
tents nevertheless can be forced to bear the full costs of a cleanup. And not surprisingly, this prompts a lot of litigation—and delay.

There is no guarantee, moreover, that EPA is putting the riskiest dumps on its list. A 1991 report by a committee of the National Research Council, Reilly notes, “said that EPA has no comprehensive inventory of waste sites, no program for discovering new sites, insufficient data for determining safe exposure levels, and an inadequate system for identifying sites that require immediate action to protect public health.”

“The existence of toxic wastes at a site does not necessarily mean that they pose a threat to nearby residents,” Reilly notes. Recent research has shown, for example, that even at Times Beach, Missouri, where the whole community was evacuated, the potential health risks were relatively minor. The 1991 National Research Council report, however, said that while “current health burdens from hazardous-waste sites appear to be small,” prudence demands “a margin of safety.” The EPA’s failure to link costs with benefits, Reilly says, means that will not always happen. When Superfund comes up for reauthorization next year, Reilly says, Congress should direct EPA to end the “crusade” and “focus the program on practical risk reduction.”

A Venusian Catastrophe?

“Did Venus Hiccup or Just Run Down?” by Richard A. Kerr, in *Science* (March 5, 1993), American Assoc. for the Advancement of Science, 1333 H St. N.W., Washington, D.C. 20005.

Geophysicists have generally assumed that Earth and its companion “terrestrial” planets (Mercury, Venus, and Mars) share a basic design—a planetary geology shaped by the steady escape of heat from the interior, its amount only slowly diminishing over the eons. Radar images from the Magellan spacecraft, which has been orbiting Venus since 1990, reports *Science* writer Kerr, have upset this cozy image of the four rocky planets. Venus, it appears, may be a planetary black sheep, “a dramatic exception to the

rule of a smoothly running, steadily slowing planetary heat engine.”

By combining counts of the craters revealed by Magellan with estimates of how frequently meteorites have rained down on the surface, planetary geologists have calculated that the Venusian surface’s average age—the time since it was last wiped clean of craters—is about 500 million years. As an *average*, the figure is not in dispute. According to the controversial interpretation of the Magellan data by Gerald Schaber of the U.S. Geological Survey and Robert Strom of the University of Arizona, Kerr writes, a catastrophic “paroxysm of volcanic outpourings” wiped the face of the planet clean of landmarks some 500 million years ago. “Then, in less than 100 million years—abruptly, in geological terms—the planetary heat engine was throttled back, leaving a barely detectable trickle of lava.”

Many geophysicists remain skeptical. Roger Phillips of Washington University, Kerr notes, sees in the Magellan data not “one global episode of resurfacing [but] a patchwork, in which smaller regions were renewed at different times over Venusian history.” That would suggest that the planet’s internal heat engine kept working slowly and steadily.

Yet another explanation of the Magellan images has been offered by Sean Solomon of the Carnegie Institution of Washington. Like Phillips, he still thinks Venus’s heat engine is intact.

What sets Venus apart, according to his theory, is its blistering surface heat of 475 degrees C., caused by the greenhouse effect of the planet’s thick atmosphere. That heat, when combined with the additional heat flowing from a hotter interior in the distant past, Kerr writes, “could have kept near-surface rock soft well into Venus’ history.” The planet’s shifting surface would have remained smooth, without any catastrophic volcanic outburst. Eventually, perhaps 500 million years ago, as the planet’s interior slowly cooled, the temperature of the crust could have fallen enough to allow the rock to stiffen and resist stresses. No longer would new meteor craters be smoothed over. If that is what really happened, Kerr observes, “Venus could keep its flamboyant reputation—and still be pretty conventional at heart.”