported that a Pakistani engineer who had been training in the uranium enrichment facility at Almelo, in the Netherlands, had fled to Pakistan with plans of the facility and a list of possible suppliers of crucial components. The obvious question asked was — what would be the use of a uranium enrichment facility to a country operating only a natural uranium reactor? The obvious answer — that reprocessing was not the only, and perhaps not even the best way for a would-be proliferator to acquire fissile material — did not strengthen the position of the US delegation in INFCE.

The INFCE exercise — a very costly one — came to an end in February 1980. One of its beneficial effects was to reduce the level of acrimony between nuclear suppliers and importing countries caused by the so-called ‘London Guidelines’ and new US legislation. Not that any country was persuaded by the others’ arguments, but each had an opportunity to assess how isolated it might become given its present position and how much support it might receive if it adopted another position. In that sense, INFCE was a good lesson in pragmatism. No one considering the exercise in retrospect would take pride in its technical aspects. In particular, the figures bandied about by the experts for nuclear facilities in operation and uranium consumption worldwide in the year 2000 simply demonstrate that predicting is a very difficult pastime. The political conclusions, however, still represent the ‘common ground’ of all countries as regards nuclear energy. The INFCE report states that non-proliferation is basically a political issue which cannot be resolved through technical fixes alone and that each country has the right

to decide its own energy policy in accordance with the resources available to it and with the economic, financial, environmental and public opinion constraints to which it is subject. Thus, the views of the USA did not receive much support from other countries.

Contrary to what some people expected, however, that failure proved to be a major victory for the non-proliferation regime: the threshold countries remained isolated; none of the NPT parties decided to withdraw from the NPT; and no support was forthcoming for those who — especially in France — maintained that the activities associated with harnessing nuclear energy were innocuous and that international nuclear trade need not be regulated. Refusing to move towards a system based on technical solutions, a large number of countries strongly endorsed the existing non-proliferation regime based on political commitments, IAEA safeguards and — despite the criticisms of the 'London Guidelines' — export controls.

It would be wrong to leave INFCE without mentioning the exceptional role played in the exercise by Abram Chayes, who chaired the main body — the Technical Co-ordination Committee. As an American, he was, at the beginning, regarded with suspicion by all those who opposed the Carter Administration's nuclear policy, and he was appointed Chairman of the Technical Co-ordination Committee only for its first session, it being understood that someone from another country might well be appointed Chairman for the second session — and so on. He proved to be such an outstanding Chairman, however, that at the end of the first and subsequent sessions all delegations enthusiastically agreed that he should remain in the chair. The Committee had no clear mandate and no rules of procedure, and he had to arbitrate between totally opposed positions and take into account strong nuclear industry interests, but he enjoyed the situation enormously. Like a tightrope walker twisting his own rope as he progresses, Abram Chayes would time and again discern the shadow of a generally acceptable idea and, building on it, lead the Committee to what he felt to be the consensus. His chairmanship was an artistic tour de force; it lasted more than two years, and he never failed.

Following INFCE, there was established within the IAEA a Committee on International Plutonium Storage, which failed to agree on anything and was disbanded after a while. In addition, the Board established a Committee on Assurances of Supply (CAS) to examine what kinds of international solution could be provided under the IAEA's auspices if a supplier refused — in breach of contract — to deliver nuclear fuel to the customer. Although CAS

has not met for several years, it still exists, but in a market where supply far exceeds demand and all suppliers are applying the same rules it is hard to demonstrate the need for a special mechanism.

During INFCE there was a sudden shift in focus from the politics to the safety of nuclear energy, with reports of an accident in a nuclear power reactor at Three Mile Island in the USA. For several days it was not clear whether the accident could be managed successfully. In the end, no one was injured and no radiation escaped from the reactor, which was safely shut down. Afterwards, the US authorities did a remarkable job of clarifying all aspects of the accident — the deficiencies at both the local and the national levels. They did not try to hide anything, and their frank description of all deficiencies was an impressive demonstration of the advantages of a democratic system. After the accident (which should perhaps have been referred to as an 'incident'), many important measures were taken in a number of countries to improve nuclear power plant safety, which became a top priority issue.

Nevertheless, the impact of the Three Mile Island accident on public opinion was very negative. For several years already, environmentalists — in particular those associated with Ralph Nader — had been raising doubts about the safety of nuclear power plants, and the so-called Rasmussen Committee had pointed to the risk of a fuel meltdown in the event of a loss-of-coolant accident in a light water reactor; there had even been a feature film, "The China Syndrome" (starring Jane Fonda and Jack Lemmon), about unscrupulous reactor operators paying insufficient attention to safety in order to maximize profits. The accident seemed to confirm all the fears which had been expressed, showing that the experts had been overconfident about their ability to operate nuclear power reactors safely. Not a single new power reactor order has been placed in the USA since 1979 and, although this has been due primarily to economic considerations, the Three Mile Island accident probably had something to do with it.

At that time, the role of the IAEA in the nuclear safety area was confined to facilitating information exchange and providing assistance (for example training) through its technical co-operation programmes. However, the Three Mile Island accident made it clear not only that far more attention would have to be paid to nuclear safety in future, but also that international co-operation in the nuclear safety area would have to be increased, perhaps with a corresponding increase in the role of the IAEA. Public opinion has come to demand — particularly as a result of the Chernobyl accident — the stringent

international regulation of all the world's nuclear power plants, and many people seem to believe that the IAEA is responsible for ensuring that all plants are built and operated properly and that it can order the shutdown of plants. But the incident at Three Mile Island has also demonstrated that, although an important factor, the nationalistic attitude of States to nuclear safety is not the only obstacle to wider international co-operation and a greater role for the IAEA in that field. Further reflection is necessary on what could in practice be the action of an international organization. The incident emphasized both the need for increased co-operation to prevent an accident and the difficulties of external intervention if an incident occurs.

Late in 1979, the IAEA's General Conference held its annual session in New Delhi — so far the last session held outside Vienna. In accordance with tradition, the President of the Conference was the host country's delegate, Homi Sethna, Chairman of the Indian Atomic Energy Commission and an accomplished and dynamic scientist regarded as a possible future candidate for the post of Director General. As usual, the President of the General Conference was also the Chairman of the Conference's General Committee, one task of which is to make recommendations regarding delegates' credentials. This task is generally conducted in a perfunctory manner, the Committee merely satisfying itself as to whether the credentials of a delegate have been signed by an appropriate representative of the country in question. Invariably in those days, a representative of an Arab country challenged the credentials of the Israeli delegate (this still happens at General Conference sessions), a representative of a country belonging to the Soviet bloc challenged those of the delegate of the Republic of Korea (South Korea) and a representative of an African country challenged those of the South African delegate. With no consensus in the General Committee, the Chairman would suggest that the Committee recommend the adoption by the Conference of those three delegates' credentials, and the suggestion was never turned down.

In 1979, however, as the usual scenario got under way, with Committee members speaking for or against acceptance of the credentials of the three 'sensitive' delegates, Homi Sethna took the floor less as Chairman of the Committee than as a representative of India and made an impassioned statement about the evils of apartheid which, he said, were in contradiction to the Statute of the Agency. He added that, if it came to a vote in the Committee regarding the South African delegate's credentials, he would vote in favour of a recommendation that they be rejected. It did come to a vote, and — against tradition — he voted, thereby creating in the Committee a majority in

favour of recommending that the credentials of the South African delegate be rejected — a recommendation which the Conference adopted by a large margin in plenary. Many delegates — probably even including some who shared his views about apartheid — felt that he had violated the convention that Presidents of the General Conference should be neutral in such matters. But a good number of them also regretted that, by courageously giving his personal convictions precedence over his procedural obligations, he had deliberately lost all chances of ever becoming Director General of the IAEA.

After such a succession of rather unusual events, one might have expected the IAEA to enter a period of comparative calm. However, the campaign leading to the election of a new Director General in September 1981 started in the autumn of 1980 already. It was a ruthless campaign, which initially involved six candidates but rapidly developed into a duel between two: the Ambassador of the Philippines in Vienna, Domingo Siazon, who was at the time also the Governor from the Philippines in the Board and is now the Philippines Foreign Minister; and the former State Secretary of the FRG's Federal Ministry for Research and Technology, Hans-Hilger Haunschild. Each candidate was supported by the diplomatic network of his country, feelers being put out in various capitals and at cocktail parties and dinners in Vienna. In the Board, at the suggestion of Domingo Siazon, a series of informal 'straw ballots' was conducted in order to assess the success or otherwise of initiatives being taken outside, and in the light of the results all but two of the candidates — Siazon and Haunschild — dropped out of the race. However, neither of the two remaining candidates could obtain the two thirds majority of votes in the Board necessary for election.

This situation was bad as it undermined the relations between developing and industrialized countries, at a time when all the nuclear threshold countries belonged to the Group of 77 while among the industrialized countries only France and Spain had not yet acceded to the NPT, and also at a time when there were still bitter disputes in progress between the two groups of countries over nuclear export controls — aggravated by the unfortunate discussions about the IAEA's technical co-operation budget.

Each of the two remaining candidates had his strong supporters, but also his determined opponents — not to say enemies. Neither was willing to step down, however, and the Chairman of the Board was preparing to state at the Board's June session (at which the election of the Director General normally takes place) that informal consultations would have to continue during the summer.

At that session, however, the item "Election of the Director General" passed almost unnoticed since, a few days before, on 7 June 1981, all radio and television networks reported that the Israeli Air Force had bombed and destroyed Tamuz-1, a research reactor being built by a French firm in Iraq, near Baghdad, despite all assurances given by the French Government and the fact that French experts were to be present at the site for some ten years and would no doubt have prevented any misuse of the reactor. The destruction of Tamuz was an unfair and unwarranted blow to the IAEA, since it showed that Israel did not trust the IAEA's safeguards to prevent a diversion of fissile material from the reactor. As the then Director General, Sigvard Eklund, told the United Nations, the blow was particularly resented because it had been dealt by a country operating nuclear facilities not under IAEA safeguards and capable of producing sizable amounts of weapons-grade plutonium. The aggression was unanimously condemned, with even the US authorities unable to say anything in support of an action so detrimental to the non-proliferation regime.

This time the idea of the IAEA being a purely scientific or technical organization was really shown to be a mere fiction; political considerations prevailed all down the line. In the bitter dispute which followed about whether Tamuz could have assisted the Iraqis in establishing a nuclear weapons programme, the Israeli authorities first tried to justify their actions by putting forward reasons which had no basis in the technical realities. After a while, however, their arguments became more serious. A Nobel Prize winner said one thing — a member of the National Academy of Sciences said exactly the opposite. They were equally sincere, and each had very strong and reasonable arguments, and the layman suddenly realized that science could not provide an answer to the question "What would have happened if Tamuz had not been destroyed?" It became clear that in such situations even scientists have to base their judgements on emotional and political considerations as much as on science and technology. They could explain in greater detail and more rationally the grounds for their conclusions, but in the end their conclusions were no more valid than anyone else's. Instead of a single absolute certainty, they could provide only contradictory guesses.

In September, during the 1981 session of the IAEA's General Conference, the atmosphere was very tense and the Israeli delegate had an armed bodyguard even within the conference premises at the Hofburg. Isolated but refusing to soften its stance, the Israeli delegation seemed to be at war. The situation was a clear demonstration that, without a credible

non-proliferation system, countries would have to live in fear that their nuclear facilities will suffer pre-emptive destruction or that, after carrying out a pre-emptive strike, they themselves will suffer armed retaliation. The message is still valid.

In the meantime, no solution had emerged as regards the election of a new Director General. Neither of the two remaining candidates seemed capable of gaining the necessary two thirds majority. A third candidate had been mentioned, Hans Blix, a former Swedish Foreign Minister, but when the General Conference convened in September the impression was that we were at an impasse. However, some delegates seemed to be more occupied with consultations outside the Hofburg than with the ongoing business of the General Conference, and in the middle of the week some people noticed a friendly man whom they had never met before chatting in the corridors of the Hofburg. Still, nothing concrete had emerged by late on the last day of the session. Then a Governor requested a special meeting of the Board, and the loudspeaker announcement that the plenary meeting of the General Conference was being suspended and that Governors should convene in a few minutes was a sign that perhaps things were moving. When the Board was assembled, in a fairly solemn atmosphere, the Chairman proposed one or more informal straw ballots involving three candidates, the two long-standing ones and Hans Blix. He added that if any of the three candidates obtained the required two thirds majority, the Board would meet in formal session to take a final decision. In the first ballot, one of the candidates failed by only one vote to obtain the required majority — a tribute, in most people's opinion, to his energetic campaign. A second ballot was held, and Hans Blix obtained more than two thirds of the votes. The Governor from the Philippines was participating in the meeting, and the announcement of the result was for him obviously a very serious blow, but he recovered quickly and, when the Board met in formal session a few minutes later, he himself proposed the election of Hans Blix by acclamation.

Late in the evening, the friendly man who had been seen a couple of days before chatting in the corridors of the Hofburg entered the Festsaal (the main conference hall), which was completely packed, to deliver his first speech as Director General of the IAEA. The atmosphere was electric, for this was the first time in 20 years that a new Director General had been elected. In addition, the newcomer did not belong to the nuclear establishment, had no scientific or technical background and was taking over responsibility for the IAEA at a time of confrontation, bitterness and resentment. All were eager to

witness his first appearance. When he began his speech, his voice was grave, but also soft and pleasant. In sharp contrast with the hectic atmosphere of the previous days, he was calm — but confident — and his words were to the point. He said what many people hoped he would say, avoiding all traps, building bridges between enemies and giving the impression that misunderstandings could be ironed out, with co-operation replacing confrontation. It was his first triumph, but his greatest triumph is that during the past 15 years he has done what he said he would do; despite all difficulties, he has attained his goals by taking account of Member States' concerns and ensuring an acceptable level of co-operation among Member States. He has handled crises like those involving Iraq and the DPRK with great courage, conviction, intelligence and skill, and he has demonstrated that he is what he seemed to be on that first day.

His election was the beginning of a new era in the history of the IAEA. At the head of an organization that was never a purely technical one, a Swedish diplomat succeeded a Swedish physicist, and somehow that suddenly seemed perfectly natural.

THE SUSPENSION OF  
US PARTICIPATION IN  
THE IAEA: 1982-1983

Roger Kirk



*Roger KIRK:* Ambassador Roger Kirk is a career Foreign Service Officer of the USA who served as the US Resident Representative to the IAEA from 1978 to 1983. Subsequently he was Principal Deputy Assistant Secretary in the Bureau of International Organization Affairs at the Department of State (1983–1985) and Ambassador to Romania (1985–1989). After a tour as Diplomat-in-Residence at Georgetown University in Washington, DC (1989–1990), he retired from the Foreign Service and became Adjunct Professor at Georgetown, teaching graduate seminars on international relations and Eastern Europe (1990–1994). He has also conducted seminars on foreign affairs organization in several former Soviet republics, is Vice Chairman of the Atlantic Council of the United States, and is Chairman of the Board of Trustees of the Washington International School. Previous positions included Principal Deputy Assistant Secretary in the Bureau of Intelligence and Research at the Department of State (1975–1978) and Ambassador to Somalia (1973–1975). Earlier he had diplomatic tours in Rome, Moscow, New Delhi and Saigon, as well as varied posts in the Department of State. A Phi Beta Kappa graduate of Princeton (1952), he did post-graduate work with George Kennan at the Johns Hopkins School of Advanced International Studies in Washington (1953). He co-authored a book entitled *Romania Versus the United States, Diplomacy of the Absurd: 1985–89*, St. Martin's Press, 1994, with Mircea Raceanu, former head of the Romanian Foreign Ministry's US Section. Ambassador Kirk is married to the former Madeleine Elizabeth Yaw. They have four children and twelve grandchildren, who also take a good deal of his time right now.

## INTRODUCTION

On June, 1981, Israeli warplanes bombed the Iraqi nuclear establishment at Osirak, on the grounds that the site was the scene of nuclear weapons work as well as non-military activities. Osirak was under the IAEA inspection regime, and IAEA inspectors had stated that they found no grounds to indicate that nuclear material was being used for military purposes there. On 8 June, the United Nations Security Council, with US concurrence, passed a resolution condemning the attack and asking Israel to pay compensation.

A few days later the regular June meeting of the IAEA Board of Governors adopted, with the USA abstaining, a resolution strongly condemning Israel for the “premeditated and unwarranted” attack and calling on the September 1981 IAEA General Conference “to consider the implications of this attack, including suspending the exercise by Israel of the rights and privileges of membership” in the IAEA.

At the September 1981 session of the General Conference, several States co-sponsored a resolution calling for suspension of Israel from membership in the IAEA. Once it became apparent that the resolution would not receive the two thirds vote needed to suspend a member, they amended their resolution so that it merely called for consideration of the suspension of Israel at the 1982 session of the General Conference. The amended resolution was passed with 51 votes for, 8 against and 27 abstentions, with the USA voting against.

PREPARATION FOR  
THE 1982 SESSION OF  
THE GENERAL CONFERENCE

The Israeli invasion and subsequent occupation of southern Lebanon in 1982 intensified anti-Israeli sentiment in the developing world, led to moves to exclude Israel from various world organizations, and promised a sharp debate on Israel’s relations with the IAEA at the 1982 General Conference. It was apparent to the US Government that there would be an attempt at that Conference to suspend Israel from the IAEA. There was also the possibility of an attempt to deny Israel’s credentials to participate in the Conference, a step which would not prevent Israel from participating in any IAEA activities other than the five-day General Conference itself.

Sentiment in the US Government was divided as to what to do should Israel be suspended from the IAEA or its General Conference credentials refused. There was great concern among Israel's supporters in Congress and elsewhere, however, that infringement of Israel's rights of participation in any UN-related organization would lead to moves against Israel all over the UN system. The US House of Representatives and Senate therefore passed virtually identical resolutions in June 1982, stating that the USA should suspend its participation in any UN organization which suspended Israel or denied its credentials and should withhold its assessed contribution to that organization until the action was reversed.

The State Department, conscious of the particular value of the IAEA and the US role in it, was not prepared to take such a tough line in the IAEA. It sent instructions to the US Mission in Vienna in August 1982, reiterating a position approved by the Secretary of State before the 1981 General Conference, to wit: "We would condemn exclusion of Israel from this conference via rejection of its credentials but take no further action. If Israel's rights and privileges of membership are suspended, we would withdraw from this General Conference and announce a reassessment of our policy regarding US participation in the IAEA."<sup>1</sup>

This was the position taken by US representatives around the world and in Vienna in the preparatory work for the Conference, although the US Mission in Vienna used only the part regarding suspension, as it felt that the less severe position on credentials rejection might make that route seem attractive to some countries. During the extensive consultations in capitals and Vienna before the General Conference began, it became apparent that a move for suspension of Israel from the IAEA was likely to be made but that it probably would not achieve the two thirds vote needed for passage. There was no indication from any quarter that Israel's credentials would be seriously challenged, and US representatives generally refrained from raising that possibility.

It should be noted here that it was the practice of the USA and several other countries to hold exhaustive advance consultations in capitals and in Vienna before each meeting of the IAEA General Conference and Board of Governors. The endeavour was to have good understanding, and if possible

<sup>1</sup> State Department Confidential Telegram 230946, 17 August 1982, to the US Embassy Vienna; declassified 16 August 1994.

agreement, on all the issues that were expected to arise in the formal sessions of these bodies. These consultations included not only US allies; they were also conducted with the Soviet delegation and with key non-aligned countries. Some of the chief tasks of the US Resident Representative were to learn what issues would come up at the forthcoming meeting, to recommend US positions on them, and, after receiving approval from Washington, to hold thorough discussions with key missions in Vienna on the issues involved.

This process was greatly facilitated by the fact that the various resident representatives in Vienna knew each other well, dealt with each other on a variety of issues in virtually all of the UN system organizations in the city, and for the most part had grown to trust and respect one another. This personal factor was of great importance in Vienna, as in other forums for multilateral diplomacy. Indeed, one of the rewards of multilateral diplomacy is that personal contacts and reputation can make a real difference in advancing a nation's interests.

The city of Vienna of course provided an abundance of attractive places where informal consultations could be held, and pleasant lunches or dinners often paved the way for smooth formal meetings later on. A secluded, velvet-appointed room in the Sacher Hotel, for example, was the stage for a luncheon the author hosted for a small group discussing a particularly difficult problem — the level of the technical assistance target for the year. The good food, discreet service and sense of history provided just what was needed to reach agreement.

These meetings at the resident representative level were supplemented by consultations in capitals, and the US Governor and/or Chief Delegate to the General Conference would arrive in Vienna a day or two in advance of the General Conference or Board of Governors session in order to complete the consultation process. The US schedule for those days always included a meeting with the Soviet delegation, for the two countries, despite their Cold War differences, had similar positions on most issues coming before the IAEA and considered it very important to be in agreement, if possible, on the questions expected to arise. In the US–Soviet meeting before the 1982 General Conference, the US side laid out its position on suspension of Israel or denial of its credentials and warned that it might react strongly if Israel's credentials were denied.

## THE 1982 GENERAL CONFERENCE

Once the General Conference opened, some States did take an initiative to seek the suspension of Israel from membership in the IAEA, but they dropped their attempt when it became apparent that a suspension resolution would not receive the necessary two thirds vote. They then launched an effort to reject Israel's credentials to the Conference. This would require only a majority vote, which they thought they might obtain. The General Committee, sitting as a Credentials Committee, did not challenge Israel's credentials, but it was clear that Israel's opponents would ask the plenary to amend the Committee's report so as to reject Israel's participation.

The morning of 24 September, two hours before the Conference was to vote on the Israeli credentials question, the US delegation received new instructions from Washington. These required the delegation to walk out of the Conference and announce a reassessment of US participation in the IAEA in the event the Conference rejected Israel's credentials. Telephonic protests to Washington at the change of instructions, particularly coming so late, were to no avail.

The US delegation then launched a frantic last-minute lobbying effort, telling every representative they could find what denial of Israeli credentials would now mean. The author remembers running around the Hofburg Café where delegates were having their pre-meeting coffee, spoiling the breakfast of those who were faced with a new and difficult voting decision or who feared the consequences for the IAEA if the USA walked out. Some delegates said they would reconsider their own position in the light of the US position, but most simply looked shocked.

A major problem for everyone was that delegates under general instructions to support anti-Israeli moves (and there were many) had no time to ask their capitals how they should vote in this specific instance in the face of the US position, nor did US missions in foreign capitals have time to lobby home governments to instruct their delegates to abstain or perhaps simply be absent from the hall when the critical vote came.

The Conference meeting room was full when the vote on Israel came up. The US delegation members were all there, sitting on the edge of their chairs, having previously given instructions to have trucks ready to remove the delegation's office equipment from the Hofburg in the event the vote went the wrong way (the delegation wanted to make it very clear that it was in fact going to leave the Conference under those circumstances).

The roll-call vote went agonizingly slowly. As it proceeded down the alphabet, US delegates continued to lobby those countries whose turn had not been reached. I tried to keep track of how countries voted, but soon lost my way. The head of the US delegation, sitting next to me, simply had a yellow pad with a "Yes" and "No" column and marked an "X" in the appropriate column each time a vote was announced. I watched in fascination as the two columns marched slowly down the page, sometimes one a little ahead, sometimes the other. In the end, the columns stopped on the same line on the pad. The vote was a tie, 40 to 40. The President of the Conference announced that the amendment had failed, as it required a majority of votes to pass. The US delegation, and many others, breathed a large sigh of relief, and the Conference turned to other business.

At this point the delegate from Madagascar asked for the floor and said that he had been present at the time of the vote and that he wished his "Yes" vote to be recorded and counted. It was not clear why the delegate had not voted if he had been present in the Conference Hall at the time of the ballot and there were reports that he had in fact been outside the hall and came in later.

The President of the Conference sought the advice of the Legal Advisor on whether the vote of the delegation of Madagascar could be recorded and counted. The Legal Advisor said that in his view the vote should be counted in the result.

The Legal Adviser's ruling was a surprise and a shock to the US delegation, which had expected that, in accordance with what it thought was normal UN practice, Madagascar's vote would have been disallowed. The delegation moved to have the ruling reversed, but this motion failed to obtain the necessary majority. The delegation then withdrew from the hall, packed its supplies in the waiting trucks, and drove to the US Mission to report to Washington and consider the next steps.

The rejection of Israel's credentials affected only Israel's participation in the particular General Conference session in question, which concluded on the day of the credentials vote. The Director General of the IAEA clarified this point in a letter he sent to the US Government in October stating that Israel "remains a Member State and can continue to participate in Agency activities". After a short delay and consultations with the USA, Israel resumed its participation in IAEA activities early in the following year (1983).

US REACTION TO THE REJECTION OF  
ISRAEL'S CREDENTIALS

The USA had committed itself to a "reassessment" of its participation in the IAEA, but it was not clear what that meant. There were arguments in Washington and the US Mission in Vienna as to whether the USA should continue to participate in Agency activities and/or make its regular payments to the IAEA while the "reassessment" went on, but it was decided to suspend participation in IAEA activities and stop all payments to the IAEA. It was still not clear how the "reassessment" would proceed, what the USA would do once it was completed, and what the USA would require to resume participation in and payments to the IAEA.

The United States Government was in a dilemma. Although it remained adamantly opposed to discriminatory action against Israel, it realized that its non-participation was damaging the IAEA, whose work it valued highly. IAEA technical meetings and symposia were severely handicapped by the absence of US experts. The Agency was quickly drawing down its cash reserves, and appeals to other major States for advance payments were producing insignificant results. The Agency was curtailing expenses, sometimes at the cost of useful programmes. Some States' annual payments to the IAEA would arrive early in 1983, but the Agency would have to make very severe programme cuts by the second quarter of 1983 if no US payments were forthcoming. The issues were hotly debated within the US executive branch. The US Government's reassessment of US participation in the IAEA nevertheless concluded that the USA should resume participation in and payments to the IAEA.

Just before Christmas, however, Congress, on the initiative of Senator Kasten of Wisconsin, inserted into the continuing resolution funding the Department of State for Fiscal Year 83 (1 October 1982 to 30 September 1983) a provision stating that none of the funds should be used for US contributions to the IAEA "unless the Board of Governors of the IAEA certifies to the US Government that the state of Israel is allowed to participate fully as a member nation in the activities of that Agency and the Secretary of State transmits that certificate to the Speaker of the House of Representatives and the President of the US Senate".

President Reagan accepted the executive branch recommendation that the USA should resume participation in the IAEA, but he noted that the Congressional requirement of IAEA Board certification of Israel's full participation had to be satisfied before the USA could make any payments to the

Agency. It was apparent that a way would have to be found to fulfil this requirement at the next IAEA Board meeting, in February 1983, if the Agency was to avoid severe disruption of its work.

‘CERTIFYING’ ISRAEL AS  
A FULLY PARTICIPATING IAEA MEMBER

The certification requirement presented a formidable challenge. The 34 Members of the 1982–1983 IAEA Board of Governors included representatives of countries such as the Libyan Arab Jamahiriya and Algeria, which were bitter opponents of Israel, as well as several others — including Ambassador Emil Koblížek of Czechoslovakia, the Board Chairman — whose governments did not recognize Israel and had voted for suspension of Israeli credentials at the IAEA General Conference.

Most of these countries wanted the USA back in the IAEA, but they did not want to “repudiate” the General Conference’s earlier action. Moreover, a number of delegates from all geographical areas resented what they characterized as the US “arrogance” in asking for a “certification” from the Board of an independent international agency before making legally assessed payments to that agency.

The US delegation in Vienna immediately undertook intensive consultations as to how to achieve the necessary certification. These consultations revealed that virtually all 34 Board members were willing, in order to bring the USA back into the IAEA, to tolerate some form of acknowledgement that Israel was participating in the work of the Agency. A Board resolution to that effect was the obvious solution, and Washington suggested a moderate text. The consultations in Vienna also revealed, however, that it would be impossible to pass such a resolution in the Board. It would be either rejected or amended in a way critical of Israel that would make it unacceptable to the US Congress. Some other tactic had to be found.

Board Chairman Koblížek, whose contribution throughout the discussions was outstanding, raised with the US delegation the possibility of Director General Blix, in his customary oral report to the Board on developments over the previous five months, noting that he had informed the USA in October that Israel was a fully participating member of the IAEA. Ambassador Koblížek said that he could announce from the chair, immediately after the Director General’s report, that he took it that the Board noted and/or endorsed

the Director General's report. In the absence of instant objection by a Board member, he would assume the Board agreed and gavel the question closed. Director General Blix could then send a letter to the US Government repeating his earlier assurance that Israel was a fully participating member of the IAEA and stating that the Board of Governors had accepted his position.

Ambassador Keblůšek, his Soviet colleague, Ambassador Khlestov, and others conferred intensively with the Director General and other delegations over the wording of the two statements and the feasibility of avoiding objection to them by any delegation during the Board session. They kept in touch with me, and I recall many occasions spent poring over drafts with Ambassador Keblůšek, adding and deleting words, trying to find phraseology weak enough for the Board but strong enough for Congress. In all of these discussions, the excellent knowledge of English on the part of all the principal players was of immense value, as we could discuss the fine points of an English text without any translation or risk of misunderstanding. The delegation reported regularly to Washington, pointing out that the best we could get would be a scenario of this nature, a fact confirmed by US contacts with leaders of the non-aligned and Arab delegations.

It was a great relief to all involved when Washington told the Mission that the Department of State, under the leadership of the US Governor of the IAEA, Richard Kennedy, had persuaded Senator Kasten to agree to accept, as the "certification" the law required, a letter from the Director General of the IAEA to the Secretary of State stating that Israel was a fully participating member of the IAEA and that his statement was acceptable to the IAEA Board of Governors.

Another issue raised in Washington was whether the USA should participate in the February Board meeting until the Israeli matter had been settled. The US delegation, after talking with the principal players in the proposed scenario, strongly urged that the USA be present, both as a sign of good faith and in case last-minute pressure or negotiations were necessary. Washington accepted this recommendation, and Ambassador Kennedy went to attend the meeting.

The February Board session was, as usual, to open with the Director General's report. The room was full, the atmosphere tense. Everyone knew what was planned. No one knew what would happen. An objection, or even a comment, on the Director General's or Chairman's statements by any delegation could force others to speak and the whole scenario to unravel. The Libyan delegation in particular was on the US delegation's mind.

The Director General made his oral report, including the planned statement about Israel. Ambassador Keblůšek, as Board Chairman, then stated

that he took it that the Board accepted the Director General's report. Everyone held their breath. No delegate asked for the floor. After what seemed an eternity, Ambassador Keblúšek brought down his gavel. The Indian representative did then make a brief statement going along with the Chairman's ruling but making some points of law and substance about the matter. No one else spoke, and the Chairman turned to the next agenda item. The relief around the room was palpable, and nowhere more than in the US delegation.

The Director General duly sent his letter to the State Department, which forwarded it to Congress. US payments to the IAEA resumed shortly thereafter, and life returned to normal for the US team in Vienna.

#### IMPLICATIONS FOR MULTILATERAL DIPLOMACY IN GENERAL

These events have several important implications for the conduct of multilateral diplomacy. They show, first, how essential to successful multilateral diplomacy are careful advance consultations with the other countries involved. This requires determining one's own government's desired position well in advance, propounding it to other nations, and possibly adjusting it in the light of those consultations. Thus the fact that the USA made it clear well in advance that suspension of Israel would lead to a reassessment of US policy towards the IAEA was instrumental in heading off a suspension. That the USA said it would react so strongly to a rejection of Israel's credentials only some two hours before the vote did not allow enough time for the US representatives to use this US position to stave off such a rejection. Even another hour or two would probably have enabled the US delegation to capture the one or two votes needed. A week would have permitted approaches in capitals that almost surely would have accomplished this end.

On the other hand, patient and careful consultations in Vienna and capitals regarding the "certification" required by Congress were instrumental in determining what was feasible and what was not and in developing a procedure and a formula that could pass the Board of Governors. The consultations gave the other members of the Board the feeling that their interests had been considered and that they had a stake in a successful outcome, persuading them to reject pressure to stick to a harder line. Similar consultations with the US Congress convinced key members of that body to agree in advance to

a very indirect form of “certification”, which was clearly the most that could be obtained from the IAEA Board.

These events also show how rivals, in this case the USA and the Soviet bloc, can co-operate when their interests coincide on a critical issue, even though their overall relations are strained. It was not only Soviet bloc acquiescence that was required in this case; the Czech Board Chairman had to take a leading role in propounding and carrying out the agreed formula, and he did so very ably.

Finally, these events illustrate how nations can avoid getting caught up on questions of form if they apply careful diplomacy and a recognition of concrete interests. Many members of the Board, including the Soviet bloc, did not recognize Israel. They and others had voted in favour of rejection of Israel’s credentials at the 1982 General Conference. Yet they found it possible to let the “certification” proceed, indeed in some cases to play a major role in its adoption. This was possible because of the importance to them of US participation in the IAEA, and because the certification procedure was constructed, in co-operation with them, in such a way as not to pose the question of principle.

## CONCLUSION

Combined efforts accomplished a seemingly impossible task in Vienna in 1983 — obtaining a certification of full Israeli participation in the IAEA from a Board of Governors whose membership included many States hostile to Israel, including a radical like Libya, and whose Chairman, and Soviet representative, both of whom played key roles in the outcome, represented States that did not recognize Israel and had voted in favour of the motion that excluded Israel from the General Conference a few months before.

As noted above, fundamental to this successful outcome was the willingness of the governments concerned to allow their representatives to be flexible on matters of doctrine in the interest of their principal priority, the effective functioning of the IAEA. The US ability to persuade its Congress to accept something less than a formal Board resolution was likewise crucial. But the co-operative and mutually respectful relationship among the national representatives in Vienna, and the IAEA Director General, was also fundamental to the operation.

Finally, this experience clearly shows the value of countries being represented at the seats of important international organizations by individuals

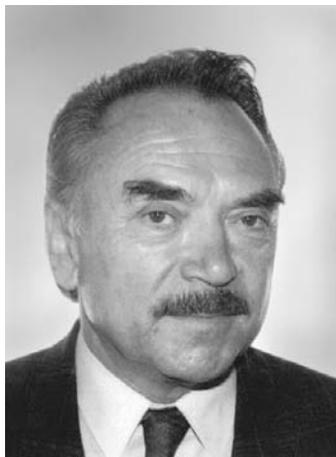
who are skilled in multilateral negotiations and who remain on post long enough to build up good personal relations with their colleagues, and of having a person with first-class diplomatic skills as head of the international organization involved.

As it turned out, the whole experience, trying as it was, was one of the most interesting and rewarding of the author's 37-year diplomatic career, and he would like to record here his gratitude to all those who played such constructive roles in it.



THE SPIRIT OF VIENNA

Emil Keblúšek



*JUDr. Emil KEBLÚ'EK* was born on 21 January 1932 in Petrovice, Slovakia. His university education was obtained at: Prague School of Economics (1951–1953); Institute of International Relations, Moscow (1953–1959); Charles University — doctorate of international law (1959–1961); and the Diplomatic Academy, Moscow — postgraduate studies (1986). For many years, he worked in the Czechoslovak Ministry of Foreign Affairs: 1963–1965 Head of African Section; 1969–1971 Deputy Secretary-General of the Ministry; 1973–1974 Head, Political Information Department; 1974–1976 Director, Cabinet Office; 1984–1988 Advisor to the Prime Minister and Chief Advisor to the Foreign Minister (strategic foreign policy and economic questions).

His foreign assignments include: Chargé d'Affaires a.i. Lagos, Nigeria (1962–1963); Ambassador to the Republic of Zambia and to the Republic of Botswana (1965–1969); Ambassador and Permanent Representative to the International Organizations in Vienna (1976–1984); Chairman and Vice-Chairman of the Board of Governors of the IAEA in Vienna (1978–1983); President of the General Conference of the IAEA; Chairman of the Board of UNIDO; member of the Board of IIASA in Vienna (1978–1984); member of the Governmental delegations to the UN General Assembly (1973–1988); member of the delegation to the CSCE Conferences in Helsinki; Ambassador Extraordinary and Plenipotentiary to the Republic of Cyprus (1988–1992); Initiator and organizer of the intercommunal dialogue between the political parties in the divided Cyprus (1988–1992).

The IAEA has a special status within the family of UN organizations; this was indeed the intention of the founding fathers 40 years ago. The purpose was to share knowledge about nuclear energy for peaceful applications and to improve and implement technical and institutional safeguards against its misuse. If we can say that the world has been rescued from a nuclear catastrophe, then we have to add that this achievement is partly due to the active role of the Agency.

The subject matter of the Agency's work is intrinsically a conflicting one. A small group of those who have been able to produce nuclear weapons of mass destruction is very often opposed by another small group of countries that would like to legalize their status as nuclear weapon countries. The ownership of nuclear weapons, or even the technological capability to produce them, is an important asset in the power game.

It is therefore essential that the majority of countries which have never had the ambition, or the capacity, to go nuclear in weaponry will have confidence that their restraint is appreciated and secured by a system of safeguards measures which will give them the assurances of non-proliferation.

At the same time, it is the moral obligation of nuclear weapon countries to share their knowledge and experience with the Member States of the IAEA, and again effective safeguards are a prerequisite for the ability to carry out valuable programmes of assistance in such fields as health and agriculture.

There is no doubt about the political importance of the basic Agency programmes. At the same time, the secret of their effectiveness has been the restraint shown by Member States in introducing conflicting political issues that are not directly relevant to the activities of the Agency and, indeed, to its Statute.

The possibility of restricting the Agency's scope to technical matters has brought effectiveness to the activity of the staff and to the utilization of financial resources. This principle has been one of the secrets of the stable nature of all the programmes of the IAEA.

The Member States acted with an understanding of their responsibility to humanity even in the period of international tensions between opposing politico-military blocs, keeping the Agency as a sort of safe haven. The relations between the USA and other nuclear countries (the United Kingdom, France, China and the USSR) were of a special character and the foundation stone of the progress of the Agency.

In this way, the IAEA was able to withstand the attempt of some of the Member States to introduce sensitive political issues which were of the utmost importance for them at a particular moment, but which could have

derailed the major programmes of the Agency and thus be counterproductive for these countries themselves. In the period of confrontation it was relatively easy to introduce issues which were everyday subjects of discussion in international organizations of a political character. The experience of the IAEA shows that there should be a mechanism introduced within the rules of procedure which would give a chance to the countries concerned to air their grievances in a proper forum but which would, however, avoid any process of decision making on major issues.

In the relatively short history of the IAEA there have been several occasions where it was necessary to exercise a major effort in order to avoid a crisis.

One such case occurred at the regular session of the General Conference in 1982. It was at the end of the Conference that, during the consideration of an item concerning the examination of delegates' credentials, a motion was introduced to amend the draft resolution by the addition of the words: "with the exception of the credentials of the delegation from Israel." This proposal was strongly opposed by some delegations because it appeared to be inspired by political considerations and was contrary to the Statute and the practice of the IAEA. It would be equivalent to suspension of the privileges and rights of a Member — which could be decided only by a two-thirds majority — and was against the principle of universality. Some delegations argued that their governments had already condemned the Israeli attack on the Iraqi research reactor. It was stressed by the delegation of the USA that in the event of de facto suspension of the exercise by Israel of the rights and privileges of membership (which would be illegal), it would withdraw from the current session of the General Conference and the Government of the USA would reconsider its participation in the Agency's work. In the vote that followed the amendment, there were 40 votes in favour and 40 against, with 6 abstentions. Therefore, according to the Rules of Procedure (Rule 78), the amendment was not adopted.

However, after the ruling of the President, the delegate of Madagascar explained that he had been present at the time of the vote and that he wished his vote to be recorded as 'yes'.

After this intervention, the President invited the Director of the Legal Division to give advice on the question of the vote of the Malagasy delegation. The advice was that the vote of this delegation should be counted in the result. This was objected to by some delegations as being a reconsideration of a ballot which had already taken place and the result of which been announced by the President. The decision to hold a fresh ballot required a two-thirds majority.

Finally, the President ruled, on the basis of the opinion of the Director of the Legal Division, that the vote of the Malagasy delegation should be taken into account. In the following ballot there were 41 votes in favour and 39 against, with 4 abstentions.

As a result, some delegations declared that the Agency by this ruling had become politicized and this was unacceptable to their governments. In the circumstances, the delegation of the USA stated that it must withdraw from the General Conference and that the Government of the USA would reassess its policy regarding US support for participation in the IAEA and its activities. In September 1982, the US Government decided to suspend its participation in the activities of the Agency.

These were the circumstances when I was elected to the Chair of the Board of Governors at its first meeting after the General Conference.

It was clear to everyone that without the participation of the USA the whole functioning of the Agency would be in jeopardy. This position was shared by all members of the Board. Having in mind possible financial difficulties, the Director General had wisely introduced a programme of austerity in order to keep the Agency functioning in the major areas. At the same time it was necessary to start negotiations with the US Administration on their full return to support the Agency's activities. This was not an easy task owing to the position of the US Congress. At the same time it was not in the interests of the US Government to weaken the system of safeguards which lay as a keystone of the Agency's activities.

Delicate negotiations had to start as soon as possible with the Members of the Board and with the leaders of the geographical groups on the way out of this most serious crisis.

The negotiations with the US Ambassadors Kennedy and Kirk were very co-operative and constructive. It was necessary to negotiate the text of a statement that would enable the US Administration and the Congress to re-evaluate and reconsider US participation in the Agency. This position was accepted by all members of the Board.

Together with the Director General, Hans Blix, we established close contacts with Ambassadors Kennedy and Kirk, the Ambassador of the USSR, Oleg Khlestov, as well as other colleagues from the Diplomatic Corps.

It was imperative to establish a climate of co-operation between Member States — a prerequisite for the success of this effort. Personal contacts with the Director General and his staff and with the Governors were of paramount importance.

At the same time it was necessary to change the method of decision making, placing importance on the pre-negotiation of the outcome of the process. The existing procedure of putting all questions, even conflicting ones, straight before the Board would have been counterproductive in the changing circumstances. After consultations with Board members, the Chair introduced a method of pre-negotiations so that there was time for preparation of the positions of the governments for future Board meetings. The Governors were thus informed in time about all essential items of the next meeting and they could exercise flexibility during the actual sessions. They were able to assess the position of the other governments and to negotiate a compromise with the Chair. The major decisions were thus well prepared in time so as to avoid any unexpected development like the one that I presented earlier. The advice of the Governors during these pre-negotiations was highly appreciated and helpful.

The early reaction of the staff to this proposal was rather one of suspicion, although co-operative. It was welcomed by the Governors, since it gave them the time to prepare for the meetings. I am pleased to note that this method is now fully operational in the Agency.

During the period from the end of 1982 to the beginning of 1983, emphasis was placed on a complete and effective service by the Agency to Member States on promoting progress in the application of nuclear power for peaceful purposes and all other activities related to the Statute.

For the further effective functioning of the IAEA it was essential to create conditions for the application of universality in membership. Therefore, intensive negotiations progressed during the later part of 1982 and the early part of 1983, aimed at finding a formula which would enable the USA to conclude its assessment of the Agency and to fully participate once again in its activities.

Gradually the atmosphere changed from one of confrontation to one of co-operation. We were reaching the critical edge, where the final touch was needed to reach the expected results. This chance was provided by the invitation of the Austrian Government to the Diplomatic Corps to visit one of their famous winter resorts. This gave the opportunity to the Chair and to the Director General to finalize the text, to negotiate it through Ambassador Kirk with the US Administration and the Congress and to discuss the progress reached at different stages with fellow diplomats. For this purpose Ambassador Kirk established an on-the-spot communications centre for direct contacts with Congress, the State Department and Ambassador Kennedy in Washington. Ambassador Khlestov conferred intensively with the Foreign Ministry in Moscow.

It was certainly a time consuming process and therefore we were able to enjoy only 'window skiing'. Some relief during the almost 24 hour sessions was provided by the necessity for Oleg Khlestov to take care of his grandson, who had heroically accompanied us. Finally, the text was pre-consulted with colleagues on the spot and was made ready for the presentation to the Board meeting in February 1983.

The Director General in his statement to the Board on 22 February 1983 recalled that in a letter of 14 October 1982 sent to all members of the Board, he had described the factual and legal situation pertaining to Israel's position in the Agency — namely that Israel remained a fully participating member. Technical assistance to Israel had been suspended as a result of a resolution adopted by the General Conference in 1981. He intended, if so requested, to confirm to any interested State that this was the factual and legal situation.

The US delegation was in a position to complete the assessment and to renew its commitment to the Agency. But this was not quite the end of the story. It emerged again at the General Conference in September 1983 where I was elected President. The practical experience gained from the previous period paid its dividends. There were some attempts to introduce conflicting issues which were not directly related to the activities of the Agency. I was pleasantly surprised by the co-operative spirit even of those delegations which had their instructions to project political positions that might have distracted the attention of the General Conference. After intensive negotiations with the Chair it was possible to allocate an appropriate time and place for presentation of their views at a forum that could not derail the Agency and its future projects. Personal contacts between the Chair and the Director General and, indeed, other colleagues, helped to re-establish an atmosphere of co-operation which made it possible to accept resolutions aimed at strengthening the Agency.

The new mechanism of intensive pre-negotiations, personal explanations of intentions and expected results, as well as wide range of contacts, made it possible to establish what I call 'the spirit of Vienna'.



THE PERIOD 1980–1993

Richard T. Kennedy



*Richard T. KENNEDY* served as ambassador-at-large of the USA from December 1982 until January 1993. In that capacity, he was given the responsibility of Special Advisor to the Secretary of State on Non-Proliferation Policy and Nuclear Energy Affairs. He was also the US Representative to the IAEA and a member of the IAEA Board of Governors from 1981 until January 1993.

Ambassador Kennedy served as a senior staff member and Director for Staff Planning and Co-ordination at the National Security Council (1969–1973). From 1973 to 1975, he held the position of Deputy Assistant to the President for National Security Planning. He became a Commissioner of the Nuclear Regulatory Commission in 1975 and served for five years. Ambassador Kennedy in 1981 became Under Secretary for Management at the Department of State, a position he held until the end of 1982. From 1983 to 1989 Ambassador Kennedy was the US representative to the OECD Nuclear Energy Agency and served as Chairman of its Steering Committee for five years. He served for 30 years in the US Army, retiring in 1971 with the rank of Colonel.

Ambassador Kennedy received numerous awards, including the Distinguished Service Medal and the Legion of Merit. He graduated from the University of Rochester with a BA in Economics and was awarded an MBA with distinction from the Harvard University Graduate School of Business Administration. He was awarded the University of Rochester's Hutchinson Medal and the European and American Nuclear Society's Karl H. Bechurst Award. He is a member of the Board of Directors of the American Nuclear Society and of the International Nuclear Energy Academy.

## INTRODUCTION

The period 1980–1993 was noteworthy in many respects for the IAEA. It was a time of growth and consolidation; a time of new and unique challenges; and a time of ever increasing budgetary stringency. It was a time when the managerial and technical competence of the Agency's Secretariat was tested and was found well up to the task. Calls for broadening the membership on the Board of Governors were repeated while suggestions to this end continued to fall short of consensus. As Agency membership grew, the demands for services also grew in both safeguards and technical assistance. As technology expanded so did the need to disseminate it in consonance with the Agency's charter. Though there was seldom a pause in the intensity of Agency activity, a few signal events might be recalled.<sup>1</sup>

China joined the Agency and became a party to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), completing a safeguards agreement on the basis of a voluntary offer. Coincident with China's joining the Agency, the Board of Governors expanded its membership by one seat to accommodate the Chinese.

France also became a party to the NPT and for the first time all of the declared nuclear weapon States were members of the Treaty.

The accident at Chernobyl rocked the nuclear power world and engaged the Agency in an effort to enhance international safety programmes and information sharing. New conventions were initiated, providing for emergency assistance in the event of an accident and for early notification of an accident or incident.

The Democratic People's Republic of Korea completed its safeguards agreement after many years of delay only to initiate a continuing dispute over its materials declaration. This led ultimately to a finding of non-compliance with the safeguards agreement — a prelude to the ongoing effort to dismantle a nascent potential nuclear weapons programme, replacing it with a fully safeguarded nuclear power programme.

<sup>1</sup> This article is not intended as an historical report or summary of events of the period. Rather it is an anecdotal recollection of certain matters which were of signal significance in the Agency's affairs and in which the author was a participant.

These were but a few of the issues and events which confronted and engaged the Agency and its Policy-Making Organs over these years.

Three other matters, reported more fully in this article, were noteworthy for their having captured the attention of the Secretariat, the Board of Governors and the General Conference for extended periods and for their political and operational impact on the Agency. These were Israel's nuclear capabilities, Iraq's violation of its safeguards agreement, and South Africa's nuclear capabilities. The following is a discussion of each of these issues and events as they unfolded over the years.

### ISRAEL — RIGHTS AND PRIVILEGES OF MEMBERSHIP

In September 1982, at the twenty-fifth regular session of the General Conference, the first of these events unfolded with consequences which for a time threatened serious disruption to the Agency's programme. The roots were set in the early part of the previous year when Israel launched an air attack on the research reactor located in Iraq's nuclear research centre. There was serious and all but universal condemnation of this action as reflected in the United Nations Security Council resolutions on the subject. The IAEA General Conference of that year (1981) also deplored Israel's action, and intervention by a number of delegations related this action to other grievances reflective of the tensions in the Middle East. The matter was referred for further consideration at the 1982 General Conference.

A resolution was introduced at the 1982 General Conference by a number of States reiterating the condemnation of Israel's action and calling for withdrawal of its rights and privileges of membership. A vigorous debate followed. Iraq and its supporters argued that Israel had acted in ways inconsistent with the UN Charter and the Agency's Statute and in a way which undermined the Agency's safeguards system (Iraq was a signatory of the NPT and accordingly had accepted Agency safeguards). On the other side a number of States asserted that, however reprehensible Israel's action was, it was not grounds for withdrawal of the rights and privileges of membership in the Agency. Moreover, it was strongly argued by many that the principle of universality of membership must be protected. The General Conference ultimately expressed its serious displeasure over

Israel's action, urging its compliance with applicable Security Council resolutions but not terminating or suspending Israel's rights and privileges of membership.

Subsequently, near the end of the meeting, the General Committee's recommendation as to acceptance of credentials was brought to the floor. The Committee had split evenly in its vote to accept Israel's credentials. As it had forecast in the discussion of the earlier resolution, Iraq challenged the Committee's report and Israel's credentials. Again, a spirited and lengthy debate took place. This challenge, which had been raised without effect in previous years and was destined to be repeated in future years as well, was focused on the political implications of Israel's conduct in the Middle East generally and specifically on its attack on the Iraqi nuclear facility.

The USA quietly signalled that a decision to reject Israel's credentials would not be viewed favourably. Many other delegations expressed similar views. The USA further informed some delegations that, if the credentials were rejected, it would withdraw from participation in the General Conference and would reconsider the nature of its continued participation in the Agency's activities.

The debate was protracted and it was clear that the vote would be close, reflecting the intense feeling in the Conference. In the event, the vote was a tie and was so announced by the Conference President, with the result that the motion to reject Israel's credentials was defeated and the credentials were accepted. A certain delegation then rose to request that its vote opposing Israel's credentials be counted. This delegation previously had been reported absent. The President asked the Director of the Agency's Legal Division for his view and his recommended ruling. Surprisingly, the legal officer, citing precedents which seemed to many to be irrelevant to the case at hand, recommended that the late vote be included despite the fact that voting had been closed and the results announced. The President then ruled that the additional vote should be counted. As a consequence, Israel's credentials were rejected. As for Israel itself, this had little operational effect. The Conference was for all intents and purposes over and the rejection did not extend beyond that Conference.

The USA, however, announced its rejection of the ruling and its withdrawal from the Conference and further participation in Agency affairs on the grounds that the rejection of credentials was improper and unlawful under the Agency's Statute. Because of the nature of the ruling a number of other delegations also withdrew from the Conference.

The USA, true to its word, withdrew not just from the Conference but also from active participation in the Agency, including the Board of Governors. In fact, it absented itself from the Board meeting following the General Conference. This reflected concern that throughout the UN system, Israel's participation and privileges of membership were under increasing attack on purely political grounds which the USA considered both unjustified and inappropriate in world organizations.

Nevertheless, whatever its intention, the US action sent a shock wave through the Agency's membership and the Secretariat. In the eyes of much of the membership, it was unthinkable that the USA, a founder and major supporter of and leader in the Agency, could step aside as it had done. The USA, on the other hand, believed that a major principle was at issue which, if not asserted, could lead to an unravelling of the Statute and loss of credibility for the Agency.

The USA continued its non-participation, including withholding financial contributions, until the February 1983 meeting of the Board of Governors. At that meeting a statement from the Chair was read into the minutes of the meeting with the acquiescence of the Board, asserting that all of Israel's rights and privileges of membership were assured.

Meanwhile, the continued efforts throughout the United Nations system to single out Israel for condemnatory language resulted in a law being passed by the US Congress stating that the USA would not contribute to any organization in which Israel's rights and privileges of membership were infringed. As earlier observed, the issue of Israel's receipt of technical assistance from the IAEA did not arise since such technical assistance was not considered a right or privilege of membership in the Agency.

As a footnote, the issue did not end there but continued to be discussed in the Board and General Conference until the evolving Middle East peace process tended to lessen, at least for a time, the intense feeling in the Conference. This evolution in Middle East political relations was noted by the Conference President on behalf of the General Conference in September 1992, which set aside discussion of "Israel's Nuclear Capabilities", and was reflected in a statement by the President two years later restoring technical assistance to Israel.

This was a particularly graphic case of political events in a region (exacerbated in this situation by Israel's attack) having an effect which went beyond the Agency's mandate and its Statute. In the end, a potentially damaging effect on the Agency's programmes was averted and the Agency's Statute was affirmed.

IRAQ — A THREAT TO  
THE AGENCY'S CREDIBILITY

Iraq had been among the first to join the IAEA and among the first to join the NPT. The Agency had applied safeguards through the years in accord with the safeguards agreement governing Iraq's declared materials and activities.

In 1991, Iraq invaded and overran Kuwait, generating a strong reaction in much of the world. In response to Security Council Resolution 661 the IAEA Board of Governors suspended technical assistance to Iraq. Early in the following year a coalition of States undertook a major military effort which forced Iraq to return within its own borders. Almost immediately it became evident that Iraq had been engaged in a major effort to develop weapons of mass destruction, including biological, chemical and nuclear weapons and the means for their delivery. The Security Council quickly moved to demand the elimination of these programmes and put in place mechanisms for enforcement of the resolutions (UNSC Resolution 687). A Special Commission was established to oversee and conduct inspections to locate and destroy these capabilities.

Initially, the relationship between the UN Special Commission and the IAEA as concerned the nuclear programme was in some question. Ultimately, the IAEA's responsibility for enforcement of the resolutions, as they related to the nuclear aspects of the Iraqi programme, was affirmed, as was the relationship of the Director General to the Secretary General and the Security Council. Despite a moderately rough beginning, a reasonable *modus vivendi* was established which ensured that the effective application of the full powers and competence of both the UN Special Commission and the IAEA would be brought to bear while maintaining the essential relationship of the IAEA to the United Nations and the Secretary General as contemplated in the 'Relationship Agreement' between the United Nations and the IAEA.

At a special meeting of the Board of Governors (6 May 1991), the Director General advised the Board of the tasks entrusted to the Agency by UNSC Resolution 687, summarized as follows (GOV/INF/609):

- (a) To carry out immediate on-site inspection of Iraq's nuclear capabilities. An Agency team is to inspect all the locations declared by Iraq and also all those designated by the Special Commission.

- (b) To develop for submission to the Security Council within 45 days of adoption of the resolution a plan for the following:
  - (i) the taking of exclusive control for the custody and removal of all nuclear weapons usable material in Iraq;
  - (ii) the destruction, removal or rendering harmless, as appropriate, of all items listed in the Security Council resolution.
- (c) To carry out the plan outlined above within 45 days following approval of the plan by the Security Council.
- (d) To develop, within 120 days of adoption of the resolution and taking into account the rights and obligations of Iraq under the NPT, a plan for the future ongoing monitoring and verification of Iraq's compliance with its commitment not to acquire or develop nuclear weapons or nuclear weapons usable material or any subsystems or components or any research, development, support or manufacturing facilities related to the above.

This plan was to include an inventory of all nuclear material in Iraq subject to Agency verification. Also, the plan should provide for inspections to confirm that Agency safeguards cover all relevant nuclear activities in Iraq. Under UNSC Resolution 687, the right of Iraq to maintain a peaceful nuclear programme was preserved.

An Agency Action Team had already been established under the direction of Dr. Maurizio Zifferero, with Mr. Demetrius Perricos as Deputy Team Leader, to plan, co-ordinate and manage the Agency's action implementing UNSC Resolution 687. A letter had been sent to the Resident Representative of Iraq requesting a declaration of materials, equipment and activities in the nuclear field as required by the Security Council's resolutions and any other information which would assist the Agency in preparing and co-ordinating the required on-site inspection.

Unfortunately, Iraq's responses to this and subsequent requests were grudgingly provided and incomplete in detail. A series of on-site inspections proved both arduous and disturbingly illuminating. The arduous nature of the visits was illustrated by the now famous (or infamous) encounter in the 'parking lot' and the repeated instances of Iraq's interference or uncooperative response to Action Team requests. Nonetheless, the Action Team determined that Iraq had in fact been engaging in a significant programme for the enrichment of uranium which had not been disclosed or subjected to Agency safeguards. The Director General advised the Board of Governors at a special meeting on 18 July 1991 of his conclusion that because Iraq had conducted this

activity without submitting the relevant materials, facilities and installations to safeguards, it “was in non-compliance with its safeguards agreement with the IAEA.” The Board and successive General Conferences called upon Iraq to immediately provide a full and accurate accounting as required by its safeguards agreement and UNSC resolutions. The Security Council observed that Iraq had violated its obligations under the NPT.

The situation disclosed by the inspections in Iraq and Iraq’s long period of effective non-compliance with both UNSC and General Conference resolutions gave rise to criticisms of the Agency’s safeguards system. Agency members decried the potential damage to the credibility of the safeguards system and of the Agency itself. There were criticisms of the Agency and its system from outside as well and calls in some quarters for drastic revisions of the safeguards system or substitution of other systems for it. Fortunately, none of these drastic approaches were needed. The Board of Governors, however, undertook a review to strengthen the system with a view to ensuring that all existing Agency authority was effectively stated and employed. Initial steps to this end were approved by the Board of Governors in 1991, and this effort continues to this day.

At the outset, this event showed potential for serious damage to the credibility of the Agency and its safeguards system. The immediate response of the Secretariat, with full support from the Board of Governors, averted what could have been perceived as a serious shortcoming and possibly a fatal failure of the system and of the Agency. The dedicated professionalism displayed by the Secretariat and the determined effort to fully implement the Security Council’s resolutions soon demonstrated the Agency’s effectiveness. At the same time, weaknesses in the implementation of the safeguards system were disclosed and corrected by prompt action of the Board of Governors.

#### SOUTH AFRICA — A REVERSAL OF COURSE

Since the early 1970s, South Africa had not been seated in the Board of Governors or had any active participation in Agency affairs. This situation was the consequence of Security Council resolutions and resolutions of the General Assembly. Nevertheless, limited Agency safeguards continued to be applied in accordance with a long standing safeguards agreement with South Africa. There had been repeated calls, however, both at the United Nations and at the IAEA for South Africa to undertake a full scope safeguards agreement with the Agency. Underlying the debate in both forums was an all but

universal abhorrence of South Africa's apartheid policy of racial discrimination which generated consistent resolutions calling for the expulsion of South Africa from UN related organizations on the basis of alleged violation of the UN Charter. Of direct concern to the IAEA was the charge that South Africa was in fact building a capability to produce nuclear weapons and thereby threatening the security of much of the African continent.

Throughout the period, many individual States, including the Depositary States of the NPT (USSR, UK and USA), had pressed South Africa to undertake a full scope safeguards agreement and to become a party to the NPT. These efforts were seemingly of no avail. As a consequence, "South Africa's Nuclear Capabilities" became a staple on the agendas of the General Assembly and the IAEA General Conference. Eventually, in June 1987, the Board of Governors decided by a rare roll call vote to recommend to the General Conference at its September 1987 meeting that South Africa be suspended from the exercise of rights and privileges of membership in the Agency until it complied with previous General Conference resolutions and "conducts itself in accordance with the purposes and principles of the Charter of the United Nations." This decision was taken by majority vote, it having been determined by a previous vote that the matter did not require a two-thirds majority. A major consideration in the debate was the principle of universality of membership and the leverage for the Agency which continued membership by South Africa would afford through continuance of safeguards. The General Assembly calls for expulsion from all UN related organizations, however, proved to be a powerful incentive.

Individual States, including the NPT Depositaries, continued to urge South Africa to negotiate a full scope safeguards agreement with the Agency as a step towards establishing a nuclear free zone in southern Africa. Meanwhile, contacts between the South African authorities and the Director General continued.

The 1987 General Conference issued a call on South Africa to comply with previous resolutions but it took no further action except to direct that the matter be raised again at the General Conference in the following year. South Africa meanwhile proposed that safeguards be applied at its pilot scale enrichment plant and also at a waste repository then under construction. Progress continued on the political front and in safeguards discussions to the end that the General Conference continued to be seized of "South Africa's Nuclear Capabilities" as a matter of debate in successive annual meetings. At its meeting in September 1990, the General Conference, while urging continued

efforts to bring South Africa into compliance with existing resolutions, resolved to consider and take a decision at the 1991 General Conference on the “suspension of South Africa’s rights and privileges of membership” (GCXXXIV/RES/545).

In February 1991 the Director General had discussions in Vienna with South African officials concerning a full scope safeguards agreement and subsequently visited South Africa for consultations further to the February discussions. South Africa deposited its instruments of accession to the NPT in Washington on 10 July 1991. These matters were reported in a memorandum to the General Conference by the Director General on 29 August 1991. South Africa concluded a full scope safeguards agreement as required by its NPT membership shortly thereafter. The General Conference noted these actions and called upon the Director General to verify the inventory as reported by South Africa.

In 1993, in a statement which was unique in the annals of the worldwide effort to end the proliferation of nuclear weapons, South Africa announced that it had fabricated material for a small number of nuclear weapons. This material was made available to the Agency for verification, it having been disassembled from the devices, which in turn were destroyed. South Africa co-operated fully with the Agency in the verification of the inventory and in verifying the nature and extent of its nuclear activities.

This saga ended with the 1994 General Conference’s invitation to South Africa “to resume participation in all activities of the Agency” and a request that the Board of Governors “review the designation of South Africa to the Board” (GCXXXVIII/RES/18). On recommendation by the Board, South Africa was elected by the General Conference to a seat on the Board at the 1995 September meeting.

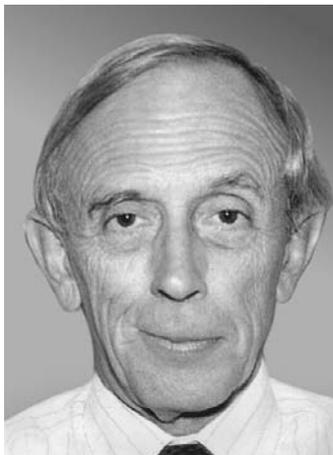
Thus a full reversal of course was completed by South Africa. This was the only case up to that time of a nuclear weapon State (albeit undeclared) to have embraced the NPT and given up all of its nuclear weapons unilaterally in full co-operation with the Agency’s safeguards system. This achievement, which led subsequently to an African Nuclear Weapons Free Zone, was in no small measure the result of the firmness of purpose of the Agency’s Policy-Making Organs and the technical competence of the Secretariat working closely together.



SAFEGUARDS AND THE IAEA  
BOARD OF GOVERNORS:  
1991–1993

*Iraq, a Necessary Stimulus  
for Handling the DPRK*

Michael Wilson



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## THE CHALLENGE OF IRAQ

It is now axiomatic that an intrusive inspection system is required to provide international assurance against the misuse or diversion of materials capable of being used to manufacture weapons of mass destruction. The START 1 and 2 Treaties, the Chemical Weapons Convention and the agreement on conventional forces in Europe, which were concluded in the last decade, incorporate systems of inspection which reflect the changes in attitude and policy since the IAEA pioneered a safeguards system in the late 1950s. When the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), whose principal purpose was to prevent the spread of nuclear weapons capability, entered into force in 1970 all non-nuclear-weapon States parties to the Treaty were required to accept comprehensive safeguards on their nuclear materials and to conclude a comprehensive safeguards agreement with the Agency. The executive council of the Agency, the Board of Governors, agreed in 1971 to the "structure and content" of the agreement.<sup>1</sup> The essential purpose of the agreement is to account as accurately as possible for all nuclear material under safeguards by tracking this material in the country "as it flows into, through or out of the national fuel cycle".<sup>2</sup> The agreement provided for regular accounting, physical inspections and instrumental surveillance and included a provision for a special inspection should the Agency have cause to believe that the information provided did not permit it to fulfil its responsibilities. This provision was not used in relation to suspected undeclared material until the case of the Democratic People's Republic of Korea (DPRK, or North Korea) in 1993.

From the early 1970s for about two decades the system was not called seriously into question. The Agency had been able to report annually to its Board of Governors that, with three exceptions in the early 1980s, there had been no diversion of nuclear materials from peaceful to military purposes. Confidence in the probity and reliability of the safeguards system grew and an increasing number of non-nuclear-weapon States became parties to the NPT as they recognized that their essential security interests were best served by renouncing the option of nuclear weapons. The verification system was not

<sup>1</sup> This is contained in the Agency's Information Circular No. 153, known as INFCIRC/153.

<sup>2</sup> FISCHER, D., *Towards 1995: The Prospects for Ending the Proliferation of Nuclear Weapons*, UNIDIR, Dartmouth Publishing, Aldershot (1993) 237.

infallible and a determined proliferator could — as in the case of Iraq — circumvent the system spectacularly. However, while Member States abided by the rules there was general public and Member State confidence in its efficacy.

After the Gulf War, the discovery of the full extent of Iraq's nuclear capability, which had not previously been revealed through Agency inspections, severely damaged the IAEA's reputation and international confidence in the safeguards system. The UN Special Commission for Iraq was established by the Security Council in 1991, led by Ambassador Rolf Ekeus, to search for evidence of Iraq's advanced capability for the manufacture of chemical and biological weapons and intermediate and long range missiles. The Security Council similarly asked the IAEA to map Iraq's nuclear capacity and to destroy, remove or render harmless the components of its nuclear weapon programme.

The revelations and findings of the IAEA of the evidence of Iraq's advanced nuclear capability, which had been acquired secretly, stimulated understandable fears and critical judgements of the quality of the Agency's verification system. Safeguards were held to be unreliable and, in the enthusiasm to find an obvious and relatively defenceless scapegoat, the Agency was perceived to be complacent and unobservant. The limitations on safeguards inspections, whose principles had been agreed by governments, were either disregarded or apparently not understood.

When Iraq joined the NPT in 1969 it concluded the required safeguards agreement (in 1972) with the Agency accounting for its entire nuclear inventory, which Iraq was required to declare and which was thereafter routinely inspected by the Agency. Its clandestine programme began later. The equipment and materials concerned were not added to the Iraqi nuclear inventory, as required under the agreement, and were consequently never inspected. The Agency had confined its inspections to the nuclear material in the facilities 'declared' in the inventory and had had no apparent cause to seek to inspect others.

This was a major cause of criticism when the clandestine programme became known. Why had the Agency not sent inspectors around Iraq to make random, spot checks at uninspected sites? This criticism took little or no account of the tightly controlled nature of the Iraqi regime, a condition now well understood. Agency inspectors are not international police. While the IAEA can require a 'special inspection' if it considers that the information provided by the State is deficient, its inspectors have no powers to search and enter without authority. Any such demand would have been resisted by Iraq and perceived by other members of the Agency as a political act and would have required at least the authority of the Agency's governing body — the

Board of Governors — and possibly also the support of the UN Security Council. I believe it is very questionable whether, even if the Agency had raised doubts about the Iraqi programme in the 1980s, there would have been sufficient support for special inspections given the political positions of some major powers then towards Iraq. Iraq was at war with the Islamic Republic of Iran from 1980 to 1988 and some of the permanent members of the Security Council and other major exporters of nuclear materials had made no secret of their marked preference, including through their nuclear export policies, for Iraq.

Did the Agency have any evidence about Iraq to cause it to have misgivings during the 1980s? The Agency operates effectively while Member States have confidence in the transparency of its operations. Director General Hans Blix is acutely aware of this principle. No Agency concerns were made known and the conclusion must fairly be that it had no such evidence.

Nevertheless, the Agency had difficulty defending itself. It could not deflect criticism by pointing to the former policies of principal suppliers to Iraq, who were also prominent members of the Agency and the Board of Governors, and who were in some measure responsible and had contributed in the 1980s to Iraq's clandestine nuclear development. It had to confine its defence to the limitations of the rules and practices of the safeguards system.

How an international organization with no intelligence gathering capability could have detected clandestine nuclear activity in Iraq when the resources of sophisticated national intelligence agencies had failed to do so was never convincingly explained. The Agency was fully aware of this contradiction but, mindful of its chief clients, was unable to use this argument publicly.

Some criticism of the Agency therefore was protective and a self-serving attempt to divert attention from misjudgements in policies or practice of industrialized suppliers. It became evident later from documents found by the IAEA in Iraqi possession that in the 1980s a number of States with advanced nuclear fuel cycles had permitted the export to Iraq of relevant materials and technology. Some had a dual use capability, i.e. were capable of being used either for legitimate industrial purposes or, in Iraq's case, a clandestine nuclear weapons programme. Some export policies seemed to have been administered carelessly with no particular concern about the intended end use of the materials or equipment. Whilst it is not suggested that these policies were deliberately aimed to assist Iraq to develop its nuclear capability, they appear to have been the by-products of policies, indifferent and damaging, which focused on the short term commercial advantages rather than the long term strategic implications.

The Agency's verification system was clearly porous. More rigorous control over export policies was a matter for governments, but the strengthening of the safeguards system was the concern of the Agency. The Director General and the Board of Governors responded vigorously. The criticisms and re-examination of policies had revealed that the limits of the safeguards system were not generally well understood and that changes and reforms were urgently needed, in both national and international policies, to restore confidence in the Agency and in an effective international safeguards system.

The Board, between 1991 and 1993, after more than thirty years of operating effectively in decent obscurity, temporarily found itself the object of international public and media attention. It responded to this pressure by adopting additional measures to strengthen the safeguards system which later proved to be essential political and technical underpinnings when the DPRK issue came up. Dr. Blix proposed that the Board of Governors strengthen the safeguards system by reaffirming the Agency's right of access to additional information and unrestricted access, through a special inspection, to any relevant location (i.e. to any site of possible safeguards concern). He emphasized that in any such eventuality the strong support of the international community, both in the Board of Governors and in the Security Council, would be essential.

The first proposal had two aspects. The Agency's own information base was strengthened by asking Member States to volunteer to provide it with additional reporting on exports and imports of nuclear material and, also, on specified equipment and certain non-nuclear materials used in nuclear plants and earlier advice on the design information of nuclear facilities. This was not contentious, although some substantial exporters were concerned about the administrative burden of additional reporting. Secondly, as the Agency does not have an independent intelligence capability and, apart from information gained by the application of safeguards, relies largely on public sources and what Member States might provide, it therefore proposed to use information provided by national sources. This caused misgivings in some government and academic circles as it was feared that the Agency's independence might be prejudiced and that it might become too dependent on Washington. The Board nevertheless endorsed this proposal, but declined to provide funds for additional staff for intelligence collection and assessment. (This contention was again raised during the DPRK consideration when the Agency drew on intelligence material of US origin. But the very irritation that the Agency's actions caused at times in some obsessional, recondite circles in Washington suggested a reasonably successful effort to remain independent.) The Board reaffirmed

the right of the Agency to call for a special inspection as set down in the safeguards agreements. This provision had never been used in relation to an undeclared nuclear facility and the Director General thought it prudent to remind Member States of this power and to secure endorsement of its continuing validity. This proved percipient because it was used in the DPRK case.

Should the safeguards system find a State in non-compliance with its safeguards obligations, the Agency's governing charter — the Statute — provides for recourse to the Security Council. The energy and application of the Security Council over Iraq heartened and impressed supporters of collective security and emphasized to Agency managers that possible recourse to the Council might be particularly relevant in any future crisis. The Director General was therefore anxious to secure the Board's understanding and support for this principle.

After the Gulf War, supplying countries also reviewed their export policies. Germany, Belgium and Switzerland, for instance, all of whom have significant nuclear industries, had refused until 1990 to insist that the importing State should accept comprehensive safeguards on its nuclear activities as a condition of supply of nuclear materials or equipment. In retrospect, such conditions could have been very relevant to the end use of exports to Iraq capable of nuclear application.

A Nuclear Suppliers' Group, a group of industrialized exporters of nuclear material and equipment, had existed since 1978 to try to co-ordinate national policies on the export of nuclear technology and material. Its consultations had lapsed in the 1980s', but in the wake of the Iraqi disclosures the Group was revived and participants agreed to new and tighter guidelines designed to ensure that nuclear exports (including dual use items) would be used solely for peaceful purposes and that there should be no nuclear exports to non-weapon States that did not have comprehensive IAEA safeguards. In essence, post-Gulf War suppliers agreed at the time to put security concerns ahead of commercial considerations.

These decisions, the Board of Governors' energetic responses and the Agency's successful investigations in Iraq and responsible analysis and reporting helped to restore the Agency's reputation, made it more alert and assertive in its approach to verification and more confident that it could rely on the positive support of the Board of Governors and the wider international community should there be another challenge. This came quickly.

Sensitized by the failures in detection and inconsistencies and weaknesses in national nuclear export policies, the international community took

up non-proliferation as the issue of the moment. Major changes were at hand. South Africa announced that it had produced six nuclear weapons which it dismantled before it acceded to the NPT in 1991, and placed all its facilities and equipment under full scope safeguards. France and China, both nuclear weapon States, accepted the international obligations of non-proliferation and became NPT parties in 1992. Argentina and Brazil, both of which had sizeable nuclear establishments but were not parties to the NPT, set up a bilateral safeguards authority and, together with the latter, negotiated an agreement with the IAEA which brought all nuclear material in the two countries under Agency safeguards. All the States of the former USSR other than Russia declared their intention to become or remain non-nuclear-weapon States. More States joined the Nuclear Suppliers' Group. Membership of the NPT became almost universal. Preparations began for the 1995 NPT Review and Extension Conference which would have to decide the crucial issue of the future of the international non-proliferation regime, the overarching legal structure for safeguards.

#### THE DPRK CASE

The circumstances of the dispute with the DPRK differed markedly from that with Iraq but the safeguards issue was essentially the same — the unqualified necessity for a full disclosure of the nuclear inventory to ensure that the international community would be confident that the State was engaged solely in peaceful activity. Iraq had been defeated in war, economic sanctions had been imposed, and the IAEA and the UN Special Commission on Iraq had wide powers of search and enquiry under successive Security Council resolutions. From time to time IAEA inspectors had reported to the Security Council that Iraq was seriously obstructing the search for and destruction of its nuclear potential and the Council had adopted resolutions to exert pressure on Iraq to comply.

The DPRK's safeguards agreement with the Agency was concluded about five years after the required date, which in itself caused disquiet and suspicion about the country's nuclear intentions. No accurate information about the extent of the DPRK's nuclear programme was available and reports persisted that the DPRK had begun amassing plutonium for a nuclear weapons capability. These reports were particularly unsettling on the Korean peninsula, in North East Asia and to other countries in the Asia-Pacific region. The DPRK therefore came under increasing pressure to observe its safeguards agreement in every respect.

Since the end of the three-year war between North and South Korea in the early 1950s, in which China participated on the North Korean side, and the USA, Australia, the United Kingdom and a number of other countries fought to assist South Korea, the DPRK has remained almost hermetically sealed against external influences. It has a struggling economy, low living standards, few friends — among them China and Russia — and a reputation for bizarre international behaviour. Large armed forces maintained a hostile posture towards the Republic of Korea (ROK, South Korea) and the US forces, with a nuclear weapons capability, stationed there. In enviable contrast, the ROK is an ‘economic tiger’, one of Asia’s modern economic miracles with spectacular economic achievements and wide diplomatic and political acceptance including by China and Russia.

Early in the 1990s, the DPRK seemed to have decided to come out of its shell. It joined the United Nations in September 1991 and at the end of that year signed a joint declaration with the ROK on the denuclearization of the Korean peninsula. The conclusion of a safeguards agreement with the IAEA followed quickly. Was this a genuine desire for reconciliation with the South; was the North struggling to come to terms with its self-imposed isolation and insecurity exacerbated by the South’s flourishing economy and international prestige; was it an attempt to buy time to proceed with weapons development? — speculation was prolific.

The DPRK provided the Agency in May 1992 with an initial report of its nuclear materials and design information about its nuclear facilities, and the Agency made six inspections up to January 1993 to verify its accuracy. It found inconsistencies in the accounting of the amount of plutonium declared by the DPRK, raising questions whether more plutonium had been produced than had been disclosed. Estimates of the amount of plutonium unaccounted for varied between a few grams and as much as 20 or 40 kg. (The IAEA defines the amount needed to make a nuclear weapon as about 8 kg.)

The Agency’s request for additional information and the right to inspect two nuclear waste sites to obtain accurate and complete information was refused principally on the grounds that the Agency’s accounting of the amount of plutonium was wrong, that it would involve access to military sites of no nuclear significance and that in requesting access the Agency had made use of information from a third party — the USA.

The DPRK’s challenge was met. At stake was the maintenance of international confidence in the safeguards regime and the Agency’s reputation after great efforts had been made to repair the failures over Iraq. The NPT

Review and Extension Conference was approaching and it was no time to appear weak before a challenge.

The Agency proved to have an unexpected talent for prudent and patient diplomacy. It had to persuade the DPRK to stay within the rules and fulfil its legal obligations but not in such a manner that might precipitate the DPRK to abrogate its responsibilities. It also had to balance the sentiment in some Member States that the DPRK, a small Asian State, was being unduly pressured by the West through the Agency, with the attitude from others that resolving the question about plutonium was an urgent issue adversely affecting the security of the ROK and Japan and should be pursued expeditiously. Sensitive management and judgement were demanded and provided — a skilful juggling performance. The Agency therefore moved firmly but cautiously, and strictly within the strengthened rules, to maintain contact and dialogue and gradually to try to verify the complete nuclear inventory.

The DPRK was also a skilful diplomatic player and, as later events proved, got results by a blend of threats and inducements. In March 1993, it announced intention to withdraw from the NPT, which would have terminated its safeguards agreement three months later, and relieved it of most of its legal obligations to the Agency, was well timed.

The issue of safeguards verification was not, however, the DPRK's main concern. What it wanted, and later achieved, was the withdrawal of US nuclear weapons from the ROK, suspension of an annual US military exercise with the ROK and direct bilateral talks with the USA. It was quite open about its basic purposes: "...we joined the NPT for the purpose of getting the US nuclear weapons withdrawn from South Korea, removing the US nuclear threat to us and denuclearizing the Korean peninsula..."<sup>3</sup>

Parallel with the Agency's efforts, a small advocacy group of Board Members, initially Australia, Canada, Japan and the USA, soon joined by the ROK, met periodically in 1992–1993 to review the position, make representations to the Director General, exert pressure on the DPRK at Board meetings and stimulate thinking of Board Members on the issue by lobbying in Vienna and home capitals. As the issue became more urgent in early 1993 the group met frequently, sometimes daily.

<sup>3</sup> IAEA document GOV/INF/673.

At first the group found it hard to get the support or even the attention of some Board Members. Some developing countries felt that the preoccupation with safeguards reflected an obsession with one issue which deflected interest and support from other Agency activities, primarily technical assistance, and distorted the Secretariat's functions and energies. The problems in the Korean peninsula were perceived to be so complex that continuing patient diplomacy was preferable to a preoccupied insistence on the application of the principles of safeguards. Among the developing countries, Egypt was particularly sympathetic and knowledgeable about the importance of effective safeguards.

Some industrialized countries also seemed slow to grasp the strategic implications of potentially unaccounted stocks of plutonium in an isolated authoritarian State with a sizeable nuclear industry located in a sensitive and tense geographical and political situation. It became evident from the Agency's inspections up to January 1993 that the DPRK was deliberately obstructing the investigations, going beyond reasonable differences in interpretation over legal and technical issues. The DPRK seemed to have something to hide.

Support in the Board for the Agency's efforts began to grow from the advocacy group's diplomatic pressure in Vienna and home capitals, from the demonstrated patience and professional persistence of the Director General and his colleagues, and from the accumulating evidence of DPRK obstruction of Agency inspections. The advocacy group was expanded: some European Union countries, notably France, joined. With the zeal of the recent convert, France was rigorous in its advocacy of the virtues of the principles of safeguards. The group prepared a draft resolution in early 1993 which would put the weight of governments behind the Agency's actions. The task then was to secure the co-sponsorship of as many members of the Board as possible.

When the matter came before the Board in February 1993, the Director General sought the Board's backing to request the DPRK to agree to inspection of the two disputed sites. With no conclusive results from the previous six inspections, the Agency and the sponsors of the draft resolution wished to increase the pressure to secure compliance. Not to do so would have left the Agency looking weak and raised renewed doubts about the safeguards regime. The draft resolution endorsing this approach was introduced by Australia on behalf of 22 members of the 35 member Board and approved without a vote. A key to its successful passage was the tacit support of China. It certainly had no wish to see the DPRK become a nuclear weapons power and it had many

reasons to encourage détente on the Korean peninsula. Though it did not believe that the DPRK should be backed into a corner, it was persuaded, through multiple lobbying in Beijing and Vienna, that this resolution was a reasonable expression of Board concern. What tipped the scales decisively in the Board and secured the very strong vote for the Director General's proposal was the display of a sequence of satellite photographs showing changes, intended to conceal its existence, in the external appearance of a suspected nuclear site in the DPRK — one which the Agency had persistently sought to visit. This was a unique experience, the first time the Board had made use of such intelligence material. It was consistent with the Director General's mandate, post-Iraq, to have access to and make use of additional information.

It was a watershed for the Board and the Agency too in other ways. The Board, which on this occasion met in closed session, rarely decided its business by resolutions and votes. It disdained this practice as unnecessary and undesirable in a technical agency where business was best concluded by consensus after a chairman's summary. This procedure had worked well in the club-like atmosphere which had evolved over thirty years. The Board included members of very long standing with professional memories, experience and a strong sense of decorum and appropriate professional behaviour. There was trepidation and anxiety, but in the end the Board acted decisively.

Once the Board had taken this decision, others followed more easily. In mid-March 1993 the Director General reported that the Agency had been unable to carry out the required inspections and on 1 April the Board concluded that the DPRK was in a state of non-compliance with its obligations and referred the issue to the Security Council. This judgement, in a resolution again introduced by Australia on behalf of more than twenty sponsors and adopted easily, was, on this occasion, opposed by China as exerting too much pressure on the DPRK.

At this point the Agency relinquished primary carriage of the issue to the Security Council or, in reality, to the permanent members of the Council, some of whom had barely disguised their impatience to remove it from the hands of the 'technical' agency. In the Security Council these five States have the power of veto and much greater control whereas in the Agency they were equal members in a body of 35 Board members accustomed to consensus and measured speed where their status related to the quality of their representation and policy contribution.

The Director General had recognized the realities of power and began to consult the permanent members of the Council independently of his consultations with other groups in the weeks before the matter went to New York.

The Security Council proved no better placed than the Agency to secure compliance. China, a permanent member of the Council with the power of veto, was reluctant to take precipitate action against the DPRK and was not prepared to contemplate the imposition of economic sanctions. Argentina and Brazil, then members of the Council and both non-NPT parties, had doctrinal difficulties about Council action pursuant to the NPT. There was loose rhetoric, not taken seriously, about possible military action in the event of persistent non-compliance.

The DPRK's intention to withdraw from the NPT would have taken effect in mid-June 1993. This proved to be the catalyst. The USA, faced with a choice between coercion and negotiation, began bilateral talks with the DPRK — an objective the DPRK had persistently sought and which, with long gaps between meetings, lasted until October 1994.

The Agency had an ambivalent role during these negotiations. It had no desire to complicate them by imprudent or untoward actions but it continued to try to complete its verification task, fearing that the nuclear material could deteriorate to the point where an accurate determination of the suspected existence of plutonium could be impractical.

After the Board suspended all technical assistance to the DPRK, the DPRK tightened the screws by announcing in June 1994 its decision to withdraw from the Agency. Inspections were suspended but resumed shortly before an agreement between the DPRK and the USA, the "Agreed Framework", was signed in October 1994. This agreement provided for the exchange of the DPRK's graphite moderated reactors and facilities with light water reactors, which would be 'proliferation resistant', i.e. in normal operation producing plutonium unsuitable for use in nuclear weapons. A further provision postponed by up to five years the IAEA's inspection of the two sites in dispute, leaving the issue of unaccounted plutonium unresolved in the meantime.

The security threat in the Korean peninsula has been reduced and the DPRK has made critical security concessions in accepting in due course a "freeze" of its nuclear programme (monitored by the IAEA) and the destruction of its suspected nuclear weapons capacity. From a safeguards perspective the agreement is flawed but when measured against the alternatives of stalemate or coercion it may have been about the best outcome possible.

Neither the Agency nor the Board of Governors were parties to the negotiations between the USA and the DPRK, which had proceeded without any mandate from the Board.

The Agency has had to accept that its right to inspect the disputed sites has been postponed and that the DPRK can continue to be in a state of non-compliance with its safeguards agreement. Director General Blix is a realist and in accepting the Agency's subordination put the best face on it.

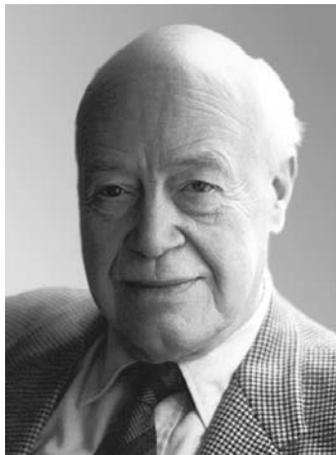
Potential proliferators might, however, reasonably conclude from this case study that intransigence can certainly have financial and strategic rewards. The Agency nevertheless came out of the matter well. It had a difficult, awkward, balancing role; negotiating with an obstructive client and being pressed frequently from all sides, including or especially by its strongest supporters, about the pace and direction of its actions. It came under much press and other public criticism and scrutiny. However, it managed to steer a reasonably independent course. For its part the DPRK underestimated the Agency's intrusive accuracy and technological sophistication, perhaps assuming that an international organization might have faltered over the long haul. However, it did not and the experience and lessons of Iraq were rewarded.

#### A C K N O W L E D G E M E N T S

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NON-PROLIFERATION  
AND THE IAEA

Bo Aler



*Bo Aler* was born in 1926. He obtained his Ph.D. in nuclear physics at Stockholm University in 1951. He served as Head of the Department of Nuclear Physics, Research Institute of National Defence, from 1952 to 1956. For the next nine years he worked at AB Atomenergi (now Studsvik AB) as Head of Management Staff and then Director of Administration.

From 1967 to 1969 he was Head of the Department for Technical R&D at the Ministry of Industry. He then left to take up the post of Managing Director of AB Atomenergi, becoming Working Chairman of the Board of Directors in 1979. In the Ministry of Energy and Environment, he served as Head of the Delegation for IAEA Affairs and Nuclear Consultant.

Bo Aler's official assignments included: Secretary of the Commission on Nuclear Energy (1955–1956); Expert to the Delegation for Atomic Energy Affairs (1956–1969); member of the Delegation's Reactor Safety Committee (1956–1967); Member of the Commission on Energy (1964–1970); Chairman of the Commission on Public Technical Procurement (1976–1978); Member of the Government's Advisory Board on Research and Science (1970–1979); and Member of the Science Research Council (1978–1983).

Amongst his international assignments, Bo Aler was a Member of the Swedish delegation to the IAEA (1956–1991) and Governor to the IAEA for Sweden for eight years during the period 1969–1991.

NUCLEAR ENERGY IN THE UNITED NATIONS:  
THE EARLY YEARS

The first awesome demonstration to the general public of the potential of nuclear energy came with the atomic bombs over Japan in August 1945. More than half a century has since passed and the world community has as yet not been able to reach an irreversible decision to eliminate all nuclear weapons. It was possible two years ago to achieve an indefinite extension of the Non-Proliferation Treaty (NPT), but tens of thousands of nuclear weapons are still in various stages of deployment and vast amounts of nuclear weapons material are still in storage without international supervision and control.

The IAEA celebrates its 40th anniversary at a time when at long last its most important function is being generally recognized, namely to ensure that nuclear energy is never again used for a military purpose. The Agency has achieved this through a long process that has inevitably been interwoven with, or rather entangled in, an interminable series of disarmament negotiations.

In July 1945, already before the atomic bombs fell on Japan, the USA and the United Kingdom approached Sweden with a proposal that all export of uranium be forbidden. The vast amounts of uranium contained in the low grade shale deposits in Sweden were well known to geologists. An agreement was proposed that would give the USA and the United Kingdom exclusive rights to all uranium deliveries for 30 years with an option for a 30 year prolongation. This was obviously part of a first attempt to try to control the future spread of any utilization of nuclear energy. Sweden turned down the proposal in September with reference to the new world organization, the United Nations.

When the United Nations General Assembly met for the first time in January 1946 in London, the three major powers together with Canada, France and China as co-sponsors made a proposal to establish a UN Atomic Energy Commission, UNAEC. The resolution was unanimously adopted and the Security Council countries plus Canada were elected as members. The UNAEC mandate has a familiar ring, namely to present proposals as follows:

- (a) "for extending between all nations the exchange of basic scientific information for peaceful ends;
- (b) for control of atomic energy to the extent necessary to ensure its use only for peaceful purposes;

- (c) for the elimination from national armaments of atomic weapons and all other weapons adaptable to mass destruction;
- (d) for effective safeguards by way of inspection and other means to protect complying States against the hazards of violations and evasions.”

It was not until the UNAEC was constituted that serious preparatory work was begun, mainly in the USA and the USSR. In June 1946, the USA presented a plan, known as the ‘Baruch Plan’ after the American delegate, which proposed that an International Atomic Development Authority (IADA) should be placed in charge of all dangerous activities, including ownership or control of all uranium and thorium mines and all facilities for the production of fissionable materials. These facilities should be located in different States in order to maintain a strategic balance, while harmless activities should be allowed — under supervision — in other individual States. A corps of inspectors should be responsible for supervision. In addition, there should be strong sanctions in order to secure adherence to IADA rules and under no circumstances should the veto rights be exercised in the Security Council with regard to these questions.

The Soviet counterproposal came already at the next meeting and was delivered by the USSR delegate, Andrei Gromyko. He proposed — with reference to the 1925 Geneva Protocol — that an international convention of indefinite duration be concluded, with an absolute ban on the use and production of nuclear weapons and the destruction of all existing nuclear weapons within three months. The signatories should within six months introduce national legislation with severe penalties for any breach of the convention, which implied that control of adherence was up to national authorities. The USSR proposal contained a complete draft for the convention and detailed rules for the work of the UNAEC, particularly emphasizing that it would be subordinate to the Security Council and that it was unthinkable that its veto rights should be waived.

The conflicts, however, remained unresolved and the UNAEC concluded its work at the end of 1949 after 200 sessions. In spite of this, it may be noted that a number of fundamental ideas were launched, and on many issues it was possible to come so close to agreement that it would take another 20 years of negotiations to arrive at the same point. Bertrand Goldschmidt has pointed out that Gromyko in 1947 presented a proposal for a control regime which in all essential respects is close to that of the NPT. It was rejected by the majority, who argued that “it is completely unrealistic to expect any nation to renounce atomic weapons without any assurance that all nations would be prevented

from producing them." While the work of the UNAEC was still in progress, the development of nuclear weapons continued in the USSR and the United Kingdom.

The first nuclear bomb explosion in the USSR in 1949 started an arms race between the nuclear weapon powers that continued for decades. President Eisenhower inherited a production capacity for nuclear weapons that was still in rapid expansion and a weapons development programme that resulted in the explosion of the first airborne thermonuclear bomb in 1953. It has been estimated that the US arsenal grew from 1000 nuclear charges in 1953 to 18 000 at the end of the decade. Information on the effects of nuclear weapons gradually increased and doubts about the reasons for a continued nuclear arms race were frequently expressed, also in Western Europe. Thoughts on preparing public opinion in the USA for a slowing down were put forward at the same time as ideas on the "Atoms for Peace" programme were being developed.

#### "ATOMS FOR PEACE" AND THE CREATION OF THE IAEA

The plan presented by President Eisenhower to the United Nations General Assembly in 1953 was mainly an attempt to turn public opinion from the effects of nuclear weapons to the positive aspects of nuclear energy in accordance with a recent UN resolution. He proposed that the five major powers meet to seek solutions to the nuclear disarmament problems. They should also agree to create a new international atomic energy agency under the UN, which should be entrusted with the task of putting uranium and fissionable material at the disposal of other Member States. The amounts foreseen were relatively small and would not require a worldwide control system.

The USSR had many reservations, mainly of a technical nature, but a circle of Western powers started to work in Washington on a draft statute for the agency and the USSR agreed to join in 1955. The UN First Committee discussed the draft later in the year. It was only at this point that the safeguards problems came into focus and it was agreed to hold a technical conference in Geneva in 1955, immediately after the first UN Conference on the Peaceful Uses of Atomic Energy. It turned out that the US delegation did not have any proposals ready, either on policy or on control techniques, and the meeting was

a near disaster. The United States Atomic Energy Commission immediately formed a special task force, which concluded that the requirements for inspectors were so great that "a practical control system which accounts for all fissionable materials cannot be devised." The most serious risk foreseen, however, was the fact that the training of technicians through the "Atoms for Peace" programme would make it possible for other countries to build plutonium producing reactors with natural uranium as fuel.

The Washington drafting group was enlarged to 12 countries and they prepared a new draft on the basis of the reactions received, including an increase in the size of the proposed Board of Governors and, most important, more precise safeguards regulations. IAEA membership would not entail a duty to submit all activities to safeguards but only when those activities involved acceptance of assistance from the IAEA. Thereby the major powers and others having resources of their own were exempted.

A question that was of particular interest to Sweden was the relation between the IAEA and the UN. Minister for Foreign Affairs Undén from Sweden underlined that the original proposal did not give enough scope for co-operation between the UN and the IAEA and that a special agreement should be concluded between the two in order to facilitate closer collaboration. The Conference on the Statute of the IAEA in 1956 recommended that this should be achieved in accordance with guidelines elaborated by UN Secretary General Dag Hammarskjöld in consultation with his special advisory committee on atomic energy. An agreement was drafted by the IAEA Preparatory Commission and approved by the General Assembly and the IAEA General Conference in late 1957. This agreement is still valid without change, but it did not receive general attention until the breach by Iraq of its NPT safeguards agreement.

During the first years of the IAEA's existence, offers of nuclear materials still played an important role and, in addition to those of the USA, offers of natural and enriched uranium were made by the USSR, the United Kingdom and Canada. Before the first deliveries it became necessary to elaborate the general principles in the IAEA Statute. The very protracted discussions in the Board in 1959–1960 on safeguards to be applied to fuel for a minor research reactor in Japan resulted in requests for a more general framework.

The Secretariat laid down a number of fundamental principles which were provisionally approved by the Board in 1959. A special group chaired by Gunnar Randers of Norway, who had for many years served as special adviser

on atomic energy to the UN Secretary General, worked out a new document on principles and procedures which was finally approved by the Board in 1961 (INFCIRC/26). After a general revision of the system, new proposals were finally approved in 1965 (INFCIRC/66). The special group was reconstituted in 1966 in order to extend the control system to include reprocessing plants and material in conversion and fuel fabrication facilities. These revisions were approved by 1968 and this system of control is still in force (INFCIRC/66/Rev. 2).

The fact that the control is strictly limited made it in the end possible to reach agreement. Only activities supported by the IAEA or by countries which have stipulated IAEA safeguards as a condition for assistance or deliveries are included. The recipient countries are thus free to develop nuclear energy for weapons or other military purposes using their own resources or assistance that has been received without control. The rules for control of later generations of nuclear materials specify certain measures as being only desirable, not compulsory.

This system gave industry in the exporting nations, especially the USA, access to international markets without formal violation of national legislation. The USA had built up an overcapacity in uranium enrichment and enjoyed a de facto monopoly until the mid-1970s. This was used to discourage the emergence of national or regional enrichment facilities and to favour the export efforts of the US reactor industry. However, the IAEA control system alone was not able to provide an effective barrier against the proliferation of nuclear weapons.

#### THE BIRTH OF THE NON-PROLIFERATION TREATY

The intensified nuclear arms race, the nuclear tests and their global consequences raised new requests for international agreements on limitation of the proliferation of nuclear weapons. From 1955, activities within the UN were intensified. In 1956, the UN Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) was created with the primary task of investigating the effects of the fallout from nuclear tests. The unanimous conclusion by the scientists, that the long term consequences were unacceptable, certainly contributed to a Limited Test Ban Treaty (LTBT) being finally agreed in 1963.

The USSR had consistently pleaded for a ban on nuclear weapons and other weapons of mass destruction, but without means for verification. After a protracted stalemate between the major powers, a turning point came in 1958. Foreign Minister Aiken of Ireland tabled a first proposal for a non-proliferation treaty in the General Assembly. The ensuing discussions on the proposal, mainly held in a ten-nation committee created within the UN disarmament commission in 1959, produced a set of fundamental definitions which are still valid.

At the opening session of the General Assembly in 1961, President Kennedy proposed a broad programme of disarmament, in particular of nuclear weapons. In 1961, a resolution was passed which contained what are now Articles I and II of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). Later, on a Swedish initiative, the General Assembly requested the Secretary General to ask the Member States what their conditions would be for renouncing the manufacture and acquisition of nuclear weapons and refusing permission for any other State to deploy such weapons on their territory in the future. This report of the Secretary General did not result in any action. In the meantime negotiations took place, mainly in the Eighteen-Nation Disarmament Committee (ENDC) that was formed in 1962 in Geneva. A group of eight neutral and non-aligned countries (Brazil, Burma, Egypt, Ethiopia, India, Mexico, Nigeria and Sweden) was very active. The focus of the discussions during the years 1962–1965 was on the test ban and nuclear weapon free zones.

Non-proliferation was on the General Assembly agenda in 1964, but it was only after a long session of the disarmament commission in early 1965 that a resolution was passed asking the ENDC to prepare a proposal for a non-proliferation treaty. Another question raised at this session by both India and Sweden was the need for a more balanced solution through a package deal, combining non-proliferation undertakings with actions that would directly affect the capacities of the nuclear weapon States.

In the ENDC Sweden proposed that the nuclear weapon States contribute with a complete test ban and a cut-off on the production of fissionable materials. India proposed a two-stage process: as a first step the nuclear weapon States should undertake not to spread know-how on nuclear weapons, stop production of nuclear explosive charges and carriers, and start disarmament; and as a second step the non-nuclear-weapon States should commit themselves not to acquire or manufacture nuclear weapons. This proposal bears a great similarity to that presented by Prime Minister Rajiv Gandhi at the third UN Special Session on Disarmament 20 years later.

Hopes for a package deal were cherished for a long time, particularly by Sweden, but were never realized. This is hardly surprising since there was a genuine common interest between the superpowers on one point: a non-proliferation agreement must preserve the status quo for them. Unfortunately, this attitude characterizes the whole history of the NPT.

The above mentioned General Assembly resolution lays down the following five principles that were to guide the work of the ENDC:

- (a) "The treaty should be void of any loopholes which might permit nuclear or non-nuclear powers to proliferate, directly or indirectly, nuclear weapons in any form.
- (b) The treaty should embody an acceptable balance of mutual responsibilities and obligations of the nuclear and non-nuclear powers.
- (c) The treaty should be a step towards the achievement of general and complete disarmament and, more particularly, nuclear disarmament.
- (d) There should be acceptable and workable provisions to ensure the effectiveness of the treaty.
- (e) Nothing in the treaty should adversely affect the right of any group of States to conclude regional treaties in order to ensure the total absence of nuclear weapons in their territories."

Intensive work followed in the ENDC as well as directly between the major powers during 1966 and 1967. In 1967, the USA and the USSR presented separate but identical texts for a treaty, which after some revisions were forwarded in 1968 by the ENDC to the General Assembly. The Security Council then adopted a resolution (255) on (positive) security assurances presented by the USA, the USSR and the United Kingdom. Proposals for the inclusion of such guarantees in the treaty itself were thereby averted.

The NPT was opened for signature in 1968 and entered into force in 1970. The nuclear weapon State parties (USA, USSR and the United Kingdom) were depositaries. France and China detonated their first atomic bombs in 1960 and 1964, respectively, raising the number of the nuclear weapon States to five, but they did not join the NPT until 1992.

## THE NPT CONTROL REGIME

Sweden showed a particular interest in Article III, which was of immediate concern for the IAEA. The proposals by the USA and the USSR in late

1965 did not contain any precise texts on safeguards. The non-nuclear-weapon States in the ENDC made energetic attempts to rectify the situation. Sweden presented in 1967 six alternatives with a decreasing degree of acceptability. The strongest solution would be “a universal and obligatory submission to safeguards of all nuclear industry of all parties to a treaty and for all transfers of nuclear material, principal nuclear facilities and certain specialized equipment for all purposes from, to and between all parties.” The weakest alternative would mean that “safeguards would be applied to all peaceful activities of the non-nuclear-weapon States only and on all transfers to those States only” (ENDC/PV.300).

The identical texts proposed by the USA and the USSR in 1967 left the control article blank. Sweden then proposed that all parties should require IAEA controls on transfers to other countries and apply them in their own territory. All non-nuclear-weapon States should accept full scope safeguards and the nuclear weapon States should gradually accept IAEA safeguards on their peaceful nuclear activities.

The failure to reach agreement on control was due to two controversial issues: first, different views on the role of EURATOM control and, second, demands on extension of the safeguards to the nuclear weapon States as well. The latter caused President Johnson to proclaim in 1967 “that when such safeguards are applied under the treaty, the United States will permit the IAEA to apply its safeguards to all activities in the United States — excluding only those with direct national security significance.” British Foreign Secretary Mulley made a corresponding statement in the House of Commons without, however, specifically mentioning the IAEA — probably in order to avoid criticism from EURATOM. The two States eventually concluded their agreements with the IAEA in 1980 and 1978, respectively. The final text of Article III contains — as could be expected — the weakest alternative in the comparison presented by Sweden. Several countries showed their dissatisfaction by not signing the NPT.

Article III puts the focus on fissionable materials and equipment and other resources that could contribute to the production of such materials. This reflected ideas on system analyses and necessitated formulation of rules that were fundamentally different from those that had been elaborated earlier by the IAEA. The primary emphasis in INFCIRC/66/Rev. 2 is on nuclear installations. In March 1970 the Board of Governors set up an open ended committee under the chairmanship of the former Foreign Minister of Austria, Kurt Waldheim, that within a year worked out a standard

agreement (INFCIRC/153). It requires non-nuclear-weapon States to establish and maintain a national system of accounting and control. The application of IAEA safeguards is regulated in subsidiary arrangements and descriptions for all installations.

In order to encourage wide adherence to the NPT, general rights and privileges were listed in Articles IV and V. The first drafts of Article IV were met with pronounced distrust by the non-nuclear-weapon States, who feared, in particular, that the obligatory control would hinder them from making full use of the technical progress reported, for example, at the periodic Geneva conferences. Peaceful co-operation was first mentioned in the identical drafts of August 1967 both in the preamble and in a first version of Article IV. Article V would give the non-nuclear-weapon States access via the IAEA to the peaceful uses of nuclear explosions, such as 'geographical engineering' and extraction of gas from certain geological formations. No such requests have been received.

During the final negotiations a formula was reached that was thought to strike a reasonable balance between sacrifices and benefits. However, the non-nuclear-weapon States raised new demands at a 'non-conference' in late 1968, including a wider representation on the IAEA Board and support from UNDP and the World Bank for peaceful nuclear projects. The IAEA members remaining outside the NPT still emphasize the fact that the IAEA Statute gives equal rights for assistance to all members.

#### IMPACT OF THE NPT ON THE WORK OF THE IAEA

The central role given to the IAEA in the NPT had immediate consequences, both political and practical. Many countries delayed their adherence in order to study the consequences that the new control regime could have on their nuclear programmes. A number of them, including the threshold States, refused to subject themselves to a more stringent control and criticized the IAEA for neglecting its primary task as a technical assistance agency.

The development of nuclear power increased rapidly in the industrialized countries during the 1970s and was accelerated by the oil crisis. Interest also rose in the developing countries, especially in those without indigenous oil resources. The market for power reactors and nuclear fuel was broadened

and the leading position previously held by the USA was challenged; in fact an international buyer's market was established. In this process the role of governments — and thereby also that of the IAEA — became essentially limited to the area of regulations.

The role of the IAEA had thus changed fundamentally from the time of its creation in the mid-1950s. It no longer served as a conveyer of scarce resources of nuclear materials nor did it have a key role in spreading know-how in the field of the peaceful utilization of nuclear energy. The applications of nuclear techniques in medicine, agriculture and hydrology were supported in collaboration with other specialized agencies. However, the responsibility of the IAEA for international regulations on radiation protection and norms for the transport of nuclear materials was firmly established. The last of the Geneva conferences was held in 1971 and the United Nations International Conference on the Peaceful Uses of Nuclear Energy in 1987 gave only a faint echo of the past.

The new safeguards functions rapidly raised the demands on staff and financial resources. The NPT safeguards agreements turned out to require unexpectedly large administrative resources in the IAEA Secretariat, firstly because a great amount of detailed work was needed for each country with any significant nuclear activity; secondly because it was necessary to adjust the agreements to special demands from certain countries, in particular the EURATOM countries and Japan. In many cases the agreements were completed several years behind the time foreseen in the NPT.

A recurring problem was that many countries wished to limit the intrusion of the IAEA as far as possible, claiming concern about industrial secrets and unreasonable administrative burdens. In reality these concerns were of very limited importance to the rapidly expanding international market for reactors and nuclear fuels. However, these attitudes inevitably grew stronger in the face of the total lack of will from the side of the nuclear weapon States to fulfil promises of subjecting their own civil nuclear activities to the same procedures.

The financing of safeguards soon became an issue within the IAEA Board. According to Articles III and XIV of its Statute, the IAEA is authorized to exercise control under any bilateral or multilateral arrangement and to finance such activities through contributions from the parties concerned. This option was never used, but when the costs of NPT safeguards increased in the 1970s, a special formula was developed, providing relief for the vast majority of the members.

THE TIGHTENING OF  
EXPORT CONTROLS

The Indian nuclear explosion in 1974 gave a dramatic emphasis to the need for strengthened control by the supplier countries. The device turned out to be made of material from a reactor that had been delivered by Canada and supplied with heavy water from the USA.

The Zangger Committee was created outside of the IAEA with the task of listing materials in addition to nuclear materials, equipments and components, that should trigger safeguards in accordance with Article III.2 of the NPT. A first such list was published in 1974 (INFCIRC/209). However, the weakness of the export control regime was at the same time demonstrated by French and German plans to sell reprocessing plants to Pakistan, the Republic of Korea and Brazil. South Africa also built an enrichment plant using technology said to be partly of German origin. After US intervention, the French but not the German offers were withdrawn.

The leading export countries met in London in 1975 to agree on new guidelines for deliveries. The original group (the USA, USSR, the United Kingdom, France, Federal Republic of Germany, Canada and Japan) was enlarged by the addition of eight countries (Belgium, Czechoslovakia, German Democratic Republic, Italy, Netherlands, Poland, Sweden and Switzerland). The 'London Guidelines' were issued by the new Nuclear Suppliers' Group (NSG) in 1978 and contained the Zangger list plus heavy water and plants for its production (INCIRC/254). Export would require acceptance of IAEA safeguards by the recipient country. It should be noted that France, without being party to the NPT, in 1968 declared herself prepared to act as if she were. The restrictions were not very far reaching but triggered strong reactions from developing countries.

President Carter's administration wished to introduce further restrictions in order to strengthen the non-proliferation regime. The new Non-Proliferation Act required full scope safeguards for deliveries, prior consent for reprocessing — also for EURATOM — and renegotiations for all export agreements. The actions against reprocessing and plutonium were supported by a number of countries but met with as great an opposition from France, the Federal Republic of Germany, Japan, Switzerland and the United Kingdom as from the developing countries. In 1977, President Carter initiated the International Nuclear Fuel Cycle Evaluation (INFCE) study. The result did not give a clear basis for judging the safeguards characteristics of different fuel cycles.

It is postulated already in Article XII.A.5 of the Statute that the IAEA should store any excess of special fissionable material, a right that has never been exercised. In 1978, the Director General initiated an expert study of the possibility of establishing an International Plutonium Storage (IPS). After five years the experts concluded that many conflicts remained unresolved, especially concerning the rights of returning the plutonium to the country of origin.

### THE CONTROL ISSUE IN THE NPT DURING THE FIRST 25 YEARS

Further strengthening of the non-proliferation regime gradually took place, mainly in connection with the five-yearly NPT review conferences. These were naturally overshadowed by the nuclear disarmament negotiations, but the nuclear weapon States usually seemed able to find very similar positions vis-à-vis the non-nuclear-weapon States.

The first review conference in 1975 was in actual fact a continuation of the non-nuclear-weapon States' conference in late 1968. In particular, the nuclear weapon States were criticized for lack of progress on nuclear disarmament. In the final document IAEA safeguards and the Zangger list were given full support and application of full scope safeguards was recommended also for importing countries outside the NPT.

At the 1980 NPT review conference, criticism was again directed towards the nuclear weapon States for failure on a comprehensive test ban and other disarmament measures, and for the new export policies. Full scope safeguards as a condition for export to non-nuclear-weapon States outside the NPT was given strong support not only from the USA but also from the 'Group of 10' (Australia, Austria, Canada, Denmark, Finland, Ireland, Netherlands, New Zealand, Norway and Sweden) which started its work at this conference. Unfortunately, the conference did not reach agreement on a final document.

This failure at the 1980 conference caused apprehension from many sides before the next review conference in 1985, as the nuclear disarmament negotiations were at a total standstill. The Group of 10 tried in vain to reach agreement on the demand for full scope safeguards on exports to non-nuclear-weapon States not party to the NPT. A joint appeal was directed to these countries to make an international, legally binding undertaking not to develop nuclear weapons and to accept full scope safeguards. The nuclear weapon States, however, still refused to subject themselves to the same control of their

peaceful activities as the non-nuclear-weapon States. It was claimed that this would mean a ten-fold increase in the IAEA safeguards budget. However, a Swedish study showed that it would in fact only necessitate a doubling of the costs. A gradual implementation would obviously facilitate a future cut-off agreement.

This time it turned out to be possible to find a compromise for a final document, in which the conference recommended "the continued pursuit of the principle of universal application of IAEA safeguards to all peaceful nuclear activities in all States."

The 1990 review conference was held at a time of dramatic international developments: the end of the Cold War, the Gulf crisis and the newly established understanding between the permanent members of the Security Council. The US–Russian treaty on the elimination of intermediate range and shorter range missiles was concluded but there was still no progress on a comprehensive test ban treaty and no agreement on reduction of strategic nuclear weapons. The Group of 10 could at last register a positive response to the appeal for full scope safeguards as a condition for export to non-NPT countries. After an announcement by the German Foreign Minister Hans Dietrich Genscher at the opening session, general agreement on this was reached at the conference. The acceptance by the nuclear weapon States of the application of IAEA safeguards within their peaceful nuclear sectors was also welcomed as a step towards the ultimate goal recommended in 1985. The nuclear weapon States were asked to separate peaceful and military installations, to guarantee that deliveries for peaceful purposes would not be used for military ends and to verify the transfer of military installations and materials to civil use by subjecting them to safeguards. The IAEA was encouraged to strengthen the safeguards regime by using the right to undertake special inspections. Unfortunately, owing to disagreement on a text about a test ban treaty, there was no agreed final document. However, through an initiative by the Group of 10, the agreed text of direct relevance to the IAEA was immediately published as GC(XXXIV)/INF/291.

## A NEW SAFEGUARDS REGIME

The NPT Review and Extension Conference in 1995 was preceded by an exposure of weaknesses in some areas of the existing non-proliferation regime: the secret nuclear weapons programme in Iraq, the production of

nuclear explosives in South Africa, the refusal by the Democratic People's Republic of Korea to allow inspection by the IAEA, and the uncertainties concerning the nuclear weapon status of some former members of the USSR. On the other hand the NPT regime had been strengthened through START and other disarmament agreements, the accession of the nuclear weapon States France and China and a number of non-nuclear-weapon States, most notably South Africa and former members of the USSR. Argentina and Brazil had concluded a full scope agreement with the IAEA.

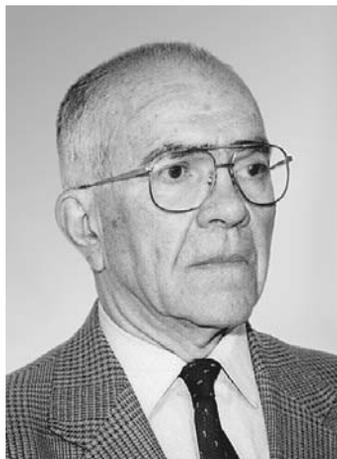
The outcome was not only an indefinite extension of the NPT, but also a new model for monitoring progress in various areas of the Treaty, in particular on Article VI, during meetings of the NPT preparatory committee between the review conferences.

The immediate consequence for the IAEA of political developments during the last few years has been a new programme for the strengthening of the safeguards system, in particular its ability to reveal undeclared activities. Improved effectiveness and efficiency are necessary for the increasing control requirements of the NPT. In addition, it is to be hoped that work on agreements on cut-off for the production of fissionable materials for weapons, on dismantling of nuclear explosives and on disposal of excess materials will be started without further delay and implemented "under strict and effective international control" (NPT Article VI). Only the IAEA has the experience that is necessary for undertaking these new verification tasks.

THE IAEA AND  
NUCLEAR ARMS CONTROL:  
PAST, PRESENT AND FUTURE

Roland M. Timerbaev

*Roland M. TIMERBAEV* has been associated with the IAEA, in different capacities, for over 30 years, since the preparation of the first Agency document on safeguards (INFCIRC/66). Since then, he has attended, as a member of Soviet/Russian delegations, numerous sessions of the General Conference and Board of Governors, as well as the Agency's various committees and working groups. In 1970, he participated in the deliberations of the Safeguards Committee which was charged with the challenging task of negotiating document INFCIRC/153. In the early 1980s, he negotiated the USSR-IAEA voluntary offer safeguards agreement. In 1988-1992, he was his country's Permanent Representative to the IAEA and other international organizations in Vienna.



Ambassador Timerbaev was a Soviet/Russian arms control negotiator and in this capacity took part in negotiating the NPT, the ABM Treaty, CTBT, the Seabed Treaty, the Threshold Test Ban Treaty, the PNE Treaty and other international arms control agreements.

For many years he was a member of the Soviet Mission to the UN in New York and in 1986-1987 was his country's First Deputy Permanent Representative to the United Nations with the rank of Ambassador.

Ambassador Timerbaev had a distinguished academic career: he has a PhD in diplomatic history, was a professor of the Moscow Institute of International Relations (MGIMO) and a visiting professor of the Monterey Institute of International Studies (California). He has published 6 books and over 100 other publications on international relations, arms control and non-proliferation.

At present, he is President of the Center for Policy Studies in the Russian Federation, an independent non-profit think tank in Moscow.

STATUTORY PROVISIONS AND  
EXISTING ARMS CONTROL ARRANGEMENTS

The primary objective of the IAEA is the contribution of atomic energy to peace, health and prosperity throughout the world, in such a way that the Agency's assistance is not used to further any military purpose. The founders of the IAEA, however, had sufficient foresight to provide for the Agency's role in arms control as well, by empowering it to act "in conformity with policies of the United Nations furthering the establishment of safeguarded worldwide disarmament and in conformity with any international agreements entered into pursuant to such policies" (Article III.B.1 of the Statute), and established an appropriate statutory relationship between the two organizations.

This provision of the Statute has become the keystone of the legal basis for the Agency's activities in disarmament, and in particular in nuclear arms control. Its role in promoting nuclear non-proliferation and nuclear arms control evolved significantly even during the years of the Cold War, despite the tense political environment. In the beginning, Member States were reluctant to entrust the Agency with the tasks that would allow it to play a tangible political role, particularly in the area of arms control. However, as time went on, and as the co-operation among the major powers began to improve, this reluctance gradually gave way to more pragmatic and constructive attitudes.

A watershed event took place in 1967 when the IAEA's General Conference expressed, without any dissent, its willingness to undertake measures required to carry out the Agency's increasing responsibilities in connection with the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). This occurred while the NPT was still being negotiated by the Eighteen-Nation Disarmament Committee (ENDC) in Geneva, and before the UN General Assembly endorsed the Treaty and opened it for signature in June 1968.

Soon after the NPT entered into force in March 1970, the Board of Governors approved, in 1971, the model safeguards agreement for non-nuclear-weapon States party to the NPT known as document INFCIRC/153 and, on the basis of this model, the Agency has by now concluded over 100 safeguards agreements with the non-nuclear-weapon States party to the Treaty. In addition, all five nuclear weapon States have concluded 'voluntary offer' agreements with the Agency, thus placing part of their nuclear activities under IAEA safeguards.

Although the NPT does not explicitly provide for any controlling mechanism to verify its compliance, one can argue that Article III of the Treaty in fact establishes the Agency's authority to perform certain important controlling

functions, such as verifying the implementation of the provisions of this article. On this basis, the Agency, for over a quarter of the century, has been conducting safeguards operations under the NPT, and, on two occasions, the Board of Governors notified the UN Security Council of non-compliance — by Iraq and the Democratic People's Republic of Korea (DPRK) — with safeguards agreements.

In 1971, in anticipation of the Agency's major role in stemming nuclear proliferation, the UN General Assembly requested the IAEA to include in its annual reports full information on the progress of its work on the application of safeguards in connection with the NPT.<sup>1</sup>

The Agency's role as an arms control monitoring mechanism on a regional level is established under existing multilateral and bilateral agreements — the Tlatelolco Treaty, the Rarotonga Treaty and the Guadalajara Agreement. Similar arrangements are provided for in the recently signed treaties establishing nuclear weapon free zones (NWFZs) in Africa (Pelindaba Treaty) and in South East Asia (Bangkok Treaty). It may be expected that any future NWFZs would have the same kind of monitoring arrangements with the Agency.

The post-Cold-War environment, characterized by the efforts of the major nuclear powers to reduce their nuclear arsenals and to strengthen and expand the international nuclear non-proliferation regime, has provided favourable conditions for the Agency's increased participation in nuclear arms control. At the same time, the heightened threat of nuclear proliferation in areas with regional security concerns or through illicit trafficking in nuclear materials necessitated more intensive IAEA participation in non-proliferation efforts and the strengthening of the non-proliferation system as a whole.

The need to re-evaluate the Agency's safeguards system became particularly evident in the aftermath of the Gulf War with the discovery of Iraq's efforts to build nuclear weapons clandestinely. Since then, a number of measures have been taken by the IAEA to improve its safeguards system. In 1995, under 'Programme 93 + 2', the Secretariat presented to the Board of Governors proposals for a strengthened and more efficient safeguards system. Their endorsement and implementation would certainly provide the Agency with an increased authority to deal with the growing responsibilities in the area of nuclear arms control.

<sup>1</sup> UN General Assembly Resolution 2825(XXVI).

THE AGENCY'S FUTURE RESPONSIBILITIES IN  
NUCLEAR ARMS CONTROL

It is to be expected that the Agency could be asked to play a significant supporting role in the implementation of the Comprehensive Test Ban Treaty (CTBT). The original draft of such a treaty submitted to the Conference on Disarmament by Sweden in 1993 assigned the entire verification task to the IAEA. However, soon after negotiations actually started in Geneva, early in 1994, Australia presented a draft treaty that proposed that CTBT verification be carried out by an independent organization co-located with the IAEA in Vienna.

As was finally agreed upon by the negotiators, the new organization (known as CTBTO) is to be located in Vienna and it shall "seek to utilize expertise and facilities, as appropriate, and to maximize cost efficiencies, through co-operative arrangements with other international organizations such as the International Atomic Energy Agency. Such agreements, excluding those of a minor and normal commercial and contractual nature, shall be set out in agreements to be submitted to the Conference of the States Parties for approval" (Article II.A.8 of the CTBT).

In our view, a more pragmatic and cost efficient arrangement would have been to assign most, if not all, of the CTBT monitoring to the Agency, which certainly has or could easily acquire additional appropriate monitoring expertise in order to be able to discharge new challenging duties. Let us hope that common sense will prevail, and Article II.A.8 of the CTBT will be judiciously utilized to assure maximum cost efficiency and exemplary co-operation between the two organizations, both of which would be involved in verifying nuclear arms control and nuclear non-proliferation. This CTBT provision establishes a substantial legal basis for sharing verification and other treaty implementation responsibilities between the organizations.

Verification of a future treaty banning the production of fissile materials for nuclear weapons, usually known as a cut-off treaty, would become another challenging task for the Agency. There is general understanding that the IAEA would be a natural choice for verification of such a treaty when it is negotiated by the Conference on Disarmament.

The safeguarding of enrichment and reprocessing plants, although a difficult task, is a problem to which much international effort has already been devoted and a task which is already one of the IAEA's duties. The safeguarding of enrichment and reprocessing plants, as well as storage facilities for spent fuel,

falls within the present safeguards system. On a number of occasions, Director General Hans Blix suggested that the IAEA could assist in planning and providing international verification for a cut-off of fissile material production.

US President Bill Clinton, in his September 1993 statement to the United Nations, expressed the commitment of the USA to seek the conclusion of an international agreement banning the production of plutonium and high enriched uranium for use in weapons. The US delegation, in its statement to the UN General Assembly on 1 November 1993, emphasized that, with regard to a cut-off, "verification through IAEA safeguards will, of course, be absolutely essential to the credibility of such a regime."<sup>2</sup>

This is also the declared policy of the Russian Federation.

The Agency was given strong political support for the role it could play in relation to a cut-off by the UN General Assembly resolution adopted on 16 December 1993. The resolution, which recommended the negotiation of a "non-discriminatory, multilateral and internationally and effectively verifiable treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices," requested the IAEA "to provide assistance for examination of verification arrangements for such a treaty as required."<sup>3</sup> On the basis of the above resolution, a mandate for the Ad Hoc Committee on cut-off was agreed upon by the Conference on Disarmament.

A cut-off treaty would have important non-proliferation and arms control benefits. It would strengthen international nuclear non-proliferation norms by capping unsafeguarded fissile material production in non-nuclear-weapon States which do not have all their nuclear activities under IAEA safeguards. It would place a firm and reliable limit on the amount of fissile material available for nuclear explosives. It would slow or prevent a nuclear arms race in areas such as the Middle East and South Asia and thereby contribute to regional and international security.

A cut-off agreement would also have a positive effect on arms control among the nuclear weapon States. With the demise of the Cold War and continuing reduction of nuclear arms and their dismantling by the USA and the

<sup>2</sup> US Mission to the United Nations, Press Release USUN 178(93), Statement by Ambassador Karl F. Inderfurth, United States Alternate Representative to the 48th Session of the United Nations General Assembly, in Plenary, on Agenda item No. 14 "The Report of the International Atomic Energy Agency", UN (1 November 1993) 3.

<sup>3</sup> UN General Assembly Resolution 48/75.

Russian Federation, a cut-off treaty would constitute an important legal barrier to a resurrection of the nuclear arms race.

A major issue for the Agency could be the cost of any cut-off treaty. According to a US expert, Fred McGoldrick of the State Department, two options for verifying the obligations of the fissile material cut-off treaty could be considered: (1) the comprehensive option in which all peaceful nuclear materials would be safeguarded except unsafeguarded fissile materials produced prior to the entry into force of the cut-off treaty, and (2) the option that focuses verification on enrichment and reprocessing facilities and their fissile material products. In either of these options, safeguards would not apply to fissile materials produced prior to the treaty's coming into force. The estimates of the costs would not be too exorbitant given the significance of the treaty. Rough estimates of the costs to the IAEA of the more focused approach would be at least \$60–70 million while the comprehensive option could cost as much as \$150 million.<sup>4</sup>

A cut-off treaty, after it is concluded, would have a profound effect on the Agency's responsibilities. Most importantly, it would greatly expand its contribution to an effective international non-proliferation regime and could prepare the IAEA for more comprehensive tasks in the field of nuclear arms control and nuclear disarmament.

Participation in regional or bilateral arrangements such as NWFZs would continue to be an expanding part of the IAEA's role in nuclear arms control. Regional or bilateral agreements supplement, rather than replace, IAEA safeguards and can provide an opportunity to adopt more extensive verification schemes than under standard NPT type safeguards agreements. Thus, regional agreements allow areas in conflict to address the specific security concerns of the States involved. As new regional agreements are negotiated and endorsed by the UN, new opportunities for expanding the activities of the Agency would be created under Article III.B.1 of the IAEA Statute, which calls on the Agency to act in accordance with UN policies on disarmament and any related international agreements.

The Agency for years has been and continues to be involved in efforts aimed at establishing an NWFZ in the Middle East and at securing the application of full scope IAEA safeguards to all nuclear activities in the region. Any

<sup>4</sup> MCGOLDRICK, F., *Scope of fissile material cut-off and verification approaches*, unpublished paper, 1995.

agreement in the region would most likely be more intrusive than standard NPT arrangements and would require regionally tailored safeguards agreements. Since under Security Council Resolution 687 (1991) very extensive monitoring requirements are in force in Iraq, one can expect that Arab countries would wish that more stringent safeguards than the NPT type be applied in Israel, as well as elsewhere in the region.

Another area where an NWFZ has been proposed is South Asia where both India and Pakistan have advanced nuclear capabilities. It seems, however, that such a zone in this region would most probably be long in the making owing to the broader security concerns, especially of India.

In 1992, the two Koreas signed the Joint Declaration for a Non-Nuclear Korean Peninsula. This Declaration, however, has not yet been put into effect owing to the continuing tensions between the DPRK and the Republic of Korea. It is not clear whether any progress in the implementation of the "Agreed Framework" between the USA and the DPRK of 21 October 1994 for the settlement of the safeguards issue in the DPRK may advance the entry into force of the Declaration.

In February 1996, Australia's Minister for Foreign Affairs called for the establishment of a nuclear-free bloc in the Southern Hemisphere. The proposal was for a link between the NWFZs in the South Pacific, Latin America and Africa, under the Treaties of Rarotonga, Tlatelolco and Pelindaba, respectively, so as to create a "super-nuclear-weapon-free zone".<sup>5</sup> The same idea of "a nuclear weapon free Southern Hemisphere" was proposed by Brazil and New Zealand at the 51st session of the UN General Assembly.

Yet another NWFZ was proposed by Belarus and supported by Ukraine, which informally circulated at the 51st session of the UN General Assembly a draft resolution suggesting the establishment of an NWFZ in Central and Eastern Europe. Under this proposal, the General Assembly would be asked to welcome this initiative, to invite all countries of the region to declare their support for establishing such a zone and to invite them, pending the establishment of the zone, not to permit stationing on their territories of nuclear weapons.

In 1995, at the NPT Review and Extension Conference, Kyrgyzstan proposed the establishment of an NWFZ in central Asia. The proposal was supported at the conference by Uzbekistan. This idea was promoted at the

<sup>5</sup> PPNN Newsbrief No. 34, 2nd Quarter (1996).

51st session of the UN General Assembly by Kyrgyzstan and Mongolia. It is being further pursued on the governmental level, and is being actively discussed by non-governmental analysts in central Asian and other newly independent States.<sup>6</sup>

### THE AGENCY'S POTENTIAL ROLE IN THE INTERNATIONAL CONTROL OF NUCLEAR ENERGY

Reductions in nuclear strategic arsenals by the major nuclear weapon States under the START I and II treaties, expected further downsizing of these and non-strategic weapons, as well as eventual involvement in this process of other nuclear weapon States would, at some point in the future, inevitably raise the problem of zero nuclear weapons.

This is a legally binding obligation of all five nuclear weapon States inscribed in Article VI of the NPT.<sup>7</sup> It was reaffirmed in the "Principles and Objectives for Nuclear Non-Proliferation and Disarmament" approved by consensus at the NPT Review and Extension Conference in 1995:

"(c) The determined pursuit by the nuclear weapon States of systematic and progressive efforts to reduce nuclear weapons globally, with the ultimate goals of eliminating those weapons, and by all States of general and complete disarmament under strict and effective international control."<sup>8</sup>

Nuclear disarmament, in the light of the conclusion of the CTBT and the expected negotiation of a cut-off treaty, would, without any doubt, become a

<sup>6</sup> A discussion of this proposal by Guzel Taipova (Almaty) and Vladimir Chumak (Kiev) was published in *Yaderny Kontrol*, 20-21 (August-September 1996) 26-30.

<sup>7</sup> See the discussion of this obligation in: BUNN, G., TIMERBAEV, R.M., "Nuclear disarmament. How much have the five nuclear powers promised in the non-proliferation treaty?", *At the Nuclear Crossroads*, The Lawyers Alliance for World Security, University Press of America, Lanham, MD (1995) 11-29.

<sup>8</sup> NPT/CONF.1995/32. 1995 Review and Extension Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons. Final Document, Part I, New York (1995) 10.

top priority issue during the review of the NPT implementation which has started in April 1997 and would lead to the review conference in the year 2000. The paramount significance and urgency of this issue has been recently emphasized by the Canberra Commission on the Elimination of Nuclear Weapons, consisting of prominent politicians, arms control specialists and scientists from around the world:

“Nuclear weapons are held by a handful of States which insist that these weapons provide unique security benefits, and yet reserve uniquely to themselves the right to own them. This situation is highly discriminatory and thus unstable; it cannot be sustained. The possession of nuclear weapons by any State is a constant stimulus to other States to acquire them.”<sup>9</sup>

The Canberra Commission has very appropriately drawn attention to the need for thorough monitoring of the future nuclear disarmament:

“Effective verification is critical to the achievement and maintenance of a nuclear free world. Before States agree to eliminate nuclear weapons they will require a high level of confidence that verification arrangements would detect promptly any attempt to cheat the disarmament process whether through retention or acquisition of clandestine weapons, weapon components, means of weapons production or undeclared stocks of fissile material. Formal legal undertakings should be accompanied by corresponding legal arrangements for verification. To maintain security in a post-nuclear-weapon world the verification system must provide a high level of assurance as to the continued peaceful, non-explosive use of a State’s nuclear activity. A political judgement will be needed on whether the levels of assurance possible from the verification regime are sufficient. All existing arms control and disarmament agreements have required political judgements of this nature because no verification system provides absolute certainty.

<sup>9</sup> Report of the Canberra Commission on the Elimination of Nuclear Weapons, Commonwealth of Australia, National Capital Printers (1996) 10.

A key element of non-proliferation arrangements for a nuclear free world will be a highly developed capacity to detect undeclared activity at both declared and undeclared sites. Progressive extension of safeguards to nuclear activity in the nuclear weapon States, the undeclared weapon States and the threshold States will be needed with the end point being universal application of safeguards in all States. Systems will be needed to verify that nuclear warheads are dismantled and destroyed, and their fissile material content safeguarded to provide maximum confidence that such material cannot be reintroduced for weapons use."<sup>10</sup>

The nuclear disarmament process would inevitably require further expansion of international verification measures, covering not only materials and facilities to be withdrawn from military use, but also those in civilian programmes. Such a process could then be further expanded to create a more comprehensive and institutionalized control of nuclear energy, possibly including many other areas of nuclear activity requiring international regulation such as, for instance, nuclear safety and waste management. The conclusion, under the auspices of the Agency, of the Nuclear Safety Convention which entered into force on 24 October 1996, and the ongoing work on an international waste management convention provide some insight into the areas to be considered for possible incorporation into an overall international control scheme.

Any future plans aimed at establishing comprehensive control over nuclear energy should be built on and around a dependable, effective international organization strongly supported by the United Nations Security Council, which is solely responsible to the world community for the maintenance of international peace and security.

It seems a cogent proposition, instead of creating a new, costly international mechanism for that purpose, to build up the existing one — the International Atomic Energy Agency. The Agency was able to overcome serious credibility problems posed by the unexpected revelations of clandestine nuclear activities in Iraq and to strengthen its capability of monitoring the nuclear non-proliferation regime — a process that is continuing and expanding through the implementation of 'Programme 93 + 2'.

<sup>10</sup> *Ibid.*, p. 13.

The IAEA has thus demonstrated its aptitude for change and institutional learning. New responsibilities with which the Agency may be vested under a future cut-off treaty and through some co-operative arrangements with the CTBTO would enhance its overall nuclear expertise and its preparedness to assume more demanding and challenging tasks. This is also the conclusion of the Canberra Commission which agreed that the "IAEA has wide experience in application of safeguards to provide high assurance that nuclear material remains in peaceful non-explosive use. Subject to strengthening of its safeguards system the IAEA would seem the logical body to verify non-proliferation undertakings in a nuclear weapon free world."<sup>11</sup>

A significant practical step in this direction was taken by the Russian Federation, the USA and the IAEA in September 1996 when the Minister of Atomic Energy of Russia, the Secretary of Energy of the USA and the Director General of the IAEA agreed to the application of Agency verification to weapon origin fissile materials. A trilateral group was formed to address the issue and report on its progress.

One can foresee that the International Atomic Energy Agency is to play a crucial role if and when a nuclear weapon free world becomes a reality. The Agency can certainly be of great help when humankind is ready to move towards this lofty goal.

<sup>11</sup> Ibid. p. 13.

NUCLEAR SAFETY:  
THE PUBLIC BATTLE LOST?

Lodewijk van Gorkom

*Ambassador Lodewijk van GORKOM* was born in 1925 in 's-Hertogenbosch, the Netherlands. After his law studies at the University of Utrecht, he entered the Foreign Service of the Netherlands in 1951. He was posted in Bonn, Pretoria, the Ministry of Foreign Affairs, International Organizations Department, and twice in New York with the Permanent Mission of his country to the United Nations, the second time, 1972 to 1974, in charge of economic and social affairs. He also served in Bangkok as Permanent Representative to ECAFE (now ESCAP), and as Minister in Tokyo.



From 1974 to 1980, Ambassador van Gorkom was Director General for International Co-operation in charge of United Nations affairs and development co-operation. He served as Ambassador to Jakarta from 1980 to 1984 and in 1984 became Ambassador to Austria and Permanent Representative to the IAEA, UNIDO and the United Nations Office at Vienna.

As Permanent Representative to the IAEA, Ambassador van Gorkom was Chairman of the Group of Experts to draft the Conventions on Notification and Assistance in the Case of a Nuclear Accident, Chairman of the International Conference on the Relations between the Paris Convention and the Vienna Convention on Liability for Nuclear Damage which adopted the Joint Protocol linking the two Conventions and Chairman of the Working Group on Liability for Nuclear Damage. He also chaired the first two sessions of the Standing Committee on Liability for Nuclear Damage.

As Permanent Representative to UNIDO he was Chairman of the Programme and Budget Committee.

After his retirement in 1990 he served for some time on the National Advisory Council on Development Co-operation and on the Advisory Commission on Human Rights in the Netherlands.

Ambassador van Gorkom is married and now lives in The Hague.

**C**hernobyl April 1986: ten days that shook the nuclear world. Has the nuclear power option survived or has the public battle been lost? What did the IAEA do and what should the Agency do to ensure the future of the nuclear option as a worldwide, environmentally safe energy supply for future generations?

In trying to give some answers to these questions, I shall not myself argue the nuclear option. Others have done so and are doing so convincingly. I refer in particular to Hans Blix's statement at the 1992 Rio Conference on Environment and Development and many other speeches, to the Agency's contribution to the Rio Conference, the conclusions of the Helsinki and Vienna meetings on energy and nuclear power and, more recently, the presentation of John Taylor (British Nuclear Fuels) to the Uranium Institute Annual Symposium 1996. I also recall the strong political endorsement of nuclear power as a vital source of energy by the Moscow Nuclear Safety and Security Summit of 20 April 1996.

My observations will be based on my experience as permanent representative of my country to the IAEA (1984–1990), of which two years were as a member of the Board of Governors. My comments will not be those of a nuclear expert, but those of a diplomat and lawyer. I am aware that there are several factors that will determine the validity and public acceptance of the nuclear power option, in particular the economic cost factor. Here, I shall mainly speak of the nuclear safety factor as dealt with by the IAEA. The Moscow Summit stated: "The use of nuclear energy and ensuring its safety are two sides of the same coin. Countries using nuclear energy must put 'safety first'." If the battle for nuclear safety is lost, nuclear power is lost.

Referring to the IAEA, I make a distinction between the Secretariat (Director General and staff) and the Governing Organs: the General Conference and the Board.

For my own country, Chernobyl came at a crucial, most inopportune moment. On the eve of Chernobyl, the Government was on the verge of deciding, in consultation with Parliament, on the sites of new nuclear power reactors with a capacity of between 2000 and 4000 MW. After Chernobyl, that decision was indefinitely postponed. Instead, a thorough reconsideration of nuclear energy was undertaken, covering all aspects of nuclear power and nuclear safety. Today, ten years later, public opposition to nuclear energy remains very strong and vocal. The small Dodewaard reactor (57 MW), with important research facilities in the field of nuclear safety, will shortly be closed. The closing date for the 460 MW reactor at Borssele has, under political

pressure, been advanced to 2004. A special project to maintain at least our competence in nuclear technology was terminated at the end of 1996. One of our top nuclear experts, Professor Hugo van Dam of Delft University, bitterly complained that the Netherlands in a few decades would be “a nuclear underdeveloped country”.

In fact, the immediate need for nuclear energy has almost disappeared as a result of large scale energy savings, the industrial application of co-generation technologies and the use of natural gas for power generation.

And yet, in its most recent Energy Memorandum to Parliament, the Government keeps the nuclear power option explicitly open: “Although at the moment no increase of the nuclear capacity is foreseen, Dutch nuclear capability will be maintained in order ‘to board the train’ next century if desirable. Part of the nuclear research programme will be participation in innovative work in co-operation with institutes from other countries. The Netherlands has no ambition in due course to be able to construct nuclear power plants entirely by itself, but — if such plants should be built in the Netherlands — it does want to be an effective discussion partner.” (Extract from the Energy Memorandum 1995.)

In view of strong anti-nuclear public opinion, government ministers and officials have to be very cautious in dealing with nuclear energy, but, as in other matters with environmental implications like railways, roads and airports, the Government is showing foresight and courage. For the Netherlands, therefore, the public battle on nuclear power and safety is not yet lost.

#### C H E R N O B Y L : T H E I M M E D I A T E A F T E R M A T H

The Chernobyl disaster found the Director General of the IAEA and his staff well prepared. The Director General, in close consultation with the Soviet authorities, acted with admirable speed and efficiency and was able at short notice to set in train the necessary measures for assistance and co-operation and for presenting the disaster in its true proportions to the world. The Board, initially, acted with less expediency. A German initiative to call an emergency session did not meet with immediate approval. At the special session of the Board on 21 May, the Director General reported on the findings of his visits to the disaster area and the measures taken together with the Soviet authorities. He forcefully set out what the Agency could and should

do, not only with regard to the disaster itself but also on the general problem of nuclear safety: "The Agency needs to adopt a comprehensive programme on safety and to do so without delay." He proposed a broad range of measures, including more binding international safety rules and immediate work on new generations of safe power reactors, requiring much work by the Secretariat and Member States and adequate resources. The immediate reaction of the Board, on the basis, *inter alia*, of far reaching Soviet proposals, was adequate enough:

- Convening a post-accident review meeting;
- Establishing a group of experts to draft binding agreements on notification and assistance in the event of nuclear accidents;
- Establishing an expert group on additional measures for nuclear safety;
- Convening at an early date a conference of government representatives on the full range of nuclear safety issues.

In the same breath, however, the Board decided to set budgetary limits on the action to be taken!

#### CONVENTIONS ON NOTIFICATION AND ASSISTANCE

One of the most glaring deficiencies in the aftermath of Chernobyl was the absence of international obligations on the reporting of nuclear accidents and assistance in the case of accidents. After the Three Mile Island accident in 1979, the USA had proposed a treaty on information and co-operation in the case of a nuclear accident. This was opposed by the United Kingdom and others: "There was no political will to do so" (A.O. Adede in his book on the two conventions). This time, however, the situation was different. On the basis of earlier, non-binding, guidelines for notification and assistance, drawn up by the Secretariat, the group of experts established by the Board produced in the incredibly short time of three weeks in August 1986 the two conventions on notification and assistance which were adopted and signed and which entered into force within ten months! This achievement was due, first of all, to the political momentum created by Chernobyl, fresh in everybody's mind. It was also due to the Secretariat's preparatory work, to a fair, and sometimes even unfair, amount of pushing by the meeting's bureau and to the fact that

the Director General had given the experts no more than three weeks to do their work. Otherwise, it would probably have taken years to complete the conventions. In the last hours of the meeting, the Soviet delegate — Oleg Khlestov, one of those eminent Soviet diplomats who, all through the Cold War period, were always ready to seek constructive compromise — played a decisive role.

### SPECIAL SESSION OF THE GENERAL CONFERENCE

By the time the Special Session met in September, much of the political momentum created by Chernobyl had already been lost. The nuclear community, operators, regulators and constructors seemed to have closed ranks behind the principle of exclusive national control and national safety standards. The Special Session did emphasize that the highest level of nuclear safety would continue to be essential to the use of nuclear energy and appealed for the strengthening of international co-operation on nuclear safety, but at the same time reaffirmed the national responsibility of States for ensuring nuclear safety. It could not reach agreement on the need for a binding system of nuclear safety and radiation protection, as advocated by many delegations. It endorsed the two conventions but did not even approve a modest Swedish proposal to set up an open ended ad hoc committee on nuclear safety under the Board, a proposal subsequently killed by the Board itself. A Dutch proposal to strengthen the system of liability for nuclear damage was not voted upon.

The Special Session clearly revealed a strong divergence of views on preventive nuclear safety. Whereas some delegations, in particular those of important nuclear power States, insisted that nuclear safety was and should remain a matter of exclusive national responsibility, others advocated a system of binding international rules or principles of nuclear safety. It would take ten years before even a modest international safety convention would enter into force!

### SLOW PROGRESS ON NUCLEAR SAFETY

A further loss of political momentum was displayed at the 1986 regular session of the General Conference and by the Expert Working Group on

International Co-operation in Nuclear Safety set up by the special session of the Board in May 1986.

Long before Chernobyl, the Agency had undertaken important steps towards greater nuclear safety and radiation protection, in particular in drafting the Nuclear Safety Standards (NUSS) codes for nuclear power plants, the Incident Reporting System, the Operational Safety Review Team (OSART) system and other advisory and review services. After Chernobyl, important activities were undertaken to assess the causes and the consequences of the disaster and to improve the safety of reactors in Eastern Europe, all of this mainly as a result of Secretariat action and advice from the Director General's International Nuclear Safety Advisory Group (INSAG).

Progress on the establishment of a comprehensive, binding international safety regime, however, remained slow. In fact, the report of the Expert Working Group showed little or no sense of urgency. It reviewed the Secretariat safety programme and made some recommendations for the expansion of the programme, but many of the experts were explicitly opposed to the establishment of mandatory safety standards.

The Director General and his staff remained convinced of the need for further, more decisive action, but many of their proposals were scaled down by the Board on budgetary grounds, but also because of unwillingness among some important members of the Board, even after Chernobyl, to give priority to nuclear safety. One member of the Board put it quite bluntly: "Enough is enough!" During the 1988 General Conference, the USA, France and other major nuclear powers were not prepared to co-sponsor a modest Dutch draft resolution on nuclear safety and insisted that the word "priority" be changed into "emphasis".

A particularly vexing obstacle towards the goal of a more comprehensive international safety regime was the severe budgetary restrictions to which the Director General was subjected by the major Western members of the Board in the form of the so-called zero growth policy, invented and strictly applied to the budget of the UN family by the Geneva Group, the ten major Western contributors to the UN budget. This policy is justified in order to remedy excessive growth and the absence of clear priorities in the budgets of the UN and some of the less well managed specialized agencies. Its indiscriminate and inflexible (a US delegate coined the phrase "zero is zero is zero"! ) application to the budget of the IAEA, probably the best managed agency of the UN system, has been decidedly harmful to the essential Agency programmes in the fields of both nuclear safety and safeguards and thus to the future of

nuclear energy as a vital source of world energy supply. For 1986 and 1987 the Board granted an exception to the zero growth rule, but for all the following years the rule was again strictly applied, thus hampering the Agency's programmes on nuclear safety.

Notwithstanding these budgetary restrictions, the Secretariat, together with INSAG, managed to push forward its nuclear safety programmes, notably in revising the NUSS codes and by drawing up a set of Basic Safety Principles for Nuclear Power Plants as well as a Code of Practice on the International Transboundary Movement of Radioactive Waste which were endorsed by the Board and by the General Conference. In fact, the mood slowly started to change towards a greater sense of urgency and higher priority for nuclear safety measures. In 1990, the Board and the General Conference endorsed a broad nuclear safety strategy drawn up by the Secretariat, outlining a range of priority measures. The Director General stated that: "During the 1990s the international community will be faced with the task of ensuring that all nuclear installations are safe, well regulated and environmentally sound and that firm plans are in place for the disposal of radioactive wastes. From this basis it will have to build broad public confidence in the safety of nuclear installations and the management of radioactive wastes." At the same time, the Board and the General Conference endorsed a proposal by the European Union to convene a high level international conference on nuclear safety in 1991 "to provide an opportunity to the international community to define the nuclear safety agenda for the decade."

## THE 1991 SAFETY CONFERENCE

The conference was intended to be of a high policy making, political nature and, truly, the keynote speeches were political enough to be quoted from in this anniversary volume, because they reflect the vital importance of nuclear power and nuclear safety and the tasks of the Agency in the years ahead.

*Hans Blix*: "The future of nuclear power depends essentially on two factors: how well and how safely it actually performs and how well and how safely it is perceived to perform. In these safety issues I also include the safe disposal of waste."

"The vast majority of the IAEA's member governments wish to promote the use of nuclear power as one source of the world's energy supply and they know that a key to such promotion is the development and maintenance of an international safety regime."

*Klaus Töpfer*, German Federal Minister for the Environment, Nature Conservation and Nuclear Energy, and President of the Conference: "As a result of intensive national and international efforts, today's experts are of the opinion that all the technologies required for safe waste disposal are available, that they can be evaluated with sufficient accuracy and that appropriate facilities and storage sites can be safely constructed."

"The credibility and prospects of success of a strategy for the future are ultimately measured by the efforts to find optimum and practical solutions to the future tasks we face in the spheres of environment and development, in particular with regard to world energy supply."

"The objective (of the development of new reactors) must be to limit the effects of even very improbable severe accidents to the plant itself."

On effective control and verification: "In this context, I want to repeat my most important proposal to start with the work on a convention on nuclear safety."

*Laurens Jan Brinkhorst*, European Commission: "The acceptance of the nuclear industry depends upon public knowledge of its benefits and public attitudes to safety practice."

"The answers that the international community can give to the...issues of safety and waste disposal are not so convincing. Indeed, we do not yet have anything that resembles an international nuclear safety regime, that is a system of international treaties, conventions and practices to which States could adhere."

*Klaus Stadie*, NEA/OECD: "It is regrettable that countries did not, from the start, treat international co-operation in nuclear health and safety with the same urgency as the safeguarding of nuclear fuel."

"Had governments joined forces — 35 years ago — and created an international body dedicated to the uniform achievement of the highest safety standards in this industry and dedicated to the pooling of resources, Three Mile Island and Chernobyl might not have occurred."

*Morris Rosen*, IAEA: "It may be the proper time to bring about an international accord on a comprehensive and up-to-date set of fundamental nuclear safety principles covering the many aspects leading to safe operation, including the necessary oversight."

*Herbert Kouts*, Chairman of INSAG: "Yet there is a widely held fear of nuclear power generation and of related activities. Such concerns must be shown to be unfounded if the nuclear option is to be exploited fully to mankind's benefit."

The discussions of the experts, almost as if Chernobyl had not occurred, did not reflect these clear statements and exhortations; they lacked a sense of urgency and were characterized by excessive caution. There was, again, no consensus among the experts on the need for binding international safety standards, the primacy of national responsibility was strongly insisted upon and too many issues which, five years after Chernobyl, should have been solved, were referred to new expert groups. On the issue of the next generation of nuclear power plants and nuclear waste disposal, more concrete and positive conclusions were reached, including the need for an internationally binding arrangement on safe waste management.

In the end, overcautiously, the conference recognized "the potential value of a step-by-step approach to a framework convention on all aspects of nuclear safety."

Fortunately, the President, Minister Klaus Töpfer, in his closing statement restored the balance and clearly hammered out the need "to implement an international safety culture on the basis of safety principles and requirements already agreed upon, based on legally binding agreements."

Fortunately also, the Board and the General Conference acted with due urgency and, besides pushing forward the regular safety and waste disposal programmes, set in motion the process that led to the Convention on Nuclear Safety of 1994, which entered into force in October 1996, ten years after Chernobyl and ten years after Hans Blix proposed in the Board the elaboration of binding international safety standards!

Together with the two 1986 conventions, the Safety Convention is an important step towards a comprehensive international safety regime. Yet it remains to be seen whether public and parliamentary opinion will consider it adequate for ensuring nuclear safety. Its review mechanism is a novel and important step forward, but it falls short of a system of inspection along the lines of the OSART missions and it lacks any sanctions on non-compliance, partly because of the consensus rule on reports of the review meetings.

## OTHER SAFETY RELATED ISSUES

Another glaring deficiency in the international nuclear fabric at the time of Chernobyl was the fact that the Soviet Union and the Eastern European countries were not parties to any of the two existing regimes of civil liability for nuclear damage and that the Vienna Convention on Civil Liability was far from adequate. At the Special Session of the General Conference in 1986, the Netherlands called attention to this fact and to other weaknesses in the liability regime.

As a first step to remedy the situation, in September 1988 a Joint Protocol linking the 1963 Vienna Convention on Civil Liability for Nuclear Damage and the 1960 Paris Convention on Third Party Liability in the Field of Nuclear Energy was adopted at an international conference jointly convened by the IAEA and the Nuclear Energy Agency of the OECD.

The purpose of this protocol was to broaden the coverage of the two conventions and to avoid conflicts of law.

The protocol was yet another step towards a comprehensive, binding nuclear safety regime. As stated by the US Governor in the Board in February 1990: "Public acceptance of nuclear power will depend, among other things, on an effective and credible system of liability for nuclear damage."

However, even after the adoption of the Joint Protocol of 1988, that system was neither effective, nor credible, because, among other things, it was limited both in geographical scope and in the amount of compensation to be provided in the event of damage.

The General Conference of 1989, therefore, requested the Board to continue, as a matter of priority, to consider the question of nuclear liability and to convene an open ended working group to study all aspects of liability for nuclear damage.

The working group brought to light a seemingly fundamental difference of view as to whether priority should be given to strengthening and broadening the existing system of civil liability or whether an additional system of State liability was required. The former view was held by the USA and most of the parties to the 1960 Paris Convention, the latter by Canada, Australia and others.

Nevertheless, so much progress was made on this and other issues, including the revision of the Vienna Convention and the relationship between international civil and State liability, that the Board could decide in February 1990 to dissolve the working group and to transform the existing Standing

Committee on Civil Liability into a committee to consider both civil and State liability and also to start the preparations for the revision of the Vienna Convention. Given the urgency of the matter and the political momentum created by the Board and the General Conference, it was hoped that agreement on the creation of a new, comprehensive system of nuclear liability was within grasp. However, the new standing committee became bogged down in legal detail, the political momentum was lost and, worse, the initial willingness to seek compromise was also lost. Recently, under new leadership, new progress has been made and it now seems possible that the revision conference for the Vienna Convention will be held in 1997, 11 years after Chernobyl and nine years since the General Conference gave priority to nuclear liability!

For public, political and parliamentary opinion, uninformed and even informed, perhaps the most controversial aspect of nuclear power generation is the safe and durable disposal of nuclear waste. The urgency of this issue was never disputed and a tremendous amount of work has been done by the Agency, the industry and governments to design technologies, and develop and implement standards, criteria, guidelines and practices for the safe management and disposal of nuclear waste. The present state of the art was stated by the German Minister Töpfer at the 1991 safety conference, quoted above. And still public opinion and even responsible government ministers are not convinced!

It is, therefore, very important that an international convention on the safety of radioactive waste management be concluded without delay, thus further completing the international safety regime. Current progress in this regard seems promising.

Another, no less vital, aspect of the nuclear safety complex is the design and the development of a new generation of inherently safe power plants, essential for convincing the world of the validity of the nuclear power option. Here again, a great deal of research and development has been done by the industry and by the Agency, in particular INSAG, but the results and the present state of the art are less than transparent and convincing.

Finally, there is the issue of the management and storage of plutonium, which after the INFCE (International Nuclear Fuel Cycle Evaluation) discussions of the early 1980s seems to be disappearing from the international nuclear agenda. Recently, the Agency has become engaged in safeguarding plutonium released from military programmes, but the general question of plutonium management and storage remains open. And it is the risk of

plutonium which keeps haunting public opinion! Therefore, new initiatives for an international regime for plutonium management and storage, with effective physical protection and safeguards, would be timely. The Director General's trilateral initiative with regard to excess plutonium is an important first step.

### THE BROADER CONTEXT

The validity of the nuclear power option in the context of sustainable development and environmental protection and in comparison with other sources of energy has been convincingly explained in numerous technical meetings and publications. I refer in particular to the 'Memorandum on Nuclear Power, Nuclear Techniques and Sustainable Development' submitted by the Agency in 1992 to the Rio Conference on the Environment and Development. Still, public and parliamentary opinion in many countries remains deeply concerned about the perceived risks of nuclear power. Chernobyl, Hiroshima, nuclear testing and the illegal Iraqi nuclear weapons programme are visible and are constantly revived by the media. But the gradual exhaustion of fossil fuel reserves and the greenhouse effect of fossil fuel burning are invisible and affect no one today.

What complicates matters is the absence of a high level, political, world-wide forum on present and future energy demand and supply in its economic and environmental context. Energy, let alone nuclear energy, is not on the political agenda of the world community. It should have been on the agenda of the Rio Conference, but it was not. Nuclear power was relegated to some paragraphs on nuclear waste.

It is absurd that there is a specialized agency on tourism and none for energy, on which the future of the world economy is totally dependent. There have, rightly, been world conferences on food, population, environment, women and children, but none on energy. Existing organizations and forums on energy are either sectoral or regional or both. There is no worldwide co-ordination of efforts. The IAEA deals with nuclear energy, the OECD is regional and has the NEA for nuclear and the IEA (International Energy Agency) for other sources of energy. OPEC is limited to producers of fossil fuels. Twenty-three years after the 1973 energy crisis the absurd situation persists that the heads of the IEA and OPEC cannot officially communicate, as if OPEC were outcasts! The European Energy Charter, initiated by the Dutch Prime Minister Lubbers, is also regional, excludes OPEC and does not

deal with nuclear energy as an option, except with regard to nuclear safety in Eastern Europe.

The only more or less global forum is the International Energy Conference of producers and consumers of fossil fuels, which in December 1996 held its fifth session in India. At this session, Norway made a proposal on the establishment of a global energy organization on which, it seems, further action is going to be taken.

### CONCLUSIONS

When the Director General invited me to write a contribution for the anniversary publication of the IAEA, I chose the subject "Nuclear safety, the public battle lost?" on account of the frustration and impatience with the slow progress towards a binding safety regime which I experienced during my six years' posting to the Agency. The conclusion, I felt, would be: Yes, the public battle is lost.

But upon reflection, and having gone over some of the records, my conclusion runs otherwise: no, the public battle has not been lost and the nuclear power option is still open, because:

- The rapidly increasing demand for energy, especially outside Europe and North America, the inevitable long term exhaustion of fossil fuel reserves and the threat to the environment of fossil fuel burning will simply compel governments to return to the nuclear option;
- Although too slowly and belatedly, progress has been made by the IAEA and the industry towards a comprehensive, binding international nuclear safety regime which can provide a maximum degree of nuclear safety.

Reviewing the ten years that have elapsed since Chernobyl, I cannot but conclude that the Director General and the Secretariat of the Agency have been alert and forward looking, whereas the governing organs of the IAEA and the nuclear industry and regulators have acted too cautiously and too slowly. Much valuable time and many opportunities have been lost!

Whether the nuclear power option will be realized depends on urgent action:

- The nuclear industry itself must vigorously pursue its efforts to guarantee nuclear safety and develop new generations of safe power reactors in order to present an economically, financially and environmentally viable nuclear power option to the world;
- The IAEA, and especially member governments, must vigorously pursue efforts to make the nuclear power option viable and acceptable by, *inter alia*:
  - establishing without further delay an effective new regime for liability for nuclear damage,
  - concluding a convention on the safety of radioactive waste management,
  - pushing forward in a transparent, concrete manner research on and development of a new generation of safe power reactors,
  - pursuing and broadening the existing nuclear safety, radiation protection and waste management programmes, and review and advisory services,
  - making the necessary budgetary resources for nuclear safety and related programmes available without preconceived restrictions,
  - reconsidering the feasibility of an international plutonium management and storage regime.
- The UN should convene a World Energy Conference to consider the future demand and supply of energy and all possible options for energy production in the perspective of sustainable development and the preservation of the environment. It should consider the feasibility of establishing a World Energy Organization.



EVOLUTION OF  
THE RADIOACTIVE WASTE  
MANAGEMENT PROGRAMME  
IN THE YEARS 1985–1993

Jia Lou Zhu



*Jia Lou ZHU* was born on 2 October 1932 in Shanghai, China. He graduated from Zhejiang University, Mechanical Engineering Department, in 1952 and from 1959 started to work for the development of the Chinese nuclear industry. He received further engineering physics and nuclear power technology training both in China and abroad. He worked as a reactor engineer, reactor project manager and Deputy Director of the reactor and reactor materials division in a designing and research institute for more than fifteen years. In 1980, when the academic system in China was resumed, he completed a thesis and was awarded the title of Senior Nuclear Engineer.

From 1975 to 1985 he was Deputy Chief Engineer in charge of nuclear fuel cycle projects of the Bureau of Science, Technology and Nuclear Power at the Ministry of Nuclear Industry, Beijing.

In 1987 he was officially awarded the status of Professor.

From 1985 to 1993, he was Director of the Division of Nuclear Fuel Cycle and Waste Management at the International Atomic Energy Agency. After he retired from the IAEA and returned to China, he was assigned to be Vice Chairman of and Adviser to the Science and Technology Commission, China Atomic Energy Authority.

The International Atomic Energy Agency has been assisting its Member States in the management of radioactive wastes for almost three decades. The Agency has an integrated programme that supports Member States in the safe and effective management of nuclear wastes by organizing the exchange and dissemination of technical, safety and regulatory information, providing guidance, technical assistance and training and supporting research and development.

The Agency's mechanisms for fostering international co-operation and collaboration are well established and include:

- Collection, review and publication of up-to-date information;
- Dissemination and exchange of information at international meetings;
- Sponsorship of research work through Co-ordinated Research Programmes;
- Provision of technical assistance and training opportunities for developing Member States.

The waste management programme of the Agency in the mid-1980s was organized into four major areas: waste processing and storage, radioactive waste disposal, radiological and environmental effects of waste disposal and the decontamination and decommissioning of nuclear facilities

## PROGRAMME PLANNING

The Agency has always had a continuing process of exploring ways to modify its waste management programme to support the changing needs and requirements of its Member States. This process is in itself a challenging undertaking owing to the diverse nature of the waste management activities that are planned or are under way in Member States. For example, in an effort to cover the status of Member State activities in this field, five waste management activity categories have been developed and used during the formulation of the Agency's waste management programme. These categories span waste generated from the use of radioisotopes for medicine at one end of the spectrum to waste from nuclear fuel cycle activities at the other end.

With such diverse fields of interest among its Member States, the Agency's programme was carefully balanced so as to place sufficient resources in activities which were beneficial to all Member States regardless of their degree of sophistication in the management of radioactive wastes.

This often meant that some activities would be directed towards the developed Member States while other programmes were established to assist developing countries. Of course, there were also programmes that were beneficial to all Member States.

In introducing new programmes, a very careful analysis was performed to determine the costs/benefits since the Agency has been operating under a 'zero growth' budget environment. Under such an environment, implementation of a new programme, by definition, meant the shifting of resources away from other programmes. New activities or initiatives were therefore carefully evaluated to determine if their implementation would strengthen the overall programme.

## R A D W A S S

In 1988, at the request of Member States, Hans Blix, the IAEA Director General, proposed that consideration be given to establishing a special series of safety related documents devoted to radioactive waste management. Initial work to structure the so-called RADWASS (Radioactive Waste Safety Standards) programme began in early 1990 and full approval to execute the programme was given by the IAEA Board of Governors in September 1990. RADWASS was established to create a series of documents to: improve the visibility and status of Agency safety related publications in the waste management area and thereby to make more evident the harmonization which exists in the approaches to establishing safety in this area at the international level; and impose an improved and more logical structure on these publications.

The initial RADWASS programme was formulated to provide a series of international consensus documents on the safe management of radioactive waste. It was organized within the framework of the hierarchical structure of four levels of the IAEA Safety Series and within the six radioactive waste management subject areas.

In 1995, the highest level document in the programme, the Safety Fundamentals entitled *The Principles of Radioactive Waste Management*, was approved by the Board of Governors and published. It has been used as the basis for preparing a draft Convention on the Safety of Radioactive Waste Management.

## TECHNICAL PEER REVIEWS AND ADVISORY SERVICES

Technical peer reviews have been an essential component of national waste management programmes from the very beginning. Peer reviews are important for interpreting and verifying or validating assumptions, R&D results or conclusions critical to the success of programmes. While peer reviews may not be legally required in all countries, external reviews are and have been a formal aspect of many programmes. As programmes move towards common phases of development, there will be an inevitable increase in the use of independent peer reviews, both domestic and international, to bolster technical confidence, strengthen programme credibility and, more importantly, foster public acceptance of national waste management programmes.

At the IAEA, the need to offer direct advisory services and peer reviews to the Member States has become quite apparent. Three main services have been implemented — the Waste Management Advisory Programme (WAMAP), the Waste Management Assessment and Technical Review Programme (WATRP) and the Spent Radiation Source Programme (SRSP).

WAMAP was developed in co-operation with technical assistance programmes to facilitate the IAEA's efforts to provide direct assistance to developing Member States for the management of radioactive wastes in a safe and environmentally acceptable manner. The programme provided a technical assistance mechanism which offered international expertise in waste management problems and issues faced by developing countries. It helped developing countries by: assessing their needs in waste management and related areas; reviewing operational and planned programmes; and evaluating available expertise and staffing, laboratories, equipment and services.

Teams of experts in various waste management disciplines visited a Member State, upon its request, for a comprehensive overview of waste management needs, practices, procedures and institutions. The teams directly assisted in the practical development and implementation of waste management options, plans, and methods for waste segregation, treatment, conditioning, storage and disposal, all within the context of the country's policies, programmes and financial situation.

Between its inception in 1987 and December 1991, there were 35 WAMAP missions to 34 countries. The results included a strengthening of waste management infrastructures, enhanced safety practices and a greater commitment of resources to the waste problems faced by the countries visited.

WAMAP missions identified a number of areas demanding greater national awareness and attention. Each mission reported its findings and recommendations to national authorities, with special emphasis placed on practical approaches that could be taken to address or remedy specific problems. Additionally, during the course of missions, the experts provided on-the-spot assistance and advice to the country's waste management staff.

As part of each mission's follow-up actions, Agency technical officers monitored the steps taken by national authorities to implement WAMAP recommendations. They also sent supporting technical reports and technical video films that demonstrated safe waste management practices, especially of spent radiation sources. In some cases, experts were dispatched to provide further assistance in the field.

Similar to WAMAP, WATRP is an advisory service available to Member States upon request. However, while WAMAP focused on waste management concerns in developing Member States, WATRP was established to provide a mechanism for technical assessment and independent peer reviews of waste management strategies and activities in Member States with developed nuclear programmes. The objective of WATRP is to assist Member States with nuclear power plants and fuel cycle activities in their evaluation of the technical, operational, safety and performance features of waste management systems planned or in operation. The missions can thus contribute to improving waste management systems and plans, and in raising levels of public confidence in them, as part of IAEA efforts to assist countries in the safe management of radioactive waste.

WATRP missions are composed of a group of international experts under the IAEA's auspices. The members of the WATRP panel act in their individual capacities. Therefore, the views and comments expressed by panel members regarding the programme under review are their own and do not necessarily represent the opinion or views of their respective governments or the Agency. Unlike the WAMAP service, Member States requesting WATRP are expected to provide the necessary funds to cover the cost of the programme.

Most of the WATRP requests were performed by a careful review of source materials followed by technical discussions between the team of experts and the professional staff of the customer at the Agency or at the customer's site. WATRP started in 1989. Up to 1994, seven missions (Sweden, the United Kingdom, Republic of Korea, Finland, Czech Republic, Slovakia and Norway) were carried out.

As past experience has shown, radioactive waste management issues attract considerable attention, particularly from the standpoint of health and environmental safety. International peer reviews can be valuable components of national efforts to obtain objective assessments of their programmes and plans.

Another area of major concern faced by many of the IAEA's developing Member States is the management and disposal of spent radiation sources. Recent estimates indicated that over 25 000 spent radiation sources were unaccounted for in developing countries. These unmanaged spent sources have the potential of high radiological risk to the public. Radiation source mismanagement has resulted in fatalities to the public. Since 1962, reported accidents with spent sources have caused the death of 19 people through overexposure. Moreover, not only is human health at stake but large monetary amounts are also involved: for example, the cleanup costs for one accident were estimated at approximately \$34 million. From 1989, the IAEA initiated the Spent Radiation Source Programme (SRSP) that provides, depending on the country's waste management infrastructure, direct training and/or practical demonstration and implementation of techniques for the treatment, conditioning and disposal of spent radiation sources. The programme marks the beginning of a new 'hands-on' approach in providing assistance to developing Member States.

Regional training courses focused on: identification and location of sources; transport; conditioning of sources, or their return to suppliers; storage options; and final disposal. In addition, the development of a database package for keeping track of sealed sources from the cradle to the grave, named 'The Sealed Radiation Sources (SRS) Registry', was developed for Member States that have a small number of sealed sources.

#### WASTE PROCESSING AND STORAGE FACILITY (WPSF)

Many developing countries generate similar volumes and activities of radioactive wastes from the use of radioisotopes. In recognition of the need to assist them in planning for the processing and storage of wastes from nuclear applications, the Agency developed a plant design package of reference materials for the handling, processing and storage of low and intermediate level waste.

By offering such a package, the Agency and Member States benefit in two important ways. First, it promotes the availability of a plant design that has been structured according to the needs of Member States that generate

waste only from nuclear energy applications. This means that the plant would be designed for low volumes of waste and with process technologies that are easy to operate and maintain.

Secondly, since the resources available for providing technical assistance to developing countries are limited, there is considerable merit in developing an application or concept which meets the needs of several countries and can be used repeatedly. The reference package would serve as the basis for the construction of facilities to handle radioactive waste from nuclear energy applications.

Accompanying this reference design, the Agency prepared a series of 11 technical mini-manuals for the management of low and intermediate level wastes generated at nuclear research centres and by radioisotope users in medicine, research and industry.

#### WASTE MANAGEMENT DATABASE (WMD B)

Starting in 1989, the Agency began the process of developing and implementing a Waste Management Database (WMD B). Information put into the WMD B was derived from a questionnaire that was forwarded to all Member States in May 1989. The WMD B was structured so as to provide a waste management profile of Member States. It includes information on the current inventory of waste volumes, waste volume projections, policy and regulatory developments, organizations responsible for waste management activities, national strategies, waste management research and development programmes, operational activities and significant milestones. To the author's knowledge, more than 35 Member States submitted a profile of their waste management activities. The database is being used by the Agency to enhance the waste management programme by providing ready access to information on Member State activities in the field.

#### PUBLIC UNDERSTANDING OF ISSUES IN RADIOACTIVE WASTE MANAGEMENT

Nuclear energy development is at a crossroads and, in fact, has been so for many years now. The industry is in a dilemma because of the changing public attitude over the years on the nuclear issue. The safety of

operating nuclear facilities and the associated health risks are uppermost in people's minds, especially after the nuclear plant accidents at Three Mile Island and Chernobyl. Of equal concern is the question of the safety of waste disposal.

The technology for radioactive waste management was developed right from the beginning of the nuclear industry, unlike the case for some other, conventional industries. The quantities of nuclear wastes are small, especially high level wastes, when compared with conventional wastes. The radiation doses which can be expected from waste disposal are trivial when compared with those from natural sources of radiation and the effects of radioactive fall-out. Analyses show that the health risks to existing and future populations are acceptable and far below those from alternative sources available for energy production. All energy fuel cycles produce wastes; however, nuclear waste disposal is less polluting than disposal of other wastes.

Public understanding is the all important bridge between the opponents and proponents. To achieve this it is necessary to translate and communicate the technical solutions in an understandable way to the public and provide an opportunity to interested individuals and groups to give their views.

The Agency's programmes and actions, started in 1987, were based on three broad areas: (1) analysis of issues and identification of gaps in public understanding; (2) consultation with Member States; and (3) development of action strategies.

As a first step, the preparation of an IAEA source book was recommended by a senior consultants group which met in 1987 and the book was produced in 1992. This book gives pertinent information on radioactive waste management to help national authorities in the development of their national strategies for public acceptance. The topics covered include: types of wastes; protection goals; radioactive waste management procedures; evaluation of methodology for long term assessment of waste disposal systems; socio-political and ethical concerns; institutional aspects; and public acceptance strategies.

## CONCLUDING REMARKS

The IAEA's activities in radioactive waste management, as already described, are continually under review to meet the needs of Member States and to reflect the current status of work in the field. In view of its wider

responsibilities to give global guidance, the needs of developing countries are given special importance. The work done so far, and the IAEA RADWASS programme in particular, have been useful to all countries. However, it is being increasingly felt that in addition to the publication of reports, IAEA activities should also meet the needs of Member States, especially developing Member States, for practical approaches to the implementation of waste management programmes and projects.

The new initiatives summarized in this paper represented results between 1985 and 1993 of a continual assessment process conducted within the Agency to develop services which are useful to Member States regardless of the status of their waste management programmes. The author is confident that this assessment process will continue as the Agency strives to ensure that resources are directed to activities that are of immediate interest and importance to Member States.

CONCEPTION, BIRTH  
AND GROWTH OF THE  
JOINT FAO/IAEA DIVISION

Björn Sigurbjörnsson



*Björn SIGURBJÖRNSSON* was born in Reykjavik, Iceland, in 1931. After finishing primary education, including farmers' school in Iceland, he obtained a BS degree in agriculture from the University of Manitoba, Canada, in 1956 and a Masters degree in plant genetics from the same school in 1957. After studying nuclear applications in agricultural research in Oak Ridge and elsewhere in the USA in 1957, he completed a PhD in plant breeding from Cornell University in 1960. He was a research scientist in the field of plant breeding at the University of Iceland until he joined the IAEA in 1963. He became Head of the Plant Breeding and Genetics Section of the new Joint FAO/IAEA Division in 1964, where he served until 1968, when he was appointed Deputy Director of the Division. He left the Agency in 1974 to become Director of the Icelandic Agricultural Research Institute. He was co-founder and later Chairman of the Board of the Nordic Gene Bank and Chairman of the Nordic Council for Agricultural Research. In 1983, FAO appointed him Director of the Joint FAO/IAEA Division. He was Chairman of the FAO Committee on Biotechnology and Chairman of the FAO Task Force on the Chernobyl accident. In 1995, he was appointed Secretary General of the Ministry of Agriculture in Iceland where he, his wife Helga and their daughter, Unnur Steina, and her family live.

## CONCEPTION

In the same year the IAEA was founded, the USA invited a group of European agricultural scientists to visit major research and university centres in the USA which were actively using radiation and isotopes in food and agricultural research. The purpose was to show the European scientists how agricultural research could benefit from nuclear applications. The four-month tour, visiting some dozen university and research centres, included graduation from the 'Drip'<sup>1</sup> course at the Oak Ridge Institute of Nuclear Studies, Tennessee. The American tour leader was Ed Englebert, a soil scientist from Wisconsin. The European leader of the group was Vic Middleboe, an agronomist from the Agricultural University of Denmark. There was Carl Lamm, a soil scientist from Denmark, Gian Tommaso Scarascia-Mugnozza, a plant breeder from Italy, and the author, then a plant breeder from Iceland. One of the lecturers at the Agricultural Research Centre, Beltsville, Maryland, was Maurice 'Mac' Fried, a soil scientist. All the above were to become the pioneers who gave life to the eventual Joint FAO/IAEA Division seven years later, including two Directors, two Deputy Directors and Section Heads. Many other members of the group became important participants in its programmes.

Shortly after the founding of the Agency, an agricultural scientist was hired and a small number of research contracts were placed in the field of soils and plant breeding. In 1960, Mac Fried arrived at the 'Unit of Agriculture' and two years later activities were started at Seibersdorf. At the same time FAO decided that nuclear technology was important enough for it to create an 'Atomic Energy Branch', which eventually had five staff members. Unavoidably, these two entities started similar programmes and their activities overlapped and competed. Under pressure they had no choice but to co-operate to some extent. This was hard on both parties. I remember the preparations for a major conference co-sponsored by the two organizations in the early part of 1964, ten months before the beginning of the Joint Division. I went to FAO, Rome, in January 1964, as a member of the IAEA Unit of Agriculture and thus a member of the joint planning committee. I was more or less told to accept FAO's leadership and the Agency's marginal role. Agency money was OK but no interference! It was clear to me, as one who had joined the

<sup>1</sup> 'Dabbler in radioisotope procedures'.

Agency a few months earlier, that this situation was untenable. I did not know then that the two Directors General, B.R. Sen and Sigvard Eklund, had already come to this conclusion. Dr. Eklund later told me that the two had agreed to set up a joint Division as they sat side by side at a Salzburg festival concert!

## BIRTH

The Agency had first tried to solve the problem of co-existence by posting a liaison officer in Rome. Peter Vose spent the summer of 1964 at FAO in Rome and reported to Mac that he had had nothing to do and was wasting his time. In fact he was kept out of the work of the Atomic Energy Branch as much as possible. During the summer Ed Engelbert, with the help of Peter Vose and together with the Chief of the FAO Branch, hammered out an agreement between the two organizations — in effect the constitution of the Joint Division — which today stands unchanged.

The items most difficult to resolve were first of all the location of the Division and, secondly, which organization would be responsible for the appointment of the Director and who that should be. Engelbert told me that three things had caused the Division to be located in Vienna: the large technical co-operation component of the programme financed by the Agency, the existence of the Seibersdorf laboratory, and the Agency's unique research contract programme of which agriculture already had become a major component.

Having resolved the question of location for the new Division, it became a matter of tit for tat that FAO should become responsible for naming the Director. The real surprise was that FAO chose the Head of the Agency's Unit of Agriculture, Dr. Fried, in favour of its own Branch Chief to become the first Director of the Joint FAO/IAEA Division of Atomic Energy in Agriculture as it was then known.

I remember 1 October 1964 very well. We had six Professional staff members in the Unit at the time and on that day all but me were on duty travel, so in effect I, at the tender age of 32, was the first acting Director of the new Division on that fateful day. I remember saying to the small staff present at the end of the day that I had not noticed any change. No calls from Rome and business as usual! On that day I also became Head of the Plant Breeding and Genetics Section, and together with my secretary, Johanna Hoch, we constituted the whole Section.

Nothing much changed until November, when three of the FAO staff members and one consultant moved to Vienna. None had anticipated the choice of Vienna; some had refused to move and the unhappiness of those who came with the move was unmistakable. Mac Fried organized a party upstairs in the Beethovenhaus to welcome our colleagues. We drank Grüner Veltliner, sang 'Wienerlieder' as we always did on a 'Heurigenabend' and even danced, but we learned later that our colleagues interpreted this as a celebration of our victory over them. Maybe this was not so far from the truth: we had stayed in Vienna and our beloved chief, Mac Fried, continued as our boss. They had to move from Rome, work under a different boss and, in effect, join our Unit. Unfortunately, this atmosphere was never to heal; in fact it became much worse and, for a while, very serious.

### GROWING PAINS

The reaction of the Branch Chief who had expected to become Director, but instead became the Division's Deputy Director, was to try to destroy the budding Division. The next few years were a continuous struggle for survival. At every meeting of FAO's Governing Bodies until well into the 1970s, a number of delegates had been lined up and fed (mis)information about the Division to discredit its work. Fortunately, Adeke Boerma, FAO's Director General, and the senior staff stayed on our side and we succeeded in defending ourselves. During one conference, having been forewarned, almost all the headquarters and Seibersdorf staff headed for Rome for our defence and counterattack. We all stayed in the same hotel. Mac Fried held strategy meetings and we, in effect, divided the delegations between us and made contacts. Yehia Barrada got the Middle East, Hans Broeshardt Central Europe and Peter Vose the United Kingdom. Mac handled the Americans and I got the Scandinavians and Canada (since I had studied there). This was certainly not very ethical but in the face of the hundreds of memo pages which had been distributed to delegates by our adversary, our choice was either to fight or give up — which would have certainly meant the end of the Joint Division. Aside from the ethics, our methods were to use facts only and rely on our quite successful record.

At one point, both the Directors General got a letter demanding that I be sacked. I had then replaced the Branch Chief as Deputy Director and was accused of having lied to the highest UN committee on science and technology.

What saved me was a tape recording of the proceedings, revealing my innocence. In spite of these birth pains — and in retrospect possibly because of them — the Division flourished. The number of staff grew, the budget grew, we tried our very best and our self-esteem grew and all this because we were able to show that the programmes were actually helping developing countries.

### SEIBERSDORF

In 1962, Hans Broeshardt, a Dutch soil scientist, started the agricultural activities at Seibersdorf. With him were Helmut Brunner and later Helga Axmann. They did some isotope analyses for the new International Rice Research Institute in the Philippines and were paid \$15 000 for it. In those days one could keep what one earned and Fried decided to build a 'temporary' laboratory building. That became the agricultural building until a new wing was built in 1986. The old 'barracks' are still there and still being used, at least for storage.

Agriculture did not get much space in the elegant main laboratories. Fried needed to expand and discovered that there was a sort of basement under the main building with a low ceiling and all cluttered with pipes and service utilities. Not being tall himself, he simply hired John Monroe, an equally short Australian entomologist, who in 1964 started work on both the tsetse and the medfly and had no difficulty manoeuvring under the pipes.

An FAO appointed review committee in 1966, headed by Sir John Cockcroft and including the rather tall Swedish Professor Ake Gustafsson, was appalled at having to crawl under the pipes in order to inspect the SIT (sterile insect technique) activities which it found to be of utmost importance and deserving of more dignified surroundings. The result was that FAO Director General Boerma decided to pay for a modern laboratory building for entomology research. This was the first tangible sign of FAO's pleasure with its new Joint Division.

### THE EARLY YEARS

When I joined the Agency in October 1963, there were specialists in soils, food preservation and entomology. Per Göran Knutsson, a Swedish scientist, started the programme on livestock in 1965 and Gordon Wortley

who had come from FAO expanded his programme on fallout measurements to include initial studies on chemical contamination by pesticides. Another staff member, recruited from FAO, Peter Winteringham, a well known pesticide chemist, later expanded the programme in the area of agrochemicals. A Swedish scientist, Lars Erickson, headed the activities on food irradiation. We all thought Lars, who was in his thirties, was brilliant. He had been at FAO in Rome for a meeting in April 1964 and came back not feeling well. He did not think much of it, but in a few days he was dead from a burst appendix. The best ones die young. By 1969, after I had been appointed Deputy Director, the Division had taken on all the disciplines that now comprise its programme.

#### PROGRAMME DEVELOPMENTS

Of course many things have changed. New sophisticated technology started giving nuclear techniques serious competition. In the early 1980s, biotechnology reared its head. Many thought this was a better alternative technology, posing a threat to nuclear techniques. It was overlooked that the new biotechnology laboratories had more radiation warning signs than Seibersdorf: DNA work depended on phosphorus-32 labelling of one of the DNA strands! Gradually biotechnology became a part of the Division's programme. It is now even included in the name of the Seibersdorf agricultural laboratory. As of the early 1970s there was talk that nuclear techniques had become obsolete and would be taken over by new, more sophisticated methods, leaving 'nuclear' institutions as stranded whales. This of course was far from the truth. What was overlooked was the fact that nuclear technology is based on the most fundamental elements of nature, and thus can never be replaced. All other new technologies are a refinement, based on the same basic principles. This is precisely what happened: new technology was adapted and added to the arsenal of tools. Nuclear laboratories now use a mixture of 'nuclear' and 'non-nuclear' techniques and ordinary research establishments also adopted nuclear technology. In some instances the word 'nuclear' or 'atomic' was dropped from the name of the laboratories, sometimes as a reaction to the anti-nuclear lobby. In retrospect it must have been the wish of the Agency to have nuclear technology introduced into the mainstream of science.

In fact it had always been the main principle of the Joint Division to be task or problem orientated as opposed to technique orientated. The words

'nuclear' or 'atomic' were only found in its name and detailed description of activities, never in its programme titles. The six Sections of the Division and the five Units at Seibersdorf were identified by the subject matter only. Mac Fried always emphasized to his staff that when they drew up their draft programmes and proposed priorities they should first determine the importance of the food and agricultural problems which nuclear techniques could help solve and not the reverse. On our travels and visits to many atomic energy establishments, which included agricultural laboratories, we had seen too many examples of physicists playing around with some elegant nuclear technique and trying to find a problem that would fit it.

All the staff members of the Division were agricultural or food scientists with the highest educational degrees and experience in an agricultural discipline — all of whom had also had training and experience in the use of isotopes and radiation. Fried used to tell a story from a meeting in the Division of Isotopes, where the Unit of Agriculture was located in the early 1960s. The Director of the Division had said that the Unit needed to hire a physicist. A young entomologist on the staff exclaimed: "What in the world would we do with a physicist?" This was certainly not meant to belittle physicists and their specialty, but the truth was that the IAEA in those days was overflowing with physicists and there were very few 'aggies'! We worked with these physicists who were our good colleagues and friends and were always ready to help and advise us.

## THE FAO CONNECTION

While the Joint Division from the beginning was well accepted and even respected within the IAEA, it took a long time for FAO's sister Divisions to accept the fact that here was a Division, located far away from headquarters, with its own programmes dealing with the same subject matters that the other FAO Divisions were dealing with and therefore stepping on everybody's toes, and meddling, so to speak, in everybody else's business. The Plant Production and Protection Division, for example, was engaged in improving plants and claimed that it was free to use any technique, including radiation induction of mutations. In some ways this was beneficial: in the early days that particular FAO Division helped the Joint Division carry out nearly all its programmes in plant breeding. They helped us run the first rice mutation breeding programme in Asia; they organized field trials of mutant

wheat varieties, which had been developed by Scarascia-Mugnozza, all over the Middle East and North Africa, and co-operated in a large protein improvement programme.

In retrospect it was perhaps regrettable that as the Joint Division established itself with its own, independent programmes, this close co-operation with other FAO units decreased to some extent. There was a lot of turf fighting and considerable doubt on the part of our colleagues that our technology would ever leave a dent in the great struggle to improve food security in the world. This was particularly noticeable in the fight against insects, where SIT was not readily accepted. It was not until the screwworm episode in the Libyan Arab Jamahiriya (Libya) that FAO finally recognized its importance — and in fact the corresponding FAO Division tried to run away with it, claiming all the credit, even though all of the expertise and the technical leadership had come from FAO's joint programme with the IAEA. In all later references to that immensely successful project, however, the role of the Joint Division has always been prominently featured. The use of SIT for tsetse eradication was introduced to the field against often active opposition by the Rome colleagues. In food irradiation there were two camps in FAO: one giving strong and very effective support, the other dragging its feet and even actively opposing. In the field of soil and water there was always good support and good relations. This may have been because of a lack of overlapping: our techniques complemented whatever they were doing.

This support was evident when Eduard Saouma was Director of the FAO Land and Water Division. That goodwill carried over when Saouma became Director General. He always supported the work of the Division and was largely responsible for the buildup of the physical facilities at Seibersdorf. On the 20th anniversary of the Joint Division in 1984, an FAO Regional Conference for Europe was held in my home town of Reykjavik. I asked Mr. Saouma if he would give the Division a birthday present. I said we needed a new agronomy laboratory for Seibersdorf. Maybe it was our presence on my home territory, but Saouma agreed on the spot on condition that the IAEA would match his contribution. He called Rome and confirmed this while we talked and, fortunately, IAEA Director General Hans Blix agreed and a beautiful, modern laboratory facility was built. Saouma had been a Director of an agricultural research institute in his home country, Lebanon, and really loved the Seibersdorf laboratory and felt strongly that it should also be an international centre for training in advanced scientific technology for agriculture. The Training Wing followed and later he insisted that we should also provide

an international reference and training centre for food quality and pesticide control at Seibersdorf. His term in office came to an end before that could be started, but now that project is at least in the opening phase. At FAO staff meetings Mr. Saouma often expressed pleasure over the work of the Joint Division and often exhorted his other Divisions to use us as an example of how to do things. This of course did not endear us to our colleagues.

The Joint Division was fortunate to have as heads of FAO's Agriculture Department, of which the Division is a part, a series of excellent Assistant Directors General, all from Germany — Otto Fischnich, Dieter Bommer, Christian Bonte-Friedheim and Hartwig deHaen who both liked and supported the work of the Division.

Cultivating good relations with FAO took a lot of time and a lot of effort. It meant endless travels to Rome and many meetings with colleagues. When my Agency colleagues complained about their workload in running their Divisions, I could only chuckle; the poor Director of the Joint Division had everything twice over as we had to meet all administrative and fiscal demands of FAO as well as the IAEA, which means that the Joint Division has double the amount of paper preparation and report making. I do not ever remember being able to use the same document or paper for both organizations. The mandate, structure and methods of operation of the two organizations are so different that this was (and is) not possible.

The Animal Production and Health programme was initially slow in starting, possibly because of a rapid change of Section Heads. It was in the mid-1980s that it took wing: a laboratory unit was created, a number of Co-ordinated Research Programmes organized and a vigorous technical co-operation programme developed. The origin of the Animal Laboratory Unit was extraordinary. We had long wanted to create such a unit, but bad times had come with zero growth budget and there was no possibility of expansion. Then by coincidence two developments made this possible. The organizational structure of the Agency was being updated and Seibersdorf showed only the Agriculture and Entomology Units. Instead of only adding Plant Breeding and Agrochemicals, I included an Animal Unit. Before this slip-up was noted, the new Unit was already alive with activity. Of course we had no staff, but our other lucky break was that another entity had some inter-staff problems and we were asked to safekeep one position together with the incumbent. We thus had staff. The rest of the duties were fulfilled by the energetic and imaginative headquarters staff. Finding space for this growing 'hawk' was another thing. It really behaved like a hawk in somebody else's nest and soon had

elbowed its way into a few rooms! The animal programme became the most active, even though one could never tell by checking budget figures. (This only proves the truth in the saying that 'zero growth is better than no growth at all!')

In the beginning FAO hardly noticed this programme and relations were cordial. With the rapid increase in activity, FAO's counterpart Division started to raise eyebrows and soon a big fight was looming. I discussed this with my counterpart and we decided to call a meeting in Rome of the senior staff of both sides. One night the small Vienna staff headed with me for Rome and, at the invitation of my fellow Director, we headed straight for his home where he had assembled all his senior staff. It was a lively party. In his part of the world vodka was supreme and it did the trick again. When we met at FAO Headquarters the morning after, there was nothing to do but sign the papers and shake hands. As far as I know, there are to this day the most cordial relations and close co-operation between these units.

#### THE IAEA CONNECTION

The position of the Joint Division in the Agency was quite different. Nobody else dealt with agriculture and everybody dealt with nuclear aspects. In the Agency we were one part of the whole structure, a part of the applications side which always forms the counterweight to the control side — safeguards. As such, a successful agricultural programme contributed to the good reputation of the whole Agency. Our success was everybody's success. The various governing bodies, committees, the Board and the General Conference were appreciative and supportive, almost without exception.

The Agency is very much involved with the safeguards aspects of the nuclear world and rightly so. Aside from that, its main mission sometimes seemed to be preaching the gospel of nuclear power. As that ran into opposition and difficulties, the other, less grandiose applications gained in importance. Even though nuclear technology faced increasing competition from other developing and sophisticated technologies, even prompting some delegations to proclaim their obsolescence, their importance only increased over the years. As noted above, nuclear techniques gradually became part of a wider arsenal. If the Joint Division had not followed suit it would not have survived. Its programmes became known as dealing with 'nuclear and related techniques', a concept which gave the Division a wide mandate indeed.

Understandably this concept was difficult to accept in the beginning. To its credit the Agency acknowledged the new realities and recognized the direction in which scientific thought and technology were heading and allowed more flexibility in its programmes. Thinking back to the considerable resistance we encountered, I believe the main credit for this sensible approach lies with the clear concepts of the future in the mind of Hans Blix.

FAO's position on a wider mandate for the Joint Division was ambiguous. When I replaced Mac Fried, my superiors in FAO could not see a clear future for the Joint Division if it dealt only with isotopes and radiation. I was encouraged to widen the scope to include non-nuclear activities. The Division was even entrusted with the leadership in biotechnology for the whole organization and I presided over an organization-wide committee to guide FAO's entry into this new field.

Gradually it dawned on some sister FAO Divisions that the Joint Division was walking away with some of the most exciting new developments in agriculture and objections were raised. It really was a tightrope walking exercise, but in the end all agreed that the Joint FAO/IAEA Division was in fact the only truly research oriented Division in the organization; even FAO's Division on Research and Technology Development was not actively supporting, dealing with or carrying out research like the Joint Division. During a Committee on Agriculture meeting at FAO in April 1997, I met a number of former colleagues and my conclusion is that the Joint Division is as fully integrated into FAO's organizational structure as one could hope for. It has gained acceptance as a vital part of FAO, respect for its activities, appreciation of its willingness to co-operate, and recognition of the tangible beneficial results its programmes have provided to developing countries.

## LIVING UP TO EXPECTATIONS

The Agency celebrates 40 years of its existence this year. The separate agricultural activities in the nuclear field at the IAEA and FAO started about the same time, although they were not joined together until seven years later. The Joint FAO/IAEA Division presents a rare, if not unique, example of interagency co-operation in the UN system. Considering the complexities of operating a programme of work under the supervision and control of two separate administrations, answering to two Departmental Heads and two Directors General, undergoing the scrutiny of two separate sets of Governing

Bodies and dealing with two sets of programmes and budgets which are out of phase, it is a wonder that the Division is still functioning and — as it appears — to the full satisfaction of both parent organizations.

This would not be so if this was only an exercise in complex administration; without concrete results which Member States recognize and appreciate, the Division would not exist.

Looking over the 33 years of the Joint FAO/IAEA Division and 40 years of food and agricultural applications of atomic energy in the UN, it is clear that the early visions and hopes for the benefits deriving from the peaceful applications of nuclear techniques have been largely fulfilled.

The history of the Joint FAO/IAEA Division was assembled and written by Carl Lamm, a former Deputy Director of the Division, and published on the occasion of the 30th anniversary of the Joint Division in 1994. It contains a comprehensive account of persons involved and events that took place. On the same occasion the Agency also issued a publication written by another former staff member, Peter Vose, entitled *Thirty Years of Benefits from Nuclear Techniques in Food and Agriculture*.

The benefits have been both direct and indirect, arising from the graduation of thousands of scientists from training courses and fellowship training, from the important results of thousands of research projects, partly financed and organized within hundreds of Co-ordinated Research Programmes, each with 10–20 scientists attempting to solve an agricultural problem within a five-year period.

Then there are the results and impacts from the number of technical co-operation projects throughout the developing world and the effect on the scientific community of the number of technical publications, manuals, handbooks and conference proceedings. And, uniquely in a UN system, the Joint Division has conducted its own, supportive research at the Agency's Seibersdorf laboratory.

It has been said that the influence stemming from the mere existence and intensity of the activities of the Joint Division may have stimulated directly and indirectly at least half of the applications of nuclear technology in food and agriculture worldwide over these years. Many of the results have come from projects supported and co-ordinated directly by or through the Division in each of its six disciplines.

One of the first programmes in plant breeding aimed at developing simple and effective methods of mutation breeding. The result was a manual, published in the late 1960s. It became the 'bible' on mutation breeding for

plant breeders worldwide. It was translated into Chinese long before China joined the Agency and laid the framework for the immensely successful Chinese programme in this field where about 10% of the total acreage in China is now under mutant crops. The *Mutation Breeding Newsletter*, published by the Division, now lists almost 2000 plant varieties which originated from the use of these techniques. The majority of these can be traced to work by scientists co-operating in the Division's programme. The economic benefits to farmers and consumers from these improved crop varieties are enormous.

The use of isotopic tracers to exactly locate and follow the movement of atoms of fertilizer elements has laid the groundwork for more efficient fertilizer practices, placement, timing and composition which now are in general use throughout the world. The management of expensive irrigation systems has been greatly improved by the continuous monitoring of soil moisture by neutron measuring devices. Stable isotopes used to study nitrogen fixation have greatly contributed to the more effective use of legumes and symbiotic bacteria in this environmentally friendly method of providing plant nutrients.

Some rather spectacular results have come out of the entomology programme, where radiation is used to sterilize insects and mass release them into affected areas by the sterile insect technique. The emergency eradication of the New World Screwworm from Libya in 1991 has been singled out by FAO as one of its most dramatic and successful projects ever. The steady progress in eradicating the Mediterranean fruit fly using SIT is already resulting in savings of billions of dollars from the reduced use of pesticides and particularly from the opening up of otherwise closed markets for fruits. The total eradication of this pest from Mexico and Chile and the progress made in Argentina illustrate this point.

The Division's work on animal diseases is mainly based on diagnostic techniques using radioimmunoassay and the related, enzyme based method. The Division and the corresponding Unit at Seibersdorf are now the official reference points for such diagnostic services, playing a pivotal role in FAO's effort at eradicating rinderpest from Africa. Isotopic labelling of reproductive hormones has also greatly contributed to more efficient livestock production in many developing countries.

It is not so easy to see where the Division's activities in food irradiation have led to. It has been said that without the Joint Division, this technology would not be pursued at all! From a strictly economic point of view the impact of food irradiation so far has only been modest. The general fear of nuclear radiation and the Chernobyl incident have drastically slowed down

universal acceptance of this method as an effective and often unique means of preserving food and guaranteeing wholesomeness. The Division has worked primarily through the International Consultative Group on Food Irradiation in this field.

The Division's work has been increasingly involved with environmental protection. In fact most of its work enhances environmental quality: more effective use of fertilizers, disease resistant plants, eradication of harmful insects without using chemicals and chemical-free food preservation. One of its programmes, furthermore, has contributed significantly to improved management of pesticide use by employing isotopic tracers to study the fate and significance of pesticides and their residues in plants, animals, soil and water.

On the 40th anniversary of the Agency it can be concluded that the Joint FAO/IAEA Division has earned its place as an important component of its activities. The results of its worldwide programmes are benefitting farming operations in developing as well as developed countries throughout the world. It has demonstrated how UN organizations dealing with subjects as far apart as food and nuclear science can successfully operate a joint programme and in full harmony. Judging by comments made by delegates to the recent FAO Committee on Agriculture, this appreciation of the Joint Division is shared by FAO.



THE AGENCY'S  
LABORATORIES AT  
SEIBERSDORF AND VIENNA

Otto Suschny



*Otto SUSCHNY*: Born in Vienna, Austria, in 1924, he made his first acquaintance with chemistry at the (British) Army College in Perugia, Italy, as a sequel to war service in the British Army. From 1947 to 1954 he studied chemistry and physics at Vienna University, receiving a PhD degree in 1954, but stayed on at the university until 1958 as assistant to Prof. E. Broda, Head of the Radiochemical Department, and worked on the production of radio-nuclide labelled compounds and on tracer applications in biochemical studies.

He was first employed as a consultant to the Agency in 1958 to produce the *International Directory of Radioisotopes*. In 1959 he joined the Agency as a staff member to assist in the setting up of the provisional laboratory at headquarters and in 1961 was transferred to Seibersdorf as Head of the Low Level Radioactivity Laboratory. At the request of the Austrian Government to the Agency he organized the first survey of radionuclides in Austrian food. He was also responsible for providing assistance to Member States in radio-nuclide, trace element and uranium analysis, including teaching, fellowship training and technical assistance missions.

In 1983, he was appointed as Head of the PCI (physics, chemistry and instrumentation) Laboratory. As a member of a negotiating team he drafted the contents of various technical agreements (supplements to the Headquarters Agreement) between the Agency and the Austrian Government. He retired at age 61 in 1985. He is author or co-author of about 120 scientific publications.

## START IN VIENNA

Most of the Agency's programmes have originated from deliberations at international conferences, committees or working groups; they were the results of compromises between the different opinions of statesmen, diplomats and scientists from many different nations. The strength of such origins lies in the wide support often given to well balanced compromises, always provided that care is taken that a committee given the task of designing a horse does not produce the proverbial camel.

In contrast, the idea of adding laboratory facilities to an international organization set up by diplomats, although vaguely considered already by the Preparatory Commission in 1957, was pushed through by a single individual, the Deputy Director General of the Department of Research and Isotopes of the IAEA, Dr. Henry Seligman. He alone had the vision to realize that such facilities were essential not only to provide a solid foundation for the unique scientific and technical tasks to be performed by the new organization but also to ensure its support by the scientific community, which might otherwise have regarded that organization as yet another bureaucratic structure in a world already abundantly provided with such edifices. He also had the skill and managerial capability to put his idea into practice in spite of considerable opposition from some colleagues and from several Members of the Board of Governors who did not share his vision, and of formidable practical and financial difficulties.

The new laboratory was to be set up within easy distance from the Agency's Secretariat and, since some of the experimental work envisaged would involve the use of a nuclear reactor, close to the site of such a reactor. The Austrian Research Centre Seibersdorf and its ASTRA research reactor were at that time under construction and the responsible Austrian authorities, particularly Professor Michael Hignatsberger, welcomed the idea of having an international laboratory on the premises. Arrangements were made under which the Agency was leased a piece of ground at the Centre for a nominal rent of one Austrian Schilling per year and was provided with all the necessary services at cost. (Incidentally, the decision to build a second research reactor in the Prater area, right in Vienna, was taken only two weeks later; if that had been known to Henry earlier, he might have preferred to have the Agency's Laboratories put up there.) Since the Agency's Scientific Advisory Committee meanwhile had also supported the idea and since several tasks to be performed at the laboratory had been defined in the usual way at deliberations

of panels of experts in different fields, several Member States were willing to provide the means to build and to equip it, starting with a generous financial contribution (\$600 000) from the Government of the USA.

Not to lose momentum in view of the fact that the reactor as well as the laboratory buildings would not be available for more than two years, provisional laboratory facilities were installed early in 1959 in the basement of the Grand Hotel in Vienna, which at that time was also the Agency's provisional headquarters. Facilities for radioactivity measurements and dosimetry were rapidly set up, a radiochemical laboratory soon added and the necessary fume cupboards built into the old kitchen. For the maintenance and development of the complicated electronic equipment required, an electronics and a mechanical workshop were made available. Very soon the basement of the Grand Hotel was bustling with activity.

The first task of the handful of people employed there was the production of radioactive standard materials and the organization of intercomparisons between the very few laboratories in the world capable of performing radioactivity measurements by absolute methods. The need for such materials and for the assurance of the reliability of measurements had arisen mainly in the medical field, in which the satisfactory development of radioisotope applications in diagnosis and therapy was seriously hampered by the uncertainty of dose determinations, in particular in the hands of inexperienced personnel in hospitals and medical laboratories, not only in developing countries.

Not much later, a new problem was brought to the attention of the staff. Requests from Member States had poured into the Agency to assess the consequences of radioactive fallout from atomic weapons testing on the health of their populations. Although, strictly speaking, this did not fall within the terms of reference of the Agency since it obviously did not result from any peaceful applications of atomic energy, these requests could not be disregarded and, anyhow, the techniques to be used in such assessments would be quite similar to those applied in pre-operational surveys on reactor sites which were well within the competence of the Agency. Eventually, it was decided to co-operate with the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) in determining the concentration of fallout radionuclides in environmental samples and assessing their significance. The largest individual project of the many handled in this context was the determination, at the request of the host country, of strontium-90 and caesium-137 in Austrian food samples collected throughout the country. (The incineration of large quantities of organic materials necessary in these

determinations gave rise to some complaints from the office staff in the building since the chimneys were not always quite effective in carrying away the resulting smells over the roof.) Several publications were produced from the data found.

Member States soon became aware of the various laboratory activities and very soon requests were made for the training of laboratory workers, scientists and technicians. Already in the first year of operation six trainees were accepted for in-service training, including three from the host country who assisted in the radionuclide survey. Smaller projects handled at the provisional laboratory included the preparation of a mock iodine-131 phantom (from a mixture of barium-131 and caesium-137) which was used by a medical dosimetry expert who travelled to many countries to calibrate thyroid scanning apparatus at hospitals, and the setting up of an absolute calorimeter. The work on these and related projects showed the need for and gave rise to the later establishment of the Dosimetry Laboratory. Investigations of the radiation effects from thorium daughter products on patients given thorotrast as an X ray contrast medium in an outdated technique (these investigations were undertaken in support of an 'international thorotrast project' which had been set up to determine these effects and those of low level radiation on the body in the long term) necessitated the installation of a whole body counter, the nucleus of what was later to be the medical applications laboratory.

In 1961, the laboratory buildings at Seibersdorf were finally completed and most of the equipment transferred there. Only a newly installed Hydrology Laboratory for groundwater investigations with the aid of tritium as tracer and deuterium, and for a while also calorimetry and whole body counting, remained at Headquarters. (Since that time, the Agency has moved to the Vienna International Centre and the old Grand Hotel has been rebuilt in grand style. Where the laboratory used to be there is now a restaurant and when I was invited there last year to attend a wedding I could not identify the location at which I had worked and where my desk had stood.)

#### PROGRESS AT SEIBERSDORF

With the move to Seibersdorf, Dr. Gerald Cook took over from Professor Alexandre Sanielevici as Head of the Laboratories. He would remain in this position until his retirement some twenty years later and with him would

remain the Heads of most of the individual laboratory sections, including Hans Houtermans (physics), Erich Keroe (instrumentation), Brian Payne (hydrology), Robert Dudley (medical applications) and myself (chemistry). This fact and the quiet, unassuming authority of Gerry Cook provided the basis for the continuity of the work programmes and for a team spirit kept up beyond his retirement and my own and, to my knowledge, still evident today. Shortly after we were appointed, the Agency's policy in respect of granting permanent contracts to scientific personnel was changed and most new professionals were employed only for periods of up to five years. The reason given for this policy was that scientists away from their own laboratories or universities for longer periods of time were supposed to grow 'stale' and unproductive. We had no such problems, being kept on our toes constantly and interacting with the stream of colleagues flowing through the Agency as visitors or experts or attending one or the other of the frequent scientific meetings organized at the Agency's premises or elsewhere. Very often, we found ourselves acting as secretaries at such meetings or as rapporteurs. Luckily, our technical support staff, most of which was locally recruited, was not affected by this policy and could be employed for any length of time. We were able to recruit highly competent technicians, including some with university degrees — most of whom were later transferred to professional posts.

The move to Seibersdorf led to a considerable increase in the capacity for work. Fellowship training was greatly facilitated and the organization of training courses for groups between 10 and 20 fellows at a time became possible. The first courses were on topics such as radiochemistry and low level radioactivity measurements. Later on, many different topics were taught and training provided at a rate of one or two courses per year. In-service training was offered on an increasing scale by all sections of the Laboratories.

Of the new projects handled by the sections already established at the time, one consisted in the preparation of large batches of homogeneous uranium ore material which were analysed at a number of reference laboratories to establish a consensus value for their uranium contents. Subsamples of these materials were then made available to many laboratories in Member States as reference materials for uranium ore analysis. In later years, the preparation of reference materials for many different purposes and the organization of intercomparisons between analytical laboratories became one of the main programmes of the Laboratories under the heading 'Analytical Quality Control Services'.

One of the advantages accruing to the Agency from having its own laboratories was that they gave it an edge in the early existing rivalry with other international organizations which had responsibilities overlapping with those of the Agency. Later on, steps were taken to minimize this rivalry by co-operation in joint working groups or panels. In the case of atomic energy applications in agriculture, the common responsibilities of the Agency and FAO even led to the establishment of a joint Division with the impossible name "Joint FAO/IAEA Division of Isotope and Radiation Applications of Atomic Energy for Food and Agriculture Development" which brought with it the need for laboratory services which had not originally been foreseen. Since no space was available in the finished laboratory buildings, a prefabricated building was 'provisionally' set up in 1964 to accommodate the new Agriculture Laboratory, headed by Hans Broeshart, and providing training and research in the soil sciences. Investigations were carried out on ways to improve soil fertility, irrigation and crop production, using isotopic tracer methods in field experiments to evaluate the amount of phosphorus or nitrogen taken up by the crop plants during their growth period, in an effort to optimize fertilizer use. Since no radioactive tracer is available for nitrogen the work involved the use of the stable isotope tracer nitrogen-15 and measurements by mass spectrometry.

A few years later, a plant breeding section was added, with the task of developing crop plants of higher disease resistance or higher yield, using mutation breeding (by irradiation or use of chemical mutagens) to shorten the time for production of new and better strains.

For another new project in agriculture, the use of the sterile insect technique, a new building had to be constructed to allow the mass rearing of insects that would be sterilized by radiation and then eventually released into their natural habitat. When sterilized males mate with females of the natural pest population, the latter will lay unfertilized eggs. By successive repetitions of such releases using large quantities of males (in excess of those in the native population), the pest population can be drastically reduced and eventually eradicated. During the later stages, chemical pesticides may be used in addition to hasten the process of elimination. The pests investigated included the Mediterranean fruit fly and the tsetse fly in projects in Africa and Latin America.

Later still, towards the end of the 1970s, an agrochemicals section was set up with the objective to develop simple but sensitive analytical methods which could be used to measure minute residues of pesticide chemicals in

foodstuffs or in the environment, and to find ways to formulate some of these agrochemicals to improve their usefulness in tropical conditions. Particular emphasis was placed on the development of 'slow-release' formulations which would ensure the action of the pesticide at low levels over extended periods of time.

An important development took place in safeguards. The Agency's safeguards system had been set up in 1961 and updated in 1968. Upon endorsement by the United Nations General Assembly and entry into force in 1970 of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), the IAEA assumed further responsibility in the field of safeguards to act as the international body which would negotiate and conclude agreements with non-nuclear-weapon States party to the NPT "...for the exclusive purpose of verification of the fulfillment of their obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices." The Agency had created a Department of Safeguards which sent inspectors to nuclear facilities under Agency safeguards to ensure that the safeguards agreements and later the NPT were respected at these facilities. Most of these inspections involved purely visual or instrumental verification but in some cases the taking of samples for analysis was indicated. At Seibersdorf, a small Safeguards Analytical Laboratory (SAL) was set up in 1975, headed by Stein Deron, to co-ordinate the analysis of these samples by a network of competent analytical laboratories in Member States. The rapid increase in the workload of SAL made it necessary in 1979 to move to a new laboratory building, which in turn had to be further enlarged in 1983.

## DEVELOPMENTS DURING LATER YEARS

Gerald Cook retired in 1981 to his home in Scotland, where he passed away a few years later to the regret of his former colleagues. His place was taken by Christopher Taylor in 1982. During the latter's term in office the Laboratories, which until then had reported to the Division of Research and Laboratories, were given the status of a Division in view of their growing importance and the size of their staff, which had increased to well above one hundred. In 1989, four years after my own retirement, I was commissioned by the present Director of the Laboratories, Pier Danesi, to prepare a brochure on the organization and the work of the Laboratories. The organizational

structure as it presented itself at that time is, broadly speaking, still valid today, although growth has continued. The Laboratories are part of the IAEA's Department of Research and Isotopes, to which they report directly. However, they provide support for programmes in the other scientific and technical Departments.

The activities were carried out in 1989 by a staff of about 180, consisting of scientists, technicians and supporting personnel drawn from about 40 different countries. The Laboratories covered a floor space of more than 7000 square metres. (All these figures have increased considerably since that time.) Most of the budget was (and still is) provided out of the Agency's regular funds, with sizeable contributions from FAO and from individual governments. In addition to regular budgetary resources, the Laboratories had access to funds made available to them for specific projects, the scientific responsibility for which rested with the Laboratory staff or was shared by it.

The work performed at the Laboratories today covers a broad range of subjects. Individual projects have of course changed with time and keep evolving in response to demands in a changing world. One important quantitative change has been the stepping-up of training activities and the increasing role of the Laboratories in the transfer of advanced technology to developing countries.

The need of the Agency and its Member States for the continuing services provided by the Laboratories is now widely recognized and no longer in need of any demonstration. The large number of requests for laboratory assistance received by the Agency as well as the willingness of governments to give support in the form of donations of equipment and in defraying the costs of special projects is proof enough of the value of the contribution of the Laboratories to the work of the Agency.



THE EARLY DAYS OF  
THE MONACO LABORATORY

Rinnosuke Fukai



*Rinnosuke FUKAI* was born in Tokyo in 1925. One of the last graduates of Tokyo Imperial University, Faculty of Sciences (Chemistry) in 1947, he received a DSc degree in 1955. He joined the Monaco Laboratory in 1962 from the National Institute of Fisheries, Tokyo, Ministry of Agriculture and Forestry and was Head of the Radiochemistry Section during the period 1962–1982 and Director from 1982 to 1986.

Like a man, a laboratory has its countenance, its character and its age, which change gradually with the lapse of time. It is also true, however, that some characteristic features of a man remain throughout his lifetime, regardless of the events he has gone through. An Oriental saying states that the soul of a three-year old child remains unchanged until it reaches the age of one hundred years. The existence of the Monaco Laboratory now exceeds 35 years, and it is now arriving at its full maturity, yet some initial features of the Laboratory seem to be maintained intact. These are the prevailing optimistic views on the future development of the Laboratory, the crowded and cramped office and laboratory spaces, and the collaborating spirit amongst the staff — people having different origins, cultures and ideals.

When I arrived at Monaco in May 1962, the physical existence of the Laboratory was represented by only four rooms, measuring approximately 150 m<sup>2</sup>, one office for the Director, one room for the secretariat and two large laboratory rooms at a level of half-basement in the Oceanographic Museum building. Although all furniture, laboratory instruments and supplies had been purchased by the Vienna Headquarters and sent to Monaco at a much earlier date, these were not released from the customs house in Monaco until early 1962, owing to an unfortunate bureaucratic misunderstanding between the authorities involved. When I first entered the Laboratory the released furniture and instruments were being installed. The Laboratory looked rather empty owing to the lack of instruments and personnel. In fact, this was the only period during which I felt the Laboratory to be 'empty' during my service of over two decades.

According to the tripartite agreement for the creation of the Monaco Laboratory, concluded in March 1961 between the International Atomic Energy Agency, the Government of the Principality of Monaco and the Oceanographic Institute, Paris (which included the Oceanographic Museum at Monaco), the Museum was responsible for the hosting arrangements. In order to fulfil this responsibility, the Museum was constructing laboratory rooms between the huge pillars supporting the massive, more than 50 m high Museum building. The space was packed with solid rock which had to be excavated to make room for the construction. In order not to risk damaging the supporting pillars, the use of dynamite was out of the question, so the rock had to be removed by hand drills. As the rock was much harder than expected, it took a long time before the real construction could begin, and we were able to occupy the new laboratory premises only in early 1963.

In addition to the unique location of the laboratory space, the configuration of the Laboratory was also unique in itself. The building was shaped like an upside down triangle, comprising six rooms at the uppermost level and only one room at the bottom. After the full expansion of the Laboratory within the Museum building in the early 1970s the Laboratory rooms were spread over six floors from the fourth basement to the ninth basement. As the standard configuration of radionuclide handling laboratories had been to distribute the laboratories horizontally in a single floor, this virtually vertical configuration made it very difficult to maintain the necessary security measures within the laboratory areas and resulted in extra burdens associated with carrying heavy seawater samples and lead bricks up and down.

Dr. I. Hela, a physical oceanographer, was appointed as the first Director of the Monaco Laboratory in the summer of 1961 (deceased in 1976). He had served as Director of the Institute of Marine Research, Helsinki, before joining the Laboratory and had an energetic, comprehensive and open character. He was a well known figure amongst oceanographers as he was a member and chairman of various international scientific groups and committees. This was due to his character, but also to his neutral origin within the East–West confrontation. This neutral origin certainly carried some weight in his appointment as the Director of an international laboratory. Although he came from one of the northernmost countries in Europe, he used to complain about the ‘cold’ winters spent on the Côte d’Azur. He rented a villa which was built as a summer home, so that there was no appropriate separation between rooms, corridors and stairs to make heating effective. He had to cover himself with six blankets in order to achieve comfortable but ‘heavy’ sleep.

The most senior member of the Laboratory was Dr. W.C. Chipman, approaching the age of 60, a marine radiobiologist, who joined the Laboratory from Washington, D.C. (deceased in 1978). He had once served as Director of the Marine Radiobiological Laboratory at Beaufort, North Carolina, introducing radiotracer techniques into marine biological studies in the USA. Coming from a country of expanded highway systems, he had some problem in adapting his driving to the narrow and winding roads of southern Europe. He often visited his relatives living in Italy and while he drove smoothly on expressways connecting big cities like Genoa and Milan, he used to get lost as soon as he entered into these cities and could not find his way out. Hence he sometimes had to remain overnight on unplanned visits.

Dr. S. Fonselius, a chemical oceanographer who came from the Royal Fisheries Board, Göteborg, Sweden, had continuing problems with renting

agencies in trying to obtain an appropriate apartment to live in. He had to change his apartment several times during his two-year stay at the Laboratory.

I joined the Laboratory from the National Fisheries Institute, Tokyo, as a marine radiochemist. Since I had to leave my wife in Tokyo owing to the expected birth of our daughter in July 1962, I was forced to endure a temporary bachelor life. I soon found out that the safest way to buy certain kinds of meat was to mimic the gestures of the corresponding animals rather than to pronounce French words with a bad accent.

Upon my arrival, I was introduced by Dr. Fonselius to Mr. D. Malayas, a young Greek man who was to be my assistant. I was very much touched by this generous and considerate treatment, as Dr. Fonselius himself did not have an assistant. Mr. Malayas was a cheerful fellow, educated in Paris, so he spoke fluent French but very little English. Therefore, I had to carry a dictionary with me always in the laboratory in order to make sure that my experimental instructions were correctly communicated. Soon afterwards, however, I learned that Dr. Fonselius had hired an assistant, Ms. D. Broquet, a nice looking French woman who spoke fluent English. One can imagine my frustration at that time.

Towards the end of 1962, Dr. E. Gilat, a marine ecologist, from the Sea Fisheries Station, Haifa, Israel, and Dr. A.F. Fedrov, a biophysicist, from the All-Union Institute of Fisheries and Oceanology, Moscow, USSR, joined the Laboratory to complete the staffing at the professional level.

While the adaptation to our new life proceeded gradually, with more or less difficulty, the largest problem to be resolved was right in front of us — how to organize and orient the research programme of the Laboratory. The tripartite agreement for the creation of the Monaco Laboratory set out the objectives, namely to study: (1) the movement of sea water and marine organisms and the deposition of organic and inorganic matter; (2) the distribution and redistribution in marine organisms of various forms of radioactive materials; and (3) the effect of radioactive materials at various concentration levels on marine organisms and ecosystems. These were the outcome of compromises between the conflicting views among the Member States of the IAEA, for and against, on radioactive waste disposal into the sea. The term 'waste disposal' was purposely avoided in the text of the agreement, so as to neither justify nor prohibit radioactive waste disposal.

The objectives encompassed practically the whole field of oceanography, but were rather broad and unhelpful for setting up the specific research

programmes of a small laboratory with a time limit (the first trial period of the Monaco Laboratory for three years was expected to expire in early 1964). In addition, the choice of research subjects appeared to be extremely delicate, since serious criticisms persisted on the effectiveness of the creation of an international laboratory on a small scale for resolving such a large issue as radioactive waste disposal into the sea.

In order to decide on our approach to the formidable tasks, formal and informal meetings were held and research subjects to be pursued were discussed and rediscussed. We all knew that whatever subjects were chosen, spectacular and substantial results could not be achieved within a short time, but they should be sufficiently sensible and appealing to attract support for their continuation from the interested scientific community. Finally, we decided to start working on the behaviour of some radioactivation product radionuclides in the coastal areas of the Mediterranean, since the subject of fission product radionuclides had already been extensively studied in connection with the worldwide atmospheric radioactive fallout. Thus, towards the end of 1962 we were able to obtain some preliminary results which were presentable and we continued to work throughout 1963. Although the results obtained were admittedly modest, we were satisfied that our capabilities had been exhaustively utilized. For any objective observer the situation was perhaps unconvincing, but the optimism for the future of the Laboratory persisted among us, since we all believed that the creation of the Monaco Laboratory was fundamentally an excellent idea and there was no reason to bury the concept without giving it a serious try.

In early 1964, the Monaco Laboratory was able to clear its first hurdle by obtaining a five-year extension.

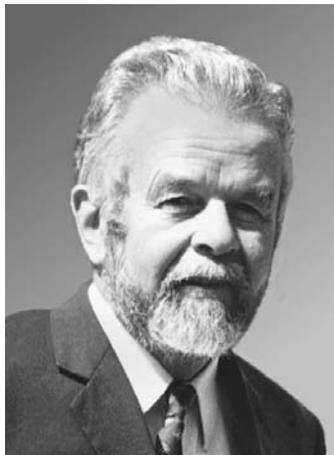
The Laboratory has now been solidly established on the basis of its scientific reputation as a unique international laboratory in the UN system. The proposal to create such a laboratory for environmental studies has been proved to be sensible and sound. The hostile climate originally surrounding the Laboratory has been gradually overtaken by appreciation and recognition of the usefulness of the approach followed and services rendered. The turning point was during the early 1970s, when the United Nations Conference on the Human Environment was organized. Although the change was due mainly to increased public concern about various environmental problems, it should not be forgotten that the experience and competence accumulated in the Laboratory during the long years of incubation played an important role in making this change occur. This incubation period commenced in the early

days of the Monaco Laboratory, during which patient, unspectacular and unrewarded efforts and services were rendered by the numerous laboratory staff. Tracing back the course followed by the Laboratory, I realize that one of the most important assets is the staff, who have made it possible for the Laboratory to grow. It should also be stressed that the support and encouragement given by various individuals, groups and organizations were essential to the success of the Monaco Laboratory. As long as it continues to recruit creative and spirited staff and to ensure the necessary support by responding to requests for the provision of services and the completion of tasks, the future of the Monaco Laboratory will be guaranteed.



THE INTERNATIONAL CENTRE  
FOR THEORETICAL PHYSICS

Paolo Budinich



*Paolo BUDINICH* studied at the Scuola Normale Superiore in Pisa, where he graduated in experimental physics in 1938, and was appointed Full Professor of Theoretical Physics at the University of Trieste in 1954.

He carried out research in theoretical physics and published more than 160 papers in scientific reviews and in the book *Kosmische Strahlung* edited by Werner Heisenberg in 1953.

As Director of the Institute of Physics at the University of Trieste, he was promotor of the initiative to create in Trieste in 1964 the International Centre for Theoretical Physics (ICTP) of the IAEA and UNESCO; he was Deputy Director of the ICTP from 1964 to 1978. He promoted the creation of the Trieste International Foundation for Scientific Progress and Freedom (of which he is at present President), which also led to the creation in Trieste of the International Centre for Genetic Engineering and Biotechnology and of the Third World Academy of Sciences. He also assisted in the formulation of the law for the establishment of the Research Area.

He was founder and first Director of the International School for Advanced Studies (SISSA), of which he is at present Emeritus Professor, and of the Interdisciplinary Laboratory for Natural and Humanistic Sciences of SISSA. He promoted the creation of the Laboratorio dell'Immagine Scientifico.

## PROLOGUE

The idea of creating an international centre for physics under the flag of the United Nations first arose in the minds of Niels Bohr, Albert Einstein and Robert Oppenheimer in 1945 after the use of atomic weapons against Japan. Behind that idea there was the intention and the hope of avoiding the repetition of such disasters by combining the efforts of scientists and of the United Nations in order to prevent the use of physical sciences for military purposes.

Subsequently, in most international conferences, especially in the so-called 'Rochester' meetings on high energy physics, that idea was passionately discussed among physicists. But it was the privilege of Abdus Salam to bring it in the form of a proposal on the part of the Pakistani delegation to the fourth General Conference of the International Atomic Energy Agency in Vienna in September 1960. This proposal became Resolution GC(IV)/RES/76, unanimously adopted on 30 September, requesting the Director General, in consultation with appropriate international organizations, to study the question of establishing an international centre for theoretical physics. The restriction to theoretical physics was decided on because of the financial difficulties which the setting up of experimental laboratories would have involved.

To fulfil this request, the Agency convened a panel, consisting of ten distinguished theoretical physicists from various parts of the world as well as representatives of international organizations (UNESCO, CERN, NORDITA) interested in the subject. The panel met in Vienna on 21 and 22 March 1961. All members warmly supported the idea of the creation of an international centre for theoretical physics, basing their support mainly on the following considerations:

- The centre would encourage and assist international contacts and exchange of ideas, especially between the 'West' and the 'East';
- The centre would help and encourage able theoretical physicists from the newly developing countries to continue and develop their research work;
- The centre would serve as a 'pilot plant' for future international research institutes.

The Director General submitted the document resulting from the study to the Scientific Advisory Committee for comments. He furthermore requested

Member States to express their opinion on the project and on their readiness to host such a centre, obtaining positive answers from Austria (Vienna), Denmark (Copenhagen), Italy (Trieste) and Yugoslavia (Dubrovnik). The results of these actions were brought to the attention of the Agency's General Conference in late 1961. After a long discussion during which the project was strongly supported by a few European Member States (mainly Austria, Denmark, Italy, Sweden and Yugoslavia) and the large majority of developing countries, a resolution was adopted on 6 October 1961 (GC(V)/RES/107), requesting the Board of Governors and the Director General: "to continue studying the matter and to submit their conclusions to the next General Conference." The Agency organized a Seminar on Theoretical Physics held in Trieste, Italy, in July 1962 and a Summer School in Lower Tatra, Czechoslovak Socialist Republic, in August 1962.

The results of these actions, reported at the General Conference in September 1962, led to a resolution, unanimously adopted during the 71st plenary meeting on 26 September 1962 (GC(VI)/RES/132), which:

- Requests the Board of Governors and the Director General to study ways and means of establishing an international centre for theoretical physics under the auspices of the Agency; and
- Further requests the Board, if the results of this study so warrant, to prepare plans for the establishment of such a centre for inclusion in the Agency's programme as early as possible.

With this resolution the creation of the centre was essentially decided; it remained to be determined how, where and when to set it up.

As far as the main purpose of the centre was concerned, one can say that this clearly evolved from the modality of the discussions, which led to the final decision that the main supporters of the project were, in addition to the world scientific community, the developing countries. Therefore, the main purpose of the projected centre had to be changed. It had to become an institution devoted to helping developing countries build up their own scientific communities. The Director General, Sigvard Eklund, in consultation with the Board of Governors, nominated a panel of three eminent theoretical physicists, namely R.E. Marshak, J. Tiomno and L. Van Hove, who, after meeting in Vienna in 1963, once again enthusiastically supported the project of establishing an international centre for theoretical physics.

In order to select an appropriate place for the location of the institute, the Agency had to carefully examine the various offers from Member States

and choose the most favourable for constituting a meeting place for scientists from both the advanced and the developing worlds.

### THE SETTING UP OF THE ICTP IN TRIESTE

After long preparatory work, the Agency decided to accept the Italian offer and, on 5 October 1964, the International Centre for Theoretical Physics (ICTP) of the International Atomic Energy Agency, under the direction of Abdus Salam, was officially inaugurated in Trieste by Director General Sigvard Eklund with the following main aims:

- To help in fostering the growth of advanced studies and research in physical and mathematical sciences, especially in the developing countries;
- To provide an international forum for scientific contacts between scientists from all countries;
- To provide facilities for original research to its visitors, associates and fellows, principally from developing countries.

The success of the Italian candidature was partially accidental. In fact, after the Second World War the border between East and West, which was known as the 'iron curtain', passed very close to the town of Trieste, and was generating on both sides acute and poisoning nationalistic attitudes. The Italian Government immediately grasped the importance of setting up in Trieste, in this difficult corner of Italy projecting towards central Europe, an institution of high scientific calibre under the flag of the United Nations. It therefore generously supported its candidature for the seat of the ICTP, endowing it with an offer of about 80% of the running costs (\$270 000), a first nucleus of the library and of administrative personnel, plus a new building to be constructed in the vicinity of the Castle of Miramare, one of the most attractive locations near Trieste.

### THE SCIENTIFIC ACTIVITIES OF THE ICTP

Activities started immediately in a provisional building in the centre of town, provided by the Regione Friuli-Venezia Giulia, with East/West collaboration in plasma physics and research work on elementary particle

physics conducted by a highly qualified international team, plus a high level seminar in elementary particle physics.

In the following years the research activity at the Centre was extended to other fields such as: condensed matter physics (1967), mathematics (1971), and atomic, molecular and laser physics (1973). These activities are conducted in groups organized by a small number of staff members plus several visiting scientists and post-graduate fellows.

High level training began to be provided to scientists through schools, colleges, conferences, workshops and topical meetings covering subjects in all the fields of the research groups and in many other areas where the ICTP was not in a position itself to carry out research; special emphasis was given to areas of applied physics and topical issues relating to the latest advances in physics and mathematics.

ICTP meetings are meant to be a means of career support for already experienced scientists who need to update their knowledge. Scientists thus receive a transfer of know-how, often with hands-on experience in the laboratories, some at the ICTP, others elsewhere in Italy. One of the organizers of each meeting is, whenever possible, a scientist from a developing country who has acquired experience at the ICTP and who can better understand the needs of the Third World.

About 40 meetings are now held every year. Their duration varies from one to four weeks, and the number of participants, mostly from developing countries, from about 40 to over 100. Some of these conferences and workshops are organized by the Office of External Activities of the ICTP in developing countries.

Early on, a Scientific Council was nominated, chaired by Oppenheimer, to advise the Director of the Centre and the Director General of the Agency on scientific policy matters.

The drive of Abdus Salam as Director of the Centre was also a determining factor for the success of the ICTP, owing to his personal experience. He was born in Jhang, Pakistan, in 1926, was educated at Panjab University, St. John's College, Cambridge and the Cavendish Laboratory, Cambridge, where he obtained his PhD in 1952. He then returned to Pakistan, where he served as Professor at Government College, Lahore, and Panjab University. There he suffered from the isolation which scientists experience when they are working in developing countries. There was no tradition of post-graduate work; there were no journals; there was no possibility of attending conferences. He underwent the tragic dilemma of having to make the choice between physics or Pakistan. So he

returned to Cambridge to take up the position of Lecturer. In 1957, he was appointed Full Professor of Theoretical Physics at Imperial College, London.

Fired by his unhappiness at having had to leave his own country, he determined to find a way of making it possible for those like him to continue working for their own communities while still having opportunities to remain first-rate scientists.

As a scientist, Abdus Salam himself had a worldwide reputation. He received 18 awards in 10 countries for his contributions to physics, including the Nobel Prize for Physics in 1979 for the unification of the electromagnetic and weak forces and the Copley Medal of the Royal Society in 1990.

Since the first years of its activity, the Centre clearly showed that it could attain a high scientific level also thanks to the support of the international scientific community. In the words (written in 1965) of Oppenheimer, Chairman of the Scientific Council: "In all the work of the Centre of which I know, very high standards prevail. In less than a year it has become one of the leading institutions in an important, difficult and fundamental field (particle physics)."

#### THE INITIATIVES IN FAVOUR OF DEVELOPING COUNTRIES

The first aim of the ICTP was to help developing countries build up and maintain their own scientific communities.

Scientists in the Third World tend to experience several common problems: isolation, a lack of support or awareness from their governments, and brain drains. The ICTP has explored several schemes to help such scientists cope with these adversities. The most successful are as follows.

*Associates* are talented and active physicists from developing countries who are entitled to visit the Centre three times within six years, all fully financed by the Centre. The ICTP has 444 Associates from 69 developing countries, with more than 1000 on the waiting list. Associates lose this privilege if they emigrate.

'ICTP Associate' has become a title of prestige in developing countries: so much so that several Associates have progressed rapidly in their careers to become university rectors, presidents of research councils, even government ministers.

*Federated institutes* are universities, departments or research centres in the Third World (now about 200 per year) which are assigned funds to support a number of days (from 40 to 120) for visits to the ICTP, the visitors being selected by the organization in question.

*Affiliated centres* are long established federated institutes which are specially supported in order to perform, locally, the kind of work which the ICTP is performing globally. They are intended eventually to constitute a network that will enhance the impact of ICTP activities on the scientific communities in the South (i.e. the developing countries), by catalysing South-South links and co-operation.

The results of these initiatives are clearly visible in several regions of the Third World, and are organized and followed by the Office of External Activities of the ICTP.

An especially important instrument for assistance, advice and action in developing countries is the Third World Academy of Sciences, founded by Abdus Salam, who was its President, in 1983. Its 311 members — who include 11 Nobel laureates — are mainly Third World scientists; some have emigrated but still maintain links with their mother countries.

The Academy has not yet fulfilled its potential. I will mention just one of its programmes which could be of tremendous value: that of granting to every one of the developing countries at least one complete and up-to-date scientific library. This high priority project should be considered a moral duty on the part of the rich countries. It could start almost immediately if properly financed (about \$10 million is required to start a five-year project).

Further activities for the benefit of developing countries are represented by the provision of: training and research in Italian laboratories in the fields of condensed matter physics, energy, technology and the environment. The donation programme distributes free about 50 000 publications a year.

## THE IMPACT OF THE ICTP

Not only did Professor Salam envisage the Centre as a place where scientists could carry out research of the highest level but through the ICTP he also managed to set an example for other nations to follow. He travelled extensively throughout the world in an effort to convince heads of States and governments of the paramount importance of supporting science in their own countries for the betterment of humanity. His deep conviction and untiring

efforts have been effective and numerous institutions have now been established all over the world. Examples are:

- Centro Internacional de Física, Santa Fe de Bogotá, Colombia;
- International Institute of Theoretical and Applied Physics, Iowa State University, Ames, USA;
- International Centre for Mathematical Sciences, Edinburgh, United Kingdom;
- Asia Pacific Centre for Theoretical Physics, Republic of Korea;
- International Institute for Theoretical Physics, Texas A&M University, College Station, USA.

In Trieste itself, the ICTP was instrumental in the setting up of several Italian and international scientific institutions such as: the Area di Ricerca (Research Area), the Synchrotron Radiation Laboratory, the International Centre for Genetic Engineering and Biotechnology (ICGEB), the International School for Advanced Studies (ISAS or SISSA), and the Laboratorio dell'Immaginario Scientifico (LIS), and has also established links of scientific collaboration (especially with SISSA).

#### THE ICTP AT PRESENT

Administratively, the ICTP has been a branch of the IAEA located in Trieste since the very beginning. This has meant that the ICTP is endowed with extraterritorial status under the flag of the United Nations, which has greatly facilitated its international collaboration, especially with countries in central Europe.

Furthermore, on many occasions the generous personal support of former IAEA Director General Sigvard Eklund and subsequently the present Director General Hans Blix has facilitated the impact of the international initiatives of the ICTP.

After 1970, UNESCO joined the IAEA in the management of the ICTP as a full partner, and in 1996 the administration of the ICTP was transferred from IAEA to UNESCO and the official name of the institution has therefore become: International Centre for Theoretical Physics of UNESCO and the IAEA.

In 1994, Abdus Salam resigned from the Directorship of the ICTP and was appointed President. He left us on 21 November 1996.

In April 1995, the distinguished theoretical physicist Miguel Angel Virasoro from Argentina was nominated Director of the ICTP.

In more than 32 years of operation, the ICTP has welcomed scientists from over 150 Member States of the UN, IAEA and UNESCO, with a total of more than 65 000 visitors. The number of visitors coming to the ICTP increased from a total of 83 in 1964 to about 3600 a year in the 1990s, of which more than 50% were from developing countries. In recent years there were about 4200 person-months of visits yearly to the ICTP, of which more than 75% was from the Third World.

The regular budget of the ICTP increased from about \$400 000 in 1965 to about \$18 000 000 in 1996 (\$400 000 from UNESCO, \$1 700 000 from the IAEA, and not less than \$16 000 000 from the Italian Government).

The campus of the ICTP now consists of four buildings and a guest-house, all located in the vicinity of the Castle of Miramare.

The main facility of the ICTP is its library, which contains more than 52 000 books, 47 000 bound journals, 900 current journal issues and 50 000 pre-prints/reports. It is open 24 hours a day and is generally considered as one of the best specialized libraries in Europe. Another important facility is the computer centre, including a cluster of IBM R/6000s, along with a group of freely usable PCs and workstations, connected to the campus network, with access to remote machines both on the Internet and Hypernet/Decnet. It is possible to obtain information on the activities of the ICTP via computer (including access to the library).

## LESSONS LEARNED

More than 30 years of operation in the ICTP enterprise have shown that some of the expectations of the promoters and supporters of the project were right. That with good will a great deal can be done, especially in helping the scientific emancipation of the developing countries for the benefit of the whole world.

The main points of the lessons learned after 30 years of direct contact with the scientists working under the difficult conditions in the Third World are:

- The social (demographic), economic and political problems of the South are high, at present, and are likely to increase in the future. A preliminary,

though significant, contribution to their solution is to help these countries to fight illiteracy, including scientific illiteracy, and to set up decent universities and educational systems, a necessary condition for their social and economic emancipation;

- The work done at the ICTP represents only a drop in the ocean; much more is needed. The ICTP should be considered as a pilot plant, to be enhanced in size and in the diversity of its science, and to be reproduced elsewhere. Host countries of such institutions might consider them as an investment; Italy has benefitted from contacts in the Third World established through the ICTP.

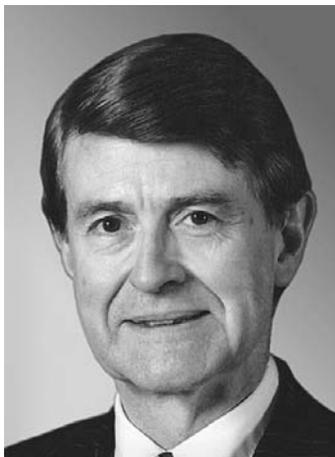
The ICTP will, of course, continue to export ideas and expertise to the South, where they are badly needed, and catalyse South–South collaboration. Furthermore, it will remain a place where deserving scientists from developing countries may come by right to keep in contact with advanced science without abandoning their home countries and while gaining prestige in the eyes of their local governmental authorities, which they badly need.

One treasure accumulated by the ICTP is the large number of channels to deserving people in the South represented by present and ex-Associates, federated and affiliated institutes, and societies of ICTP friends. These channels must be exploited by other initiatives of this kind, in Italy and beyond.



THE URANIUM INSTITUTE  
AND THE INTERNATIONAL  
ATOMIC ENERGY AGENCY

Gerald Clark



*Gerald CLARK*\* C.M.G. has been Secretary of the Uranium Institute since January 1994.

Before joining the Uranium Institute, he worked for over thirty years as a career member of the British Diplomatic Service. On graduating from Oxford University in 1960 he joined the Foreign Office as a Chinese language student. His association with China continued throughout his career, including two postings in Beijing — in the early 1960s and again in the early 1980s. Another continuing strand was economic and trade policy: the Foreign Office GATT and commodity policy desk in the mid-1960s, followed by a position in the negotiating team which took the United Kingdom into the European Economic Communities in 1972; and a two year secondment to Barclays Bank International in 1979, where he became the Bank's nuclear analyst. Along the way, he also served in Moscow (1968–1970) and Lisbon (1973–1977).

As Commercial Counsellor in Beijing in 1981–1983, his nuclear experience at Barclays was turned to good account in the negotiations leading to the Anglo-French contract to build the nuclear power station at Daya Bay.

More recently he spent well over five years in Vienna as British Ambassador to the International Atomic Energy Agency and to the other international organizations there (1987–1992).

\* Gerald Clark wishes to acknowledge the valuable assistance given to him by Jason CAMERON in the preparation of this article.

The International Atomic Energy Agency is almost twice as old as the Uranium Institute. As other writers in this volume will explain in greater detail, it was founded 40 years ago after a number of unsuccessful initiatives to devise a means of establishing effective international control over nuclear weapons. It was a late child of the Baruch Plan of 1946 and the Eisenhower "Atoms for Peace" initiative of December 1953. The Agency's Statute implicitly set up a deal whereby the nuclear weapon States would make available to non-nuclear States the civil benefits of nuclear energy in return for a commitment from those non-nuclear States that they would forswear the nuclear weapons option. In 1957 there were only three nuclear weapon States: the USA, the Soviet Union and the United Kingdom. The civil nuclear industry barely existed. But in the year before the Agency was founded the first commercial scale nuclear power reactor delivered its first electricity to the grid — at Calder Hall in Cumberland in Britain.<sup>1</sup> It is a measure of the success of the Agency that less than 20 years later the civil nuclear cycle had developed to such an extent that some of the most important companies involved in it thought it in their best interest to establish an international industrial association, the Uranium Institute. The order and the time frame of these developments is also a compelling argument in refutation of those who assert glibly that the spread of civil nuclear technologies increases the dangers of nuclear weapons proliferation. The success of the Agency in administering the international safeguards system, and the ready collaboration which the civil industry has accorded it, has demonstrated that this is far from being the case.

#### THE URANIUM INSTITUTE

The Uranium Institute was founded in June 1975 by an international group of 16 leading uranium producers, partly in response to the economic uncertainties brought on by the first energy crisis. Its purposes as set out in its Memorandum of Association were to provide a market research capability and other kinds of support for the uranium industry following the pattern of similar organizations dealing with other metals. Given that no one at that time

<sup>1</sup> A much smaller reactor producing only 5 MW of electricity was connected at Obninsk, Soviet Union, two years earlier, but this can hardly be considered a commercial quantity, even in the 1950s.

had a very clear idea of the likely future progress of nuclear power, and hence of the demand for nuclear fuel, the founder companies were acknowledging that they needed to pay much closer attention to the underlying economic, industrial and political factors of nuclear energy. It immediately became clear that there were unusually severe difficulties in making reliable demand forecasts, because of the extreme sensitivity of any estimates to assumptions regarding future economic growth in a world which was still experiencing the aftermath of the 1973 oil crisis.

This created an incentive to the founding companies to invite some of the major electrical utilities to become full members of the Institute, since it would be their perception of their likely needs which would determine the growth of the civilian market for uranium. For their part the utilities were ready to engage in a dialogue with the producers, not least because security of supply was a major consideration, given the high initial capital cost of nuclear power stations.<sup>2</sup> They were therefore anxious to assure themselves that the uranium production industry would indeed be able to keep pace with the rapidly rising level of demand. This convergence of view was reinforced by the fact that there was no substitute for uranium in conventional thermal nuclear power reactors, and no other large scale civil outlet for uranium apart from electricity generation. For all these reasons pressures developed during the second half of 1975 to extend the Constitution of the Institute so as to bring in the consumers of uranium as Full Members of the Institute instead of as Associates, as had been envisaged at first. In January 1976, just seven months after its launch, the Uranium Institute's Articles of Association were amended and consumers were invited to take up membership on equal terms with producers.

This situation has continued ever since. The two classes of Full Member are entrenched in the Constitution. Besides producers and consumers of uranium, many other industrial and commercial organizations contribute to the civil nuclear fuel cycle and influence its development. The Constitution of the Institute provides a flexible arrangement whereby such organizations can

<sup>2</sup> This was recognized also at the Agency, which established in 1980 an intergovernmental Committee on Assurances of Supply (CAS) with the objective of establishing procedures in international nuclear commerce and co-operation that would help reduce uncertainties in nuclear supply without compromising non-proliferation objectives.

participate, at the discretion of its Council of Management, in the work of the Institute as Associate Members. As a result of these changes the membership of the Institute expanded rapidly from the original 16 producers, to over 50 members of all types by 1981, drawn from 14 countries, and further in the next decade to about 80 members drawn from over 20 countries. The membership has been relatively stable in the past few years at around 80, although there have been fluctuations reflecting the varying fortunes of the companies concerned. At present, the Uranium Institute is the only international, non-governmental industrial association concerned with the entire nuclear fuel cycle.

Like the International Atomic Energy Agency, the Uranium Institute is a membership organization. But unlike the IAEA, whose membership consists of governments and which receives regular input from para-governmental nuclear energy organizations such as regulatory and research authorities, the Uranium Institute's membership is solely corporate. Its members are responsible for nearly 90% of the world's uranium production and for the generation of about one half of the world's electricity from nuclear sources. The Institute recognized from the beginning that a close and co-operative relationship with the IAEA was essential. The two bodies share many of the same ideas and goals.

#### THE INTERNATIONAL NUCLEAR FUEL CYCLE EVALUATION (INFCE)

However, at the outset, the Uranium Institute experienced some difficulty in obtaining formal recognition and acceptance from the IAEA. There were a number of reasons for this. Broadly speaking, the Agency seems to have believed that the interests of the different parts of the civil fuel cycle were so diverse that they were unlikely to take up common positions except on a few general issues, such as the proposition that economic growth would lead to an increase in demand for nuclear power, or that while safeguards should be effective in international terms this should be without impairing operational efficiency and economy. There was a further problem: in the early days, the Uranium Institute's efforts to establish its own identity were overshadowed by the events in the USA in relation to the Westinghouse anti-trust lawsuit against some of the leading uranium mining companies, which were among the founder members of the Institute.

The Institute was determined to overcome these problems by developing a reputation as an objective expert in the field of nuclear energy. The Institute successfully developed its knowledge base and began to display its expertise on the world stage. In 1976 the IAEA's committee to select United Kingdom papers invited the Uranium Institute to participate in the IAEA's conference on 'Nuclear Power and its Fuel Cycle', to be held in Salzburg in May 1977. John Kostiuk, then Chairman of the Uranium Institute, presented a paper entitled "Industrial and commercial considerations affecting the future supply of uranium".

Kostiuk's paper discussed the necessity, to both producers and consumers, of stability in the nuclear market. Physical constraints limiting the expansion of uranium production, the scale of uncertainties in estimated demand and the powerful influence of government actions had substantial effects on commercial decisions and on the freedom to produce, export and consume uranium. Kostiuk recognized that there were many ways of working towards a better match between supply and demand, but that the most effective method would include the best possible flow of information through a constructive dialogue between all concerned.

Being well received in Salzburg in 1977, the Institute returned there the following year. The Institute's first Secretary General, Terence Price, was invited to participate in a seminar in 1978 sponsored by the USA on 'Internationalization as an Alternative to Nuclear Proliferation'. During the seminar, two key events in the development of relations between the Agency and the Institute occurred. First, Price established an excellent working relationship with David Fischer, then Assistant Director General for External Relations at the IAEA, and a fellow member of the seminar. This was the beginning of the tradition of fostering relations between the two organizations by personal contact at the highest levels in both. Second, the groundwork was laid for the Institute's participation in a technical 'evaluation' of nuclear fuel cycle options orchestrated by the USA and convened in Vienna using the IAEA's facilities, the International Nuclear Fuel Cycle Evaluation (INFCE).

INFCE was a joint study involving 66 countries and numerous inter-governmental and non-governmental organizations. It was set up at President Carter's instigation to examine inter alia the whole issue of plutonium recycling, its economics and its potential effects on nuclear proliferation. It so happened that the Institute had established a committee of its members to examine the problems of the international trade in uranium shortly before the creation of INFCE. The Institute was thus in a good position to seize this

opportunity to present its views to governments on matters of fundamental importance to the conduct of its business: the disruptive effects on the market of embargoes and other unilateral governmental acts affecting trade; the need to honour contracts once entered into; the undesirability, because of the uncertainty they create for the national energy policies of consumer countries, of case by case controls administered by governments of supplier countries; and the need for effective policing, through the IAEA, of anti-proliferation controls.

The Uranium Institute submitted two papers to INFCE, one on "The nuclear fuel bank issue as seen by the uranium producers and consumers" (May 1978) and the other on "Governmental influence on international trade in uranium" (October 1978). The former argued against the creation of an international fuel bank as a means of offering additional security of nuclear fuel supply because of its possible disruption and weakening of the market system. The Institute's paper offered alternatives to the fuel bank idea, including extension of fuel 'swaps', use of producer government stockpiles and financial assistance for those embarking on a civilian nuclear power programme in compliance with the non-proliferation consensus.

The second paper on governmental influences on the international trade in uranium outlined the industry's dissatisfaction with delays in bringing mines and power plants into production; with the unpredictability of enrichment plant feed requirements; and with quantitative restrictions on imports, unilateral changes in export conditions and export control procedures. The Institute argued for limitations to governmental intervention; for preservation of adequate uranium resources in exporting countries; for predictable and effective government export controls; for government controls established for non-proliferation purposes, especially safeguards, to be based on clear principles; and for the need for a consensus in the post-INFCE era.

The arguments presented in both papers impressed their audience. Both were accepted as official INFCE documents and the Uranium Institute was invited to participate in the closing INFCE conference in February 1980. The Institute's contribution to INFCE was reflected in the conference conclusion that uranium production capacity and reserves, plus probable new discoveries, offered adequate supplies for many years to come; and in its restatement of the importance to the nuclear industry of effective non-proliferation policies. In short, the Institute's contributions to the deliberations of INFCE were widely regarded by both governments and industry as having helped to

contribute to the acceptance by supplier and consumer governments of the somewhat more simply operated regulatory procedures which have been the norm since 1981.

The experience of the Institute with INFCE had a profound effect on the work of the Institute. It demonstrated that governments were receptive to the specialized advice available from industry, provided that it was well prepared. This helped to promote a willingness (which persists to this day) on the part of the Institute's members to spend the not inconsiderable time needed to carry out such studies, away from their more directly commercial activities, as a public service to the industry.

#### ENGAGEMENT WITH THE INTERNATIONAL ATOMIC ENERGY AGENCY

Participation by the Uranium Institute in the INFCE proceedings and others like them, as well as the high calibre of the views that it presented, enhanced its reputation as an objective and well informed expert on nuclear affairs. More germane to the present topic, however, these activities drew to the IAEA's attention the growing international importance of the Institute. The Agency accordingly issued an invitation to the Uranium Institute to participate in its General Conference which was held in Delhi in December 1979. The Institute's Executive Committee, underscoring the importance of close contacts between the nuclear fuel cycle industries and the IAEA, welcomed the invitation: Terence Price attended on behalf of the Institute's Members.

A similar invitation was issued for the following year's General Conference in September in Vienna. The Institute decided on this second occasion to send its Chairman, Reginald Worrol, together with Terence Price and Eric Svenke, a well respected Swedish representative and a very close friend of Sigvard Eklund, the long serving Director General of the Agency, and of his successor Dr. Hans Blix. Reginald Worrol, a South African uranium mining expert, represented the producer interest, and Dr. Svenke represented the Consumer Members of the Institute. The delegation spent three days in Vienna. They argued that IAEA-industry links should continue to be made via existing industrial organizations, rather than through a proposed new IAEA Industry Advisory Council, and that it would be desirable for the industry to be more closely and formally associated with the work of the

IAEA committees examining the important aspects of the fuel cycle. The proposal for an IAEA Industry Advisory Council eventually died, as did the Institute's suggestion for a more formal association between the Institute and the Agency. Moreover, the Institute was advised by the highest levels of the IAEA that the best course of action would be to continue as before, relying on informal channels of communication.

Nevertheless, the habit of dialogue had been established. Invitations to the Institute to attend the Agency's General Conference became the normal form, and an observer was sent every year. Other opportunities arose and were seized with enthusiasm. For example, in September 1982 the Chairman of the Institute, Jean Feron, Inspecteur Général of Electricité de France, made a presentation on "A quarter of a century of instability" to the IAEA international conference on the 'Nuclear Power Experience'. He underscored the themes of previous papers presented by the Uranium Institute: major discrepancies between forecast requirements and actual needs, as well as government intervention in support of non-proliferation policies and discretionary imposition of regulations governing trade, produce fluctuations in the market which damage the producing industry and create financial and administrative problems for the consumers. The paper called for increased international awareness of the lessons of the first 25 years of the uranium market — and increased co-operation and dialogue between governments, mining experts and electricity producers — to help mitigate and avoid these adverse effects in the future.

Dialogue is of course a two-way street. As the newcomer, the industry, through the Uranium Institute, made it its first priority to be heard in the councils of the Agency, but it had and has its own platform at which Agency views may be heard. From its inception in 1975, each year the Uranium Institute has hosted an annual symposium in London. From the start it very quickly became the leading event in the global nuclear fuel industry calendar. It is open to members and non-members of the Uranium Institute and it always attracts senior-level delegates from around 30 countries. In 1983, the new Director General of the Agency, Dr. Hans Blix, was invited to give a presentation. He talked about the role of the IAEA in promoting the peaceful uses of nuclear energy. Nuclear safety, non-proliferation and safeguards were his main themes. Dr. Blix emphasized that the challenges in the nuclear field could only be overcome through united efforts in the private and public sectors and by action at both the governmental and intergovernmental levels.

## NUCLEAR NON-PROLIFERATION

The Uranium Institute's commitment to non-proliferation has been evident throughout its public statements and in the programmes of its annual symposia. For example, Joseph Nye, a virtual father of INFCE, addressed the participants to the 1978 Annual Symposium on the security considerations involved in the development of nuclear energy. At the 1980 Symposium, Ivor Manley, the Under-secretary for Nuclear Policy at the Department of Energy and the British member of the IAEA's Board of Governors at the time, made a speech on the political challenges associated with nuclear non-proliferation. But his speech also emphasized one of the principal beliefs of the Uranium Institute and the nuclear industry. He said that:

"Stability in the market is not just desirable in non-proliferation terms. It is essential if nuclear power is to be made widely available to meet energy requirements. The lead times in the nuclear industry can be very long. It takes 10 years or more to bring a new discovery of uranium into production; it takes 5 or more years to bring reactors from planning into operation; and governments are already considering their policies on long term options like the fast reactor that are not likely to see widespread commercial introduction before the turn of the century. Planning on this timescale is difficult enough without the uncertainties caused by non-proliferation concerns."<sup>3</sup>

In the early 1980s, the reputation and international standing of the IAEA came under pressure. The decision of the Reagan administration to impose a policy of no real growth on the United Nations budget, and on the budgets of all the UN family of specialized agencies, did not admit of any exception for the IAEA, even though on strategic and arms control grounds a good case could have been made. The Agency was also affected by the same Reagan administration's decision, for domestic budgetary reasons, to delay payment of its international dues until very late in the calendar year. The USA contributes 25% of the budget of the Agency (as of other UN bodies), and the late

<sup>3</sup> MANLEY, I.T., "Non-proliferation: A political problem," *Uranium and Nuclear Energy 1980* (Proc. 5th Int. Symp. London, 1980), The Uranium Institute, London (1981) 316.

arrival of such a significant chunk of its funding distracted top management attention at the Agency. Quarrels over the position of Israel — one of the suspected 'threshold States' — did not ease matters.

The Uranium Institute's Executive Committee viewed the decline in the standing of the IAEA with alarm. They considered the decline to be partly the cause and partly the result of greater reliance on bilateral arrangements between countries for regulating nuclear trade. Some nuclear exporting countries began to consider that an importing nation's general adherence to the provisions of the NPT was not a sufficient condition for allowing trade in material or equipment to proceed. For trade to be possible, these exporters first required the conclusion of bilateral agreements. In the post-INFCE era of the early 1980s, the resurgence of bilateral trade conditions formed part of a vicious circle: the more the stature of the IAEA was weakened, the greater the attraction of bilaterals; the greater the attraction of bilaterals, the weaker the stature of the IAEA. And so on.

While recognizing a legitimate role for bilaterals in the near term, the Institute hoped that, over time, these could gradually dissolve into a de facto international consensus for a strengthened IAEA and a credible international safeguards system. After discussing whether the Institute could usefully make a statement supporting the activities of the IAEA and international safeguards, the Executive Committee agreed that the Institute should set up a special working group to monitor the IAEA, which would keep a vigilant eye open for opportunities for supportive action. That opportunity arose in 1985.

In 1985, the Uranium Institute issued a statement to the 'Third Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons' (NPT). It called for the broadest possible consensus and reiterated its support for non-proliferation objectives. In issuing the statement, the Uranium Institute was not only supporting the principles embodied in the NPT, but it was also clearly supporting the IAEA in its inspection role. The Agency was delighted: it requested a second print of the statement so that several hundred additional copies could be distributed to its members.

The Institute issued another statement supporting the NPT to the Fourth Review Conference in 1990, while in 1994–1995 it devoted significant resources towards campaigning for the indefinite, that is to say permanent, extension of the Treaty at the renewal conference in New York in early 1995. Having achieved consultative status as a non-governmental organization at the United Nations, the Uranium Institute's members agreed a formal statement and prepared a quantity of background information for the occasion.

The Institute's statement reaffirmed the strong support from the civil nuclear industry for the objectives of non-proliferation in general, and the NPT in particular. The Institute called for a stable, predictable, effective and long lasting global non-proliferation regime, believing it to be essential for the continued development of peaceful nuclear energy.

The statement was a demonstration of the Institute's commitments of the 1980s to support the activities and the character of the IAEA whenever possible. The Institute explicitly stated its support for safeguards as implemented by the IAEA. Moreover, the statement expressed a willingness on the part of industry to co-operate in the regulators' efforts to improve the non-proliferation and safeguards regime further, making it more efficient and more cost effective, and better focused, especially on the timely detection of clandestine uses, while avoiding overregulation of responsible operators. While recognizing that disarmament is the business of governments, the Institute also welcomed progress in disarmament and offered the industry's capacity to convert fissile military material to civil electricity production within the framework of the safeguarded peaceful fuel cycle.

Needless to say, there was considerable relief among the Members of the Uranium Institute when the Extension Conference agreed without a vote on indefinite extension of the Treaty. As far as the Institute was concerned it was a matter of vital importance that the international regulatory regime which had served the civil nuclear industry so well for 25 years should thus be extended permanently.

It is perhaps worth repeating why the industry should take such a view. First and foremost, nuclear power generation is a very long term business. The existence of a long lasting, preferably permanent, system of international regulation and control has become a necessary, if not always sufficient, condition for the continued existence of a healthy trade in civil nuclear materials and technology. General acceptance of the IAEA system of safeguards and related measures of materials accountancy and other forms of control is of great benefit to companies and countries involved in the civil nuclear fuel cycle. The designers of the Treaty in the 1960s no doubt had this in mind in drafting its Article IV.

Second, after 25 years of operation the application of the Treaty had become almost universal. Compared with the early years when there were many important countries which were not members of the Treaty, and other regulatory arrangements for the civil nuclear trade were still in widespread use, by 1995 the membership of the Treaty had expanded to over 180, with

very few exceptions remaining outside its ambit. It had therefore become the main regulatory system, with most other arrangements dependent upon it. While public attention has tended to concentrate on the arms control success which this achievement of near-universality represents, it is no less important to the regulation of the civil trade.

Third, the Institute took the view that the demand in a number of quarters for some form of conditional extension was a potential danger for the civil trade in nuclear materials and technology, just as it was from an arms control perspective. The trade in civil nuclear goods and services is subject to enough constraints as it is without the threat of the disappearance of the regulatory regime under which it operates. For the uranium producers, nuclear equipment manufacturers and any other companies involved in the civil nuclear fuel cycle, the creation of this kind of uncertainty would have had a very unsettling effect. The interests of the Institute and of the Agency therefore coincided, and both greeted the outcome of the Conference with much relief.

#### CO-OPERATION WITH THE INTERNATIONAL ATOMIC ENERGY AGENCY

On 3 July 1986, Director General Hans Blix visited the offices and the staff of the Uranium Institute in London. The Institute invited him following comments which he had made at the Institute's 1985 Symposium indicating that he welcomed the interventions of the Institute on non-proliferation and the nuclear industry, and the interest which the Institute took in the Agency's activities.<sup>4</sup>

This was an extraordinary meeting, very wide ranging in the scope of subjects discussed and lasting several hours. Taking place just over two months after the Chernobyl disaster in April 1986, the meeting inevitably was dominated by that catastrophe. In addition, Dr. Blix, Terence Price and Jan Murray, then Assistant Secretary General, also looked at the relationship between the IAEA and the Institute and their many common interests. Among the subjects discussed were non-proliferation, the 'Red Book' (on

<sup>4</sup> BLIX, H., "Banquet address," *Uranium and Nuclear Energy 1985* (Proc. 10th Int. Symp. London, 1985), The Uranium Institute, London (1986) 379.

world uranium resources, production and demand) and the economics of nuclear power, but the centre of attention was Chernobyl and the catastrophe which had occurred there earlier that year. As a result of these discussions, the IAEA participated in the Institute's seminar on the technical issues raised by Chernobyl in September during the Annual Symposium<sup>5</sup> and the Institute was represented at the special ministerial conference on Chernobyl which preceded the usual September IAEA General Conference in Vienna.

Until 1986 or so relations between the two organizations had been rather ad hoc and informal. It was agreed during Dr. Blix's visit to the Institute that it would benefit both organizations if the Uranium Institute held its Executive Committee meeting in January 1987 in Vienna so that senior IAEA officials could have the opportunity of briefing the Institute's leaders on the new initiatives and work programme of the IAEA.

As this was the first formal meeting between the two organizations, much of the discussion in January 1987 was devoted to mutual education about each other's work programmes and activities, but such issues as the practical consequences of the safeguards system and plutonium storage as well as the specific activities of the IAEA's Committee on Assurances of Supply were also examined in detail.

This first meeting went very well. The Institute viewed the exercise as an extremely useful bridge building process. No dramatic conclusions were reached, but both sides agreed that the meeting had clearly helped to break down the reservations which both sides had earlier felt about each other. The Institute agreed that similar meetings should be held between the two organizations each year.

The meetings which took place over the next few years followed a similar informal but comprehensive pattern, with both sides giving an overview of the situation as each perceived it, and going into more detail on specific matters of importance. In particular, issues that cropped up during the meetings included the IAEA's role in relation to small and medium sized reactors, the aftermath of Chernobyl and nuclear safety, safeguards and non-proliferation, Eastern Europe, transport, and the outlook for the uranium industry.

<sup>5</sup> The proceedings of the seminar were published as: *Understanding Chernobyl*, The Uranium Institute, London (1986).

In January 1992, after five highly successful annual meetings with the senior staff of the IAEA, the Uranium Institute decided that it would be best to hold its joint meeting with the IAEA every other year to enable it to establish similar exchanges with other relevant international bodies, such as the World Bank. The Agency saw no difficulty about this. A good relationship had been established. Exchanges of information and assistance took place in between the meetings as necessary. The Institute's staff were now taking part on a regular basis in some of the IAEA's specialized or technical projects.

The joint meeting with the IAEA in 1994 concentrated on non-proliferation, safeguards and issues surrounding plutonium and high enriched uranium from dismantled weapons. Underlying much of the discussion was the shift in public expectations from the safeguards system following the discovery of Iraq's clandestine weapons programme at the end of the Gulf War, and following the superpowers' decision gradually to dismantle most of their strategic nuclear warloads. Other topics at the 1994 meeting included ways of dealing with undeclared nuclear activities and the long term safeguarding of repositories. The Institute advocated a careful examination of the likely scale of safeguards in long term repositories. The Institute also gave strong support to the need to find a permanent solution to the problem of weapons material removed from the arsenals of the nuclear weapons States: in the industry's view it was important to examine ways in which plutonium from warheads, particularly, could be rendered less accessible and less attractive to would-be proliferators. These early thoughts are now being reflected in the pronouncements of the US Department of Energy, which is satisfying evidence that the industry's efforts and advice are not being ignored.

Both sides found the 1994 meeting after a gap of two years particularly rewarding, and resolved to continue the exchange of views on that footing. The next meeting in January 1996 was even better. In the interim there had been a great deal of co-operation at a practical level, with the Institute (as detailed above) having played an active role behind the scenes at the conference to extend the Non-Proliferation Treaty in early 1995. The 1996 meeting became, more than any preceding one, a review of progress towards joint goals, and an exchange of views on how each side could best support the other. Significant progress had been made towards an international convention on nuclear safety, and even the glacial saga of cross-boundary nuclear liability, which was a serious obstacle to technology upgrading at nuclear installations in the former Soviet Union and even in some Eastern European countries, was showing signs of a thaw. A large measure of agreement was

reached on responses to the growing public awareness of and anxiety about putative climate change, and on the need to be more proactive in programmes designed to influence public acceptance of nuclear energy.

The establishment of traditional annual or biennial joint meetings between the Institute and the Agency has not only had the result of encouraging a friendly and co-operative relationship between the senior management of the Agency and the leaders of the nuclear fuel cycle industries, which is worth its weight in gold (or shall we say uranium?); it has also led to co-operation at all levels between the two organizations. Research officers of the Institute have been willing participants in a number of Agency technical projects, such as the 'Decades' project on the health implications of different forms of electricity generation, and the Agency-led project to revise the Basic Safety Standards for Radiation Protection, set up after the publication of ICRP Publication 60 by the International Commission on Radiological Protection in 1990. The present Secretary General took part in the meetings on 'The IAEA Beyond 2000' in the summer of 1995, and was an enthusiastic member of the steering group which prepared for the symposium on 'Nuclear Fuel Cycle and Reactor Strategies: Adjusting to New Realities' which was held in June 1997. It is a sign of the extent to which the relationship between the Institute and the Agency has evolved that the Institute was asked and readily agreed to be a sponsor of this symposium, together with the European Commission, the Nuclear Energy Agency of the OECD and the IAEA.

## CONCLUSION

The above narrative has adumbrated the growth over the past 20 years of a mutually beneficial relationship. From a rather uncertain start with prickliness in evidence on both sides, perhaps more on the Institute's as the fledgling has to squawk louder if it wishes to compete with the adult bird, co-operation has gradually developed on all fronts. The Agency's technical committees have benefited from the direct input of industrial representatives attending as Members of the Institute. The Institute has been able to turn to the Agency as to an elder brother for advice and assistance. But the reality is that both need each other. The Agency's non-proliferation function can only work with the ready and continuously conscientious co-operation of the industry to which these controls are applied. Likewise, public confidence in the Agency enables the civil nuclear fuel cycle industries to go about their

business much more smoothly than would otherwise be the case. It is not entirely surprising that two organizations which each have as their strategic aim the encouragement of the wider use of nuclear energy for the benefit of humanity should collaborate in this way, but it is gratifying, given the very different origins of the two organizations, that they should have found, as a result of goodwill and persistent effort on both sides, the means to do so successfully.

It gives the Uranium Institute great pleasure to salute the International Atomic Energy Agency on its Fortieth Anniversary.



INTRODUCING CHANGES INTO  
THE AGENCY'S SCIENTIFIC  
AND TECHNICAL PROGRAMMES

Tadeusz Wojcik

*Tadeusz WOJCIK* was born on 24 August 1923 in Pilzno, Poland. After completing his high school education in 1944 under the scheme of underground education operated in Poland during World War II, he obtained his MS Econ. Sc. in 1948 and his Dr. Econ. in 1965, both at the College of Economics in Kraków. The title of his doctoral thesis was: *Economic Aspects of the Development of Nuclear Power*.

Since 1956, after several years of work in the machine industry, he has been associated with the peaceful uses of atomic energy. He served in the Institute of Nuclear Research in Swierk, near Warsaw, as:

- Head of the Group of Economic Problems of Nuclear Power (1956–1965);
- Scientific Secretary of the Institute of Nuclear Research (1965–1970). The main duty of this post was to co-ordinate the preparation of the scientific and technical programmes of the Institute, which at that time had about 3000 employees;
- Head of the Safeguards Group (1970–1971). In this capacity he served as Head of the Polish delegation in the Safeguards Committee of the Board of Governors which, in 1970–1971, elaborated the safeguards system under the NPT (document INFCIRC/153). The Safeguards Group initiated preparation of the Polish State System of Accounting and Control of Nuclear Materials.

In 1971, he joined the International Atomic Energy Agency and became Special Assistant to the Director General and in 1975 Director in the Office of the Director General, in which capacity he served until 1992. During this period he acted as the co-ordinator of preparation of the IAEA's technical programmes and, in this connection, served from 1977 to 1987 as Scientific Secretary of the Agency's Scientific Advisory Committee.

In 1992, he retired and returned to Poland, where he accepted a position (part-time) of Adviser to the President of the National Atomic Energy Agency. From 1993 to 1995, he was Head of the Polish delegation to the Committee of the Board of Governors which prepared the draft Nuclear Safety Convention and in 1995 represented Poland in the Diplomatic Conference which established this Convention.

In December 1994, he was elected President of the Polish Nuclear Society and in December 1996 was re-elected for the period 1997–1998.

He is married to Elizabeth Kempf, a medical doctor. They have two sons and a daughter, all married.



On the occasion of the 25th anniversary of the IAEA, the then President of Austria, Dr. Rudolf Kirchschläger, addressed the General Conference at the opening of its session. In his statement he said, *inter alia*, that according to the comments he had received from leading experts in various areas of the Agency's programme, its work was rated as being useful and for any organization that was the highest compliment one could pay.

I was much impressed by the wisdom of this statement attributing the highest importance to the usefulness of an organization to those for whose benefit it had been established.

Because of their unique nature, international organizations such as the IAEA are not in a position to compete in the market with other organizations and thus are not forced to prove their superiority in the market in order to escape the fate of being eliminated. They have, instead, to convince the governments of their Member States, their clients, that they deserve the financial contributions paid into their budget because their programme is useful and can be perceived to be executed in an efficient way.

The needs of Member States which are met by the programme of an international organization are subject to alterations for various reasons, two important ones being the following:

- The growing or diminishing importance for countries of the disciplines supported by the organization,
- The maturing of those disciplines, which usually results in the gradual reduction of demand for assistance from an international organization.

Therefore the usefulness of the programmes of any international organization should be subject to continual reassessment in order to make sure that it reflects the real situation at any given time.

One can distinguish certain specific aspects of this situation with regard to the International Atomic Energy Agency. Its area of activities, as outlined in its Statute, is exceptionally precisely defined and limited to "...the peaceful uses of atomic energy." This is useful because it helps to keep under control the scope of the Agency's programme. On the other hand, the potential for the success of the IAEA is to a large extent dependent on how technically and economically relevant the peaceful uses of atomic energy in Member States are — and in general terms they represent a rather modest segment of the national economy. The scope and economic attractiveness of the applications of atomic energy are now, we should acknowledge, much less than was expected at the time of creation of the IAEA.

This is one of the essential reasons for the perceived lower level of usefulness of the IAEA to Member States than initially contemplated; nuclear power and its fuel cycle represent the only areas where there exist large scale industrial operations of a fully nuclear character. The utilization of isotopes and radiation techniques — the second major area of the peaceful uses of atomic energy — comprises different techniques applied in different branches of industry, agriculture, health care and environmental protection and in the majority of cases these techniques have to compete with other, non-nuclear techniques and thus to fight for recognition as being the more useful and/or economical.

The practical conclusions drawn from the continuous reassessment of the usefulness of the applications of nuclear energy in Member States should lead to alterations in the Agency's programme, i.e. the phasing out of projects related to applications of diminishing usefulness and the initiation of projects corresponding to new or growing areas which justify the involvement of an international organization. It might be mentioned in this context that it is, for various reasons, much easier to introduce new activities into the programme than to terminate existing ones.

Discussions in the former Scientific Advisory Committee (SAC) and in the numerous standing and ad hoc advisory groups of the Agency were dominated by these considerations. In the late 1970s, the Director General used to submit to SAC a list of programme elements, asking individual members for an indication of the level of priority (very high, medium, low) that they would assign to them. The members of SAC were rather sceptical about the usefulness of this exercise, the summary results of which were in many cases non-conclusive. On the recommendation of the late Lord Marshall, this form of assessment was eventually discontinued. He argued that the Director General had in his hands a lot of useful information which should allow him to recommend to the Board of Governors discontinuation of certain projects which he considered to be of low priority. The Director General should then listen to the "level of noise", as Lord Marshall named the negative reaction of Member States, and react in the event of its being high. This seemed to me a very pragmatic approach, because there is no effective method of assessing the level of priority that would be equally valid for the different political and economic situations existing in different Member States.

I remember very well a number of cases where the Agency rightly reacted to the emerging needs for new international action. One of them was the initiation in the mid-1970s of the Nuclear Safety Standards (NUSS) project, which I consider as representing a very high level of usefulness.

This was a period of fast expansion of nuclear power and consequently a fast growing need for safety evaluations of nuclear power plant projects — many of them representing the first nuclear power plants to be built in a given country. It should be remembered that in the years 1970–1975, construction was initiated on 25–35 units per annum in the world and the IAEA was increasingly invited to assist in assessing the safety aspects of various projects at different levels of implementation.

The Agency's experience with the safety evaluation of Kori Unit 1 in the Republic of Korea with a Westinghouse PWR type reactor triggered consideration of "...the creation of a universally acceptable set of safety and reliability criteria which could serve both States and the Agency as a yardstick in evaluating the design adequacy, quality of manufacture and construction and prudent operation practices of a nuclear power plant..."<sup>1</sup> This later took the form of the NUSS programme.

The contract for the delivery of the Korean plant was signed in June 1969 with the understanding that it would have all the main features of the Kewaunee Plant in the USA, the construction of which started in 1968.

The Agency's safety missions, invited by the Office of Energy of the Republic of Korea to assist in preparing the preliminary safety analysis report, faced two problems:

- In comparison with the Kewaunee plant, some aspects were planned to have reduced safety features while others would have enhanced safety features,
- A policy was adopted by the Office of Atomic Energy (OAE) of the Republic of Korea and its Advisory Committee on Reactor Safety that requirements related to the safety codes, regulations and criteria should be based on the provisions existing in the USA in October 1968, i.e. the time when the detailed design was elaborated.

Experts participating in the Agency's safety missions initiated in 1971 to the Republic of Korea in relation to the above plant were aware of the continuous revisions and updating of the safety requirements being introduced in the USA as well as in other countries. They were of the opinion that all the safety codes, guides and criteria in existence at the time of the preparation of the preliminary safety analysis report, including those issued after October 1968, should be taken into account before a construction permit was issued.

<sup>1</sup> Minutes of Director General's meeting 4/74.

Another possible way out of the problem was to consider an acceptable alternative that would be equivalent to the updated requirements. The assessment of these solutions would involve a considerable amount of judgement on the part of the IAEA.

Yet another problem which the IAEA was facing at that time was to ensure uniformity of approach amongst different safety teams composed mainly of outside experts and established on an ad hoc basis for a given safety assistance project. There were complaints that different teams composed of different experts going to the same country in connection with the same project were offering different advice.

In this situation two possible alternative solutions were formulated:

- The establishment of a four- or five-person team of Agency staff with basic technical competence in critical matters relating to the evaluation of safety analysis reports pertaining to essential aspects of nuclear power plant design, construction and operation, including the principles of regulatory control. The initial emphasis could be placed on acquiring competence in light water reactors. This team would be assisted by an advisory committee composed of regulatory experts from six nations advanced in power reactor technology, with representation also from interested developing countries.
- The development of internationally agreed technical principles on which safety and reliability criteria for nuclear power plant design, construction and operation should be based. Although the approach to the formulation of these criteria was different from country to country, the role of the Agency should be to extract certain basic technical principles on which the safe design should be based and to obtain some general consensus on them. In the second phase of this programme a series of guides and, when needed, manuals should be developed indicating how the established safety and reliability criteria could be satisfied. These documents should serve both the Agency in its advisory services as generally accepted terms of reference as well as the Member States as a systematized worldwide frame of reference for national regulatory bodies.

Eventually, the second solution was selected. On the basis of the advice of two consultative groups and discussions in the Administrative and Budgetary Committee, the Board of Governors and the General Conference (all during 1974), a detailed programme for preparation during 1975–1980 of 5 Safety Codes and 47 Safety Guides was established. A special procedure

for the elaboration, review and approval of these documents was also set up. Ultimately, 5 Codes and 56 NUSS Guides were produced following this procedure.

In the course of the discussions in the Board of Governors in December 1974 it was agreed that the NUSS documents should not be considered as mandatory standards.

In the 1980s, when the NUSS programme was completed, there were informal discussions about changing their status of recommendations into a mandatory status but no agreement was reached because of the negative attitude shown towards this idea by the main nuclear power plant manufacturers.

In 1987, a questionnaire was distributed to Member States operating nuclear power programmes with an enquiry about how the requirements of the first of the five NUSS Codes (related to governmental organization) were reflected in the national documents. Replies received from 47 Member States indicated, according to the Secretariat, that the basic concepts, purposes and functions of the regulatory bodies established in the Member States were generally in accordance with the recommendations of the Code in question.<sup>2</sup>

Another attempt to make the NUSS Codes mandatory was undertaken in 1992 in connection with the drafting of the Nuclear Safety Convention. The idea was to incorporate the set of NUSS requirements into the Convention. This was not accepted by the committee established by the Board for preparing the draft Convention. The committee based its draft text on the Safety Fundamentals publication — *The Safety of Nuclear Installations* — itself based mainly on NUSS documents and recommendations by the Director General's International Nuclear Safety Advisory Group (INSAG).

It could therefore be said that the international effort initiated in 1974 and co-ordinated by the IAEA to prepare the set of NUSS documents was very well invested and saved the resources of many Member States initiating nuclear power programmes at a later stage.

Two other cases of new initiatives for truly international actions which have obtained wide support are related to the preparation of documents on 'Early Notification of a Nuclear Accident' and on 'Assistance in the Case of a Nuclear Accident or Radiological Emergency'. No specific provisions for such actions exist in the Agency's Statute.

<sup>2</sup> INTERNATIONAL ATOMIC ENERGY AGENCY, *Analysis of Replies to an IAEA Questionnaire on Regulatory Practices in Member States with Nuclear Power Programmes*, IAEA-TECDOC-485, IAEA, Vienna (1987).

I well remember an outburst of criticism against the IAEA in connection with the Three Mile Island (TMI) accident because it did not immediately provide information about the nature, scope and consequences of the accident. The reply by the Director General that the US authorities were not under any formal obligation to provide the IAEA promptly with such information was received by the media with surprise.

The enormous publicity given to this accident and information about how widely the powerful R&D capacity existing in the USA in the area of reactor technology was utilized in performing an analysis of the course of the accident and the reasons for its occurrence and in formulating recommendations for preventive action made the international community aware that in the event of a serious accident taking place in a country without such a capacity international aid action would be necessary. The huge programme of remedial actions undertaken after the Chernobyl accident by the powerful Soviet nuclear complex confirmed that conclusion.

The two documents covering these issues were prepared in the IAEA within a couple of months after the TMI accident with the participation of countries advanced in nuclear power. A proposal made at that time by the Director General that guidelines for action recommended in the two documents should become the subject of international conventions was not accepted. The comment was made that the existence of guidelines formulating recommendations for action would be sufficient for Member States to undertake promptly the recommended actions in the event of a serious nuclear accident.

The fact that the first information received on Monday 28 April 1986, two days after the Chernobyl accident, about an abnormally high level of radiation, came to the IAEA from Sweden proved that the existence of recommendations alone was not enough.

The idea that internationally agreed mandatory measures were necessary then became so widely accepted that within a couple of months both guiding documents were turned into conventions — which came into force within less than one year after the Chernobyl accident.

A new activity of a similar nature, but on a more modest scale, was the introduction in the early 1990s of the International Nuclear Event Scale (INES), a public information oriented measure. The IAEA was right to take up initiatives of this kind started in a number of countries (including France and Japan) and develop them into a worldwide rapid information dissemination endeavour.

The effective functioning of this system in quickly providing public media with factual information should be seen as an important element in the policy of openness of the nuclear industry, which is widely considered crucial for success in gaining public acceptance for nuclear power. As in the case of NUSS and the international conventions, INES seems to represent an activity which exactly fits the nature of an international, intergovernmental organization.

In its entire work related to the promotion of nuclear power and the utilization of isotopes and radiation techniques the Agency has to carefully avoid promoting results of nuclear science which are not clearly competitive with other, non-nuclear, options satisfying the same needs. It was therefore a very correct decision to initiate in the 1970s, within the nuclear power programme, work on a series of guidebooks, manuals and computer programs related to the assessment of electricity demand and cost comparisons between the different electricity generating options under the specific conditions of a given country. These tools were developed in close co-operation with the World Bank, the International Energy Agency and the Nuclear Energy Agency of the OECD. By developing this methodology and providing assistance (mainly to developing Member States), the IAEA was able to avoid the risk of becoming involved in the initiation of nuclear power programmes in cases where the electricity demand and economic factors did not provide sufficient justification for such a decision.

As mentioned before, proposals for the termination of the Agency's activities were usually resisted. Behind most activities there are specialists in Member States who consider that these subjects should appear in the programme of the IAEA.

Exceptional cases where the lack of demand for continued action by the Agency was so obvious that no objections were voiced against discontinuation included: cessation in 1967 of the practice of sending to various parts of the world two mobile isotope laboratories donated to the IAEA in 1958 by the USA and, more than ten years later, the disbanding of a unit (established soon after entry into force of the NPT) whose objective was to arrange for services between a nuclear weapon State and a non-nuclear-weapon State willing to utilize nuclear explosions for specific peaceful uses.

It was also relatively soon realized, after the Agency had established its first Regional Office in Asia in 1965, that in contrast to the activities promoted at the international level by FAO and WHO, some of which have distinct regional features, the scientific and technical subject areas promoted by the

IAEA were more global in character. The existence of the Regional Office was terminated in 1971 and, very rightly, no proposals have since been made for establishing regional offices within the realm of the Agency's promotional work.

A different reaction was experienced when discontinuation of publication by the Agency of the journals *Atomic Energy Review* and *Nuclear Fusion* was attempted. Publication by the Agency of the *INIS Atomindex* bibliographic database and of the results of the meetings of experts, seminars, symposia and conferences seems to be fully justified. However, competition by the IAEA with commercial scientific publishing houses ceased to be so attractive after the market in nuclear related scientific publications became established. That conclusion was accepted only in 1983 for the *Atomic Energy Review*, when its publication was discontinued. In 1993, a different solution was adopted for the *Nuclear Fusion* journal, with the cost of publication being covered by revenues.

The decision to transfer the administration of the International Centre for Theoretical Physics in Trieste to UNESCO was also debated for several years before being finally taken in 1993. It was known for many years before that co-ordination at the governmental level of theoretical physics activities in many Member States had been transferred from atomic energy authorities to the ministries of science and technology or ministries of education. These governmental bodies have now established relations with UNESCO rather than the IAEA.

During the time when I served in the Office of the Director General as co-ordinator of programme preparation, various approaches were used to facilitate the selection of the most appropriate subjects to be covered by the Agency's programme and best corresponding to its intergovernmental character. In the approach applied in the preparation of the programme proposals for 1991–1992, managers were invited to formulate for their subject areas:

- The main accomplishments during the previous five years,
- The changes proposed in comparison with the previous biennium;

under proposed problems to be addressed:

- A statement of the problem,
- The ranking given to the problem,
- The target countries,
- The role of the Agency in the given area;

under proposed projects:

- The project objective,
- The main activities proposed and their outputs,
- The project duration,
- The project ranking.

One of the aspects analysed in the consideration of the programme was how to reflect the growing maturity of specific applications of nuclear science. At a national level this progress is demonstrated by a reduced demand for research and development occurring in parallel with progress in the commercialization of the specific applications. The Agency's involvement in direct support for R&D work in such areas should diminish, while technical assistance to developing countries wishing to establish capabilities for the practical application of such matured methods and techniques could increase. The Agency's activities in the areas of physical and chemical sciences, and industry and earth sciences (especially as regards nuclear data, the utilization of research reactors and particle accelerators, chemistry, industrial applications and the development of water resources) seem to deserve special scrutiny in this respect.

Both the promotion of R&D as well as the provision of technical assistance for establishing practical applications of isotopes and radiation techniques on a commercial scale in developing countries could be facilitated by the existence of specialized regional centres of excellence (e.g. in isotope hydrology). Selected national laboratories which have achieved a high level of excellence, partly through the assistance of the IAEA, could acquire such a regional function without any formal affiliation with the IAEA. The existence of such centres could permit a reduction in the work of the Agency's laboratories, which should increasingly focus on functions typical for the worldwide intergovernmental organizations — such as interlaboratory quality control of measurements.

The establishment of the World Association of Nuclear Operators (WANO) after the Chernobyl accident, with a network of regional centres, could be seen as a development of a similar nature in the nuclear power safety area, indicating greater maturity of the world nuclear power industry. The programme carried out by WANO allowed the IAEA to reduce considerably the volume of its safety missions to individual nuclear power plants.

Proposals are voiced from time to time for very considerable changes in the content of the Agency's programme — namely for introducing issues

relating to renewable sources of energy or even for the IAEA to become the UN agency for all forms of energy. According to my recollection, a statement to the latter effect was made in the UN General Assembly after the 1981 UN Conference on New and Renewable Sources of Energy. No support for the proposal was expressed.

A decisive factor behind such proposals is the outlook for the future of nuclear power. The present stagnation provides fruitful ground for these ideas.

However, as someone associated with nuclear power for 40 years, I would strongly recommend great restraint in promoting this idea. There is currently significant uncertainty regarding:

- The availability of oil and gas in the period beyond the next 50 years,
- The potential impact on the Earth's climate of the burning of growing quantities of fossil fuels,
- The potential role of renewable sources of energy over the long term.

In the above context it is very likely that the nuclear power option will become accepted as being a great asset for humanity in the 'age of electricity' in which we now live. With its potential for 'breeding' fissionable material, nuclear power is in a sense a renewable source of energy. It should also be considered as a truly sustainable form of energy since the known and estimated resources of uranium have the potential to satisfy the electricity needs of the whole world for hundreds of years, provided that fast breeders are introduced into the system.

The expanded development of nuclear power will require, among other things, a high level of international nuclear safety culture, including an international safeguards regime, and for these purposes an IAEA devoted solely to these issues will be indispensable.

THE IAEA AT A CROSSROADS:  
AN ISRAELI PERSPECTIVE

Gideon Frank

*Gideon FRANK* was born in Tel Aviv in 1943. Between 1982 and 1989 he was Director of the Soreq Nuclear Research Center. From 1990 he served as the Deputy Director General of the Israel Atomic Energy Commission, of which he was nominated as the Director General in 1993.

The International Atomic Energy Agency has always been a distinguished member of the family of United Nations organizations. From Israel's perspective, as one of the founding members of the Agency, it has been gratifying to reflect on the first 40 years of the IAEA and to recognize it as a professional organization, distinguished by its commitment and contributions to all facets of the peaceful uses of nuclear energy.

My long association with the Agency has given me the opportunity to observe its evolution over the past three decades. During this period the IAEA has demonstrated, and has in fact led, the development of one of the most important aspects of nuclear energy: the amalgam of science, technology, statesmanship and diplomacy.

Recent years have witnessed many changes affecting the Agency's functions in such areas as nuclear safety and related environmental questions, and safeguards and verification, to mention only a few. This year will also be noted by a change at the helm of the Agency. After 16 years of distinguished service marked by many widely recognized achievements, the Director General of the International Atomic Energy Agency, Dr. Hans Blix, will be stepping down.

Looking to the future, the Agency must continue to evolve in a manner that will best prepare it to meet the challenges of the 21st century. In doing so it will hopefully benefit from opportunities that come its way and avoid the pitfalls that will naturally confront it.

In this article I would like to address briefly, from an Israeli perspective, some of the issues which may influence the Agency's future course.

## NUCLEAR SAFETY

Of the full spectrum of activities led by the Agency, the promotion of nuclear safety undoubtedly stands out as one of the most significant.

The IAEA has played an important role in promoting and supporting all safety aspects of nuclear energy and should be commended on its systematic, coherent and comprehensive manner of administering international expert groups to deal with nuclear safety and radiation protection issues. The Agency's initiatives and support have, moreover, advanced several conventions in the field of nuclear safety. The intensive IAEA programme — aimed at improving the safety standards of nuclear power technology, research reactor operation, radiological protection and waste disposal — has yielded impressive achievements and progress. It has, in fact, become a guide to all of us concerned

with issues of nuclear safety. From my involvement with these issues in various management positions in the Soreq Nuclear Research Center and at the headquarters of the Israel Atomic Energy Commission, I can attest to the influence that the Agency's Safety Series publications have had on our national nuclear safety regulations. The evolution of our pertinent laws and regulations has closely followed developments in the nuclear safety recommendations of the Agency. Likewise, the basic data and know-how compiled in the various technical documents and reports have guided us in many safety and safety assessment issues.

The Agency has organized numerous conferences dedicated to nuclear reactor safety, accident prevention and waste management. These, as well as the growing list of titles in the authoritative Safety Series and other publications, provide competent professional background material in support of the ongoing campaign for public acceptance of the merits of nuclear power. It is hard to envisage any progress in this difficult task without the groundwork laid down by the Agency.

The bulk of the Agency's safety related activities has been at the professional expert level, not readily accessible, let alone comprehensible, to members of the general public. Risk management and the related issue of public acceptance are generally taken as crucial to any future development of industrial nuclear applications. Yet we consistently find that this risk is not generally perceived simply in statistical terms, for example in terms of the expected number of deaths. The nuclear community has traditionally been inclined to treat this state of affairs as a product of confusion and misinformation. But in our modest experience, this is an over-simplification, and special care should be taken not to presume to understand the public's perception of risk. Experimental psychologists have shown that people rank risk on the basis of additional factors, i.e. how well the risk is understood, how equitably the danger is distributed, how well individuals can control their exposure and whether the risk is assumed voluntarily.

Observing the exceptional contributions of the Agency to nuclear safety, we feel that it is uniquely placed to look for means to improve communication with the general public on issues of nuclear risk. The IAEA could help further by defining guidelines that will enable Member States to understand what people already believe and to prepare objective and unbiased messages that take this knowledge into account. Most importantly, it could help devise careful empirical evaluation of such messages. Such an effort would complement the excellent achievements of the IAEA in the field of nuclear safety.

PEACEFUL APPLICATIONS  
OF NUCLEAR ENERGY

The IAEA has carried out important programmes in many fields which have been no less important than that of nuclear safety to the States and people concerned. Beneficial results have been accomplished in the fields of agriculture, medicine, hydrology and industrial applications. Furthermore, it is worthwhile mentioning the Agency's programmes for monitoring and restoration of the environment in the aftermath of nuclear accidents and nuclear tests.

The technical co-operation programmes of the IAEA have assisted in the transfer of technologies which have contributed to food production and preservation, the utilization of freshwater resources and the promotion of human health. These vital efforts have certainly fulfilled one of the principal tasks of the IAEA envisioned in the Statute. One can fully endorse the new criteria used by the Agency to identify so-called 'Model Projects' for technical co-operation, namely that they should be responsive to real needs with socio-economic impact for the end user, and should demonstrate the cost effectiveness of nuclear technologies. Full and general implementation of these criteria in all the programmes will improve the Agency's technical co-operation effort as a whole. I believe that the Agency's project management practices should be strengthened, especially at the post-completion stages. More comprehensive evaluation procedures of the actual impact on the end users should be employed after completion of the project. The final evaluation results could be used as feedback for further enhancement of the initial stages of project identification and formulation, thus providing for a process of ongoing improvement.

I feel that two topics, treated quite extensively in the past and reappearing again after some years, merit the Agency's focused support for further development in the future.

The first concerns water desalination. Water supply problems, both shortages and deterioration of quality, affect several areas of the world. IAEA activities in the field of desalination, restarted in 1989, have produced state-of-the-art technical documents and recommendations. The work accomplished so far proves that the Agency can and should act as a focal point in this area. It would be particularly useful to place more emphasis on economic analyses, including nuclear as well as non-nuclear desalination options.

The second topic that merits attention is food irradiation. Here once again the Agency should be commended for its comprehensive work to date.

Application of this useful technology, recommended by all the relevant international organizations, has experienced unjustified delays and run into unwonted obstacles. I believe that the Agency, with organizational powers and international expertise at its disposal, can and should define a programme aimed at understanding the basic causes hampering public acceptance of food irradiation. It could suggest ways to deal with the obstacles on a world-wide basis in order to promote the practical advantages of this technique, especially in and for developing countries.

### NUCLEAR SAFEGUARDS AND VERIFICATION

Given the IAEA's mandate and recent history, its safeguards mission has both assumed special importance and undergone rapid evolution and development.

My first encounter with the application of IAEA safeguards occurred in 1970 while I was serving as Director of the research reactor at the Soreq Nuclear Research Center. Under the prevailing political environment in the Middle East, the notion of allowing international safeguards inspectors to infringe on national sovereignty was to me (in fact to all of us) nearly unthinkable. We were fascinated not by the fact that international safeguards had some limitations, but by the fact that they were conceivable at all.

The major developments in the responsibilities and capabilities of the Agency that followed the NPT became more tangible to me in 1973 when I joined its Safeguards Department as an inspector. In the years since my return to the Israel Atomic Energy Commission, I have had further opportunity to witness the gradual progress in the safeguards approach of the Agency. Since the general nature of nuclear safeguards is well known, I would like to offer some observations on just four issues.

The first issue concerns the unprecedented development of technical capabilities available to the verification regimes. The second observation addresses their inherent limitations and shortcomings and the necessary conditions for their successful implementation. The third point assesses the practical issues associated with the implementation of safeguards regimes attempting to achieve verification goals, both current arrangements and new concepts for safeguards developed since the Gulf War. It also covers some implications for the Middle East of a nuclear weapon free zone (NWFZ). The

last observation pertains to the dilemma of striking a balance between concentrated verification efforts on problematic cases and the demand for universality in the application of safeguards.

### Technical evolution of safeguards

One of the most dramatic and important developments in the area of safeguards has been the evolution of the technical capabilities at the disposal of the Agency. Its use of instrumentation for measurement, sampling, containment and surveillance has developed and improved appreciably since my days as a safeguards inspector. The verification effort has shifted from mainly nuclear material accountancy to a more balanced approach, which includes an increased share of information actually measured and monitored in the field. The years since the Gulf War have seen an accelerated rate of improvement in this domain.

The need to deal effectively with the realities in Iraq, coincident with the availability of excellent new analytical methods, has created a vastly improved and expanded field of technical verification capabilities. The advent of new analytical methods, especially modern mass spectrometry, in addition to classical radiation measurements, has made it possible to detect and measure progressively smaller amounts of tell-tale traces. These technological developments showed their potential, not only in Iraq but also in the Democratic People's Republic of Korea (DPRK), where they enabled the Agency to detect the initial inconsistencies.

On the more conceptual level, the Action Team effort in Iraq has further improved the effectiveness of verification by emphasizing a systems approach. This comprehensive analysis takes into consideration the national infrastructure as a whole, while searching for various illicit schemes not necessarily confined to the diversion of nuclear materials. As a result, the technical verification capabilities of the Agency have been considerably enhanced.

Still, an important part of the technical capabilities of safeguards remains inadequate. One of the most difficult aspects of the situation in Iraq has been the need for a paradigm shift towards undeclared facilities and activities. This fundamental change of attention was the basis for the Agency's 'Programme 93 + 2'. However, we feel that the technical implications of this shift have not yet been satisfactorily resolved. Further development of instrumentation and techniques is still required, and operational experience in their implementation must still be gained, especially with regard to wide area detection of undeclared facilities.

## Between safeguards objectives and verification

The improvement in the Agency's technical verification capabilities in the safeguards domain, impressive as it has been, does not, however, suffice to assure compliance with safeguards objectives. It is worth noting that safeguards verification regimes are inevitably dependent on a complementary political commitment for ensuring non-proliferation objectives.

The Agency has astutely defined its verification objectives as early warning (timely detection of diversion of significant amounts of nuclear materials) and deterrence. Realistic budgets and national sovereignty interests will always limit verification to some extent. Consequently, even the most effective safeguards regime can only verify information about specific instances in time and space.

This holds true under ideal conditions, where the inspectors are properly trained, well equipped and highly motivated, and when the inspectorate has a no-trust culture which supports and cultivates the hunt for inconsistencies. In real life, however, especially in international organizations, even these conditions are hard to attain.

Given these limitations, even attainment of the limited objective of providing early warning cannot be guaranteed with certainty under practical conditions. This holds especially true if a sophisticated concealment campaign is run by a sovereign government. In these cases the probability of timely detection of diversion leaves much to be desired. This probability is usually even lower at the two ends of the national nuclear infrastructure scale: both for a very extensive one and for a rather small clandestine nuclear operation.

As for the other function of safeguards — deterrence of violations — its success is heavily dependent upon the inspected State's perception of the risk of getting caught in non-compliance, coupled with the political cost of such a finding. The latter issue properly lies outside the Agency's hands but can undermine its success.

Attainment of both of the Agency's objectives thus depends also on the political intentions and commitment to non-proliferation of all the States concerned. Given the inability to ascertain the political intentions of a government as well as the weakness of the international regime in enforcement of non-compliance, a verification regime alone cannot, by definition, guarantee compliance.

The interdependence between safeguards and political commitments is even more pronounced when the Agency's verification capability does not cover the full scope of obligations under a treaty.

The efficiency of the IAEA verification regime under the NPT is uneven and highly context dependent. It may be very effective in those regions of the world where international obligations are honoured and political interests and intentions have been clearly demonstrated and proven over time. But because the efficiency of verification depends so heavily on political conditions — extraneous to the safeguards regime itself — one cannot expect to find a uniform solution that will be equally applicable to all States.

The revelations of the Iraqi non-conventional programme in the aftermath of the Gulf War are highly instructive in this context. United Nations Security Council resolutions have provided the Agency's Action Team and the United Nations Special Commission with far reaching verification and enforcement powers. These actually exceed the powers normally accorded to law enforcement agencies in democratic countries. But even under these unique conditions, verification activities in Iraq have been dependent mainly on initial information supplied by defectors, other Member States, or the Iraqis themselves. We consider these insufficient detection capabilities of the extraordinary verification regime to be one of the most significant lessons that must be drawn from the Gulf War: no intrusiveness can replace reliable and durable political obligations. The other lesson is, of course, the limited value of safeguards as a deterrent to non-compliance by certain types of regimes.

Are, then, verification regimes such as the NPT effective only when they are in fact not required? Surely not, since even partial effectiveness may be important, indeed crucial. Furthermore, in many cases peaceful relations and economic co-operation have developed into a stable interdependence. Under these conditions there is a high enough probability that the Agency's safeguards by themselves will suffice. In other cases, the Agency's safeguards may complement a bilateral or regional verification regime that is already in place, in an effort to reassure the international community as a whole. This, of course, will be up to the parties to negotiate themselves, once they have assuaged each other's concerns directly. It is worth noting that complementary Agency safeguards are more essential in regions where no contentious conditions prevail and collusion between States, at least in principle, is more probable.

There is also much to be said in support of the argument that a verification effort, even if it falls short of ensuring compliance, will compel a proliferator to operate under difficult and uncertain conditions — for example, by denying use

of established nuclear sites. Neighbouring States, however, can hardly find this to be sufficiently reassuring when their security is at risk. Consequently, they will have to maintain adequate security margins against such eventualities until greater confidence in their neighbours' intentions emerges, normally through a combination of political developments and economic co-operation. The Argentina–Brazil model is most instructive in this context.

Ignoring the necessary political context may create dangerous illusions. Indeed, had it not been for the war, the Iraqi breach of its obligations under the NPT would not have been detected and would have continued unhindered. We can well imagine where such a development would have taken the region and the world.

These general considerations and specific circumstances are the reason for Israel's position that there are political preconditions for establishing the Middle East as a NWFZ. In essence, these preconditions are aimed at creating mutual confidence in the peaceful intentions of all States in the region and finally assuring elimination of the risk of war.

For this purpose Israeli policy has always maintained that the nuclear issue as well as all regional security problems, conventional and non-conventional, should be dealt with within the full context of the peace process. Moreover, negotiations on these, as all other issues concerned with the security of the region, could only realistically be expected to take place freely and directly within the framework of the peace process. The political realities of our region mandate a practical step-by-step approach; beginning the process with confidence and security building measures, establishing peaceful relations and reconciliation and, in due course, complementing the process by dealing with conventional and non-conventional arms control. Furthermore, priority has to be assigned to dealing with those weapons and systems that experience has proven to be destructive and destabilizing. This step-by-step approach is substantiated by the vast experience accumulated with similar processes elsewhere.

#### Implementation of the verification regime

Practical limitations in the actual implementation of a verification regime may augment the inherent limitations mentioned above. A comparison of the

safeguards implementation concepts developed in the Agency to date presents us with three basic modes in ascending order of intrusiveness:

- The existing safeguards measures;
- The strengthened safeguards measures envisioned by 'Programme 93 + 2';
- The ultimate measures required by and allowed for in the relevant Security Council resolutions pertaining to Iraq.

Soon after I joined the Safeguards Department in 1973, developments in the Agency's approach resulting from the NPT became more apparent. On the one hand, it has developed into one of the essential elements of global order — a comprehensive safeguards regime covering many countries. On the other hand, curiously enough, its provisions for verification have included the principle of safeguarding only nuclear material flow (not nuclear plants and equipment). Furthermore, access rights during normal inspections have been confined to predetermined key measurement points. These safeguards measures have thus evolved to become less stringent than those of the then prevailing INFCIRC/66 regime. It is important to note, however, that this development is not a failing of the Agency. In fact quite the opposite — the IAEA Secretariat has tried its best to strengthen the safeguards arrangements under the agreed regime but obviously could not deviate from the general understanding on which they were based. The handling of the critical problems of undeclared activities and facilities has thus not been satisfactorily resolved.

Viewed from this perspective, 'Programme 93 + 2' constitutes an important improvement in the safeguards system, given its wider information requirements and strengthened access rights. Still, only experience will prove its promise for augmented verification effectiveness, as the inherent limitations stemming from the political arena still pertain.

The last of the three verification modes — that of IAEA Action Team safeguards in Iraq — is hardly viable under normal conditions. Nevertheless, it is instructive, if only to serve as a guide to the theoretical upper limit to intrusiveness.

The uniquely complex and challenging conditions prevailing in the Middle East require a specific verification mode. We believe that when political conditions eventually ripen for arms control and disarmament to take hold in our region, the appropriate verification mode would have to be a NWFZ based on a mutual regular and challenge verification regime that ought to be more stringent than the NPT.

It is certainly the most effective verification mode for a region in which suspicions of non-compliance have not traditionally proven groundless. The inspectorate under a mutually verifiable regime will generally be more effective, first because of the motivation of its inspectors. When an inspector from one State goes to the other State, he or she shoulders a national responsibility and feels personally motivated to look for any inconsistency. Another factor has to do with the information base supporting the inspectors in the field. Under mutual verification the inspector goes to the field with the full backing of his or her country's institutional power. Put simply, if the country's intelligence service suspects anything, this information could be made available to help the inspector define what is wrong and where to go. In short, a regional mutual verification regime is generally more effective because it fosters inspectors who are highly motivated and better informed individuals.

However, mutual verification regimes have demonstrated other advantages characterized by focused verification efforts and inherent abuse prevention.

#### Universality versus focused verification

Effective application of verification efforts under realistic constraints will always require concentration of efforts on the more problematic areas. International organizations such as the Agency, on the other hand, are obliged to operate even-handedly, without singling out any one State. Accordingly, the classic approach has been to establish a verification regime based on uniform technical criteria applied generally. Such a course may unnecessarily burden most States and the Agency itself because of the scarcity of suspect instances. The dilemma therefore is between a fair, but expensive and burdensome regime, and a concentrated but necessarily discriminatory one. The usual solution to this dilemma envisions normal, less intensive verification measures applied under universal criteria and special ones activated by the proper authority in specific cases.

This is well reflected, for example, in the 'Programme 93 + 2' protocol. The requirements concerning additional information will be universally applied. Provisions for special inspection and additional access rights, while allowed for by every Member State signatory to the protocol, will presumably be used by the Agency to concentrate on specific problems. In the Agency's case, final judgment on the application of special inspection and access rights is the professional judgment of the Secretariat. In contrast, it is worth noting that

the treaties concluded after the Gulf War have assigned responsibility for the final decision on the application of special measures to the Member States.

Both the Chemical Weapons Convention (CWC) and the Comprehensive Test Ban Treaty (CTBT) apply normal and universal verification measures — the CWC by establishing a general inspection regime based on uniform criteria and the CTBT by using global monitoring systems. But both treaties recognize the need to focus on problematic instances by using special intrusive instruments, such as the challenge inspection by the CWC and the on-site inspection in the context of the CTBT. The triggering mechanism for the application of these special measures in both global treaties, however, rests with individual Member States and is, therefore, based on political decisions.

Such an approach is more direct and seems to offer effectiveness, but also implies higher probabilities for abuse. For that reason both treaties also include political filters against possible abuse: a weak filter in the CWC ('green light') and a stronger one in the CTBT ('red light'). Since no international experience with the application of the new approach has as yet accumulated, its effectiveness both in verification and in abuse prevention remains to be proven. The Secretariat, on the other hand, has demonstrated its professional, unbiased approach, prescribed as it is by the agreed arrangements and by decisions of the Board of Governors. Additional authorization under 'Programme 93 + 2' will hopefully enable it to strengthen its safeguards capabilities, and especially to apply more intrusive and focused measures.

For those who are familiar with Israel's chronic problems vis-à-vis the Policy-Making Organs of the IAEA, the above statement may seem uncalled for. However, our experience with the Agency shows clearly the dichotomy between the Secretariat and the Policy-Making Organs. In our experience the Secretariat has generally acted professionally and impartially. In stark contrast, Israel has been discriminated against in the Governing Bodies of the IAEA for 40 years.

It may be of interest to note that experience accumulated with mutual verification regimes indicates that most of the problems mentioned above may have been taken care of. Such regimes offer the following advantages:

- Each State can concentrate its verification efforts as it deems necessary, without having to pay dues to universality considerations;
- The incentive structure helps prevent abuse because of obvious retaliatory options;
- No Member State can effectively be discriminated against.

General experience indicates that in multilateral or asymmetrical situations the last two points may require arrangements with 'multi/bilateral' characteristics. Mutuality under these conditions means in practice that every Member State can challenge and inspect any and all others in the region.

### RISK OF OVER-POLITICIZATION

Having observed the deliberations of the General Conference for many years, and in recent years as the Israeli delegate, I could not help but witness the efforts of certain States, not least from the Middle East, to make political use of the Policy-Making Organs of the Agency. We, like many others, feel rather strongly that politicization of the Agency is inherently detrimental to its objectives and its long term viability. It also hurts the Agency's professional reputation and its prominent position among international organizations.

There are two problems that may be of general interest in this respect. The first pertains to any attempt to act in contradiction to the Agency's Statute, for example, by infringement of the principle of sovereign equality. Permitting any encroachment of rights under the Statute is, in the long run, bound to undermine the essential basis on which Member States can participate in the Agency's functions, thereby causing it to deteriorate.

The other problem has to do with the use of the Policy-Making Organs of the Agency as a forum for consideration of issues that are essentially political in nature. The Agency is fundamentally a technical organization. Therefore, using, for example, the General Conference as a vehicle for political issues is incompatible with the responsibilities and activities of the Agency as provided for by the Statute. Such actions concerning contentious regional issues are even more counterproductive. They can create an illusion that majority resolutions in international forums can replace direct negotiation between the relevant parties. As such, they can only complicate and delay this sole effective problem solving process. Moreover, initiative and intervention by the IAEA tends to lift the nuclear issue out of the full security context. This is bound to be an impractical approach that would also serve to erode confidence in the Agency and between the parties. It would also further delay meaningful substantive progress on any conciliation efforts between the countries directly involved.

Fortunately, a number of other Member States are equally alarmed by the prospect of politicization of the Agency. Together we must strive to

reverse this trend and protect the Agency from the pitfalls that have beset, indeed crippled, other international forums and organizations.

### THE WAY AHEAD

The IAEA has come a long way since its inception in 1957. It is approaching the third millennium as a competent and vibrant organization, with a major role in an area of considerable importance for the safety and prosperity of humanity. But the Agency is also presently facing significant challenges that could have a profound bearing on its continued prominence and viability in the future. I firmly believe that the Agency can adapt successfully to the new international environment if it concentrates its efforts on certain key issues.

High priority must be given to continuous improvement of the Agency's effectiveness under budgetary constraints. This would require constant management attention to its two main endeavours: the promotion of the peaceful uses of nuclear energy, including all their safety aspects, and safeguards. I believe that these two important thrusts are complementary and the Agency should maintain its emphasis in the future on both.

Most important in terms of the Agency's outlook for the future is the need for unswerving pursuit of safeguards objectives without deviation from agreed arrangements. In addition to the essential development of various verification methods and technologies, constant care should be taken about formal safeguards related statements and declarations so as to avoid misunderstanding or oversight. Conclusions drawn from verification activities should be pronounced precisely with all their qualifications and limitations. The professional credibility of the Agency must never be compromised.

Lastly, preservation of the culture and spirit of the Agency demands resisting any attempt to impair its professional competence and impartiality, and shielding it from the debilitating effects of over-politicization. Indeed, political initiatives and energies should be channelled into further regional co-operation in the peaceful applications of nuclear energy. The Agency already has both the necessary professional competence and an impressive track record in this domain. I believe that this is also the way to move ahead, building on the Agency's strengths in order to spread co-operation, stability and prosperity to those regions of the world that have thus far not been fortunate enough to benefit from them.



POSITIVE ASPECTS OF  
THE WORK OF  
THE INTERNATIONAL  
ATOMIC ENERGY AGENCY

Raja Ramanna

*Dr. Raja RAMANNA*: Born in 1925, Dr. Raja Ramanna received his education in Bangalore and Madras, India, and obtained his PhD degree from London University in 1948. He received a diploma of Licentiate of the Royal School of Music (London) in 1940.

Dr. Ramanna's professional specializations and interests have been in the fields of nuclear physics, reactor design, European and Indian music and philosophy.

His research achievements centre on the design and commissioning of the research reactors 'Apsara' and 'Dhruva' at the Bhabha Atomic Research Centre. His investigations on fission include a stochastic theory of the fission process and nuclear structure. He has taken part in accelerator design, fast reactor development and defence oriented research programmes. He led the group which was responsible for the peaceful nuclear explosion test in India (Pokharan, 1974).

Dr. Ramanna continues to be actively engaged in research, his current interests being in development of a theory of unstable nuclear systems based on the duality of time and mass. These works have been published in the *International Journal of Modern Physics A* and *Modern Physics Letters A*.

During his career, Dr. Ramanna held positions of high responsibility: Director, Bhabha Atomic Research Centre, Bombay (1972–1978 and 1981–1983); Scientific Adviser to the Minister of Defence and Director General, Government of India (1978–1981); Chairman, Atomic Energy Commission (1983–1987); and Minister of State for Defence, Government of India, during 1990.

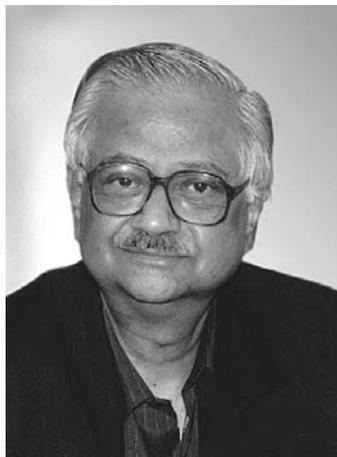
He was Chairman of the NORA Project of the IAEA connected with heavy water reactors; Chairman of the Scientific Advisory Committee to the Director General, IAEA; and President of the General Conference of the IAEA in 1986.

He is a Fellow of the Indian National Science Academy and was its President during 1977–1978.

He has received several awards and honours.

Apart from research papers, Dr. Ramanna has written two books, an autobiography entitled *Years of Pilgrimage* (1991) and a book on music entitled *The Structure of Music in Raga and Western Systems* (1993).

Since 1987, Dr. Ramanna has been the Director of the National Institute of Advanced Studies, Bangalore.



As I have been connected with the development of atomic energy now for more than 50 years, it is but natural that my article will be somewhat historical in nature. I would like to begin with a reference to the Geneva Conference on the Peaceful Uses of Atomic Energy, held in 1955, at which Dr. Homi Bhabha of India was elected as President. The purpose of the Conference was clear in the sense that while fantastic progress had been made in the development of atomic energy, much of the subject was still covered in secrecy and the more advanced powers were keen to know about each other's work. There was the hope that unnecessary secrecy could be discarded. The developing countries hoped that their development programmes would progress swiftly through the use of modern technology and above all by the availability of abundant power.

A tremendous amount of nuclear information was released, and at the end of the conference the general feeling was that all interested countries should participate in the peaceful uses of atomic energy in some organized way towards this positive end rather than repeat and rediscover what had been done in each country separately.

At the end of the Second World War the general feeling was one of co-operation all round the world, especially in helping the developing countries to solve the problems of underdevelopment and poverty and it seemed that the discovery of fission power was a new gift to humanity for this purpose.

At the time of the 1955 Conference, there were rumours that some countries had made progress in the harnessing of fusion power, especially after the development of the hydrogen bomb, but all this was covered in total secrecy. In his presidential address, Dr. Bhabha made the prediction that fusion power would be available for peaceful uses within 20 years. This, in spite of great efforts by many countries, has not turned out to be true and even after 40 years we have not been able to simulate the plasma conditions required for the extraction of this energy for useful purposes.

The 1955 Geneva Conference is considered in all scientific circles as a great starting point for international collaboration in many aspects of science and technology. Of course, the Conference had its moments of relaxation, in spite of the fact that scientists who collected there by the hundreds were all very serious about their work. Nearly all the nuclear scientists of repute were present and only Einstein was conspicuous by his absence. Niels Bohr, the great scientist and humanist, attended and was asked to give an evening lecture. He was not a good speaker, perhaps owing to a speech defect, and though he was speaking in English, the organizers had arranged for another

speaker to read out his speech, also in English, in the form of a simultaneous 'translation' on another channel. So we heard Bohr speaking to us as a film actor would.

The Conference was repeated in Geneva three years later, but it was perhaps not as interesting as the previous one, as the need for such a meeting had changed. Countries interested in various specializations preferred smaller meetings to the crowded atmosphere at Geneva. The Conference had by now tended to become a place of show of strength as to who was bigger and better. The Americans had brought a whole reactor (swimming pool type) as one of their exhibits.

However, the two Conferences had proved that there were immense possibilities in the atom and if they were to be used effectively in various parts of the world it would require the co-operation of governments and scientists in many different fields of knowledge. This had been one of the motivations for the creation of the IAEA — to bring governments together, give guidance on technological matters in different fields and collate information, be it on energy for electricity production, or the use of isotopes in medicine, agriculture or the basic and life sciences.

The IAEA formally came into existence in 1957. India is a founder member and has been on the Board of Governors as a designated member ever since.

Prior to this all co-operative effort had been on a bilateral basis. I especially recall the first ever conference on heavy water reactors in Oslo in 1953, where many aspects of reactor construction and the use of neutrons were made known. Some of the information given at Oslo was still a secret in other countries and this led to a declassification policy in several countries, more for the priority of discovery than anything else. While the USA and the United Kingdom kept aloof, France signed an agreement with India as early as 1951 and our joint work on beryllium oxide and later on fast reactors turned out to be of great importance.

An Indian group visited Canada after a conference on nuclear power at Ann Arbor, USA, in 1954. For reasons of secrecy the USA reported mostly on very advanced systems which were not very useful to us. In Canada the secrecy surrounding the NRX reactor (heavy water research reactor) was unbelievable. They would hardly talk to us about anything connected with it, much as Professor William Bennett Lewis would have liked. He was very understanding towards India and was a special friend of Bhabha. Canada at that time had not recovered from the atomic secrets leaks of the mid-1940s. Yet, by the following year, the Canadians were offering to build an NRX type reactor in India to be

followed by heavy water power reactors. At about the same time the USA was negotiating to set up a power reactor of the light water enriched uranium type at Tarapur. The United Kingdom was good enough to loan India enriched uranium as processed fuel to build a swimming pool reactor. The condition we insisted on was that every part other than the fuel was to be made in India. It was to be a demonstration of the rise of a once colonized country. All these projects bore fruit within the decade and were carried out on a purely bilateral basis. On its own, India developed the nuclear and reprocessing plants so that the entire fuel cycle was under control, again on the basis of self-reliance.

It was at this stage that the work of the IAEA began to become organized and give a structure to international collaboration. Very correctly during the early stages, assistance in training, especially for developing countries, was given importance. A conference was held in 1962 in Bangkok on the utilization of reactors for peaceful purposes. For those of us who had been trained to look to the West for inspiration, this visit was an eye-opener. While the participants were from different countries in the region, I was surprised to notice a common cultural heritage. At this historic conference it became clear to me that now that small reactors were being set up in various countries of South and South East Asia, the maximum benefits could be obtained by joint collaboration among these countries. Many of the countries joined these projects under the co-ordination of the IAEA and notable successes have been achieved in the field of agriculture in producing new mutants, studying materials using neutrons, and above all in the use of isotopes in very many ways.

Over the years, a vast amount of work was done by the IAEA in collecting data concerning the use of isotopes, holding a large number of seminars to establish the authenticity of the data, and producing safety manuals. The early years of the IAEA were guided by a Scientific Advisory Committee (SAC) which had some of the most distinguished scientists of the world and it is this guidance that made the quality of work and publications of the Agency of the highest order. Besides Bhabha, I recall the names of I.I. Rabi, John Cockcroft, W. Lewis, Bertrand Goldschmidt and others. The IAEA's own laboratory at Seibersdorf, working in collaboration with many well known laboratories around the world, has contributed to the required data with all the necessary quality and accuracy. This would not have been possible without the help of the SAC.

For reasons not clear to me the Agency decided to discontinue SAC, and I have the feeling that several countries did not like the way SAC took independent decisions which were outside the policy of the more influential countries concerned. I was, therefore, the last Chairman of SAC.

While the introduction of atomic energy was considered as an inevitable part of development, two things have happened which have reduced the momentum of the Agency's activities. The first is the two accidents that happened in the two most advanced countries in the field, namely the Three Mile Island accident in the USA and the Chernobyl accident in the former Soviet Union. Especially in the latter case, the disaster was so serious that the psychological damage to unsuspecting people has been deep. The press and motivated groups have done much harm to what I believe is the only source of power of the future. The second relates to the close relation of nuclear power to weapons of mass destruction. The pre-Cold-War situation as we know it now does indeed give rise to fears of the worst kind.

I recall the time when the political aspect of the work of the Agency centred on the question of diversion of fuel designated for the purposes of power production to weapons development. Safeguards on fuel had become the major topic for discussion. Dr. Bhabha, who was killed in 1966 in an air accident on his way to a SAC meeting in Vienna, had taken a strong view on the nature of the safeguards that were being proposed, one type for certain countries which recognized no inspection, another type for European countries, only through EURATOM, and the rest coming under IAEA safeguards. When one asked why this differentiation, one would invariably get the reply that the first were exempt from safeguards as they were the victors of the Second World War and in the second case, Europeans could take care of their own security as they were comparatively more advanced in this technology. This was the major question of the time and it was made clear that those who did not agree with this system would come under 'embargoes' on any nuclear hardware. The definition of 'hardware' became more and more severe as time went on, to include dual use technologies. These restrictions came under various names such as the London Club, Zangger list, etc. I often accompanied Bhabha to help him propagate the Indian viewpoint. On occasions, some of the countries would agree with Bhabha at a high level and say they would make a similar case at the appropriate time, but when the time came and I would prompt their aides about it, they would turn round and say they had no such papers!

On another occasion, an ambassador from a country in the developing world asked me if I could help him as he understood nothing about safeguards. I explained as much as I could and told him which way we were going to vote. He agreed and said he was going to do likewise. The voting was to take place later in the evening. I think he had other work and could not be found anywhere. In the meantime there were intense negotiations and all the countries

came to an agreed consensus. I was frantically looking for my friend to explain to him what had happened and there was no need for him to vote. He turned up just when the President was asking the delegates to put up their hands for and against. As it turned out, his was the only vote against the proposal. He was, however, nice about it and asked me to suggest some books which would help him understand all this. The incident, though not important, indicates on how much understanding international laws are sometimes made.

It is to be expected that an international atomic energy organization with a worldwide reputation has to change with the times and must alter its programmes and concentrate on what is most useful to its Member States. After 40 years of existence, one can expect that the problems of earlier years have been more or less solved or, as often happens in science, have become obsolete. I recall a conference held in Vienna when I was sitting next to an empty seat. Suddenly, Molotov, who had been nominated as the new USSR representative to the IAEA, came in and sat next to me. For us who remember the events of the Second World War, it was an experience to sit next to such a legendary person, though I am certain he did not understand a word of what the conference was all about.

Atomic energy has long passed its early period and has now become not merely the work of a few laboratories but connected with large industrial operations involving the safety of the plants and the potential environmental hazards. Both these include controversial matters involving financial investments and political issues. This naturally has led to a change in the accent of the programmes of work of the Agency.

We can say that the first period of the working philosophy of the IAEA which I have described is more or less routine, involving prototype plants, new materials of construction, the training of personnel, the exchange of technological information, etc. The use of isotopes in industry, agriculture and medicine, the basic sciences and the preparation of information through conferences and allied meetings for this purpose will continue but cannot be the main programme of the Agency. International collaboration among countries in the realm of this kind of activity must be revitalized as cultural backgrounds and propinquity make research cheaper. However, the sale and safety of nuclear plants is perhaps more important and should take a more prominent place than before. The second period should include the standardization of the design of nuclear components and in this private utilities should be more involved. The demand for fuel and its security will always be a problem and the use of a material such as thorium should be thoroughly examined to

simplify the many problems concerning the present process of extraction of the fissile material. It is not that the spread of the use of nuclear energy has become so worldwide that a uranium shortage will suddenly appear, but if its supply conditions become so dependent on power politics, this is equivalent to a shortage. One may recall that some countries are dependent on atomic power for electricity to an extent of more than 70%. The comparison is not out of place.

There is the important question of the use of the available fissile fuel in stockpiled weapons. If it is not burnt away in reactors, it will become a political problem and will always act as a temptation to terrorists. In such a situation, concerned governments will become more involved in controlling fuel movements, questioning sovereignty and (alas!) thinking of punitive measures, even as the diversion of fuel continues to take place.

In the earlier days SAC played an important role in the work of the Agency and decisions could be taken on the basis of scientific rationality. In recent years, politics and economic theories are beginning to play a major role. One notices that more economists and administrators are becoming members of the Board of the IAEA and a large number of diplomats have replaced the scientists as delegates to the annual session of the General Conference. I was President on one occasion of the General Conference, which happened to be the last one held at the Hofburg. At the end of the Conference, the organizers had arranged for very large pieces of cake, the size of which I had never seen. It was then I remembered that Marie Antoinette had been brought up in this palace and it is not surprising that she is supposed to have said "if there is no bread, why don't they eat cake." At this Conference much time was spent on discussions of apartheid in South Africa and the validity of the membership of Israel. Earlier, it was on the membership of mainland China, which India strongly supported. These were the issues with a strong emotional basis and one is happy that they have been solved.

I also recall a seminar organized on the peaceful uses of nuclear explosions (PNEs). Prior to 1974 there was much publicity given to the many possibilities of PNEs for carrying out difficult operations which normally would have taken a very long time or would have been totally impossible. There were many demonstrations by the advanced countries to show all these possibilities. Once a team of scientists from all over the world were taken to a PNE site in the USA to witness such a demonstration. The experiment was called 'Project Rulisson'. However, after the Indian test in 1974, opinions reversed about the benefits of PNEs and they were considered useless and far too expensive. At the IAEA seminar on this subject, the latter view was taken

up and projected mostly by economists and diplomats as opposed to scientists, who informally had very different ideas. At the General Conference held immediately after the Indian PNE, some countries to the west of us made a big fuss about the activity our test had released, even though it was well under ground and I was myself on the top of the crater looking for radioactivity within an hour after the explosion. We had chosen the month of May for the test as the monsoon winds would blow eastwards — but not a single scientist in that great assembly rose to point out that even if some activity had been released it could never go west in detectable quantities.

Of all the UN organizations, the IAEA has been the most effective in the implementation of its programmes. I especially recall a programme to develop a small heavy water reactor on the basis of international co-operation. It was called the NORA project and was located in Oslo. It had an international committee to supervise its programmes; I was its chairman and the other members were Norwegian scientists and members of the IAEA. Some years after the reactor had completed its programme, it was closed down. This was an international programme in a developed country.

I now make a special reference to the IAEA's technical assistance programme for developing countries. In this programme, a group of countries of South East Asia got together on the utilization of the many research reactors that had been set up in the region. This programme helped not only the training of personnel within the cultural atmosphere in which they lived, but also in fields of direct importance to them. I believe this kind of assistance has been of great value in giving them self-confidence. Some countries like India, which have received assistance in the past, have voluntarily stopped receiving this assistance in the hope that it will be used for other countries who have a greater need.

A word about the future. Surely we entertain the hope that the time is not far off when nuclear weapons will disappear from the world, but the problems of verification and terrorism will be with us for a long time. How the work of the Agency will be divided between the promotion of the peaceful use of atomic energy and the policing of the world is a major question for the future. In a sense the IAEA has reached its most difficult period, where politics become an essential part of its activities. Power politics and regions of influence, which are common words from a previous era, still flourish in present-day thinking. Work of useful and practical importance leading to economic progress can reduce the tensions and I can only wish that this positive side of the work of the IAEA will come into greater force early in the next century.



MAJOR MILESTONES  
IN THE DEVELOPMENT  
OF THE IAEA

Munir Ahmad Khan

*Munir Ahmad KHAN*: A nuclear engineer, was Chairman of the Pakistan Atomic Energy Commission (PAEC) from 1972 to 1991. His associations with the Agency go back to 1958 when he joined the Division of Nuclear Power and Reactors, serving as a senior officer until 1972. He participated in the development of several projects and programmes of the Agency in its formative years, particularly those relating to power and research reactors and the nuclear fuel cycle. He was a Scientific Secretary of the United Nations Conferences on the Peaceful Uses of Atomic Energy in 1964 and 1971. Later, as Chairman of the PAEC, he continued his close affiliations with



the Agency as a member of its Board of Governor (for 12 years) and as the leader of his country's delegations at 19 General Conferences. He was Chairman of the Board of Governors in 1986–1987. He has thus observed the development of the IAEA, both as a senior staff member and later as a representative of his country in the policy making organs, and contributed actively to and witnessed the making of decisions which helped shape the evolution of the Agency. He entered the nuclear field through the "Atoms for Peace" programme in 1956 and worked at the Argonne National Laboratory before joining the Agency. As Chairman of the PAEC, he guided the development of his country's nuclear programme for nearly two decades, involving the entire range of activities in nuclear power, fuel cycle, research and applications in agriculture and medicine. He is a member of various international groups and organizations dealing with nuclear policy and development at the regional and global levels. He is a Fellow of the American Nuclear Society, the International Nuclear Academy and the Pakistan Nuclear Society. He has served as Minister of State in the Pakistan Government and was awarded the 'Hilal-i-Imtiaz' for his services. His current activities relate to nuclear disarmament, non-proliferation, nuclear power and the application of science and technology for economic development.

The IAEA is a unique organization within the UN system dealing with the promotion as well as regulation of a new technology to ensure that its increasing use remains both safe and peaceful. It has succeeded to an admirable extent in the performance of such dual functions owing to the co-operation and spirit of consensus demonstrated by the Member States and its pragmatic evolution despite many difficulties over the past four decades. In this brief article, an attempt has been made to identify some of the major milestones and turning points in the growth of the IAEA.

The Agency came into being to overcome the fear of atomic energy by offering hope about its unlimited potential for socioeconomic development. The 1955 and 1958 Geneva Conferences on the Peaceful Uses of Atomic Energy had aroused great expectations about cheap and unlimited nuclear energy for electric power production, ship propulsion, rapid construction of dams and excavation of canals by peaceful nuclear explosions and the use of isotopes and radiation for revolutionizing agriculture, medicine and industry. The staff was charged with a sense of mission. The first Director General of the Agency, Sterling Cole, encouraged them to translate these hopes into reality. He earnestly believed that the Agency could do great things and help transform the world through exploitation of the unlimited potential which nuclear energy had to offer. His enthusiasm and optimism spread down the line. He asked his staff to devote attention to identifying what could be done, what the Member States needed and how and where the Agency could help. For this purpose, the Agency sent preliminary assistance missions to a large number of member countries to identify their needs. In retrospect, this helped lay the foundation for the Agency's future work in nuclear power and research reactors, radiation protection and applications of isotopes in agriculture, medicine and industry. It is interesting to note that the first resolution adopted by the General Conference was to make specific appropriations for the provision of technical assistance to developing Member States.

Under the "Atoms for Peace" programme, a large number of research reactors were built all over the world and the Agency issued several volumes of a publication entitled *Directory of Research Reactors*. Most of the reactors were built without any clear research plans. So the Agency launched a programme for research reactor utilization which brought together experts from the advanced nuclear States and the recipient countries. It was the first time that nuclear scientists in Asia and the other developing regions interacted with each other. Out of such meetings in 1963 and 1964 was born the idea of multilateral co-operation in Asia (subsequently extended to Africa and Latin

America) which later led to the formation of the Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (RCA), which is now celebrating its 25th anniversary.

Commercial nuclear power was not yet available in 1960, but the USA and other countries were building several demonstration plants based on all major concepts including boiling water, pressurized water and heavy water, gas, sodium and organic cooled and even nuclear superheat power reactors. The Agency was asked to collect and disseminate information on these and other demonstration plants. It organized a major conference on small and medium power reactors (SMPRs) in 1960 which evoked considerable interest in several developing countries. However, it soon became apparent that many of the early concepts had serious difficulties and economies of scale weighed heavily in favour of larger units (300 MW and above) instead of smaller ones of 100 MW and below. For technical, economic and financial reasons this ruled out the immediate use of nuclear power in countries with smaller grids. Three decades later the potential importance of SMPRs is still there and new designs have been developed which could make them attractive in many energy deficit, rapidly growing economies. However, the definition of SMPR has been changed to cover a range of 300 to 600 MW and financing still remains a major problem.

Applications of nuclear energy in agriculture, industry and medicine began to flourish more quickly as they do not require large infrastructures or investment. Actually, insufficient recognition has been given to the Agency's contribution to the promotion of nuclear techniques for developing better varieties of crops, for food preservation, quality control, water resources development and above all medical applications, where they have had a broad impact on improving the economic well-being and the quality of life in many countries.

The Agency started work in radiation protection right at the beginning. However, an incident underlining the importance of reactor safety took place in 1960 at a critical assembly at Vinča in Yugoslavia. This prompted the Agency to develop a comprehensive programme for the safe operation of critical assemblies and research reactors. Besides getting involved in the analysis of the Vinča accident, the Agency was asked to evaluate the safety of research reactors in Switzerland and the Netherlands. At that time there were no power reactors in operation which could be submitted for safety assessment by the IAEA but this was the starting point for a progressively increasing role by the Agency in promoting nuclear safety throughout the world.

Technical assistance and the exchange of information constituted the bulk of the Agency's work and proved to be its mainstay in its early years, which were the years of the Cold War and of confrontation. Although the Agency's Statute had assigned it the important function of safeguards, in the early years there was no consensus on how to carry it out. In fact, the Soviet Union vehemently opposed the safeguards activities of the IAEA and refused to pay its assessed contribution for such activities. It opposed the appointment of the first list of inspectors presented to the Board of Governors in 1960, which had to be approved by a majority vote. The only function which had consensus was promotion of nuclear energy. The major task of the Agency at that time was in the area of technical assistance, through the provision of training, fellowships and the supply of equipment, materials and experts. The Agency was looking for more to do, and in a way to justify its existence.

It was at this juncture that a young professor from Imperial College, London, Abdus Salam, while addressing the General Conference in 1960, proposed the establishment of an international centre for theoretical physics. According to him it would require only pencil and paper and very little money, but could help break the isolation of physicists in developing countries and bring them into the mainstream of science. The developing countries supported the idea, but the advanced countries opposed it. In fact, even the IAEA's Scientific Advisory Committee (SAC) unanimously opposed its establishment. Nevertheless, Professor Salam won the support of many leading physicists in the world. Dr. Sigvard Eklund, the Director General of the Agency and a physicist himself, gave the idea his strong backing and the International Centre for Theoretical Physics (ICTP) was established in 1965. It has now completed over 30 years of highly successful operation with the generous and continuing support of the Italian Government. It has trained thousands of young scientists from the developing countries, provided a forum for interaction between scientists from the East and the West, the North and the South and produced outstanding research papers not only in theoretical physics but also in many fields of applied science. The ICTP is an example of how the Agency was able to win respect in the world of science, facilitate interaction between Soviet and Western scientists in the Cold War years and earn the gratitude of developing countries, all with only modest annual contributions from its own sources. Although the Agency has now transferred the main responsibilities for the ICTP to UNESCO, it still remains closely associated with it.

The appointment of Sigvard Eklund as Director General in 1961 over the strong objections of the USSR led to an unprecedented walk-out by the Soviet

delegation from the General Conference. But the Soviet Union soon realized that it was in its interests to continue to co-operate with the Agency. Eklund succeeded in winning over Moscow to support the difficult task of building up the Agency at the height of the Cold War. Owing to the change of attitude of the USSR about safeguards and Eklund's vision in emphasizing the technical rather than the political role of the Agency, the organization was transformed in the 1960s. It expanded rapidly but in a controlled manner, enhancing its technical competence and capability to become a respected member of the UN family, capable of responding to the new demands resulting from the development and implementation of NPT safeguards. Eklund was able to engender greater rapport between the Board and the Secretariat, win support from the two superpowers and gain the confidence of Third World countries by strengthening technical assistance activities. In the latter case he was ably assisted and advised by U.L. Goswami, who headed most of the technical assistance operations for over 16 years.

A major change occurred in 1963, when the USA and the USSR negotiated the Limited Test Ban Treaty (LTBT). The Soviet Union, which had earlier opposed safeguards, suddenly reversed its stand and became its champion. This enabled the Agency to develop a comprehensive safeguards system, as reflected in document INFCIRC/66/Rev. 2. This underlines the importance of developing and maintaining a consensus on various major functions and programmes of the Agency whether they are promotional or regulatory in nature.

In the mid-1960s, major developments took place in the commercial applications of nuclear power. Several utilities in the USA started placing orders for nuclear power plants. The most noteworthy order was for the Oyster Creek plant at a fixed generation price of \$126 per kilowatt to be fully competitive with an oil fired station costing 35 cents per million BTUs or \$14 per ton of oil. This led to a complete change of thinking about the economics of nuclear power and persuaded a large number of power companies in the USA and Western Europe (as well as in India, Pakistan and Argentina) to order nuclear plants. The impact of this development on the Agency's activities was extensive. The Nuclear Power and Reactors Division was expanded to cover the economic aspects of nuclear power and the nuclear fuel cycle, as well as the siting and safety of nuclear plants.

The 1963 ratification of the LTBT, and the later atmospheric nuclear test by China in 1964, brought the USSR and the USA closer together on the question of preventing the further spread of nuclear weapons and helped the conclusion of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT),

which was approved in 1967. Under the NPT, the Agency was asked to apply safeguards on the nuclear programmes of the non-nuclear-weapon States signatories to the Treaty. This necessitated the rapid expansion of the Agency's safeguards activities and the related budget and had a profound effect on the structure and operation of the Agency. Foremost was the question of providing adequate resources for safeguards in the Agency's budget, which meant an overall increase in the assessed contributions. This was resisted by many Member States. Secondly, there was the question of relative allocations between safeguards and technical assistance or co-operation, which had until that time constituted the backbone of the Agency's programme. Opinions differed sharply. Safeguards can be funded through the regular budget to which all Member States contribute in accordance with an agreed formula of assessment. But technical assistance is funded largely through voluntary contributions. The advanced countries refused to increase funds for technical assistance in direct proportion to the increase in the safeguards budget. The developing countries demanded parity between the two and further emphasized that technical assistance should also be funded through the regular budget or equally predictable resources. This became a major issue. A formula had to be devised that might satisfy both the advanced countries or the donor States which strongly supported safeguards and regarded it as the primary function of the Agency and the developing countries which deemed technical assistance to be equally important if not more important.

Another major difference between the advanced countries and the developing countries arose in 1971, when the composition of the Board was changed, and a number of industrialized countries were admitted as permanent or designated members of the Board, thereby diluting the representation of the developing countries from Asia, Africa and Latin America. Thus, the combined scheme to relegate the technical assistance functions of the Agency to seemingly secondary place and dilute the representation of the developing countries in the Board led to greater cohesion amongst the so-called 'have-nots' and the Third World countries. This expanded the influence of the Group of 77 (G-77) in the IAEA in the mid-1970s. The G-77 has since then played an important role in the formulation of the policies of the IAEA both in the Board and the General Conference: the election of the Director General, the structure of the Secretariat, the composition of the staff, and the allocation of resources for various programmes and activities.

With the increase in workload in safeguards resulting from the NPT, the appropriations for safeguards had to be increased. According to the Statute

this had to be funded from the regular budget. The advanced countries were inclined to increase the budget to accommodate safeguards without a corresponding increase in resources for technical assistance. This was totally unacceptable to the G-77. Although the advanced countries are by far the major contributors to the Agency's budget, they cannot always force their views upon the G-77. While the Board, where the advanced countries wield greater influence, can recommend a budget, the final approval, according to the Statute, lies with the General Conference, where the G-77 continues to have a majority. Therefore, a solution had to be found.

In this context, the delegate from the Philippines, Ambassador Domingo Siazon, who was also member of the Board at that time, played a key role along with other members of the G-77. A formula was devised whereby the safeguards allocations could be increased substantially but the contributions of the developing countries to safeguards were frozen at the then existing level. The advanced countries were eager to see the safeguards programme through by consensus and therefore agreed to this compromise, which still stands today. It seems that any attempt to change this understanding could revive the old debate and adversely affect the spirit of consensus which is vital for the success of the Agency. As regards technical assistance, the advanced countries have refused to accept its parity with safeguards or to include its financing in the regular budget of the Agency as desired by the G-77. The matter was partially resolved by the Chairman of the G-77 at that time by proposing, for budgetary purposes, an indicative planning figure for voluntary contributions towards technical co-operation to be agreed by various Member States (primarily the donor States) as an agreed target. This compromise has worked reasonably well for the last two decades and has enabled the Agency to obtain approval of its budget in the General Conference by consensus.

The appointment of a new Director General in 1981 posed a major challenge. The developing countries insisted that after 25 years in the hands of the advanced countries, the Agency should be headed by a person from the Third World. They also voiced their grievances, which included poor representation of the G-77 on the staff, particularly at senior level, limitation of funds for technical assistance as compared to those for safeguards and overemphasis on regulatory and control functions. During the negotiations, which sometimes went into the early hours of the morning, the advanced countries, as a quid pro quo for electing their nominee, offered to restrict the period of office of the new Director General to two terms, i.e. eight years, and hinted that the next holder could come from the G-77. But the G-77 insisted on their moral

right to the post. However, after marathon balloting going to 36 rounds spread over four months, a stalemate developed between the candidates from the Philippines and Germany. At this point, the candidature of Dr. Hans Blix was put forward. Dr. Blix got the necessary majority and was appointed unanimously by the Board and endorsed by acclamation by the General Conference. He showed great diplomatic and management skills and sensitivity to the grievances of the G-77. He appointed several qualified candidates from the G-77 to senior posts, streamlined technical assistance, abolished the convention of allocating certain senior posts to specific major powers, helped persuade the advanced countries to finance expanded programmes in safeguards and technical assistance and strengthened the safeguards system. This enabled him to win the support of both the G-77 and the advanced countries to maintain the consensus within the Agency.

It may be mentioned here that the appointment of Dr. Mohamed ElBaradei as the new Director General in 1997 is, in a way, a follow-up of what transpired in 1981. The advanced countries did not want to precipitate the confrontational and divisive debate of 1981 and accepted that it was desirable for the G-77 to provide the Director General in 1997.

With respect to the expansion of the Board to give fairer representation to under-represented regions such as Africa, and the Middle East and South Asia (MESA), the task has been much more difficult. In 1976, the countries of these two regions tabled a resolution demanding three additional seats for Africa and two for MESA. This met with strong opposition. Later on, as a result of negotiations between the G-77 and the advanced countries and within the G-77 itself, a modest increase of one seat for Africa and one for MESA was agreed upon. In informal discussions, the US delegation, representing the advanced countries, offered to accept the one-plus-one formula in addition to the concept of the South African seat in the Board going to a developing country of the region. This was also reflected in a General Conference resolution. But, unfortunately, certain members from Africa persisted in demanding three seats for Africa and the compromise fell through. Since then a number of developments have taken place, including the breakup of the Soviet Union, changes in the number of Member States in various regions, and advances in the programmes of various countries, which have complicated agreement on the further expansion of the Board and the criteria for designating members. However, it would be interesting to speculate what would have happened if the one-plus-one formula had been accepted at that time. In any event, the question of still further expansion would have inevitably come up again.

In 1981, Israel attacked and destroyed the Tamuz reactor facility in Iraq, which was under IAEA safeguards, on the pretext that it was being used for developing nuclear weapons. This unilateral action by Israel against a safeguarded facility where the Agency had detected no diversion to military purposes was strongly condemned by most countries. The Director General, Sigvard Eklund, termed it as an attack on the IAEA safeguards system. During the June 1981 meeting of the Board, this question was debated and a resolution had to be drafted to accommodate the different views of the G-77 and the Western group, particularly the USA. The informal discussions went on until late at night and a compromise draft resolution was worked out which condemned Israel but stopped short of demanding its expulsion. The US representative participated in drafting the compromise resolution. However, the next day when this resolution was presented to the Board, the US representative, under instructions from Washington, went back on the informal commitment. This was a matter of great disappointment. Nevertheless, the resolution was adopted. The question of the Israeli attack remained a major issue for several years in the General Conference until it was overtaken by the events of the 1990 Iraq–Kuwait war, which revealed that Iraq, even though a signatory to the NPT, had a large scale clandestine programme for developing weapons of mass destruction, including nuclear weapons, and was building undeclared nuclear facilities without the knowledge and hence outside the control of IAEA safeguards. This came as a shock to the world community and raised questions about the adequacy of IAEA safeguards and the ability of the Agency to detect clandestine nuclear programmes in NPT countries. The perception was further heightened by the discovery of large scale clandestine nuclear weapons activities in the Democratic People’s Republic of Korea which, though a signatory to the NPT, had deliberately delayed the conclusion and signing of the safeguards agreement under document INFCIRC/153 and had built and was operating nuclear-weapons-related production facilities.

These two events led to a strong move for strengthening IAEA safeguards and reinforcing its ability and authority to carry out unannounced inspections based on intelligence and other data made available to it. This underlined the need for a significant expansion of the authority of the IAEA for the implementation of safeguards, an increase in its staffing and technical capabilities and a corresponding increase in technical support and the budget. The fact that this programme (termed as ‘Programme 93 + 2’) was approved by the Board in 1997 reflects how the Agency can respond to changing

circumstances so as to retain the credibility and effectiveness of its safeguards system through consensus. However, the revised safeguards norms apply only to the signatories of the NPT and an attempt to use them for the non-signatories to the NPT, who are governed by INFCIRC/66/Rev. 2, could lead to a number of problems.

Another important issue related to the question of the continued membership of the apartheid regime of South Africa, particularly in view of the nuclear weapons programme being pursued by Pretoria. The African countries, supported by the G-77, launched a strong campaign in the international forums to expel the apartheid regime from various UN bodies. The issue spilled over to the Agency. In September 1979, the credentials of the South African delegation had been rejected by the General Conference and Egypt had replaced South Africa as a designated member on the Board. Nevertheless, the African countries felt that this was not enough and that the apartheid regime of South Africa had to be expelled from membership of the Agency. In 1987, the Governor from Nigeria, after consultation with the G-77, took the calculated risk of presenting a formal resolution to the Board recommending that the General Conference consider expelling South Africa from membership of the IAEA. This move was strongly opposed by the USA, West Germany, France and several other advanced countries which had large investments in South Africa. At the start of the debate it was by no means certain that the resolution would attract the necessary majority. Just before the vote was due to take place the US delegation, to the surprise of many, asked for a recess for consultation. The idea was to consolidate support against the resolution. However, the manoeuvre proved to be fatal, because it provided enough time for the G-77 to come together in support of the resolution. After the recess the resolution was adopted by a significant margin and sent to the General Conference. For several years it remained a subject of intense discussion. The African countries were wise enough not to put the resolution to a vote as they realized that they did not have the required majority. Nevertheless, the resolution served the purpose of putting strong pressure on the Western countries to review their policy towards the apartheid regime of South Africa and later forcing it to join the NPT. This happened when, owing to international pressure, South Africa abandoned its policy of apartheid, accepted black majority rule, dismantled its nuclear weapons programme, joined the NPT and became a strong advocate of nuclear non-proliferation.

One of the major events which precipitated a profound change of attitude and perception about nuclear energy at the global and regional levels

and influenced the Agency's programmes was the underground nuclear explosion by India in May 1974. India exercised its sovereign right to conduct what it called a peaceful underground nuclear explosion. But this sent reverberations throughout the world by raising alarm about the spread of nuclear weapons and the use of nuclear energy for military purposes. Only future historians can assess, in detail, its overall impact, but it served to underline that nuclear capabilities could spread to the Third World. It encouraged the perception that any transfer of 'sensitive' nuclear technology, even under safeguards, could somehow contribute to the development of a nuclear weapons capability.

The Agency took up this matter in its June meeting of the Board immediately after the explosion. It did not pass any resolution but several members of the Board took a serious view of the development and warned about the danger of nuclear proliferation and the possibility of misuse of nuclear supplies, transfer of technology and other assistance unless they were covered by safeguards. The USA and other countries started reviewing all co-operation agreements and began imposing restrictions on the supply of nuclear materials and equipment even to NPT signatories by citing possible proliferation risks. The London Suppliers' Group was formed and its policy decisions communicated to the Agency. The rules and guidelines for providing technical assistance by the Agency, particularly those covering the supply of sensitive technologies and equipment, were revised. The developing countries expressed their reservation towards such revision. India and Argentina opted out of technical assistance. All the Agency's technical programmes and projects were reviewed more stringently by the Safeguards Department before being submitted to the Board. Globally, opposition to nuclear energy and nuclear power increased and the hands of non-proliferation groups and environmentalist were strengthened. Tension grew between the supplier and recipient States (including some advanced countries such as Japan and Germany), who imported uranium for their nuclear power programmes from Canada, Australia and the USA. Thus the nuclear game changed radically and it will never be the same again.

The USA faced protests from its allies as it forced renegotiation of existing contracts, particularly with Western Europe and Japan. In order to overcome these difficulties, the USA proposed the setting up of the International Nuclear Fuel Cycle Evaluation (INFCE) programme to develop a consensus on how co-operation could facilitate global nuclear trade while keeping non-proliferation goals in the forefront. This study lasted until 1980 without

resolving any of the major issues. It conceded that nuclear power was essential for economic development in many countries and each country could choose its own nuclear fuel cycle. It accepted that there were no technical fixes to ensure non-proliferation. It led to the formation of the Committee on Assurances of Supply (CAS) so that contracts and supply agreements could be honoured by both sides within an agreed framework. It was further agreed to launch a study on international plutonium storage (IPS) to reduce the risks of proliferation resulting from the excessive supply of reprocessed plutonium. However, neither CAS nor IPS led to any consensus and they were terminated. The fear of proliferation connected with nuclear plants, questions about the economics and safety of nuclear power and the changes in the political environment have made the conclusions of INFCE less relevant.

Two other major events have had far reaching effects on the Agency's overall programme. These were the Three Mile Island (TMI) accident in 1979 and the even more serious Chernobyl accident in 1986. These have raised serious questions about the safety of nuclear power plants and provided the opponents of nuclear power, particularly the Greens, with strong arguments to precipitate worldwide opposition and set public opinion against nuclear power. For the Agency itself they provided a great challenge, which it has met with credit. The TMI accident led to the rapid expansion of the Agency's safety programme, requests for Agency advisory services for safety assessments and reviews, and the development of standards for the design and operation of nuclear power plants. However, the greater impact came from Chernobyl, which showed that a major accident, including the dreaded explosion of a power reactor, could actually occur even in an advanced country, resulting in death and injury and long term hazards to the population beyond international borders. The Agency's Secretariat responded to the Chernobyl accident in a very credible manner and the Director General, Hans Blix, deserves credit for such a prompt response. Safety now constitutes one of the major activities of the Agency, which has provided most valuable help to the advanced as well as developing countries, particularly in establishing standards and guidelines for the siting, design, construction and operation of nuclear power plants throughout the world. It is hoped that the strengthening of the Agency's programmes and activities in this field will contribute appreciably to an upsurge of nuclear power in the future.

Closely connected with safety are the challenges of the decommissioning of nuclear power plants (including particularly the RMBK type of power reactors). This poses formidable technical and economic challenges. The

Agency has, in response to the Vinča, TMI and Chernobyl accidents, developed comprehensive plans for collecting information about nuclear incidents, grading them according to the level of hazard, and has developed the ability to respond to such emergencies in the shortest possible time. There is also a growing realization that proper management of radioactive waste has to be tackled to pave the way for more widespread use of nuclear power.

The Agency has not played a direct part in nuclear disarmament. However, as a result of the Comprehensive Test Ban Treaty (CTBT), it can offer competent services for technical verification because of its long term experience in the implementation of international safeguards.

The new Director General, Mohamed ElBaradei, inherits a technically strong, professionally capable, financially viable and administratively well managed organization which is held in great regard in the UN family and enjoys the support of the advanced and developing as well as nuclear and non-nuclear States. However, the Agency cannot live on its past laurels. It must foresee and prepare itself for the challenges which lie ahead, the foremost of which is to maintain and sustain the consensus which prevails in the Board by carefully balancing the regulatory and promotional functions of the Agency. Currently there is strong support for the further strengthening of safeguards, which is both necessary and in keeping with the statutory and assigned responsibilities of the Agency. But to gain global political backing the Agency needs the support of the entire membership and, therefore, it must also carry the G-77 with it. The strengthened safeguards system as approved by the Board in 1997 has to be applied and implemented in the field. If it continues to enjoy the full support of the Member States, there will be greater confidence in the Agency's ability to develop and administer a viable verification system regarding the legal and other undertakings given by Member States. If there is unreserved co-operation from its Members States, then there can be a reduction in the cost of safeguards implementation without a reduction in effectiveness. There will have to be greater use of remote sensing and monitoring, and automatic checking of the flow of materials by more sophisticated techniques and systems. Nevertheless, as the coverage expands to more facilities and more countries, the cost of safeguards will increase. This will be incompatible with the 'zero-growth' constraints. Therefore, there will be a constant struggle for cost reduction on the one hand and the demand for more resources on the other.

Emphasis on safety will increase, partly because of the greater sensitivity of the public, the need for cleaning up huge Cold War nuclear waste dumps

and the decommissioning of ageing nuclear plants and facilities, in addition to strengthening the safety of existing plants.

Technical co-operation will remain one of the two main pillars of the Agency. Any attempt to downgrade it would revive the old debates and controversies and undermine the *quid pro quo* which provides for the consensus which underpins the success of the Agency. While nuclear power is not growing as rapidly in the developing countries as expected at one time, these countries can benefit enormously from expanded multinational and inter-regional programmes for the application of nuclear techniques in agriculture, medicine, industry and environmental protection and yield rich dividends with relatively small investments.

The Agency cannot live on safeguards alone. In the long run it can survive only if it provides concrete and meaningful services for accelerating the socioeconomic development of its Member States. Besides the vast potential offered by peaceful applications in the non-power fields, the Agency has to be prepared for a revival of nuclear power as a source of clean and economic electric power for meeting the expanding needs of the world and particularly of energy hungry Asia, which contains nearly two thirds of the world's population.

One must not forget that the existing safeguards provide a technical and administrative system for verification and control but do not eliminate the political incentives for proliferation in the future. The present system will work as long as nuclear technology and its fuel cycle, as conceived today, remains. But human ingenuity cannot be prevented from discovering dangerously simpler and much harder to detect fuel cycles. New technological breakthroughs could pose new threats to the non-proliferation regime. Hence there is a need for building a stronger political consensus on the necessity of non-proliferation and nuclear disarmament. The Agency has the technical competence and expertise to play a role in verification under the CTBT regime. However, it will be up to the Member States, particularly the nuclear weapon States, to agree to the extent and nature of the Agency's participation in this area.

All in all, the Agency can look forward to playing a vital role in both promoting and safeguarding the use of nuclear energy in the 21st century for greater peace and prosperity throughout the world.

*Also available:*

*History of the International Atomic Energy Agency:*

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David Fischer took part in the negotiations on the Statute of the IAEA in Washington in the mid-1950s and served on the Preparatory Commission for the Agency.

From 1957 to 1976 he was the Agency's Director for External Relations and subsequently Assistant Director General. In 1981 and 1982 he acted as consultant to the Director General and since then has frequently provided consultant services to the IAEA. He is the author of several books on nuclear safeguards and non-proliferation issues.

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