

Chapter 11. Keeping up with a changing world

We are nearing the end of this look at how occupational hygiene has developed in Britain in the past 300 years. The struggle to stop the working environment killing the workers has been an ever-changing one, as industry and society has changed, and technology has provided more solutions as well as more problems. I have decided to end this account at about 2002-3, but as will be seen later that is a very rough date because some topics do not fit it neatly. At that date the occupational hygiene principles of control of substances, which Thomas Legge had spelt out in 1912, were finally brought into British law, and at that time too there were big changes in the profession of hygiene – but that will be discussed in the final chapter. Meanwhile this article summarises how some of the great changes of the last 30 years of the 20th century affected our field.

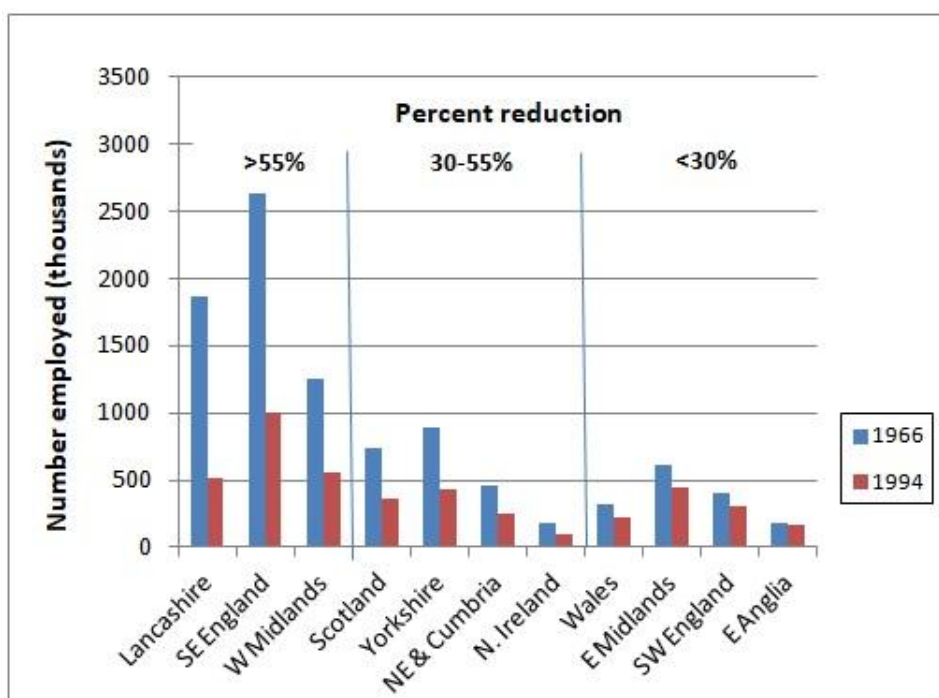


Fig.11.1 The reduction of employment in manufacturing in different parts of Britain between 1966 and 1994. Figures from Cunliffe et al, *The Penguin Illustrated History of Britain and Ireland* (2004)

The changing workplace

Ted Hatch, the American industrial hygiene pioneer who had been born in 1901, listened to some presentations at BOHS's 5th Inhaled Particles conference in 1980, and is said to have commented, "In my day we counted bodies. Now they worry about chromosomes." The other people present in 1980 were conscious of different changes that were happening. The founders of BOHS in 1953 had in general been linked with big industries – manufacture and mining in particular – or with government bodies regulating those industries, or with universities training people who would expect to make careers in them. By the time those new graduates retired, British employment had changed vastly. In 1971, about 300,000 people worked in coal mining – down from 600,000 a decade earlier – and 320,000 in steel processing.¹ By 2020, those figures were down to 1000 and 24,000.² In contrast, by then the four big supermarket chains employed about 780,000.^{3 4 5 6} Manufacturing was still a substantial employer, but the number of employees fell from 9.5 million in 1966 to 4.3 million in

1994 (Fig 11.1). There had been a massive shift to service industries and smaller companies, and the users of occupational hygiene services had changed.

The legislative environment

The legislative environment also changed out of all recognition. The main organs of health and safety law had been the succession of Factories Acts, which were supported by probably hundreds of sets of regulations spelling out required controls for particular workplaces or activities. Despite that, there were many areas of employment not covered by those laws. This changed in 1974, when the Health and Safety at Work Act made it “the duty of every employer to ensure, so far as if reasonably practicable, the health, safety and welfare of all his employees” and to similarly ensure that members of the public were not exposed to risks. The onus was therefore now on every employer, not just those in the restricted range of businesses covered by the Factories Acts. There was a general shift from specified control measures to performance standards. The system was overseen by the Health and Safety Commission, with representatives of employers and employees and other interests, supported by a system of advisory committees, also tripartite, and the Health and Safety Executive (HSE). The duties of every employer led to concern for occupational hygiene, and growth in BOHS membership (Fig. 11.2).⁷

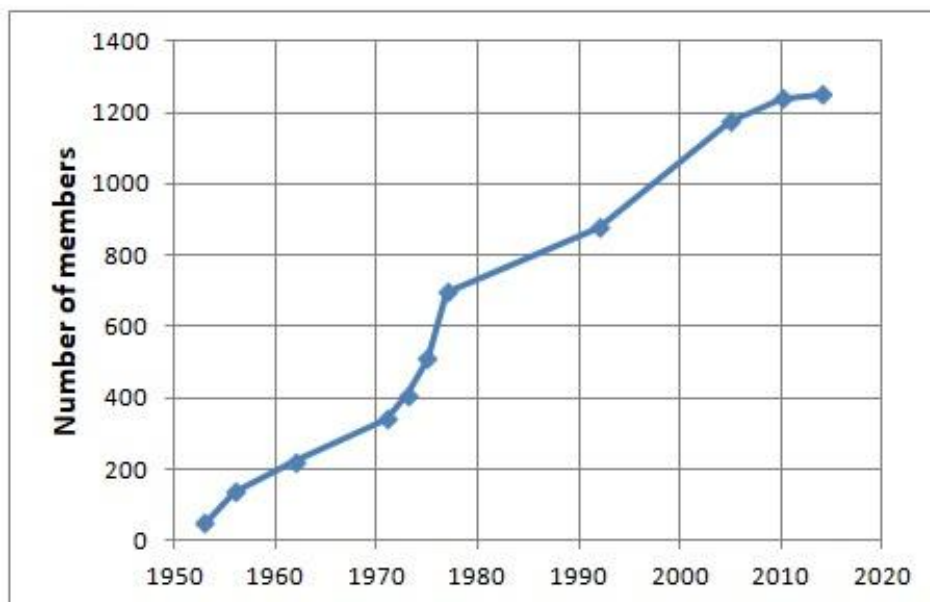


Fig 2. BOHS Individual membership. The effect of the Health and Safety at Work Act in 1974 is clear – the membership doubled between 1971 and 1977.

In more specific regulations, there was a major change in emphasis (Table 11.1). Employers became responsible for properly assessing exposure (lead 1980, asbestos 1987, and noise 1989), or more generally risk (COSHH 1988, MHSWA 1992), and the controls required depended on the risk. This approach largely replaced the forest of Factories Act regulations and orders laying down detailed requirements - the Control of Lead at Work Regulations 1980 revoked all or part of 24 earlier measures, and COSHH 1988 similarly dealt with 50.

In 1986 the European Community adopted the Single European Act, which brought about measures to implement a Single Market between the Member States. One of the results was the 1989

occupational safety and health Framework Directive. Since then the twenty individual directives implemented within this framework have dominated British legislation affecting occupational hygiene. Some of these are listed in Table 11.1. Although this account stops at about 2002, other directives came after that, notably on noise, vibration, electromagnetic fields, and optical radiation.

<i>Measure</i>	<i>Some of the Occupational Hygiene Impact</i>
HSE organisation from 1974	Team of specialist inspectors. Occupational Medicine and Hygiene Laboratories. Regional laboratories. Mines and Quarries inspectors brought into HSE.
Advisory Committee on Asbestos 1 st Report, 1977	Recommended quality control scheme
Advisory Committee on Asbestos Final Report, 1979	Control Limit based primarily on reasonably practicable exposure rather than risk
Control of Lead at Work Regs, 1980, and Control of Asbestos at Work Regs 1987	Required exposure assessment, monitoring, and various control measures
Single European Act 1987	Laid down programme towards the Single Market, including reform of EU legislative processes. Led to the 1989 OS&H Framework Directive, and by 2013 to 20 individual directives
Control of Substances Hazardous to Health (COSHH) Regs 1988	Assessment of risks and necessary controls, and use of controls; Introduced Maximum Exposure Limits (MELs) and Occupational Exposure Standards (OESs)
Noise at Work Regulations 1989	Exposure assessment, limits, action levels, and controls
Management of H&SAW Regulations, 1992 (revised 1999)	Required risk assessment
Workplace (HS&W) Regs 1992	Ventilation, cleanliness, lighting, etc
Personal Protective Equipment at Work Regulations 1992	Employers must provide suitable PPE unless control is by other means
Manual Handling Operations Regulations 1992	Risk assessment, and avoidance of risk of injury where reasonably practicable
H&S (Display Screen Equipment Regs 1992	Assessment and reduction of risks at workstations
European Standard EN 481:1995	Inhalable and respirable particulate definitions
COSHH Regulations 2002	Hierarchy of control measures (following their appearance in the Chemical Agents Directive, 1998). Workplace Exposure Limits (WELs)

Table 11.1. Some important regulatory changes affecting British occupational hygiene 1974-2002. The following years saw further measures implemented, notably to implement directives on physical agents.

HSE expertise

Within HSE, a specialist occupational hygiene unit had been established in the Factory Inspectorate under Stuart Luxon (President of BOHS in 1971). By the mid 1970s, the leader of this team was Stan Silk (President, 1980), although his inspectors still generally regarded themselves as chemical or engineering inspectors rather than occupational hygienists. Their skills were needed not only for investigations and the development of regulation and guidance and support of enforcement, but expertise in assessing what limits of exposure were really reasonably practicable. Before 1974, the Factory Inspectorate had a small laboratory in London, but in HSE this greatly expanded to meet the needs for in-house capability, and research on better methods of measurement and control. Organisationally, the laboratories were integrated with the occupational hygiene side of the Safety In Mines Research Establishment in Sheffield. As EU activity grew in workplace health, HSE specialist staff were required to negotiate and improve European measures, which increasingly influenced British legislation.

The struggle for quality – for consultants

The shift to proper assessment and proportionate control obviously gave importance to occupational hygiene skills, but who should exercise them? At the 1976 BOHS Annual Conference, Bill Simpson, Chairman of the Health and Safety Commission, used his after-dinner speech to say that HSC had decided against requiring specific qualifications in health and safety work. (I was on the top table that year and gathered from the senior members around me that BOHS had hoped for a role for the British Examining Board in Occupational Hygiene (BEBOH) – see Chapter 10.) This was clearly easier for employers where the health and safety problems were trivial or the solutions were obvious, but as legislation grew, so, apparently, did the number of unscrupulous or incompetent people willing to take employers' money to give them bad advice, sometimes requiring unnecessary action, but often failing to identify problems or solutions. This obviously wasted resources and weakened the position of competent consultants, and no doubt often cost the good health of employees. Examples are seldom published, but in the course of a review of rubber fume and rubber process dust Abid Dost and an HSE team looked at occupational hygiene reports for the British rubber industry, and found a lack of essential information on sampling and analysis, frequently ill-conceived sampling strategy, measurement of the wrong substance, inappropriate advice, and misrepresentation of control requirements.⁸

In 2010 the government commissioned a review by Lord Young of “the operation of health and safety laws and the growth of the compensation culture”.⁹ The emphasis, as the Prime Minister David Cameron put it in the Foreword to the report, was to help businesses “drowned in red tape, confusion and the fear of being sued for even minor accidents”, and there was no hint that the same businesses were responsible for thousands of deaths and perhaps hundreds of thousands of cases of illness every year. However, one outcome with the potential to help the quality problem was a “requirement that all consultants should be accredited to professional bodies”, and that they should be listed in “a web based directory of accredited health and safety consultants.” This had the prospect of correcting HSC’s decision 34 years previously. But once on the list a consultant can claim the area of expertise they choose, and there is then no specific test of occupational hygiene competence, so the quality problem was not solved. In his 2016 Manchester University MSc dissertation, David Marsh presented more jaw-dropping stories of consultant incompetence.¹⁰ And even if a consultant’s qualifications are appropriate, there is still a problem for professional associations in adequately testing and policing competence to make sure that the qualifications deliver what they claim.

The struggle for quality – for laboratories

Perhaps it is not too surprising that hygienists differ in their judgement, but they might hope that the analyses that they depend on should be reliable. Occupational exposure limits were originally intended as guides to trained professionals, who would be able to use judgement and experience in interpreting the results. As compliance with the numbers became a legal necessity, everyone expected that the measurements compared with them were right. Unfortunately when measurements were checked, it was sometimes found that the confidence was misplaced. Standardisation of methods helped, but was often insufficient.

This is especially true of optical counting methods, and in the days when coal-mine air quality was judged by the counting of thermal precipitator slides, the National Coal Board had an elaborate system of interlaboratory comparisons. As the membrane filter method of measuring asbestos spread in the 1970s, the problem was rediscovered, and as concern grew about the health effects of asbestos exposure, the lamentable state of measurement accuracy became a major problem. The Regular Interlaboratory Counting Exchange (RICE) scheme became available to all laboratories in 1984, and the results showed that the asbestos exposure limits had little objective meaning. Different laboratories showed systematic differences of a factor of ten, or a factor of a hundred on individual samples.¹¹ Participation in the scheme rapidly resulted in improvement, but a quarterly voluntary check was insufficient to ensure daily good performance, and eventually, in the 1990s, regulations required asbestos laboratories and then asbestos surveyors to be accredited by what is now UKAS.

There was already a blood-lead interlaboratory exchange scheme operating in the 1970s, and gradually the tests spread to other analytes. It led to nasty surprises, and a common response was: "I have been measuring this substance for many years; your scheme says that my results are inaccurate; what is wrong with your scheme?" I saw a letter from one respected but aggrieved senior hygienist to other laboratories, telling them how to cheat at RICE, but I do not know if the letter was actually sent. In the end the scheme improved and became accepted.

A golden era?

Looking back, we can see that the fifteen years following the Health and Safety at Work Act led to important technical developments in British occupational hygiene, and input into standards, which had worldwide effects (Fig 11.3).^{12 13} By the end of that period, there was a much more critical attitude to the finance of applied research, and perhaps there was an unspoken attitude in some quarters that the worker was protected enough and there should be more emphasis on economic development. Also, the impact of regulations whose main purpose was to reduce accidents led to public disenchantment with "health and safety", and perhaps this affected willingness to spend on the much bigger problem of occupational disease. The decline of large manufacturing and extractive industries led to a decrease by them in research into their own health problems.

However, at the same time as the emphasis on research decreased, the profession of occupational hygiene was gaining more confidence, and at last more influence. The chapter will illustrate some of these changes.

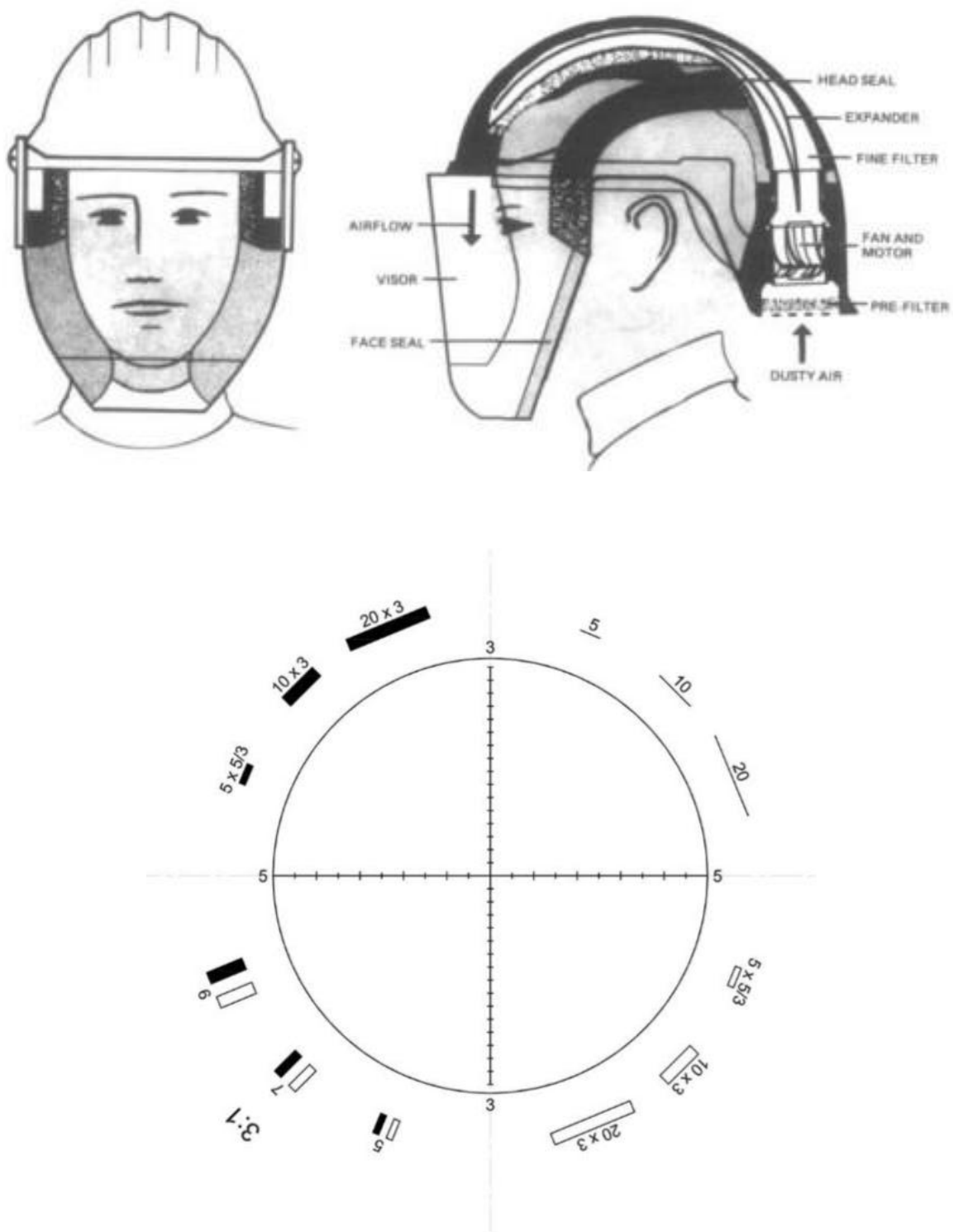


Fig 11.3. Two important British developments of the 1970s which had an international impact. (a) The Airstream dust helmet, developed at HSE's Sheffield laboratories under the direction of George Greenough, incorporated head protection, a visor, and a powered respirator. It could also carry a lamp. Air is drawn in behind the head and filtered, and then passed down in front of the face. (Crown Copyright 1980; Open Government Licence) (b) The Walton-Beckett eyepiece graticule, developed at the Institute of Occupational Medicine, greatly improved the ease and accuracy of asbestos counting, and was soon specified worldwide .

¹ Sönnischen, N *Employment in coal mining industry in the United Kingdom (UK) 1920-2019*. 6 Aug 2020. <https://www.statista.com/statistics/371069/employment-in-coal-mining-industry-in-the-united-kingdom-uk/> (Accessed 2020-08-20)

² Full fact, 9 Mar 2018. <https://fullfact.org/economy/british-steel/> (accessed 2020-8-20)

³ Wunsch, N-G Tesco group: number of employees in the United Kingdom (UK) 2012-2019. 1 Nov 2019. <https://tinyurl.com/yxoqtr24> (accessed 2020-08-20)

⁴ Our Sainsbury's, *My Sainsbury's* <https://oursainsburyss.online/sainsburys-employees-benefits/#!> (accessed 2020-08-20)

⁵ Morrisons. Wikipedia <https://en.wikipedia.org/wiki/Morrisons> (accessed 2020-08-20)

⁶ Asda Company Facts. <https://corporate.asda.com/our-story/company-facts> (accessed 2020-08-20)

⁷ Sources of Fig 2 data: 1953: BOHS publication "*The first 40 years*" (ISBN 0 9520332 0 8); 1956 and 1962: *Ann Occ Hyg* 6:50; 1971, 1973, 1975, 1977: Membership lists published in *Ann Occ Hyg*; 1992: Publishers report to Ann Occ Hyg Management Committee of the number of members' copies distributed (so subject to greater uncertainty than data for the other years); 2005 and 2010: BOHS Annual Reports; 2014: BOHS Membership Directory

⁸ Dost AA, Redman D, Cox G. (2000) Exposure to rubber fume and rubber process dust in the general rubber goods, tyre manufacturing and retread industries. *Ann Occup Hyg* 44(5):329-342

⁹ Lord Young of Graffham, *Common Sense, Common Safety*. HM Government, 2010. <https://tinyurl.com/y3nqayb6>

¹⁰ Marsh DJ, *A descriptive study of the quality of occupational hygiene practice and advice provided by health and safety professionals in the UK*. MSc dissertation, University of Manchester, 2016.

¹¹ Crawford NP, Cowie AJ (1984) Quality control of airborne asbestos fibre counts in the United Kingdom – the present position. *Ann Occ Hyg* 28:391-398.

¹² Bancroft B, Greenough GK, Hodges JP, Whitelaw DG (1980) Measurement of the dust protection and airflow of a helmet respirator. *Ann Occ Hyg* 23: 295-304.

¹³ Walton WH, Beckett ST (1977) A microscope eyepiece graticule for the evaluation of fibrous dusts *Ann Occ Hyg* 20 (1): 19-23