

# SCIENCE AND ENGINEERING AT THE HEART OF HEALTH AND SAFETY



Judith Hackitt CBE  
Chair, Health and Safety Executive

The mission of the Health and Safety Executive (HSE) is the prevention of death, injury and ill-health to those at work and those affected by work activities. For the organisation to achieve its mission requires commitment and action from many other organisations and in HSE itself we employ a wide range of scientists and engineers to:

- conduct workplace inspections and conduct forensic work for accident investigations
- acquire scientific safety evidence and knowledge on new developments and technologies related to health and safety
- apply this evidence and knowledge to regulation, policy, guidance, standards and enforcement methods
- evaluate and disseminate the results of research

## SCIENTISTS AND ENGINEERS IN HSE

HSE employs around 3500 people of whom about a quarter are practising scientists and engineers. This makes HSE one of the major employers of science and engineering specialists within Government. The majority of scientists and engineers work in one of four locations: HSE's Bootle headquarters, the Health and Safety Laboratory (HSL) in Buxton, and in two of the regional offices, York and Aberdeen. Some work as Specialist Inspectors alongside HSE inspectors, based in offices throughout Great Britain.

In policy work, our specialists use their knowledge and skills to help identify new and emerging health and safety problem areas, using their experience and commissioning research to develop solutions. In a changing world, they are able to keep up to date with new developments and technologies, and ensure that people can manage emerging risks whilst at the same time enabling innovation and business development throughout Great Britain.

Setting targets for work-related ill-health and implementing actions is complex. Some ill-health is clearly work-related, with long-latency in certain cases. Other causes of ill-health are not solely work-related or their seriousness may be exacerbated by non-work-related factors. Our specialists engage in work to

identify health priorities and establish the most effective solutions.

Incidents such as the explosion at Buncefield highlight the importance of controlling risks from major accident hazards. Many of HSE's specialists focus on assuring safety by assessing safety cases prepared by businesses and conducting inspections to regulate offshore and onshore chemical and nuclear activities. Their knowledge, skills and professional standing within their respective industries are essential to the successful management of ongoing and emerging issues. Part of our role as regulator is to provide advice and guidance to assist dutyholders in effectively controlling the risks their activities inevitably create. This requires us to attract and retain people of the right calibre who can work alongside industry specialists from many disciplines.

Controlling risks at source has long been a cornerstone of HSE's approach and is an important tool in the supply chain for chemicals and new products. HSE's specialists play a leading role in establishing the national and international framework for regulating the supply chain, carrying out the reviews and assessments on which the approvals are based.

As laid out in the new Health and Safety Strategy, inspection, investigation and enforcement are also key elements of HSE's

regulatory approach. Our specialists provide the expertise to support these activities. Of the thousands of inspections and investigations each year, a significant proportion require particular science or engineering knowledge to identify the causes of problems and to identify solutions which meet the key criteria of being reasonable and practicable. These specialists come from over twenty disciplines including mechanical, chemical, electrical and construction engineers; occupational health and hygiene specialists; and radiation, noise and vibration, and human factors specialists. They are the eyes and ears of HSE's science and engineering community, providing valuable intelligence about particular customs and practices in and across a range of industries. A continuing challenge for HSE is to collect, collate and use this corporate knowledge effectively.

## RESEARCH

HSE currently funds about £36.5m of scientific and technical work, mostly in support of its inspections and investigations. Around 30% of this funding is spent on health and safety research.

HSE commissions applied research to provide independent scientific advice for our regulatory purposes, particularly where employers either lack the relevant scientific and technological expertise or where they require new ideas to stimulate improvements.

Our agency laboratory (HSL), conducts most of this research because it is the national focus for occupational health and safety research. However, we also use academic and third party organisations to undertake a range of research, and we seek joint funding where possible. Some costs are recoverable from industry, such as the offshore oil and the nuclear energy industries.

A few recent examples of research work supporting changes of approach in managing health and safety at work include:

- changing the management regime for tower cranes following a number of recent collapses;
- developing management guidance to avert explosions in fuel storage depots following the Buncefield explosion and fire;
- conducting research into workplace cancers to help identify priorities for addressing future cancer burdens; and
- developing workplace stress management standards.

It is important to note that while some of HSE's research is in response to events, other research projects are commissioned to support the new Health and Safety Strategy, including work on long-latency disease following exposures to asbestos and silica. Evaluation of leadership, competence, worker involvement and the impact of health and safety interventions

are other important parts of HSE's research priorities.

In conducting research to inform the evidence base for policy, HSE stresses the need for researchable questions. HSE's Chief Scientific Adviser ensures that HSE policy staff are trained to appreciate how to make best use of evidence from scientific research and analysis. This in turn helps policy staff commission projects better, make suitable arrangements to evaluate results and demonstrate the impact and utilisation of research.

In addition, HSE uses a Futures Team at HSL to identify emerging issues which are likely to have an impact on health and safety in Great Britain within the next 10 years. Horizon scanning is used to help identify the need for research into topics such as emerging energy technologies, ageing industrial infrastructure, and obesity in the workforce. A recent example has been HSE's research into nanotechnology – commissioned five years ago as a horizon scanning topic, which has led to contributions to the Government's nanotechnology strategy and to codifying the knowledge for health and safety inspectors.

## HEALTH AND SAFETY LABORATORY (HSL)

HSL undertakes scientific support and investigation work for HSE, as well as for other government departments and for private sector organisations. This cross-sector position means that HSL is ideally placed to

make a strong contribution to the overall health and safety system in Great Britain, by spreading best practice. This is complemented by HSL's high international standing and is active in a number of worldwide networks, which aim to ensure consistency of approach through knowledge sharing and collaborative projects.

A significant feature of HSL's position relates to the safe and healthy implementation of new technologies, helping enable Great Britain to remain at the forefront of such advances. For example, the 'green economy' is a key element of our future economic development: HSL has been working with industry and Government to ensure that the hazards and risks associated with these new approaches are considered early enough in their development to ensure safe and successful implementation of these important and innovative developments.

A topical area, where this is particularly appropriate, concerns carbon capture and storage (CCS). Although most processes within the CCS chain can be effectively regulated under existing legislation, there are some important gaps which need to be addressed before an appropriate safety regulatory regime can be successfully implemented. HSL is working with various organisations, including HSE and the International Energy Agency, to identify potential hazards at all stages in the CCS system from capture to storage, and to determine how regulatory and knowledge gaps can be appropriately filled.

Another example concerns alternative fuels, which may pose health and safety risks if certain issues are not adequately addressed. HSL has conducted work for the Department for Transport on hydrogen fuels and

biofuels to identify the knowledge and data required to develop fully a risk assessment for a hydrogen delivery and storage infrastructure. A current project is looking at vent stack design for emergency release of hydrogen from storage systems to understand how these systems can be used safely in urban areas. The work is carried out under the umbrella of the International Energy Authority Hydrogen Implementation Agreement, and is funded by HSE and a number of private sector organisations.

HSL's scientists are also working on approaches to improve human capital performance for businesses and organisations. For example, HSL's development of the stress management standards for HSE showed how a complicated workplace issue could be managed effectively through the application of a simple, practical tool. HSL is now developing a similar approach in the area of workforce wellbeing. In essence, this is about providing employers with more support to create 'healthy organisations' that provide the necessary conditions for innovation, job/life satisfaction and improved productivity. As this work progresses and generates more information, a benchmarking service is envisaged.

Scientists and engineers play a hugely important role in helping HSE to perform its role in preventing death, injury and ill-health in workplaces throughout Great Britain whilst at the same time ensuring that Government and business priorities are taken into account. We do this by being proactive and flexible so that we can adapt to changing needs and ensure that we enable others to innovate and grow Great Britain's economy, safely.



Buncefield Tanks