MENACE OF THE ATOM BOMB

NO ROOM FOR HYSTERIA: Gen. A.G.L. McNaughton, Canadian representative on the U.N. Atomic Energy Commission, addressing the University of Toronto Engineering Society, Oct. 30, said there was no way, and no likelihood of one being found, by which an atomic bomb could be neutralized. It was not against the bomb, therefore, but against its carrier that we must look for forms of defence that might prove effective.

We were, however, a long way from the push-button type of warfare described in the sensational magazine. There was no occasion for hysteria but, on the other hand, it would be folly to waste time remaining to us through failure to give proper consideration to defensive measures and, in particular, to advance by every means within our power the setting up of an international agreement which would effectively protect the peoples of the world.

The carriers, Gen. McNaughton continued, which might be used for atomic bombs are:

(a) the long range guided missile whether it be rocket or crewless aircraft;
(b) manned aircraft of the large bomber class;
(c) submarines and other carriers or saboteurs who would place the bombs with delay fuses in position by stealth.

Of these, guided missiles have today a reliable range of perhaps two or three hundred miles. Unmanned aircraft will travel well above supersonic speed and rockets may have velocities of 5000 or 6000 feet per second which is more than four times that of sound at sea level.

It is likely therefore that these missiles, because of their great speed, will be almost immune to enemy interference. Their accuracy is of the order of a couple of per cent of range -- that is, even now they can be placed with certainty within the limits of a large target such as a city which is the only kind of target they would be used against in any event. Nothing less than a few million people and their goods and chattels would be counted as a worth while target until all such remunerative objectives had ceased to exist.

There is thus very little hope of effective defence against the guided missile once it has been launched. The only prospect is to deal with the ship or other platform from which it is to be launched to hold it out of range or at least to prevent it from launching its missile at short range where the accuracy would be higher. Thus, as matters stand at the moment, there is a sort of defence to be found in distance but this is not very comforting as ranges for guided missiles certainly show every indication of great increase, perhaps even to the extent of substituting thousands of miles of range for the present hundreds with a few decades. However these futuristic conditions are not here yet and most fortunately we are a long way from the push button type of warfare described in the sensational magazines.

RANGE OF MANNED AIRCRAFT

Manned aircraft in the large bomber class which have been specially designed have today a radius of action of about 5000 miles out and the same distance back after due allowance has been made for the weight of an atomic bomb payload. These machines will fly in the stratosphere at 30 or 40,000 feet with speeds of 500 m.p.h. or better.

Thus the means of intercontinental attack even today are well within the limits of established practice. The over-all cost, including casualties of operating bombers these great distances with a payload of ordinary h.e. would certainly not be worth while but with atomic bombs, each of which is at least several thousand times more powerful weight for weight, this limitation would not exist.

An aircraft flying in on a target at stratosphere heights at 500 m.p.h. or more poses an exceedingly difficult problem for the defence. It takes a long time for a defence rocket to rise to 40,000 feet or so and jet propelled fighters have as yet a very limited endurance. As a result it seems possible that at least a proportion of the attackers will get through. Applied to the small numbers of atomic bomb carriers required a high casualty rate does not represent the prohibitive scale of loss which it would be if the same or even a fraction of the same percentage of loss were applied to the vastly larger numbers of aircraft required with ordinary h.e. bombs to give a comparable result.

Thus it does not seem that the expectation of casualties can be counted on as a deterrent to intercontinental attack with atomic bombs borne in manned aircraft. In this connection I would observe that modern methods of radio navigation permit these aircraft to know their position at all times with the precision required for bombing a city.

PLACEMENT BY SUBMARINE

The third method of using atomic bombs to which I have referred was their placement by submarines or saboteurs who would set the delay to give plenty of time for escape. I do not think it necessary to enlarge on these methods except to say that against skilled operators I can foresee great difficulties in establishing any really effective defence against atomic bombs because their secret placement is so much less difficult than ordinary h.e. where the volume and weight of the explosive required to secure a worth while result is so vast that the chances are it could not be placed in position secretly let alone kept hidden if it were.

Thus whether by guided missiles, by manned aircraft, by submarine or by saboteur it seems that it will not be possible by any conceivable physical means to prevent an attack with atomic bombs which might conceivably result in a crippling blow through the destruction of centres of population and industry which, as I have said, are the kinds of target against which the atomic bomb will be used.

However, with the prospect of atomic war no nation will leave all its defence resources in these vulnerable locations and it is not probable therefore that an atomic attack would determine the outcome. In consequence in the military establishments the atomic bomb does not replace the army, navy or air force -- it is a weapon of special application which is added to all other weapons.

If we accept, as I think we must on the evidence available, the thesis that there is no physical defence against atomic war, then what avenues of hope remain to us for the preservation of the world?

There are indeed two possibilities which merit consideration. The first and most attractive is to develop an international agreement under which we may hope that all nations may come to have confidence that atomic energy will be used for peaceful purposes only. As part of this agreement it is proposed to set up a system of safeguards and controls which will in fact ensure that atomic war cannot be prepared or at the least that if any nation should attempt to do so then the situation will be promptly known and reported to all other nations so that they may take whatever action is appropriate.

It has been thought by those who have studied all aspects of this problem that without undue restriction on the peaceful uses of atomic energy and without the setting up of an unduly cumbersome organization, it would be possible to provide at the least several months' warning before atomic war could be launched by any nation on any significant scale. It is thought that the certainty of having such a period of warning during which appropriate counter measures could be taken should give the nations confidence to undertake the establishment of such a system which, once established, could be expected to develop in reliability.

This is what the United Nations Atomic Energy Commission has been set up to study and later I will have more to say about the progress of this work.

The second possibility of preserving peace, which is, I think, fully justified in the short term view by considerations of expediency and practicability, is that the United States, which is the only nation which at the moment possesses the atomic bomb in quantity, should be encouraged to continue to retain for as long as may be possible its paramount ascendancy in this field.

NO CONTINUING MONOPOLY

There can, of course, be no continuing monopoly in the facts of science; what one nation has found out, others can learn also by the application of appropriate efforts and granted sufficient time. In truth there never have been any really scientific secrets about the atomic bomb. The whole epic history of nuclear physics has been international in character from the first detection in France of the peculiar rays given off by uranium minerals, to the first recognition of atomic fission in Germany with very substantial contributions in between from almost every other country engaged in scientific research.

While I make the point that there are no real scientific secrets yet there are most important technological advantages and engineering know-how which are the exclusive perquisite of those who have laboured and carried the burden of development. I would say that in the atomic energy project, like any other major undertaking, there is a phase where prodigious effort is required for little in the way of return; then there comes a point at which the returns increase very rapidly for a little additional effort and everything goes forward on a rising curve.

The United States is today on this rising curve with atomic energy and if our American colleagues maintain their research and development on the scale authorized by Congress it seems that their ascendancy will remain for a decade at least. Meanwhile no other country on earth has as yet passed out of the difficult first phase to which I have referred.

Quite frankly the only major country or association of countries about which we of the Western world might feel anxiety is the USSR I pose the question that having regard to the devastation of war, the primary requirements of rehabilitation, the limited resources in materials and industrial equipment and particularly in technological skills, is it likely that the U.S.S.R. would at this time be capable of diverting effort on the scale necessary to make atomic war? The United States capital equipment in atomic plants is estimated to have cost over 2½ billion dollars mostly in payment in one way or another for skills which had to be taken out of the national economy. No other country is as yet endowed with these skills on such a lavish basis nor is it likely that any other country could make this diversion without destroying or at the least seriously crippling their national economy.

In the light of what I have said as to the great magnitude and long continued efforts required for the preparation of atomic war, it seems reasonably probable that we need not fear its outbreak on any significant scale for a while yet. There is thus no occasion for hysteria but on the other hand it would be folly to waste the time which remains to us through a failure to give proper consideration to the defensive measures which are open and in particular to advance by every means within our power the setting up of an international agreement which will effectively protect the peoples of the world.

The first international step towards the creation of such an agreement was made very shortly after the termination of the way by