controllers. No individual PNE would be allowed to exceed 150 kilotons, which is to say that the threshold for weapons tests would also apply to PNE's. And, in the event either nation should plan a simultaneous detonation of two or more peaceful devices with an aggregate yield greater than 150 kilotons, the other could have observers present to monitor the event on-site.

With the yield limited to 150 kilotons, no PNE would produce militarily useful information not otherwise obtainable through weapons tests allowable under the TTBT. Also, properly equipped observers present for simultaneous multiple explosions could verify that no individual explosion has exceeded the threshold, something which could not be accomplished by seismic monitoring at a distance.

The negotiations for the PNET began in late 1974 and were not successfully concluded until this past April. The United States would have readily agreed to ban PNE's altogether. After spending more than $160 million on earth-moving (cratering) and gas-stimulation experiments with PNE's, the U.S. government had pretty well decided that their promise was illusory. But the Soviets, who had experimented with a number of different PNE applications, professed an especially keen interest in pursuing grandiose plans to use PNE's for canal building. There might be some simultaneous multiple explosions having an aggregate yield of several megatons, with some individual explosions of up to 400 kilotons or greater. In the hope that they would be able to continue conducting PNE's without restrictions, the Soviets had agreed in principle at the Moscow summit to allow some PNE's to be witnessed by on-site observers, subject to such terms and conditions as the negotiators might later arrive at. And this was, in fact, a significant concession in light of the traditional Russian aversion to the idea of on-site inspections.

But, by the time negotiations for the PNET got under way it had become apparent that the Senate would probably reject the TTBT unless PNE's as well as weapons tests were made subject to the 150-kiloton threshold, with adequate provisions for verification.

The on-site observer provisions ultimately agreed to testify to the delicate balance that had to be struck to satisfy both the U.S. negotiators' insistence on effective verification and the Soviets' insistence on minimizing any American intrusion. For instance, American observers witnessing a Soviet PNE would bring two identical sets of yield monitoring equipment and allow the Soviets to choose the set actually to be used; the other set would be turned over temporarily to the Soviets. This, together with other conditions meticulously spelled out in the treaty, would make any unauthorized snooping hard to get away with.

The nation carrying out PNE's would be required to provide the other party with a substantial amount of geologic, hydrologic, and other data bearing on the interpretation of seismic signals and the measurement of explosive yields. In general, the larger the PNE, the more data required. Such data would be essential to verification because, unlike weapons tests conducted solely at designated test sites (about which there would be information exchanges), PNE's might be carried out under widely varying conditions.

The question whether the TTBT and the PNET represent a gain or a loss for the cause of arms control must be considered from the standpoint of weapons development, nuclear proliferation, and the chances for a comprehensive test ban.

The TTBT would impose some constraints on weapons development, but they would be clearly marginal, especially in light of the numerous kinds of high-yield weapons already in the U.S. and Soviet inventories and of all the testing done between July 1974 and the end of March 1976. During this period, the United States conducted 12 announced tests at yields over 200 kilotons; a number of these tests were at yields of up to a megaton. The Soviets also detonated a number of high-yield devices, including several in the multimegaton range.

From the standpoint of nuclear proliferation, the 150-kiloton threshold does indeed seem to make light of the superpowers' solemn obligation under the Nonproliferation Treaty of 1970 to seek arms reductions and a comprehensive test ban. Furthermore, the PNET in a sense legitimizes PNE's, although it does underscore the fact that a PNE and a weapons test can be indistinguishable.

Arms controllers can only hope that, as some people in the Ford Administration are now suggesting, the PNET's on-site observer and data requirements may discourage the Soviets from undertaking a major program of PNE's. But, if such a PNE program is carried out by the Soviets, this could encourage some nonnuclear nations to develop nuclear devices, either out of a genuine interest in PNE technology or from a recognition that PNE's offer a convenient mask for a fledgling nuclear weapons program.

As for whether the TTBT and the PNET would improve chances for a comprehensive test ban or harm them, one person's speculation may be as good as another's. The treaties would establish a threshold from which negotiators could work downward. But many arms controllers believe that, if the treaties are formally ratified, the U.S. and Soviet governments will not resume serious test ban negotiations during the TTBT's initial 5-year term (renewal is automatic unless either party withdraws).

The treaty does call for negotiations looking toward a comprehensive test ban, but, in light of its other provisions, this has the ring of an empty promise. There is even the very real likelihood that, if the Soviets try to employ PNE's in canal building, they will violate the 1963 test ban treaty. Expert opinion holds that some "venting" of radioactive debris would inevitably occur and that part of this material probably would drift across international boundaries.

Yet, despite all doubts and migivings, if the TTBT and the PNET are sent to the Senate floor this year and brought to a vote, they are likely to be ratified. This is so because even such senators as Edward Kennedy, sponsor of a resolution calling for a comprehensive test ban, are afraid that Senate rejection of the treaties might undermine hopes for further arms control agreements.

On the other hand, there may be a better than even chance that in this election year time will run out before the Senate brings itself to act. Indeed, senators who regard the treaties dubiously may contrive to make this happen. If time does run out this year, the question of ratification will go over until 1977 when a newly elected President will have to review it. If the president should be someone like Jimmy Carter, who favors an immediate moratorium on testing, the treaties' fate will be in serious doubt.

—LUTHER J. CARTER

Clarification: The article, "Pesticides: Three EPA attorneys quit and hoist a warning flag" (19 March) referred to aldrin and dieldrin and heptachlor and chlordane as "two pairs of compounds found to be potent carcinogens." Most uses of both aldrin/dieldrin and heptachlor/chlordane were in fact ordered suspended by the administrator of the Environmental Protection Agency as an "imminent hazard" to human health and the environment. But some readers may take the words "potent carcinogen" to mean that a compound has been determined by federal authorities to be carcinogenic in laboratory animals at relatively low dose levels. No such finding has been made with respect to heptachlor/chlordane.

In the case of these compounds, the administrator overruled the decision of the administrative law judge, who held that to suspend their use as an imminent hazard was not justified. He felt "hesitantly unwilling at this time to find that heptachlor/chlordane are conclusively carcinogens in laboratory animals." The administrator concluded, however, that heptachlor is a carcinogen in both the rat and the mouse. Weighing the risks of continued use of heptachlor/chlordane against the benefits, he decided that most uses should be suspended. His ruling is now under review by the U.S. Circuit Court of Appeals for the District of Columbia.—L.J.C.