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SILICON SALE

The last U.S.-owned merchant producer of semiconductor-quality silicon has been sold to a foreign company. Palo Alto-based Monsanto Electronic Materials, which operates plants in Missouri and South Carolina, has been sold to Heuls AG, part of West Germany's Veba AG conglomerate.

Though some U.S. chipmakers, such as IBM and Texas Instruments, produce their own silicon in house, Japanese-owned and German-owned firms now control the open market. In 1986 Mitsubishi Metals bought out Siltec, another leading U.S.-owned supplier.

Some top executives of American-owned chipmakers—the companies that buy silicon and etch microcircuits onto silicon wafers—reportedly objected to the sale, and objections raised by the Pentagon and Commerce department forced a high-level review of the transaction. The Omnibus Trade Act gives the President the authority to block foreign takeovers of U.S. corporations. The Pentagon suggested that the U.S. might lose access to silicon processing technology if the sale went through.

The Committee on Foreign Investment in the United States, which is made up of officials from several executive agencies and departments, recommended in January that the sale be permitted, and President Bush okayed the purchase in early February.

By the time the decision was made, the Pentagon apparently retracted its objection. Heuls reportedly had promised not to shift R&D or production outside the U.S.

This time, the U.S. government acted wisely. In an economic environment that encourages international trade and capital flows, there is no coherent reason for limiting such buy-outs. To help resolve future disputes, however, it is important to clearly define the U.S. national interest. Does the nationality of the majority-ownership of a firm make a difference? Or does the locus of production determine a firm's real nationality, at least when considering government subsidies and regulations?

ONSHORE TERMINAL PRODUCTION

Advanced Digital Data Systems (ADDS), a subsidiary of NCR, is moving half of its terminal production from Taiwan back to the U.S. In November, ADDS contracted with Omnishore, a contract manufacturer in Carson City, Nevada, to build a new line of ADDS terminals, and the company announced it would phase out the contract manufacturing of older models now built in Taiwan.

Omnishore has been manufacturing for less than two years, but its contract customers already include IBM and Unisys.

ADDS shifted production overseas in 1984, when a typical terminal cost $320 to build in an automated U.S. plant compared to $270 in the Far East. Now, reports **Electronics** (January, 1989), a terminal costing $320 to make in the U.S. costs about $300 in the Far East, and expenses there are rising. As the Yen appreciates, Asian manufacturers must pay higher prices for Japanese components. And the U.S. has applied the 3.9% tariff on terminals to imports from Hong Kong, South Korea, and Taiwan.

Domestic manufacture also allows the company to quickly alter its product mix, to cut administrative costs, and reduce the costs of inventory in transit.

Current Costs of Terminal Production

	Far East	U.S.
Material & Components	US$225	$272
Direct Labor	12	16
Administration	30	22
Shipping	15	6
Inventory	6	3
Duty	12	0
TOTAL	300	320

ADDS President David Laws says that the firm

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plans to keep half of its terminal manufacture in the Far East, even if costs there surpass U.S. costs: "Most of the development work in video technology is being done in the Far East. We'll maintain a presence there just to tap into the technology advances."

SALES TAX

Silicon Valley's commercial high-tech firms not only pay property taxes to local agencies and communities, but they are an important source of sales tax revenues. When a Silicon Valley manufacturer makes a direct sale to a domestic, non-government customer, it pays a seven percent sales tax. One percent goes to the city from which the sale is made. One percent goes to the Santa Clara County Traffic Authority and Transit District.

In two Silicon Valley cities, Mountain View and Santa Clara, non-retail taxable sales almost equal retail sales. Neither city has substantial non-high tech wholesale activity. Below are the taxable sales figures for Silicon Valley industries cities for the year beginning July 1, 1987. (Source: "Taxable Sales by Jurisdiction," **Info**, Issue #88-12a, December, 1988, Advance Planning Office, County of Santa Clara)

Taxable Sales, 1987-88

City	Retail Sales	Non-Retail Sales
Cupertino	$438,433,000	$136,391,000
Milpitas	265,198,000	189,727,000
Mountain View	540,137,000	529,376,000
Palo Alto	740,685,000	395,019,000
San Jose	4,304,886,000	1,669,669,000
Santa Clara	1,150,425,000	1,032,104,000
Sunnyvale	1,077,581,000	858,347,000

EAST PALO ALTO "SUN"RISE

Even before the Valley was renamed for Silicon, high-tech entrepreneurs and developers in the Stanford-Palo Area ignored predominantly black East Palo Alto. As an unincorporated area, it lacked the infrastructure and planning staffs of neighboring communities, but most businesses simply feared East Palo Alto.

In general, this is still the case. The community has a reputation for drug traffic and related crime, and most high-tech employers consider black workers less reliable and more militant than the other minorities they employ in production.

Still, East Palo Alto, now a city, contains large tracts of developable land in the heart of Silicon Valley. It contains worker housing; it lies at the west end of the Dumbarton Bridge, a major commute route into Silicon Valley; and it is close to Stanford and communities such as Palo Alto and Menlo Park, where a large number of high-tech professionals live.

In December Sun Microsystems, the rapidly growing manufacturer of desktop work stations, offered East Palo Alto $50,000 for exclusive rights to plan a 170-acre industrial development. Sun's management may be more willing than others to overlook the risks of East Palo Alto operations, but East Palo Alto also offers Sun an unusual opportunity. It contains the largest underdeveloped industrial sites in or near northern Santa Clara County. (East Palo Alto is just across the county line in San Mateo County.) Sun is currently spread out in numerous facilities, most of which are leased, in Mountain View and across the San Francisco Bay in Fremont. The new site would allow the company to consolidate and reorganize its operations.

Sun asked East Palo Alto to create a redevelopment district. It offered the cash-starved city $50,000 immediately to fund a three-month redevelopment study, $400,000 in permit fees if the project is approved, and $500,000 to cover the administrative costs of the redevelopment district it proposes. It also has promised to help build an access route from the Bayshore Freeway to the Dumbarton Bridge.

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On February 6, the City Council approved the initial stages of the Sun proposal, but it warned the company that it could not rely upon the city to use the redevelopment authority to force private property-owners to sell their land to Sun. It told Sun to directly negotiate with the owners. If the current owners ask for too much money, the whole project could be blocked. (**San Jose Mercury** News, February 8, 1989)

NEW FABS

Despite reports that the semiconductor market has leveled off, for now, the long-term prospects are good enough that a number of firms are investing in new wafer fabrication capacity. Here are four such reports, all from the **San Jose Mercury News** (January 5, 11, and 20, 1989). Note that three of the four reports describe manufacturing outside the home country of the investing company.

- NEC Corp. Japan-based NEC, originally known as Nippon Electric, plans to fabricate 4-megabit dynamic random access memory chips (DRAMs) in the U.S. in 1991. NEC is considering producing the chips in Roseville, California (near Sacramento), where it currently makes 256-kilobit (256K) DRAMs.
- Texas Instruments. TI plans to build a US$50 million wafer fabrication facility in Avezzano, Italy, about 100 km east of Rome. The plant, which is expected to employ 500 people, will produce a variety of chips, including DRAMs, for the European market. The circuits will be assembled in Rieti, about 35 miles to the north. TI has operated in Rieti for 20 years.
- Intel. Intel is resuming construction of a facility in Chandler, Arizona. The company suspended construction more than three years ago due to declining business. It had already spent $15 million, completing about one fourth of the structure.
- Vitelic. San Jose-based Vitelic has announced plans to build a factory in Taiwan to produce specialized 1-megabit DRAMs. Vitelic has raised $39 million, largely from its customers—including Sigma Designs, Genoa Systems, and Western Digital—and it plans to borrow about $41 million more. Vitelic currently contracts with fabricators in South Korea, South Korea, and Taiwan.

GAS LEAKS

Palo Alto is the first Silicon Valley city to endorse a model ordinance for the regulation of hazardous gases in high-tech manufacturing. The law, considered the first of its kind, is toned down from earlier proposals, made by area fire chiefs, that were opposed by industry representatives.

Jacqueline Bogard, speaking for the Santa Clara County Manufacturing Group, told the **San Jose Mercury News** (January 9, 1989), "We're going along with it, but from an industry perspective we think it's unnecessary." However, just five days earlier, some 400 workers were evacuated from National Semiconductor in Santa Clara after a small leak of deadly arsine triggered an alarm.

FAB SAFETY SURVEY

Last November 30 the Federal Occupational Safety and Health Administration (OSHA) released the findings of a pilot program to evaluate semiconductor industry health and safety practices ("Evaluation Report Regarding the Semiconductor Industry Pilot Evaluation Program in California"). OSHA inspectors found that the companies they visited generally followed good practices, but they noted numerous serious and less serious problems.

From April through September, 1988, OSHA industrial hygienists and safety professionals checked 17 establishments in California for compliance with OSHA health standards and 13 of those sites for safety compliance. About two thirds of the inspections took place in Silicon Valley.

They found 20 serious violations of OSHA standards, at seven wafer fabrication establishments, as well as 81 other violations. Half of the serious problems involved the Respirator or Arsenic standards.

Serious violations were concentrated in Southern California. Although only one fifth of the inspections took place in the San Diego and Los Angeles OSHA jurisdictions, 16 of the 20 serious violations were found there. The remaining four were identified in Silicon Valley.

Small firms had a disproportionately high rate of violations. Companies "controlling" less than 300 employees had half of the serious violations and 45 of the 81 non-serious citations. OSHA explains, "Unlike larger semiconductor employers which have full-time safety and industrial hygiene staff, the smaller employers inspected generally had staff such as a production manager assigned to

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the safety/health tasks as a collateral duty. Unfortunately, those individuals often neither had the appropriate training and education, nor the time to adequately perform their collateral safety/health duties."

The pilot study was by design a small study, "difficult to base generalizations on." OSHA found enough to continue the study into the current fiscal year.

The pilot evaluation program's findings, particularly if matched by subsequent inspections, speaks well for Silicon Valley's larger chipmakers. It shows that they tend to comply with existing OSHA standards and procedures, but it does not show whether those standards and procedures are sufficient to protect the health and safety of workers.

It will take another study, such as one just getting underway, to measure the health impact of wafer fabrication employment. Seventeen companies from the Semiconductor Industry Association (SIA) are funding a University of California at Davis team to conduct a comprehensive health risk study. Though the level of industry involvement might make the results suspect, the study could not take place without at least some form of industry cooperation.

All the OSHA and SIA studies lack one vital component, independent worker participation. Since union-less chip workers have no presumption of job security, most are unwilling to complain, let alone pinpoint health and safety problems.

STANFORD SPIN-OFFS

Stanford University serves a model to those who believe that modern universities should stimulate the formation of new profit-making enterprises. It not only created the climate in which Silicon Valley flourished, but it has long encouraged graduates, faculty members, and research staff to set up their own companies.

Charles Krenz, a Business School student working with the Stanford Office of Technology Licensing, has compiled a list of one hundred such spin-offs. His inclusion criteria appear inconsistent; nevertheless, the list is a valuable resource for those wishing to study the relationship between academia and the formation of high-tech business.

Krenz's list includes such well known high-tech firms as Hewlett-Packard, ROLM, Sun Microsystems, Syntex, Tandem, and Varian. There are well regarded start-ups such as MIPS Computer Systems, and Conductus. And the list also contains a few non-high-tech ventures, such as shoemaker Nike, Klutz Press, and MacGregor Yacht.

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