

portant physical and biological systems.

U.S. Navy Capt. T. K. Treadwell, commanding officer of the Naval Oceanographic Office, says of Operation CHASE, "The results could be truly catastrophic." He says the effects could be felt in almost any area along the Eastern coast.

One misconception that must be corrected about the capacity of the north-west Atlantic to continue to absorb the waste of the Eastern U.S., he points out, is the idea that the entire northern part of the ocean is just one big continuous mixing system. Treadwell describes the northwestern Atlantic as a semi-closed circulation system which rotates clockwise between the U.S. land mass and an area approximately in mid-ocean. He says this cyclonic movement of water may be more significant than has been supposed, extending down to the deeper currents, and causing a concentration of contaminants rather than an ocean-wide dispersal.

The Navy has oceanographic data from recent studies of deep currents in the vicinity of the proposed disposal which indicate the presence of underwater turbidity sufficient to transport materials across the ocean floor and even upward at a much faster rate than suggested in the Army testimony.

Following the May hearing, the Army agreed to suspend the gas dump pending the evaluation and recommendations of a special group of scientists appointed by the National Academy of Sciences.

But the Army is impatient with the delay. Beyond the month of September, it says, Operation CHASE would no longer be feasible due to the beginning of the winter storm season in the North Atlantic. And, it will require three summer months for some 20 trains to be loaded at four different chemical munitions stockpiles and brought to Earl, N.J., where the ocean phase of the operation begins. If the academy report is not completed by the end of June, ocean burial would probably be ruled out for this year.

It is going to be close. Having been assembled for only a short while, the NAS scientists have much work remaining, although the chairman of the group, Dr. George B. Kistiakowsky, says that his ambition is to have a final report by the end of June. The scientists are finding no easy task in compiling a comprehensive collection of information covering the many ramifications of the Army's gas dump plans.

One of the most difficult areas to evaluate is the effect of a large volume of various toxic chemical munitions upon the physical and biological systems of the ocean.

As one oceanographer put it, "I don't envy them their job." ◇

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GAS AND GERMS

Policy reevaluation ordered

President Nixon is ordering a Government-wide reevaluation of the U.S. chemical and biological warfare program.

The President's action was relayed to Rep. Richard D. McCarthy (D-N.Y.) last week in a letter to him written by Gerard Smith, director of the U.S. Arms Control and Disarmament Agency. Smith wrote:

"Within the U.S. Government, the control of chemical and biological weapons is a subject of major concern. The President has directed the Executive Branch to undertake a detailed review of chemical and biological warfare, including U.S. position on arms control and the question of ratification of the 1925 Geneva Protocol."

Although the U.S. is publically committed to the substance of the protocol banning first use of chemical and biological weapons, it has never formally ratified it. McCarthy has been joined by 25 other House members in urging Senate ratification of the protocol.

McCarthy also said last week he learned of Defense Department tests with biological warfare agents on Eniwetok Island in the South Pacific. McCarthy says that while the island has no native human population, biological agents could be spread to other islands by migrating birds. He has called for a moratorium on all open-air testing of biological agents by U.S. biological-warfare agencies.

VENUS

Still a mystery

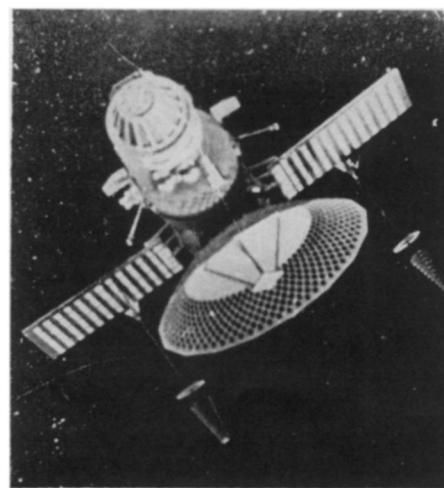
Once again instruments sent to Venus by the Soviet Union have descended through the planet's thick and hot atmosphere. And once again, a trail of confusion and minor scientific mystery has followed.

This time, however, the puzzlement is not over whether the instruments continued transmitting until they reached the surface. When Venera 4 dropped into Venus' atmosphere in October 1967, Soviet scientists steadfastly claimed they had achieved a landing. It took many months of detective work by U.S. scientists (SN: 8/24, p. 179) to show that Venera 4 must have transmitted from about 50 kilometers above the surface down to 25 rather than from 25 down to the surface. The fault probably was with its radio altimeter.

When Venera 5 and 6 entered the atmosphere on the nightside of the planet three days apart last month, there were no similar claims of transmission down to the surface.

In the official Soviet report of the preliminary findings, which was reaching U.S. scientists last week, it is made quite clear that no intact landing was achieved by either capsule. In fact, it is obvious none was expected. Although certain modifications had made the packages more resistant to Cytherian conditions, their collapse limit was about 27 earth atmospheres, far below the pressures expected at the surface.

Most of the data returned by the two new probes tend to confirm or refine measurements obtained by Venera 4, Mariner 5 and ground-based observations.



Novosti Press Agency

Venera model: The altimeter again.

But some perplexity is being caused by a disparity in altitude readings. When both capsules were reporting a pressure of 27 atmospheres, indicating they were at about the same level, Venera 5 registered an altitude of 24 to 26 kilometers; Venera 6 read 10 to 12 kilometers. The descents were over different sections of the planet's surface, leading the Soviet scientists tentatively to attribute the difference to "accidents of the Venusian terrain."

U.S. scientists are highly skeptical. High mountains have been discovered on Mars, but no variations of surface features greater than about 2 kilometers have thus far been measured on Venus by radar.

"This is a much bigger variation in altitude than is considered acceptable,"

says Dr. Francis S. Johnson of Southwest Center for Advanced Studies and head of a panel that advises the National Aeronautics and Space Administration on Venus. He cites the radar studies and theory about how much Venus could be out-of-round; others point to the difficulty of explaining how an extremely hot and probably highly plastic surface could support high mountains.

Dr. Johnson, along with many others, feels Venera 6's altimeter was in error.

But there are warnings as well, from two scientists who have studied Venus' surface features with radar, that skepticism not be unbridled. Dr. Irwin I. Shapiro of the MIT Lincoln Laboratory points out that his measurements of low variations on the surface are confined to within a few degrees of the planet's equator. And Richard M. Goldstein of the Jet Propulsion Laboratory says his group's observations of some surface roughness extend about 35 degrees from the equator, but as yet the equipment is not capable of measuring the elevations involved. "They could be mountains, or craters, or canyons like the Grand Canyon," he says.

The Soviet measurements of temperature and pressure seemed less subject to dispute. The instruments recorded outside temperatures ranging up to 320 degrees C. and pressures to 27 atmospheres, the apparent collapse point. If the readings for Venera 5 are extrapolated from its final reported altitude of 24 to 26 kilometers from the surface, they imply surface temperatures of 530 degrees C., and pressures of 140 atmospheres; an extrapolation of the data of Venera 6, whose lower altimeter reading is questioned, gives 400 degrees C. and 60 atmospheres at the surface.

The atmospheric composition measurements also roughly agree with earlier findings. The concentration of carbon dioxide was 93 to 97 percent, of nitrogen and other inert gases 2 to 5 percent, and of oxygen not more than 0.4 percent. All these refinements fit present theory quite well.

U.S. scientists are pleased to see the oxygen figure expressed as an upper limit. The new limit figure no longer contradicts earth-based spectroscopic measurements which indicate that Venus' atmosphere consists of no more than 1 part in 100,000 of oxygen.

The new probes found a slightly higher content of water vapor in the atmosphere than did Venera 4, and this has caused some surprise. But the new figure, 4 to 11 milligrams per liter, is still not high enough for the formation of water clouds, says Dr. Michael B. McElroy of Kitt Peak National Observatory.

One other puzzling finding is still unexplained. The two probes contained photoelectric sensors designed to register any illumination above a figure roughly equivalent to the illumination on earth at dusk. The sensors were not activated, except for one reading by Venera 5, fifty times brighter than the threshold. Whether this was an instrument malfunction or some atmospheric phenomenon is unknown.

Further analysis is needed, but Dr. Johnson offers the "awfully speculative" idea that what was being recorded was sunlight carried around from the other side of the planet by Venus' super-refractive atmosphere (SN: 11/4/67, p. 439).

If this were true, says Dr. McElroy, it would tend to support the greenhouse effect explanation of Venus' very high temperatures.

This hypothesis is that the carbon dioxide in the atmosphere allows visible sunlight to enter but does not let re-radiated infrared energy escape. A difficulty with the theory is that if the atmosphere is too opaque, sunlight cannot enter at all. The instrument reading might indicate that sunlight does indeed penetrate into the lower reaches of the thick atmosphere.

CONTRACEPTIVES

Further evidence on clots

New evidence strengthens the belief that oral contraceptives are a cause of deep-vein blood clots and cerebral thrombosis (SN: 2/3/68, p. 112).

The new study, reported in the June 14 *BRITISH MEDICAL JOURNAL*, is by M. P. Vessey and Dr. Richard Doll, who also reported similar findings in 1968. The original report included women discharged from hospitals with thromboembolic disease during the years 1964 through 1966; the present study extends through 1967.

Of 84 patients with deep-vein thrombosis or pulmonary embolism, 42—exactly half—had used oral contraceptives during the month preceding onset of their illness, while only 23 of 168 controls, or 14 percent, had not taken them. These figures include the whole period of both studies. Nineteen London hospitals were surveyed, and women 16 to 40 years old were interviewed if they had been discharged with a diagnosis of deep-vein thrombosis, pulmonary embolism or cerebral thrombosis.

Of 19 women with cerebral thrombosis, 11, or 58 percent, had been using oral contraceptives, compared with an expected 3.5 percent from the experience of the control subjects. The clots affected the cerebral arteries rather than the veins in the brain.

BACK CONTAMINATION

Heroes or the plague



NASA

Apollo 11 crew tries new recovery.

From the moment the Apollo 11 astronauts arrive back on earth from their epochal visit to the moon, they will be treated not as heroes, but as bearers of the most virulent, devastating plague the world has ever known.

The extremely minute but nonetheless potentially catastrophic possibility of contamination of the earth by some lunar microorganism against which men have developed no immunity has inspired some elaborate precautions. In Houston, the Lunar Receiving Laboratory has been designed to protect the outside world from even the tiniest contact with lunar material until the moon samples have been declared safe (SN: 6/14, p. 582). But the safeguards will begin well before the LRL is even reached, with an elaborate recovery procedure that begins as soon as the Apollo spacecraft splashes down in the Pacific.

Recently, however, there has been some concern that the National Aeronautics and Space Administration has punched a hole in its own wall of safety.

Originally, the spacecraft returning from the moon-landing mission was to have been picked up with the astronauts—and any dangerous moon bugs—still sealed inside. This would have marked a departure, for plague's sake, from the usual Apollo procedure, in which the astronauts are first lifted from their spacecraft by helicopter to avoid possible hazards in recovering the heavy capsule on unpredictable open seas.

On Jan. 23, however, space officials decided that leaving the men in the spacecraft would be too dangerous, and that the existing procedure, plus some safeguards, would be used. The recovery of Apollo 9, two months later,