News of Science

Test Moratorium Extended; Geneva Negotiations Analyzed in Senate

The President has announced a 2-month extension of the 1-year moratorium on nuclear tests that was scheduled to end on 31 October. The announcement, which was made on 25 August through the State Department, came 5 days after the three nuclear powers—the United States, Britain, and the Soviet Union—had agreed to a 6-week recess of the 10-month-old negotiations for a treaty to end testing. The three-power talks, which have been taking place in Geneva, will resume on 12 October, after the President and Soviet Premier Nikita S. Khrushchev will presumably have had an opportunity to discuss the proposed treaty during their exchange of visits this month.

Treaty Progress

The treaty has 24 articles, and so far agreement has been reached on 17 of them. Broadly, the areas of agreement are as follows. Vienna would be headquarters for a control organization composed of a seven-nation commission, of which the three nuclear powers would be permanent members. An administrator, acceptable to the three powers, would be responsible for operating the control system. There would be 70 to 80 control posts throughout the world, each of which would be staffed by 30 to 40 technicians, plus supporting personnel. The control organization would continuously conduct research to improve the control system. A series of satellites would be launched to assure that tests do not take place in outer space. Other countries may join in the treaty, which would continue indefinitely.

The major areas in which accord has not yet been reached are in the staffing of the control posts, the composition of the control commission, the control system for high-altitude tests, the budget, the equipment at control posts, and the number of on-site inspections.

Humphrey Spokesman for Geneva Talks

Senator Hubert H. Humphrey (D-Minn.), chairman of the Subcommittee on Disarmament of the Senate Foreign Relations Committee, discussed all of these issues in an address to the Senate on 18 August. For months he has been this country's leading spokesman in support of the Geneva conference, consistently pointing out and opposing pressure from the Atomic Energy Commission and the Defense Department for the resumption of nuclear tests. Humphrey has said repeatedly that testing on the part of the United States should not be resumed unless the Geneva test-ban negotiations collapse. In his recent Senate speech he observed: "If tests resume before we know the outcome of the test-ban negotiations the United States will be inviting an outburst of indignation and criticism by the people of other nations."

Humphrey maintains that of all the undecided issues at Geneva, only one really stands in the way of an agreement—that of the number of on-site inspections. He charges that on this major remaining point the United States is in a poor position to negotiate because opinion is divided between two groups—those who are concerned with the risks involved in a continuing arms race and those who feel that there is more to be gained than to be lost by continuing the tests.

Last fall the United States recommended a formula for inspection under which all unidentified seismic events the size of a 5-kiloton explosion or larger, and 20 percent of all events below 5 kilotons, should be subject to inspection. At that time, adoption of this formula would have resulted in about 85 inspections per year. However, after the Hardtack explosions, the figures were revised sharply, so that now the number of inspections would be 366 in the Soviet Union and only slightly less in the United States. Humphrey protested in his recent address that this number, referred to recently by AEC officials, gives the impression that the inspection problem is "so huge that the negotiators might just as well pack up their bags and go home." He then pointed out that at least two-thirds of all earthquakes in the Soviet Union occur in the Kamchatka Peninsula, a very small area, and another 25 percent occur along the southern periphery of the country. The senator believes that a system of representative inspections could be worked out that would greatly simplify the control problem. He pointed out that it would certainly not be necessary to conduct 242 inspections (two-thirds of the number of earthquakes that occur in the U.S.S.R. in a year) in the Kamchatka Peninsula "to satisfy ourselves that the Soviets were not sneaking tests in that area."

Humphrey also suggested that once the earthquake-checking system is installed, more will be known about earthquake patterns, and the identification of nuclear tests will be less complicated.

Executive Branch Criticized

In his comments to the Senate Humphrey was highly critical of the President's role. He said that this country's negotiators are "burdened by obstacles which have been built primarily by the Atomic Energy Commission and to a lesser extent by the Defense Department." He observed: "The AEC is allowed to continue to oppose the official position of the United States and to inject its own views on foreign policy due to a lack of leadership at the top. . . . The President has failed to assert the leadership necessary to reconcile conflicting views." (It was a week later that the President announced the 2-month extension of the moratorium on nuclear tests.)

Humphrey pointed out, further, that one of the recommendations of the Geneva conference of experts last year is being ignored by this country, and that is the possibility of using and re-equipping existing seismograph stations throughout the world. Of the some 650 stations, approximately one-quarter are strategically located. Humphrey proposed that the executive branch recommend that the United Nations establish a special working group to assist other nations in improving and modernizing their seismograph stations.

Another point emphasized in the talk was the government's failure to imple-

ment many of the recommendations of the Panel on Seismic Improvement, of which Lloyd Berkner was chairman. Last year that panel concluded that this country's seismological research should be greatly expanded immediately and proposed a number of important programs, yet the executive branch has not asked for funds to support such work.

Other Aspects Examined

Senator Humphrey put forward still another aspect of the problem in his analysis of the test-ban issues when he urged that the principle of deterrence, the concept underlying other United States defense policies, be applied to the nuclear test control problem. He commented:

"We must accept the fact that we cannot cover every little unidentified event in the Soviet Union to see whether it is an earthquake or a nuclear test. We can, however, demand the right to inspect a certain number of cases on the assumption that such inspections will constitute a spot check system of random sampling which will have a high probability of accuracy and which will deter a nation from thinking a few sneak tests can be held without being caught."

Humphrey emphasized that new scientific data do not preclude the realization of a workable agreement. He pointed out that the scientific problems that have developed during the course of the negotiations in Geneva are not substantially different from those the negotiators faced when the meetings began. He said:

"We knew then that although our techniques of detecting and identifying tests would improve with increased research and knowledge, we would also discover a larger number of natural phenomena with this newer and more sensitive equipment.

"Nothing has changed since last October that justifies our giving up."

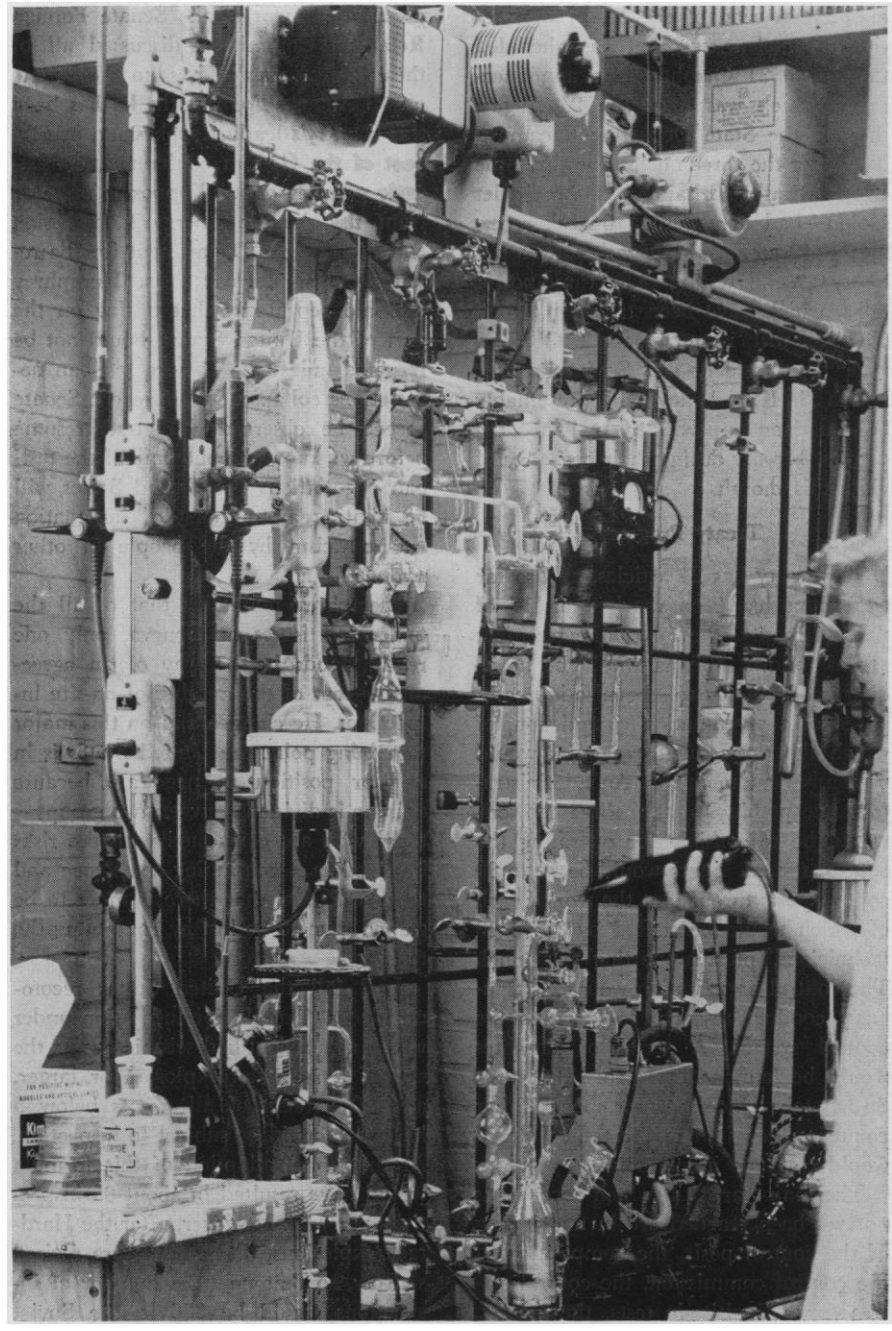
Hydrogen Isotope Studies Applied to Geology

The movement of water in cosmic scale processes and its geochemistry are current projects of the Geochemistry and Petrology Branch of the U.S. Geological Survey. By mass spectrometry, researchers in the nucleonics group are determining the ratios of light to heavy hydrogen in clouds, surface waters, glaciers, rain and snow, and the rocks of the earth's crust in an attempt to learn the earth's past and present water circulation and migration.

Water sometimes takes thousands, even millions, of years to complete the hydrologic cycle from ocean to cloud, to land, to ground water, to surface water, and back to the sea. And in the sea itself there are also known to be large time factors involved in the mixing of the various layers of ocean water and for exchanges with the atmosphere.

Congressional Report Says Current Fallout Not Hazardous but Warns against Test Resumption

On 24 August the Joint Committee on Atomic Energy released a "Summary-Analysis" *of hearings on weapon-test fallout that were held in May before the Special Subcommittee on Radiation. The 42-page report is reassuring about the fallout hazard from past nuclear tests but warns against resuming testing at the level of intensity of the last 5 years. The committee's analysis also points out that*



A U.S. Geological Survey geologist preparing a sample of atmospheric water for hydrogen isotope analysis.