

## THE WALL STREET JOURNAL.

## MARKETPLACE

## HEALTH

Computer-Chip Worker Study  
Confirms Risk of Miscarriages

By JIM CARLTON

Staff Reporter of THE WALL STREET JOURNAL

A massive study into health hazards in the semiconductor industry found that pregnant women who work in chip-fabrication plants run an elevated risk of miscarriage, confirming on a nationwide basis what studies had found on the local level.

Results of the study, sponsored by the Semiconductor Industry Association, show that pregnant workers remain at risk despite some industry safeguards instituted in recent years. The study, moreover, raises the specter of possible lawsuits from affected workers, although many analysts said any legal liability would probably be minimized, because semiconductor companies have moved aggressively to attack the problem.

Some of the big chip makers, in fact, announced upon news of the study results that they plan to retrofit plants so workers would not be exposed to one toxic chemical believed most responsible for the higher miscarriages, as well as to rotate pregnant workers out of high-risk areas. "This has been an industry that has been ahead of the game in addressing environmental problems," said Michael Gumpert, an industry analyst with Lehman Bros.

Some worker-advocacy groups, how-

ever, blasted the semiconductor industry for dragging its feet, saying scientists have warned for 10 years about possible miscarriage hazards from exposure to ethylene-based glycol ether that the industry uses as a solvent in chip fabrication. Researchers on the most recent study said they believe this chemical could be responsible for the higher miscarriage risk.

The semiconductor industry "has been stalling the adoption of safer alternatives until there is a body count," charged Amanda Hawes, director of the Santa Clara Center for Occupational Safety and Health, a California advocacy group.

## Report in 1986

After federal researchers in California discovered a decade ago that glycol ether had damaged the reproductive systems in test animals, the Semiconductor Industry Association issued alerts to chip executives on possible worker health effects. In 1986, Digital Equipment Corp., Maynard, Mass., said a study by health researchers found that women employed on its semiconductor production lines suffered significantly more miscarriages than the statistical norm. In October, preliminary results of a study for International Business Machines Corp., Armonk, N.Y., indicated that

Please Turn to Page B2, Column 1.

Risk of Miscarriages Is Confirmed  
Among Computer-Chip Workers

Continued From Page B1

10 of 30 pregnant women exposed to glycol ether at an IBM plant had miscarriages.

After the Digital findings, the semiconductor association, which represents the industry's approximately 200 chip makers, launched a national study into the problem by a team of academic researchers based at the University of California at Davis. They sampled about 15,000 male and female workers at plants of 14 chip companies throughout the country. Most of the research was on female workers, who constitute as many as 60% of the estimated 35,000 workers in chip-fabrication plants.

In a review of 953 pregnancy cases between 1986 and 1989, the research team found a 14% miscarriage rate for women working in chip-fabrication areas, compared with a 10% rate for women who did not. To corroborate those findings, researchers then monitored 450 women currently working in fabrication plants. Through analysis of their urine specimens and medical records, the team found the rate of miscarriages nearly as high as those previously examined.

Overall, the study found a 20% to 40% greater chance of miscarriage among the fabrication workers than their counterparts in chip non-manufacturing sites. While indicating that exposure to ethylene-based glycol ethers may be the culprit, researchers said they were unable to say for sure, because other chemicals are commonly used in the work areas. Researchers also pointed out that actual risk of miscarriage depends on many factors including medical history, age and whether the individual smokes.

For both men and women, the study noted a slight increase in such things as nose and throat irritation, as well as hand, wrist and forearm pain. Most of the study work, however, was directed on the miscarriage issue.

Upon release of the findings, the semiconductor association recommended that

the industry accelerate its efforts to eliminate the use of ethylene-based glycol ethers in manufacturing. "From the industry perspective, the days of ethylene-based glycol ethers are numbered," said Andrew A. Procassini, president of the association, based in San Jose, Calif. The group also recommended that the industry quickly begin to share information and technology, in order to minimize worker exposure to potentially hazardous chemicals.

Chip makers are reacting swiftly. Intel Corp., a Santa Clara company that was among participants in the study, said it instituted a policy guaranteeing jobs in nonfabrication areas at equal pay for any pregnant workers who want to switch out of manufacturing. Intel said that while it stopped using glycol ethers in its newest plants, it will re-engineer all plants still using the chemical so they can use a safer alternative.

Another study participant, National Semiconductor Corp., also based in Santa Clara, said it plans to eliminate glycol ether from all its fabrication plants by June 1, possibly by using the less toxic chemical propylene glycol monomethyl ether acetate. The company already lets pregnant workers rotate out of fabrication if they want.

LSI Logic Corp., Milpitas, Calif., another study participant, said it notified all employees of the study results. "Long term, we certainly take the study seriously [and] we are studying what to do," said LSI spokesman Tom Mahon.

As in the case of Intel, most newer chip-making plants do not use the ethylene-based glycol ether. For the older plants that still do, Tom Beermann, spokesman for the semiconductor association, said many companies were awaiting this report before taking action. Before this study, "there was no definitive link," Mr. Beermann said. "But the balance of the evidence is such that this kind of action [removing glycol ether] is warranted."