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THE ECONOMIC AND SOCIAL CONSEQUENCES OF DISARMAMENT

Effects on the development of the peaceful uses of nuclear energy

Note by the Director General

1. The Board of Governors has indicated in its annual report to the General Conference for 1963-64 that, within the framework of Resolution 982 (XXXVI) of the Economic and Social Council of the United Nations, a further study has been made of the economic and social consequences of disarmament for the development of the peaceful uses of nuclear energy [1].
2. The study was based on the published reports of various national atomic energy authorities and other information in the public domain. The material thus assembled has been communicated to the Secretary-General of the United Nations pursuant to the Conference's Resolution GC(VII)/RES/160, and is now reproduced in the Annex hereto for the information of the Conference and the Board.

[1] GC(VIII)/270, para. 5.

A N N E X

EFFECTS ON THE DEVELOPMENT OF THE PEACEFUL USES OF NUCLEAR ENERGY

1. It may be timely to recall that one of the main concepts that led to the creation of the Agency was the desire to have international machinery that could be used to divert nuclear materials and technology from military to peaceful ends. This concept was expounded in the proposals put before the United Nations on 8 December 1953 for the establishment of the Agency and is implicit in its Statute.
2. Several interesting developments have taken place during the past few months which have pointed towards the bearing that certain aspects of disarmament may have on the peaceful uses of atomic energy.
3. Three nuclear Powers have announced cuts in the production of fissile material for nuclear weapons. The Government of the United States of America has declared that it is closing down four of its fourteen plutonium production reactors [1] and is willing to permit international inspection of one of them. [2] In a subsequent statement it further declared that over a four-year period an overall decrease in the production of plutonium by 20% and of enriched uranium by 40% will be effected. [3]
4. At the same time the Government of the Union of Soviet Socialist Republics announced that it has resolved to discontinue the construction of two large new reactors for the production of plutonium, and that in the next several years it will reduce substantially the production of U²³⁵ for nuclear weapons, and accordingly will allot more fissile material for peaceful purposes [4].
5. This coincided with an announcement by the Government of the United Kingdom of Great Britain and Northern Ireland that it had already stopped the production of weapons-grade U²³⁵ and was gradually terminating production of military plutonium [5].
6. The possibility of a role for the Agency has been suggested for verifying an agreed halt in the production of fissile material for nuclear weapons. [6] In accordance with its Statute, the Agency is playing a growing role in helping to ensure that any transfer of fissile material, equipment or information is only for peaceful purposes. For instance, the United States has announced its intention of placing its 175 MW(e) Yankee Atomic Power Station under the Agency's inspection.
7. In the paper submitted by the Agency to the Secretary-General last year it was estimated that the plutonium and U²³⁵ stockpiles in the world might be of the order of 2300 tons. [7] No new information is available to change this figure radically. It is

[1] Statement by President Johnson, on 8 January 1964.

[2] Statement made by the United States representative at the Conference of the Eighteen-Nation Committee on Disarmament, on 6 February 1964.

[3] Statement by President Johnson, on 20 April 1964.

[4] Statement by Premier Khrushchev, on 20 April 1964.

[5] Statement by Prime Minister Sir Alexander Douglas-Home, on 21 April 1964.

[6] Statement made by the United States representative at the Disarmament Conference, on 6 February 1964.

[7] United Nations document E/3736/Add. 3, section 1.

difficult to estimate what proportion of this is in the form of U^{235} or Pu^{239} . It appears likely that about one fifth may consist of plutonium and the rest of U^{235} .

8. Adequate information regarding the use of U^{235} as a reactor fuel is already available, and the existing stocks of this material could readily be used in different types of enriched reactors for power production. But the use of plutonium to fuel power reactors is not so simple. So far, only limited experience has been gained in this regard; its physical and metallurgical properties are not well known and several technical problems in connection with the fabrication of plutonium fuel elements have yet to be resolved. Since the existing stocks of plutonium are quite large and more of this material will continue to be produced in power reactors, it is important to develop plutonium technology as rapidly as possible. The Agency is following closely the technical developments regarding the use of plutonium as power reactor fuel. A panel of experts is being convened in November 1964 to advise the Secretariat concerning the programme of activities which could help in the development of plutonium technology for peaceful applications.

9. Another matter which concerns the Agency is the utilization of depleted uranium stockpiles. In the United States, the stockpiles of depleted uranium (with enrichment of 0.2% of U^{235} or less as compared with 0.7% in natural uranium) may be of the order of 248 000 tons. The world stockpiles of this material may total 400 000 tons. Depleted uranium is fertile material and if converted into plutonium it could supply a great deal of energy, for instance, 400 000 tons of depleted uranium if converted into plutonium would have an energy content of 1000 billion (10^{12}) tons equivalent of coal. [8] This implies that due emphasis should be placed on the development of breeder reactors as well as seed and blanket type of reactors to make use of these extensive stockpiles. The Agency is studying the development of technology for such reactor systems.

10. It has been estimated that the stockpiles of 2300 tons of U^{235} and plutonium would be sufficient initially to fuel power reactors having the same output as all the conventional power stations now in operation throughout the world. [7] The value of this stockpile, at \$10 per gram would be of the order of \$23 000 million. The inventory charges alone on this amount would exceed over a thousand million dollars per year.

11. In the previous paper also it was estimated that there were over 23 000 highly-qualified scientists and engineers working on defence aspects of atomic energy. These scientists, if transferred to civilian work, could lend considerable support to the development of nuclear power. For example, the announcement of the Government of the United States of its intention to shut down four plutonium production facilities, releasing several hundred scientists, may present the elements for an interesting study of the problems of absorbing nuclear scientists into civilian industries.

12. The statements of the United Kingdom, the United States and the Soviet Union presage a substantial reduction in the output of U^{235} . Normally this would affect the unit cost of the product concerned and it will be interesting to observe the effect of any substantial reduction in the world's output of U^{235} .

13. The possibility is being considered in the United States of converting plutonium production reactors that are expected to be closed down into power reactors. Such a conversion of a military reactor for civilian purposes would offer the subject for a useful study.

[8] In comparison, the total estimated recoverable reserves of fossil fuels in the world amount to 3.5×10^{12} tons equivalent of coal, as reported in the Proceedings of the First United Nations International Conference on the Peaceful Uses of Atomic Energy, Vol. I, page 45.

14. It might also be worthwhile to study the technical and, particularly, the economic feasibility of using the existing plutonium production reactors as a means of producing cobalt-60 and other radioisotopes which, in turn, could be employed to carry out food sterilization and other important activities.

15. Under international supervision the use of nuclear explosives for civilian purposes might become a factor in the development of transportation and navigation facilities. It is also noteworthy that under certain conditions nuclear energy may be found economic for the desalination of sea water and that this peaceful use of atomic energy has been mentioned in recent statements. [9]

16. The Third International Conference on the Peaceful Uses of Atomic Energy to be held in Geneva from 31 August to 9 September 1964 is expected to release the latest information on the technical and economic status of nuclear power. In view of the recent encouraging developments in nuclear power, it is expected that this conference might serve to stimulate nuclear power programmes in various countries of the world.

[9] Statement by President Johnson, on 6 February 1964; and Statement by Premier Khrushchev, on 6 April 1964.