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*LaDou examining semiconductor worker for lung disease: Only the tip of the iceberg*

## Toxic Trouble in Silicon Valley

They are the gleaming symbols of the postindustrial workplace: the factories of California's Silicon Valley where men and women wearing white gowns work in "clean rooms" making the computer chips of the technological revolution. But too often, it is the well-being of the chip that is being protected—not the health of the worker. Despite its clean, nonpolluting image, the semiconductor business "provides a complete spectrum of occupational hazards . . . including exposures to chemicals, gases [and] metals," writes Dr. Joseph LaDou of the University of California, San Francisco, in the current Technology Review. Even worse, there are growing indications that a few less responsible firms are actually hiding evidence of the hazards.

Industry spokesmen insist they are the victims of a bum rap. Thomas Hinkelman of the Semiconductor Industry Association (SIA) charges that health scares come from "people associated with attempts to unionize the industry," which he claims "ranks among the best" in health and safety. But the criticism is mounting. "We think there is an immense problem and we've managed to expose only the tip of the iceberg," says Gayle Southworth of the Santa Clara Center for Occupational Safety and Health. Finding out how big the iceberg is hasn't been easy. Lawyer Amanda Hawes, who handles workers' compensation cases, obtained records from one company that showed numerous leaks and accidental exposures to dangerous chemicals. Yet the firm did not always tell the workers they had been exposed. In another case, when one patient of occupational-health specialist Dr. Molly Coye of UCSF asked his firm about the amount and kind of chemicals he had been exposed to, he was fired.

There is no question that workers come in contact with enough toxic materials to

irritation of the bronchial passages, that result from inhaling acid vapors.

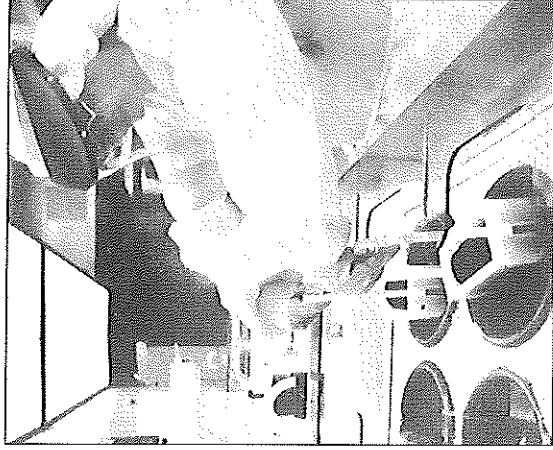
Long-term effects, which are harder to predict, are even more worrisome. Although a number of solvents are known carcinogens, cancers often take decades to develop. Solvents have also been shown to kill embryos in lab animals, a reproductive hazard that bodes ill for an industry where the majority of factory workers are women. Even industry consultants admit that the effect of chronic exposure to chemicals is a question mark. Donald Lassiter, an SIA consultant, concedes that, for the long term, "there is not enough information to tell what is happening in the workplace."

**Handcuffs:** In fact, what information does exist may not be reaching the scientists who need it to evaluate the risks. In-plant nurses are seldom trained in toxicology and so do not always spot illnesses from chemicals. In one case, worker Anita Zimmerman, 32, says she was "exposed to chlorine gas every day for over a month" at her job with Advanced Micro Devices, Inc. in Sunnyvale, Calif. An industrial-health clinic told her, after one particularly high exposure forced evacuation of part of the plant, to "gargle with sugar water and take cough syrup," she recalls. Zimmerman now suffers from a form of bronchial asthma that leaves her gasping for breath. In addition, private physicians charge that their industry counterparts do not properly publish reports of occupational disease because the firms "put velvet handcuffs" on them—pressure to maintain the industry's clean image. This suppression of information makes determining which exposure causes which illness a mission impossible.

Recently there also have been signs that industry is changing the rules of the game. Two years ago California officials noticed an abrupt decline in the rate of illness among semiconductor workers, which in 1980 was three times as high as illnesses in general manufacturing. "After the rate dropped we were told anonymously that they were using a different definition of illness," says Karen Jones of the CDIR. What happened was that one-time events like inhalation of arsine gas were no longer being recorded as illnesses even if the worker showed symptoms of chemical exposure. Lassiter, the SIA consultant, argues that the semantics switch did away with "overreporting."

The greatest hope for workers' health may be that, as the industry matures, it will pay more attention to safety. And workers' compensation cases may spur companies to improve protection for employees. Until occupational diseases are investigated fully, however, more workers will become guinea pigs. That may spark a sense of *déjà vu* among veterans of the war for occupational health in other industries. But the fact that workers' health is being threatened in semiconductor factories could prompt second thoughts about embracing Silicon Valley as the model for the postindustrial age.

SHARON BEGLEY with JOHN CAREY



*Etching silicon with acid: Guinea pigs?*