

Nuclear negotiations and underground blast

For more than a year the United States delayed testing a peaceful nuclear device called Cabriole in order not to complicate negotiations on the nuclear non-proliferation treaty.

But as the United Nations General Assembly last week moved deeply into discussion of the draft treaty jointly sponsored by the U.S., the U.S.S.R., and Britain, the dust was settling from the biggest U.S. underground nuclear explosion yet; the biggest of any kind ever set off in the continental United States. The test was part of the weapons development program, presumably to develop warheads for the Spartan antiballistic missile system; the pressure to conduct it was apparently too great for the delicacy that prevented the Cabriole explosion, and more such tests are being considered.

The non-proliferation treaty, although enthusiastically espoused by the U.S. as a critical means of reducing the danger of nuclear war, has been attacked by some non-nuclear powers as condemning them forever to second-class status. They would be giving up the prospect of joining the nuclear club, while the present members continue to build ever more sophisticated and powerful weapons. And the ABM, doubtful weapon though it may be (SN: 3/23 p. 279), is the current frontier of nuclear sophistication.

Reaction at the U.N. was slow in developing, but "the timing," says an Arms Control and Disarmament Agency official, "was not the best."

Still, the ACDA is optimistic that the treaty will gain the two-thirds majority endorsement it needs from the U.N. after the current debate, which could stretch out for five weeks.

But even if the U.N. action goes smoothly, it will remain for the non-nuclear nations to sign the treaty individually. And if a substantial number of countries with latent nuclear abilities stay outside the agreement, its effectiveness could be close to nil. Such key nations—including West Germany, India, Japan and Brazil are still on the fence; each of them could produce nuclear weapons, if they were needed.

Although the Atomic Energy Commission did not describe the 1.2 megaton device set off at its Nevada test site as thermonuclear—it called it merely a nuclear test—it is highly unlikely that an explosion of that magnitude was produced entirely by the fission of uranium 235 or plutonium. Most probably it was a combination of fission and fusion, in which a trigger of U-235 is used to set off a hydrogen

thermonuclear reaction. The fusion reaction in turn could cause fission in a jacket of uranium 238, which doesn't ordinarily split but can be made to do so by the high-energy neutrons produced by fusion.

It's this combination that gives the highest yield for its weight—an important consideration in a missile-borne explosive designed to kill incoming weapons over a large area in the outer atmosphere: Spartan's job.

The huge underground test—60 times as powerful as the Hiroshima atom bomb—was preceded by complaints by some scientists that it entailed possible dangers to distant cities and such relatively nearby structures as the Hoover Dam.

Those warnings turned out to be unnecessary, but more serious rumblings have since been heard from other quarters, about whether the underground tests will be adequate to test an ABM warhead.

The trouble is that explosive power is useless in the upper atmosphere where the Spartan would operate. Enemy missiles would be killed either by X-rays or by neutrons emitted from the blast. The range of these two kinds of radiation, and their energy, would characterize the weapon.

Scientists developing the Spartan

warhead will have to extrapolate from the underground measurements to estimate what radiation would be produced in space, and what that radiation would do to incoming missiles at various ranges.

X-ray production is pretty much determined by the explosive yield of the device, so in that regard the bigger the bang, the better. But neutrons from fusion reactions are more energetic than those produced by fission. If neutrons are more important, it might be useful to sacrifice some of the fission yield, and some of the X-rays with it, to produce more energetic fusion neutrons. The delicate balance of fusion and fission reactions is still being determined in the testing program.

This kind of delicate balancing of factors is more difficult to weigh when tests are held underground rather than in the actual operating area above the atmosphere.

The difficulty of developing an ABM warhead with underground tests was one of the chief complaints within the Government against the limited test ban treaty before it was ratified. If the ABM runs into technical trouble—and indications are that it is highly vulnerable to enemy countermeasures—there can be expected a build up of pressure from military leaders in both the U.S.S.R. and this country to test the warheads in the atmosphere—in effect, an assault on the treaty banning them.

CONTRACEPTION

FDA moves to revise labels on the pill

In May 1967 the first of a series of studies on the connection between the pill and thromboembolism were published in the *BRITISH MEDICAL JOURNAL*. They concluded that there is no doubt that some forms of fatal blood clots are associated with oral contraception. More studies corroborating this conclusion were promised (SN 2/3 p. 112).

These studies have now appeared in the *Journal*. On the strength of them the Food and Drug Administration, leaning toward a harder line, has wired the eight leading pill makers asking them to meet with FDA May 8 to discuss prompt revision of their contraceptive pill labels, based on the British warning that there is a cause-and-effect relationship between the pills and thromboembolism.

The latest studies conclude that the risk of illness from deep-vein thrombosis or pulmonary embolism is nine times greater among pill takers than among controls not using oral contraception. Such illness is sometimes fatal. The annual death rate due to pill-caused

clots ranges from 1.3 per 100,000 for younger women to 3.4 per 100,000 for women aged 35 to 44.

An editorial accompanying the reports in the *Journal* says this disease rate is diquieting in view of the fact that the pill is given to healthy patients. The editorial notes that the risk of death in pregnancy from clots alone is higher than the risk from the pill over the same time period. But it questions whether enough unwanted pregnancies are prevented by the pill over other methods to make up for the difference.

"While there is no cause for panic about the possible consequences of widespread use of the present types of oral contraceptives, neither is there room for complacency," the editorial concludes. "The goal (of research) must be effective contraception free from all risk."

A spokesman for Ortho Pharmaceutical Corp., one of the eight pill-makers wired by the FDA, says the British results are interesting but notes that they are derived from after-the-fact studies.