
SCIENCE & TECHNOLOGY

place of craftsmen in preparing and painting miles of wooden gutters. The exhibition hall went up in 17 weeks, surviving (after being moved in 1852) until a fire gutted it in 1936.

With its simplicity of structure and novelty of design, declares Kihlstedt, the Crystal Palace ranks "with a handful of other preeminent buildings such as the Pantheon." It remains a monument to "the time when engineering was throwing off the mantle of intuitive craft to take on that of applied science."

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The Frontier Lives

"Survival of the American Frontier" by Frank J. Popper, in *Resources* (Summer 1984), *Resources for the Future*, 1755 Massachusetts Ave. N.W., Washington, D.C. 20036.

Americans are forever searching for "new frontiers." Meanwhile, says Popper, a Rutgers urbanologist, the *old* American frontier is alive and well.

The end of the American frontier was officially declared by the Bureau of the Census in 1890. By then, thanks to population build-up on the Pacific coast, it was no longer possible to draw the traditional national "frontier line" beyond which there were fewer than two people per square mile. Yet, many pockets of land where population density was below that level remained—and most have survived for a century. Today, about one-quarter (949,500 square miles) of the United States is still technically "frontier."

About half of this territory, 17 percent of the U.S. land area, has never even been surveyed.

Alaska (586,412 square miles) is almost entirely untouched; Nevada is 80 percent "frontier"; Idaho, 44 percent; Montana and Utah, 41 percent. Vast tracts of unsettled land remain in California, Colorado, Nebraska, New Mexico, Oregon, South Dakota, Texas, and Wyoming. Some aspects of the old frontier survive in altered form, according to Popper. Homesteading on federally owned land was largely discontinued in 1934; but several states allow it on land that they own, and the federal government permits it in selected areas, such as Alaska's Kuskokwim Mountains. To apprehend squatters, the U.S. Bureau of Land Management is creating a "contemporary cavalry" of sorts, Popper says. And lands where settlers once warred with Indians, the British, the Spanish, and others now serve as sites for military training exercises and weapons tests.

Obviously, the open lands are not what they were. Agriculture, big mining and timber operations, and public irrigation projects have all left their marks. The defining characteristics of America's remaining wilderness are its harsh terrain and climate, and its lack of water—qualities that have spared it greater encroachment by humans.

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Yet rich resources (notably coal, oil, and natural gas in Alaska) remain largely untapped. Popper cautions, however, that these open lands are neither as fragile as many environmentalists contend nor as ripe for easy exploitation as others suggest.

Before authorizing the 1803 Louisiana Purchase, President Thomas Jefferson prophesied that although it might take Americans 100 generations to settle the West, another thousand generations would be sustained by it. Seven generations later, Popper observes, Jefferson's predictions seem surprisingly close to the mark.

*Cleaning Up
The Superfund*

"After 'Voluntary' Liability: The EPA's Implementation of Superfund" by Carol L. Dorge, in *Boston College Environmental Affairs Law Review* (vol. II, no. 3, 1984), 885 Centre St., Newton Centre, Mass. 02159.

In 1980, Congress passed "Superfund" legislation aimed at cleaning up the nation's toxic-waste dumps. Since then, argues Dorge, a Chicago lawyer, the U.S. Environmental Protection Agency (EPA) has dragged its feet in enforcing the law.

The 1980 statute (officially, the Comprehensive Environmental Response Compensation and Liability Act of 1980) established a \$1.6 billion Superfund that the EPA could draw on to eliminate hazardous-waste deposits. The Superfund would be replenished by reimbursements from industrial polluters. The law also empowered the EPA to take "emergency action" by suing suspected offenders to force them to conduct and pay for their own cleanups. In Dorge's view, the EPA has used this provision as a way to avoid carrying out its full responsibilities.

As of August 1984, the Superfund had disbursed only \$360 million. The EPA itself estimates that outlays of up to \$16 billion will eventually be needed to complete Superfund's mission. Even the replacement of controversial EPA head Ann Gorsuch Burford with William Ruckelshaus in May 1983 failed to accelerate the agency's efforts.

Instead, the EPA has relied heavily on its emergency powers, threatening alleged polluters with lawsuits to get them to agree out of court to "voluntary" toxic-waste-control efforts. One reason the EPA prefers using the emergency rules is that they make suspects' liability easier to prove: Dumping *any* toxic wastes leaves a company liable under the emergency rules, while to be reimbursed for Superfund outlays, the EPA has to prove that a suspect's wastes are "harmful." Often, Dorge suggests, both the innocent and the guilty are dragooned into out-of-court settlements. They settle because it is cheaper to do so; but low-cost toxic-waste cleanups also mean less effective ones.

Congress never meant the EPA to use its emergency powers either to force industry to play by two sets of rules or to skimp on cleanups, Dorge contends. Using the Superfund as intended, she argues, would be good for both industry and the environment.