Water cleanup not so clear

The United States has made significant progress in the cleanup of its rivers, lakes and estuaries, mostly for fishing, swimming and the propagation of aquatic life, according to an Environmental Protection Agency (EPA) report submitted to Congress last week. However, "a number of serious problems remain to be solved," the report says, "in particular the cleanup of toxic substances in fish, sediments and water; the management of nonpoint [untrackable] sources of pollution; the protection of groundwater; and the continuing need for maintaining and improving levels of water quality and waste treatment in the face of resource shortages."

According to the report, which summarized information provided by 47 states, "significant improvements in water quality" include the fact that 73 percent of assessed river miles, 78 percent of assessed lake acres and 82 percent of assessed estuarine and coastal waters were safe for "designated uses," primarily swimming and fishing. And these improvements, the report says, are mostly attributable to the pollution control programs instituted under the 1972 Clean Water Act. However, these controls and monitoring activities have been aimed primarily at oxygen-consuming substances, such as sewage, says Fred Leutner, deputy director of EPA's Monitoring and Data Support Division. "Our information on toxic pollutants is not as complete as we would like to have — and an improved understanding of toxics may well change some of these designations for the worse," he says. According to the report, "Information on the pervasiveness and effects of toxics on the aquatic environment is not yet complete but will improve as toxics monitoring programs are developed."

The problem of inadequate monitoring was also cited in a separate study of New York's Hudson River released this week by Inform, a New York-based research group. "Files obtained from state agencies ... revealed extensive errors and inconsistencies and missing facts" about what toxic sources affect the Hudson, according to the report. From the information provided in the files, "no judgments can be made on the quantities of individual chemicals released into the Hudson, nor on whether releases have increased or decreased over the last six years," says the report. "Of the 555 chemical streams we identified going into the river, we were not able to quantify the amounts of toxics released for 310," says Joanna Underwood of Inform.

Inform did find that at least 771,000 pounds of oil and grease were released into the river during 1982, "making it by far the most widely and heavily discharged pollutant." — *J. Mathewson*

Chemical study zeros in on deep magma

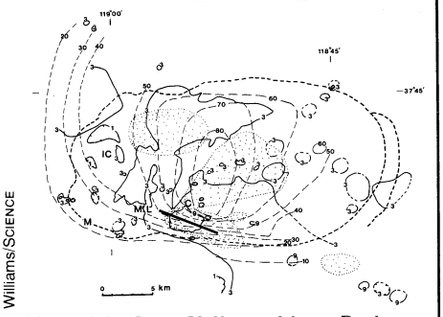
On the south side of the Long Valley caldera in California lies a patch of land that looks geologically innocuous. Unlike the Inyo craters to the northwest, which were the sites of the last Long Valley eruption 550 years ago, this southern region is not laced with obvious surface faults. And without geothermal vents steaming with gases from below, it is not the kind of region in which geochemists go hunting for chemical clues of magmatic rumblings underfoot. But results of a new study show that this is precisely the region that is shrouding underlying magma movement, making it the Long Valley site with the greatest potential of volcanic activity.

What makes this geochemical study different from most others conducted at the Long Valley caldera — a basin-shaped volcanic depression — is that it measured radon levels in soil gas at 600 sites spread over the entire caldera. "By sampling the whole caldera, we didn't presuppose that we knew where the area of interest would be," says Stanley Williams, who conducted the study.

Moreover, by measuring mercury as well as radon, Williams, a volcanologist at Louisiana State University in Baton Rouge, was able to distinguish areas permeated by gas flow today from those still saturated with chemicals from past gas movement: High levels of radon, an inert and very short-lived gas, should reflect ongoing geothermal convection, whereas mercury, which is reactive and can accumulate on soil grains for hundreds of years, marks regions where heat from buried magma may have been rising for a long time.

Williams identified three areas with pronounced mercury levels, all of which seem, on the basis of seismic data and other considerations, to overlie large magma bodies. He also reports in the Aug. 9 SCIENCE a few regions with elevated radon concentrations. One area coincides with a mercury high over the "resurgent dome" into which magma was thought to begin to move in 1980.

But the area containing the highest radon concentration by far — measuring more than nine times more than background values — lies in the southern moat of this dome, a "monotonous flat piece of land" devoid of any apparent geothermal activity or faults, according to Williams. Strangely, Williams found that mercury concentrations in this region were abnormally low compared with both background levels and concentrations measured there 10 years ago.



Williams/SCIENCE

Map of the Long Valley caldera. Radon highs are marked by continuous lines, magma bodies by stippled areas, seismic swarm by hatched area, a projection of a dike by a continuous heavy line and uplift by light dashed lines. Letters mark various geographic locations.

Most significantly, this radon-high and mercury-low zone is situated just where geophysicists had noted a number of seismic swarms and a high rate of deformation in 1982 and 1983 — around the time when Williams was in the field. Two of these geophysicists subsequently postulated that a dike of magma had moved up to within 3 kilometers of the southern moat floor.

Williams believes the intrusion of the hot dike upset the caldera's geothermal system, sending steam and gases up to the southern moat. Radon, carried by the upwelling steam, makes it to the surface but for some reason the mercury does not. Williams suspects that the mercury is precipitated out as mercury sulfide when the hot plume encounters cold or strongly oxidized water near the surface.

The agreement between the geophysical data and his study, Williams believes, demonstrates that geochemistry is as important as geophysics in volcano hazard evaluation. "This shows that the radon and mercury, chemicals I'm measuring at the very surface of the earth, are responding not to very shallow phenomena — the hydrology of the caldera or local surface faulting — but they're apparently reflecting deep-seated events," he says.

—*S. Weisburd*

Ohio radiotelescope saved

The radiotelescope belonging to Ohio State University (OSU) that was threatened with destruction (SN: 2/12/83, p. 101) has been spared for at least 10 more years. Originally a joint property of OSU in Columbus and Ohio Wesleyan University (OWU) in Delaware, Ohio, the telescope stands on land that belonged to OWU and was sold to the Green Highlands Ohio General Partnership, which planned to develop the land. By an agreement between OSU and the partnership, OSU will take a 10-year lease on 10 acres on which the telescope stands, with an option of renewing for another 10 years. □