

## Strict rules don't scare industry away

"My study does not support the contention that environmental regulations will lead to significant shifts in the location of industry within the United States," Howard A. Stafford says. Through interviews with decision-making executives of 500 U.S. firms, the University of Cincinnati researcher found environmental rules had no systematic effects on either the size of the search for a new manufacturing site nor on the number of sites seriously considered. Regulations also had no systematic influence on the size of facilities built nor altered decisions to expand existing plants versus building new ones.

For medium and large corporations building new branch plants, environmental laws were "consistently overshadowed" in importance by factors such as labor availability and access to markets or raw materials. This helps explain, Stafford says, why California, with a reputation as the nation's most environmentally difficult state, led the nation in industrial growth during the 1970s. His research, performed for the National Science Foundation, also showed that when environmental rules were important, uncertainties about whether permits would be issued and the time permitting would take proved more important to site selection than the direct cost of pollution-control equipment needed to comply with environmental regulations.

## Soybean predator prefers polluted air

Sulfur dioxide (SO<sub>2</sub>) really seems to have it in for soybeans—a crop whose annual cash value (\$14 billion) accounts for more than one-fifth the total value of all U.S. farm crops. Four years ago, research blamed SO<sub>2</sub>—a major combustion pollutant—for stunting soybean growth (SN: 3/17/79, p. 169). Now research by Patrick Hughes of the Boyce Thompson Institute in Ithaca, N.Y., shows that the plant's primary insect pest actually thrives better in an SO<sub>2</sub>-polluted environment than in clean air.

Hughes fumigated test plots with 0.14 parts per million SO<sub>2</sub>—well below the federal secondary standard of 0.5 ppm. (Secondary standards are designed to protect the *environment* from air pollution, and are usually looser than those assigned to protect human health.) Mexican bean beetle larvae were placed on the plants and allowed to mature. Hughes found that beetles dining on fumigated plants grew larger than those dining on unfumigated soybeans. Even worse for the poor soybean, female beetles fed a polluted-bean diet produced twice the eggs of their counterparts munching in the unfumigated environment.

## Radiation and the central nervous system

The central nervous system (CNS) in mammals appears to be more sensitive to single, sublethal radiation exposures than was generally held. "If this is the case," write Henry Wixon and Walter Hunt in the June 3 *SCIENCE*, "then a radiation-induced disruption of a fundamental CNS process is possible that could affect individuals at far lower doses than previously believed, perhaps even at doses commonly used for therapeutic purposes."

In studies at the Armed Forces Radiobiology Research Institute in Bethesda, Md., Wixon and Hunt measured how radiation dose altered the uptake of sodium through "sodium channels" present in detached nerve-cell endings (derived from rat brains). A strong solution of veratridine, a poisonous alkaloid extract from certain seeds, is known to stimulate the opening of channels, permitting sodium uptake. At doses between 10 and 1,000 rads of high-energy electrons, the chemically-stimulated sodium uptake decreased in a dose-dependent manner from 13 to 60 percent, respectively. It's likely, the researchers say, that radiation is disrupting sodium-channel function—perhaps by reducing the number of channels that open upon chemical stimulation, or by somehow restricting the extent to which channels can open.

## El Chichón particles penetrate Arctic

While sampling Arctic air for signs of pollutant haze (SN: 1/29/83, p. 69; 4/9/83, p. 229), scientists have found heavy concentrations of sulfur droplets in the stratosphere, the upper layer of the earth's atmosphere extending from about 10 to 50 kilometers above the earth. The abnormally high amounts of sulfur-laden dust—more than 2,000 particles per cubic centimeter rather than the typical 35 parts—have been linked through laboratory analyses to the vast injection of gas and volcanic debris from the eruption of El Chichón in April 1982 (SN: 5/15/82, p. 326; 8/21/82, p. 121). The National Oceanic and Atmospheric Administration reports that the sulfur may cause a slight increase in acidity of rain—an effect that probably will be felt more in isolated areas than in urban areas already polluted. The researchers decided to look specifically for the El Chichón debris after readings from the National Aeronautics and Space Administration satellite Nimbus-7 showed that tongues of air from the stratosphere over the Arctic might penetrate into the lowest atmospheric layer, the troposphere. Such mixing is the process through which the stratosphere is recycled. During the two months of flights for the Arctic haze investigation, three such injections of stratospheric material were sampled at altitudes as low as about 5.25 km, reports Melvyn Shapiro of NOAA's Environmental Research Laboratories in Boulder, Colo. Russell Schnell of the University of Colorado in Boulder heads the Arctic haze project. Data collected will be used to help learn whether gas and dust from El Chichón and the seasonal build-up of soot over the Arctic affect the earth's climate.

## Fletcher's Ice Island: Found & lost?

For 25 years Fletcher's Ice Island provided a home—albeit a frigid one—for Air Force, Navy and National Oceanic and Atmospheric Administration research parties based in the Arctic. The island was abandoned in the mid-1970s, but not forgotten. Using satellite photos, the Navy Arctic Research Laboratory tracked the 7- by 3-mile chunk of freshwater ice as it made its way through the saltwater ice pack, but lost the island six months ago. Then, during flights over the Arctic to sample a seasonal layer of pollutant haze, NOAA pilot Dave Turner spotted the island about 150 miles from the North Pole near the International Dateline. The island is found, but not for long. Joseph O. Fletcher, the now-retired NOAA researcher for whom the island is named, still follows the movements of his icy namesake. He predicts that within several months currents will carry the island into the Greenland Sea and on into the North Atlantic. There, warmer waters will guarantee that Fletcher's Ice Island disappears for good.

## Earth science briefs

- At the insistence of company and city officials desiring more detailed hurricane information, beginning Aug. 1 the National Weather Service will issue odds on a hurricane striking a particular location. Meteorologists have used the percentages but have not made them public until now because it is still difficult to predict as far as 72 hours in advance the movement of the capricious, massive storms.
- A new satellite, GOES 6, recently began transmitting weather data to forecasters whose work has been hampered since the GOES West satellite failed last November. Meteorologists were forced to rely on the GOES East satellite, which transmits photos only of the eastern United States and the Atlantic Ocean. From its circular orbit 23,000 miles over the equator, the \$40 million GOES 6 (later to be renamed GOES West) photographs storms moving across the Pacific at night. By traveling at the same speed as the earth, the satellite maintains a stationary perch about 4,000 miles southwest of San Francisco.