Comprehensive Test Ban (CTB) Reviews

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VIEWS ON A CTB

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May 7, 1970

I have read with interest Heckrotte's paper on Seismic Verification. I think it is a fair report of the status of the technical capability to detect and identify underground nuclear explosions. Taking off from his paper, some observations on a comprehensive test ban (CTB) ought to be made. With the facts that I have on hand, I can convince myself that there are no really pressing technical reasons to conclude a CTB, nor are there very compelling technical reasons not to do so. Perhaps there are other, more valid reasons for or against a CTB. If there are, I hope this paper will flush them out.

A reason for concluding a CTB is said to be that "it would slow down the nuclear armament race. True, it would slow or halt the development of new nuclear warheads. However, we now have a large stockpile and a great number of designs so that even a halt in producing new designs would not alter our nuclear weapon capability to any large degree. Rather than developing the best possible warhead for a new weapon system, non-optimized warheads could be used. Compared with changes in numbers and types of weapon systems, degradation of warhead yields or outputs by using off-the-shelf warheads on new military systems is unlikely to be of great military significance. Our military posture is therefore relatively insensitive to future nuclear testing. It follows that the probability of nuclear war is similarly independent of future nuclear test activities.

A second reason to stop nuclear testing is that we could save money. The amount saved would depend on whether low yield (below seismic identification threshold) tests were allowed. Test savings also must be balanced against the costs of a seismic verification network -- as a result, large dollar savings are unlikely.

A third reason to stop testing might be put forward by the less advantaged countries. They could argue that their nuclear disadvantage relative to the nuclear weapon states would not be widened further if we stop testing. Clearly our weapons are already so advanced that this point would have more political merit than technical substance.

[REDACTED]

A fourth reason advanced to discontinue testing is that it is polluting the earth. In fact, except for Plowshare excavation tests, the amount of radioactivity from underground tests escaping to the atmosphere is quite small. It is currently negligible compared with other sources of radiation. The question of ground water contamination appears to be equally unimportant, although environmentalists certainly will argue this point.

The reasons against a treaty are that (1) we could not verify the condition of our nuclear stockpile, (2) other countries might surreptitiously make significant improvements in their warheads and thus put us at a disadvantage, (3) our nuclear laboratories would lose their good people and their design capabilities would be eroded, (4) we need tests for weapon systems now on the drawing boards, and (5) in terms of the overall weapon system, nuclear testing to provide optimized warheads is cost effective. All of these arguments make some sense, but they do not seem very strong to me.

As far as stockpile verification goes, we have hardly ever needed such tests. Our need in the future is not likely to be greater than in the past.

On the argument that the other side might make significant warhead improvements through cheating, I don't believe that the sort of improvements that can be made in fission or fusion explosives would really alter the balance of power now existing. To lend credence to that point, the SALT studies that I know of are based on numbers of weapon delivery systems and not on a detailed analysis of warhead yields. Nuclear design effort over the past years has led to 10 or 20% improvements in warhead performance and to devices with radically enhanced characteristics. None of these warhead developments have really altered our deployed weapon capability in a major way. The particular warhead designs for ABM use are, however, the result of recent nuclear testing. Without these optimized warheads, the ABM system would be clearly degraded. Nevertheless, one could argue that without new warhead designs, an ABM system using existing warheads would still have been developed.

Perhaps the "cheating" argument against a treaty could be more forcefully focused on the possibility that one side could advance relative to the other in the field of systems effects, blackout, etc., by preparing a test series and then breaking the treaty.

[REDACTED]

If our laboratories lose their best designers and the enemy retains good designers, I cannot see how the balance of power is likely to be altered. The next weapon breakthrough, as has happened in the past, is most likely to be generated by non-development work at some university laboratory.

The need for tests to supply warheads for urgent new systems (like the ABM) has decreased with the successful series which is nearing completion. The ABM warhead for Spartan will be completed before any CTB could now be negotiated.

The fifth argument against cessation of testing is certainly valid. If there is no good reason to give up testing, and if the US needs new weapon systems, then an optimized warhead rather than some make-do, less efficient model off the shelf, makes good military sense. The fact that testing dollars are small compared with weapon system costs makes the development and use of the best possible warhead a cost effective (or approximately so) procedure.

Thus, it seems to me that the technical arguments for or against a CTB are not compelling. (How these arguments appear to other observers is another question.) Beside the question as to whether it is desirable or not to have a CTB, there are some details relative to a seismically verified threshold treaty, which need answers.

One question needing an answer is how will tests be treated below the seismic identification threshold? That is, are low-yield tests banned or allowed? Many interesting tests could be executed within a magnitude 4 limit (20 KT in alluvium). They would be an effective inducement to keep good people at the laboratories. If you ban these tests, you achieve a more concrete disarmament status and you might save some money. However, national means of verification would clearly be inadequate to monitor such a ban. If a moratorium on low yield tests was concluded, and if one side continued to test small devices in a clandestine manner, the gains for that side are not likely to be very great. They could get a little information on high yield device performance; they could keep their good weapon designers interested; and they could continue development of low yield weapons for tactical or ABM applications. By arguments similar to those which I used earlier, none of these developments is likely to make a large change in the balance of power. Nevertheless, I would expect quite a few people (e.g., Senators) to remain

unconvinced that asymmetries in testing could be tolerated. If you don't ban low yield tests, you haven't gained very much in a disarmament sense by a complicated and expensive threshold test ban treaty which could even lead, through suspicion, to a worsening of international relations.

A second question is what to do with Plowshare development tests. I cannot conceive of any simple way to guarantee that such tests would not be weapon related. Since there could be relatively large numbers of these, a significant possibility for weapon development would exist. I think the chances for cheating in this area are greater than offered by decoupling, earthquake masking, or other spoofing techniques. If no controls can be instituted to guard against weapon development, Plowshare development could be given up (which seems a large price to pay), or weapon development potentialities would have to be ignored.

From all of the above, my conclusions are that we should do some hard thinking about a comprehensive test ban treaty. The pressures for such a treaty are likely to increase greatly in the next year or so and we should not be caught unprepared.

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