

**Achieving the  
*Revitalising Health and Safety*  
Targets**

**Statistical Note on Progress Measurement**

**Health and Safety Executive**

**Epidemiology and Medical Statistics Unit and  
Economic and Statistical Analysis Unit**

**June 2001**

## Introduction

The *Revitalising Health and Safety (RHS)* strategy statement, launched by the Deputy Prime Minister and the Chair of the Health and Safety Commission (HSC) in June 2000, set three national targets for improving health and safety performance: by **2010**:

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

Inasmuch as they relate to ill health (i.e. the second target, and a part of the first), these also featured among the targets announced in *Securing Health Together: A long-term occupational health strategy for Great Britain (SH2)*, launched by the Health and Safety Commission and Executive (HSE), in association with other government departments, in July 2000.

In the factsheet *Achieving the Revitalising Health and Safety Targets*, published in October 2000, the Government and the HSC explained the targets and gave our best estimates of what achieving them would mean for the numbers of workers killed, injured or made ill by their work (for more information please email: [revitalising@hse.gsi.gov.uk](mailto:revitalising@hse.gsi.gov.uk)). The factsheet promised 'a statistical note to ... give more detail about the targets and baselines and the range of sources we will use to monitor progress'.

This note meets that commitment. Its scope is limited to the measurement of progress for the three global, national targets; organisations which set lower-level targets will need to develop measures relevant to their own circumstances. The note is in four parts, after this introduction and a summary. The first sets out some **general principles** which apply to measuring progress against all three targets. This is followed by more specific points on the approach to (and delivery of) measurement for the targets related to **injuries**, to **ill health incidence** and to **days lost**. There are four Annexes containing more detailed background information.

The principles described in this note are designed to provide a methodology which is robust and credible. At the same time, we recognise that the methods are not set in stone and they will be constantly **reviewed**. We therefore welcome comments from our stakeholders on the approach set out in this note as well as suggestions for other steps we might usefully take.

## **Summary**

### **I -- General principles**

- (1) Progress measurement will involve **more than one data source** and some adjustment or integration of data from the different sources will be necessary; as a rule this will only be appropriate at the global level.
- (2) Percentage changes over time are what matter for monitoring progress against the targets, so efforts should be focused on **measuring change**; estimates of absolute levels may vary as information sources evolve.
- (3) In assessing trends and progress over the strategy period, **statistical modelling** techniques will be used to limit the impact of **sampling variability** in the figures for individual years.
- (4) To support the 'outcome' data on injuries and ill health, supplementary approaches should be explored, for example collecting data on **economic, social and cultural factors**.
- (5) The data and methods used for progress measurement will be **National Statistics**, so the methods will be subject to independent quality review and stakeholder consultation.
- (6) A **report on progress** will be prepared each autumn, comparing the latest data with those for the base year (1999/2000). For at least the mid- (2004/5) and end-point (2009/10) of the strategies, this report will incorporate **external peer review**.

### **II -- The injuries target**

- (1) The incidence rate of **fatalities and major injuries** will be calculated as the sum of the rates for fatalities (reported under RIDDOR) and for major injuries (reported under RIDDOR, adjusted for under-reporting using the Labour Force Survey).
- (2) The adjustment for **under-reporting of major injuries** will use the ratio for 'over 3 day' injuries.
- (3) For injuries, the **progress report each autumn** will include provisional estimates for the previous (financial) year; these will be revised in the following year's report.

### III -- The ill health incidence target

- (1) Progress should be measured ***separately for different diseases***, using the most appropriate data source(s) for each.
- (2) The existing data sources should be ***refined*** (e.g. estimating the effects of raised awareness), and new sources ***developed*** (e.g. workplace-based surveys), to meet the needs of progress measurement
- (3) Data from the various sources should be ***integrated*** to produce an overall ***judgement*** about progress against this target, for individual diseases and in aggregate.
- (4) Diseases with ***long latency periods*** between exposure and health outcome should be included in this target, but should be separately identifiable.
- (5) For ill health, the ***progress report each autumn*** will present a judgement based on data from all the sources available at the time; this will include new data from ODIN (every year) and SWI surveys (less frequently).

### IV -- The days lost target

- (1) The only sources currently available rely on ***self-reports*** (the LFS and SWI surveys). Steps will be taken to ensure greater consistency between them but limitations will remain, especially in respect of ill health.
- (2) In future it may be possible to develop ***innovative additional sources*** to help measure progress, in the context of broader government targets for reducing sickness absence.
- (3) Days lost will be covered in the autumn ***progress report*** only in years for which there are new data from the LFS/SWI – roughly on a ***three-year cycle***.

## **Part I -- General principles**

This note explains the principles which statisticians in the Health and Safety Executive (HSE) propose to follow when measuring progress against the targets, using existing information sources and developing new ones. We believe it is important to state these principles now, near the beginning of the period covered by the RHS and SH2 strategies, in the interests of **transparency**: there must be no suspicion that the sources or measurement methods have been chosen to provide the most favourable possible interpretation of the figures as they emerge over the next 10 years.

This section sets out a number of basic groundrules which should be followed in respect of all three global targets. These Principles are necessarily phrased in general terms; the further explanation under each gives examples of how it would be applied with respect to the individual targets (for injuries, ill health or days lost).

**(1) Progress measurement will involve more than one data source and some adjustment or integration of data from the different sources will be necessary; as a rule this will only be appropriate at the global level.**

The International Labour Organisation recommends that “In compiling statistics of occupational injuries, **various sources of information** should be used in order to provide as full a picture as possible”<sup>1</sup>. This applies even more to occupational illness, given the further complexities in this area, and HSE is firmly of the view that “No single source of information is available in Great Britain on the nature and full extent of occupational and work-related ill health”<sup>2</sup>.

The two main sources of **occupational injury** statistics are employers’ reports to HSE under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) and individuals’ responses to injury questions on the Labour Force Survey (LFS). Integrating the two consists of applying factors from the LFS to the RIDDOR estimates to **adjust for underreporting** by employers. More detail is given in Part II on the injuries target and in **Annex A**.

The indicator for injuries is focused on the combined rate of fatal and major injury, where major injuries form the bulk. In effect, trends in the indicator are trends in the rate of major injury. However, assessment of progress cannot ignore trends in **fatal** injuries, particularly if they get worse. Furthermore, **all reportable** injuries (major and ‘over 3 day’ – where the person was unable to carry out their normal work for 4 days or more) from the LFS have a big impact on the number of days lost and so will also need to be examined when assessing trends.

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<sup>1</sup> *Report III: Statistics of Occupational Injuries*, Sixteenth International Conference of Labour Statisticians, 1998.

<sup>2</sup> *Health and Safety Statistics 1999/2000*, Health & Safety Commission, HSE Books, 2000.

For **occupational ill health**, HSE has built up its information base by developing a range of sources, including self-reporting by individuals, surveillance by specialist doctors and recording claims for disablement compensation. The different sources give different evidence on trends, which needs to be **integrated** to give an overall judgement about progress. This is described further under Point (3) in Part III (for the ill health incidence target).

The adjustment or integration of data from the different sources is a resource-intensive process. Moreover, where one or more of the sources involve sampling, the reliability of the resultant estimates will reduce as the level of disaggregation increases. Therefore, as a general rule, this process will only be worth undertaking at the global, aggregate level: for injuries and days lost this means the **whole economy**, while for ill health it means at the level of **individual diseases**.

Data from the various sources will still be collected and published at the most disaggregated level at which robust estimates are available. Resources will be focused on providing data for the 'priority programmes' identified in the HSC Strategic Plan (including the agriculture, construction and health services sectors) and for the nations of Scotland and Wales.

**(2) Percentage changes over time are what matter for monitoring progress against the targets, so efforts should be focused on measuring change; estimates of absolute levels may vary as information sources evolve.**

All the targets are expressed as percentage changes to be achieved by 2010 (and 2004). The key requirements therefore are for **consistency and currency** in the data sources, to ensure reliable and stable measures of change over the ten years of the strategies. Some sources may meet these criteria even though their coverage – and hence their ability to measure levels – is less than comprehensive.

For both injury and ill health statistics, this means that the sources which give the most inclusive and broadly-based estimates of the overall scale of the problem – generally, those based on large household surveys – are not necessarily the best **indicators of change**. By their nature such surveys tend to be relatively costly and infrequent, take some time to process and analyse, and are subject to sampling errors. Alternative sources may provide data which are more timely, frequent and appropriate to the purpose of progress measurement.

Estimates of the levels of work-related injuries, ill health and days lost depend on the state of knowledge at the time; they will be revised as further years' data become available, existing sources are refined and new ones developed. The factsheet *Achieving the Revitalising Health and Safety Targets* gave preliminary estimates of the base year data: 29,000 fatalities and major injuries to workers reported, 400,000 new cases of self-reported work-related ill health, and 24 million working days lost (also based on self-reports). However it acknowledged that "New information sources may mean that our view of the baseline changes". This is discussed further under Point (2) in Part III (for the ill health incidence target) and in Annex C.

**(3) In assessing trends and progress over the strategy period, statistical modelling techniques will be used to limit the impact of sampling variability in the figures for individual years.**

All the statistical measures proposed for these targets are subject to *random error*. For each target therefore there will be a central estimate of the reduction, and upper and lower confidence limits (conventionally defining the interval which has a 95% probability of covering the true value) around this central estimate. Only if the lower confidence limit on the estimated reduction equals or exceeds the target value can we make a clear judgement that the target has been met. Similarly it is only if the upper confidence limit falls short of the target value that we can be reasonably sure that the target has not been met. When the target value falls between the upper and lower confidence limits, *no definitive statistical judgement* can be made.

It is important to be clear that this is not a marginal or theoretical issue. Even our best measurements (those for injury rates) are subject to uncertainty, because the injury indicator is uprated from the LFS to allow for underreporting and the LFS carries sampling error. This means that a straight comparison of two years (e.g. 2000 and 2010) would carry about  $\pm 5\%$  margin of error - a substantial proportion of the target improvement of 10%. The margin of uncertainty on disease estimates drawn from self-reported surveys is even greater: up to  $\pm 30\%$  for the three largest disease categories stress/depression/anxiety, upper limb disorders and back disorders. It will be smaller for disease estimates from the specialist surveillance systems, though we do not yet have an agreed methodology for measuring sampling error in these systems (developing one is a statistical priority for target monitoring).

The use of statistical modelling across a run of years (see below) will reduce this uncertainty, perhaps by a factor of two, and devices such as having some overlap between samples for successive periods, or increasing sample sizes (where feasible) would also help, but a material degree of uncertainty will remain. There is therefore a high probability that in conventional statistical terms the question "have the targets been met?" will have no clear answer.

We propose that when the judgement is statistically uncertain, the decision should be based on a comparison of the central estimate with the target, but that the *uncertain nature of the judgement* in this case should be recognised. Because this is an unsatisfactory situation (particularly when the confidence interval is wide) we should seek to reduce the statistical uncertainty to as low a level as possible. One approach to this is to use statistical modelling on data from a run of years rather than taking account only of the data from (for example) the base and final years of the strategies. A simple version of this approach is already implicit in the use of a 3-year average in the estimation of under-reporting of injuries.

The precise *statistical models* will depend on the series that emerge. For example, a uniform decline in incidence rates of fatal/major injury would justify use of a simple linear regression. However, the statistical model will be different where trends are non-

uniform, for example, a substantial reduction in the first few years with little thereafter. Recent analysis of German accident rates suggested that trends there were best modelled as an exponential rather than a linear decline. Choices here must be data driven, but must be justified by their fit to the data (not by whether they give a favourable answer).

Modelling may deliver a view on whether the targets have been achieved which is different from the simple percentage change between 2000 and 2010. We will take into account both views but the statistical modelling will provide a more coherent and robust assessment of trends and progress over the period.

Finally, in deriving the models, and assessing progress over the target period, allowance will be made for any **discontinuities** in the data – for example, changes in the arrangements for reporting injuries, in the classification of diseases, or in the methodologies used by survey contractors. If necessary the data will be recalibrated to adjust for such changes, so that models can be estimated on a consistent basis over time.

**(4) To support the ‘outcome’ data on injuries and ill health, supplementary approaches should be explored, for example collecting data on economic, social and cultural factors.**

While the incidence rates of injuries, ill health and working days lost can be seen as the ultimate outcomes regarding health and safety performance, they do show not the whole picture. One supplementary approach is to measure ‘inputs’ – e.g. the amount of enforcement activity (including prosecutions) by HSE and Local Authority inspectors. This is done routinely as part of performance monitoring, but it is not enough. In order to monitor fully the effectiveness of the *Revitalising Health and Safety* and *Securing Health Together* strategies, it will also be necessary for HSE to develop a fuller understanding of **other relevant factors**.

For instance, any changes in the **size and structure of the working population** - for example, the proportion employed in high-risk industries - will have an impact on injury and ill health incidence. The interpretation of the incidence figures should also be informed by knowledge of the severity and duration of the injuries and ill health involved, since a simple count of the number of cases gives an imperfect indication of the total amount of suffering or **cost to society**. HSE economists have done work looking at these factors<sup>3 4</sup>.

In carrying out this work to understand the context in which we are monitoring the targets, we will be alert to changes which might work to help, or hinder, **wider objectives** for the Health and Safety Commission. Changes in the structure of employment, for example, might reduce accidents or ill health but might lead to a poorer

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<sup>3</sup> Taylor S, Davies N and McCrea P, *Demographic and employment trends in: Occupational Health Decennial Supplement* Drever F (Ed), HMSO, 1995.

<sup>4</sup> *The costs to Britain of workplace accidents and work-related ill health in 1995/96*, HSE Books, 1999.

quality working environment. Or the increasing capacity by employers to select and retain workers who are the most suitable for particular jobs might reduce days lost through ill health or accidents - but only at the expense of excluding the less suitable from these jobs.

In the case of ill health, it is sometimes feasible to measure directly the extent or intensity of **exposures to risk factors**. Because the strategies will have effects on exposures more rapidly than on health outcomes, this can give a more immediate measure of their success, especially for diseases where there is a long latency period between exposure and ill health. HSE has used a variety of techniques to measure exposures (for example, by surveys of self-reported working conditions<sup>5</sup>) and we will continue to do so in the future.

We should also aim to improve our understanding of the broader **health and safety culture**. This may be approached by measuring people's **awareness** of health and safety risks, their **attitudes** to occupational health and safety and the resultant **behaviours** (including conformance with controls) – especially in areas where it is not feasible to collect 'hard' data on exposures or health outcomes<sup>6</sup>. This approach will be investigated through links with surveys of the public, employers or workers.

Information collected on changes in any of these other relevant factors over the period of the strategies will help **inform our interpretation** of the outcome data. For example, an estimated fall of x per cent in work-related ill health would mean something different if it were accompanied by raised awareness and improved health and safety behaviour than if there had been a deterioration in these factors.

**(5) The data and methods used for progress measurement will be National Statistics, so the methods will be subject to independent quality review and stakeholder consultation.**

New arrangements for 'National Statistics' were launched by the Government in July 2000, to enhance the integrity and quality of official statistics. Measuring progress against targets clearly comes within its scope: "The primary aim of National Statistics is to provide an accurate, up-to-date, comprehensive and meaningful picture of the economy and society to support the formulation and monitoring of economic and social policies by Government at all levels ... **to provide a window on the work and performance of Government**".<sup>7</sup>

The National Statistics 'badge' means that the statistics concerned must be produced to high professional standards, subject to regular quality assurance reviews and published free from any political interference. To achieve this, the National Statistics arrangements include an independent Statistics Commission, a *Code of Practice*

<sup>5</sup> Jones J et al, *Self-reported working conditions in 1995*, HSE Books, 1997.

<sup>6</sup> Osman J and Benn T, *Monitoring occupational disease, past, present and future in: The changing nature of occupational health* McCaig R Harrington M (Eds), HSE Books, 1998.

<sup>7</sup> *Framework for National Statistics (First Edition)*, Office for National Statistics, June 2000.

covering matters such as release arrangements, a programme of **quality assurance** (with the involvement of external expertise) for all key outputs, and mechanisms for consultation with stakeholders. The quality assurance programme is also in line with the Government's requirement for an external validation regime for data that support Public Service Agreement (PSA) targets.

**Consultation with stakeholders** will be co-ordinated with the 'Health and Care' National Statistics Theme Working Group and also with other arrangements for such consultation, notably the *Securing Health Together* 'Programme Action Group' (PAG) looking at knowledge issues. Stakeholders include the customers/users of the statistics within and outside Government, and also data suppliers (for example, employers and workers) and those with relevant technical expertise. This Statistical Note has been subject to such a consultation process.

**(6) A report on progress will be prepared each autumn, comparing the latest data with those for the base year (1999/2000). For at least the mid- (2004/5) and end-point (2009/10) of the strategies, this report will incorporate external peer review.**

The publicity surrounding the launch of the RHS and SH2 strategies implied a programme period of 10 years from 2000 to 2010. For data organised on a financial year basis the **base year** is **1999/2000** – the last full year before the strategies were launched in summer 2000 (some data sources provide figures on a different basis – e.g. calendar years – but this is unlikely to matter, given all the other uncertainties).

An overall assessment of progress against the targets needs to be made at the end of the 10-year period covered by the strategies – i.e. for **2009/10** – and also at the mid-point described in the RHS Strategy Document – i.e. for **2004/05**. In addition, progress reports will be required more frequently to meet the needs of HSC/HSE's strategic planning. To ensure that all such needs are covered, we will produce an **annual progress report** bringing together the available data. This will normally be in the autumn, coinciding at present with the publication of *Health and Safety Statistics* and the HSC's *Annual Report*. The first progress report, in autumn 2001, will give updated estimates for 1999/2000 (the base year) alongside first estimates for 2000/01. Details of what will be provided and when are given in point (3) of Part II (injuries), point (5) of Part III (ill health) and point (3) of Part IV (days lost).

Because of the importance of the RHS and SH2 targets, and the complexities of the measurement process, we believe that the overall assessment of progress should be subjected to some form of external validation. To this end a **peer group** will be constituted which will be asked to review the judgement arrived at by HSE statisticians. This will be done at least for the mid- and end-points, and possibly also for other key years (for example, when a major new source becomes available).

## **Part II -- The injuries target**

For this target we have statistics which are quite well-defined, timely and frequent. They will be used to monitor progress in accordance with the following approach:

**(1) The incidence rate of fatalities and major injuries will be calculated as the sum of the rates for fatalities (reported under RIDDOR) and for major injuries (reported under RIDDOR, adjusted for under-reporting using the Labour Force Survey).**

The RHS indicator for injuries is the combined rate of fatal and major injury. In HSE publications, rates of injury are usually expressed as the number of reported injuries per hundred thousand employees or workers as appropriate. This section explains why we derive the rate of fatal and major injury as the sum of two parts:

- the rate of reported fatal injury to workers; and
- the rate of reported major injury to employees uprated by an estimate of under-reporting of non-fatal injuries by employers.

The results from the LFS confirm HSE's previous concerns that **non-fatal injuries** are substantially under-reported. For example, the LFS indicates that, in 1998/99, there were 380 000 reportable injuries to workers, of which 343 000 injuries were to employees. Employers, however, made injury reports on only 161 000 employees. These figures suggest that employers reported around 46% of the injuries that should have been reported under RIDDOR in 1998/99. Self-employed people made 1599 non-fatal injury reports in 1998/99, compared with 35 000 injuries estimated by the LFS. This suggests a reporting level of less than 5% for the self-employed.

**Fatalities**, by their nature, are different and are virtually fully reported. HSE and local authorities reckon to get to know about all fatalities at work. The key element is the death certificate and the role of coroners and coroner's officers (see **Annex A**).

Two assumptions are inherent in the above treatment of the major injury rate. First, that the injury rate among the self-employed is the same as that among employees. This is justified by the observation that injury rates in the two groups as estimated from the LFS are not significantly different. Second, that the same degree of under-reporting applies to major injuries as to the less severe category of reportable injury. This is justified by the fact that the major/non-major distinction depends essentially on type of injury, together with the observation that the distribution of injury types seen in the LFS is the same as that among reported injuries.

The key measure against the targets will be the adjusted one. However we will also continue to publish the **reported** numbers without the uprating for underreporting. This will allow us to examine the impact of underreporting on the judgement about achievement of the targets. It is also worth noting that the extent of underreporting may be affected by administrative changes – for example, the introduction in April 2001 of an 'Incident Contact Centre' allowing employers to report under RIDDOR by telephone or email as well as on paper.

**(2) The adjustment for under-reporting of major injuries will use the ratio for 'over 3 day' injuries.**

The rate of fatal and major injury would be understated because of under-reporting of major injuries by employers and self-employed people. We uprate the major injury component by an estimate of the reporting percentage. This estimate is derived by comparing data from RIDDOR and LFS sources. Four technical issues on the estimation of the under-reporting correction need to be explained.

*The self employed*

The numbers of reported injuries tell us that the reporting level from self-employed people is very low. Furthermore, because the numbers involved are smaller than for employees, estimates of the true number of injuries and of the rate of under-reporting vary substantially from year to year. The under-reporting estimate can therefore be securely estimated only for employees and not for self-employed people.

However the LFS results show no significant difference between the injury rates for employees and self employed people. We can therefore take the employee rate (corrected for under-reporting) to represent the rate for all workers (employees and self employed combined). The details on the derivation and use of LFS rates of injury are given in the latest LFS Factsheet available on the HSE website.

*Rates or numbers?*

A further technical issue is that the employee under-reporting estimate is derived, not from a ratio of injuries from the two sources, but as a ratio of injury rates. This allows for the different employment estimates utilised in the sources: the employment estimate comes from the LFS itself for LFS injury rates, and comes from the Annual Employment Survey for the rate of reported injury. In practice comparing the rates rather than the counts makes only a small difference, and for 1998-99 both approaches estimated under-reporting at 46% (reported rate 689, LFS rate 1490).

*Major and non-major injuries*

Major injuries like all non-fatal injuries are underreported by employers. On the face of it, under-reporting would affect the indicator. The regular questions in the LFS cannot carry the range of topics needed to identify major injuries. The LFS cannot therefore provide a rate of major injury. However, Eurostat developed with member states a special module of questions on the types of injury (and ill health) in the 1999 LFS. The results of those questions show that the profile of the general types of injury suffered by working respondents is similar to those actually reported under RIDDOR. In effect, the injuries reported under RIDDOR are representative of those which occur, implying that employers do not report one type of injury substantially more than another. It is reasonable to argue that major injuries, mainly defined by the type of injury (fractures, dislocations and lacerations), are not reported differently to over 3 day injuries. Further details are given in the LFS Factsheet.

### *Reducing sampling error*

Injury rates from the LFS carry survey sampling error. In order to reduce the sampling error, we derive the LFS injury rates for a reference year from three surveys centred on that year. The rate of reportable injury from the LFS for 1998/99 is 1490 per hundred thousand workers and is based on the surveys for 1997/98, 1998/99, and 1999/00. The sampling uncertainty (95% confidence interval) around this estimate is  $\pm 55$  (or 3.7%).

**(3) For injuries, the progress report each autumn will include provisional estimates for the previous (financial) year; these will be revised in the following year's report.**

Because the first estimates appear some time after the period to which they relate, and because they continue to be revised as more data become available, progress monitoring will need to be on a 'rolling' basis. For the first few years of the programme period, the likely pattern for delivering this monitoring information is as follows:

#### **Autumn 2000** (*Achieving the Revitalising Health and Safety Targets* factsheet)

1999/2000: Preliminary estimate, based on provisional 1999/2000 RIDDOR updated using LFS estimate for 1998/99.

#### **Autumn 2001** (around *Health and Safety Statistics 2000/2001* publication)

1999/2000: Final estimate, based on final 1999/2000 RIDDOR updated using LFS estimate for 1999/2000 (based on the surveys in 1998/99, 1999/2000, and 2000/01).

2000/01: Preliminary estimate, based on provisional 2000/01 RIDDOR updated using LFS estimate for 1999/2000.

#### **Autumn 2002**

2000/01: Final estimate, based on final 2000/01 RIDDOR updated using LFS estimate for 2000/01.

2001/02: Preliminary estimate, based on provisional 2001/02 RIDDOR updated using LFS estimate for 2000/01.

On this basis, first estimates for the **mid point** (2004/05) would be available in autumn 2005 and final figures in autumn 2006; and for the **period end** (2009/10) we would have first figures in autumn 2010, finalised in autumn 2011.

### **Part III -- The ill health incidence target**

This target – which features in both *Revitalising Health and Safety* and *Securing Health Together* - is widely recognised as presenting challenges for progress measurement. Perhaps most importantly, except in the few instances where a disease is uniquely linked to a specific occupational exposure it is inherently difficult to decide whether an individual case of ill health is **attributable to work causes**.

Following discussions with stakeholders at a workshop held in December 2000, and further work in HSE, we have decided that the following approach should be followed (this Statistical Note meets the commitment given by HSE at the workshop to provide further information on progress measurement):

**(1) Progress should be measured separately for different diseases, using the most appropriate data source(s) for each.**

HSE's **existing sources** of occupational health statistics are of five main types:

- Household surveys of self-reported work-related illness (**SWI**): These have been held in 1990 and 1995, linked to the Labour Force Survey. A module of health and safety questions was also included in the Europe-wide LFS in 1999.
- Voluntary reporting of occupational diseases by specialist doctors in the Occupational Disease Intelligence Network (**ODIN**): Covering occupational physicians and doctors in an increasing range of specialisms, these provide annual estimates from broadly the same 'panel' of reporting physicians.
- New cases of assessed disablement under the Department of Social Security's Industrial Injuries Scheme (**IIS**): The most longstanding source, based on a list of prescribed diseases and associated occupations, again giving annual figures.
- Statutory reports under HSE's Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (**RIDDOR**): Based on a similar list to the IIS, which was expanded under RIDDOR 95.
- Deaths from occupational lung diseases recorded on Death Certificates (**DCs**): Principally mesothelioma and other asbestos-related diseases.

SWI and ODIN are the main sources, supplemented by the IIS and DCs. RIDDOR is of far less use for work-related ill health than it is for injuries, largely because it is subject to very substantial under-reporting (due to the strict criteria which need to be met for a case to be reported, as well as the reporting mechanism itself). Taken together, the sources have provided a picture of the overall scale of work-related illness, the major types of health outcomes involved and the occupations and industries associated with them. This has helped HSE and other stakeholders to identify priorities and has informed policy, campaigning and enforcement activities.

Up to now, the statistics have not been used to measure progress against targets. When used for this purpose, different sources can be more appropriate for **different diseases**. For example, occupational asthma and dermatitis are the subjects of well-established schemes for reporting by specialist physicians; while the incidence of mesothelioma is well represented by the number of deaths. **Annex B** indicates the

range of data sources for 17 occupational diseases or conditions, in six groups: stress, musculoskeletal, skin, respiratory, hearing loss and infections. The intention has been to include all diseases with a non-trivial number of work-related cases; specific exclusions are listed in the Notes to the Annex table.

For most conditions, Annex B suggests a **leading data source**. This does not mean that this source is perfect - existing sources will need to be refined and new ones developed, as discussed under Point (2) below - nor that only one source should be used - the need for a judgement involving several is explained under Point (3). Rather, it is intended as a first step in considering how the data from the different sources should be integrated to form such a judgement, and in indicating - other things being equal - which source will give the most reliable estimate of change. It is constrained by the need to use sources which provide data for the base year (1999/2000). For stress and musculoskeletal disease, a final decision on leading sources will be made later this year, as explained in the Notes to the Annex table.

Annex B also presents the **latest available figures** (in most cases relating to 1999) from each source for each of the conditions. These supplement the figures quoted in the *Achieving the Revitalising Health and Safety Targets* factsheet, which were taken from a single source - the SWI survey for 1995. General Principle (2) above should be borne in mind when interpreting them: the figures for the base year will continue to change as new data become available.

**(2) The existing data sources should be refined (e.g. estimating the effects of raised awareness), and new sources developed (e.g. workplace-based surveys), to meet the needs of progress measurement.**

There are four particular factors which need to be addressed when using occupational health statistics to measure progress against targets:

- **Attribution to work:** Since most of the diseases which can arise from work exposures can also be caused by many other factors, attribution will be done differently by different people and will be influenced by cultural factors. Therefore **increased awareness** (for example, due to improvements in the 'health and safety culture' generated by the RHS and SH2 strategies, especially in their early years) could result in an apparent rise in the levels of ill health attributed to work, as reported by individuals (to SWI surveys) or their employers (under RIDDOR). This bias is likely to vary with the nature of the ill health.
- **Scope/coverage:** The threshold above which a case is defined as 'illness' is not straightforward (e.g. in claims for disability benefits), and there are a number of reasons why the sources' coverage may be less than complete (e.g. varying levels of participation by those responsible for reporting).
- **Statistical uncertainty:** The number of cases of occupational illness even in large samples of the general population will be quite small and the sampling variability will be large, making assessment of change difficult.
- **Stability of sources:** Administrative changes may introduce discontinuities (for example new IIS compensation rules, and RIDDOR Reviews), while reliance on external research and expertise can make it difficult to secure the flow of data in the longer term.

**Annex C** gives a list of **developments** which we believe will be required to meet these challenges. These consist of refinements to address weaknesses in the existing sources, and the development of new ones. Perhaps the highest priority for developing the existing sources is to model the **effect of increased awareness** on measured ill health incidence: the 'Competition of Ideas' in HSE's *Mainstream Research Market 2001/2002* document invited research proposals to address this issue. As far as new sources are concerned, the development of a fully HSE-owned **workplace-based survey** is one of the options being actively considered, as well as new instruments - probably survey based - for the major disease categories stress and musculoskeletal conditions.

The intention is that by 2004, the mid-point of the strategies, we will have significantly improved our statistical apparatus while retaining links with the existing system in order to provide comparability between the two. The feasibility and resource implications of all of these developments still need to be fully worked out, which in some cases will require collaboration with other interested parties (for example, the DSS Statisticians responsible for the IIS).

**(3) Data from the various sources should be integrated to produce an overall judgement about progress against this target, for individual diseases and in aggregate.**

As a result of following the approach under (1) and (2) above, we will have data from a number of sources on trends in the work-related incidence of each disease. What we need next is a methodology for **integrating or reconciling** these. **Annex D** gives examples of where such methodologies are used in other areas of National Statistics; the essence is to exploit the strengths and minimise the weaknesses of all the available sources, by means of:

- **Conceptual adjustments** – especially to allow for known differences in the scope of the sources.
- **Quality adjustments** - to correct for known biases and allow for different levels of statistical uncertainty.
- **Aggregation** - to give global figures.
- **Benchmarking** - to update measures of levels using indicators of change.

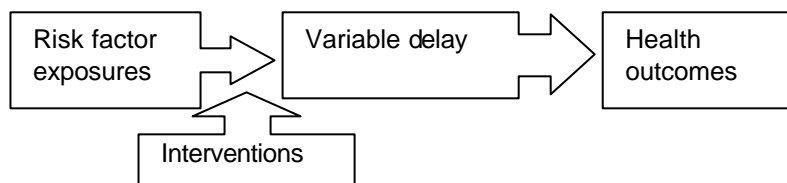
The application of this sort of methodology in a fully **quantitative** way - so as to produce a single consistent set of estimates - would be novel in the field of occupational health statistics. An alternative would be a "semi-quantitative" approach, looking at the evidence on trends from each data source separately and reaching a qualitative overall judgement on progress relative to the targets. Either approach will require developmental work of the type described under (2) above, in order to understand the extent to which measured trends reflect real underlying change (rather than changes in, say, awareness or propensity to claim).

Because the target has been set at the global level, we will need to address the issue of **aggregation of data for different diseases**. Data for different diseases may come from sources with different definitions and scope, so cannot simply be added together. A fully quantitative approach would involve conceptual adjustments to convert them to the same basis, after which they could be aggregated. In practice it may be necessary to approximate to this by using a set of **weights** from a single source – for example, the SWI surveys – to ensure that the estimated percentage change in overall incidence reflects the relative scale of the different diseases. The weights will affect the final result - they may even determine whether or not the target is measured as having been met – and it is likely that the **peer group** referred to under General Principle (6) will have an important contribution to make here.

**(4) Diseases with long latency periods between exposure and health outcome should be included in this target, but should be separately identifiable.**

Most occupational ill health, unlike injuries, does not occur immediately after exposure. There is typically a **period of latency** between hazardous exposure (e.g. to a toxic substance) and the appearance of actual harm. The situation is similar where exposures have a **cumulative** effect (as e.g. for noise-induced hearing loss).

This can be illustrated in the following simple model: exposure to risk factors in the workplace produces clinical effects in terms of health outcomes only after a delay, which is **different for different diseases** (and indeed for each individual case).



Where there is a long latency interval between exposure and outcome, successful interventions may not be reflected in measures of health outcomes during the period covered by the *Revitalising Health and Safety/Securing Health Together* strategies.

Making simplifying assumptions, we have identified between five and seven **long latency diseases**, where the typical latency is greater than 10 years. These are mesothelioma, asbestosis/other pneumoconioses, benign pleural disease, chronic bronchitis/ emphysema, skin cancer, (more debatably) noise-induced hearing loss and (even more debatably) vibration-related conditions. It is unlikely that the incidence of these conditions can be much affected by actions taken during the lifetime of the strategies, and there is even an argument that they should be excluded from the coverage of the targets.

On other hand, many of them are severely disabling illnesses and they form part of the overall burden of occupational ill health. We therefore believe that, on balance, long latency diseases should be **included** in the target. Measuring and publishing data on their incidence, using the sources indicated in Annex B, will document future trends and will also tell us whether past (and by implication current) interventions are working. In accordance with Point (1) above, progress will be measured separately for them and so

it will be possible to construct alternative overall progress measures excluding long-latency conditions (however defined).

Finally, in recognition of the low sensitivity of health outcome measures for these diseases to interventions made in the next 10 years, we will devise **supplementary approaches** to assessing short/medium-term progress for them, for example by measuring exposures (as discussed under General Principle (4)). Indeed, when interpreting the data it will need to be borne in mind that even for some of the diseases **not** defined as long-latency, interventions to prevent or reduce the exposures can take some time to show up in terms of health outcomes.

**(5) For ill health, the progress report each autumn will present a judgement based on data from all the sources available at the time; this will include new data from ODIN (every year) and SWI surveys (less frequently).**

As for injuries, progress monitoring will need to be on a 'rolling' basis. The number of different sources, and the plans for developing them, make the position for reporting progress against the ill health incidence target more complicated. For the first couple of years of the programme period, the likely pattern for delivering this monitoring information is as follows:

**Autumn 2000** (*Achieving the Revitalising Health and Safety Targets* factsheet)

1999/2000: Preliminary estimate, based on 1995 SWI Survey.

**Spring 2001** (this *Statistical Note*)

1999/2000: Preliminary estimates from 1999 ODIN and other non-SWI sources.

**Spring 2001** (*SWI 1999* publication)

1999/2000: Prevalence estimates from initial (summer 1999) Euro-SWI survey, not directly relevant to the ill health incidence target.

**Autumn 2001** (around *Health and Safety Statistics 2000/2001* publication)

1999/2000: Revised estimates from 1999 ODIN and other non-SWI sources.

2000/01: Preliminary estimates from 2000 ODIN and other non-SWI sources.

**Autumn 2002**

1999/2000: Adjusted estimates from 1999 ODIN and other non-SWI sources, incorporating adjustments from commissioned research.

2000/01: Revised and adjusted estimates from 2000 ODIN and other non-SWI sources.

2001/02: Preliminary adjusted estimates from 2001 ODIN and other non-SWI sources.

Incidence estimates from re-run (winter 2001/02) Euro-SWI survey.

HSE is working towards ensuring that specialist-based surveillance of work-related ill health, of the type currently provided by ODIN, will continue in future years; and that future SWI surveys will take place in at least winter 2004/5 and 2009/10 (initial soundings on this with the Office for National Statistics, which runs the Labour Force Survey, have been positive). On this basis a first judgement for the **mid point** (2004/05) will be available in autumn 2005 and for the **period end** (2009/10) in autumn 2010.

## **Part IV -- The days lost target**

Measurement of progress against this target requires measurement of both injuries and ill health, and also of the number of days off work due to each of them. On the health side there was some discussion on this issue at the December workshop, but no agreed way forward. We suggest the following approach:

**(1) The only sources currently available rely on self-reports (the LFS and SWI surveys). Steps will be taken to ensure greater consistency between them but limitations will remain, especially in respect of ill health.**

Estimates for days lost due to injury and ill health have up to now been derived from different sources, though both are based on self-reports. Their combination will require careful consideration of definitions, timing and other aspects of consistency.

Estimates of days lost due to injury have been based on absence in the current year between the time of the injury and the return to work. For ill health, all subsequent days lost due to an illness have been counted, regardless of its date of onset (i.e. days lost due to longstanding work-related illness cases are included). On balance, we have decided to **accept this difference of definition**, on the grounds that here consistency over time within a source is more important than between sources.

The days lost estimates for injuries and illness have also adopted different approaches e.g. to the treatment of missing values (what to do when respondents fail to answer some questions). We will **review our methodologies** to develop a more consistent basis, subject to the need to identify the over 3 day category of injury and to minimise discontinuities in estimates of absence.

The **timing** of estimates from the two sources has also differed. The injury component is available, through an additional question in the LFS on the number of days absence from work, for 1994/95 and 1997/98, and the established cycle is for this to be repeated every three years – in 2000/01, 2003/04, 2006/07 and 2009/10. The ill health component has been provided by the SWI Survey in 1995. Estimates for days lost from both injury and illness could be generated from a European module run in summer 1999 and (on the health side) to be re-run in winter 2001/02.

To maximise the value of this information in the context of the targets, we have decided to seek a deferment of the LFS questions from 2003/4 to **2004/5** (the programme mid-point). Initial indications from the Office for National Statistics are that this will be acceptable. The collection of ill health information from SWI Surveys will be **synchronised** with this, subject to LFS steering committee approval.

Despite this, the **reliance on the SWI surveys** mean that the limitations of self-attribution of ill health to work causes, and the potential effects of raised awareness on this, carry through to the days lost measure. In addition, this measure relies on the respondents recalling the number of days off work due to a particular illness, which may introduce further inaccuracies.

**(2) In future it may be possible to develop innovative additional sources to help measure progress, in the context of broader government targets for reducing sickness absence.**

Data on days lost due to injuries and ill health are potentially available from a number of sources, including employers' sickness absence records. However, few of these even attempt to record whether the absence is attributable to work causes. Given the uncertainties involved in estimation and work attribution, and in the broader context of the Government's targets for public health<sup>8 9 10</sup> and reducing sickness absence in the public sector<sup>11</sup>, it is even arguable that the issue of **work-relatedness** might usefully be **disregarded**, with a view to making innovative use of data collected for other purposes so as to benefit the health and safety system, although such an approach would risk confusing the picture when considering the effectiveness of different interventions.

**(3) Days lost will be covered in the autumn progress report only in years for which there are new data from the LFS/SWI – roughly on a three-year cycle.**

Assuming the timing of surveys described under (1) above, the likely pattern for delivering monitoring information over the programme period is as follows:

**Autumn 2000** (*Achieving the Revitalising Health and Safety Targets* factsheet)

1999/2000: Preliminary estimates for injuries and ill health, based on 1997/98 LFS and 1995 SWI Survey.

**Autumn 2002**

2000/01: Injuries estimates from 2000/01 LFS.

2001/02: Ill health estimates from re-run (winter 2001/02) Euro-SWI survey (with better days lost categorisation than in 1999 survey).

**Autumn 2005**

2004/05: Estimates for injuries and ill health from 2004/05 injury elements of the LFS/ ill health elements of SWI Survey.

**Autumn 2010**

2009/10: Estimates for injuries and ill health from 2009/10 LFS/SWI Survey.

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<sup>8</sup> *Saving lives: Our healthier nation*, Department of Health, 1999.

<sup>9</sup> *Towards a healthier Scotland*, The Scottish Office, 1999.

<sup>10</sup> *A strategic framework. Better Health, Better Wales*, The Welsh Office, 1998.

<sup>11</sup> *Working well together: Managing attendance in the public sector*, Cabinet Office, 1998.

## **Annex A: Occupational injury statistics: sources and definitions**

### **Injury reporting requirements of RIDDOR 95**

All fatal injuries and certain non-fatal injuries arising from accidents at work (or in connection with work activities) are required to be reported to the HSE or local authorities under RIDDOR 95. The regulations apply to injuries to employees, the self-employed and members of the public. The term *accident* includes acts of physical violence at work and acts of suicide or trespass on railways or other transport systems.

Non-fatal injuries to employees and the self-employed are reportable as *major injuries* if they are on the list of injuries specified as major under RIDDOR 95. Non-fatal injuries are reportable as *over-3-day injuries* if the injured person is unable to carry out their normal work for four days or more.

Non-fatal injuries to members of the public are reportable if the injured person is taken from the site of the accident to a hospital. However, if the accident occurred at a hospital, only those injuries on the list of major injuries are reportable.

Schedule 2(1) of RIDDOR 95 defines the following as major injuries:

- Any fracture, other than to the fingers, thumbs or toes;
- Any amputation;
- Dislocations of the shoulder, hip, knee or spine;
- Loss of sight (temporary or permanent);
- Chemical or hot metal burns to the eye or any penetrating injury to the eye;
- Any injury resulting from an electric shock or electrical burns leading to unconsciousness or requiring resuscitation or requiring admittance to hospital for more than 24 hours;
- Any other injury: leading to hypothermia, heat induced illness or unconsciousness; or requiring resuscitation; or requiring admittance to hospital for more than 24 hours;
- Unconsciousness caused by asphyxia or exposure to a harmful substance or biological agent;
- Acute illness requiring medical treatment, or loss of consciousness arising from absorption of any substance by inhalation, ingestion or through the skin;
- Acute illness requiring medical treatment where there is a reason to believe that this resulted from exposure to a biological agent or its toxins or infected material.

### **Scope of RIDDOR 95**

The following injuries are not reportable under RIDDOR 95:

- road traffic accidents involving people travelling in the course of their work, which are covered by road traffic legislation;
- accidents reportable under separate merchant shipping, civil aviation and air navigation legislation;
- accidents to members of the armed forces;
- fatal injuries to the self-employed arising out of accidents at premises which the injured person either owns or occupies.

### **RIDDOR 85**

Injury and dangerous occurrence statistics for 1986/87 - 1995/96 were compiled from reports made under RIDDOR 85. Under these regulations, the range of reportable injuries and dangerous occurrences were generally not as extensive. In particular:

Injuries resulting from acts of physical violence at work and acts of suicide or trespass on railways or other transport systems were not reportable;

The list of defined major injuries was not as extensive. In particular, fractures of the hand, foot, collar bone, shoulder blade and ribs, dislocations of the spine, knee, hip and shoulder were not reportable.

Amputations of fingers, thumbs or toes were only reportable if the joint or bone was completely severed;  
Non-fatal injuries to members of the public were reportable only if the injury was on the list of major injuries;

Estimates of the effect the changes in RIDDOR had on the statistics between 1995/96 and 1996/97 were published in *Health and Safety Statistics 1997/98*.

### **Death Certificates**

A death certificate is required by undertakers to bury or commit a deceased person and is required to settle the deceased's estate. A certificate must be signed by a doctor to satisfy themselves as to the natural causes of death. The coroner issues a death certificate in the case of non-natural causes for which the Coroner's Act stipulates that the coroner must enquire into the circumstances of death with a view to establishing the causes of death. The Act also requires that coroners cannot hold an inquest into a death arising out of or connection with work unless they have informed an inspector (of HSE or a LA)

### **Employment data used to calculate injury rates**

Injury rates for employees produced by HSE are based on employment estimates produced by the Office for National Statistics (ONS) in their 'Employees in Employment' series. Such estimates are normally subject to a number of revisions based on information from the Annual Employment Survey. When HSE finalises the provisional injury statistics, rates are revised using the employment data available at that particular time. Injury rates are not revised to incorporate subsequent revisions to employment estimates by the ONS. Such revisions are generally small, but as a result, injury rates calculated using HSE's injury statistics and finalised employment data from the ONS may differ slightly from finalised rates published by HSE.

### **The Labour Force Survey and HSE's questions on accidents**

The Labour Force Survey is a survey of around 60 000 private households throughout Great Britain. Interviewers from the Office for National Statistics ask each household member a range of questions on topics including household characteristics, employment history, and education and training. From 1992 onwards, the survey has been conducted on a quarterly basis in Great Britain. Each quarter's LFS sample of 60 000 households is made up of five 'waves', each of approximately 12 000 private households. Each wave is interviewed in five successive quarters, such that in any one quarter, one wave will be receiving their first interview, one wave their second, and so on, with one wave receiving their fifth and final interview.

A systematic random sample design is used for the survey and it is therefore representative of the whole of Great Britain. Each person in the survey is given a weight or 'grossing factor' related to that person's age, sex, region and residence. All estimates based on the LFS are subject to sampling error.

HSE has placed four questions on workplace injuries on the winter quarters of the LFS since 1993/94, with the latest questions relating to the winter quarter 1999/2000. The questions ask respondents if they had suffered an accident in the twelve months before the LFS interview, which resulted in injury at work or in the course of work. Injury rates are derived as the ratio of the estimated number of employed people who have suffered a workplace injury in the twelve months prior to the interview, to the estimated number of people employed at the time of the LFS interview. This approach to deriving an incidence rate of injury is described in a special feature to the Employment Gazette<sup>12</sup>.

#### *LFS Days absence*

Every three years a further question is asked to establish the actual number of days off work following the workplace injury. The standard annual questions are designed to provide sufficient information to determine reportability (4 or more days off work), but longer periods of absence are grouped together. By collecting the actual number of days off work we can estimate the total number of working days lost through workplace injury in Great Britain. This question was last asked on the winter quarter 1997/98

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<sup>12</sup>Stevens G 'Workplace injury: a view from HSE's trailer to the 1990 Labour Force Survey' Employment Gazette, December 1992, 100(12) 621-638

LFS. The total working days lost figure is based on those injuries which result in at least one full day being taken off work. Corresponding figures for reportable injuries are based on more than 4 days off work. No estimates of days lost are made for the small proportion of people who are still off work following an injury at the time of the LFS interview, or in the rare cases where the person expects never to return to work.

The annual accident questions in the LFS identify if an injured worker has returned to work on the same day, following day, 2nd, 3rd, 4th, or 5th day after their accident. The additional question every third year asks the number of days absence of those injured workers who returned on or after the 5th day. Thus we can deduce, for each injured respondent in the LFS, the number of days absence from no days, one day, or longer. The estimate of the number of days lost is then the aggregate absence from all injured respondents. Further, we can apply a simple ratio of 5/7 to estimate the number of working days lost.

#### *LFS Proxy respondents*

Where a household member is not available for interview, a proxy response from another household member can be taken. On average, about one third of all interviews are proxy interviews. Rates of injury can be lower in interviews with people who act as proxy than in personal interviews. The effect of proxy interviews on LFS rates of injury is relatively small (for example the reportable rate including proxy respondents in health and social work is about 6% lower than the rate excluding proxy responses). In previous years, rates for the construction industry have been adjusted because proxy respondents appeared to have a limited knowledge of workplace accidents. This no longer seems the case, therefore rates for the construction industry have not been adjusted.

#### *LFS sampling errors*

To minimise the effect of sample error on rates of injury, LFS rates from 1993/94 onwards are displayed as three year moving averages. This means combining the first three surveys (1993/94, 1994/95 and 1995/96) to give estimated rates of injury centred on 1994/95. Then, for each subsequent year, the first survey is dropped from the three year average and the most recent survey added (e.g. 1997/98, 1998/99 and 1999/2000 combined to produce an estimate centred on 1998/99). Rates of injury for individual industries produced as three year moving averages have coefficients of variation of between 3% and 18%. The coefficients of variation for rates of injury from each individual year's survey are between 6% and 35%.

#### **Structural factors**

Structural changes in employment, from high risk agriculture and industrial production to the service sector, will provide some improvement to the indicators. And modernisation of machinery and equipment potentially leads to a safer working environment. The effects of such factors are difficult to quantify but some knowledge of their effects, or direction at least, is necessary to assess progress made by HSE and employers towards the targets.

There are relatively simple methods for estimating the effect on the whole economy injury rate of a change in the sectoral composition during the programme period. We can assume that sector rates remain level during the period and then we can apply those rates to the employment structure at the end year. This would give us an estimate of the change in the injury rate at the whole economy level which is due simply to a change in sectoral composition. There are at least two ways of estimating a change in sectoral composition of employment.

- Prospective estimation through a forecast.
- Retrospectively at the programme end through applying end -year employment composition to the base year rates of injury.

**Annex B: Annual incidence of work-related ill health: preliminary base year estimates for different diseases from existing sources** **Great Britain**

For each disease, the proposed leading source for measuring change - from among the existing sources - is highlighted [see Note 1].

Sources: [see Note 2]	SWI (1995)	ODIN (1999)	IIS (1999)	RIDDOR (1999/00)	DCs (1998)
<b>Stress</b>					
Anxiety/depression and other stress conditions	92,000	5,451			
Post-traumatic stress disorder		420			
<b>Musculoskeletal</b>					
Upper limb disorders	91,000	4,376	415		
Back disorders	70,000	2,715			
Lower limb disorders	19,000	614			
Hand-arm vibration / Carpal tunnel syndrome [see Note 4]		751	778 [see Note 5]	1,052	
<b>Skin</b>					
Contact dermatitis	12,000	3,934	220		
Other short latency skin disease		536			
Skin cancers [Note 4]		327			
<b>Respiratory</b>					
Asthma	10,000	1,118	196		
Other short latency respiratory disease		435			
Mesothelioma [Note 4]		1,018	620		1,527
Asbestosis /other pneumoconioses [Note 4]		319	868		331
Benign pleural disease [Note 4]		1,217	242		
Chronic bronchitis/emphysema [Note 4]		129	1,451		
<b>Hearing loss</b>					
Noise-induced deafness [Note 4]		714	316		
<b>Infections</b>					
Infectious diseases		823 [see Note 6]			

**Notes:**

- (1) Leading sources have not been indicated for the musculoskeletal and stress categories. It is probable that ODIN will provide the soundest indicator of change, but the ODIN data in these areas is more recently established than for respiratory and skin conditions, and since musculoskeletal and stress are both large categories, the ODIN advantage in sampling error over SWI is less marked. We will produce a specific assessment of this issue before the publication of this year's Health and Safety Statistics.
- (2) The main existing sources are referred to by their acronyms, as follows:

- **SWI:** Self-reported Work-related Illness surveys
- **ODIN:** Occupational Disease Intelligence Network, comprising:
  - **OPRA:** Occupational Physicians Reporting Activity, plus six schemes involving specialist physicians:
  - **SOSMI:** Surveillance of Occupational Stress and Mental Illness.
  - **MOSS:** Musculoskeletal Occupational Surveillance Scheme.
  - **EPIDERM:** Occupational skin disease surveillance by dermatologists.
  - **SWORD:** Surveillance of Work-related and Occupational Respiratory Disease.
  - **OSSA:** Occupational Surveillance Scheme for Audiologists.
  - **SIDAW:** Surveillance of Infectious Disease At Work.

For most diseases, data are available both from OPRA and from one or more of the specialist schemes. These have been added together to give the figures in the table but will need to be analysed and interpreted *separately*, because occupational and specialist physicians are likely to diagnose conditions in different ways and the coverage of the workforce achieved by the former is partial and may change over time.

- **IIS:** Industrial Injuries Scheme (run by the Department of Social Security).
  - **RIDDOR:** Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (run by the Health and Safety Executive)
  - **DCs:** Death Certificates for certain occupational lung diseases.
- (3) The following diseases are explicitly excluded:
- Physical conditions ascribed to stress, such as heart disease (to avoid double-counting and because the incidence date of the stress is not known).
  - Alcohol or drug abuse, psychotic episodes and mental illness other than stress (because they cannot be ascribed clearly to work).
  - Asbestos-related lung cancer (because, while it is estimated that there are at least as many cases as there are of mesothelioma, there is no basis for updating this estimate: the change in incidence of asbestos-related lung cancers is most accurately reflected in the figures for mesothelioma).
  - Other cancers and reproductive effects due to chemicals (because of lack of a credible data source to describe trends).
  - Other cancers and reproductive effects due to ionising radiation (because of the small numbers of cases predicted by internationally agreed models).
  - Cancers and other diseases due to non ionising-radiation (because for skin cancer due to UV radiation it is difficult to separate the effects on occupational and non-occupational exposures to sunlight, while the effects - if any - in producing other diseases are uncertain and difficult to quantify in the present state of scientific knowledge).
- (4) These seven diseases have relatively long latency periods between exposure and health outcome, and it is proposed that they should be separately identified (but not excluded) when measuring progress against the targets.
- (5) Includes vibration white finger. Excludes HAVS/CTS cases in coal miners, which are influenced by many factors other than the number of cases actually incident in the year concerned and so will distort the measurement of trends.
- (6) Excludes infections reported to OPRA other than skin and lung diseases. SIDAW figures were affected by changes to the reporting arrangements during 1999, so 2000 data (when available) should be used for the base year.
- (7) Several of the estimates are affected by double-counting: in most of the sources, individuals with more than one diagnosis will be counted more than once.

## **Annex C: Occupational ill health statistics: developing existing and new sources for monitoring into the future**

The available data sources on occupational ill health, while adequate to establish the general scale and distribution of work-related illness, have significant weaknesses as an instrument to monitor the RHS/SH2 targets. It is by no means clear that alternative feasible systems will solve this problem, which is a combination of statistical (sampling accuracy) and logical (definition and attribution) difficulties. However we see a need to review options for *new* data sources (including self-reporting, GP-based reporting, attributable fraction estimation, exposure/hazard surveys and measures of awareness, attitudes and behaviours) and to develop the *existing* sources.

The first two sections of this Annex outline our view of the main options under each of these headings. This is followed by an outline programme of statistical activities related to monitoring the ill health targets. In the first half of the strategy period - up to 2004 - monitoring is based on existing sources using the approach outlined in this note. By 2004, assuming the review does identify feasible options for improved data, new systems will be in place to supplement or replace existing ones.

### **(i) Main options for new sources**

#### *1. Workplace-based SWI.*

Switching from a household sample to a workplace sample for collecting self-reported data would present a number of advantages. These would mainly be a consequence of having the opportunity to collect good data at the workplace level as well as at the individual worker level. For example, much better information about sector of activity, workplace size, exposures and the presence (or absence) of health and safety management systems would be generated. There would be some disadvantages too, notably poorer coverage of certain parts of the economy (e.g. the informal sector). There are existing surveys which have successfully used such a workplace-based approach, incorporating responses from both employers and employees, notably the Workplace Employee Relations Survey (WERS). If this approach were adopted, it would make sense to combine illness and injury questions in the same survey. A further possibility would be to explore the usefulness of data available from the insurance industry; experience suggests that this approach might run into practical difficulties, but it could have the advantage of giving data closely related to industry sectors.

#### *2. GP-based reporting.*

Many cases of work-related health ill health will not present to specialist or occupational physicians but will be seen by General Practitioners (GPs). This represents a gap in the existing surveillance arrangements, and feasibility studies of different ways of filling it (perhaps on a regional basis) have already been commissioned.

#### *3. Attributable fraction estimation.*

This approach was advocated by some participants at the December workshop. It would be modelled on the surveys (funded by HSE) recently undertaken by the MRC environmental epidemiology unit on the proportion of cases of finger blanching, back pain and hearing loss that are attributable to vibration (hand and whole body) and noise. This kind of survey has the advantage that the problem of attributing individual cases to occupational factors is avoided. By establishing the symptom rate in representative samples of exposed and unexposed individuals, the excess (if any) of cases among those exposed can be estimated and the "attributable" number of cases estimated. A large sample size would be needed to produce reliable estimates of change. Because of practical limits on questionnaire length, only a limited number of endpoints and suspect exposures can be treated in a single survey, so there would need to be a range of such surveys. For the results to carry conviction, there

must be a clear causal link between the outcome and the assessed risk factors, and ideally a means of validating both symptom and exposure reports.

#### 4. *Exposure/hazard surveys.*

Certain hazards lend themselves to some sort of biological monitoring (e.g. of blood-lead levels, or radiation doses), but for many the only obvious means of data collection is by self-reported surveys. These have been adopted by a number of EU member states, and the Dublin based European Foundation for the Improvement of Living and Working Conditions has organised EU-wide surveys of this kind, though with quite small samples in each country. HSE has done one survey of this kind in parallel with SWI 95, the Self-reported Working Conditions (SWC) 1995 survey. For those hazards which can reasonably be self-reported, these surveys give an efficient way of assessing population exposure. The Dutch government, who have also recently set Health and Safety policy targets, have set their targets in terms of self-reported hazard levels, rather than health outcomes.

#### 5. *Trends in awareness, attitudes and behaviours.*

Along with hazard/exposure measurement, the levels of awareness, attitudes and behaviours (including conformance with regulations or more generally with good practice) could be used as an indicator of the impact of actions taken under the strategies. Statisticians and others in HSE plan a number of initiatives in this area, for example through a module of health and safety questions on the British Social Attitudes Survey in 2001.

### **(ii) Potential development of existing sources**

As well as reviewing the potential for new sources, we need to look at ways of strengthening existing sources. These are listed below, with a suggested priority rating from 1 to 3.

#### **SWI:** *Self-reported Work-related Illness Surveys*

- research to assess the effect of changing awareness on self-reported work-related illness **[1]**
- qualitative research to understand what respondents mean when they report an illness as work-related **[3]**
- research to validate self-reports against detailed occupational health review of reported cases **[3]**

#### **ODIN:** *Occupational Disease Intelligence Network*

- producing estimates of sampling variation and confidence intervals for levels and changes **[1]**
- developing a model to extract trend information, allowing for non-participation and non-response, and identifying necessary improvements **[1]**

#### **IIS:** *Industrial Injuries Scheme*

- research into the factors underlying claimant behaviour, to give a better understanding the degree and nature of under-counting (i.e. under-claiming) **[3]**
- assessment of the effects of any discontinuities due to administrative changes **[2]**

#### **RIDDOR:** *Reportable Diseases*

- research to assess the effect of changing awareness and compliance on the reporting of occupational illness by employers **[1]**
- consideration of the role of RIDDOR in any employer-based information strategy introduced under *Securing Health Together* **[2]**.

### **(iii) Programme of statistical activities relating to RHS/SH2 occupational ill health targets**

Assuming that the priority 1 work on existing sources is taken forward, the following programme of statistical activities would take place.

#### **2001/02**

*Throughout the year:* work up (or commission) specifications, costings and business cases for the options outlined above. This process also needs to link with the planned review of the RIDDOR reporting requirements and the development of guidance for companies reporting their health and safety performance in annual reports. By early in 2002 the basis for a firm decision on options to take forward into detailed design and piloting should be available.

*April:* Commission confidence limits and trends research for ODIN data for delivery by end 2001.

*May-July:* Review proposals for research on awareness issues.

*December 2001 to February 2002:* Revised Euro-SWI questions, incorporating incidence question and improved days lost categorisation, run in this LFS quarter.

#### **2002/03**

*Throughout the year:* detailed design and piloting of chosen options.

*November:* Put proposals to LFS steering committee for combined injury/illness questions in LFS for winter quarter 2004/05, to give an estimate for the midpoint.

#### **2003/04**

Throughout the year: new systems start to go live. They should be fully in place before the start of the "midpoint" year 2004/05.

#### **2004/05**

*December 2004 to February 2005:* Joint illness/injury questions in LFS winter quarter. (Subject to LFS steering committee approval.)

New sources now in place.

#### **2005/06**

Outputs from new sources will start to come on stream.

## **Annex D: Integrating data from different sources: examples from other areas of statistics**

### **(i) Unemployment statistics**

The claimant counts of unemployment are reconciled with estimates on the internationally agreed definition from the Labour Force Survey by making conceptual adjustments, e.g. to allow for non-claimants and for claimants who are not seeking or available for work<sup>13</sup>.

### **(ii) National Accounts**

The estimates of gross domestic product are built up from a variety of data sources, including administrative (e.g. taxation) systems and statistical surveys (e.g. of businesses), each of which is subject to errors and biases. To make the accounts balance, there are well-established procedures for making both conceptual adjustments (to convert to a consistent basis) and quality adjustments (to allow for known biases in the sources, and using information on their sampling errors)<sup>14</sup>.

### **(iii) Labour Accounting Systems**

Attempts have been made to apply a similar framework to labour market statistics. In the Netherlands and some other European countries, integrated estimates of employment, unemployment etc. are produced by combining data from different sources, again making conceptual and quality adjustments.<sup>15</sup>

### **(iv) Estimates of employee jobs**

Estimates are produced for each industry using data from a representative 'panel' of workplaces, or in some cases (e.g. government departments) returns from a central point. These data for different industries are aggregated to give global figures for the whole economy.<sup>16</sup>

### **(v) Mid-year population estimates**

Figures for the UK and local areas are 'benchmarked' on the decennial Census of Population, using more frequent smaller enquiries to give an indicator of change since then, and are revised when the results of the new Census become available (for the 2001 Census new techniques are being used to minimise the number of revisions).<sup>17</sup>

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<sup>13</sup> *How exactly is unemployment measured*, Office for National Statistics (ONS).

<sup>14</sup> Penneck S and Mahajan S, *Annual Coherence Adjustments in the National Accounts*, ONS.

<sup>15</sup> *Labour Accounts Principles and Practice: the Dutch Experience*, Statistics Netherlands.

<sup>16</sup> *How exactly is employment measured*, ONS.

<sup>17</sup> *2001 Census: A Guide to the One Number Census*, ONS.