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# STRATEGIC RESEARCH OUTLOOK

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2003

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that risks to people's health  
and safety from work activities  
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# HSE STRATEGIC RESEARCH OUTLOOK 2003

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The document can also be viewed on and downloaded from HSE's website at: [www.hse.gov.uk](http://www.hse.gov.uk)

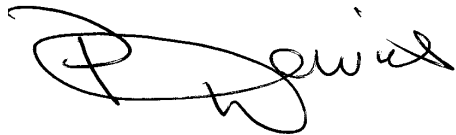
## **Foreword**

I am pleased to present the Health and Safety Commission and Executive's (HSC/E's) Strategic Research Outlook Document for 2003.

This document offers a guide to HSE's research activities, which are closely aligned to the block-based structure of HSE's business, as described in the HSC/E Strategic Plan 2001 to 2004. Our aim is to make more direct and transparent the link between HSC/E's research activity and its business aims and objectives.

Our research requirements are expressed in broad terms in this document, highlighting those issues or topics on which we expect to carry out research either now or in the future. A draft version of this document has already been made openly available on HSE's website for comment on its structure and content. The responses received have been fully taken into account in the production of this final, published version.

HSE is currently undergoing significant internal change, which includes the way in which research needs are identified across the organisation. For this reason, the annual 'Competition of Ideas' exercise has been suspended in order to allow time to identify the most effective ways of ensuring that we remain open and receptive to new ideas.

A handwritten signature in black ink, appearing to read 'Paul Davies', with a large, stylized initial 'P'.

Dr Paul Davies.  
HSE's Chief Scientist and Head of Corporate Science and Analytical Services Directorate

## **Glossary**

AGR	Advanced Gas-cooled Reactor
ALARP	As Low As is Reasonably Practicable
BNFL	British Nuclear Fuels
CIS	Common Information Systems
CDM	Construction (Design and Management) Regulations 1994
COMAH	Control of Major Accident Hazards
COSHH	Control of Substances Hazardous to Health
CSU	HSE's Chief Scientist Unit
DEFRA	Department for the Environment, Food and Rural Affairs
DfT	Department for Transport
DOH	Department of Health
DSE	Display Screen Equipment
DTI	Department of Trade and Industry
EC	European Community
EMF	Electromagnetic Field
ERTMS	European Rail Traffic Management System
ETCS	European Train Control System
EU	European Union
FP	Framework Programme
FPSO	Floating Production Storage and Off-loading Unit
FOCUS	HSE's Field Operations Directorate computer system
FOD	HSE's Field Operations Directorate
GMOs	Genetically Modified Organisms
GMO(CU)	Genetically Modified Organisms (Contained Use)
HAV	Hand-arm Vibration
HELA	HSE/Local Authority Enforcement Liaison Committee
HSC	Health and Safety Commission
HSE	Health and Safety Executive
HSL	Health and Safety Laboratory
HSWA	Health and Safety at Work, etc Act 1974
IAEA	International Atomic Energy Agency
IBC	Intermediate Bulk Container
ILGRA	Interdepartmental Liaison Group on Risk Assessment
IT	Information Technology
KBA	Key Business Activity
LA	Local Authority
LMA	Liabilities Management Authority
LUP	Land Use Planning
MRI	Magnetic Resonance Imaging
MSD	Musculoskeletal Disorders
NHS	National Health Service
NII	Nuclear Installations Inspectorate
NIOSH	National Institute for Occupational Safety and Health in the USA
NRI	Nuclear Research Index
NSD	HSE's Nuclear Safety Directorate
NSS	Nuclear Safety Studies
ODIN	Occupational Disease Intelligence Network
OECD(NEA)	Organisation for Economic Cooperation and Development – Nuclear Energy Agency
OSD	HSE's Offshore Safety Directorate
OSHA	Occupational Safety and Health Administration in the USA
PIU	Cabinet Office's Performance and Innovation Unit – now called Strategy Unit
PLEM	Plant Life Extension Management
PPE	Personal Protective Equipment
PSA	Public Service Agreements
PSA	Probabilistic Safety Analysis
PTO	Power Take-off
R&D	Research and Development
RHS	Revitalising Health and Safety

RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences
RTD	Research, Technological Development and Demonstration
SAM	Severe Accident Management
SAR	Search and Rescue
SH2	Securing Health Together
SME	Small and Medium-sized Enterprises
S&I	Science and Innovation
S&T	Science and Technology
SWI	Self-reported Work-related Illness Surveys
TUC	Trade Union Congress
UKCS	United Kingdom Continental Shelf
ULD	Upper Limb Disorder
WBV	Whole Body Vibration
WRMSD	Work-related Musculoskeletal Disorder
WRULD	Work-related Upper Limb Disorder

# HSC/E STRATEGIC RESEARCH OUTLOOK 2003

## INTRODUCTION

1. This document offers a guide to the Health and Safety Executive's (HSE) research activities. It provides information on the broad spectrum of issues and topics, including new and emerging issues, on which HSE expects to carry out research, either now or in future years. This will normally be commissioned against a detailed specification using competitive tendering wherever appropriate.

2. This document sets out HSC/E's strategic science and innovation aims and its layout reflects that of the *Health and Safety Commission and Executive's (HSC/E) Strategic Plan 2001-2004*.<sup>1</sup> It is intended that this format will make more transparent the link between HSC/E's research activity and its business aims and objectives. HSE seeks to comply fully with the principles set out in the government's Chief Scientific Adviser's *Guidelines 2000*.<sup>2</sup>

3. HSE's research management system has been changed to be consistent with the programme structure set out in the Strategic Plan and details of the arrangements can be found in our *Science and Innovation Strategy*.<sup>3</sup> In addition to the strategic research priorities presented here, HSE will continue to commission additional research in other areas as the need arises. HSE's research activities are only undertaken to support operational and policy needs, and future research requirements can therefore be subject to change to allow resources to be allocated to unplanned high priority reactive work.

4. Industry and the research community will find this a useful source of reference. HSE places a high priority on collaborative projects and this document is intended to stimulate opportunities for collaboration leading to better use of resources and better outcomes. Research contractors will find information on topics likely to be of interest, and industries, trade associations and trade unions will obtain a clear picture of the major business issues likely to require research. Complementary documents are the *HSE Research Projects Handbook*, which provides details on non-nuclear, non-offshore R&D projects currently underway or recently completed, the *Offshore Research Projects Handbook* and the *Nuclear Research Index*.<sup>4</sup> These documents are all available on-line. Regular newsletters on research matters, *Mainstream Research News* and *Offshore Research Focus*, are also available on-line.<sup>5</sup>

## HSE RESEARCH - BACKGROUND

5. The aims of the Health and Safety Commission and Executive (HSC/E), whose existence and functions derive from the Health and Safety at Work etc. Act 1974, are to protect the health, safety and welfare of employees, and to safeguard others, principally the public, who may be exposed to risks from work activities.

**HSC/E's MISSION STATEMENT:** *to protect people's health and safety by ensuring risks in the changing workplace are properly controlled.*

6. The risk creators are responsible for control but HSE, as the regulator, has the role of better defining the standards and challenging actual practice. In order to pursue its mission, HSE uses Science and Technology (S&T) to provide a sound independent understanding of what underlies the risks, and of the means to assess and control them.

**HSC/E's S&T MISSION STATEMENT:** *HSC/E develop and apply science and technology to provide a sound, independent knowledge base to evaluate the risks to people's health and safety from work activities and the means to assess and control these risks in order to help achieve HSC/E's objectives.*

7. The Health and Safety at Work etc. Act 1974 requires HSC to 'make such arrangements as it considers appropriate for the carrying out of research, the publication of results of research, and the provision of training and information. ...'. HSE fulfils these functions on HSC's behalf.

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<sup>1</sup> <http://www.hse.gov.uk/aboutus/plans/hscplans/plan0104.htm>

<sup>2</sup> <http://www.dti.gov.uk/ost/aboutost/guidelines.htm>

<sup>3</sup> <http://www.hse.gov.uk/research/content/strat01.pdf>

<sup>4</sup> <http://www.hse.gov.uk/research/index.htm>

<sup>5</sup> <http://www.hse.gov.uk/research/index.htm>

## FACTORS INFLUENCING RESEARCH

8. HSC/E's Strategic Plan for 2001/04 puts an emphasis on outcomes, underpinned by agreed government targets. The targets are for the health and safety system as a whole and so HSC/E's contribution to meeting the targets will depend on close collaboration with all stakeholders including those groups that have been hard to reach, for example ethnic minorities, small businesses, contractors and subcontractors, mobile workers and part-time workers. To achieve this, HSC/E will need to be transparent in its activities and responsive to feedback. Collaborative working will extend to the use of S&T resources through joint ventures and shared funding with collaboration on research welcomed, particularly with industrial partners.

9. The targets for the health and safety system stem from the publication by the Government and HSC during 2000 of *Revitalising Health and Safety*<sup>6</sup> and *Securing Health Together*.<sup>7</sup> The targets for improving health and safety performance over the next ten years are:

- reduce the number of working days lost per 10,000 workers from work-related injury and ill-health by 30% by 2010;
- reduce the incident rate of cases of work-related ill health by 20% by 2010;
- reduce the incidence rate of fatalities and major injuries by 10% by 2010;
- achieve half the improvement under each of the above targets by 2004;
- a 20% reduction in ill health to members of the public caused by work activity;
- everyone currently in employment but off work due to ill health or disability is, where necessary and appropriate, made aware of opportunities for rehabilitation back into work as soon as possible; and
- everyone currently not in employment due to ill health or disability is, where necessary and appropriate, made aware of and offered opportunities to prepare for and find work.

10. HSC/E's contribution to achieving these targets will involve taking action in 4 main areas or blocks:

- **Block 1 - work on eight Priority Programmes** where significant improvements in health and safety are needed now if the targets are to be met. These programmes are: Falls from Height; Workplace Transport; Musculoskeletal Disorders; Work Related Stress; Construction Sector; Agricultural Sector; Health Services Sector; and Slips and Trips;
- **Block 2 - ensuring an effective regulatory regime in the major hazards sector**, regulating the major hazards sectors (nuclear, railways, offshore, onshore gas, pipelines, explosives and chemical installations covered by the Control of Major Accident Hazards (COMAH) Regulations and mining industries) remains a critical activity for HSC/E;
- **Block 3 - securing compliance with the law**; and
- **Block 4 - meeting the mandate given us by statute and Government** to modernise and simplify the regulatory framework, provide appropriate information and advice, promote risk assessment and technical knowledge, and operate statutory schemes..

More details of the research needs of these blocks are given in the second part of this document.

11. It is expected that the proportion of research expenditure on the eight Priority Programmes will increase over the next few years as the programmes become established. To meet our business needs the emphasis on research will necessarily involve more work on human and organisational behaviour, socio-economic issues and new ways of working, rather than the more traditional 'hard' science areas. We will need to do operational research in order to establish the most effective ways of achieving our objectives and there will be increased effort on evaluation, in particular of the impact of our activities in order to establish the evidence base for 'what works'. Research will be evaluated as part of an overall business and programme strategy, rather than as an isolated activity.

12. In addition to the above, the need to keep abreast of new and fast changing technologies, throwing up new health and safety issues, to respond to changes in the socially acceptable level of risk to develop guidance and

<sup>6</sup> <http://www.hse.gov.uk/revitalising/strategy.pdf>

<sup>7</sup> <http://www.ohstrategy.net>

assist in the formulation of new or revised standards and to negotiate international directives all bear directly on HSE's research needs. HSE initiatives to establish a strategic foresight function are described later in this document. It is also becoming clear that attention to health and safety has a broader social and economic impact; for example, it can contribute to public health objectives, it can address social equality concerns and it can improve competitiveness. We need to understand better the socio-economic mechanisms involved as well as the impact of health and safety policies to date.

13. Collaboration across Europe, and beyond, helps to achieve more comprehensive and widely acceptable, scientific and technological information on which to base future EU and international legislation, standards and guidance. It can also assist in identifying and achieving speedier effective solutions to emerging occupational safety and health problems. HSE seeks to maximise the opportunities from international collaboration through involvement in joint activities and initiatives such as the EU Framework Research, Technological Development and Demonstration (RTD) Programme and through work with the European Agency for Safety and Health at Work, the European Commission's Joint Research Centre, the US Occupational Safety and Health Administration (OSHA) and the US National Institute for Occupational Safety and Health (NIOSH).

## **RESEARCH ORGANISATION**

14. A key element of HSE's scientific approach is a wide-ranging programme of research and development and technical support, which covers all the industries for which HSE has regulatory responsibilities. In 2003/2004 HSE plans to spend about £20 million on research in addition to research funded through HSE by industry. Funding for most of the research comes from HSE's grant in aid from Government and through collaboration with industry, but that for nuclear safety research is derived from licence fees and a levy on the nuclear industry. The bulk of HSE research expenditure is extramural. At any one time there are around 600 projects involving more than 200 contractors.

15. Since April 2002 HSE research has been organised in line with the blocks of activity described in the Strategic Plan. Priority Programme Managers and those with responsibility for the other key blocks of work will identify and oversee programmes of research which address both the specific and generic investigation of hazards to health and safety and short term reactive needs, for example to support risk assessment and investigations of specific accidents or incidents. Specific areas of interest, current activities, broader topic based issues and examples of potential future projects in each portfolio are described later in this document

16. It is recognised that many issues will be common to more than one area. In the Priority Programmes, where a particular hazard is common to more than one programme, it has been included with the hazard, rather than the industry sector, unless the context is clearly sector specific. It is expected that there will be collaboration between programme areas in the design of research and the sharing of information between Priority Programmes and strategic planning blocks of activity. Our internal structures will ensure that this happens. Where key issues that would benefit from the application of research impact across a range of business issues and programmes, a number of cost effective cross-cutting research programmes will be established and resourced. These crosscutting areas are identified in the Mandatory Activities block, under Work to Promote Risk Assessment and the Use of Scientific and Technical Knowledge to Manage Risk.

## **PROCUREMENT**

17. HSE research is commissioned on a rolling basis. For 2003/2004, around 70% of this total is already committed to projects commissioned in previous years; it follows therefore that there will be significant competition for funds from HSE's research budget. Some projects involve industrial collaboration and some are part-funded by the European Community. HSE research procurement procedures operate in a rigorous competitive regime. Any proposals for single tender action have to be justified by the commissioning customer against defined criteria. HSE does not award grants.

## **STANDARD PROCEDURES**

18. Most work is commissioned against a defined HSE specification, by competition wherever appropriate. HSE looks to commission research with organisations that can demonstrate that they have the necessary capability and follow sound health and safety and environmental practices. HSE will also take into account the existence and proper operation of appropriate quality management systems. In certain circumstances, e.g. where the aim of the research is to underpin regulatory activity, accredited status will, where appropriate, be a mandatory requirement.

19. In commissioning research HSE has to take into account various internal and external requirements, including those arising from the Government's control of surveys, the European Community Public

Procurement Directive, Treasury spending limits for individual projects and HSE's Research Ethics and Scrutiny Committees.

## **CONTRACTORS**

20. HSE research comprises projects carried out by contractors from private industry, consultants, Government laboratories, universities, and the Health and Safety Laboratory (HSL). HSL is an in-house agency of the HSE, and research placed with HSL is subject to competition in a similar way to that placed with external contractors.

21. HSE is dedicated to ensuring an informed and professional approach to research contractors and strives to achieve value for money in procuring its research needs. The Chief Scientist Unit (CSU) is responsible for overseeing the research management process for non-nuclear research, while NSD is responsible for nuclear safety research. CSU maintains a database of suitable contractors to improve the efficiency of tendering exercises, and details from additional contractors can always be received. The database is referred to when lists of suitable tenderers are compiled. Research contractors wishing to be placed on the database should request an information pack from the contact point noted in the Appendix. However, it should be noted that inclusion in the database does not guarantee an invitation to tender. Contractors who have submitted their details previously will be retained on the database and need not reapply.

## **DISSEMINATION OF RESULTS AND RESEARCH EVALUATION**

22. It is HSE policy that the results of research should be published freely in accordance with scientific practice except where timing is affected by considerations of commercial exploitation. CSU will challenge any claims that research should not be published. Where appropriate, results will be available through publication of final reports in HSE's Research Report series. These reports are available on HSE's website for free download.<sup>8</sup> First generation quality hard copies of the reports can be purchased either on-line or from HSE Books<sup>9</sup> at reasonable cost. Publication of results in scientific and trade journals and conference proceedings is also encouraged. HSE has also collaborated on work to establish a Government research website that has provided access to reports in the fire and explosion field.

23. Information is also disseminated via seminars, exhibitions, press releases and quarterly newsletters. The information generated by research is utilised for the provision of Guidance Notes, Codes of Practice, standards setting, evaluation of risk control measures, negotiation of international Directives, evaluation of policy options, and for ad hoc advice on health and safety issues.

24. Evaluation of HSE research is carried out to determine the effectiveness and efficiency of project activity, and to identify the impacts of research and assess the relationship between those impacts, the objectives of research and wider HSE business objectives.

## **INTELLECTUAL PROPERTY RIGHTS (IPR)**

25. HSE's revised policy on the ownership and management of IPR arising from its funded research activity was published in March 2003 under the title '*HSE Research: Intellectual Property Policy Statement and Exploitation Plan*'. The document can be obtained free of charge from the contact point in the Appendix or can be accessed via the HSE web site.<sup>10</sup> The new policy fully accords with the accepted recommendations of the Baker Report on commercialisation of public funded research, *Creating Knowledge Creating Wealth*,<sup>11</sup> in that ownership of the intellectual property and the associated responsibility for commercial exploitation will in future, except where specific exemptions apply, be vested in the organisations that have undertaken the research rather than with HSE.

## **UNSOLICITED PROPOSALS**

26. Proposals received that are not as a result of an invitation to tender will be treated as unsolicited proposals. Such proposals will be subject to appraisal alongside solicited proposals, in the context of limited available funds, and are thus less likely to be funded.

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<sup>8</sup> <http://www.hse.gov.uk/research/index.htm>

<sup>9</sup> HSE Books, PO Box 1999, Sudbury, Suffolk, CO10 2WA, Tel 01787 881165, Fax 01787 313996, [www.hsebooks.co.uk](http://www.hsebooks.co.uk)

<sup>10</sup> <http://www.hse.gov.uk/research/iprights.pdf>

<sup>11</sup> [http://www.hm-treasury.gov.uk/Documents/Enterprise\\_and\\_Productivity/Research\\_and\\_Enterprise/ent\\_sme\\_baker.cfm](http://www.hm-treasury.gov.uk/Documents/Enterprise_and_Productivity/Research_and_Enterprise/ent_sme_baker.cfm)

## **BLOCK 1 - PRIORITY PROGRAMMES**

### **FALLS FROM HEIGHT**

#### **Programme Objectives**

To reduce fatalities and major injuries from falls from height by 5% by 2004 and 10% by 2010.

#### **Policy Objectives**

To identify groups, activities or economic sectors to be targeted for priority action to reduce falls

To identify the most effective methods of improving individuals' awareness of the risks of working at height and ensuring that they take appropriate measures to minimise them. These methods are likely to include publicity, enforcement, and advice.

To ensure that new legislation on work at height is effective in contributing to fewer accidents

To develop means of working with key stakeholders to identify and spread good practice

#### **Evidence Base and State of Knowledge**

In 2001/02, 68 people died and 3996 suffered a major injury as a result of a fall from height in the workplace.

The basic statistical data on falls accidents is contained in records on HSE's operational computer systems FOCUS, CIS and RIDDOR. There is a large body of statistics on falls, which has been analysed as much as possible for trends and basic background data e.g. agent of fall, occupation of accident victim, but less is known about the causal/initiating factors and other relevant circumstances.

There is also a considerable body of knowledge from research projects on technical aspects of work at height, e.g. on ladders, scaffolds, lanyards, many of which are related to the construction industry. In addition there are many scientific reports on individual incidents investigated by the Health and Safety Laboratory (HSL). There is a continuing need for this type of information and there is also a need for information about the safety of new technological developments in equipment for preventing or arresting falls from height.

There is less information about the causes of so-called 'low falls' and about certain agents, particularly stairs, which feature in a large proportion of the major injury if not the fatal accidents. There is also a need for better understanding of which groups of people are vulnerable and how they can be persuaded to work more safely at height.

#### **Research Objectives and Innovation Strategy**

To provide more in-depth intelligence on accident causal factors, and to recommend areas where efforts might best be targeted.

To investigate risk perception and behavioural issues.

To encourage the 'designing out' of the need for work at height.

To evaluate protection systems, including the wider work place design and environment dimension.

To develop expert systems to guide dutyholders.

#### **Recent Research Outcomes that are informing policy**

Recent research findings on the degradation of lanyards have been incorporated into guidance for inspectors and to inform policy-making. This work is ongoing. A review and evaluation of existing information on harness suspension also informs current guidance and policy-making. Two draft research reports - on prevention and risk control effectiveness against falls from height, and on the evaluation of the effectiveness of ladder stability devices, are currently being considered and these will inform the development of Programme policy.

#### **Current Main Research Interests**

Evaluation of effectiveness of equipment for working at height e.g. safety nets, airbags, ladder hoops.

Investigation of need for revision of technical guidance e.g. re. body weight on fall arrest equipment.

Production of technical guidance for selection and use of equipment for work at height.

Prevention of falls involving stairs/steps (in collaboration with Slips and Trips programme).

Methods of conveying safety messages (re. work at height) to workers.

### **New and Emerging Areas of Interest**

Developing awareness of risk among workers subject to 'low falls' and methods of reducing numbers of such accidents.

Assessing whether 'non-specialist' or 'incidental' workers (e.g. maintenance staff, fitters, goods drivers) at height are more vulnerable to falls accidents than 'specialist' workers (e.g. steel erectors, telecommunications engineers) at height.

Designing out the need to work at height.

Mapping the extent and effectiveness of training.

Identifying existing good practice in avoiding falls and how to replicate this.

A continuing need to evaluate new technical solutions to avoid need for work at height e.g. robotics or minimising the consequences of falls, through the use of nets, airbags, etc. Development of safe systems by using the most appropriate combination of all available methods.

Evaluation of pilot projects tackling falls and recommendations for replicating successful approaches.

Evaluation of the forthcoming 'Work at Height Regulations' (2003) to inform the Priority Programme as well as to meet EC obligations.

Falls from vehicles in the workplace (in collaboration with the Workplace Transport Priority Programme)

## **WORKPLACE TRANSPORT**

### **Programme Objectives**

To reduce fatal and major workplace transport accidents by 5% by 2004 and by 10% by 2010.

To reduce over 3 day injuries arising from workplace transport accidents by 5% by 2004.

### **Policy Objectives**

To provide information to support robust detailed baselines.

To provide agreement on the main causal factors using robust evidence.

To use information received in response the discussion document to identify areas where actions/interventions can be made, and to take these forward in consultation with the stakeholders.

To work towards improved standards, guidance, expert systems for risk assessment and protection selection, and to support compliance and enforcement leading to reduced injury and fatalities.

To develop a longer-term basis for improved design for inherently safer machinery and workplace environment.

### **Evidence Base and State of Knowledge**

Approximately 100 people die every year in workplace transport related accidents.

More than 2500 major injuries and around 5850 minor injuries cause people to be off work for more than three days.

Workplace transport accidents are usually caused by a complex combination of factors and not by a single initiating incident. For example, management and procedural factors together account for 80% of the accidents caused.

There is an extensive evidence base already collected by various bodies, which has been analysed by the Health and Safety Laboratory (HSL) for recommendations on trends of causation. HSE's Field Operations Directorate (FOD) have collected a database of 600 incidents and HSL have mirrored this work retrospectively in the Local Authority enforced sectors.

### **Research Objectives and Innovation Strategy**

To collect information to identify SME stakeholders and establish employer awareness.

To identify causation factors of workplace accidents, particularly behavioural issues, and safety management systems.

To consider current working practices and control measures and identify areas for improvement and to collect information from a variety of contexts on the economic cost of workplace transport incidents, including those where no-one is injured, to help define reasonable practicability.

To assess adequacy of current training measures and consider improvements and extensions.

To assess the effectiveness of current methods of risk communication and to explore innovative methods for improvement.

To monitor the effectiveness of changes identified above and fine tune as necessary.

To investigate the design of workplace traffic systems and vehicles.

### **Recent Research Outcomes that are informing policy**

An analysis of accident investigations by HSE identified reversing vehicles as being involved in a high proportion of these incidents. The policy is to eliminate so far as possible or if not possible to reduce the risk from such manoeuvres so far as is reasonably practicable. We are using the results from four completed projects relating to this to give advice to employers and to devise a cheap and easy method whereby they can map blind spots on particular workplace vehicles. Formal published guidance will be forthcoming

### **Current Main Research Interests**

Further information on the effectiveness and performance of various protection systems, e.g. roll over protection systems, about vehicle design and the inherent stability of machines and equipment and concerning factors influencing operator and pedestrian visibility. To include aspects of machinery and workplace design.

Developing sound intelligence on the effectiveness of training techniques and identification of the best refresher training indicators.

Ongoing detailed work on engineering controls specific to types of vehicle and uses.

Collecting information on employer awareness of the risks to provide a baseline.

### **New and Emerging Areas of Interest**

Identification of targeted methods of risk communication.

Ways of identifying areas where human factors affect the need for, or the frequency requirement, for training or refresher training.

Exploration of the benefits of training employees for pedestrian activities in areas where vehicles are operating (both drivers and non-drivers).

Investigation into whether the trend for partially and fully automated workplaces is increasing the risk to employees and others.

## **MUSCULOSKELETAL DISORDERS**

### **Programme Objectives**

To reduce the incidence rate of work related musculoskeletal disorders (WRMSD) by 12% by 2004; based on SWI 1995 (self-reported) figures, this equates to around 22,000 fewer new cases of WRMSD in 2004 than now.

To reduce the number of working days lost per 100,000 workers due to WRMSD by 15% by 2004; based on SWI 1995 (self-reported) figures this equates to around 1.5 m fewer working days lost by 2004 than now.

### **Policy Objectives**

To secure management commitment to and employee involvement in tackling musculoskeletal disorders (MSDs).

To identify and assess the high-risk jobs and the high risk tasks within those jobs.

To identify appropriate risk control solutions, for example, by redesign of the task.

To identify what training and education is required and by whom, and to ensure that existing training and education is evidence based.

To secure appropriate arrangements for managing episodes of MSD.

To secure appropriate evaluation of programmes for controlling MSD.

To develop the appropriate role for diagnostic tools to assist research, prompt the correct treatment and rehabilitation of, and a reduction in the prevalence in MSD, particularly upper limb disorders (ULDs).

To identify existing examples of good practice which will help to generate guidance on how to manage MSDs appropriately (e.g. reporting systems, evaluation, treatment and rehabilitation)

To motivate designers, manufacturers and suppliers to apply ergonomic principles in the design of work equipment, for example: tools, machines, furniture, etc.

### **Evidence Base and State of Knowledge**

Musculoskeletal disorders (MSD) are the commonest kind of occupational ill health. Around 200,000 **new** cases or work-related MSD occur each year. In 2001/02 it was estimated that around 1.1 million people in Great Britain were suffering from a MSD caused by work, accounting for about 60% of all reported cases of occupational ill health. It is estimated that this resulted in 12.3 million working days lost in the previous year, at a cost to society of about £5.7 billion (1995/96 prices).

A number of research projects have been carried out which have contributed to HSE's knowledge of cause, effect and prevention of MSD. These include:

- a study of the health risks associated with handling whilst adopting complex postures;
- a study of the extent and causes of MSD work-related problems among cleaners;
- studies to determine the health problems associated with the use of portable display screen equipment and non-keyboard devices.
- evidence based patient handling.
- manual handling in the food and drink industries – injury rate v weight of unit loads lifted

### **Research Objectives and Innovation Strategy**

To ensure inspectors and duty holders have the tools and information they need in order to enforce on / comply with the law on MSD.

To gain more information on incidence and prevalence data across the working population and in particular sectors/groups, in order to target those sectors and groups for whom MSD are a high risk.

To evaluate the effectiveness of HSE in regulating MSD.

To find ways of addressing the needs of particular groups with particular requirements or where inequalities exist, including rehabilitation of those with an injury/ill-health

To understand how best to develop a culture of good practice including use of collaboration and partnership working to improve compliance.

To improve our understanding of the pathomechanisms and epidemiology of MSD and their prevention.

To find out which solutions work and under what circumstances.

To determine the range of competencies and skills which apply to MSD and those who need them (e.g. workers, supervisors/managers, etc., as well as relevant professionals and experts) and to evaluate the effectiveness of training and development.

To determine how to increase knowledge and competence where skills are lacking or in need of improvement and the opportunities available to do so.

To identify the information, advice and support needs of all those who can help tackle MSDs, especially duty holders and employees, but also various other intermediaries and suppliers.

To evaluate existing guidance relevant to MSDs so that improvements can be made to the support provided and the way it is delivered.

#### **Recent Research Outcomes that are informing policy**

The findings from the ‘Court judgments for WRULD and HSE regulations and guidance’ research will help HSE write guidance that can be interpreted correctly and consistently by employers, employees and the courts.

The ‘Evaluation of ‘Back in Work’ pilot projects’ will inform the development of future interventions, including the identification and involvement of stakeholders and especially of workers and safety representatives. This project also confirmed the strategic theme of the MSD Priority Programme, that a holistic and partnership approach is the best way to tackle back pain in the workplace.

‘The role of inequality and musculoskeletal health’ research has helped to inform the targeting and development of the Priority Programme.

The results of the research ‘Health and safety of non-keyboard input devices’, have fed directly into the revised Display screen Equipment guidance, particularly Appendix 4 on work with a mouse, trackball or other pointing device.

#### **Current Main Research Interests**

Evaluation of the NIOSH lifting equation.

Workplace risks associated with pushing and pulling.

Obstacles to recovery from musculoskeletal disorders.

The role of work stress and psychological factors on the development of musculoskeletal complaints.

Principles of good manual handling: achieving consensus.

Low back pain in drivers: roles of whole-body vibration (WBV), posture and manual materials handling.

Further development of the usability and validity of the Quick Exposure Check.

The effects of thermal environments on the risks associated with manual handling.

Development of functional magnetic resonance imaging (MRI) to measure the central nervous system response to chronic back pain.

MSD's, mental health and the work environment.

**New and Emerging Areas of Interest**

Rehabilitation cost-benefit studies.

Effective management of ULD, particularly how can health professionals become more effective.

Improved management of pain in ULD

Risk perception in relation to MSD.

Gathering better, up-to-date ill-health data related to specific types of work (e.g. DSE).

Warming up / stretching to prevent work related MSD.

Further development of manual handling assessment charts i.e. for push-pull activities.

Development of a tool to aid assessment of the force element of a task and the provision of guidance on factors that may influence this assessment.

Determining which MSD solutions work best in which circumstance.

Cost-benefit analyses of tackling MSD in the workplace.

Benefits of taking a holistic approach to tackling MSD.

Addressing MSD in various industrial sectors identified as having high prevalence.

## **WORK-RELATED STRESS**

### **Programme Objectives**

Reduce by 20% the incidence of work-related stress by 2010. This means, using the self-reported work-related illness survey (SWI) 2001/02 figures for illustration, around 53,000 fewer new cases of stress, anxiety or depression by 2010.

Reduce by 30% the number of working days lost from work related stress by 2010. An illustration based on SWI 2001/02 figures, indicates around 4 million fewer working days lost due to stress, anxiety or depression by 2010.

### **Policy Objectives**

To work with partners to develop clear, agreed standards of good management practice for a range of stressors.

To equip HSE inspectors and local authority officers to be better able to handle the issue in their routine work.

To launch a publicity push to help educate employers, including the development of detailed guidance.

To identify and publicise best practice in work related stress, including models for rehabilitation.

### **Evidence Base and State of Knowledge**

Data from SWI 2001/02 indicates in 2001/02 an estimated 265,000 new cases of stress, anxiety or depression caused or made worse by work in Britain. Indeed, estimates from this survey indicate 500,000 people were suffering from stress, anxiety or depression caused or made worse by work including new cases; resulting in an estimated 13.5 million working days lost due to stress, anxiety or depression in 2001/02.

A great deal of research has been carried out on work-related stress. There is a consensus that organisational factors have a major part in the development of 'stress' outcomes, and similarly, that targeting organisational factors is the most effective way to reduce or eliminate work-related ill-health. We are in the process of establishing the type and level of intervention that will be both practicable and effective in preventing stress in the workplace; this will also further our understanding as to what constitutes a 'case' of stress.

### **Research Objectives and Innovation Strategy**

To identify good practice in stress prevention and rehabilitation.

To establish reliable baseline data and firm up indicative targets. This will allow us to measure progress towards them.

To elucidate the benefits for taking organisational action on stress.

To develop our understanding of the relationship of work stressors and health outcomes. Particularly, we are seeking to address specific stressor areas (demand, control, support, role, relationship, change).

### **Recent Research Outcomes that are informing policy**

A study on the scale of occupational stress has helped to define HSE's strategy for dealing with this problem.

Results from the Whitehall II study of civil servants' health have reinforced HSE's arguments that the design and organisation of work can have serious effects on employees' health.

Other recent research has shown that it is possible to intervene at the level of the organisation to influence work-related stress.

The identification of beacons of excellence in stress prevention.

### **Current Main Research Interests**

Further research to assess the influence of stress on human reliability.

Clarification of objective factors that define a 'case' of stress, and what perceptual factors that influence people reporting that they are stressed by work.

Further exploration of the data arising from Whitehall II and how these might be used to support the development of standards of good management practice.

Clarification of the strength of the links between management actions, stressor reduction and ill health reduction.

The nature, cause and consequences of harm in emotionally demanding occupations.

**New and Emerging Areas of Interest**

Evaluation of the Management Standards pilot and collection of evidence to underpin the second phase.

Research to identify examples of best practice in rehabilitating employees back to work after an absence stemming from work-related stress.

Evaluation of the HSE stress guidance for managers: *'Tackling work-related stress – A managers' guide to improving employee health and well-being'* (HSG218).

## **CONSTRUCTION SECTOR**

### **Programme Objectives**

To support delivery of the Revitalising Health and Safety (RHS) targets set by Government and HSC:

- To reduce the incidence rate of fatal and major injuries by one third by 2004/05.
- To reduce the incidence rate of cases of work related ill health of employees by 20% by 2004/05.
- To reduce the number of working days lost per 100,000 workers from work related injury and ill health by 20% by the end of 2004/05.

### **Policy Objectives**

To engage with key intermediaries and stakeholders to achieve a cultural change in the industry - in particular to develop an expectation of competence, compliance and continuous improvement that involves partnership between those who create, manage and are exposed to risk.

To develop the regulatory framework to address key issues for the construction industry and to ensure regulations are easy to understand, especially by small firms.

To develop and promulgate guidance and standards that are clear and easy to understand and, in particular, meet the needs of small firms.

To develop improved intelligence on the structure of the construction industry, its health and safety performance and a better understanding of underlying causation of failure to manage and control risks. All this to improve our understanding of the hazards and risks to inform HSE and industry of priorities for action, to improve targeting of actions and guidance leading to raised standards and a reduction in accidents, injuries, ill-health and fatalities.

To support the development of effective occupational health support for the industry.

### **Evidence Base and State of Knowledge**

The Construction Industry gives rise to a disproportionately high number of deaths and serious injuries. Although the risks arise from traditional activities and approaches to project management they are also likely to be influenced by new structural designs and building techniques. The scale and complexity of large infrastructure projects are growing.

The fatal and major injury rate is 392, 58 and 270 per 100,000 for employees, the self-employed and all workers respectively. Estimates suggest up to 30% of the construction workforce is significantly affected by work-related musculoskeletal disorders (MSD) injuries. There is also concern for hand-arm vibration and the legacy from asbestos.

Currently, there is a lack of provision of occupational health support in the construction industry, despite a number of serious health problems among construction workers.

Manual handling is a major cause of ill health and injury in construction with a prevalence of 96,000 (SWI - 1995).

### **Research Objectives and Innovation Strategy**

To understand better the structure, interdependencies and relationships of the industry to ensure that HSC/E's Construction Priority Programme is addressing all parts of the industry contributing to its health and safety performance.

To establish the extent to which differing procurement processes and employment practices influence behaviour, standards and health and safety performance.

To identify areas where designers, clients and construction product suppliers can have a direct impact to design out risk at source, avoid hazards and reduce risks from products.

To investigate practical ways to encourage development, provision and uptake of occupational health support for construction, and to improve the knowledge and management of work-related health risks such as respiratory sensitisation, MSD, hand-arm vibration and stress.

### **Recent Research Outcomes that are informing policy**

Research on case studies on manual handling in construction was directly incorporated into HSE's Field Operations Directorate (FOD) sector guidance entitled *Backs for the Future*.<sup>12</sup>

Research on the evaluation of the Construction Design and Management (CDM) Regulations had considerable influence on the decision to produce a revised CDM Approved Code of Practice and contributed in the form of the initial Consultative Document.

The results of a scoping study are leading to a full project that will inform policy on provision of occupational health support in the construction industry.

Collaborative research between HSE and the Institute of Cancer Research led to a change of direction in the Control of Asbestos at Work Regulations by identifying the largest group at risk from asbestos diseases were those working in the building trade.

An influence network for construction has been successfully tested and has been useful in determining priorities for action; the idea is being refined to provide a more accurate view of influences across the construction sector.

In order to provide an adequate evaluation of the Construction Priority Programme, research has been undertaken to establish which elements can best be evaluated and the most appropriate mechanisms for evaluation.

### **Current Main Research Interests**

The influence of various factors on accidents and incidents of ill health. The objective is to identify the key factors that HSE can most easily influence to reduce such events. The work is likely to continue to be a priority.

New materials and building techniques: risks during construction, maintenance and demolition.

Risk perception, training and education, particularly among young workers and mobile workforce.

Tools available to assist designers to incorporate health and safety into their design processes. The findings should enable targeted guidance or other tools to be provided to this audience.

### **New and Emerging Areas of Interest**

In order to meet the challenging targets the industry has set for itself, HSE needs to be in a position to monitor the implementation and impact of the various action plans launched at the February 2001 summit. It also needs to assure itself that its intervention strategy effectively and proportionately targets all those in the construction procurement and supply chain. It also needs better intelligence on the comparative performance of the various parts of the industry, e.g. through industry profiling and improving data on the true nature of, and trends in, construction under-reporting.

The business case for improved health and safety performance in order to move the industry away from an approach that focuses on minimal compliance and sees health and safety as an additional cost towards an approach focused on excellence or continuous improvement. The idea of 'Corporate Social Responsibility', where all stakeholders in a project take corporate responsibility for health and safety, is an area where work needs to be done to establish mechanisms for encouraging this process.

The impact and consequences of increasing skills shortages on health and safety performance – including changes in the employment pool and any 'new' implications such as language skills in a workforce being drawn from a widening pool of nationalities.

Major Hazards: certain construction activities have the potential to create major hazards. There is the need to review current knowledge and consider future developments to identify such possibilities, so that attention can be targeted at their prevention.

Compressed air tunnelling and decompression issues.

Structural stability of advanced false works, facades and temporary claddings and structures, especially during refurbishment.

Safer design via CDM and worker and management competence.

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<sup>12</sup> Guidance Note HS(G)149 (ISBN 0 7176 611225) available from HSE Books

## **AGRICULTURAL SECTOR**

### **Programme Objectives**

Following a fundamental strategic review of fatal and major incident rates over the last 16 years and all other available evidence, a revised strategy for the Agriculture Priority Programme has been formulated. As a result, in October 2002, the following more challenging long-term targets were agreed with the industry and include for the first time a broad occupational health objective:

To reduce the incidence rate of fatal injuries to employees by 5% by 2004/5, and by 30% by 2009/10;

To reduce the incidence rate of fatal injuries to self-employed workers by 5% by 2004/5, and by 10% by 2009/10;

To reduce the incidence rate of major injuries to employees by 5% by 2004/05 and by 30% by 2009/10;

To reduce child fatal accidents to zero by 2009/10.

To develop, trial and evaluate a viable model for the provision of occupational health and rehabilitation services in rural communities; and

To promote and encourage farmers and agricultural workers to access rural occupational health and rehabilitation services.

### **Policy Objectives**

To achieve a sustainable downward trend in fatal/major accident trends to workers, and the number of farm accident deaths to members of the public and children and to reduce the consequential costs to society and the economy.

To meet ongoing responsibilities for the enforcement of pesticides legislation.

To meet business priorities resulting from the Revitalising Health and Safety (RHS) and Securing Health Together (SH2) strategies.

### **Evidence Base and State of Knowledge**

The agricultural sector gives rise to a disproportionately high number of deaths and serious injuries. Child deaths on farms continue to be high profile. Older workers, often family members, feature regularly in the statistics. Fatal accident incident rates show divergent trends over the past 16 years between the employed and non-employed sectors. Over this timescale, the incident rate for the employed has roughly halved whereas it has doubled for the self-employed sector.

Agriculture has few large employers and many family only or self-employed farms. The industry is a conglomerate of different activities including: horticulture; forestry; arboriculture; fish farming as well as the obvious livestock and arable activities. Farms are also homes.

The fatal accident incidence rate for workers in agriculture (employed and self-employed combined) in 2001/02 was 9.2 per 100,000 - the highest of any sector.

The fatal accident incident rate in 2001/02 was 8.0 (per 100,000) for employees and 11.0 (per 100,000) for self-employed workers. The reported major injury rates for employees in 2001/02 was 239.3 per 100,000 employees, but the industry suffers from a high level of under-reporting.

Key causes of injury include: transport accidents (vehicle overturns and being struck by a moving vehicle); falls from height (roofwork and arboriculture); contact with moving machinery; and livestock. Key cause of non-fatal injury include: manual handling; slips and trips; struck by a moving/falling object; and falls from height – which align with HSE's priority RHS topics.

Workers experience double the average exposure to dusts/ fumes including respiratory sensitisers and average rates of new assessment of asthma were 2.6 times the national average (HSE statistics 1999/2000). Workers experience 8 times the average exposure to hand-arm vibration (HAV) – self reported work-related illness survey (SWI) 1995.

Stress in agriculture is thought not to be primarily work related, but results amongst other things from financial pressures and lone working.

### **Research Objectives and Innovation Strategy**

The aim is to change the deeply imbedded culture of risk taking which exists within the employed and self-employed sectors in the industry with the objective of improving awareness, information, communication, training and competence. This will be achieved by the following approach, which is consistent with the sector's research strategy statement and reflects a real determination to deliver the new targets. This approach includes elements for delivery of an underpinning business improvement strategy, e.g. objective evaluation of HSE's interventions and the development of outcome-related surrogate performance monitoring measures:

- development of an in-year outcome-related performance monitoring tool;
- development of surrogate outcome indicators, e.g. a barometer of change in health and safety culture;
- evaluating the best means of influencing farmers' attitudes;
- evaluating the best methods of disseminating advice and information to determine which are the most influential, authoritative and reliable;
- measuring the effect of provision of health and safety advice;
- assessing the effectiveness of education and training provision in the industry;
- evaluating the impact of safety awareness days and other intervention techniques;
- measuring the effectiveness of health and safety advisors and roving health and safety representatives in agriculture;
- improving safety of equipment and working practices by, for example, assessing the use and effectiveness of rope access techniques and mobile elevating work platforms in tree work;
- determining safe means of hauling round timber in the forestry industry;
- encouraging safety of agricultural machines by design;
- determining the true levels of ill health particularly in relation to musculoskeletal disorders (MSD), exposure to dust, noise, zoonoses, asbestos and asthmagens;
- determining the levels of ill health in poultry industry workers, intensive horticultural establishments and self-employed forestry workers;
- determining the number of accidents in agriculture involving children;
- identifying the true extent of under-reporting in the industry and the steps that can be taken to improve the reporting of accidents and ill health;
- setting time baseline figures for Revitalising Health and Safety;
- identifying practical solutions to MSD in agriculture; and
- identifying the scale of work-related stress in agriculture, identifying key stressors and the extent to which these are occupationally related.

### **Recent Research Outcomes that are informing policy**

Research into fatal accident causation in Agriculture has led to the identification of priority areas for intervention and policy making.

Research into whole body vibration and power take-off (PTO) guard design have already fed into EC Directives and Safety Standards.

Research into risk awareness and resultant behaviour is influencing policy on, for example, MSD and occupational health.

Research into the effectiveness of lap straps as seat restraints on tractors in the event of overturning has led to guidance and to tractor Directives.

Research into health and safety in the agricultural engineering design process is being used to encourage designers to improve the quality of new machinery.

Joint research between HSE, Department for Transport (DfT) and the Forestry Commission into the security of cross-loaded timber is leading to changes in industry practice for loading and securing logs. It has also resulted in changes to the DfT and Industry Code for load security.

Reactive pesticide support work is essential to HSE's continuing ability to deliver the commitment under the Agency agreement between HSC and Ministers.

Research into practical noise solutions will inform HSE's inspection /enforcement strategy on this RHS topic.

### **Current Main Research Interests**

Measuring the effectiveness of roving safety representatives in agriculture.

Determining the incidence of accidents and cases of zoonotic infections to children in agriculture.

Structural deterioration of tractor safety cabs with age.

Understanding and influencing farmers' attitudes to health and safety.

### **New and Emerging Areas of Interest**

The sector is reviewing its research portfolio in light of the findings and recommendations from recent work on fatal accident causation. The findings of this work, which it is proposed to extend, are already reflected in our prioritisation of projects for funding in the current year.

The following new areas are also of particular interest:

- the use of IT is being explored to provide the industry with risk assessment techniques specifically tailored for use by the industry and to encourage ease of take-up of the techniques;
- exploring new risks or opportunities to reduce known risks from Green and organic influences, further automation, biotechnology and countryside management responsibilities that farmers may be asked to take on following the Curry Report recommendations and the Department for the Environment, Food and Rural Affairs (DEFRA) recent strategic 'Sustainable Food and Farming' proposals.
- engaging health and safety in the new stewardship schemes being developed in the industry.

We are also identifying areas of research which will help in the delivery of an underpinning business improvement strategy, for example, more objective evaluation of HSE's interventions and the development of improved performance measures:

- development of an in-year outcome-related performance monitoring tool;
- development of surrogate outcome indicators, e.g. a baometer of change in health and safety culture.

## **HEALTH SERVICES SECTOR**

### **Programme Objectives**

To support delivery of the Revitalising Health and Safety (RHS) targets set by the Government and HSC:

- to reduce the number of working days lost per 100,000 workers from work-related injury and ill-health by 30% by 2010.
- to reduce the incident rate of cases of work-related ill-health by 20% by 2010.
- to reduce the incidence rate of fatalities and major injuries by 10% by 2010.
- to achieve half the improvement rates under each of the above targets by 2004.

The Human Resource targets set by the Department of Health (DOH) in England (reduce all accidents by 30% by April 2004; reduce all incidents of violence by 30% by April 2004; and reduce all sickness absence by 30% by December 2003) are more demanding than the above. We have not attempted to substitute these targets with the RHS targets, but have stressed that we want HSE's programme to help the NHS deliver on the objectives they have already set for themselves. Those targets set by the DOH in Scotland and Wales are broadly in line with the RHS targets.

### **Policy Objectives**

To collaborate with NHS regions and Scotland and Wales at a strategic level to support their quality improvement programmes for health and safety.

To establish, through the HSC Health Services Advisory Committee, the commitment of the private sector on the setting of suitable targets and performance measurement systems.

To implement compliance-based interventions focusing on key risks, manual handling, violence, slips/trips, stress and asthmagens.

To identify poor performers and target enforcement action accordingly.

### **Evidence Base and State of Knowledge**

About 1.1 million people are employed in the NHS, and 0.6 million are employed in the private health sector in England, Wales and Scotland. Some of the main occupations (especially nurses and ambulance crews) have extremely high rates of accidents and sickness absence resulting from: manual handling (mainly of patients); slips and trips; violence; and stress.

### **Research Objectives and Innovation Strategy**

To identify evidence based, evaluated examples of good practice on managing occupational stress in healthcare.

To determine why the NHS and independent organisations do not act on the compelling business case for health and safety management.

To measure the contribution of a training regime in the overall risk management system for managing violence to staff in healthcare settings.

To assess the effectiveness of other factors, such as workplace (environment) design and work patterns to control workplace violence in healthcare settings.

To identify the ergonomic risk factors which lead to sickness absence from musculoskeletal disorders (MSD) in health services, in addition to patient handling.

To establish the prevalence, causal agents and routes of transmission of work acquired infections to healthcare workers.

To develop measures of the real effectiveness of health and safety management systems so HSC/E can develop more authoritative evidence-based guidance.

To obtain better evidence on the business case for employers to rehabilitate people back to work following work-related absences within the healthcare sector.

To investigate ways of changing attitudes and behaviour, for example, assessing the effectiveness of education and training programmes in changing the behaviour of healthcare staff.

### **Recent Research Outcomes that are informing policy**

Work on occupational stress and patient handling will feed into health service guidance.

The Royal College of Nursing study on needlesticks will have impact on policy and standards setting.

### **Current Main Research Interests**

Assessing the effectiveness of stress management techniques.

Collecting information on the residual risk of non-powdered, low-leachable protein latex and the feasibility of substitute materials.

Identifying the effectiveness of different methods of dealing with aggression, and their application to various scenarios, e.g. violence related to alcohol and drug abuse, learning disability, mental illness, and frustration, leading to enforceable guidance on control measures which are evidence-based and costed.

### **New and Emerging Areas of Interest**

Safer needlestick technology and work-acquired infections - causation and reasonably practicable control measures.

Psychosocial issues of management of patient handling and MSD in the ambulance service.

## **SLIPS AND TRIPS**

### **Programme Objectives**

To reduce fatal and major accidents caused by slips and trips by 5% by 2004.

To reduce the incidence of all injuries from slips and trips by 10% by 2004.

### **Policy Objectives**

To motivate employers, employees and other key groups to: i) recognise the importance of slips and trips and the existence of practical measures to reduce them; and ii) take action to minimise slips and trips in the workplace.

To find ways of influencing manufacturers, designers, specifiers, clients, purchasers, etc. of new floors to incorporate slip-resistant flooring at the design stage where necessary.

To find ways of influencing the footwear industry to develop footwear that helps to protect wearers from slip risks.

### **Evidence Base and State of Knowledge**

In 1999/2000, slips and trips in local authority enforced workplaces in Great Britain accounted for 41% of all reported major non-fatal injuries, and 21% of over-3-day injuries, to employees. Comparable figures for HSE enforced premises for 1999/2000 are 32% and 20% respectively. In addition, approximately 50% of all accidents to members of the public are slips and trips. It is estimated that the annual cost of slips and trips accidents to society could be as much as £763 million, with £368 million directly attributable to costs to employers.

As part of the necessary evaluation of the programme, we need a more systematic understanding of the knowledge and awareness of target groups.

Food and drink is the manufacturing sector reporting most injuries and with the highest injury rates. Slips injuries in food/drink premises occur at about four times the average. Of these, 90% are due to wet contamination on the floor. In the majority of workplaces, slips and trips dominate the accident statistics. Most of these ought to be readily preventable by applying effective and targeted health and safety management.

On slips, there is a well-established knowledge base within HSE, the Health and Safety Laboratory (HSL) and other similar informed bodies (e.g. UK Slip Resistance Group), but outside these groups there is a dearth of information, some misinformation, and the issues are education and promoting best practice e.g. holistic risk assessment. There are still new areas to be explored, because of changing markets, etc, such as surface treatments, matting systems and cleaning regimes. The majority of research has been about slips on the level involving able-bodied people. Much less is known about slip issues on slopes, ladders, etc. and with more vulnerable groups, such as those with disabilities and the elderly.

On trips, there is still a gap in understanding what initiates a trip and the relationship to age and disability.

### **Research Objectives and Innovation Strategy**

To improve the knowledge base about the causative factors influencing slips, trips and falls, particularly in relation to floor and other surface coatings and coverings, the effect of typical workplace contaminants and the performance of protective systems and aids.

To evaluate the impact and adequacy of available countermeasures in the context of wider workplace and working environment design and produce case studies within workplaces of significant risk.

To identify causes, trends and industry/sector issues associated with all slips and trips reported injuries to inform and influence the direction of proposed research and the research strategy.

To determine levels of baseline knowledge, awareness and compliance and evaluate the impact of programme activity.

To influence manufacturers, designers, specifiers, clients, purchasers, etc. of new floors to incorporate slip-resistant flooring at the design stage.

To influence the footwear industry to develop safety and occupational footwear that helps to protect wearers from slip risks. To develop standard footwear tests which generate valid data.

To consider ways in which the HSE/HSL Pedestrian Slipping Expert System can have wider application both within and outside HSE/Local Authorities (LAs).

### **Recent Research Outcomes that are informing policy**

A series of projects on pedestrian slipping has fed into a programme of training events on slips for LA enforcement officers. Recent independent evaluation of the training events has shown them to be an effective vehicle in raising awareness, increasing knowledge and galvanising action on slip and trip issues. They will be adapted for use with other key stakeholder groups.

Recent trials of innovative anti-slip footwear, following laboratory testing, have demonstrated the potential of appropriate footwear to have significant impact in reducing slip accidents. Further research is planned in this area. Research results have fed into standards making work at national and international level and are being used in the production of new guidance on reliable coefficient of friction tests.

A prototype expert system on preventing slips is currently being tested by LA and HSE inspectors.

### **Current Main Research Interests**

Evaluation studies to determine baseline data on current levels of awareness, knowledge and compliance levels/enforcement activity, and time series data on the impact of programme activities and interventions.

Analysis of past accident data to identify trends, vulnerable groups, age and locations.

Workplace studies in the retail, leisure and food and drink sectors.

The efficacy and efficiency of cleanup regimes.

Further development/application of HSE/HSL pedestrian slipping expert system, including real premises testing.

Assessment of footwear performance in different environments to address the risk of slipping – development of a standard test method.

New footwear soling materials.

To explore the most effective ways of communicating and raising awareness generally and also with influential stakeholders (e.g architects and designers of new floors)

Human factors – the effect of the trivialisation of slips and trips on awareness and prevention; changing attitudes towards slips and trips (creating a slips safety culture); initial collaborative work with the food retail sector prior to broader studies.

### **New and Emerging Areas of Interest**

Effective partnerships between employers and trade unions – a collaborative project between HSE and TUC to produce case studies.

The bulk of the work to date has been on slips rather than trips, and on level surfaces. There is likely to be more attention on trips and on slips and trips on non-level surfaces, such as stairs.

Trips – following statistical and literature studies – what constitutes a trip and the relationship to age and disability.

Metal and engineered wood floors – little is known about the potential slipperiness of these floor surfaces. Engineered wood floors, particularly laminate surfaces, are increasingly popular in retail and leisure sectors.

Profiled tiles and tactile flooring. With profile flooring some work has been done, but more is needed especially in barefoot situations (e.g. swimming pools). With tactile flooring, little is known about slips and trips issues especially with regard to partially sighted people.

Surface treatments for existing flooring – some work has been done but more is needed e.g. new products – their use and effectiveness and risks to operators.

Fundamental study of forces between foot and floor on level ground.

## **BLOCK 2 -WORK IN THE MAJOR HAZARDS INDUSTRIES**

### **NON-NUCLEAR MAJOR HAZARDS**

#### **Programme Objectives**

To ensure that risks to worker and public safety from potential major incidents are properly managed by dutyholders backed up by firm but fair regulation largely through permissioning regimes resulting in a high degree of public assurance.

#### **Policy Objectives**

To monitor and enhance the effectiveness of regulatory permissioning regimes.

To improve the understanding of safety management systems in high hazard industries including indicators of success and failure.

To develop the use of risk assessment to assist decision making by duty holders and regulators.

To encourage the adoption of inherent safety rather than control and mitigation and demonstrate effectiveness of this approach.

To improve the targeting of compliance activity.

To work with interested parties to identify, define, document and promote good practice in the management of major accident hazards.

To reposition major hazards land use planning (LUP) with other LUP policies.

To improve provision of information to assure public confidence.

To investigate human factors issues.

To investigate individual safety issues arising from major accidents where accident experience calls into question the current state of knowledge.

#### **Evidence Base and State of Knowledge**

There is evidence of a high degree of societal concern about potential catastrophic events, including risk perception studies. Other evidence is subjective as indicated by media interest following incidents. Objective evidence indicates that recent initiatives have reversed the trend downwards from a plateau of loss of containment events e.g. OSD's hydrocarbon release database and numbers of reported Dangerous Occurrences reported under RIDDOR.

In many areas we have good understanding of the nature of hazards and associated risks but some gaps exist. Equally, from time to time, the current understanding is challenged in the aftermath of a major accident. There is good operational intelligence on parts of the hazard base but there are areas where more research is needed.

Further, there is a need to fill gaps in the knowledge of how regulatory intervention can more effectively influence the root causes of safety management systems failures, then to measure progress. The drive to reduce operating costs has seen a significant reduction in manning levels. Changes have led to increased interest in safety management in general and human factors, in particular, in safety critical industries.

Closing the uncertainty gap for duty holders and regulators in risk judgment and management is an area for future development.

Whilst now reasonably mature, the offshore industry in the UK continues to evolve both technically and operationally. Floating production systems are a relatively new challenge. There have been some difficulties due to the inadequacy of marine and process system standards for such vessels, which has been the subject of increasing research.

Increased attention is now being paid to other major accident scenarios such as ship collision.

Current challenges include decommissioning of very large fixed installations and the proposed introduction of helicopter search and rescue facilities to replace standby vessels.

The investigations into the train accidents at Southall and Ladbroke Grove clearly identified human factors as a key issue in the prevention of accidents on UK railways.

### **Research Objectives and Innovation Strategy**

To clarify and develop the measures that are required to demonstrate prevention of major incidents, including a suite of risk performance measures.

To improve the knowledge of hazards and incident causation including dangerous occurrence/near miss information.

To understand organisational response to significant events - e.g. learning the lessons from major incidents.

To identify the best ways of making interventions with multi-site duty holders.

To develop standards for risk assessment and identify good practice and benchmarks in line with operational and technical change, e.g. for ALARP judgments and publish guidance.

To encourage the development of technologies aimed at prevention and control of major accident hazards, including inherently safer approaches in design, construction, operation, maintenance and decommissioning.

To develop understanding of key elements of risk management and control of major incident risks, including safety critical systems and emergency planning.

To investigate human factors issues including variations in safety culture and safety management across major hazard sectors.

To identify and address challenges to important areas of current knowledge, particularly in the light of major accidents, such as the explosions at Enschede (Netherlands) and Toulouse (France).

To identify, define, document and promote good practice, and to inform the development of key safety related standards.

To provide information to support the establishment and maintenance of the integrity of safety critical equipment and systems including software.

### **Recent Research Outcomes that are informing policy**

Scientific evaluation of dense gas dispersion models.

Modelling dense toxic gas releases in road tunnels.

New requirements for the transport of explosives by road.

Ignition risk assessment of potentially explosive atmospheres.

Development of methods to estimate the production of nitrogen oxides from large scale chemical fires.

Land pipelines state limit (structural reliability) based design and assessment methods and guidance.

Further development of COMAH Safety Report Assessment Guides.

Proof testing of safety instrumented systems in the major hazard industries.

Validation techniques for risk audit methodologies.

Coal mine roadway behaviour – neural networks.

Survey of Explosives sites licensed by and registered with Local Authorities.

Strategies to promote safe behaviour as part of a health and safety management system.

Development of a standard for defensive train driving.

Rationalisation of FPSO design issues.

Factors affecting helicopter SAR operations in the UKCS.

Maintenance – what's it all about.

Demanning aspects of offshore platforms.

### **Current Main Priority Research Interests**

Review of ERTMS, including public views on train protection and economic aspects.

Investigating influences on safety climate in train operating companies.

Study into the effects of contractorisation on safety performance in the railway sector.

Evaluation of Automatic Warning Systems.

Post Hatfield investigation of rolling contact fatigue.

COMAH safety report regime: evaluating the impact on new entrants.

COMAH offsite risk assessment.

COMAH ALARP - developing tools and guidance.

Guidance on relevant good practice.

Updating HSE's risk assessment methodologies in support of its statutory land use planning advice.

Evaluating offshore lifting incidents to support review of operational standards.

Review of the safety implications of European risk based inspection and maintenance methodology.

Range of engineering studies (including Joint Industry Projects) investigating the structural integrity of offshore plant and equipment (including pipelines and pipework), both in fixed and floating platforms.

Comparison of alternative forms of supervision delivery in the chemical industry.

Circadian adaptation in offshore shiftworkers returning to day life at home.

Understanding the safety implications in changing nature of competency in the multi skilled work environment offshore.

Developing human factors guidance for selecting appropriate maintenance strategies in the offshore industry.

Learning from incidents involving electrical/ electronic programmable electronic-related systems.

Model for the design and validation of water deluge systems.

Review and rewrite of guidance on fire attack, mitigation & protection on offshore installations.

Risk informed enhancement of fire safety guidance for the chemical and allied industries.

Fire testing of IBCs used for flammable substances.

### **New and Emerging Areas of Interest**

Development of performance indicators, including human factors in the major hazard industries.

Developing strong links between human resource management and safety management in the major hazard industries.

Encouraging implementation of evidence based practice in applied psychology/ ergonomics.

Public perception of risks from major hazard pipelines.

Use of cost/benefit analysis techniques to evaluate the 'reasonable practicability' of major accident risk reduction measures (including human factors) for chemical processing and storage activities.

Ongoing projects to maintain fit for purpose methodologies to support HSE's advice on development control at and in the vicinity of major hazard installations and pipelines.

Examining the value of safety reports to employees and local residents and ways that have been found or could be used to increase its relevance to these stakeholders.

Operational research to enhance the impact of regulatory interventions in the major hazard industries e.g. evaluation of the Railways (Safety Case) regulations.

Seismic hazards and risk assessment for on and offshore installations.

Literature review of global refinery accident and incident data.

Review of refinery safety reports to identify and collect data on key risks and controls to support further guidance.

Evaluation of progress with Outcomes from the Uff and Cullen reports, i.e. human factors, ERTMS/ETCS development, crash worthiness, performance versus safety.

Evaluating the impact of HSE's regulation of hazardous biological agents including GMOs.

## **NUCLEAR SAFETY.**

### **Programme Objectives.**

To secure effective control of health, safety and radioactive waste managements at nuclear sites for the protection of the public and workers and to further public confidence in the nuclear regulatory system by being open about what we do.

### **Policy objectives.**

To protect people from harm caused by the activities of the nuclear industry by:

- ensuring that those who we regulate have no major nuclear accidents;
- ensuring that the nuclear industry maintains and improves standards of health and safety;
- ensuring that those who we regulate bring about a reduction in the hazard potential from the UK's legacy of radioactive waste and to promote the safe decommissioning of redundant nuclear facilities.
- promoting the improvement of international nuclear safety;
- promoting the maintenance of essential nuclear safety infrastructure in the UK;
- providing information to stakeholders on what we do and why we do it;
- ensuring that NSD moves towards being a world class organisation;
- influencing those we regulate to protect workers and the public from ionising radiation;
- regulating nuclear installations in an open and demonstrably fair manner so that the public can draw conclusions about the adequacy of the regulatory regime.

### **Evidence Base and State of Knowledge**

The nuclear industry operates mature technology that is largely unique to the UK and is supported by well developed safety cases. The key operational nuclear safety issues concern: plant ageing and operability; maintaining and improving safety; and technical standards. The principal sources of light water reactor expertise are abroad.

The nature of the nuclear technical and safety issues demands the maintenance of a UK essential nuclear safety infrastructure. The UK nuclear expertise is supported by maintaining access to generic international research; e.g. management of radioactive wastes.

In recent years the principal influences within the nuclear sector have been organisational change and deregulation of the electricity market. The industry's response to these has included downsizing and contractorisation, which is threatening the expertise and knowledge of the licensed corporate bodies and discouraging the teaching of nuclear skills and technology.

There is currently no UK commitment to construct new generating plant and therefore HSE/NSD's role in this area is a limited watching brief on new developments in nuclear generating technology.

### **Research Objectives and Innovation Strategy.**

The HSC/E is responsible for the UK's programme of nuclear safety research. The HSE has delegated to NSD responsibility for reporting to HSC on the development and commissioning of the annual programmes of nuclear safety research. The total UK programme comprises licensee and HSE managed activities.

HSE/NSD has identified research as one of the five key business activities (KBA) that are fundamental to delivery of the regulator's programme objectives. NSD has defined the Research KBA as:

*"...the process of identifying, commissioning and promulgating the results of research that address nuclear safety issues so that licensees and NII have the scientific and engineering knowledge to make judgements about the adequacy of safety measures."*

Primary objectives of the arrangements for managing nuclear safety research are:

- a balanced and adequate programme that addresses both short and long term issues;
- that the potential contribution to nuclear safety from research is maximised;
- that the results of any such research having implications for nuclear safety are disseminated appropriately.

The following objectives of the existing research programme reflect the short and long term nuclear safety issues:

- Maintain and improve standards; e.g. develop technical and safety standards, improve analytical tools and the use of data.
- Substantiate the continued operation of mature plant; e.g. plant ageing, inspection techniques, maintenance, issues arising from safety submissions.
- Managing nuclear safety during the post-operational phase of plant life; e.g. decommissioning, waste management.
- Examine the implications of organisational change; e.g. maintenance of expertise and knowledge.
- Maintenance of essential nuclear safety infrastructure in the UK and internationally
- To address issues arising as a result of events or incidents.

### **Recent Research Outcomes that are Informing HSE's Regulation of Nuclear Safety.**

Recent projects on plant life management issues have added to the industry's knowledge of the complex time dependent behaviour of the steel and concrete used in safety critical components exposed to operating conditions. The outputs are informing development of the predictive tools used to model ageing phenomenon, which, in turn, inform HSE's judgment on the continued safety of UK's nuclear generating plants.

A number of projects have reviewed the practices and techniques used by UK nuclear licensees in a variety of safety related contexts. Topics covered include: control of fission product concentrations in fuel ponds; the security and safety of computer networks; standards for probabilistic safety assessment; and off-site radiological monitoring and mobile communications for emergency planning. These projects have promoted the dissemination of the best practices that aim to reduce the potential for harm from nuclear activities.

Nuclear safety research continues to support the essential research capability of key teams that provide a unique source of expertise to the nuclear industry on safety issues. Key teams that benefited from recent research include: Plant Chemistry and Corrosion; Radiation Chemistry; Nucleonics; and Reactor Protection Equipment.

Research has helped to establish and maintain HSE's access to independent technical capability on safety critical issues where the pool of national and international expertise is largely committed to advising the licensees. Technical capabilities that have benefited from recent research include irradiation embrittlement of steel components and graphite.

Nuclear safety research supports HSE's and licensees' access to international facilities and participation in: international initiatives sponsored by the IAEA and OECD/NEA, including international standard test problems; and the EU Framework Programme (FP). Recent research projects have: provided HSE access to international test reactor and virtual reality facilities in the HALDEN and CABRI projects; facilitated collaboration with international regulators on the seismic design of nuclear plant, PSA, common cause failure and severe accidents; and allowed HSE to participate in several projects under Plant Life Extension and Management (PLEM) and Severe Accident Management (SAM) clusters of the EU 5th FP. These international activities have helped HSE to benchmark UK safety practices and influence the development of international consensus on health and safety in the nuclear industry.

### **Current Main Research Interests.**

Nuclear safety research addresses issues identified by HSE. HSE maintains a list of current safety issues that may benefit from research on the Nuclear Research Index (NRI) that is continually updated and published annually on HSE's web site. HSE and the generating licensees agree an annual programme of research that addresses NRI issues. The principal issues addressed by the current research programme may be divided into the following categories:

- Maintenance and improvement of safety performance (safety and technical standards, safety culture, application of ALARP)
- Plant life extension and management (ageing, inspection, maintenance, replacement and refurbishment)
- Decommissioning and waste management (safe management, containment and reduction of radioactive wastes).
- HSE and licensee access to industry specific expertise; e.g. independent technical capability and essential research capability.

### **New and Emerging Areas of Interest**

Although the announcement of BNFL Magnox's closure plans is leading to a reduction in safety issues concerning plant life extension and management, HSE expects there to be a corresponding increase in issues relating to waste and decommissioning. This expectation is reinforced by the increased government interest in the legacy radioactive wastes from government owned facilities and the announcement of a Liabilities Management Authority (LMA).

HSE expects the continued operation of AGR plants to attract greater interest in high burn-up fuel and graphite issues.

DTI is currently conducting a consultation exercise with a view to an Energy White Paper. This will address the implications of keeping the nuclear option open as recommended in the recent Performance and Innovation Unit (PIU) report.

There are potential links to the nuclear skills issue that need to be considered. Correspondingly, as organisations continue to change, staff retire and facilities close, data storage and knowledge management issues become increasingly important.

There is scope for improving links with non-generating licensees and other major hazard industries.

## **BLOCK 3 - SECURING COMPLIANCE**

### **Programme Objectives**

To promote compliance with the law through programmes of preventive inspection and incident/complaint investigation, and by enforcement in accordance with *HSC's Enforcement Policy Statement*.<sup>13</sup>

### **Policy Objectives**

In 2002/03, to make 206,000 regulatory contacts, undertake 86,000 inspections and investigate 10.5% of RIDDOR incidents and 87% of complaints. The number of contacts and inspections include those made under the HSC/E priority topic programmes arising from *Revitalising Health and Safety*. Further details of initiatives relevant to these programmes are given in the HSC Business Plan 2002/03.

HSE secures compliance through a mix of inspections and other regulatory contacts, investigations and formal enforcement work. This mix of preventive inspection and reactive investigations is based on the principle that prevention of harm is the primary aim. Our substantial programme of preventive work includes the annual inspection of every high risk (Category A) establishment with the aim of:

- removing them from Category A within 2 years by the implementation of improved control measures; or
- where long-term action is needed to achieve compliance, taking formal enforcement action to secure this longer-term goal within 2 years.

To continue to tackle other poor health and safety performers, both large and small companies, using effective intervention techniques to ensure that they improve their performance and to build on our existing approaches to improve coordination, impact and efficiency in the way we deal with multi-site organisations.

To secure compliance in the major hazards industries through a substantial programme of targeted inspections, investigations and enforcement activity; and monitoring of, and compliance with, safety cases.

### **Cross Cutting Issues**

The following cross-sector hazards will be the subject of specific programmes of work:

Noise: To carry out a programme of visits to ensure compliance with the Noise at Work Regulations; and with the Construction (Design and Management) Regulations for high-risk activities when relevant.

Asbestos: To carry out a programme of work to secure a national minimum commitment to the inspection of licensed work with asbestos insulation, asbestos coating and asbestos insulation board and to support the introduction of a new duty to manage asbestos in buildings.

Hand-arm vibration: To secure compliance in the use of portable power hand tools targeted at the construction, engineering, metals and minerals, mining and gas supply industries.

Asthma: To carry out a detailed programme of work, which is likely to include: enforcement activity; inspection programmes; increased health surveillance; investigation of cases of ill health; and complaints.

Hazardous biological agents: To regulate hazardous biological agents and biotechnology, including genetically modified organisms under the COSHH Regulations and the GMO(CU) Regulations.

Hazardous substances: To address health and safety standards in the painting and coatings industry.

### **Local Authorities**

Local Authorities also have a major role to play in reducing incidents and ill health in the areas for which they have enforcement responsibilities.

To work together better to improve compliance, encourage consistency and promote best practice.

To maximise collective influence of HSE/LAs on the health and safety system through an improved partnership and new ways of working.

The HELA Strategy 2001/04 for local authority enforcement comprises a four-point action plan, which will ensure:

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<sup>13</sup> <http://www.hse.gov.uk/pubns/hsc15.pdf>

- effective management of the LA health and safety enforcement function;
- a compliance agenda concentrating on key hazards/risks and issues;
- a new focus on occupational health;
- full engagement of stakeholders including small firms.

### **Evidence Base and State of Knowledge**

The Commission's view of enforcement derives from the philosophy set out in Lord Robens' report *Safety and Health at Work* (Cmnd 5034 1972). Lord Robens considered that there should be a quick and effective response to flagrant breaches of the law and a discriminating and efficient approach to other breaches.

The enforcement of health and safety law should be informed by the principles of *proportionality* in applying the law and securing compliance, *consistency* of approach, *targeting* of enforcement action and *transparency* about how the regulator operates and what those regulated may expect, as set out in the HSC Enforcement Policy Statement.

### **Research Objectives and Innovation Strategy**

The bulk of HSE's spend on Science and Technology in the compliance programme will be on reactive support, of which most is provided by the Health and Safety Laboratory (HSL) and by external suppliers under a Framework Agreement. NSD operates a nuclear safety studies (NSS) programme that provides direct and reactive support to these activities; the costs of this programme are recovered from the nuclear licensees.

#### Health and Safety Laboratory (HSL)

HSL is HSE's in-house laboratory facility. Operating as an Agency of HSE, HSL is involved in two main areas of activity: operational support through incident investigations and studies of workplace situations; and longer-term work on analysis and resolution of occupational health and safety problems. HSL employs about 222 scientists and technical specialists across a wide range of disciplines including chemistry, physics, engineering and materials science, occupational psychology, risk assessment, ignition control, fire safety, process safety, ergonomics, biomedical sciences and specialist photography.

#### Research

In addition to reactive support work, the research objectives below relate specifically to enforcement issues. This necessarily covers a wide spectrum of topics, of which the following are examples:

- To evaluate the intervention strategies and outcomes of any particular intervention.
- To establish the effectiveness of control systems.
- To improve data and analysis of occupational ill health incidents to improve targeting of inspection activity.
- To increase understanding of accident causation to improve targeting of inspection activity.
- To evaluate Sector guidance and initiatives.
- To improve effectiveness of partnerships and stakeholder liaison.
- To contribute to specific initiatives aimed at reducing levels of occupational ill, e.g. exposure to dust in the mining industry.
- To investigate implications of mechanical ignition sources and hybrid gas/dust mixtures for implementing European legislation in UK mines.
- To define acceptable work environments. This comprises setting and promulgating standards for the ergonomics, physical and psychosocial aspects of the work place.
- To investigate chronic health effects from exposure to adverse environmental conditions e.g. thermal environment.
- To investigate the effects of exposure to combinations of hazards, e.g. noise and solvents.
- To investigate the use of human factors techniques and tools in the general inspection process, for both health and safety issues, and in particular in the process of incident investigation.
- To investigate ways in which HSE can help SMEs to comply with the law, for example the development self-assessment tools such as expert systems.

### **Recent Research Outcomes that are informing policy**

Measuring improvements in health, safety and welfare.

Baseline and impact measurement of intervention programmes.

Slips and Trips - Review and identify further research needs.

Research into effective workforce involvement has led to guidance for industry on good practice.

### **Current Main Research Interests**

Assessing impact of prosecutions, notices, other types of regulatory intervention and 'naming and shaming'.  
Developing further proposals on completion of the 'Proving Inspection Works' project.

Maintaining investigative and forensic capability in fires, explosions, process safety, engineering, chemical and biomedical measurement and human factors.

Perception of HSE by the public, SMEs, other stakeholders.

Reducing occupational exposure.

Assessing risks to the public, e.g. from solarium, body piercing, unattended petrol filling stations.

Prevention of low probability major accidents at fairs; development of a model for assessing children's behaviour on rides.

Root and common causes of accidents/incidents in offshore lifting operations.

Improving inspection methodologies in the chemical manufacturing sector.

Raising the profile of occupational health in the diving industry, including the understanding of diver physiology and occupational health issues associated with work in an underwater environment (e.g. Noise exposure and the effects of dives which involve multiple ascents/descents).

### **New and Emerging Areas of Interest**

Consequential of any changes in legislation e.g. corporate manslaughter or safety legislation providing for fixed penalty notices and their impact on HSE systems.

Fundamental review of RIDDOR.

Review of the Health and Safety (Enforcing Authority) Regs 1998.

Proactive aspects of self-regulation - how duty holders access and understand information, become motivated and achieve competence.

Assessing the implications of future trends in the offshore industry, e.g. smaller installations; increasing numbers of floating installations; changing employment patterns; developments in the Atlantic frontier region; new technologies.



## **BLOCK 4 - MANDATORY ACTIVITIES**

### **STRATEGIC DEVELOPMENT**

#### Foresight

HSE has long recognised the importance of anticipating future developments in ensuring that risks to people's health and safety from work activities are properly controlled. Our approach to a strategic foresight function has been to combine 'political intelligence' with trends (technological, scientific, demographic, etc.) information. This will enable HSE to identify a wide range of issues promptly and to respond effectively. A structured and robust framework has been established for ongoing mapping and analysis of technological trends. These trends are being captured on a database and there has already been one release of the database contents to HSE's Internet site. HSE should continue to stimulate addition of valuable material to the database. The Trends in Technology database should be a useful device to aid collection and collation of information to help with future strategies and plans. The review of the database should follow linked to a decision on whether or not to continue to maintain the database. The review should form part of the 2003 - 2004 plan of work. This is in turn linked to the Foresight 'Knowledge Pool'. The database has been subject to considerable development work to make it suitable for inclusion on HSE's Internet, with a second stage in prospect to look at the feasibility and interest in producing an Internet version. In the meantime, the information contained in the database and our operational intelligence are used both to respond to potentially sensitive issues arising from a non-technical/scientific origin and to provide early identification of potentially sensitive issues arising from the technical trends themselves.

The Government's established Foresight Programme,<sup>14</sup> with the aim of improving communication, interaction and mutual understanding between the scientific community, industry and Government Departments is relevant to HSE's requirements. A number of Foresight priorities have important health and safety implications, e.g. the Ageing Population Panel has recommended that action to reduce the incidence of work-induced stress and musculoskeletal strains should be a top priority. HSE is responding positively by keeping in mind the implications for its future activities in these priority areas. HSE has established Priority Programmes on both work-related stress and musculoskeletal disorders. HSE has also been progressing a programme of scientific work relating to the Ageing Workforce, in collaboration with other departments and with international partners.

#### Communication/Working Together

To establish a baseline of stakeholder perception of HSE's openness prior to implementation of the Freedom of Information Act.

To establish means for effective communication with, and engagement of, HSE's stakeholders in risk-based decision-making

To understand the factors affecting public trust in HSE

#### Evaluation

To evaluate specific policies, initiatives, regulations etc. as required by the Evaluation Committee.

#### The changing work environment, Small Firms, new patterns of employment and vulnerable groups

To establish the extent to which employers and workers in small firms act in accordance with legislation and HSC/E guidance.

To investigate health and safety issues of specific groups, such as part-time workers, and to seek further information where this is lacking.

To investigate ways of involving small firms in policy making, identifying obstacles and optimum communication methods, taking account of literacy, cultural beliefs and attitudes within small firms.

To investigate innovative techniques for promoting health and safety in small firms.

To investigate ways of engaging hard-to-reach, vulnerable groups, either directly or through intermediaries.

To gather intelligence to identify trends in, and to demonstrate HSE's performance with, vulnerable groups, e.g. to examine the effect of literacy on accident/ill health rates.

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<sup>14</sup> <http://www.foresight.gov.uk>

To investigate the costs of accidents and ill health using case studies of modern industries, such as call centres, to build on previous studies in older traditional industries.

To examine further worker compensation schemes and employer liability.

To quantify and understand the aetiology of the effect of safety on changes external to the actual work activity.

To identify trends in occupational environment.

### **Delivery of Government PSA Target**

The strategic statement for Revitalising Health and Safety (RHS) set 10-year targets for improvements in health and safety for workers. We are required to achieve half the targets by 2004/5, which is also the government PSA target.

HSC has agreed eight priority programmes for delivering this target. These programmes are set out in Block 1. In addition to research on these, HSE is interested in research on delivering baseline information and monitoring the targets. It is also interested in new levers for motivating employers, and finding out what **does** motivate employers, the behavioural causation of accidents and ill health, finding out 'what works,' evaluating the effectiveness of RHS including setting targets, and whether or not the Government has achieved the goals set out in the 10 strategic statements set out in RHS.

## **WORK TO MODERNISE AND SIMPLIFY THE REGULATORY FRAMEWORK (INCLUDING IMPLEMENTING EU DIRECTIVES)**

### **Programme Objectives**

To continue to modernise and simplify the regulatory framework through activities delivering policy outputs such as new regulations, codes of practice and building relationships with other regulators. To help deliver the PSA and Revitalising Health and Safety targets.

### **Policy Objectives**

#### Long-term programmes

To implement in whole or in part a number of long-term programmes to bring about significant improvements in work related health and safety, including:

Securing Health Together

Occupational Asthma

The changing work environment, small firms, new patterns of employment and vulnerable groups

Prevention of at-work traffic accidents

Transport of dangerous goods

#### Policy Projects

To work with others to develop new policy in response to new risks; negotiate with others on behalf of the UK at international level and in the EU; prepare new legislation and review existing legislation.

To continue to prepare regulatory impact assessments for all legislative proposals with a likely impact on business, charities or the voluntary sector.

To be involved with negotiations which will determine the future direction of international and EU policy on chemicals during the next decade.

### **Research Objectives**

#### Securing Health Together

To evaluate the effectiveness of the current regulatory regime for ionising radiation. To simplify the system of occupational exposure limits.

To compare occupational health provision in other EU Member States to establish best practice and scope for application in the UK.

To contribute to the review of fire safety legislation and collaborate in developing the research strategy to underpin a revised regulatory framework.

To promote appropriate attitudes and motivation towards healthy and safe behaviour in the workplace, for example linking with and taking forward the existing 3Rs (mental models) research programme and understanding more about the organisational (health) culture.

To attain a greater understanding of health psychology and symptom reporting, the role of individual differences and population diversity on the onset, progression and resolution of ill health.

To develop an evidence based approach to best practice in job retention and vocational rehabilitation, its management and its effects on both sickness absence and long-term health.

To identify prevalent occupational health issues in the LA enforced sectors and determine the true picture of LA enforcement activity on occupational health issues (when compared to their activity occupational safety issues). This research will inform future HELA decisions as to the HELA strategy and LA operational priorities.

To identify the routes to influence LAs' compliance with section 18 of HSWA and the Guidance issued to LAs by HSC, to increase their health and safety enforcement activities, effectiveness and impact.

To provide information on the scale, scope and nature of health risks to inform future policy including that arising from Ministerial and external drivers. For example: biological agents, EMFs, optical radiation, pesticide associated ill health, small area health statistics unit, illegal and prescription drugs, chemical exposure on male reproductive system.

To conduct research, including social and economic research aimed at bench marking continuing risks from specific causes of occupational ill health, better understanding its cause, and indicating likely preventative interventions. For example:

- Asthma - a planned programme of work;
- Isocyanates - research to assess the effectiveness of controls and perceptions of risk by industry users;
- Vibration - extent and scope of exposure;
- Noise - non-auditory effects;
- Asbestos -research to support advice on the management of risk and epidemiological studies of risk;
- Violence - research to support promulgation of good practice.

#### Prevention of at-work traffic accidents

To identify studies of work-related incidents and any patterns in causation. To consider causation factors and identify research gaps.

#### Transport of dangerous goods

To ensure that international and domestic requirements for the transport of dangerous goods continue to meet acceptable standards of health and safety in the light of technological progress.

#### Policy projects

To extend current research to investigate the issue of above average economic growth linked to deteriorating safety performance.

#### **Examples of Recent Research Outcomes that are informing policy**

HSE has received the results of a number of research projects looking at new ways of motivating employers to improve health and safety. These include how workers' compensation schemes could be changed to provide a better lever, how we can use socially responsible investment, providing the business case for health and safety, challenging board level participation, setting targets and reporting performance in company annual reports. All of these are being used to see how HSE can encourage employers to do better.

A recent survey of 4950 companies of varying size, sector and geographical location, gathered information to set baselines for the Securing Health Together indicative target of increasing the proportion of employers using OH support by 10% by 2003.

#### **Current Main Research Interests**

Include the following:

Developing a framework for evaluating the Revitalising Health and Safety strategy;

Societal concerns and risk management;

Helping HSE to understand and prioritise the needs and motives of stakeholders;

Managing health at work - recording and monitoring of information on sickness absence including work relatedness;

Health and safety responsibilities of company directors and management board members;

Focused intervention strategies targeting occupational health within SMEs;

Evaluation of occupational health advice in primary care;

Pilots to explore the effectiveness of workers' safety advisers;

Developing the statistical analysis of the Occupational Disease Intelligence Network (ODIN);

Business case for health and safety;

Fairground safety;

Contractorisation - investigation of the effects on safety.

## **New and Emerging Areas of Interest**

### **Accident Investigation/Review of the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR).**

Following HSC's 2001 consultation exercise on proposals for a duty to investigate workplace accidents, we may wish to commission research in the short to medium term (2-5 years) into issues around the investigation of workplace accidents, dangerous occurrences and diseases. There is likely to be some overlap with research work falling within the Priority Programmes and the Compliance Programmes. In the medium to long term, research will be needed to evaluate the impact of any new legislative requirements that may be introduced or to evaluate the impact of guidance or other initiatives.

Work is now underway for the fundamental review of health and safety incident reporting regulations (Action Point 3 of the Revitalising Health and Safety Strategy Action Plan). Although there are unlikely to be any changes to legislation or guidance arising from the review before 2005 at the earliest, in the short to medium term (2-5 years), there may be a need for specific research to inform and support the review. In the long term, there will be a demand for research to evaluate the effect of any changes to the Regulations or Guidance.

## **WORK TO PROVIDE INFORMATION AND ADVICE TO IMPROVE THE KNOWLEDGE OF HEALTH AND SAFETY AND OF HSC/E**

### **Programme Objectives**

To provide information and advice on health and safety issues so as to effect particular desired behavioural or attitudinal outcomes.

### **Policy Objectives**

To create a better understanding of the needs and requirements of information users.

To understand how key messages are expressed and disseminated through media, information products and campaigns.

To inform the production of high quality priced and free information products - publications, electronic and new media.

To gain useable data on improving access to information and creating an improved understanding of health and safety law and good prevention practice.

To evaluate information products as 'fit for purpose'.

To assess the effectiveness of information products, channels of distribution and their impact on changing behaviour.

To establish the extent of audience penetration and achievement.

To establish baselines against which to measure and assess performance, effectiveness and impact.

To develop and implement policies to ensure compliance with Freedom of Information legislation.

### **Evidence Base and State of Knowledge**

There are over 25 million workers and over 3.5 million businesses in Great Britain, about one third of whom employ people. We sell over 1 million priced publications and issue over 7 million free leaflets annually. New forms of media, notably the Internet, are used increasingly to convey information and as a source of knowledge. The HSE web site attracts over 500,000 "hits" a week.

We have detailed knowledge of some sectors (construction, agriculture, paper and board etc.) and a database of some 500,000 names at HSE Books. Our penetration and knowledge of other sectors is patchy and identification and engagement of SMEs continues to be challenging.

### **Research Objectives and Innovation Strategy**

To establish a methodology which will inform decisions and the strategic direction of future information products, channels of distribution and promotion, and to develop measures to assess the effectiveness of such activities.

To commission market research and evaluation to ensure our communications are reaching their targets and producing the desired outcomes.

To identify examples of good communications practice.

To investigate the value and relevance of new media.

To investigate how particular sectors/audiences look for and access information; development of channels and intermediaries.

To investigate the types of message, communication and media that affect both attitude and behaviour; how these operate and exert influences.

To establish baselines against which to assess future performance.

### **Recent Research Outcomes that are informing policy**

Market research and customer evaluation to ensure our communications and products are appropriate.

Research on how companies identify with their sector, business type etc, how this influences the way they seek information, and what structure we should adopt for our information provision to reflect and utilise these characteristics.

### **Current Main Research Interests**

European Week of Safety and Health.

Priority programme subjects/sectors.

Young people (risk education) and children.

New media - the Internet, CD ROM, DVD etc.

"Getting the message across" - reinforcement and routes.

"Converting the unbelievers" - assessing methods of increasing effective market penetration.

"Measuring up" - establishing baselines and progress.

"Divide and conquer" - the respective roles and values of information, enforcement, advice and other interventions.

### **New and Emerging Areas of Interest**

New technology in communications.

Relating communications directly to desired practical outcomes.

Integrating communications with other influencing and enforcement interventions, and assessing their interaction and the respective effects of single and combined events.

## **WORK TO PROMOTE RISK ASSESSMENT AND THE USE OF SCIENTIFIC AND TECHNICAL KNOWLEDGE TO MANAGE RISK**

### **Programme Objectives**

To ensure that regulatory policy is based on scientific and technical evidence, systematic assessment of risk and good risk management and risk communication techniques.

### **Policy Objectives**

To promote greater consistency, coherence and understanding on risk assessment and related issues.

### **Evidence Base and State of Knowledge**

Objective risk assessment is well established as a tool to improve health and safety. HSE and others have wide experience and knowledge, built up over a long period, on which to draw in this area. Research into individual cases has provided systematic appraisal and evaluation of that knowledge. Not so well established is the experience and knowledge of the subjective aspects of risk assessment, such as the criteria against which assessed risks should be judged and the value to be placed on the benefits gained from reducing risk, and the role of risk perception, particularly that of the general public.

Statistics on the incidence of work-related injuries and ill health will be crucial in assessing whether the *Revitalising Health and Safety* and *Securing Health Together* targets have been achieved. A statistical note on Progress Measurement was published on the HSE website in June 2001<sup>15</sup> setting out the principles to be followed in this, including the development of existing and new sources and the integration of data from all of them.

### **Research Objectives and Innovation Strategy**

To pursue research in aid of policy development taking into account societal concerns, the effective engagement of stakeholders and public trust and confidence in HSE and management of its reputation.

#### Cross cutting issues

A number of issues are not sectoral or organisationally discrete. HSE will operate and keep under review programmes of crosscutting areas, including the following:

##### *Human factors*

To understand and influence the behaviour of individuals and organisations, including that related to risk based decision making.

##### *Epidemiology and Statistics*

To maintain and develop arrangements for the collection of information on the scale and nature of work-related injuries and ill health, including information on trends over the 10-year period covered by the national targets for health and safety.

To obtain information that can better define the position and trends in the areas covered by the eight Priority Programmes and in Wales and Scotland.

To collect statistical and epidemiological information to improve the assessment of risk for specific hazards and exposure groups.

To define statistical information needs and how they might best be met.

##### *Education/Training/Competence*

To establish the extent and effectiveness of risk education throughout the education system.

To establish the current adequacy and take up of health and safety training and make recommendations for improvements.

To obtain information on 'competent persons', such as how firms select and appoint them and what qualifications and competencies they need to enable HSE to build its knowledge base on what constitutes a 'competent person'.

Approaches to risk assessment.

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<sup>15</sup> <http://www.hse.gov.uk/statistics/statnote.pdf>

To establish a systematic and analytical approach to the incorporation of societal concerns in risk assessment.  
To develop new and/or improved guidance for duty holder on risk assessment.

### **Recent Research Outcomes that are informing policy**

Research on the solicitation and elicitation of expert advice has fed into a draft Code of Practice on Scientific Advisor Committees, issued for consultation by the Office of Science and Technology.

Research on risk communication in government departments led to the publication through the Interdepartmental Liaison Group on Risk Assessment (ILGRA) of *Risk Communication - A Guide to Regulatory Practice*,<sup>16</sup> produced for people in government departments/agencies, particularly in regulatory departments to help improve policy and practice in risk communication.

Major research on the Valuation of Benefits of Health and Safety Control has resulted in a change in the basis for DFT's valuation of fatalities and injuries in road accidents (although this was not a large change in monetary terms). The findings of the research has also fed into valuation of safety investment and clarified the role of valuation in the decision making process. It has also opened up discussion on the public willingness to pay for health and safety benefits, and provided evidence of the public view on the issue of single and multiple fatalities. The research has also been widely cited and discussed as representing a view on public preferences about safety programmes in different contexts, specifically in the area of road and rail safety.

The four Social Amplification of Risk projects have been used to develop guidelines for Departments dealing with risk issues. These guidelines, which will be available to all Government Departments, will advise on the factors which influence the formation of public opinion via the media, and which lead to the development of societal concern.

Current research on Public Perception of, and Trust in, HSE as a Regulator will provide us with a benchmark of public trust in HSE, indicate how to improve that trust, and identify what creates and reduces trust.

Risk Assessment Case Studies research in 1996 fed directly into the publication *5 steps to risk assessment - case studies*,<sup>17</sup> which has been widely distributed.

Research undertaken by HSL during 2001/2 into young peoples' attitudes to health and safety at work (currently in draft) has been used to inform the design of the risk education pages on the HSE website.

HSL has completed several projects to help inform training and competence policy. They have redesigned and updated information on legislation, which contains competence, licensing, accreditation or personnel certification requirements or recommendations.

HSL's work on compiling a dossier of the increasingly common Health, Safety and Environment Passport Training schemes is aiding discussions between schemes and clients on reciprocity/mutual recognition.

An evaluation of the safety information centre approach in providing health and safety advice to small firms (CRR 308/2000) has been used to inform the development of a pilot grant scheme for small firms and other initiatives to provide health and safety information to small firms.

### **Current Research Interests**

Research currently being undertaken or planned in the immediate future is looking into the engagement of difficult to reach stakeholders with a view to improving their health and safety awareness and levels of activity, and extension of the Valuation of Benefits of Health and Safety Control<sup>18</sup> into the area of dread risks such as cancer. A current project has developed a tool to enable the HSC/E to analyse and gauge public concerns, as part of the decision making process.

A review of literature on working hours and fatigue and aspects relating to health and safety and work life balance is currently under way.

Research is being undertaken into establishing cost effective means of communicating with young people based on their opinion of what would succeed.

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<sup>16</sup> <http://www.hse.gov.uk/aboutus/meetings/ilgra/risk.pdf>

<sup>17</sup> HSG183, ISBN 0717615804 available from HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA, Tel 01787 881165, Fax 01787 313995, <http://www.hsebooks.co.uk>

<sup>18</sup> Contract Research Reports 273 and 315, <http://www.hse.gov.uk/research/index.htm>

### **New and Emerging Areas of Interest**

Anticipating future risk scenarios - “horizon scanning”.

Examination of how risk assessment and risk management should be incorporated into a “lifecycle” approach to improving health and safety.

Development of a ‘virtual’ risk assessment tool for duty holders.

## **STATUTORY SCHEMES**

### **Programme Objectives**

To continue to provide statutory schemes to industry and the public to ensure that particular products and services are, assessed, approved or certified by the Government before they are marketed.

To ensure that approval conditions provide for safe subsequent use.

### **Policy Objectives**

#### Chemical Product Safety

To establish and maintain regulatory regimes for the use and supply of chemicals to the market through hazard and risk assessment work.

To assist chemicals users to manage chemicals properly by:

- developing expert systems which will help firms select appropriate controls;
- making the systems freely available on the Internet; and
- stimulating the development of improved ways of handling chemicals.

#### Plant protection and biocidal products and Veterinary Medicines Approval

To contribute to the assessment, approval and regulation of plant protection and biocidal and veterinary medicines in line with the statutory schemes for these products.

### **Evidence Base and State of Knowledge**

#### Chemical Product Safety

A recent White Paper from the European Commission has outlined proposals for a new Chemicals Policy that will lead to major changes in the present regulatory system. There is a need for improved prioritisation and risk assessment programmes to target attention more efficiently towards the most significant health concerns posed by chemicals.

Research shows many small firms have difficulty applying the requirements of the COSHH regulations. There is a need for the development of new approaches and tools to help firms manage the chemicals they use.

#### Pesticides, Biocides and Veterinary Medicines Approval

Whilst detailed toxicological knowledge of the potential human health and environmental effects of products may be provided by industry, there may be areas where further information is required to refine risk assessments, for example on the chronic effects of low level exposures or exposure patterns from the use of products.

### **Research Objectives and Innovation Strategy**

#### Chemical Product Safety

To advance the field of toxicological hazard and risk assessment to facilitate delivery of statutory responsibilities.

To investigate crosscutting issues aimed at standardising and progressing toxicological risk assessment across government departments.

To investigate, for substances which cause occupational asthma, techniques to:

- reduce workplace exposure;
- improve diagnosis; and
- overcome behavioural factors which inhibit employers and employees from taking appropriate action to prevent exposure.

#### Pesticides, Biocides and Veterinary Medicines Approval

To develop risk assessment models and measurement methods to assess exposure and toxicity with particular emphasis on dermal exposure and ingestion and protection afforded by PPE and other control measures.

To investigate human factors issues surrounding the communication of risk messages and behaviour.

### **Recent Research Outcomes that are informing policy**

Experimental data are contributing to our view on the usefulness of new test methods such as those that may be used in strategies to screen chemicals for the potential to cause skin sensitisation by skin contact (local lymph node assay) or heritable genetic damage (e.g. In vitro micronucleus test; gene mutation tests with transgenic animals).

Literature reviews and basic research into non-genotoxic mechanisms are relevant to the risk characterisation of some chemical carcinogens.

Experimental data are helping us to identify new approaches to determining useful information about the carcinogenic potential of mineral fibres.

An epidemiological study on the chronic effects of organophosphate exposure in sheep dippers is shaping government action on control measures and further research.

Results from research into amateur exposure to wood preservatives and antifouling paints is being used in assessing realistic human exposure to these types of products and the risks involved in using these products.

### **Current Main Research Interests**

Aspects of human variability and sensitivity to chemical toxicity.

Understanding better the potential for absorption of hazardous chemicals across the skin.

Predicting and modelling the toxicity of dusts.

The continuing development of computer-based structure activity and other predictive systems, e.g. physiologically-based pharmacokinetic models.

Investigating how users of products understand the hazard, risk and safety instructions on pesticide labels.

Effects of organophosphates.

Exposure modelling.

Development of an expert system to integrate health, safety and environmental risk assessments for chemicals.

Investigation of use and control of isocyanates.

Investigation into the routes of referral of people who have developed occupational asthma and the role of health surveillance.

### **New and Emerging Areas of Interest**

The possibility that respiratory allergy can develop after exposure to chemicals via the skin.

Biocidal products - usage patterns and exposure.

Probabilistic modelling of exposure in general.

## **APPENDIX – CONTACT POINTS**

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