and to open up space for more public facilities, artworks, and sunlight.

Although the new guidelines are stringent, they are designed to slow, not stop, business district growth. By the year 2000, total downtown office space and employment are projected to rise by 21.7 million square feet and 91,000 jobs, respectively. The Planning Commission hopes the new rules will cut the rate of annual growth by anywhere from one-third to one-half and encourage some businesses to settle outside of the city.

Oil and Water Sometimes Mix

"Oil Pollution: A Decade of Research and Monitoring" by John W. Farrington, in *Oceanus* (Fall 1985), Woods Hole Oceanographic Institution, Woods Hole, Mass. 02543.

There are few environmental disasters that spark more public alarm than does an oil spill.

During the 1970s, a series of spectacular oil tanker mishaps—including the 1978 *Amoco Cadiz* spill off the French coast and a 1979 oil well blowout in the Gulf of Mexico—prompted environmentalists to issue dire warnings about the state of the world's oceans. But their fears, reports Farrington, a chemist at Woods Hole Oceanographic Institution, have not been realized.

In a report released last April by the National Research Council (NRC), more than 100 oceanographers offered "cautious optimism" about the ability of sea life to recover from petroleum toxicity. Underlying their rosier assessment, notes Farrington, was an "increased understanding of how the marine environment copes with oil."

Researchers now know that man is not the only one to sully the ocean with petroleum. Seepage from natural reservoirs beneath the ocean floor is also responsible, as is the erosion of sediments (such as shale) that contain petroleum-like hydrocarbons. All told, Mother Nature annually releases between 250,000 and 2.5 million tons of oil into the oceans. By contrast, man's *accidents* account for only an estimated 420,000 tons per year. A large fraction of oil pollution in the oceans, observes Farrington, can be attributed to "the chronic dribbling of petroleum from sloppy use by modern society." Municipal and industrial wastes, normal tanker operations, ships' bilges, and other non-accidental sources annually release more than 2.3 million tons.

What happens to oil in salt water? At first the two liquids do not mix, says Farrington. But over several months, the wind, waves, sun, and microorganisms gradually break down much of the petroleum mixture. Some chemical components dissolve; others evaporate. Another portion soaks into (or clings to) floating particles, which then sink to the ocean bottom. Chunks of the remaining residue end up as tar. But petroleum products can vary widely in composition, he cautions, making generalizations about their degradation troublesome: Sometimes 11 percent of the oil decomposes, sometimes 90 percent—depending on what has been added to it.

In terms of human health, the greatest threat from petroleum pollution comes from contaminated seafood, which can be laden with cancer-causing

chemicals (mainly "polynuclear aromatic hydrocarbons"). A daily diet of such seafood could pose potentially about the same risk as smoking two packs of cigarettes a day.

Farrington stresses that the optimistic conclusion of the NRC's 1985 report does not justify continued dumping of petroleum products into the ocean. Rather, the council has assessed the pollution damage done so far—prior to urging more sophisticated precautions in the future.

The Price of Poor Farming

"Environmental Limits: The New Constraints" by Sandra S. Batie, in *Issues in Science and Technology* (Fall 1985), 2101 Constitution Ave., Washington, D.C. 20418.

The Great Farm Shakeout, as the newspapers call the current agricultural crisis, has awakened America to the financial mismanagement of many of the nation's farms. Yet money troubles are only half the story, contends Batie, an agricultural economist at Virginia Polytechnic Institute.

Batie argues that sloppy, shortsighted farming practices have damaged untold acres and increased the pollution of air, land, and water. Such adverse environmental effects, in turn, have made the public far less sympathetic to the farmers' plight than it was a decade ago.

Take, for example, some of modern agriculture's side effects. Excessive farming of wheat, corn, soybeans, and cotton has led to extensive topsoil erosion—almost three billion tons per year—and has reduced the value of agricultural output by some $40 million annually. It is especially shameful, Batie adds, since "effective techniques to combat erosion are available." Conservation tillage, contour planting, strip cropping, and terracing are measures known to reduce erosion rates by 60 to 90 percent.

Pesticide, herbicide, and fertilizer residues have contaminated, according to a U.S. Geological Survey study, an estimated 20 percent of U.S. wells with nitrates, which are potent carcinogens. Iowa and Florida are among the states hardest hit: The Iowa Geological Survey found residues of pesticides such as Atrazine, Sencor, and Bladex in more than two-thirds of the wells in northeastern Iowa. And in Florida's citrus growing regions, pesticides such as ethylene dibromide (EDB) have turned up in the drinking water.

Poorly managed irrigation has led to ground water pollution in California and several High Plains states—Nebraska, Kansas, Colorado, Oklahoma, and Texas. Runoff water from croplands can accumulate not only pesticide residues but also toxic levels of salts and minerals. Witness the debacle in California's San Joaquin Valley, says Batie. There, agricultural drainage carried salts, heavy metals, and selenium into the reservoir at the Kesterson National Wildlife Refuge. By February 1985, the pollution had become so bad that the "refuge" was declared a "toxic dump." In 1980, high levels of salinity in the Colorado River cost regional taxpayers more than $100 million from tainted soil, killed crops, and water treatment costs.

For rural pollution, Batie does not hold America's farmers wholly responsible. The government, she contends, has done its bit to encourage environ-