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## Book Reviews

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## BOOK REVIEWS

A REPORT ON THE INTERNATIONAL CONTROL OF ATOMIC ENERGY\*  
 Department of State Publication 2498, Superintendent of Documents, United States Government Printing Office, Washington, D. C., 1946. Pp. xiii, 61; 20 cents; also published by Doubleday & Co., Garden City, New York, 1946, Pp. 55, 35 cents.\*\*

This is a state paper of which every American, irrespective of agreement with its conclusions, may well be proud; it is a document which deserves even more attention and study than it has yet received. For qualities of originality, realism, imaginative boldness and objectivity, in wrestling with a political problem of the first magnitude, it would be difficult indeed to suggest many equals. The Report was the work of a Board of Consultants to a Committee, under the chairmanship of Under Secretary of State Acheson, appointed by the Secretary of State to study the subject of international control of atomic energy.<sup>1</sup> It was submitted to the Secretary of State "as representing the framework within which the best prospects for both security and development of atomic energy for peaceful purposes may be found." (p. viii.) Its recommendations have become the basis of the official policy of our Government, in so far as the Executive has the authority to define it, through the statement of Mr. Baruch as American representative on the United Nations Atomic Energy Commission.

The principal conclusions of the Report have received such widespread publicity that it is scarcely necessary to repeat them here. They may be briefly summarized as follows:

(1) That it is possible to establish a system of international controls of atomic energy which will provide, as a minimum, adequate safeguards against a surprise attack with atomic weapons by any nation:

(2) That such a system must be based upon direct and exclusive control in the hands of an International Authority, specifically created for the purpose, of the raw materials, uranium and thorium, which provide the sources of atomic energy, and of the production from those raw materials of the fissionable materials, U 235 and plutonium, from which atomic energy is directly derived;

\*This book review first appeared in Volume 41 of the Illinois Law Review at page 290, and we are indebted to that publication and the author for permission to reprint it.

\*\*The Doubleday publication contains an excellent preface by Professor I. I. Rabi, briefly explaining certain fundamental scientific conceptions with respect to the production of atomic energy. With the aid of this preface the lay reader, no matter how unversed in the sciences he may be, should have no difficulty in understanding the Report. My page references are to the State Department publication.

<sup>1</sup> The Board of Consultants who signed the Report consisted of the following: Mr. David E. Lillenthal, Chairman of the Tennessee Valley Authority, who acted as Chairman of the consulting board; Mr. Chester I. Barnard, President of the New Jersey Bell Telephone Company; Dr. J. Robert Oppenheimer, of the California Institute of Technology and the University of California; Dr. Charles Allen Thomas, Vice President and Technical Director, Monsanto Chemical Company; and Mr. Harry A. Winne, Vice President in Charge of Engineering Policy, General Electric Company. The Secretary of State's Committee consisted of Dean Acheson, Chairman, Vannevar Bush, James B. Conant, Major General Leslie R. Groves, and John J. McCloy.

(3) That this direct control must be supplemented with a system of licensing and inspection, by the International Authority, of the use of fissionable materials in relatively "safe" activities, i.e., those that cannot be readily diverted to the production of atomic weapons;

(4) That the Authority itself must be adequately staffed so as to be capable of leading the way in atomic research and in the development of atomic energy for peaceful purposes, as well as carrying on continuously the exploration, production, licensing and inspection duties conferred upon it.

These basic conclusions were all adopted in Mr. Baruch's statement to the United Nations Atomic Energy Commission, with the additional suggestion that there be provision for immediate and certain penalties for violation of the terms of the basic agreement establishing the international authority and for illegal interference with or defiance of the authority.

But the Report itself is deserving of careful attention, not merely for its final recommendations but also for the clarity and vigor of the analysis underlying them. At the outset, the Report establishes the hopelessness of attempting to remove international rivalry in production of atomic weapons either through the mere outlawry of such weapons, or through a system of inspection alone without effective international control of the raw materials and of the production of fissionable materials. The first could be only a pious expression of hope; the second would involve such an army of inspectors attempting to cover virtually every factory and every laboratory in every land where atomic energy might conceivably be developed, that the very magnitude of the task would spell its doom, even if it could be reconciled with the interests of privacy. This is particularly true because it is impossible to produce atomic energy for peaceful purposes without at the same time producing materials suitable for atomic explosives. On the other hand, the Report recognizes the serious objections to a system which would vest in the International Authority a total monopoly of all aspects of atomic energy. Such a system would cut so deeply into the private institutions of some countries and into the national institutions of others that, as the Report states, "many of the complexities, irritations, the engendering of suspicion, and the encouragement of deceit that we found militated against a system of safeguards based upon national and international inspection would to a lesser degree be repeated by such an all-out proposal for centralization." (p. 25.)

It is precisely at this point, however, that the distinction between "safe" and "dangerous" activities becomes of crucial importance. Underlying this distinction are certain dominant facts. The first of these relates to the peculiar position occupied by the elements uranium and thorium — particularly uranium — in the development of atomic energy. In this connection, the Report offers the following explanation:

"... Uranium is the only natural substance that can maintain a chain reaction. It is the key to all foreseeable applications of atomic energy. . . .

"... Thorium cannot maintain a chain reaction, either itself or in combination with any other natural material than uranium. Nevertheless, it occupies an important position with regard to safeguards. The reason for this is the following: Without uranium, chain reactions are impossible, but with a fairly substantial amount of uranium to begin with and suitably large quantities of thorium a chain reaction can be established to manufacture material which is an atomic explosive and which can also be used for the maintenance of other chain reactions.

"Absolute control of uranium would therefore mean adequate safeguard regarding raw materials. Yet, since any substantial leakage of uranium through the system of controls would make possible the exploitation of thorium to produce dangerous amount of atomic explosives, provisions governing thorium should be incorporated in the system to compensate for possible margins of error in the control of uranium. The coexistence of uranium and thorium in some natural deposits makes this technically attractive." (p. 13.)

Thus the key to an adequate system of international controls becomes exclusive ownership and absolute control by the international authority of the raw materials, uranium and thorium, from which alone the fissionable materials suitable for atomic explosives can be produced. "Dangerous" activities are, therefore, defined to comprise in general the extraction of the raw materials uranium and thorium, as well as the development of the fissionable materials themselves.

There are also certain basic facts which are essential to the definition of "safe" activities. In the first place there are various by-product materials, resulting from the development of atomic energy, the release and use of which can be of no significance in the manufacture of atomic weapons. With reference to such use the Report states:

"(1) Perhaps the clearest case is the application of radioactive material as traces in scientific, medical, and technological studies. This is a field in which progress may be expected to be very rapid, and we can see no reason at all for limiting, on grounds of safety, the activities using such tracer materials." (p. 27.)

Secondly, the fissionable materials, U 235 and plutonium, can be so treated as to make them unsuitable, without a major operation, for use in atomic weapons. In this connection the Report states: "... U 235 and plutonium can be denatured; such denatured materials do not readily lend themselves to the making of atomic explosives, but they can still be used with no essential loss of effectiveness for the peaceful applications of atomic energy." (p. 26). It is activities concerned with the use of such materials, produced and furnished by the Authority, which would be licensed by the Authority and which would be carried on through private or national institutions. Such operations would be subject to a system of inspection by the Authority designed to insure against any

attempt to convert the denatured materials back into materials suitable for atomic explosives, or otherwise to convert "safe" activities into "dangerous" activities.

The Report does not pretend that the line distinguishing "safe" from "dangerous" activities would be a simple or static one, or that the licensing and inspection system necessary for its effectuation would be entirely without burdens and complexities. It does, however, make a strong case for the proposition that these problems would be reduced to manageable proportions, provided, of course, that the Authority is given complete and exclusive control of the raw materials and of the production of fissionable materials, and is also adequately staffed with scientists and engineers in the forefront of atomic energy research and development. The crucial points here are that the denatured fissionable materials could be obtained only from the Authority; that the Authority would be able to prescribe conditions for operation designed to minimize the opportunity for diversion and evasion as well as to reduce the burdens of inspection; that any departure from these prescribed conditions of operation would in itself be a violation resulting, at the least, in cutting off the supply of the denatured materials.

It is noteworthy that the Report, unlike Mr. Baruch's statement before the Atomic Energy Commission, does not suggest any system of sanctions for enforcing compliance with the basic agreement establishing the Authority, or with the regulations of the Authority. In the case of minor infractions by a licensee it is, of course, implicit in the plan that the result may be withdrawal of the license and denial of any further supply of fissionable materials. The Report also suggests that any questions with respect to the Authority's right of access for geological survey or for inspection of installations might be resolved by submission to an international body such as the International Court. But so far as any nation's defiance of the Authority is concerned, the Report relies for its sanctions upon the circumstances that the facilities for the production of atomic energy will not be confined to a single country; that the system itself will make it impossible to embark upon a plan for the illegal production of atomic explosives without immediate discovery by the Authority. Thus no nation could reasonably hope to achieve any substantial advantage in a race for atomic weapons by violation of the agreement; such action would invite either international intervention or the seizure by each nation of the atomic energy materials and productive facilities within its borders and the resumption of international rivalry in the production of atomic weapons. In elaborating this point the Report states:

"... Seizures will afford no immediate tactical advantage. They would in fact be an instantaneous dramatic danger signal, and they would permit, under the conditions stated, a substantial period of time for other nations to take all possible measures of defense. For it should be borne in mind that even if facilities are seized, a year or more would be required after seizure before atomic weapons could be produced in quantities suf-

ficient to have an important influence on the outcome of war." (p. 48.)

In order to give each nation the sense of security thus contemplated, it is, of course, essential that agreement should be reached at the outset upon a satisfactory geographical distribution among various nations of productive facilities for the development of atomic energy.

It is also noteworthy that Mr. Baruch's statement, although it emphasizes the importance of penalties "of as serious a nature as the nations may wish and as immediate and certain in their execution as possible," does not suggest the specific means by which such penalties are to be imposed. It seems inescapable that if the violations are of a national rather than individual character, the only sanction must be war. I venture to suggest that insistence upon agreement with respect to sanctions as a prerequisite to the establishment of an international authority along the lines described may be to sacrifice the entire plan on account of failure to agree in advance upon forms of collective action if the plan should fail in operation. Mr. Baruch said: "But before a country is ready to relinquish any winning weapons, it must have more than words to reassure it. It must have a guarantee of safety, not only against the offenders in the atomic area, but against illegal users of other weapons — bacteriology, biological, gas — perhaps — why not? — against war itself." But how, so long as the principal instruments of military power remain under the control of individual nations, can such guaranties be provided by international authority? The Report seems to rest on a more realistic basis in recognizing as the greatest incentive to compliance, the realization by each nation that so long as the authority is allowed to function freely and without interference every nation will be as safe as human ingenuity can devise from surprise attack by atomic weapons.

To some the conclusions of the Report may be objectionable on the ground that they ignore the problem of the veto power and do not go far enough in the direction of real world government. To others they may be equally objectionable because they involve relinquishment of the preeminent position which the United States is now assumed to have with respect to the weapons of atomic warfare. To both types of criticism there are I submit, compelling answers.

In answer to the first kind of objection, it may be truly said that the recommendations of the Report represent the greatest single step toward world government ever seriously proposed by a great nation. Within its own sphere of activity the Authority would be indeed an instrument of world government. It is also implicit in the proposal that with respect to the internal operations of the Authority there would be no room for the veto power. The Authority would be carrying on day to day operations roughly comparable both to those of the Tennessee Valley Authority and to those of some of our regulatory commissions. In the course of such operations there would be required a continuous series of decisions which obviously could not wait until the principle of

unanimity. For its successful operation the Authority would depend, of course, upon the support of all the great nations. But this would be true of any world government, at least in its initial stages, until it had won the allegiance of the peoples of those nations and effective control of their military power.

To those who object that the recommendations of the Report involve a foolhardy surrender of our present advantage in atomic weapons it seems fair to say that if there is ever to be a time when it will be to our advantage to press for such an agreement, this is the time. The scientists who are in a position to express an informed judgment are apparently unanimous in the view that our monopoly of atomic weapons is bound to disappear in the not too distant future.<sup>2</sup> If we can achieve agreement along the basic lines of the Report while that monopoly is still in existence, we need not fear that other nations who have agreed to the establishment of the International Authority, have in fact concealed atomic bombs for use in an emergency. Indeed, since we are by hypothesis the only nation with the atomic bomb, it is our own good faith in which the greatest reliance will have to be placed, since there can hardly be any effective way of determining whether we have in fact destroyed our entire supply. It is true, of course, that other nations who have not yet produced atomic bombs, might nevertheless, before creation of the International Authority, secrete sufficient quantities of uranium and thorium to make possible the illegal production of atomic weapons. But this risk is small, indeed, compared with the risk of the secretion of atomic bombs once they have been produced. In this connection the following statement in the Report is particularly relevant:

"As we have pointed out repeatedly, the Authority will be aided in detection of illegal operations by the fact that it is not the motive but the operation which is illegal. Any national or private effort to mine uranium will be illegal; any such stockpiling of thorium will be illegal; the building of any primary reactor or separation plant will be illegal. This circumstance is of very great importance for the following reasons: It is true that a thoroughgoing inspection of all phases of the industry of a nation will in general be an unbearable burden; it is true that a calculated attempt at avasim may, by camouflage or by geographical location, make the specific detection of an illegal operation very much more difficult. But the total effort needed to carry through from the mine to the bomb, a surreptitious program of atomic armament on a scale sufficient to make it a threat or to make it a temptation to evasion, is so vast, and the number of separate difficult undertakings so hard

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<sup>2</sup> See, for example, statement of Dr. Irving Langmuir, Associate Director of the Research Laboratory, General Electric Co.: "It has already been brought out by all scientists who have worked in this field and have spoken about it that there is no 'secret of the atomic bomb' which can be permanently kept. The Smyth report and the fact that successful bombs can be made by several processes enable any nation attempting to build bombs to concentrate on one process and to start work simultaneously on separate phases of the problem." Hearings before Special Committee on Atomic Energy, U. S. Senate, pursuant to S. Res. 179 (p. 110). And statement of Professor Harold C. Urey: "My guess is that it will take 5 or 10 years for other industrial countries to secure atomic bomb plants. It depends somewhat upon which country, and it depends upon the effort that is put forward." *Id.* (p. 85).

to conceal, that the fact of this effort should be impossible to hide. The fact that it is the existence of the effort rather than a specific purpose or motive or plan which constitutes an evasion and an unmistakable danger signal is to our minds one of the great advantages of the proposals we have outlined." (pp. 40-41.)

At this writing recent developments within the United Nations Atomic Energy Commission may seem to render discussion of the recommendations of the Report somewhat academic. It is worth remembering, however, that the conclusions of the Report did not spring full-blown from the minds of the authors as a result of a priori reasoning. Rather they were evolved from patient, painstaking, and time-consuming exploration of the facts. If men of such diverse training and background as collaborated in the preparation of the Report, "found themselves at the end of a month's absorption in the problem not only in complete agreement that a plan could be devised, but also in agreement on the essentials of a plan" (Introduction p. xi), it is perhaps too early to despair that a similar patient exploration of the facts by members of the United Nations Atomic Energy Commission will produce a similar result.

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