E thylen glycol ethers are a group of organic solvents that proved to be extremely effective at coating surfaces evenly. They've been used in paints, nail polish, de-icers and many other products. One of their most important industrial applications was in the semiconductor industry. These marvelous chemicals, E.G.E.'s, were the key ingredients in a solution used in the fabrication of computer chips.

But there were some problems. Studies began emerging in the late 1970's that showed these chemicals wreaking havoc with the reproductive processes in rodents. They were linked to testicular damage, miscarriages and birth defects.

Even as the warnings grew louder, workers by the thousands were toiling in the "clean rooms" where extraordinary amounts of toxic chemicals, including E.G.E.'s, were being put to use in the manufacture of chips, disks and other electronic components.

In the early 1980's, both the National Institute for Occupational Safety and Health and the California Department of Health Services issued alerts regarding workers exposed to E.G.E.'s. The fear was that the reproductive problems found in the animal studies might also be occurring in humans.

Some industries moved with dispatch to get E.G.E's out of the workplace. But the booming semiconductor industry, which powered the spectacular computer revolution that shaped the last third of the 20th century, was not one of them.

Worker safety would have to wait.

The awareness of a potential problem was certainly there. In the spring of 1982, the Semiconductor Industry Association formally alerted industry executives to the results from the animal studies. And the following September the Chemical Manufacturers Association issued an alert.

Years passed, additional documentation piled up, and studies of humans began to turn up problems similar to those found in animals.

By the late 1980's, the industry could no longer hide from the issue. A study at a Digital Equipment Corporation plant in Hudson, Mass., had shown a marked increase in miscarriages among semiconductor workers. Industry leaders immediately complained that the sample was too small. Larger studies were commissioned by both the Semiconductor Industry Association and I.B.M.

The hope at the time was that the larger studies would refute the findings of the smaller one. The opposite occurred.

The I.B.M. study was conducted by Johns Hopkins University, and it found a big link between miscarriages and exposure to E.G.E.'s. "Women with the highest exposure potential," the study said, "had a threefold increased risk of spontaneous abortion compared to female employees with no potential for direct exposure to E.G.E."
The study said, "We also found evidence that the work on processes with direct exposure to E.G.E. was associated with an increased risk of subfertility in female employees and a suggestion of a similar effect in male employees and their wives."

The study by the Semiconductor Industry Association came up with similar findings. The reproductive havoc was not limited to rodents.

I.B.M. stopped using E.G.E.'s in all new processes in 1992 and finally stopped using them altogether in 1995, a decade and a half after the warnings began circulating. No one knows how many workers may have been harmed in that period.

A spokesman for I.B.M. said in an e-mail message yesterday that "finding suitable alternative materials for processes in semiconducting manufacturing is a complex process."

A peculiar thing about the I.B.M. study was that while it focused on reproductive processes right up until the moment of birth, it did not study the health outcomes of newborns — to what extent, for example, they might have suffered from birth defects.

In the damage suits that have been brought against I.B.M. by more than 200 of its employees are a number of cases of hideous birth defects that the plaintiffs allege were caused by exposure to toxic chemicals, including ethylene glycol ethers.

I.B.M. has already thrown in the towel in one case, that of Zachary Ruffing, a teenager who was born blind and extremely deformed to parents who had both worked in the company's plant in East Fishkill, N.Y., in the 1980's.

While I.B.M. and two of its chemical suppliers agreed to settle the case, they did not acknowledge that they had done anything wrong.