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Chemical Pollution

High-Tech: a Stain on a 'Clean' Field

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SAN JOSE—While installing a new storage tank near the Fairchild Camera & Instrument Corp. semiconductor plant here, construction workers were stunned to see the rich, black soil of the fertile Santa Clara Valley give way to a soggy, smelly, rust-colored muck.

Fairchild, too, was stunned. So were state pollution officials. And people living nearby.

The soil, they all soon discovered, had been discolored by 58,000 gallons of toxic chemical solvents that had leaked from another storage tank nearby—and crept into the drinking water of the pleasant, middle-class community across the street.

That find, in November, 1981, was the first evidence that the renowned electronics plants of the Silicon Valley had a pollution problem, a problem serious enough to endanger the very orchards, housing tracts—and people—among which the factories are spread.

Other Contamination

The problem is not confined to this part of the San Francisco Bay Area, however. Ground-water supplies in both the San Fernando and San Gabriel valleys of Los Angeles County have been similarly polluted. And communities across the country are discovering that computer-chip makers and other high-technology companies—once trumpeted by environmentalists and industrialists alike as a "clean" alternative to pollution-prone heavy industries—are proving not as environmentally sound as once believed.

"You often think of them as clean industries because you don't see belching smokestacks or anything that would visually offend you," said Paul Williams of the California Department of Health Services. "But they use all sorts of very toxic and dangerous chemicals."

Not only chemicals, but hazardous gases, too, and both of these materials—some spiked with equally toxic heavy metals—have found their way into the soil, ground water and air.

Poisoned Ground

High-tech industries use hazardous materials in a variety of ways. Computer-chip makers, for example, use arsine and other toxic gases to etch the silicon wafers on which they print miniaturized circuits. Chemical solvents are used to keep components clean. Heavy metals and acids are employed to electroplate some parts.

Here in the Santa Clara Valley, the archetypal "Silicon Valley" success story, California health officials have found 64 firms that, by spilling a variety of toxic chemical solvents, have poisoned the ground on which they sit and threatened drinking water.

State officials applaud the industry for moving swiftly to mop up the spills, but they warn that accidental spills are only half of the high-tech toxic-waste problem. There also is the question of what to do with the plentiful and poisonous wastes that are not spilled, but are the normal result of high-tech manufacturing processes and must be disposed of.

These wastes, they said, are as
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difficult to handle as toxic wastes from traditional heavy industries.

The precise volume of hazardous waste generated by high-tech firms is unknown, but UC Davis researchers estimate that the electronics industry alone disposed of 65,000 tons in California's hazardous-waste landfills in 1980. Ancillary industries serving high-tech firms—electroplaters and plastics companies and the like—add even more to the total.

Massachusetts, another high-tech haven, has noticed that a large portion of the toxic waste generated there is attributable to the growing number of high-tech firms strung along Highway 128 near Boston. "We have a considerable problem here," one state engineer said.

In Sacramento, Aerojet General Corp., a major defense contractor that manufactures guided missile components, has been accused by the state of dumping as much as 20,000 gallons of toxic waste solvents into unlined pits each day. Drinking-water wells in the area have been contaminated with suspected carcinogens at levels up to 120 times those considered safe by state health authorities.

Oregon officials, who look to high-tech to bolster the sagging lumber industry, have found that the new industries have come at a price. "High-tech firms, while frequently described as clean industries, are as an industrial class one of the largest generators of hazardous wastes in the state," said William Young, director of the Oregon Department of Water Resources.

Despite these problems, high-tech companies—computer manufacturers, pharmaceutical houses, aerospace firms and the like—still are courted by ambitious

business groups and politicians. April Young of the Fairfax, Va., Economic Development Agency said that of all of the country's 4,500 development consultants, "it's fair to say that every one of them is after high-tech."

Some are not aware of serious pollution problems, Young said. Others believe that such problems are manageable. Most accept the potential for pollution as the price one must pay for new jobs and tax revenue.

"People in Oregon, given the economic situation we have experienced in the last few years, are welcoming that high-tech kind of activity," said Young, the Oregon

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water-quality official and former director of the state's Department of Environmental Quality.

That attitude surprises some people familiar with high-tech companies.

"It's completely crazy, this rush by everyone to hustle high-tech," said Amanda Hawes, a San Jose attorney who specializes in lawsuits against companies accused of spilling hazardous chemicals. "People are falling all over themselves to give these companies what they want, but you don't see anybody stopping to ask, 'What are some of the problems?'"

"It is absolutely nuts," said Ted Smith, another San Jose attorney who heads the Silicon Valley Toxics Coalition, a collection of environmental and labor groups. "If people here had had any idea what they

were buying into when these companies first came, they never would have allowed it."

"When a spot check shows that 70% of the tanks leak, it's going to be a problem wherever the industry goes," said Peter Cervantes-Gautschi of the Santa Clara Central Labor Council. "The ostrich approach—head in the sand, ignoring the problem—just isn't going to work."

However, Cervantes-Gautschi agreed with electronics industry representatives who said the practices that led to toxic-pollution problems are not unavoidable. High-tech companies, they said, have learned from the mistakes they made here.

"No industry is risk-free," said Alan T. Foster of the American Electronics Assn., an industry group that has formed a special committee to advise its members on how to anticipate and avoid new environmental problems. "The question is how to best manage that risk, and that is where I think this industry is making great strides."

"It doesn't do the community any good, obviously, but it doesn't do us any good, either, to have this material leak into the environment," said Larry Borgman, chief of facilities planning for Intel Corp., a maker of electronic components. "Certainly the money spent to double-contain a tank is trivial compared to (what it costs to) clean up a spill."

Ground-water pollution, despite the heightened attention paid to it lately, is nothing new. Oil, chemical, steel and other heavy industries have in varying degrees contributed to it for years, engineers have discovered.

But high-technology companies were supposed to be different. The Conservation Foundation, a Washington-based environmental group, once hailed high-tech industries as

"free of major environmental problems."

High-tech industries and their attractive, campus-like factories spread through California in the 1960s and '70s as natural offspring of Stanford University near here and the defense industry near Los Angeles.

City planners, oblivious to the companies' use of toxic chemicals, often placed them in light-industrial or similar zones, sometimes across the street from homes or within a few hundred yards of drinking-water wells. Fire officials often were the only authorities to note any chemical hazards, and even then the only regulation usually was to put storage tanks underground to reduce the threat of an explosive fire.

Once underground, however, a storage tank can leak, often at a surprisingly rapid rate, without being detected.

That is what happened here in the Silicon Valley.

A subterranean fiberglass tank behind the Fairchild semiconductor plant leaked, apparently undetected, for at least a year.

A few days after the leak was accidentally uncovered by the construction crew, Fairchild warned the Great Oaks Water Co., which operated a high-volume drinking-water well 2,000 feet from the tank.

It was too late. Tests showed that the well was contaminated with unlawfully high levels of chemical solvents, including 1,1,1 trichloroethane. On Dec. 7, 1981, the well was sealed.

The contamination, which surprised hydrologists with its ability to seep through layers of clay that are impermeable to water, has since spread to threaten another Great Oaks well 4,000 feet away.

Another large leak soon was detected at a nearby IBM plant, followed by the discovery of a large diesel fuel leak from a gas station. When an informal survey by the electronics industry indicated that

the problem was common, the San Francisco Bay Regional Water Quality Control Board conducted a survey to see how common it was.

The survey showed that 89 companies use underground tanks to store strong solvents. Of the 80 that have been inspected so far, 64 of them, or 80%, have been found to leak. Nearly 90% of the tanks that leaked have polluted ground waters, the study discovered.

"From a water-quality point of view, we have a very serious potential problem," said Harold Singer of the regional water quality board in Oakland. "We already have pollution of the shallow ground-water basins, and unless we do something now to contain this, it will be only a matter of time before usable ground water is contaminated."

Both Fairchild and IBM have dug up and hauled away contaminated soil and are filtering tainted ground water on the surface in a multimillion-dollar attempt to arrest the

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spread of contaminants, Singer said. Other companies, he added, are monitoring the extent of their leaks and will be forced to clean them up when they reach usable waters.

In addition, Santa Clara County passed a law requiring new tanks to be double-walled, and requiring all tanks to be monitored to speed the discovery of any new leaks. The Legislature passed a similar but weaker law for the rest of the state. It goes into effect Jan. 1.

Several other states, such as New York, New Jersey and Michigan, also regulate underground tanks, primarily to contain petroleum leaks at refineries and gas stations.

In Los Angeles, state water officials have begun a study similar to the Santa Clara County poll. So far, the state has identified 390 underground storage tanks that fit the profile of a potential leaker—old, metallic and used to hold chemical solvents.

The board has asked the tank owners to drill wells to determine if the suspect tanks leak. Most of the tanks are in the San Fernando Valley, where drinking-water wells have been tainted with toxic chemical solvents. A separate pollution problem in the San Gabriel Valley is now targeted for study and cleanup under the federal government's "Superfund" program.

The tests in the San Fernando Valley involve 43 companies, eight of which could qualify as high-tech.

The problem in discussing toxic chemicals generated by high-tech

companies is that no one has clearly defined what constitutes high-tech. The Bureau of Labor Statistics is compiling a list of high-tech industries based on the amount of money spent on research and development, but has not completed the task.

However, one bureau official said high-tech industries generally are considered to include the makers of electronic components, medical and other scientific instruments, defense weapons systems, pharmaceuticals, and robots and other advanced industrial machinery.

As the industry blossomed in the 1960s and '70s, no one apparently gave much thought to the problems they might cause.

"Everybody was caught with their pants down," Hawes said. "Nobody ever bothered to worry about this stuff."

Problem Not Recognized

Jack Schoop, Santa Clara County planning director, concurred. "There was very little concern about the old plants because no one realized the problem," he said. "High-tech was just such a darling compared to the old smokestack industries."

Despite the problems here, Schoop said high-tech companies still do not worry him because, he said, industry and the government are aware of their difficulties, and are aware of how to regulate them.

Others, however, are still skeptical.

"You take any area with a lot of chemical usage . . . and drop a few

monitoring wells, and I guarantee you'll stop looking the other way," said Lt. Charles Rice, a hazardous-materials specialist with the Sunnyvale, Calif., Fire Department. "If they store it in the ground, you are going to find it in the ground—and in the water. Make book on it."

Ironically, the Santa Clara Valley's water wells had been tested only 18 months before the Fairchild spill was unearthed. The tests were prompted by the discovery of toxic solvents in Los Angeles-area ground water, and traces of the same chemicals were found in the Santa Clara wells, but in amounts too small to cause concern.

One well, however, was not tested: Great Oaks No. 13, the well nearest Fairchild.

Water-quality officials had lost the sample from that well.

When the contamination finally was revealed, an audit showed that at least 58,400 gallons of waste solvents, including 13,000 gallons of 1,1,1 trichloroethane, could not be accounted for and were presumed lost.

No one knows how long the chemicals had been trickling out of the fiberglass container—or how long the 700 Great Oaks customers had been drinking the chemical along with their morning cup of coffee and afternoon tea.

Fairchild, which has been sued by 267 nearby residents over the spill, said that "probable failure occurred some time after mid-1980" and that Great Oaks No. 13 had been affected for three months at most.

Residents, however, say they have an internal Fairchild memo that concludes that the leak "probably" started in 1979, increasing the amount of time that local residents may have been drinking tainted water.

In any case, people living near the 7-year-old factory—which a company spokesman said is "essentially closed" because it is outdated and no longer needed—blame a wide range of illnesses on their exposure.

"It is a holocaust, a toxic holocaust that is costing the lives of our children," said Barbara Fenster, whose grandson, Dustin, 8, has developed transient erythroblastopenia, a debilitating blood disorder. She blames the disease on chemicals in the drinking water, as she also blames the recent death of her pet dog.

"I get so emotional," she said, her eyes watering as she looked out of her living room window to her comfortable, middle-class neighborhood. "It is just so unfair—to the children, to *their* children, to all of

us. It's just so damned unfair."

In their suit—which was filed against Fairchild and 10 other companies that designed, built or installed the tank that leaked—nearby residents charged they have suffered birth defects, gastrointestinal disorders, chronic bladder infections, skin rashes and other problems.

They say the problems have occurred in numbers too great to attribute to chance. John Tyndall, one of the lawyers representing the residents in their suit, said hospital studies indicate that congenital heart defects can be expected in 0.5% of all live births; near the Fairchild plant, he said, such defects occurred in three of 135 births, or 2.2%.

At least three children in the area have died because of birth defects caused by chemicals in the water, said Hawes, one of the lawyers working on the case.

State epidemiologists are studying the people served by the Great Oaks Water Co. to try to determine what problems they have and

whether those problems are occurring any more frequently than might normally be expected.

Fairchild spokesman John Salazar said there is no evidence that residents were ever exposed to enough of any chemical in the water long enough to cause illness.

The company, which could be ordered by state or federal authorities to clean up the spill, has volunteered to try.

At a cost of more than \$12 million, the company has removed the soggy, rust-colored soil found behind its plant and has begun the laborious task of sucking ground water up to the surface, filtering it to remove most of the organic solvents, and dumping it into a nearby creek to trickle back into the earth.

State water-quality officials are not certain the process will work. No one has ever before tried to clean an aquifer. But they are hopeful.

"If we can continue the work we are doing, we feel there is a good chance to salvage the resource," said Singer of the San Francisco Bay Regional Water Quality Control Board. "Otherwise, we are wasting our time and their money."