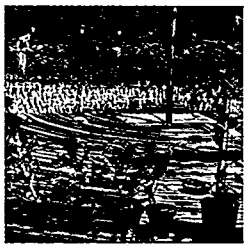


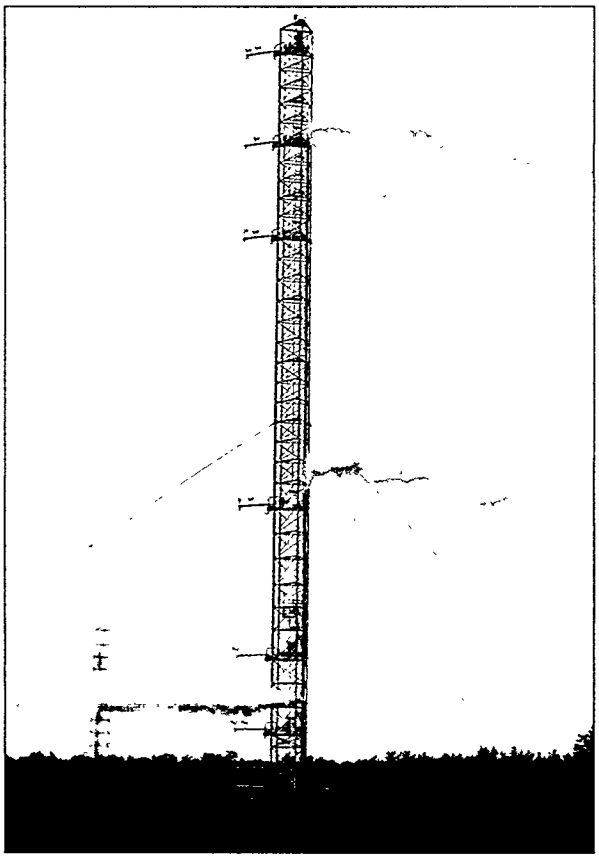
1949 Brookhaven scientists began a thirty-year program aimed at assessing the effect of radiation on living plants. Much of the work would take place at the cultivated Gamma Field, established in 1951. Results here and at Oak Ridge would confirm Brookhaven predictions that relative radiosensitivity among plant species varies with nuclear volume and chromosome size.

1950 Using phosphorus-32 in a Connecticut lake, Evelyn Hutchinson at Yale documented the quantitative cycling of the element—an essential and often limiting nutrient—within a lake ecosystem.

1951 The AEC supported the establishment of the Laboratory of Radiation Ecology at Savannah River, directed by Eugene Odum of the University of Georgia.

sions and industrial pollutants.

A natural part of the effort to understand atmospheric dynamics was the use of tracers to track the movement of materials, both locally and around the globe—not unlike the use of radionuclides to follow dynamic processes in the human body. Early "tracers of opportunity" included such natural constituents of the atmosphere as spores and ozone, as well as power plant emissions and debris from weapons tests. In at least one case, a nuclear weapon was even "salted" with tungsten, which could be conveniently traced around the world. Today's experiments in the outdoor laboratory are more benign. In the seventies, inert chemical tracers were developed at the ARL facility in Idaho Falls, at the Environmental Measurements Laboratory, at Brookhaven, and at Los Alamos. Together with ultrasensitive detectors, these tracers are now used in dispersion experiments extending up to 2500 kilometers.



THE WAY THE WIND BLOWS Early research aimed at improving models to predict the near-surface dispersion of pollutants relied in part on special meteorological facilities such as this one at Brookhaven. On this particular day, as shown by the three plumes, the wind was blowing in different directions at three heights above the ground—a worst-case scenario for the spread of airborne materials.

Early AEC studies of cloud chemistry evolved no less dramatically. The initial studies focused on the scavenging and deposition of airborne radionuclides, but by the seventies, concerns had shifted to industrial pollutants. In this new era of environmental awareness, acid deposition—more popularly, acid rain—promptly blossomed into an international issue, blamed for the decline of forests, damage to aquatic ecosystems, and human respiratory illness. In the mid-seventies, building on the earlier AEC studies, ERDA scientists were among the first in the U.S. to tackle this problem. In 1976 ERDA established the Multistate Atmospheric Pollution Power Production Study, a program of atmospheric experimentation and modeling that focused on the regional transport and chemical transformation of emissions from oil- and coal-fired power plants. Working with the Environmental Protection Agency and the Electric Power Research Institute, this program provided part of the justification for subsequent controls on sulfur emissions from power plants. Then, in 1980, as part of the ten-year, multiagency National Acid Precipitation Assessment Program, OHER established the Processing of Emissions by Clouds and Precipitation program, which focused three decades of research experience on the acid rain issue.

A CHANGING CLIMATE

In the area of atmospheric studies, the legacy of the fifties and sixties has thus been especially fertile. But perhaps the richest payoff has been a heightened awareness of our atmosphere's complexity and, in