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ACCESS FOR NON-NUCLEAR-WEAPON STATES, WHO HAVE RENOUNCED THE PRODUCTION, ACQUISITION AND USE OF NUCLEAR WEAPONS, TO TECHNOLOGY FOR PEACEFUL USES OF NUCLEAR ENERGY

by

Achille Albonetti*

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* This paper by Dr. Achille Albonetti, Director of International Affairs, National Committee for Nuclear Energy, Rome, has been prepared at the request of the Secretary-General. The views and opinions expressed therein are those of the author and do not imply the expression of any opinion on the part of the Secretary-General.

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I. INTRODUCTION

1. When the President of the United States, Harry S. Truman, and the British Prime Minister, Clement Attlee, told Joseph Stalin, on 24 July 1945 at the Potsdam Conference, that they possessed a new weapon of terrible destructive power -- the atom bomb - there were few who knew the enormous potential locked up in nuclear energy, and fewer still who really appreciated the possibilities flowing from its utilisation.

2. The first example of any significance of agreement to collaborate in the atomic field was perhaps that worked out after several attempts, by Winston Churchill at Quebec in August 1943 between the United States of America, Canada and Great Britain. This gave the United Kingdom Government a full share in military atomic research, including a right of veto on the use of future weapons. As to peaceful uses, the British Prime Minister left it to the President of the United States to decide, after the war, what share of atomic knowledge that could be put to industrial use should fall to England.

3. The Quebec Agreement was supplemented by an important convention relating to the supply of nuclear raw materials. This provided for the setting up in Quebec of an institution - the Combined Development Agency - whose task it was to buy up all available uranium and to allocate it among the three signatories to the Agreement.

4. The first American law dealing with atomic energy in peace time, the MacMahon Act, passed in July 1946, marked the end of this collaboration and ushered in a period of strict American monopoly. The Act made subject to the approval of Congress any collaboration into which the United States Atomic Energy Commission (USAEC) might wish to enter with other countries in the future.

5. The news, announced by President Truman on 23 September 1949, that an atomic bomb had been exploded in Soviet Union territory brought the American monopoly to an abrupt end, and at the same time dealt the first blow against the policy of strict secrecy instituted by the United States Government -- a policy some aspects of which were impeding the efforts being made to develop peaceful uses of nuclear energy.

6. The explosion of the first Soviet Union thermo-nuclear bomb in November 1952 also had a remarkable effect on international atomic policy. It provided the authors of American policy and public opinion alike with further proof of the practical

futility of a policy of rigid security. A period followed during which the United States showed its readiness to abandon its atomic isolation and to apply itself with increased vigour to international collaboration and to the development of peaceful uses.

7. It was therefore not a matter of chance that, only a few months after the Soviet thermo-nuclear explosion, President Eisenhower proposed at United Nations Headquarters on 8 December 1953 that an international agency for nuclear energy be created. Again, a few months later still the MacMahon Act was amended to allow the United States to collaborate with foreign countries in the field of non-military uses of atomic energy.

8. Pursuing this new course, the United States Government announced in November 1954 that, pending the establishment of the proposed agency, 200 kg of enriched uranium was being made available for countries wishing to conclude bilateral co-operation agreements for building experimental reactors. This announcement was destined to lead to the conclusion of some tens of such agreements, covering mainly the construction of small experimental and research reactors, the basic tools for the development of atomic energy all over the world.

9. For its part, on 4 December 1954 the General Assembly of the United Nations adopted a resolution expressing the hope that the negotiations then in progress in the atomic field would lead as quickly as possible to the establishment of an international atomic energy agency. By the same resolution, the Assembly also decided that a large international conference on the peaceful uses of atomic energy should be held. This conference took place in Geneva from 8 to 20 August 1955.

10. These developments helped to create a new climate and encouraged other, more fruitful endeavours. There can be no doubt that it was this fresh atmosphere that made it possible for President Eisenhower to make his famous offer of uranium 235. In the early months of 1956, the United States President announced that the American Government was making available, on a sale or loan basis, 40,000 kg of uranium 235 as fuel for research reactors, either in the United States itself or abroad. For the first time in the history of international atomic collaboration, substantial quantities of uranium 235 were placed at the disposal of foreign countries. The quantity involved was divided equally between the national and the international markets.

11. The important steps taken by President Eisenhower enabled development programmes for the peaceful utilisation of atomic energy to be put in hand on a vast scale. The American offer constituted a guarantee of supplies of nuclear fuel without which the development of the peaceful uses of nuclear energy generally would have been delayed. Further allocations of uranium 235 and of plutonium were made subsequently.

12. It is in this general setting that the various projects for European collaboration in the peaceful uses of nuclear energy must be placed. Among them must be mentioned the European Atomic Energy Community (EURATOM), the treaty setting up which was signed on 25 March 1957; and the European Nuclear Energy Agency, which came into being on 1 February 1958 within the framework of OEEC.

13. Simultaneously, in almost all the industrialised countries of the world, State institutions for developing the peaceful uses of atomic energy were set up. During the last decade, these bodies have benefited by increasing financial means, and have been trying to close the technological gap between their own countries and those which are most advanced in the nuclear sector, in the first place the United States of America.

II. THE MAIN BRANCHES OF NUCLEAR TECHNOLOGY

The five branches of nuclear technology

14. Though the scientific discoveries which have resulted in an increased knowledge of the structure of matter - which underlie the liberation of energy from it - are recent, the efforts to harness nuclear energy for peaceful purposes are more recent still.

15. To all intents and purposes, the history of the peaceful applications of nuclear energy began less than fifteen years ago. Previously, only the nuclear-weapon countries, in particular the United States of America, the USSR, the United Kingdom and France, had been engaged in research, for the most part with government funds and in conditions of the utmost secrecy. Such research could bear not only on military, but also on peaceful uses. It is indeed important to stress the fact that practically all nuclear technology is ambivalent, lending itself indiscriminately to peaceful and/or to military ends.

16. President Eisenhower's declaration of December 1953 and the amendment of the MacMahon Act eight months later laid the foundations of international collaboration in the nuclear field and led to a substantial intensification of efforts to harness nuclear energy for peaceful purposes. The First international Conference on the Peaceful Uses of Atomic Energy, held in Geneva in the summer of 1955, emphasized the eagerness of all countries, and their commitment, to turn to advantage the potentialities of nuclear energy and the technology peculiar to it.

17. It may be as well at this point to recall that the main branches of nuclear technology in the peaceful uses sector fall into five groups:

(a) the mining and concentration of nuclear raw materials (especially natural uranium);

(b) the production of onriched uranium;

(c) the fabrication of nuclear fuel elements;

(d) the design, construction and operation of nuclear reactors; and

(e) the retreatment or decontamination of irradiated nuclear fuels (recovery of enriched uranium and extraction of plutonium).

18. A State which commands all the nuclear techniques covered by the above five groups -- without taking into consideration either the solution of a number of scientific problems or international undertakings - can consider itself in fine fettle both for the largest peaceful applications of nuclear energy, especially the production of electric power, and for its military uses.

19. The five main technological groups are in fact just as essential to the production of electric power as to that of nuclear devices. The essential ingredient of a nuclear device is plutonium, a by-product of the reaction that takes place in a nuclear reactor, or enriched uranium produced by the isotopic separation of natural uranium.

<u>The mining and concentration of nuclear raw materials</u> (natural uranium)

20. The technical methods used for mining and concentrating natural uranium, the principal raw material currently used in the peaceful applications of nuclear energy, are relatively simple and not very costly. As a general rule, those countries which have deposits of uranium treat the ore on the spot, in order, among other reasons, to escape the high cost of shipping the ore in the crude state.

21. Twenty years ago, only the United States of America, Canada, the (then Belgian) Congo and the USSR were mining and concentrating natural uranium ores. Today, some twenty countries at least are working their own deposits of uraniferous minerals, having mastered the methods used for concentrating natural uranium. Vast prospecting programmes for uranium are being carried out in various parts of the world, mainly by the United States, France, the Federal Republic of Germany, Japan, Italy and other countries.

The production of enriched uranium

22. The methods used for producing enriched uranium are, even today, among the most secret in the world. In principle, there are many ways of enriching uranium. In practice, however, the only process at present being used on a vast scale is that known as gaseous diffusion. The uranium 235 is extracted from - or, to be more accurate, separated from - the uranium 238 occurring in natural uranium by passing them both repeatedly, in the gaseous state, through layers of special material. It is noteworthy that the only countries producing enriched uranium are the nuclear-weapon States, i.e.: the United States of America, the USSR, Great Britain, France and the People's Republic of China.

23. As stated above, enriched uranium is, according to its degree of enrichment, the basic raw material not only for the nuclear production of electric power (a very large majority of reactors now burn this type of fuel), but also for the manufacture of nuclear devices of the atomic ("A") and thermo-nuclear ("H") types.

24. Not only are the technical processes used for producing enriched uranium among the most secret in the world; the facilities required are among the most costly. One of the most modern plants, recently constructed at Pierrelatte in France, although of very small capacity, is reputed to have cost 1,000 million dollars.

25. Having regard to the small number of facilities and to the fact that they are used almost exclusively for quasi-military purposes, it is extremely difficult to estimate the cost of the enriched uranium produced. Thirteen years ago, when the United States made available to other countries the first few kilograms of uranium 235, its price was fixed at $ 40 a gram. A little later, the price was reduced on a number of occasions when, face to face with the prospects of the peaceful uses of nuclear energy, the European States announced their intention of building a European plant for making

enriched uranium. Owing to a number of unfavourable developments this facility was never built, and France, which had taken the lead in the matter in 1955-1956, fell back on a purely national solution.

26. According to the latest American rates, the price of uranium 235 varies between $ 8 and 11 a gram, according to the degree of enrichment. This most recent reduction is very probably due to the current resumption of efforts to get studies and research on the construction of a European uranium-enrichment plant going again.

27. The enriched-uranium supply situation is becoming more and more difficult. During the past two or three years nuclear energy, at least so far as very large power stations are concerned, seems definitely to have become competitive with other sources of power. It need only be mentioned that, whereas in 1964 only one per cent of all electric power plants commissioned in the United States were nuclear, the proportion had risen to 25 per cent in 1965 and to 50 per cent in 1966. In 1967, about 55 per cent of new power plant ordered in America was nuclear. The same trend, even if less marked, is observable in the largest industrially developed countries in the world, especially in Western Europe and in Japan.

28. Forecasts of the future growth of nuclear power are constantly being revised and stepped up. USAEC, for instance, foresaw in 1962 that by 1980 installed capacity in nuclear power stations in the United States of America would have risen to 40,000 MWe; but its most recent estimates put the figure at 150,000 MWe. The General Electric and Westinghouse corporations, the principal builders of nuclear stations, have arrived at similar forecasts. The principal estimates of capacity installed in Western Europe match the United States figures.

29. It is expected that most nuclear reactors built between now and 1980 will burn enriched uranium. The United States of America is therefore already faced with the problem of building a new uranium-enrichment plant.

30. The non-nuclear-weapon States are meeting with considerable difficulty in gaining access to the techniques necessary for producing enriched uranium. All the more so because, as already mentioned, the processes involved are being operated under the cloak of military secrecy. But, even were this security system to be abolished, and at the moment such a change in the situation is but a remote possibility, there would still be substantial differences in the starting point.

31. In practice, the nuclear-weapon States will always be able to make the best possible economic use of their facilities, because of their requirements in uranium 235 for their defence programmes. What is more, they are in a position to write off completely against their defence budgets all research and development costs, and even those of building the installations.

The fabrication of fuel elements

32. Fuel elements are one of the most important components - if not the most important component - of nuclear reactors. The techniques employed in their fabrication vary with the type of reactor for which they are designed. Advanced reactors, for example, need fuel elements that involve particularly heavy capital outlay and complex technological features which only the industrially advanced countries can command.

33. In France and Great Britain fuel-element manufacturing processes have been developed by the public atomic energy institutions, the Commissariat à l'Energie Atomique [Atomic Energy Commission] (CEA) and the United Kingdom Atomic Energy Authority (UKAEA) respectively. In the United States of America, large financial grants have been made by USAEC, the national nuclear energy authority, for the development of fuel elements suitable for various kinds of reactor.

34. Although the processes used in the fabrication of fuel elements are usually patented, the necessary licences for making these important components of nuclear reactors can be bought, and the cost of building the facilities required is relatively low (of the order of 3 to 4 million dollars).

35. There are industrial plants for making fuel elements in the United States of America, Great Britain, France, the Federal Republic of Germany, Belgium and other industrialised countries.

36. In Italy, the Comitato Nazionale per l'Energia Nucleare [National Committee for Nuclear Energy] has a few laboratories for making fuel elements, while three industrial plants are being built by the ENI, IRI-Finmeccanica and Fiat groups respectively for the manufacture, under licence, of different types of fuel element.

37. It can be concluded from the foregoing that access to the technology of fabricating fuel elements is not particularly difficult for non-nuclear-weapon States.

38. It should, however, be emphasized that, even though the fabrication of fuel elements is relatively simple thanks to the licensing system, the research and development essential to the production of fuel elements with acceptable and competitive economic and technical characteristics are much more complicated and costly. Generally speaking, the nuclear-weapon States have been able to allocate substantial funds for fuel-element research and development, given the ambivalent nature of the nuclear sector as a whole and of the particular component itself.

39. It must in fact be stressed that fuel-element development made an indispensable contribution to the operation of the first plutonium-producing reactors in the United States of America, Great Britain, France and the Soviet Union, which were run to meet military requirements. Similarly, such development was and still is essential to the operation of nuclear submarines or surface craft of advanced type.

<u>Nuclear reactors</u>: <u>Problems relating to different types of reactor, and especially to advanced reactors</u>

40. Nuclear reactor technology is particularly complex. It is in essence the ability to plan, design, build and operate a nuclear reactor.

41. It should be remembered that some nuclear-reactor components can be regarded as conventional, i.e., as being common to electric power production or to chemical plant of the traditional type and to nuclear works. However, the ability to plan, design, build and operate a nuclear reactor consists in marrying these components to the central, and most original, part of a reactor, the core, made up of nuclear fuel elements.

42. As has already been said, there are very many types of reactor. There is an infinite number of possible combinations of fuels, moderators, cooling systems, coolants and reflectors by which the energy generated in the core can be extracted from the reactor.

43. Even though not subject to military security, the techniques used in designing, building and operating a nuclear reactor are almost invariably regarded as trade secrets. They call for highly sophisticated techniques which, as a rule, are available only in the industrially advanced countries.

44. It should also be emphasised that most of the reactors that have become competitive, and which have therefore been sold and exported, are of the American type, especially boiling-water and pressure-water reactors, manufactured respectively by General Electric

and Westinghouse. These companies have granted licences to various West-European countries and to Japan. In some cases, of which the most striking example is the Federal Republic of Germany, the industries working the licences have succeeded in escaping from them and, in a relatively short space of time, in designing and building national reactors virtually in their entirety.

45. There can be no doubt that in this branch military and civilian applications are substantially the same. The technology of breeder reactors, i.e., of reactors whose vital purpose is to produce plutonium for warlike devices, is identical with that employed in Great Britain and France for developing nuclear reactors designed for the production of electricity. The Americans, benefiting by the large availabilities of enriched uranium from military isotopic-separation facilities, have followed the pattern of water-cooled and water-moderated reactors, which burn slightly enriched uranium instead of natural uranium. There can be no doubt that in this case, too, the United States of America has derived substantial advantages from being able to use fuel of military origin, as well as to call upon experience acquired in the first place with marine-propulsion reactors, especially those used in nuclear submarines.

The retreatment of nuclear fuels: Facilities for the decontamination of enriched uranium and for the extraction of plutonium

46. The fifth group of nuclear techniques comprises those required for decontaminating irradiated nuclear fuel. In practice, only a small part of the fissionable material in the natural uranium or in the enriched uranium is consumed inside the reactor core. The rest can be used again in another reactor if, after the lapse of some time, it is suitably treated in so-called decontamination or retreatment facilities.

47. These facilities are indispensable if nuclear energy is to prove competitive. Until recent years, retreatment processes were known only to nuclear-weapon States, decontamination facilities being in fact essential to the production of plutonium, the basic raw material for all warlike nuclear devices. Today, there are retreatment facilities in at least half a dozen non-nuclear-weapon countries, among them India, Italy, the Federal Republic of Germany and Japan. Over the past few years pressure has been mounting in the United States of America, especially in the Joint Congressional Committee on Atomic Energy, for the re-imposition of security measures in this sector.

48. The nuclear-weapon States have also been able to utilise research and development credits made available from their defence budgets for work on methods of decontaminating enriched uranium and producing plutonium. In this respect, they enjoy a distinct advantage over non-nuclear-weapon countries.

III. ACCESS TO ADVANCED NUCLEAR TECHNOLOGY

Advanced nuclear reactors

49. Dynamism is one of the typical features of the nuclear reactor sector. The improvement of reactors already working, or being built, is continually being studied, together with the development of new types of reactor with revolutionary features.

50. What we have particularly in mind are the so-called second-generation or intermediate reactors (gas-cooled reactors and the like) and breeders or fast reactors. Finally, it must be stressed that the nuclear reactor sector is one in which very severe competition is still apparent, and one in which hundreds of millions of dollars and thousands of highly-qualified technicians are committed to research alone.

51. This is why some nuclearly advanced countries are giving attention to the problem of safeguards, and especially to the question of the industrial espionage which might be stimulated by the introduction of such safeguards, particularly if they were applied in a discriminatory manner or were too far-reaching. Some countries are also concerned about additional economic costs that could result from an extension of the system of safeguards, or about the technical and administrative restrictions that might cramp the development of new types of reactor.

Marine propulsion and related problems

52. There can be no doubt that for a long time past the application of nuclear energy to marine propulsion has had immense possibilities. The most authoritative members of the nuclear world consider that nuclear marine propulsion will play a particularly important part in sea transport of the future.1/

53. Moreover, marine propulsion is transforming, and will do so to an even greater extent in future, the salient features of the navies of the world. Already, dozens of nuclear submarines are furrowing the oceans, and nuclear propulsion has also been used in aircraft carriers, cruisers and destroyers.

54. The non-nuclear weapon States have in the last few years run up against great difficulties in gaining access to the technology of nuclear marine propulsion as well as in procuring supplies of nuclear fuel (slightly enriched uranium). For their part, the nuclear-weapon States, and especially the United States of America, Great Britain, the Soviet Union and France, have been able - and will be in a position to do so increasingly in the future - to write off their research and development costs

1/ cf., Glenn T. Seaborg, Chairman, USAEC, in his address to the Governor's industrial Safety Conference, San Francisco, California, 7 February 1968.

in the nuclear marine propulsion field against their nuclear defence budgets. Moreover, in view of the secrecy in which this sector is shrouded, these States neither grant licences to work the relevant patents nor make available to other countries either their scientific knowledge or the know-how they have acquired.2/

55. Again, the difficulties hitherto met with by the non-nuclear-weapon States in obtaining supplies of fissionable material (slightly enriched uranium) for nuclear reactor intended for nuclear ships - even unarmed ones - or submarines have, as already stated, been particularly serious.

56. This situation, already grave in the absence of a treaty against nuclear proliferation, could get worse with the entry into force of a treaty which failed to make a clear distinction between nuclear weapons and the use of nuclear energy for marine propulsion. This observation is equally valid in relation to the liberalisation of nuclear marine propulsion technology and to supplies of nuclear fuels for marine reactors.

Peaceful atomic explosions

57. The past few years have seen extensive and remarkable developments in the peaceful use of nuclear explosives. The United States of America in particular has assigned substantial financial and scientific resources to this sector through the "Plowshare" programme. In the opinion of the most highly-qualified American experts, peaceful atomic explosions could prove to be the cheapest and quickest way of carrying out

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2/ cf., Michael Donne: "Building nuclear subs of great commercial value", in The Financial Times of 11 April 1968. According to the correspondent of this English daily:

> "The UK could gain 'commercial spin-off' from the current naval nuclear submarine building programme comparable in terms of value to the whole of the project itself - several hundreds of pounds.
>
> This view is held by Ministry of Defence experts who have studied the nuclear submarine programme - which involves seven fleet 'hunter-killer' boats and four Polaris missile-carrying submarines.
>
> Commercial 'spin-off' - or the benefits on the commercial side deriving from experience gained in the military programme - has been most marked in the shipbuilding and allied industries, and the experience which the yards are gaining from the construction of nuclear submarines is likely to be valuable if at some future date nuclear merchant ships are built ...
>
> Among new techniques have been improved welding techniques; improved designs of steam-generators; a raising of sub-contractor's standards on pumps and emergency cooler fabrication; while instrumentation in nuclear submarines has called for electronic methods previously considered impossible ..."

projects involving the moving of large amounts of earth, such as the construction of canals, ports, mountain tunnels or artificial lakes.[3/]

58. In addition, nuclear explosives hold extraordinary prospects for many underground purposes. Among the principal projects making up the "Plowshare" programme, the following are worth mentioning:

(a) Gasbuggy. In this project, underground explosions are being used to break rock in order to broach new deposits of natural gas.

(b) Roolison and Dragon Trail. This comprises two projects which will no doubt make it possible in due course to work 30 000 natural-gas wells in the United States, thus doubling that country's known reserves of this resource. They would also lead to the production of an additional 300×10^{12} cubic feet of gas. If successful, the projects could bring in more than 40 000 million dollars.

(c) Bronco. This consists in an experiment in the use of underground nuclear explosions to convert oil-shales into an extractable form. If successful, the experiment could lead to the exploitation of reserves of crude petroleum estimated to be worth 3 to 4 million million dollars.

(d) Sloop. This is intended to make it possible to mine copper from low-grade deposits, with the help of nuclear explosions. This technique could double United States reserves of the metal.

(e) Ketch. Under this project, nuclear explosives will be used to create underground cavities for storing natural gas. It is also intended to make similar cavities for collecting water, with a view to reducing the heavy losses that occur through surface evaporation in hot, dry climates.

(f) Thunderbird. This study envisages the gasification of thick seams of lean coal over an area of some 200 square kilometres. According to the estimates, this technique could make available the energy locked up in 20 000 million tons of coal, or as much as is contained in known United States reserves of crude petroleum.

59. The lead already gained by the nuclear-weapon States in this sector speaks for itself. It is obvious that these countries possess considerable resources of fissionable materials, the essential raw materials for nuclear explosions. Moreover, they have the scientific knowledge needed for making atomic devices, as well as the

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3/ cf., the documents submitted to the Conference under items 3(e) and 4(c) of the provisional agenda.

experience acquired in the hundreds of atomic test explosions carried out during the last twenty years of atomic history.

Advanced nuclear research

60. Special problems arise in advanced nuclear research. Among them should be mentioned research into controlled fusion - i.e.; for the production of electricity from nuclear fusion; for nuclear rocket propulsion; and for the creation of nuclear satellites etc.

61. Above all, it should be remembered that the comments made earlier in this paper about other nuclear techniques are equally valid in this field. In the first place, the results of the research can be applied for defence purposes just as easily as for civilian uses; hence the risk that, for the sake of preventing military applications, the development of civilian uses may be slowed down or impeded in non-nuclear-weapon countries. In the second place, the nuclear-weapon States, and in particular the United States of America and the Soviet Union, are indirectly favoured in the sphere of peaceful research and applications by their possibilities of carrying out military research and development.

62. Taking these considerations into account, where the main objective of advanced nuclear research - even if carried out by non-nuclear-weapon States - is clearly the peaceful utilization of nuclear energy, it should be exempted from the safeguards provided for in the non-proliferation treaty. Such research does not in fact fall within the scope of the treaty's objectives; moreover, it is covered by Article IV thereof, which provides explicitly as follows:

> "1. Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with articles I and II of this Treaty.
>
> 2. All the Parties to the Treaty undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy. Parties to the Treaty in a position to do so shall also co-operate in contributing alone or together with other States or international organizations to the further development of the applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapon States Party to the Treaty, with due consideration for the needs of the developing areas of the world."

IV. THE PROBLEM OF SAFEGUARDS
MEASURES TO AVOID DISPARITY OF TREATMENT BETWEEN NUCLEAR-WEAPON AND NON-NUCLEAR-WEAPON STATES

63. According to the terms of the Treaty on the Non-Proliferation of Nuclear Weapons as at present drafted, each non-nuclear-weapon State undertakes to accept safeguards in the form laid down in an agreement to be negotiated and concluded with IAEA in conformity with the latter's Statute and with its safeguards system, in order to guarantee the fulfilment of the obligations assumed by each such State under the Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices (Article III).

64. Article III goes on to provide that the procedures for safeguards shall apply to raw material and special fissionable material, whether the latter is produced, used or processed in a principal nuclear facility or outside any such facility. Paragraph 1 of Article III also stipulates that safeguards shall be applied to all raw or special fissionable material in all peaceful nuclear activities carried out within the territory of each State, under its jurisdiction, or anywhere else under its control. It must also be pointed out that Article III of the Treaty is to be implemented in the light of the terms of Article IV, quoted in paragraph 62 above.

65. Hence safeguards and inspection do not cover all nuclear activities, from the mining of nuclear materials to their concentration, from nuclear research and power reactors to retreatment plants and their components, or from facilities for enriching uranium to fuel elements. Such a provision could not but erect useless obstacles to peaceful nuclear activities, and would also involve the risk of industrial espionage.

66. Finally, it must be pointed out that safeguards and inspection would be imposed only on non-nuclear-weapon States, whereas those States which possess atomic weapons (the United States of America, the Soviet Union, the People's Republic of China, Great Britain and France) would be completely free from control over their peaceful and their warlike activities alike.

67. It is true that on 2 December 1967 President Johnson declared that the United States was prepared to accept IAEA's safeguards and inspections in respect of its peaceful nuclear activities. A similar declaration was made by the United Kingdom Government. But it should be appreciated that, for the moment, these remain simple

declarations, neither ratified by the Parliaments of the two countries nor forming the subject of an international agreement. Furthermore, neither the Soviet Union nor, a fortiori, the People's Republic of China or France - both of the latter having declared that they are not prepared to sign the Treaty - seem to have made up their minds to agree to control and inspection, even over their peaceful nuclear activities alone.

68. It must be remembered that, in earlier drafts of the Treaty, the disparity of treatment between nuclear-weapon and non-nuclear-weapon States was less marked. In the first draft, control was of a purely discretionary nature. In a later draft, prepared about two years ago, all peaceful activities of countries Parties to the Treaty, whether they possessed nuclear weapons or not, were made subject to control. Moreover, control by IAEA or its equivalent was mentioned. In other words, control by regional organizations could have been considered on the same footing as control by IAEA.

69. By contrast, the draft treaty now under consideration by the United Nations subjects to IAEA control all countries except the nuclear-weapon States. Hence the latter would evade all control, either over their warlike or over their peaceful activities. Incidentally, the system envisaged in the Treaty would introduce flagrant discrimination within the international agencies for nuclear co-operation, where, if the Treaty were adopted, some countries would be subject to control while others escaped it completely.

70. Some believe that such a difference in treatment would have serious repercussions on the functioning of, for example, the European Economic Community. It could lead to a move of nuclear activities (industrial or research) from certain States of continental Europe to the territory of one country (France) which possesses nuclear weapons and would accordingly elude IAEA's control, whether it signed the Treaty or not.

71. Dispartiy of treatment in the matter of safeguards would also create considerable difficulties in both the supply of nuclear materials and in the export sector.

72. So far as exports to other countries are concerned, countries which did not sign the Treaty would be free to export on whatever terms they deemed most desirable, whereas Parties to the Treaty would be bound to subject their exports to the IAEA system of safeguards. This would naturally create a risk of unfair competition.

73. At the same time, the situation in the nuclear materials supply sector (enriched uranium, heavy water, plutonium, natural uranium, etc.) also would be thrown out of balance. The People's Republic of China, France, Great Britain, the United States of America and the Soviet Union, for example, as nuclear-weapon countries, would not be subject to any conditions in respect of, or control over, their supplies, whereas the other Parties to the Treaty would be obliged to agree to such safeguards.

74. What is more, a non-nuclear-weapon State not a Party might find its supply of nuclear fuel cut off by producing countries Parties to the Treaty. The nuclear-weapon States, especially France and the People's Republic of China, would be exposed to no such risk, since in their case the Treaty provides neither safeguards nor the threat of sanctions should they fail to sign it.

75. All these possibilities would create disparity of treatment and pervert competition. In such conditions, the regular and equitable supply of all countries using nuclear ores and fuels would be put in jeopardy, and it would be difficult to ensure free traffic in nuclear materials.

76. It should be noted that, at the instance of Italy, Article IV of the Treaty has recently been re-drafted to take account of these problems. However, the solution adopted is still not entirely satisfactory.

77. True, it is indisputably difficult to avoid disparity of treatment in respect of safeguards when the Treaty itself provides for obligations of different kinds for nuclear-weapon and non-nuclear-weapon States respectively. However, there are a number of measures that could further reduce this dispartiy, or even offset its most prejudicial effects.

78. In the first place, the non-nuclear-weapon States should insist that safeguards on the peaceful uses of nuclear energy should apply to all States Parties to the Treaty whether nuclear-weapon States or not. In this way, some legal value would be conferred on the obligations assumed unilaterally by the United States of America and the United Kingdom to agree to the safeguards on peaceful activities provided for in the Treaty, and control would also be extended to the peaceful nuclear activities of the Soviet Union.

79. Secondly, an attempt should be made to broaden the territorial application of the Treaty to the maximum. To put it another way, every possible effort should be made to secure the adoption of such amendments to the Treaty as are likely to make it more widely acceptable, and so to extend the system of safeguards to as many States as possible.

80. Moreover, it is not a matter of chance that the misgivings entertained by many States about the non-proliferation treaty relate precisely to the question of access to the technology of the peaceful use of nuclear energy. Any improvement of the treaty in this respect - as in others - ought therefore to encourage more countries to adhere to it. Improvements which could not be adopted forthwith could be introduced, after the treaty had been signed and ratified, through a system of complementary conventions.

81. Thirdly, a principle already accepted in the Treaty on the Non-Proliferation of Nuclear Weapons and in IAEA's Statute ought clearly to be applied, namely: that safeguards apply only to nuclear materials and do not affect such nuclear facilities as: uranium mines; concentration and enrichment plants; laboratories; research reactors; power reactors; irradiated fuel decontamination facilities etc. In other words, everything which manifestly is not material directly utilisable for the production of nuclear weapons should be exempted from control.

82. In this spirit, natural uranium and slightly enriched uranium, which are of no use at all for making nuclear devices, could be freed from control. And in the final outcome, plutonium and highly enriched uranium - the so-called "weapon grade" - alone should be subject to control.

83. Such a definition of the object of control should greatly facilitate its use, rule out the erection of futile obstacles to the peaceful application of nuclear energy and reduce the risk of industrial espionage.

84. In addition, to offset the disparities in treatment which in any case flow both from the spirit and from the letter of the Treaty, it would be advisable for the nuclear-weapon States to liberalise in due course access to nuclear technology still subject to military secrecy. In particular, access to techniques for enriching uranium (either by gaseous diffusion or by centrifugation), for marine propulsion and for making peaceful nuclear explosives should be made easier.

85. Second, guarantees should be given subsequently concerning the regular and equitable distribution of nuclear materials, especially enriched uranium and plutonium, for peaceful purposes. In other words, measures should be adopted that take into account the three basic requirements, namely:

(a) security of supply of nuclear materials, especially enriched uranium;

(b) maintenance of the price of such materials at a relatively low level; and

(c) stimulation of the economic development of developing countries.

86. By way of example of a proposal which fully takes these requirements into account, that made by the Italian Minister of Foreign Affairs, Mr. Amintòre Fanfani, on 1 August 1967 at Geneva, in the Eighteen-Nation Committee on Disarmament, may usefully be quoted. On that occasion, Mr. Fanfani proposed that the nuclear-weapon States place at the disposal of the non-nuclear-weapon States part at least of the fissionable material they produce. The proposal was incidentally intended to put an indirect brake on the production of nuclear weapons by the nuclear Powers, in the shape of an obligation to allocate part of their fissionable material to non-nuclear countries for peaceful uses. In return, the non-nuclear countries receiving the fissionable material made available by the nuclear Powers would have paid for it at less than the market value. Part of the payment would have gone to the nuclear producing Powers and the rest to United Nations funds for aiding the progress of the developing countries.

87. Mr. Fanfani's proposal stressed the importance of the link between the three factors: the brake on nuclear armament; the encouragement of peaceful uses by guaranteeing continuity of supplies of fissionable matter at a low price; and, lastly, the contribution to the economic and social progress of the developing countries. To its author's way of thinking, implementation of the proposal would in the first place have been a gesture of goodwill on the part of the nuclear Powers to the cause of disarmament; by showing their readiness to give up part of their fissionable materials, they would have put the brake - albeit gently - on the unbroken growth of their military nuclear potential. In the second place, by making fissionable material available to the non-nuclear countries for peaceful purposes at a preferential price, they would have given themselves an opportunity of encouraging concrete measures to close the technological gap, measures which had already formed the subject of a specific Italian proposal in 1966.

88. Lastly, the proposal suggested that the proposed transfer of fissionable material by the nuclear Powers should be limited to those non-nuclear countries which had renounced nuclear armaments for themselves by subscribing to the Treaty on Non-Proliferation. This would have substantially enhanced accession to and signature of the Treaty by such countries which would thereby have enjoyed appreciable compensation - both moral and material - for their renunciation of nuclear weapons.

V. CONCLUSIONS

89. The foregoing provisions - had they been adopted - would probably have disposed of some of the weightier arguments which made it difficult to conclude the Treaty on Non-Proliferation in those sections where different burdens and different obligations are laid on nuclear-weapon States and non-nuclear-weapon States respectively.

90. Thus the former would have been obliged to continue to make available to the non-nuclear States - possibly for a consideration - the results of research carried out for defence purposes but vital to the peaceful applications of nuclear energy.

91. This has hitherto been the practice in respect of the technology of research reactors, power reactors, the fabrication of fuel elements, the decontamination of irradiated nuclear fuels etc. But, as has already been pointed out, this liberalisation is not complete.

92. If we fail in this, there will be a risk of perpetuating and even worsening a situation which is already creating considerable disparity of treatment and much perversion. The non-proliferation treaty has already called forth serious objections to some of its political aspects (lack of an undertaking to disarm on the part of the nuclear Powers; lack of measures to stop "vertical" proliferation; inadequate guarantees of security; general lack of balance in obligations between nuclear-weapon and non-nuclear-weapon countries; and so on). It would therefore be a particularly serious matter if technical and economic objections at least were not completely disposed of either by means of complementary agreements or in the procedures laid down for the implementation of the Treaty itself.