Cancers in "Silicon Glen"
Scottish electronics industry victims fight for future generations

Workers in a Scottish electronics components factory have been campaigning for a decade about the health impact of their work. Some of the mostly-female workforce who were exposed to a cocktail of chemicals have been affected by a variety of cancers and serious reproductive health disorders. The protest was led by a trade unionist who succeeded in getting militant action going among the workers of a rabidly anti-union US firm.

Clean room operators, Crolles, 2004
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Many leading US electronics manufacturers set up operations in Scotland in the 1970s and 80s. As well as the water needed for this kind of industrial production, they found an equally abundant supply of English-speaking female labour. Unemployment among Scottish working class women was high, and they were not unionized, making them a plentiful labour pool for an industry set for massive growth. Two decades on, Scotland's electronics economic miracle seems to have fizzled out. Many firms have made massive layoffs, relocated to Asia or simply shut down. And it is not just the jobs, but also the health of many of these workers, that has been thrown on the scrap-heap.

Around the mid-90s, rumours began to circulate about health problems among women working for the Californian firm National Semiconductor Corporation, whose UK headquarters are at Greenock, west of Glasgow. This is a working-class region whose history was until a few decades ago tied up with the epic story of the shipyards. Women here share personal confidences, and those working in the clean rooms were having repeated miscarriages.

"Initially, it was a male worker who told me about problems his female workmates had. And then as people started to hear what I was doing, some of the women workers came to tell me about the problems they had had: miscarriages, babies with birth defects, their own respiratory problems and even cancers", recalls Jim McCourt. The Scottish trade unionist runs PHASE Two (People for Health And Safety in Electronics), a campaign launched in 1997 to put these health problems into the public eye. A petition was raised to call for an epidemiological survey to be done among clean room workers.

Not so clean

The clean rooms where microchips are manufactured are permanently temperature- and moisture-controlled to protect the work equipment from

[1] Tenenbaum, D., The Cleanroom: How Clean?, *Environmental Health Perspectives*, Vol. 111, No. 5, May 2003, p. 282-283.
[2] A scientific committee set up by the Semiconductor Industry Association (SIA) found 26 carcinogens in 200 chemicals identified by study. See: *Cancer Risk among Wafer Fabrication Workers in the Semiconductor Industry Evaluation of Existing Data and Recommended Future Research. Executive Summary*, October 15, 2001. Available on: www.sia-online.org/downloads/SAC_Summary.pdf.
[3] Richards, B., Chip plants not safe. Semiconductor plants aren't safe and clean as billed, some say, *The Wall Street Journal*, October 5, 1998.
[4] Elliot, R.C., *et al.*, Spontaneous abortion in the British semiconductor industry: an HSE investigation, *American Journal of Industrial Medicine*, Vol. 36, 1999, p. 557-572.
[5] Schenker, M.B., *Epidemiologic study of reproductive and other health effects among workers employed in the manufacture of semiconductors. Final report*, Semiconductor Industry Association, December 1992.
[6] French national research and safety institute's report on glycol ethers: www.inrs.fr/htm/ethers_de_glycol.html#risquestoxic.
[7] The Clean Room's Dirty Secret, Mother Jones, March/April 2002. Downloadable on: www.motherjones.com/news/feature/2002/03/clean_room.html.

contamination. The air is constantly filtered to remove dust and other impurities that might harm production. These aseptic rooms where all workers must wear coveralls, masks, gloves and boots, are regarded by the industry as extremely safe work places. It is a view challenged by some experts who believe that the impressive array of personal and collective protective equipment is more about protecting the valuable microchips than the workers who produce them. Joseph LaDou, a Professor at the University of California at San Francisco, argues that the clean room filtration systems may remove dust but not toxic vapours[1]. Between 500 and 1000 different chemicals are used in the semiconductor industry, including many carcinogens like solvents (trichloroethylene, benzene, dichloroethane), arsenic, and heavy metals like cadmium and lead. Workers are also exposed to electromagnetic fields as well as ionizing and non-ionizing radiation[2].

Chemical leaks were commonplace in the Greenock factory in the 1980s and '90s according to workers interviewed by a Wall Street Journal reporter[3]. As a result of the extensive press coverage given to the launch of PHASE Two, Britain's health and safety at work inspectorate, the HSE, was ordered to study spontaneous abortions (SAB) in the semiconductor industry.

Writing in 1999, the authors concluded that "There is no evidence of an increased risk of SAB in the British semiconductor industry"[4]. The HSE's findings are at odds with those of studies done several years previously in the United States, including one paid for by the semiconductor industry[5]. These studies singled out glycol ethers, chemicals then widely used as solvents in the semiconductor industry. Female reproductive health is more specifically affected by ethylene glycol ethers (E series), which cause prolonged and irregular menstrual cycles, reduced fertility and an increased risk of spontaneous abortions[6]. While these reports have prompted most semiconductor manufacturers to gradually reduce their reliance on glycol ethers, they are still using other reprotoxins (xylene, trichloroethylene, phenols, etc.)[7].

Apart from the damage to women workers' reproductive health, an excess of cancers was noted among both men and women clean room workers at National Semiconductor in the 1990s, to an extent where the HSE eventually agreed to carry out a study of cancers in the Greenock plant.

Despite its flawed methodology[8], the HSE's 2001 study points to an increased risk of National Semiconductor UK workers contracting certain kinds of cancer. Women workers are at two to three times higher risk of developing lung cancer, four to five times higher for stomach cancer and five times higher for breast cancer. Male workers have a four times greater risk of brain cancer[9].

A tight-lipped industry fightback

After the study, 25 semiconductor production sites were inspected by the health and safety inspectorate, and serious failings were found. Only five of the 25 workplaces inspected were complying with minimum health and safety requirements. Also, health surveillance of workers was being done by GPs, mostly in private practice. Even so, some experts argued that the HSE inspections were too superficial, did not adequately assess exposure to carcinogens, and so would not encourage firms to change their company health and safety policy[10].

It is a conclusion shared by the man who runs PHASE Two, "It is very difficult to get information. The company will not speak to me, and the factory has no trade union so there is no one for to call on to find out what is being done to reduce or eliminate exposure to toxic products", says Jim McCourt ruefully.

Environmental lobbies, civic action groups and some trade unions in both California's Silicon Valley and its Scottish namesake have been calling for large-scale surveys for many years. The multinationals that control the market have refused or agreed to cooperate only if they are limited to a small number of workers or diseases[11].

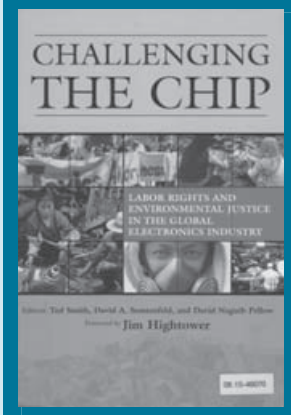
Because the workplace is not unionized, the Phase Two project is having serious problems in getting new workers on board. Also, the Greenock women who took their battle for compensation to the US courts in 1999 have given up the legal fight, so media interest has waned.

"Many of the workers who started the campaign are dead, and those who are still alive are pensioned. They are old women, and do not want their grandchildren to know that they have cancer", observes the PHASE Two campaigner. Workers still working clearly want to avoid antagonizing management. "The wages are better than those paid by local companies, and complainers run the risk of losing their bonuses", says Jim McCourt.

On a more political level, McCourt notes that the British government's economic policy of removing all potential obstacles to foreign investment has helped create a hostile climate to protection of workers' rights, making elimination of workplace risk factors an ongoing battle.

"We do not have a society that detects or looks for chemical exposure at work. What we have is a society that leaves workers no option but trying sue the company after they have the disease. We need to change towards a society which strives to prevent the disease rather than counting bodies. We know our fight will change nothing for the current members of PHASE Two, but it might change working conditions for future generations of electronics industry workers". ■

Further reading



Smith, T., Sonnefeld, D., Naguib Pellow, D., *Challenging the chip. Labor rights and environmental justice in the global electronics industry*, Temple University Press, 2006, 357 p.

The book is reviewed in *HESA Newsletter* No. 33, p. 43.

Silicon Valley Toxics Coalition web site: www.etoxics.org

[8] Joseph LaDou, director of the International Center for Occupational Medicine, University of California, takes issue with the small size of the sample of workers in the study, which included employees with little or no exposure to chemicals. See: LaDou, J., *Occupational Health in the Semiconductor Industry*, in *Challenging the chip. Labor Rights and Environmental Justice in the Global Electronics Industry*, Temple University Press, Philadelphia, 2006, p. 31-42.

[9] *Cancer among current and former workers at National Semiconductor (UK) Ltd, Greenock. Results of an investigation by the Health and Safety Executive*, HSE Books, 2001, 91 p.

[10] The HSE apparently failed to measure ambient levels of chemical fumes and toxic vapours in the clean rooms. The only carcinogen cited in the report is arsenic, even though many other carcinogens are found in the semiconductor industry (solvents, ionizing radiation, etc.). See: Watterson, A., LaDou, J., Health and Safety Executive Inspection of UK Semiconductor Manufacturers, *International Journal of Occupational Health*, Vol. 9, No. 4, December 2003, p. 392-395.

[11] The BBC reports that National Semiconductor UK would agree to cooperate only in a study on lung cancer. Cf. *Losing the workplace cancer fight*, BBC Radio 4, 9 October 2007.