International Institute for Nuclear Explosions

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Nuclear explosions have potential practical and scientific uses. It is superstition to ban them, but making sure they don't contribute to the possibility of nuclear war is necessary.

Our idea is that nuclear explosions should be studied and when appropriate carried out mainly by an international institute according to the following principles.

1. The institute is open to people from all countries.
2. No information is kept secret.
3. All work is to be done safely.
4. Explosions are done when authorized by procedures established by an internationally representative review board.
5. No weapons are to be designed or tested. Weapon design information is not to be present.
6. Non-proliferation of weapons is to be advanced.
7. If weapon information is needed for international arms control purposes, this information should be handled by a different organization.
8. I leave open the question of whether the Institute should have an initial monopoly on nuclear explosions. Large scale practical applications, e.g. to energy generation, probably preclude monopoly.

Up to now, non-proliferation has been promoted by secrecy as well as by diplomacy. Secrecy is now almost irrelevant to non-proliferation, because the essential knowledge required for weapons is widespread. Diplomacy, inspection and perhaps some coercion have to be relied upon.

There is a significant development gap between nuclear explosions and actual weapons that can be delivered by airplanes or missiles.

What scientific and practical uses of nuclear explosions may develop is hard to predict. While both the U.S. and the Soviet Union did some work in this direction, the work was always subordinated to the development of weapons.

Here are some possibilities.

1. Earth moving. The Soviets did some work in this direction, and the Americans studied it.

2. Fracturing rock to get at natural gas and oil. Some American work was done.

3. The Orion rockets propelled by nuclear explosions. This kind of rocket can only be used away from the earth's atmosphere. However, it makes possible manned missions to the outer planets in reasonable times. It didn't get past the design stage.

4. Nuclear pumped lasers. The American study of this was dominated by the development of anti-missile weapons which made the task very difficult. The extremely intense lasers that nuclear explosions make possible may have interesting scientific and practical applications.

5. Study of the behavior of matter under the conditions of extreme temperatures and pressures.

6. Thermonuclear explosions in underground chambers as a source of energy for electricity. This will surely work even if other approaches to thermonuclear energy continue to prove elusive.

7. Providing for the low probability event of suddenly needing nuclear explosions for deflecting anasteroid to prevent it from hitting the earth. A *New Yorker* cartoon showed two dinosaurs. One said, "All I'm saying is *now* is the time to develop the technology to deflect an asteroid." As the dinosaur said, now is the time to develop the technology.

Maybe the establishment of such an institute is politically impossible at present, because of the great opposition to nuclear explosions for any purpose. However, as memories of the Cold War with its fears of nuclear war recede, a new generation (and maybe older generations) will look at the question more calmly. If this institute is created, it may take some time for worthwhile experiments to be proposed and agreed upon.

Very likely, there will remain some national programs involving nuclear explosions.

It will augur ill for the future of humanity if a branch of science and its associated technology are abandoned permanently for symbolic reasons.

It is unfortunate that the test ban treaty signed in 1996 bans all nuclear explosions. Fortunately, the U.S. Senate rejected it. I wouldn't object if it merely banned bomb tests.

The treaty does not make nuclear war less likely. It merely creates an unstable situation—favoring the kind of society that can keep secret (or at least uncertain) that it is carrying out secret weapons projects.