



# Industry's Perception and Use of Occupational Exposure Limits<sup>1</sup>

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Market research was carried out to determine industry's perception of occupational exposure limits (OELs) and the extent to which they influence the selection of measures to control exposure. Telephone interviews were carried out with 1000 randomly selected users of chemicals, 400 from establishments with some use of chemicals and 600 from establishments with chemicals in daily use. 150 interviews were also carried out with Trade Union Health and Safety Representatives. The interviews covered basic information on chemicals used, sources of information, risk reduction measures used and understanding of COSHH and OELs.

Most respondents came from firms with 10 employees or less (75%, all user group; 57%, heavy user group), closely reflecting the profile of British industry. In contrast, most (77%) Trade Union Health and Safety Representatives came from firms with at least 100 employees. Respondents in the all user group were drawn from across the whole range of industrial activity, whereas the heavy users were concentrated in manufacturing.

The results showed that in making decisions on what control measures to use most users rely heavily on information from suppliers and personal experience and rather less on information from sources such as Trade Associations and HSE. Most respondents reported that steps were taken to protect employees. The use of personal protective equipment featured highly, followed by process controls. Little consideration was given to the possibility of substitution. Awareness of COSHH was limited with 65% of the all user group and 53% of the heavy user group being unaware of any legal requirements for establishments which manufacture or work with chemicals. Awareness of OELs was similarly limited with 19% of the all user group and 32% of the heavy user group having any real understanding. The results from Trade Union Representatives showed that overall they are somewhat better informed than chemical users in the small firms surveyed.

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## INTRODUCTION

Occupational exposure limits are well established in many industrialised countries as the cornerstone of occupational hygiene. In the United Kingdom compliance with occupational exposure limits (OELs), for airborne substances, is required by the Control of Substances Hazardous to Health Regulations 1994 (COSHH), established under the Health and Safety at Work Act 1974. Under the Regulations, OELs are used to define adequacy of control by inhalation (HSE, 1997). There are two types, the occupational exposure standard (OES) and the maximum exposure

limit (MEL). Table 1 summarises employers' duties in relation to each type.

The Health and Safety Commission (HSC) established its own list of occupational exposure limits in 1984. Since then there has been a rolling programme of regularly reviewing existing limits and establishing new ones, with around 10-20 limits being introduced or revised each year. The list of OELs is published in *EH40 Occupational Exposure Limits* (HSE, 1998), which is updated annually.

Despite this considerable resource commitment to establishing OELs, there is a paucity of hard data on how industry perceive and use them. Recommendations for OELs are made by the Health and Safety Commission's Advisory Committee on Toxic Substances. The major chemical producers, users and trade unions are represented on this advisory committee through the Confederation of British Industry, the Chemicals Industry Association and the Trade

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Table 1. A summary of the differences between the occupational exposure standard (OES) and maximum exposure limit (MEL)

Occupational exposure standard (OES)	Maximum exposure limit (MEL)
Set at level of negligible risk	Residual risk may remain—socio-economic factors taken into account in setting the limit
Employers must meet the standard, but are not required to further reduce exposure	Employers must meet the limit <b>and</b> exposure must be reduced below the limit so far as is reasonably practicable
If the standard is exceeded employers must take steps to recover control and meet it as soon as is reasonably practicable	The limit must not be exceeded. (If the limit is exceeded it may indicate control is not adequate, which is an offence under the COSHH Regulations)
Can be set for 8 hour time weighted average or a 15 minute averaging period	

Union Congress and, therefore, are clearly aware of and apply OELs. Similarly, occupational hygienists are aware from links with professional bodies, such as the British Occupational Hygiene Society and the British Institute of Occupational Hygienists. However, there are many thousands of small companies regularly using chemicals who do not have ready access to these networks. We wanted to know the extent to which these companies were aware of OELs and the extent to which OELs influenced control of exposure in these establishments.

To address this question we commissioned a market research firm, Research International, to carry out a survey with the following specific objectives:

- to measure perceptions and understanding of the COSHH regulations, and assess how effectively HSE has communicated risk assessment;
- to measure perceptions and understanding of OELs, and hence assess how effectively HSE has communicated application procedures; and
- to assess the extent to which OELs are useful to and influence industry in controlling exposure to hazardous airborne substances.

The survey explored these questions with a representative sample of users of chemicals, using market research techniques. An additional smaller survey assessed views of Trade Union Health and Safety Representatives. We were interested in teasing out real understanding. Therefore, the survey started by exploring broad issues of how firms get information on risks from chemicals and control measures to use, then progressed to assessing awareness of COSHH regulations, moved on to OELs and finally addressed awareness of the two types of limit and the two reference periods. Throughout, care was taken to avoid asking leading questions. The survey focused on the perception of OELs, we were not investigating the adequacy of any control measures that respondents had in place to protect themselves and employees from exposure to chemicals.

The survey was not an epidemiological study and was not designed to determine statistical differences

between different groups of respondents, for example firms in different industry sectors.

This paper describes the survey methodology and presents the main findings. A detailed report has been published (Research International, 1997).

## METHODS

### *Study design*

The study was carried out using telephone interviewing. This approach was chosen because although the response rate would inevitably be lower than face to face interviewing, it would be possible to achieve many more interviews for the same budget. Use of a postal questionnaire was not considered as these typically have a very low response rate.

The survey consisted of a 1000 computer assisted telephone interviews with managers responsible for Health and Safety at their establishment. A further 150 interviews were carried out with establishment based Trade Union Health and Safety representatives. Different establishments were used for the two parts of the study.

### *Study population*

*Chemical users.* Industry sectors for inclusion in the survey were selected from the BT Business Database. Four individuals (2 occupational hygienists and 2 factory inspectors) with experience in a wide range of industrial operations, individually identified occupations which would not be included in the survey because they did not involve exposure to chemicals (eg. baby-sitters, musicians), those which would involve some exposure, and those in which chemicals would be used at least once a day. Their individual responses were combined to generate a list of occupations which would involve some exposure to chemicals, referred to as the all user group, and those which involved daily use, referred to as the heavy user group.

From the occupations selected a contact base of 6200 names was randomly generated from the BT Business Database to provide a nationally representative sample of chemical users. 400 interviews

were carried out from occupations in the all user group and 600 from the occupations in the heavy user group.

*Trade Union Health and Safety Representatives.* 150 interviews were conducted with Trade Union Health and Safety Representatives from a sample of 495 generated from leads provided by Trade Union officials. The BT Business Database was used to provide an initial sample of Trade Unions in sectors likely to use chemicals.

#### *Questionnaire development*

A three stage process was used to develop a questionnaire. In the first stage the contractor's project team had a detailed briefing from, and discussion with, HSE staff. This was followed by 4 in-depth interviews with senior Trade Union officials and a further 4 with Trade Associations to obtain a broad perspective of the current industry awareness. From this information the project team drew up a semi-structured questionnaire. In the second stage this questionnaire was used in 10 in-depth interviews with heavy chemical users from a range of key industry sectors. The purpose was to refine the semi-structured questionnaire and to inform the development of a fully structured questionnaire. In the final stage the fully developed questionnaire was piloted among 30 randomly selected individuals responsible for health and safety in establishments in the heavy user group. Following the pilot the questionnaire was further refined before use in the main survey.

#### *Questionnaire structure*

Table 2 gives the 7 areas covered by the questionnaire. This structure enabled the survey to explore with respondents sources of information, risk reduction methods in use and use of monitoring, before coming specifically to COSHH and understanding of OELs. It also meant that the interview could be terminated once the limit of a respondent's knowledge had been reached.

To ensure leading questions were not asked the interviewer asked respondents open questions, such as 'What legal requirements are there for establishments which manufacture or work with harmful airborne substances.' The interviewer allocated responses to one of a number of options determined during the development of the questionnaire. Respondents were encouraged to give more than one response. For some of the questions, having obtained these spontaneous

responses, the interviewer read out the list of options as a prompt. In the results presented in this paper all responses are spontaneous, unless otherwise stated.

## RESULTS—CHEMICAL USERS

#### *Respondents—response rate*

Overall a response rate of 16% was achieved (1000 interviews from a contact base of 6200 chemical users). To ascertain the extent of any bias in the findings, consequent of the low response rate, the achieved sample was compared to the original contact sample, refusals and ineligible in relation to size of firm and industry sector. For the all user group the profile of the achieved sample and original sample were extremely similar, with differences being no more than might be expected from normal sampling error. With the heavy users the profile of original contact, achieved and refusal samples were very similar, except for firms employing less than 10 people, which appeared to be under represented in the achieved sample. However, further examination of the data showed that the original contact sample had a disproportionately high level of ineligible among these small companies, ie. the firms did not meet the criteria of using chemicals at least once a day. Re-calculation of the number of these small firms which should have appeared in the achieved sample, taking account of the number of ineligible in the original contact, showed they were not in fact under-represented.

#### *Respondents—size of firm, industry sector and chemicals used*

Figure 1 gives the profile of the respondents in relation to numbers of employees. It is noticeable that in both the all user and heavy user group most respondents (75% and 57%, respectively) were from firms with 10 or less employees. This distribution of size of firm very closely reflects the information derived from the Annual Employment Survey run by the Office of National Statistics, which showed that across all industries 74% of firms had 10 or less employees and in manufacturing, which corresponds to the heavy user group 55% had 10 or less.

A third of establishments in the all user group also have subcontract staff working on site at times. This practice is more common among larger companies and in certain sectors, eg. construction, health and education services. 82% of the respondents came from firms which operate from a single site, again reflecting the profile of British industry.

Figure 2 gives the profile of respondents by industry type. For the all users group respondents were drawn from across the whole range of industrial activity, whereas heavy users were concentrated in manufacturing.

Respondents were asked to name the types of hazardous substances manufactured, used or worked with at their establishment. Figure 3 summaries the substances most frequently mentioned from a list read

Table 2. Topics covered in the questionnaire

- 
- Basic information on size of firm and hazardous substances used
  - Sources of information used to establish risks to health
  - Risk reduction measures
  - Use of monitoring
  - Understanding of COSHH
  - Understanding and application of OELs
  - Sources of information on OELs
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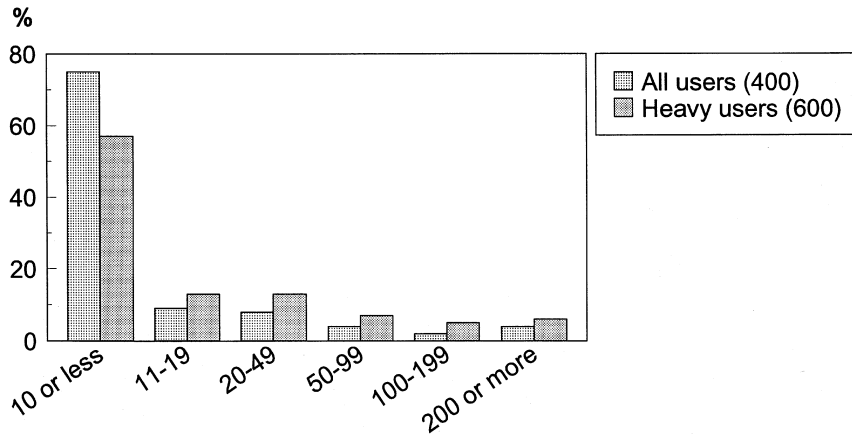


Fig. 1. Distribution of respondents by number of employees at their establishment.

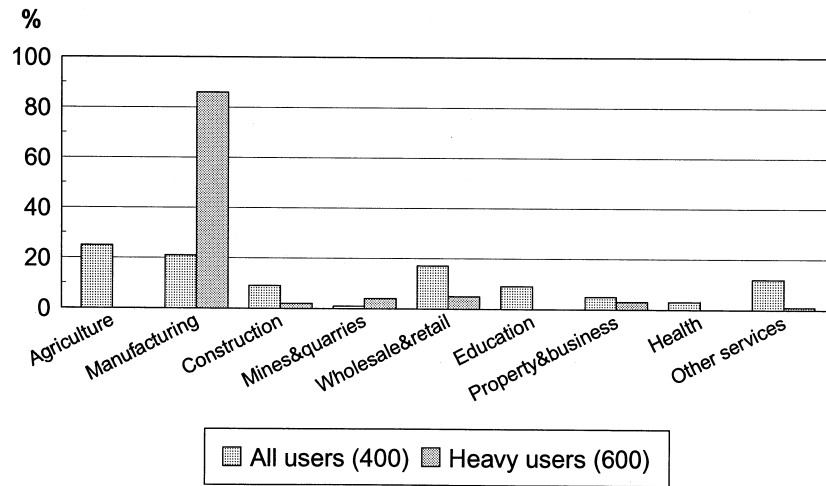


Fig. 2. Distribution of respondents by industry sector.

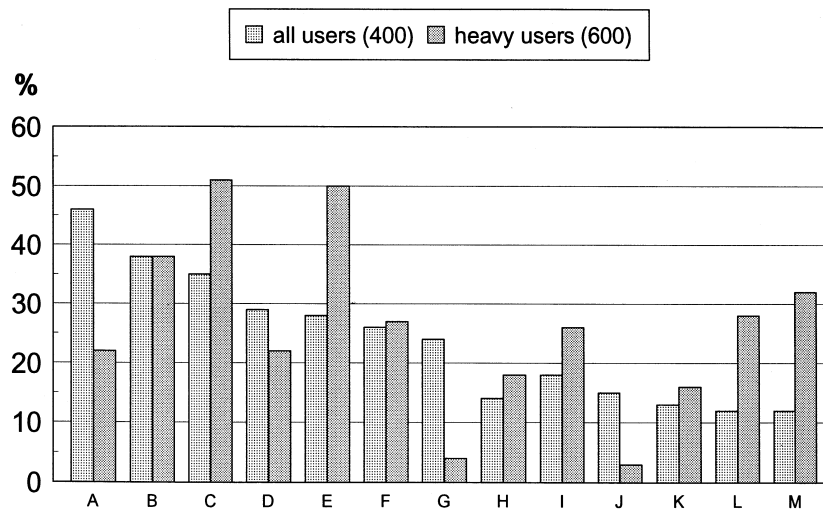


Fig. 3. Hazardous substances that respondents stated were manufactured, used or worked with in their establishment. Each respondent gave as many groups of substances as they wished from a list read out to them. A = disinfectants and preservatives; B = paints; C = glues and adhesives; D = gases; E = solvents; F = acids; G = pesticides; H = dyes and pigments; I = alkalis; J = pharmaceuticals; K = hardeners; L = process chemicals; M = inks.

out to them. It shows that many substances are being used across the board in all industry sectors although a few are mainly specific to one sector, for example, pesticides in agriculture. The figure also shows that the heavy users have a higher usage of glues & adhesives, solvents, process chemicals and inks than the all user group, reflecting the preponderance of manufacturing in that group. However, the number of chemicals mentioned by the user group and heavy user group were very similar, averaging 4.7 and 5.2 substances, respectively.

#### Sources of information used

To find out how information on risks from chemicals was obtained respondents were asked about the sources of information used to establish whether an airborne substance might be harmful. Figure 4 shows that most users rely heavily on information from suppliers and personal experience and rather less on information from sources such as Trade Associations and HSE. This trend was most marked in establishments with less than 10 employees, with 35% mentioning product labels and packaging compared to 17% in establishments with > 50 employees. Respondents were then asked to state what they are trying to find out when they refer to the information sources they use. Most replied they are seeking information about the levels of toxicity and mode of damage to health. Less than a third said they were trying to establish what action to take.

#### Risk assessment

Respondents were asked what factors are taken into account when judging the extent of risk to health faced by people working at the establishment. The responses showed that in both the all user and heavy user groups the assessment of risks is a series of common sense judgements based on information about the type of substance, its health effects and how it is being used in the workplace. Concentrations of the substance in

the workplace air and occupational exposure limits were scarcely mentioned.

#### Risk prevention

Next respondents were asked what steps are taken to protect staff, when it is possible that they could breathe in the type(s) of substance deemed to present the greatest risk. Figure 5 shows that the use of personal protective equipment (PPE) features very highly, followed by the use of process controls (ventilation systems, enclosed systems or modification of the process). Clearly very little thought is given to eliminating the harmful substance from the process or using it in a safer form. This pattern was the same for both the all user and heavy user group and all sizes of establishment. About two-thirds of both the all user and heavy user groups rely on common sense judgements when deciding what measures to take to protect staff. Those respondents which turn to information sources for help use sources very similar to those used to establish whether an airborne substance might be harmful, Fig. 4.

Only a tenth of establishments with 10 or less employees in both the all user and heavy user groups monitor airborne concentrations of hazardous substances. In establishments with 50 or more employees this increases to 43% in the all user group and 69% in the heavy user group. Among those who monitor most do so because they consider it to be a legislative requirement.

#### Awareness of COSHH

Respondents were asked what they understood to be the main principles of the Control of Substances Hazardous to Health Regulations. 35% of the all user group and 26% of the heavy user group replied they had never heard of COSHH or they did not know what the main principles were; the remainder made a variety of sensible responses. However in many cases this must have been based on a guess from the title,

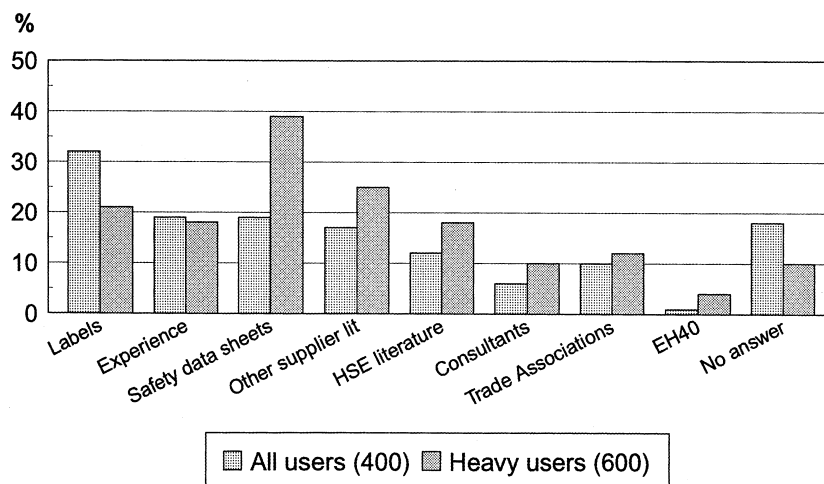


Fig. 4. Sources of information respondents used to establish whether an airborne substance might be harmful. (SDS = safety data sheet; EH40 = HSE publication: *Occupational Exposure Limits EH 40/97*).

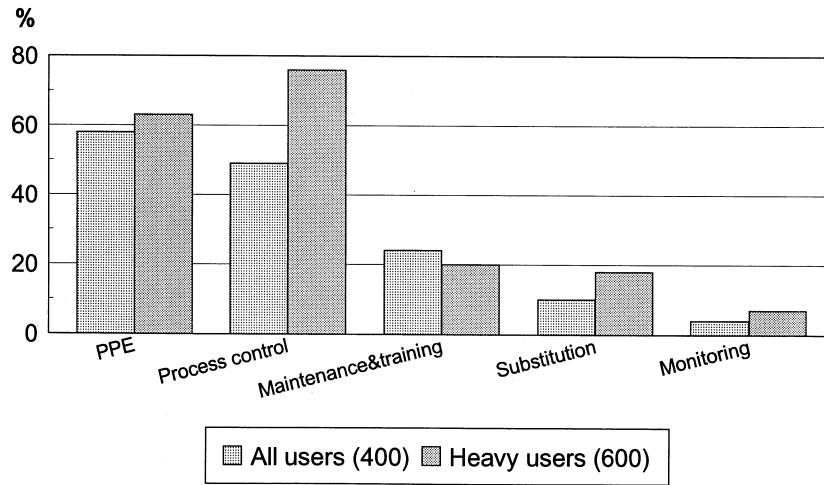


Fig. 5. Steps that respondents said they took to protect staff when it is possible they could breathe in the substance(s) they deemed to present the greatest risk. (PPE = personal protective equipment; process control = use of ventilation or enclosed systems; process modification; substitution = removal of substance from the process or use in a safer form).

since when respondents were asked what legal requirements exist for establishments which manufacture or work with chemicals, two thirds of the all user group and about half of the heavy user group said they did not know of any such legal requirements (Fig. 6). As expected, awareness was greater in establishments with 50 or more employees, with 31% mentioning COSHH, compared to only 8% in the establishments with 10 or less employees.

*Awareness of OELs*

Respondents were asked if they understood the term ‘occupational exposure limit’ or ‘OEL’. 45% of the all user group and 53% of the heavy user group claimed they did. Those not aware had a definition read to them, a further 18% of the all user group and 12% of the heavy user group then claimed to be aware of OELs.

To check the extent to which respondents actually understood the concept of OELs, all who claimed to be aware of them were read ten statements and asked to allocate a score between 1 and 10 depending on how strongly they associated each statement with OELs (1 = not associated). Two dummy statements were included. Table 3, columns 1 and 2, shows the results as mean scores out of ten allocated to each statement. It demonstrates that neither the all user group nor the heavy user group could identify the two dummy statements, indicating that real knowledge of OELs is very limited.

The respondents claiming to be aware of OELs were then asked what the legislation relating to OELs required their company to do. 49% in the all user group and 40% in the heavy user group were totally unable to answer this question, either giving no answer at all or saying they did not know. From the rest a variety of responses emerges, with 21% of the all user

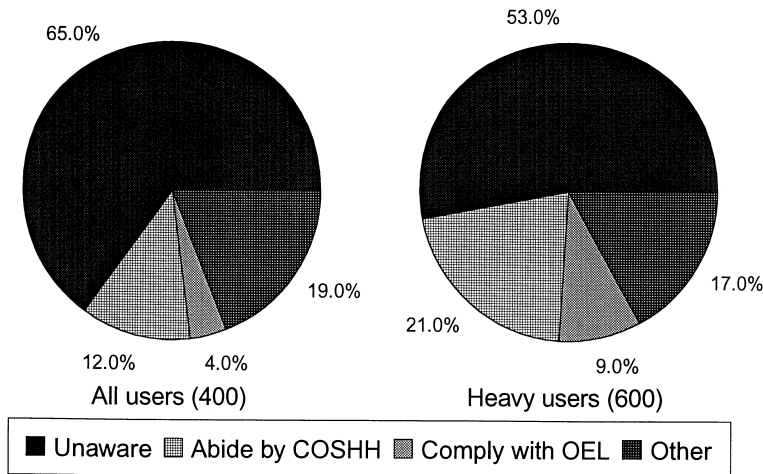


Fig. 6. Respondents’ awareness of the legal requirements that exist for establishments which manufacture or work with chemicals.

Table 3. Understanding of OELs

Question	All users	Mean Score	
		Heavy users	Trade Union Reps
As a limit above which exposure levels should not rise	8.4	8.2	8.6
To identify a substance as harmful	7.8	7.7	8
To decide whether or not current control measures are adequate	7.6	7.7	7.2
To identify a level at which there may be potential casualties*	7.6	7.5	6.8
As a limit under which staff are safe	7.5	7.7	7.4
As a guide for monitoring exposure	7.4	7.6	7.6
As a legal limit	7.3	7.1	7.7
As a measure of how toxic the substance is	7.3	7.1	7.3
To decide whether or not monitoring of exposure levels is needed	7.1	7	7.4
To decide the maximum number of people who can use the substance at any one time*	6.4	5.1	5.2

\*Dummy statement.

group and 40% of the heavy user group mentioning the need to keep below the OEL.

*Awareness of different types of OEL and different reference periods*

90% of the all user group were unaware of the two reference periods, of the 10% claiming to be aware only half (13 respondents) could name either. The heavy user group was better informed, 29% of those who were aware of OELs were aware of the two reference periods with 21% mentioning the 8 hour TWA and 15% the 15 minute reference period.

Awareness of the two types of limit was also very low. In the all user group only 5 respondents could explain the different duties associated with the OELs and MELs. Again understanding among the heavy users was higher with 20% of those aware of OELs knowing the different types, 9% were able to name the MEL and 8% the OEL. Most of those who knew of the two types could state the difference between them.

Respondents claiming to be aware of OELs were also asked how they would assess whether an OEL was being met. Figure 7 shows nearly half (47%) of

the all user group and a third of the heavy users (33%) did not know. Only 12% of the all user group mentioned monitoring (either regular or ad-hoc). Respondents from establishments with >50 employees from the heavy user group were much clearer with 74% mentioning the use of monitoring to assess compliance with an OEL.

*Awareness and usage of HSE literature*

Respondents claiming to be aware of OELs were asked how they find out what the OEL for a particular substance is, and also to state their main sources of information on OELs. Figure 8 shows that most respondents in both the all user and heavy user group rely on information from suppliers either from the safety data sheet or other supplier literature rather than information from HSE or other independent sources.

**RESULTS—TRADE UNION REPRESENTATIVES**

*Industry sector and size of firm*

The 150 Trade Union Health and Safety Representatives surveyed were mainly based at large

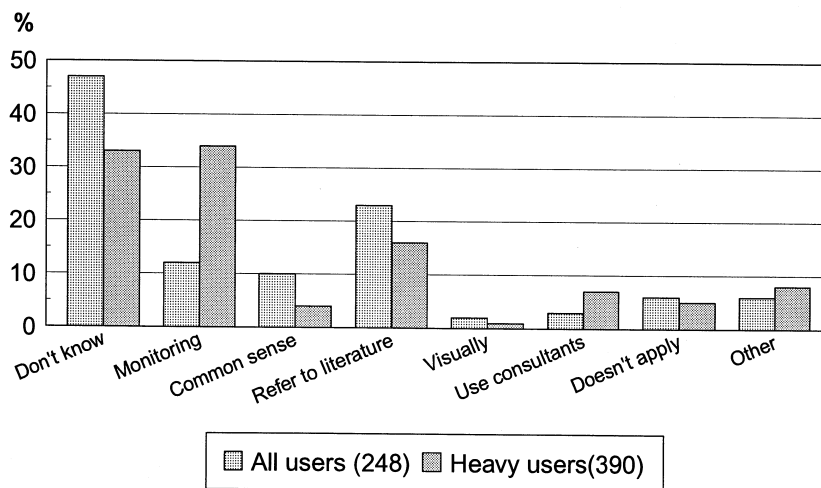


Fig. 7. Respondent awareness of how to assess whether an OEL was being complied with. (base: all those claiming to be aware of OELs; all users 248/400; heavy users 390/600).

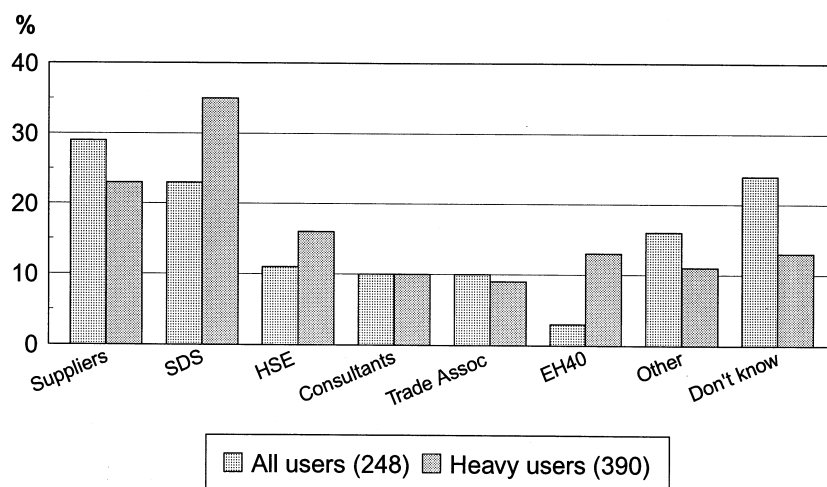


Fig. 8. Sources of information respondents use to find out OELs for individual substances (base: all those claiming to be aware of OELs; all users 248/400; heavy users 390/600).

establishments. Figure 9 shows that 77% came from establishments with at least 100 employees and only 2% from establishments with 10 or fewer employees. This is in contrast with the respondents from the main survey, Fig. 1. The industry profile from which the Trade Union respondents were drawn was similar to that of the heavy user group, with 61% employed in the manufacturing sector (82%, heavy user group, Fig. 2). However 21% came from the public administration and transport, storage and communications sectors which were not represented in the user survey. The remainder were distributed among the other sectors given in Fig. 2. The types of chemicals used were similar to the heavy user group (Fig. 3), but the average number of chemicals in use was much higher, at an average of 11.2, compared to 5.2 for the heavy user group.

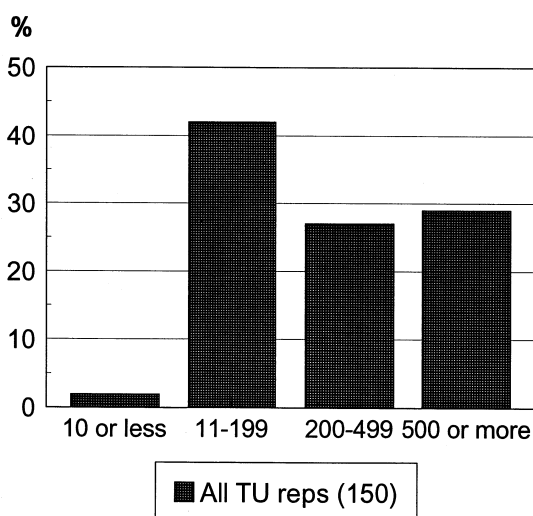


Fig. 9. Distribution of Trade Union respondents by number of employees at their establishment.

#### Awareness of COSHH

When asked what they understood to be the main principle of COSHH the Trade Union Representatives showed a greater awareness than either of the user groups with only 11% saying they had never heard of COSHH or did not know, compared to 26% in the heavy user group and 35% in the all user group. When asked what legal requirements there are for establishments which manufacture or work with hazardous substances, 28% mentioned compliance with COSHH and a further 18% the need to maintain exposure levels below the relevant OEL. This compares with 21% and 9% respectively in the heavy user group, Fig. 6.

#### Awareness of OELs

The proportion of the Trade Union respondents claiming to be aware of OELs was high, with 69% stating they understood what is meant by the term 'occupational exposure limit' or 'OEL' and a further 9% claiming awareness after a definition was read to them. Thus only 21% were unaware compared to 35% of the user group. Real understanding was also better than the user groups (Table 3, column 3) in that higher mean scores were obtained in nearly all of the correctly associated statements and lower scores in the dummy ones; nevertheless as a group they could not clearly differentiate between statements relating to OELs and dummy statements.

34% of the Trade Union Representatives aware of OELs understood that legislation relating to OELs required their establishment to maintain exposure below the OEL, but 38% were unable to state what the legislation requires.

#### Awareness of different types of OEL and different reference periods

Of those claiming to be aware of OELs 26% of the Trade Union respondents said they knew of the two



different reference periods, with 11% naming the 8 hour TWA and 7% the 15 minute reference period, 15% claimed to be aware of the two types of OEL, but only 3 respondents could name the MEL and 2 the OES.

#### Overall awareness of OELs

Figure 10 shows the proportion of the respondents in each of the all user group, heavy user group and Trade Union representatives claiming to be aware of OELs and the extent this is reflected in real understanding. While a proportion of those claiming to be aware do have some understanding of OELs and how to assess whether they are being complied with, detailed knowledge on the two types of limit and reference periods is extremely limited.

### DISCUSSION

This is the first time a comprehensive survey has been carried out across all chemical users to seek information on their understanding and use of OELs. There have been previous surveys on industries' awareness of the COSHH Regulations. The COSHH evaluation survey (HSE, 1993) used factory inspector visits to gather information on effectiveness of measures to prevent or control exposure. The study suggested the Regulations had alerted many employers to health risks in their workplaces from hazardous substances. However, it was not intended to be representative of all chemical users, nor assess understanding and use of OELs.

Although the response rate in this study was low (16%), it was well within the range normal for market research carried out by telephone interviewing. Analysis of the profile of the respondents showed that they were a representative sample, in terms of industry sector and size. However there is of course the possi-

bility of bias in that respondents without any knowledge of OELs or COSHH would be more likely to decline to take part than those with detailed knowledge. However given the very limited real knowledge that most respondents had, any bias towards overstating their understanding must be limited.

It was not the purpose of the study to investigate different levels of understanding between different groups of respondents. Therefore statistical analysis of the data was not carried out. Even the validity of comparisons between the chemical users groups and the Trade Union Representatives is limited, since most Trade Union Representatives came from establishments with more than 10 employees and over half from establishments with 200 or more (Fig. 9), whereas most of the users came from establishments with 10 or less employees (Fig. 1). Nevertheless, the data suggest that Trade Union Representatives are somewhat better informed than chemical users in small and medium enterprises (SMEs).

Three key messages emerged from the study. Firstly, it is clear that most chemical users are taking steps to protect their employees. Secondly, in deciding what steps to take to protect employees, very heavy reliance is placed on information from suppliers, with use of information from independent sources such as Trade Associations and from HSE being very limited. Finally, OELs play very little part in risk assessment or risk management decisions in SMEs.

Figure 5 shows that respondents were just as likely to use personal protective equipment as consider controlling at source by process modification or ventilation systems. Substituting the hazardous substance or using it in a safer form is rarely considered. This is the opposite of the approach required by COSHH which is to first consider substitution, then adequate control exposure by engineering means and then finally PPE. It should be emphasised again that these

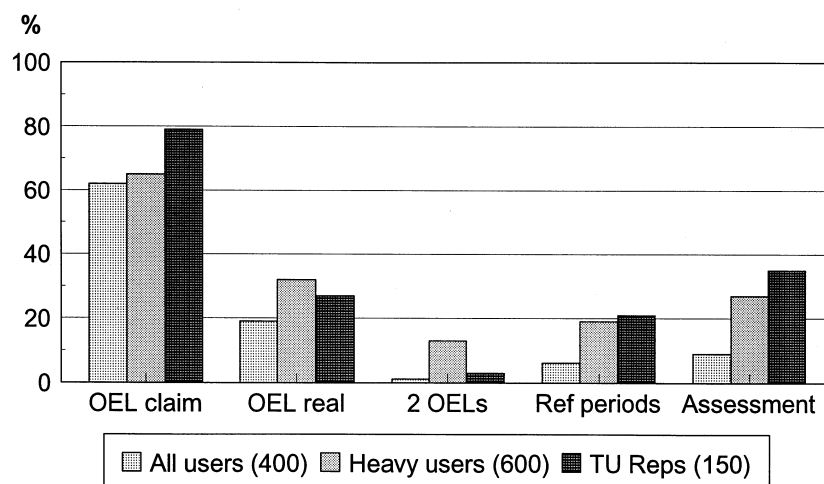


Fig. 10. Summary of claimed and real awareness of OELs for all user group, heavy user group and trade union representatives. (OEL real = awareness of requirements of legislation relating to OELs; 2 OELs = awareness of MEL and OES; Ref periods = awareness of 8 hour TWA and 15 minute reference period; assessment = awareness of how to assess whether an OEL is being met.

responses are what users reported they are doing, the survey was not designed to address the suitability and efficacy of control measures. Nevertheless it is encouraging that most users do take steps to protect their employees, indicating a willingness to protect health.

Most users take decisions on what control measures to use on the basis of common sense judgements. The quality of such judgements cannot, of course, be assessed. What may be common sense to one person may seem foolhardy to another. This heavy reliance on what effectively is personal experience strongly indicates that users need more basic readily available advice on how to effectively control chemicals. Since those who turned to sources of advice were most likely to use information from suppliers, if good quality information is made available through suppliers it is likely to reach users.

The very low understanding and use of OELs reported in this survey calls for a reappraisal of the OEL system and its contribution to securing the aims of good occupational hygiene practice. OELs were originally developed as technical standards against which to monitor adequacy of controls for the prevention of health risks from toxic substances. Many large chemical firms with readily available occupational hygiene expertise do effectively apply them in this way, but on the basis of this survey it is clear OELs are not being applied successfully across the range of industries using toxic substances. However, while not detracting from the original role of OELs, there are strong indications that they could also, with additional information (for example on physical properties and use) be used to identify appropriate control measures which can be recommended to users of chemicals.

This approach is developed in the following paper (Russell *et al.*, 1998) which describes a new scheme to help SMEs control chemicals. The approach meets the need clearly identified in this survey by providing easy to understand, basic control advice to SMEs. The validity of this scheme is dependant on the availability of robust OELs for a range of substances. The paper by Brooke (1998) shows how recently established OELs, for which there is well documented information on the basis of the limit, were used to validate the control strategies recommended by the scheme.

The survey findings raise the question of the value of attempting to generate ever increasing lists of OELs. There are well over 100,000 substances in the Eur-

opean Inventory of Existing Chemical Substances. HSE has OELs for around 600 substances. Other industrialised countries with ongoing programmes to establish OELs have lists of similar length. HSE makes proposals to the Health and Safety Commission for around 10–20 new or revised OELs each year. Thus it is an impossible task to attempt to cover more than a small fraction of the total number of chemicals. Furthermore, given that most users of chemicals are not aware of or do not apply OELs, it is questionable whether it is cost effective to generate ever increasing lists of OELs. Even if resources were to be found, what sort of radical communication and training strategy would be required to ensure widespread application of OELs and their translation into effective risk management?

In conclusion, OELs will continue to have a role in the monitoring of the adequacy of exposure, especially in larger firms. They also have an invaluable role in the validation of generic schemes to identify control measures, such as the one to help SMEs described in the following papers by Russell *et al.* (1998) and Brooke (1998). However given the low awareness of OELs among most chemical users, it would seem sensible to restrict the list of OELs to widely used substances of concern. This would allow regulators to address key risks and to draw wider generic implications on control. The fundamental objective remains, effective risk management and control, not the perpetuation of lists of numbers which few really understand.

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