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## Waste disposal in orbit

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One problem not completely solved yet by the space agency is what to do with all the trash and waste—up to 6,000 pounds—that will accumulate during the month-long flights of Skylab, the earth-orbital workshop.

Except for samples of human waste taken for medical evaluation, all waste will be placed in a space garbage disposal system—a used liquid oxygen tank. This tank has an airlock, with a double hatch to prevent backup. In the vacuum of space, the wastes will be frozen and then vented to the outside at controlled intervals.

Venting from a spacecraft, however, causes a change in velocity and hence control problems. There is also the possibility of contaminating the Apollo Telescope Mount. To avoid that, and to eliminate the probability of meeting the waste in space, the material might be dumped away from the flight path and out of the way of the telescope. But some space engineers argue that cluttering up the orbit with trash is not good policy, and they are looking for another method.

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## SPACE MEDICINE

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### Weightlessness effects on inner ear

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One effect of weightlessness is a frequent loss of balance or orientation. The system controlling man's sense of balance is centered in the otolith of the inner ear, but how this system responds to changes in gravity is not completely understood. It is known that the sensors of the otolith send tiny pulses of electric current.

Dr. Torquato Gualtierotti of the University of Milan, working with scientists at the National Aeronautics and Space Administration's Ames Research Center, has designed an experiment using bullfrogs, whose otolith system is very similar to man's. Two bullfrogs will be launched into orbit from Wallops Island, Va., Aug. 19, in a 293-pound satellite.

The frogs will be placed in a pressure tank and immersed in water to cushion the vibration forces of launch. Electrodes placed on the otolith sensors of the bullfrogs will measure the frequency of the current they emit during five days in space. This data will then be transmitted to scientists on the ground.

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## JET WAKE TURBULENCE

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### Laser Doppler system

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An aircraft in flight leaves in its wake a sheet of disturbed air which, within a few span lengths, rolls up into a pair of horizontal, tornado-like vortices. This concentration of disturbed air often lasts more than five minutes. It can create severe disturbances to aircraft which are following, resulting in loss of control or crash of the airplane. The problem is also acute at airports, where large jets take off and land within minutes of each other.

Physicists Werner K. Dahn and Robert M. Huffaker of NASA's Marshall Space Flight Center, Huntsville Ala., are developing a laser-Doppler technique to detect and measure the strength of the vortex.

Small dust particles and water droplets in the atmos-

phere scatter a laser beam's light when they are in motion. The instrument can measure the changes in frequency of the scattered light and the difference in frequency between this light and unshifted light to give a direct measurement of the velocity of the atmosphere.

Marshall physicists are designing the system with an eye toward its initial use at airports in wake turbulence detection warning systems.

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## WEATHER SATELLITES

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### From the Pacific to Kansas

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Weather phenomena originating over the South Pacific have moved halfway around the world, across Texas and Mississippi through Kansas and midwest America, pictures from the first of the space agency's Advanced Technology Satellites show. One such weather front created storms and at least 16 tornadoes in its passage.

The South Pacific had not previously been considered by meteorologists to be a source of weather phenomena affecting the United States.

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## JET FUEL

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### Crash fire safety

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The Federal Aviation Administration has awarded the Dow Chemical Co., Midland, Mich., a six-month contract to develop a test formulation of a polymeric hydrocarbon additive for use in controlled-flammability jet fuel for aircraft.

Dow will conduct a comprehensive chemical and physical study of a gelled hydrocarbon to provide improved crash fire and explosion safety.

Dow currently manufactures a glycol ether additive to prevent in-flight ice formation and bacterial growth in fuel systems.

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## APOLLO SPLASHDOWN

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### Navy discovers volcanoes

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As a result of Naval splashdown-and-recovery operations for Apollos 11 and 12, oceanographers have discovered four volcanoes and a volcanic ridge on the sea floor, thousands of feet beneath the surface.

Both moon flights ended with splashdowns directly above an 18,000-foot deep oceanic plain in the Pacific, about 400 miles apart. These plains, however, says Joe Gilg of the U.S. Naval Oceanographic Office, Suitland, Md., are studded with volcanoes and ridges.

As scientists analyzed and interpreted the depth soundings recorded by Naval ships in the splashdown areas, they found several peaks which appear to be volcanic: one peak, 3,600 feet high, about 20 miles northwest of the landing site of Apollo 11 and another 6,600 feet high, about 35 miles northeast of the same site.

A 9,600-foot peak which appears to be a cone-shaped volcano was sounded 50 miles northeast of the Apollo 12 site. According to Gilg, these could be either single volcanoes or a volcanic ridge.

The recovery areas are far off the normal shipping routes where soundings are constantly taken, are giving scientists a look at uncharted areas of the ocean.