Working in a fine rain of black ash perceptible only from a rustling in the foliage and the way it faintly pricks the skin, Burton measured the absorption of the sun's rays passing through the volcano's gas cloud. From this he could decipher the relative amounts of gases—such as sulfur dioxide, hydrogen chloride, and hydrogen fluoride—venting from the volcano.

Sifting through earlier gas data, Burton has found an intriguing correlation. Just 4 days before the eruption began, the ratio of sulfur dioxide to hydrogen chloride rose more than twofold. It remains to be seen whether such a sign will presage future eruptions.

More pressingly, the gas ratios should help researchers gauge the stamina of each of Etna's now five active vents by determining which are drawing from the main magma reservoir. "It's difficult to tell if the main central system is feeding all these vents," says geologist Renato Cristofolini of the University of Catania. Ebbing sulfur dioxide might suggest less welling up and degassing of magma—and the eruption tapering off. A lengthy eruption—such as Etna's last major one, which lasted from December 1991 to March 1993—would be cause for concern, as it would increase the likelihood of lava tube formation. These hardened lava conduits would funnel molten lava faster and farther down the mountain, perhaps threatening towns. So far, however, all signs point to ample magma—and no end in sight to Etna's latest outburst. Although monitoring tools are getting better, says Oppenheimer, "no one could give you reliable odds on how long the eruption will go." –RICHARD STONE

STEM CELLS

Japan Readies Rules That Allow Research

TOKYO—Japanese scientists would be allowed to derive and conduct research on human embryonic stem cells under guidelines expected to be approved this week by a top-level advisory body. Researchers say they are satisfied with the guidelines, which have been drawn up with little of the rancor that has characterized the debate in the United States.

A committee working under Japan's highest science advisory body was set to finalize its recommended guidelines at a meeting scheduled for 1 August. Ultimately the guidelines will have to be approved by the education minister, whose concurrence is widely expected. Barring unforeseen glitches, the guidelines could be put into practice as early as this fall, clearing the way for any researcher in Japan to establish human embryonic stem cell lines and start using them for research. "We can now go ahead in making plans for research in this very exciting field," says Norio Nakatsuji, a developmental biologist at Kyoto University who is likely to be one of the first in Japan to establish such cell lines.

Green light. Norio Nakatsuji is looking forward to creating cell lines under new guidelines.

Human embryonic stem cells, which theoretically can develop into any of the body's cells, may ultimately provide laboratory-grown replacement organs and treatments for such diseases as Parkinson's and Alzheimer's. But embryos are destroyed when stem cells are harvested, making their use ethically controversial. Unlike in the United States, there has been no organized lobbying against their use in Japan, and few politicians have addressed the issue. However, public concern over the possible commercialization of human embryos and potential misuse of the cells has led the panel to recommend tough guidelines. "Strict regulation is necessary to obtain public support," agrees Nakatsuji.

Under the proposed guidelines, all plans to establish embryonic stem cell lines and all research using the cells will have to be approved and monitored by each institution's ethical review board and by a newly established review board under the Ministry of Education, Science, Technology, Sports, and Culture. Researchers must have demonstrated an ability to handle stem cells through prior work with animal stem cells. Stem cells may only be harvested from "spare" embryos resulting from in vitro fertilization. The embryos must be donated, with donors giving written informed consent for their use. Clinics or hospitals planning to gather embryos for the isolation of stem cells must have their own review boards.

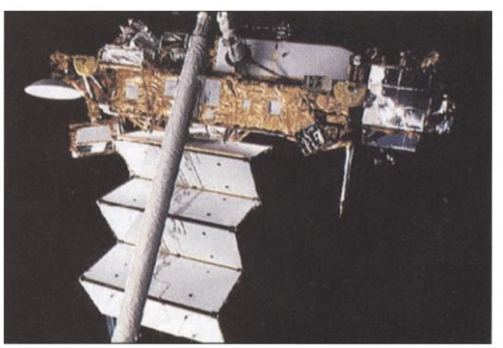
The resulting cell lines are to be used only for basic research. Use of the cells for reproductive purposes, cloning, medical treatment, or drug screening is expressly prohibited. The guidelines apply to both public and private sector research. Public sector violators could lose their funding. Although the guidelines don't carry the force of law, private firms are unlikely to risk the bad publicity that would come with flaunting public policy. As yet, however, the private sector has shown little interest in the field. –DENNIS NORMILE

EARTH SCIENCES

Satellite Shutdown Stirs Controversy

NASA last week abruptly decided to shut down a venerable research satellite that has been gathering critical global climate change data for a decade. The decision, made for fiscal reasons, surprised and angered atmospheric researchers, who were planning a festive 10th anniversary celebration next month for the Upper Atmosphere Research Satellite (UARS).

NASA officials say it's probably only the first in a series of similar shutdowns resulting from a decision several years ago to put industry in charge of satellite operations. The planned cost savings never materialized, however, forcing project scientists to make some tough decisions. "It's not a pleasant situation," says Paul Ondrus, project manager for operational missions at NASA's Goddard Space Flight Center in Greenbelt, Maryland. Now, NASA managers are faced with another



Heads up. The massive UARS satellite, here being placed in orbit, must either be brought back by the shuttle or be left to an uncontrolled descent.

CREDITS: (TOP TO BOTTOM) COURTESY OF NORIO NAKATSUJI; JSC/NASA

tough question: how to bring the school bus–sized UARS back to Earth.

Launched in 1991, UARS is still beaming data from five of its 10 instruments that are monitoring global warming factors, such as water vapor and solar radiation, as well as chemicals, such as chlorine, that destroy stratospheric ozone. The observations have already revealed a mysterious rise in stratospheric water vapor having climate implications and confirmed the peaking of ozone-destroying chemicals due to an international agreement. Although the satellite is well past its 3-year design lifetime, project scientists had hoped to keep it operating until this fall, when the European Space Agency had planned to launch Envisat, a sophisticated environmental monitoring satellite. That would have provided some continuity of data. But the launch has been delayed because of the recent failure of an Ariane rocket.

NASA officials now intend to shut off UARS's instruments next week. "Giving up that overlap is difficult," says Anne Douglass, deputy project scientist. "I'm shocked," says Paul Crutzen of the Max Planck Institute for Chemistry in Mainz, Germany, who shared the Nobel Prize in chemistry for discovering the ozone threat. "It would be a tremendous loss."

NASA also must decide how to dispose of the 7-ton satellite. Most large satellites—such as the Mir space station—are designed so that they can be guided into the Pacific Ocean. But UARS was built in an era when engineers envisioned the space shuttle routinely orbiting and returning scientific spacecraft, and it lacks the thrust capacity to be placed on a path for controlled reentry. The shuttle is now busy building the international space station, however, and it may be tough to reserve one to reclaim a defunct satellite as well as find the $50 million needed for such a mission.

Left on its own, UARS would remain aloft for another 20 years. But a slow decay of its orbit would increase the chances that it would break into large chunks containing toxic batteries and fuel. Alternatively, NASA could adjust the orbit of the spacecraft in the coming year for the best possible flight path and vent the toxic fuel, but a truly controlled reentry is not possible. "There's no guarantee where it would come down," says Ondrus.

The pending shutdown of UARS "puts a downer on our [anniversary] party," says Douglass. "But we're still going ahead. This was a successful mission, and we have a lot to celebrate." **–ANDREW LAWLER**

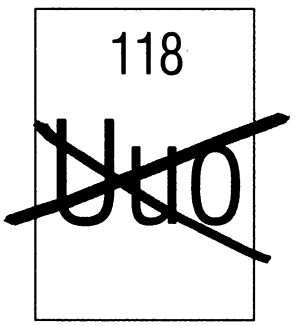
With reporting by Richard A. Kerr.

HEAVY-ION PHYSICS

Berkeley Crew Unbags Element 118

The superheavy element 118 just displayed an exotic property that nobody predicted: the ability to vanish into thin air. Physicists who thought they had created the most massive chemical element have retracted their claim in a short statement submitted to *Physical Review Letters*.

Two years ago, scientists at Lawrence Berkeley National Laboratory in California presented evidence that they had bagged element 118 along with its slightly lighter cousin, element 116 (*Science*, 11 June 1999, p. 1751). The news came as a shock to many scientists in the field, who thought that the method of the Berkeley team—gently colliding krypton nuclei with lead ones in the hopes that the two would fuse—had already been exhausted. "I was really surprised in May of '99," says Sigurd Hofmann, a nuclear physicist at the Institute for Heavy Ion Research (GSI) in Darmstadt, Germany. "If we had believed in fusion to make element 118, we certainly would have tried it here earlier." But in the face of the experimental data—three chains of alpha-particle decays that seemed to indicate the existence of a new superheavy element—teams across the world attempted to replicate the results.



Those attempts, at GSI, the GANIL heavy-ion research lab in France, and the Institute of Physical and Chemical Research (RIKEN) in Japan, all came to naught. But the extreme rarity of the new nuclei left it possible that a slight difference in the experimental setup or even a statistical fluke could be responsible for the failures. "Our experiment really did not disprove Berkeley's detection. There's a relatively high probability that the other experiments would see nothing," says Hofmann. So Berkeley tried, last year and this year, to repeat their own experiment.

They failed. In the wake of that failure, Berkeley researchers went back and reanalyzed their original data. "Those analyses showed that the chains reported are not there," says Kenneth Gregorich, a member of the Berkeley team. Gregorich has little idea what caused the false readings. "One of the possibilities is an analysis problem," he

ScienceScope

Indian Trial Troubles Hopkins Still reeling from a government-ordered shutdown of clinical research on its Baltimore, Maryland, campus (*Science*, 27 July, p. 587), Johns Hopkins University has run into a new furor over a project in southern India. The university announced this week that it has "directed" a faculty member "to cease all activities related to" research on an anticancer drug, after learning from news media of "serious allegations about the conduct of" a clinical trial last year at the Regional Cancer Center (RCC) in the state of Kerala.

According to media reports, RCC radiobiologist R. V. Bhattathiri raised questions about a trial led by Hopkins biologist Ru Chih Huang and RCC director Krishnan Nausing that is testing the use of tetramethyl NGDA to treat oral cancer. Bhattathiri told *Science* that he had alleged that 25 patients did not give proper informed consent, did not receive timely standard therapy, and were exposed to a potentially toxic substance. Indian officials are investigating.

Hopkins learned of the trial in March—and of the allegations on 16 July. It says its researcher reported that Indian authorities had approved the trial and that patients gave informed consent. But so far the school has found no record that the trial was approved by Hopkins officials or by the university's Institutional Review Board, which reviews clinical trials. It's not known whether the project received U.S. funding. Hopkins has appointed a three-member panel of experts "to develop the facts."

SOLEIL Protestors Prevail The French government has backed away from plans to privatize a new materials research center after protests from scientists. Earlier this year, the researchers briefly shut down two instruments to dramatize their opposition to a plan to operate the new SOLEIL synchrotron as a private nonprofit (*Science*, 23 March, p. 2293). The plan made it easier for other nations to participate in the project, but harder for the French scientists to move between jobs at government research centers.

Under a deal reached last week, the researchers—known as "Lurons" because they work at the LURE research center in Orsay—can choose between working for a public or private employer. Either way, most of LURE's 280 staff members are expected to join the SOLEIL's 350-strong payroll by the time the machine starts operations in 2005.

Contributors: Pallava Bagla and Barbara Casassus