

continued reliability might include a replacement, without testing, of certain weapons in the stockpile with newly built weapons of identical design.

#### **EFFECTS AND PHYSICS TESTS**

Another of the purposes of nuclear testing is to check the effects of an explosion on military equipment. Since warheads of proven design and yield are used for such tests, a secondary purpose, that of confirming the reliability of a given stockpiled weapon design, is simultaneously served. However, considering the impressive number and variety of nuclear explosions carried out so far, it is doubtful whether effects tests alone would constitute a sufficient reason for continued testing. Even less justified, at least from the point of view of arms control, seem to be field explosions to study the complexity of the physics of a nuclear detonation. Such experiments as inertial confinement fusion (ICF) research on the application of thermonuclear energy can be conducted in contained laboratory setting at extremely low yields. They may have some potential utility for the military, but are not easy to detect and cannot be covered by a test ban treaty anyway.

#### **SECURITY AND SAFETY TESTS**

Improved or additional protection of nuclear weapons may require testing, but the testing does not need to be explosive. Should, however, protective devices change the nuclear assembly or its components significantly enough to modify the design of the weapon, explosive testing may prove necessary to check its performance. Whether such far-reaching changes are essential to satisfy security needs is debatable. Many nuclear weapons are deemed already to be adequately protected by the so-called permissive action links permitting the use of weapons only by authorized personnel, as well as by use-denial mechanisms disabling the weapons when their use is attempted by unauthorized persons. Possible improvements of the protective systems would be marginal and could probably be made without affecting weapon design, in so far as they relate chiefly