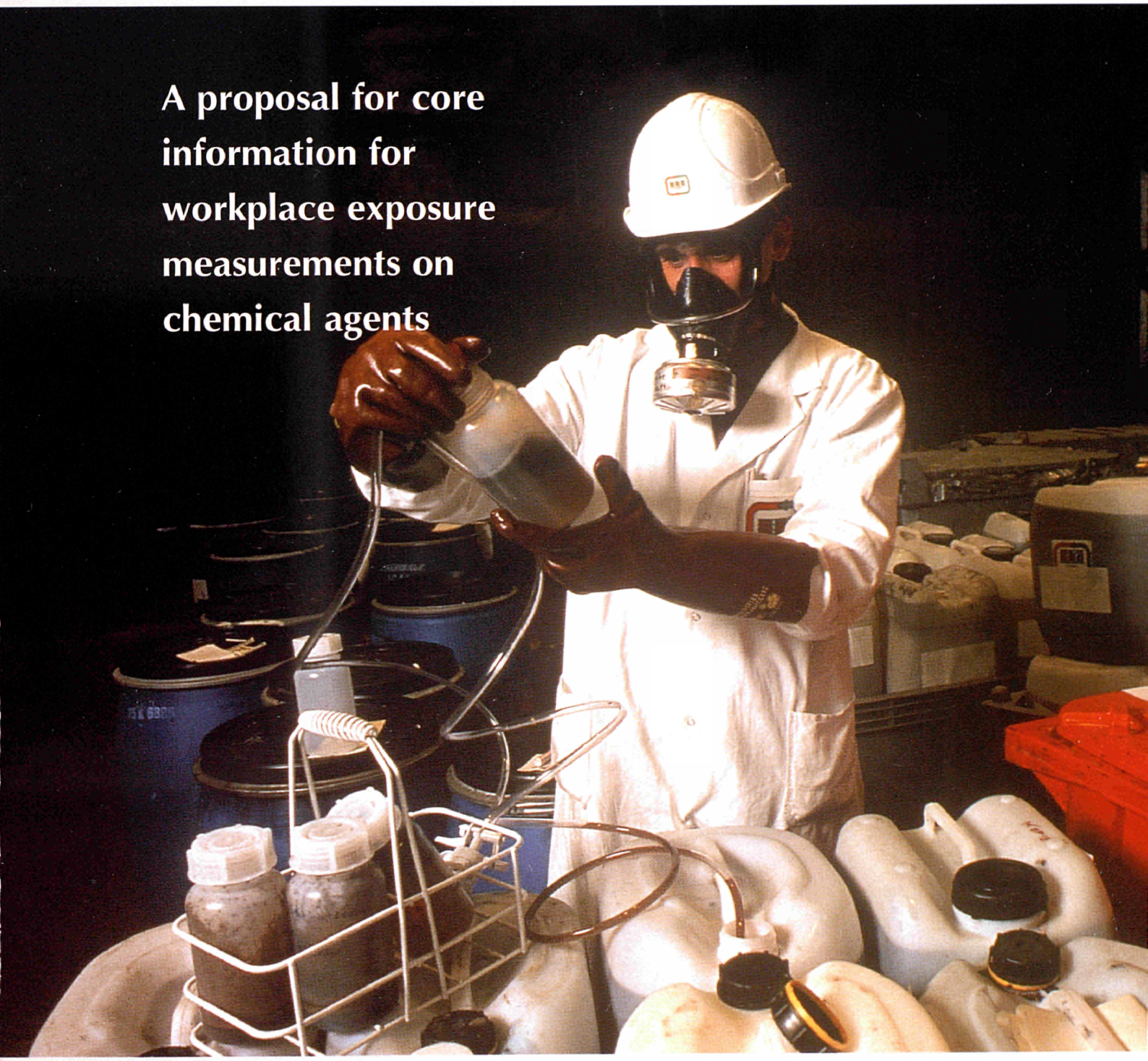
Occupational Exposure Databases

A proposal for core information for workplace exposure measurements on chemical agents



European Foundation
for the Improvement of Living and Working Conditions

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OCCUPATIONAL EXPOSURE DATABASES

A PROPOSAL FOR CORE INFORMATION FOR WORKPLACE EXPOSURE MEASUREMENTS ON CHEMICAL AGENTS

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A PROPOSAL FOR CORE INFORMATION FOR WORKPLACE EXPOSURE MEASUREMENTS ON CHEMICAL AGENTS

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PREFACE

The purpose of this report is to provide a guide to **core information** to be incorporated in databases of occupational exposure measurements on chemical agents. This report is not intended as a manual on sampling strategies, quality assurance of measuring procedures or exposure assessment methodologies.

The consensus proposals were developed following an extensive consultation of existing European documents and published literature. Harmonisation of this core information is necessary to facilitate sharing and exchange of information between databases. The recommendations are therefore aimed primarily at organisations or agencies responsible for compiling databases on exposure measurements particularly in relation to risk assessments under the existing European Regulations. It will also be of value to those preparing to submit data to these databases.

The Foundation Working Group (WG) who wrote this report is aware of the recommendations of other groups, including the 'Joint American Conference of Governmental Industrial Hygienists Association and American Industrial Hygiene Association Task Group on Occupational Exposure Databases', that include considerably more data elements. However, in defining the core information, the WG has been mindful of the need to keep the number of data elements to a level which is manageable and adequate for the interpretation of the data. The recommendations do not preclude the inclusion of additional data elements in individual databases.

The WG recognises that much of the currently available exposure data will not have information for all the proposed data elements. Nevertheless, it is the view of the WG that these data may be of value and should be included in exposure databases with the lack of information clearly identified. This approach will enable those wishing to share information to take account of this when interpreting the data.

The Foundation wishes to thank all the members of the Working Group for their contribution, especially Dr. Bob Rajan of the Health and Safety Executive (HSE), UK, who chaired the group.

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The members of the WG are indebted to their individual employers for their support and encouragement. Dr Rajan extends his gratitude to Mr D Stear (HSE) for his valuable comments and proof reading and to the HSE Typing Centre for the preparation of the type script.

DISCLAIMER

The proposals developed in this report are those of the Working Group; they are not intended to reflect or represent the views or policies of the organisations represented by the members of the Working Group nor of the European Foundation for the Improvement of Living and Working Conditions.

SUMMARY

Occupational exposure measurements on chemical agents are affected by a whole host of factors, including measurement duration, location of measurement and measurement strategy. The information recorded with those measurements is additionally influenced by regulatory and company policies and individual preferences.

The provision of adequate qualifying information with exposure measurements aids interpretation and increases the value of the data. Where organisations wish to share information, standard definitions of qualifying information are essential. This is especially true if the information is to be entered into a computerised database for long term use. This report presents a proposal for **Core Information** to meet these aims

The core information is defined by the Working Group on Exposure Registers in Europe (WG) as *'the minimum set of data elements* which should *form the basis of workplace exposure databases on chemical agents, so as to help towards validation, harmonisation and exchange of information on workplace exposure data'* .

The WG identified ten key categories of information which are listed below. The thirty nine data elements forming the core information are placed in the appropriate key categories.

- Premises
- Workplace
- Worker activity
- Product
- Chemical agent
- Exposure modifiers
- Measurement strategy
- Measuring procedure
- Results
- Reference

The information requirements aimed at facilitating the process of data exchange/sharing are also provided. The key categories and the data elements are defined to minimise misunderstanding. In addition, equivalents terms in French and German are given for the data elements.

The WG recommends that:

- Further work should be undertaken to promote the proposals among the professionals and policy makers.

- Data sharing exercises should be carried out to test the robustness of the recommendations for data sharing.

- A working group should be set up to investigate the problems arising from different coding systems currently in use for economic activity, process, profession and job.

- The European Committee for Standardisation (CEN) should be provided with a copy of this report. The CEN may wish to consider the proposals for the development of an European Standard on core information for workplace exposure measurements.

Chapter 1

INTRODUCTION

The past two and a half decades have witnessed increased awareness of the welfare of the worker and the environment because many chemical agents encountered in industry are potentially harmful to man if they are handled unwisely or are present in excessive quantities in the environment. In the 1970s, this awareness led to the development of modern health and safety legislation in many countries and 'Responsible Care' programmes by industry. The emphasis is on hazard recognition/characterisation, exposure assessment (often by measurement of concentrations in air) and prevention/control.

A recent study reported that 41 organisations in Europe hold databases on occupational exposure measurements for chemical agents.[1] Another study noted that more than one million exposure measurements are held between just five databases with many more measurements being added every day.[2] A similar situation exists in the United States of America (USA).[3]

Recognising the potential availability of exposure information across Europe and the many advantages of promoting a common approach to the collection and storage of exposure information, the European Foundation organised a meeting on Exposure Registers in Europe. This meeting brought together organisations from the European Union (EU) and Scandinavia and facilitated a medium for collaboration and the exchange of ideas between the respective holders of exposure databases.[4] As a result of this meeting, a Working Group (WG) on Exposure Registers was set up; at present it has representatives from the European Chemical Industry Council, Canada, Denmark, France, Germany, The Netherlands, Norway and the United Kingdom. The aim of the WG was to identify and recommend key categories of information and the data elements which would constitute the Core Information(for definition see page 18) for the storage and exchange of workplace exposure measurements on chemical agents.

Chapter 2

WORKPLACE EXPOSURE MEASUREMENTS

Before an attempt is made to identify and define the core information, it is essential to put in context the purposes of exposure measurements and the factors which may affect them.

Exposure Measurement

Exposure assessment is the process of measuring or estimating the intensity, frequency and duration of human contact with chemical agents actually present in the working environment or possible contact that might arise in the event of their release into the environment.[5] Workplace exposure assessment to chemical agents may involve personal exposure measurements which may be expressed as the evaluation of the concentrations of chemical agents in the air interfacing with the person's breathing zone over an averaging period.[6] These measurements play an important role in worker protection.

The representative and reliable measurement of occupational exposure to airborne contaminants is a challenging task. Therefore, before an exposure measurement is taken, it is important to ask:

i) Why is the measurement needed?

ii) What factors are likely to influence the measurement?

iii) What other information is necessary?

iv) How will the information be stored, retrieved and used?

In other words, the quantitative measurement of the hazardous chemical agent is not an end in itself, but must be considered as a part of a broader procedure of risk management.

The Needs

Whilst exposure monitoring is not synonymous with exposure assessment, it is often an integral part of the assessment process where chemical agents are being used, produced or otherwise handled. Quantitative measurements of exposure to chemical agents and the associated qualifying information are required for a variety of purposes, including:

- To assess whether the level of exposure to a given agent meets the compliance levels.[7, 8]
- To assess whether the control measures in place are adequate and functioning as expected.[7, 8, 9]
- To communicate patterns of exposure and risk levels to employers, employees and 'enforcers'.
- For use in developing cost effective control measures.
- To determine the need for health surveillance programmes.[9, 10]
- To develop better informed regulatory policies and guidance including the setting of occupational exposure Limit Values for the control of risks from exposure to chemical agents at work.[11]
- For the purpose of estimating the potential health risks of notified substances, in parallel with dose-response assessment, to satisfy the requirements of the risk assessment Directive on new substances[12].
- To facilitate the evaluation of association or causation of ill health by epidemiology.[13]

Recently, researchers have used exposure measurement results to develop and evaluate computerised exposure assessment models.[14, 15]

The European Dimension

Within the EU, the dual requirements for free-trade and the desire to control exposure to substances hazardous to health led to the development of Directives and regulations.[16, 17] The Commission of the European Communities (CEC) has set up a system to promulgate harmonised Occupational Exposure Limits (OELs) for chemical substances used in member states in accordance with the Framework Directive (80/1107/EEC)[18] and the amended Directive (88/642/EEC).[19] These OELs are defined as Binding Limit Values (BLVs) and Indicative Limit Values (ILVs)[19]. The procedure for establishing such limit values in the EU is still evolving and may be modified in future. The current proposal consists of two distinct phases: the first is known as the 'scientific phase', in which health-based recommendations for a limit value are proposed by a Scientific Expert

Group. The subsequent 'consultative phase' is where technical and socio-economic issues may be introduced.

Exposure data for substances hazardous to health may provide important pieces of information for both phases of the process. At present there is an intense discussion taking place within the CEC concerning the use of occupational exposure data held by various institutions in the Member States.[20, 21] The CEC recognise the work of this WG as "very relevant" for the development of policies for workplace risk management.[21]

Origins of Exposure Data

Worst-Case Measurements

There are occupational situations in which qualitative exposure assessment and professional judgements are adequate to recommend preventive/control measures. However, it may still be the case that quantitative evaluations are needed because of legal requirements.[22] The European Standard on guidance for airborne exposure measurements (CEN 689) describes worst-case sampling as those sampling periods which include clear episodes of high exposures due to certain working conditions.[8] Worst-case sampling has been the traditional focus of occupational hygiene practice for many years in which professional judgement is employed to determine the timing, selection and number of persons to sample.[23] Worst-case sampling is used for compliance testing with OELs, to monitor the effectiveness of engineering controls and training programmes. In addition, there are a number of other occupational situations in which worst-case exposure measurements are obtained. For example, when a new production process is being commissioned, there may be 'start up' problems which may present exposure risks requiring exposure measurements to be taken. In any industrial situation, there are a number of infrequent, or intermittent processes and operations which also require exposure monitoring (eg: maintenance activities). Although, the exposures resulting from these operations may not be representative of typical day-to-day exposure, they contribute to occupational health risks, therefore the measurements obtained are relevant to compliance management as well as long term exposure risk studies.

It is clear that worst-case sampling remains a common, if not the primary sampling approach for exposure assessments, generating a significant amount of commonly available exposure information.[23-25] However, a number of authors have indicated that, although such measurements are valuable for risk assessments and compliance testing, the data often do not meet the needs of epidemiologists.[26-29] There are practical and financial constraints which make true statistically based random sampling difficult and at times impossible. Furthermore, there will always be jobs, tasks and agents which will not be monitored for one reason or another, which means that the interpretation of exposure assessments for most agents will continue to require a substantial amount of professional judgement.

Representative Measurements

Exposure measurements generated by representative surveys rely on stringent workplace characterisation to identify all relevant workplace factors which may influence exposure patterns. According to CEN 689, the measurement conditions should be selected in such a way that the measurement results give a representative view of exposure under working conditions and the measurements should be performed on sufficient number of days and during various specific operations.[8] Based on workplace characterisation Similarly Exposed Groups (SEGs) or Homogeneous Exposure Groups (HEGs) are identified and members from these groups are then selected randomly and their exposures monitored.[30-32] Representative surveys are usually time consuming, expensive and rarely undertaken on a regular basis, but are useful for research based studies.

The Influence of Variables on Exposure Measurements

Workplace exposure measurements are influenced by many variables, some of which are outlined below. Modern industrial processes, and the chemical agents used in them, are countless and each manufacturing stage may involve different conditions (eg: batch or continuous process, high or low temperature), different tasks and chemical agents. In situations like this, the level of airborne contamination, hence exposure, may be subjected to rapid fluctuations (see Figures 1 and 2 on Page 11).

The 'people factor' may have further influence on the level of exposure. The allocation of workers to SEGs or HEGs requires professional judgement and care.[32, 33].The importance of this issue can be illustrated by the experiment conducted by Higgins et al.[33] In this experiment, they found that personal breathing zone samples of two fettlers were quite different, although the work and the way it was done remained the same. The differences were due to human factors. One operator was much shorter than the other and his breathing zone was much closer to the work piece in comparison to the other worker.

At the technology end, the sampling equipment and analytical techniques used often introduce variability and limitations. These variability and limitations could come to light many years after which the monitoring method had been accepted as a Standard. For example, very large biases may arise for certain combinations of analytes and extraction liquids when the "equilibrium method" is used for the desorption of analytes[34]. If the sampling and analytical information are stored with the exposure measurements, the usefulness and the reliability of the stored data can be assessed long after the date of sampling.

The importance and influence of variables on sampling and analysis have been recognised by standard setting organisations.[35,36] The proposed CEN Standard PrEN 482 states that the relative overall uncertainty of $\leq 50\%$ is acceptable for screening measurements of Time Weighted Average (TWA) concentrations of chemical agents for comparison with occupational exposure Limit Values.[36]

Sometimes the interpretation of results may introduce further variability. The most commonly encountered distribution of occupational exposure measurements is lognormal[29,37,38], nevertheless, it is important to establish the distribution pattern for a given set of data including the validity of the 'data-pool' which caused the distribution. This step is needed to improve the reliability and validity of information obtained from the data.

Figure 1

Typical Temporal Exposure Pattern During a Working Day (8-hour)

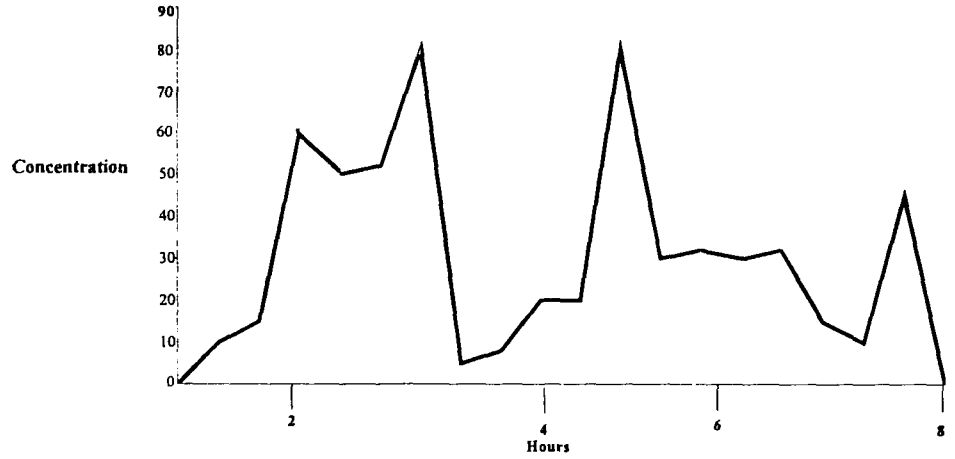
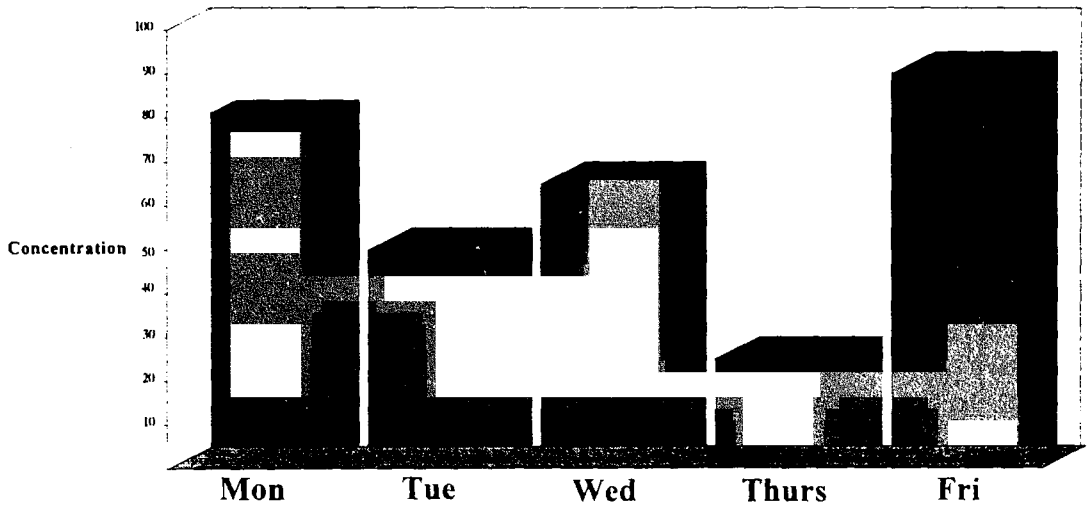


Figure 2

Typical Temporal Exposure Pattern During a Work Week (8-hour averages)



Without doubt, the failure to collect and store relevant information pertaining to exposure measurements may result in wasted effort and the wrong decisions being taken.[39] On the other hand, the conference on the Management of Occupational Hygiene Information concluded that resources are being wasted by companies trying to individually tackle the problem of the collection and storage of exposure measurements.[40] Similar sentiments were expressed at a US conference on Occupational Exposure Databases. It concluded that the main reasons for the failure to exploit the full potential of exposure measurements are due to a lack of consensus regarding:[41]

(i) core information;
(ii) accurate and standardised definitions for core information; and
(iii) effective coding systems which can capture the core information.

Discussion

The foregoing paragraphs clearly show that the gathering and storage of occupational exposure measurements is inherently complex and involves considerable time and effort. Therefore, in order to maximise the utility and usefulness of exposure measurements they need to be qualified by relevant information regarding the purpose, circumstances and methods. This is of paramount if the data is to be stored, retrieved, analysed, interpreted and used meaningfully in immediate risk management tasks as well as over a long period of time. Chapter 3 will address issues relating to the qualifying information.

Chapter 3

EXPOSURE INFORMATION

Types of Qualifying Information

Having recognised the need for qualifying information, it is natural to then ask what constitutes "adequate" qualifying information? Figure 3 (Page 15) shows some examples of qualifying information. But, there is no one set of "adequate" information or a record keeping system for all known-purposes of exposure measurements. However, records should contain as much information as practicable, providing it is manageable, appropriate and well structured.

The WG advocates that the core information required to characterise exposure measurements should be set down under a number of key categories. Before an attempt was made to define the key categories and the associated data elements, the WG scrutinised the information currently being collected for storage in databases. Table 1 (page 16) lists the types of data elements for which information is collected by the members of the WG (those who are responsible for national databases) for storage in their respective exposure databases. This list is not exhaustive but provides a representative picture. Some participants do not collect any information on certain data elements, for example, total number of employees on site, department, tasks, number of males and females exposed to the monitored agent. In some cases, the range of information is left to the professional judgement of the person responsible for carrying out the air sampling (eg: those marked (x) in Table 1). The variations reported in Table 1 are due to national practices and the way in which the databases are set up to store exposure measurements.

The information in Table 1 illustrates the lack of a common approach to the collection and storage of exposure information even among the national databases. Nevertheless, certain information is collected by all participants.

Figure 3

Exposure Measurement and Qualifying Information

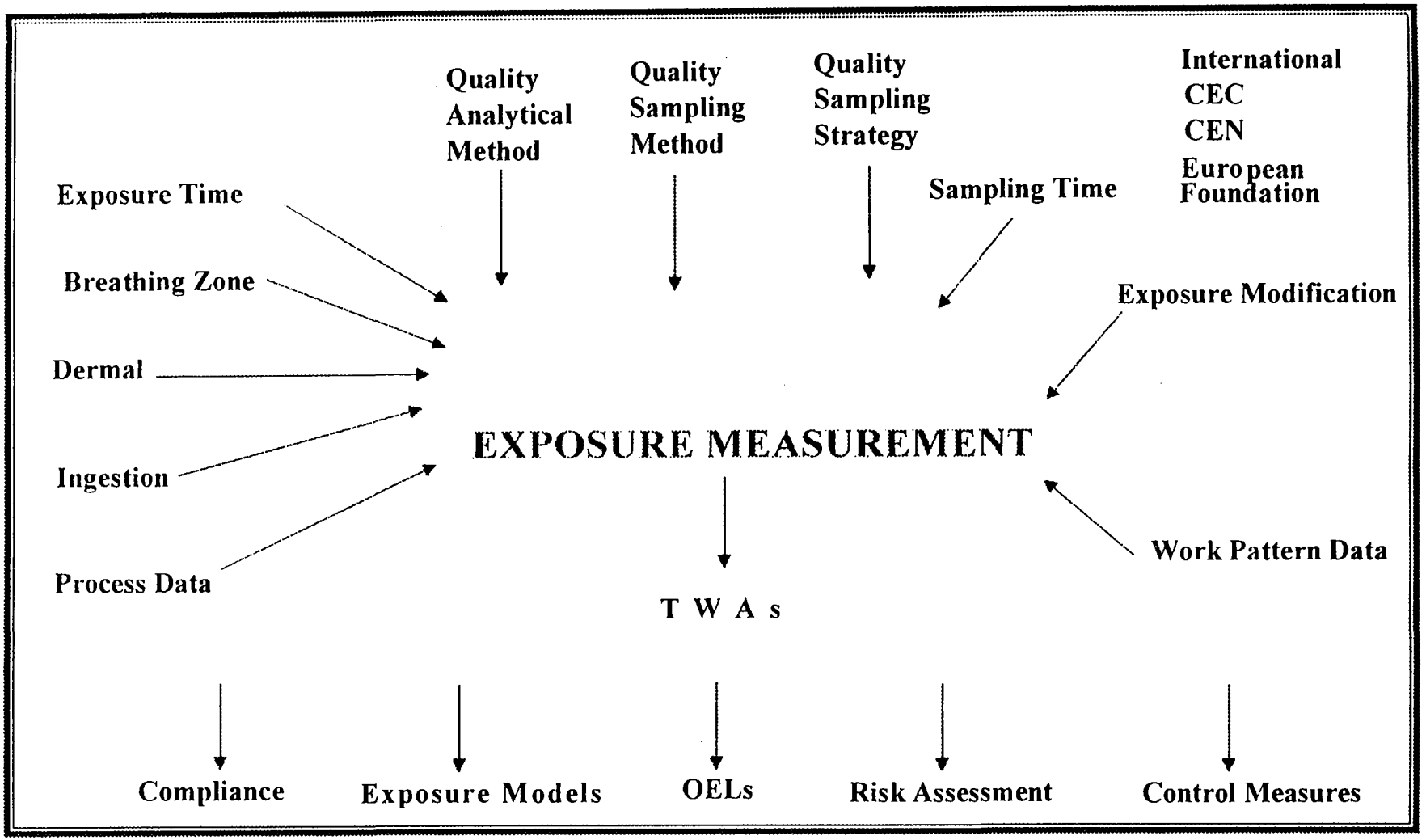


Table 1

The main types of exposure information collected by the participants of the WG

Exposure Information	Source DK	N	F	D	UK	C
Premises						
Name of the premises	x	x	x	x	x	x
Address	x	x	x	x	x	x
Employer's No	x	x	x	x	x	x
Economic activity	x	x	x	x	x	x
Total No of employees on	0	0	0	x	x	0
Site						
Workplace						
Department name	x	x	0	x	x	0
Work area name	x	x	x	x	x	0
Process name	x	0	0	x	x	x
No of persons working	0	0	x	(x)	0	0
No of exposed persons	x	0	x	x	x	0
Room dimensions	0	0	x	x	0	0
Exposure source	0	x	x	(x)	x	0
Temperature	x	0	x	(x)	0	0
Humidity	x	0	0	(x)	0	0
Heat recovery	0	0	0	(x)	0	0
Type of space information	0	0	0	(x)	0	0
Worker Information						
Name of person sampled	x	x	0	(x)	x	0
Works No	0	0	0	0	x	0
Job	x	0	x	x	x	x
Task	x	x	x	x	x	0
No of males exposed	0	0	0	0	x	0
No of females exposed	0	0	0	0	x	0

Exposure Information	Source DK	N	F	D	UK	C
Chemical Agent						
Name of the agent	x	x	x	x	x	x
CAS No	x	0	x	(x)	x	0
Sampling Information						
Date of sampling	x	x	x	x	x	x
Sample No	x	x	x	x	x	x
Type of sample	x	x	x	x	x	x
Sampling times	x	x	x	x	x	x
Exposure times	x	x	x	x	x	0
Sampling method	x	x	x	x	x	x
Sampling medium	x	x	x	x	x	x
Sampling rate	x	0	x	x	x	x
Analytical Information						
Method of analysis	x	x	x	x	x	x
Measurement Strategy						
Reason for sampling	x	x	x	x	x	x
Results						
Measured concentration	x	x	x	x	x	x
Unit	x	x	x	x	x	x
Current OELs	0	x	x	0	x	0
Exposure Modifiers						
Exposure pattern	0	x	0	x	x	0
Use of RPE	x	x	x	(x)	x	x
Work rate	x	0	0	(x)	0	0
Pattern of control	x	0	x	x	x	x
Product						
Product identifier	x	0	0	x	0	x

Key to Table	
DK	Denmark
N	Norway
F	France
D	Germany
UK	United Kingdom
C	Canada
x	Collected
0	Not collected
(x)	Optional

Before an attempt is made to define the core information, it is essential to find out what categories of information and data elements have been recommended by others. Recently, Hawkins et al proposed a rationale and framework for establishing quality exposure assessments in which they identified eight components for Good Exposure Assessment Practices (GEAP).[6] The GEAP sets out the important principles to be followed and areas of information required for exposure assessment. For example, the component 'study design' refers to sampling statistics, data collection methods, analytical methods and data analysis. It does not go on to define data elements which should be collected under each category.

Although the CEN standard PrEN 689 provides recommendations for the preparation of occupational exposure assessment reports, it does not define the core information.[8] A number of other publications recommend that a defined set of information should be collected for a reliable long term use of exposure measurements.[39,42-44] In 1991, Phillips et al described a list of 'basic data elements' which would form part of an exposure measurement record.[42] The following year the British Occupational Hygiene Society (BOHS) proposed a standard for the presentation of occupational exposure data.[39] A year later, Harris produced a guideline for the collection of exposure measurements for occupational epidemiology studies.[43] At the US Conference on occupational exposure databases, jointly organised by the American Conference of Government Industrial Hygienists (ACGIH) and American Industrial Hygiene Association (AIHA), one of the workshops recommended 'components for core data.'[45]

The data elements recommended by the above publications are compared in Table 2 (Page 19). For ease of interpretation and comparison the data elements are tabulated under sub-headings. The comparison in Table 2 shows that recommendations to standardise the core information have not produced a uniform solution. In addition, a term used to represent a variable in one publication may not represent the same in another. This interchangeability or disparity is illustrated by the terms used to represent 'measurement strategy'.

Pr EN 689[8]	-	measurement strategy
Beaumont et al[39]	-	reason for sampling
Phillips et al[42]	-	validity code
Harris[43]	-	exposure type
Creek et al[45]	-	sampling strategy

There are many reasons for a standard approach to core information, some of which are listed below.

- the need for valid interpretation of the results;[25]
- to avoid misclassification of exposure measurements;[44]
- to evaluate the reliability and validity of exposure information.[46, 47]

By now, It should be clear that there is a need for an international effort to solve this problem. At present, this is being tackled by two groups, the European Foundation Working Group on Exposure Registers and a joint task group of the ACGIH and the AIHA.[48] This report presents the findings of the European Working Group.

Defining the core information

The core information is defined by the WG as *'the minimum set of data elements which should form the basis of workplace exposure databases on chemical agents, so as to help towards validation, harmonisation and exchange of information on workplace exposure data'* .

Tables 1 and 2 show that information is collected on a variety of data elements. These data elements are grouped together in various ways by the proposers. The placing of the data elements in discrete categories would make it easy to present and discuss; will help in the design of exposure data collection forms and databases; and will facilitate structured retrieval, analysis and exchange of exposure information.

Beaumont and Dalrymple[39] recommended six categories - administrative, process, demographic, agent, sampling/analytical, and results. The following types of information are included in the 'administrative' category: where, when and from whom, from what type of industry were the data obtained, and why the measurements were made. In essence, the administrative category will carry a mixture of information about premises, economic activity, people and sampling strategies. The proposal of Creek and Schinkel[45] contains four categories of information: location, employee, sample, and process. These categories are too broad and will contain a mixture of data elements.

Table 2

A Comparison of Recommended Data Elements Recommended by Various Authors

Data Element	Source				
	A	B	C	D	E
Premises					
Company name	x	x	0	x	x
Occupiers name	0	x	x	x	x
Address	x	0	x	x	x
Employer's No	0	0	x	0	0
Economic activity	0	0	x	0	0
Total No of employees on site	0	0	x	0	0
Workplace					
Department name	?	x	x	x	x
Work area name	?	x	x	x	x
Workplace configuration	x	0	0	x	0
Process name	x	0	x	x	x
Weather conditions		x	0	x	x
No of exposed persons	x	0	x	x	0
Worker Information					
Name of person sampled	x	x	x	x	x
Sex	0	0	x	0	0
Works No	0	x	x	x	x
Exposure group	x	x	0	x	x
Job	?	x		x	x
Task(s) during sampling	x	x	x	x	x
No of males exposed	0	x	x	0	0
No of females exposed	0	x	x	0	0
Shift length#	0	x	0	x	x
Product Information					
Exposure source	x	0	x	x	x
Product name	x	0	x	0	x
Chemical Agent					
Name of the agent	x	x	x	x	x
CAS No	0	0	x	x	(x)
Air Sampling Information					
Date of sampling	x	x	x	x	x

Data Element	Source				
	A	B	C	D	E
Sample No	x	x	x	x	x
Type of sample	x	x	x	x	x
Sampling method	x	x	x	x	x
Sampling medium	x	x	x	o	x
Sampling rate	x	x	x	o	x
Sampling times	x	x	x	o	x
Sampling duration	x	x	x	x	x
Exposure time	x	x	o	o	o
Analytical Information					
Analytical Method	x	x	x	x	x
Analytical Lab		x	o	o	
Name of potential interferents	x	x	x	o	x
Calibration data		x	o	o	x
Quality assurance	x	?	o	o	x
ResultS					
Measured concentration	x	x	x	x	x
Unit	x	x	x	x	x
TWA concentration	x	o	x	o	o
Current OELs	x	o	x	o	o
Exposure Modifiers					
Operation/Exposure frequencies	x	x	x	x	x
Pattern of exposure	x	o	x	x	x
Pattern of control	x	o	x	o	x
Use of RPE	o	x	x	x	x
Skin contact	o	x	x	x	o
Skin protection	o	x	o	x	o
Work rate	x	o	x	o	o
Measurement Strategy					
Compliance testing	x	x	x	x	x
Representative survey	x	x	x	x	x
Other types	x	o	x	x	x

Key to Table	
A	PrEn689[38]
B	PhillipS[42]
C	Beaumont[39]
D	Harris[43]
E	Creek[45]
x	Recommended
0	Not Recommended
?	Not sure

Rawls and Haring recommended ten categories of information for an occupational health database. The categories are: demographics, location, survey, results, process, task, chemical, weather, equipment and personal protective equipment 0(PPE).[49]

The WG Proposals

Based on the experiences of the members of the WG and others, we identified ten key categories which are presented in Table 3 (Page 21). In our classification, process, task, equipment and PPE are considered to be data elements and will be placed in appropriate key categories. The definitions of the key categories are presented in Table 4 (Page 21). The majority of these definitions have been adopted from existing sources and are described in column three of Table 4. As most of these definitions have been taken from international documents, this approach should help towards better understanding of the terminology and will make the process of adaptation, where necessary, much easier.

Electronic storage of Exposure Data

The Core information for electronic storage of workplace exposure measurements on chemical agents is described in Table 5 (page 25). The data elements described in this Table do not include worker's name and identity number. The reason for non-inclusion of these elements is based on the premise that the laws relating to electronic storage of personal information and the requirements for data protection may lead to complications. The large majority of the data elements listed in Table 5 can also be found in Table 2. However, they were not all recommended by one single source.

Premises Information

In Table 2, three out of five sources recommended that the name of the parent company should form part of the data collection process, however, the WG does not consider this data element as part of the core information. Instead, the core information should contain the name of the premises where the sample was taken. The information on the 'size of the enterprise' is needed for future evaluation of exposure measurements. In Table 2, this data element is represented by 'Total number of employees at site'. Although the economic activity is an essential part of the core information, the details of this activity are recorded using a number of coding protocols.

Table 3

Key Categories of Information to place Data Elements on Occupational Exposure Measurements of Chemical Agents

1.	PREMISES
2.	WORKPLACE
3.	WORKER ACTIVITY
4.	PRODUCT
5.	CHEMICAL AGENT
6.	EXPOSURE MODIFIERS
7.	MEASUREMENT STRATEGY
8.	MEASUREMENT PROCEDURE
9.	RESULTS
10.	REFERENCE

Table 4

The Definitions of Key Categories

KEY CATEGORY	**DEFINITION**	**SOURCE**
Premises	Any place including any installation on land, any offshore installation, any tent or movable structure, a vehicle, any vessel, aircraft and hovercraft where an economic activity is undertaken.	UK HSW etc. ACT 1974[50]
Workplace	The defined area or areas in which the monitored worker's activities are carried out.	Pr En 1540[51]
Worker Activity	The profession, job and the work tasks associated with the monitored worker.	
Product	The description of any commercial product, any chemical intermediate or any by-product which contains the chemical agent monitored.	Various legal interpretations
Chemical Agent	Any chemical element or compound, on its own or admixed as it occurs in the natural state or as produced by any work activity, whether or not produced intentionally and whether or not placed on the market.	Pr En 1540
Exposure Modifiers	The workplace factors which are likely to influence an exposure measurement result.	Pr En 689[8] and 432[36]
Measurement Strategy	The type of air sampling approach used to obtain quantitative exposure measurement result.	Pr En 1540 and 689
Measurement Procedure	The procedure for sampling and analysing one or more chemical agents in workplace air including storage and transportation.	Pr En 1540
Results	The quantitative airborne concentration of a chemical agent in workplace air.	Pr En 689

Workplace Information

The data elements in this category provide specific information about the workplace where the air sampling was carried out. The naming of the process is based on a number of baselines: occupiers conventions, national conventions and the decisions of individuals. Sometimes a task can be confused with a process. It is hoped that the definitions in Annexe A (page 36) will be adopted by professionals throughout the world to ease the problem with terminology. There is no international dictionary/code for processes, this aspect should receive high priority among the international standard setting organisations (eg: Office for Economic Co-operation and Development, World Health Organisation, International Labour Office).

Worker Activity Information

In this category, information about the worker and his/her activities will be recorded. Professions and job titles change with fashion, the needs and culture of the company and international trends. Hence, there is a need to collect accurate information on matters relating to worker activity. The data elements 'profession', 'job title' and 'task' are often used interchangeably, and because of this, the WG recommends that it is essential to collect information on all three data elements. The International Labour Office (ILO) classification should be used when allocating information to the data element 'profession'.[52] The data elements recommended in this category are vital for the realistic evaluation of health risks and exposure assessment models and future epidemiological studies. Although a number of recent publications stated that information on gender is important and is needed in workplace risk assessment,[53, 54] this data element is not included in Table 5. However, database owners may wish to include this information, which is valuable for epidemiological studies.

Product Information

Information about the product/source giving rise to the exposure will provide vital clues for risk assessment. For example, a chemical agent has been found to cause a particular cancer and the evidence to this became available after ten years from the date of monitoring. If the product/source information is available a researcher can make inquiries on other related products to ascertain whether these also contained the agent in question. Another advantage is that the manufacturers of the original

product may have more exposure information which may be valuable for decision making.

Chemical Agent Information

It is common for exposure measurement reports to contain the common/trivial names of chemical agents. The inclusion of either the CAS or EINECS number will help to identify the agent in question with greater certainty. Trade names should only be used to describe products and not the chemical agents.

Exposure Modifiers

Accurate information on 'exposure modifiers' is vital for realistic assessment of exposure. The major factors which can alter the extent of inhalation exposure are: use pattern; exposure pattern; pattern of control; respiratory protection and the space in which the work is carried out. With regard to data element 'Respiratory Protective Equipment (RPE) used during sampling', the answer is restricted to yes/no. As it is not practicable to assess whether the RPE provided is worn properly throughout the sampling period and the person collecting the air sample may not be a qualified occupational hygienist and may therefore not be in a position to assess the appropriateness of the RPE.

As the proposal on core information is for exposure databases on inhalation exposure measurements the data elements 'skin contact' and 'skin protection' are not included. Nevertheless the WG strongly recommends that information on these data elements should be recorded when measurements are taken. Some authors recommended that information on 'shift' should be collected[42,43,45]. In this report data element 'duration of exposure' is considered to be essential.

Measurement Strategy

The data elements in this category will provide information about the exposure scenario and the reason for the sampling exercise. Based on this information, the user can make judgements on the applicability of measurements for a given situation.

Measurement Procedure

The data elements identified under 'sampling' and 'analytical' agree with a number of other sources[8, 39, 42, 43]. The information provided for sampling and analytical methods should enable users to determine the quality of the procedures used to obtain the results.

Results

The quantitative measurements, with appropriate units of measurement, resulting from air sampling are placed in this category. In addition, the information about the status of the sample is placed in this category.

Reference

The report reference is an essential administrative information which is needed to trace, if necessary, the original report.

Table 5

Core Information

for

Electronic Storage of Occupational exposure Measurements on Chemical Agents

KEY CATEGORIES	DATA ELEMENT
PREMISES	Name of the Premises (occupier) Address Economic Activity (free text) Economic Activity (code) Size of Enterprise:- Small, Medium or Large
WORKPLACE	Department Work Area Process (free text) Process Code
WORKER ACTIVITY	Profession / Occupation (free text) Profession / Occupation Code (ILO code) Job Title (free text) Tasks (free text) Tasks (code)
PRODUCT	Product Identifier
CHEMICAL AGENT	Name of the Substance (agent) measured CAS No. EINECS No.
EXPOSURE MODIFIERS	Exposure Pattern - Continual - Intermittent - Occasional Pattern of Control - Full Containment - LEV - Segregation - Dilution Ventilation - Other (free text) RPE used during sampling (Y/N) Confined Space/Enclosed Space/ Open Air
MEASUREMENT STRATEGY	Representative Survey Worst Case Survey Other Types of Survey
MEASUREMENT PROCEDURE	<u>SAMPLING :</u> Date of Sampling Sample No. (reference No.) Sampling Device (code) Type of Sample - Personal - Fixed-point - Source Sampling Times (24-hour clock) Duration of Sampling (minutes) Duration of Exposure (minutes) Sampling Method (code) <u>ANALYTICAL:</u> Analytical Method (code)
RESULTS	Measured Concentration Unit (mgm^{-3}/ppm/fml^{-1}) Sample Status - Associate Sample - Single Sample
REFERENCE	Report Reference

Data Sharing

The information requirements recommended in Table 6 are aimed at facilitating the process of data exchange. It would be difficult to prepare summary data in accordance with the recommendations in Table 6 unless the core information described in Table 5 has been stored with exposure measurements.

Table 6
Core Information
for
The Process of Exchanging Data on WORKPLACE PERSONAL EXPOSURE MEASUREMENTS

KEY CATEGORIES	INFORMATION
PREMISES	a) Specify restrictions on Economic Activities of interest b) Specify Size of Enterprise:- (all/Small/Medium /Large)
WORKPLACE	Specify restrictions on Process Code(s) of interest
WORKER ACTIVITY	a) Specify Profession Code(s) of interest b) Specify Tasks of interest (codes may be included)
PRODUCT	Specify restrictions on Product Identifiers
CHEMICAL AGENT	Name of the Substance , it's CAS No. or EINECS No.
EXPOSURE MODIFIERS	a) Specify restrictions on - Exposure Pattern - Pattern of Control - Confined Space / Enclosed Space / Open Air b) Free text for other specified Exposure Modifiers
MEASUREMENT STRATEGY	Segregate Representative and Worst-Case data
MEASUREMENT PROCEDURE	SAMPLING : a) Specify range of Dates b) Include Personal Exposure Data ONLY c) Specify Range of Sample duration (e.g. $>60<t<480$ minutes) ANALYTICAL: Define restriction on Analytical Method
RESULTS	a) Specify Units of Measurement (e.g. ppm) b) Specify Total Number of Measurements c) Specify requirements for Statistical Presentation of Deta e.g. - Arithmetic Mean - Median - Geometric Mean (GM) - Geometric Standard Deviation (GSD) - Range - Percentile values (75, 90, 95,99)

Where data are recorded by National databases under the categories in Table 5, this facilitates rapid exchange of information. However, Where for legal or other reasons, it is not possible to exchange full data sets, then the information to be exchanged will have to be defined as a specific sub-set of the data.

Exchange of pooled data between National exposure databases should be based on a clearly defined sub-set of the core data as described in the above Table 5.

Comments:
For each '*key category*', the specification of '*core data*' should be defined to be suitable for the objective aimed at by the retrieval procedure. The specification should be agreed in advance between the Occupational Hygiene Exposure Database Manager and the other party and included in its entirety in any publication describing the interpretation of these pooled data.
The statistical parameters under *'RESULTS"* should be computed using appropriate techniques; for instance, it is of paramount importance to characterise the distribution of the raw data (before pooling), when quoting the GM and GSD.

The majority of data elements recommended in Table 6 are similar to those recommended by ACGIH[30] and CEFIC.[55] The major differences between the recommendations in Table 6 and those of references 30 and 55 are:

- References 30 and 55 recommend that the comparison should be based on Homogeneous Exposure Groups.
- The recommendations in Table 6 provide the flexibility to compare data obtained for compliance testing as well as representative data.
- Recommendations in Table 6 provide room for comparison of data using a variety of combinations. For example, a comparison could be made by economic activity, size of enterprise, process, profession, job, or task. This flexibility can lead to better informed decisions.

An inter-country comparison on xylene exposures was made based on an exchange criteria similar to the one in Table 6. The results of the comparison provided an interesting insight to data exchange and suggests that the recommendations in Table 6 are valid.[2] However, further validations should be carried out to test its robustness.

Definitions for those data elements described in Tables 4-6 are given in Annexe A (page 36). These definitions are the key to a better understanding of the data elements so that misclassification and misunderstanding of exposure information is avoided. The information in Annexe A is also useful for those wishing to rationalise existing databases and for those starting from a 'green-field' site. Further help is provided at annexe B, which provides equivalent terms in English, French and German.

Discussion

Debates in WG meetings and the experiences of others[39, 42, 43, 45, 49] have shown that the task of establishing an acceptable standard for core information on workplace exposure measurements to airborne levels of chemical agents is not easy. In order to develop a consensus standard, the WG analysed available information and debated issues relating to exposure measurements. The WG found that the way in which exposure measurements are collected, stored and used are heavily influenced by cultural, legal and industrial structures. When defining the standard, the WG considered global as well as European issues relating to exposure measurements. We believe the standard proposed should go a long way towards a global Standardisation of the Core Information.

We recommend this proposal to risk managers, policy markers and others who have an interest in workplace exposure measurements to hazardous agents. The European Committee for Standardisation (CEN) may wish to consider the proposals described in this report for the development of an European Standard on core information on workplace exposure measurements.

Chapter 4

CODIFICATION OF CORE INFORMATION

Introduction

A piece of information can be recorded and communicated in a number of ways. The chosen method will be influenced by a number of factors such as culture, education, subject matter, form of communication (coded or textual) and the formalities involved. A codification system for communication can develop both informally as well as formally. Nevertheless, the major benefits of coding a class of information are to provide a standardised method of encapsulation and a formal means for the expression of the encapsulated information.

Codification in Health Risk Management

Coding schemes used for industrial health risk management can be found in many forms: numerical, alphanumeric, free-text, abbreviations and glossary of terms.[39,56-58] In this report, vital data elements are presented as core information. If desired, these data elements can be codified and the exposure measurements related by these codes. At present, the most commonly coded data elements are 'economic activity' and 'substance'.

The application of code systems in occupational health can be illustrated by the data element 'economic activity'. The most common system currently in use to code this data element is the International Standard Industrial Classification (ISIC).[59] The ISIC is used by government and international agencies for the collection of economic, demographic, health and other types of data. This system enables a premises to be classified by the main type of economic activity in which they are engaged. In the ISIC system formulated in 1980, the first two digits describe the broad industry class (eg: Chemical Industry (35)); the third digit describes the major industry grouping (eg: Basic industrial chemical (351)); and the fourth digit is intended to describe a specific industry (eg: Fertilisers (3512)).

The members of the WG do not use identical codes to express the data elements which form the core information. This is illustrated in Table 7 (page 30), by the data element 'economic activity'.

The issue is further complicated by the numerical codes assigned to ISIC in different years. The numbers allocated to a specific industry in 1968, 1980 and 1992 are some what

different. The application of the ISIC code may be operated at 3 or 4 digit levels. Similarly, there are differences in the way processes and tasks are coded. Although there is a UN (ILO) published code for professions,[52] this is not widely used in exposure databases.

Recently, Gomez[60] proposed that the ISIC 4 digit system could be extended to a 7 digit system to enable specificity to the classification of economic activities. However, he went on to say that the seven digit system has two shortcomings (i) it is based on the principal product of a firm (ii) confusion may arise when firms produce more than one principal product. In the same publication he suggested a system for coding the data element 'task'.

Table 7
Codes for Documenting Economic Activities[2, 61]

DATABASE	CODE
ATABAS, Denmark	ISIC
COLCHIC , France	Social security / NACE with changes
EXPO, Norway	ISIC/NACE
MEGA, Germany	National
NEDB, UK	SIC (UK)
DCHBASE, Canada	SIC (Quebec)

Discussion

It is clear that data elements are codified in many different ways. However, in order to realise the full potential of exposure measurements for risk assessment and risk management purposes, specially in an international scene, there is a clear need to agree international standards for coding the data elements used to qualify exposure measurements. This should be tackled by evaluating the current practices; the reason for the variations and how a unified system could be developed. This task should be performed by a number of working groups drawing experts from the fields of occupational hygiene, occupational health, epidemiology and industrial economy.

RECOMMENDATIONS

The WG recommends that:

- Further work should be undertaken to promote the proposals among the professionals and policy makers.
- Data sharing exercises should be carried out to test the robustness of the recommendations for data sharing.
- A working group should be set up to investigate the problems arising from different coding systems currently in use for economic activity, process, profession and job.
- The European Committee for Standardisation (CEN) should be provided with a copy of this report. The CEN may wish to consider the proposals for the development of an European Standard on core information for workplace exposure measurements.

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Annexe A

The Definitions of Data Elements

DATA ELEMENT	DEFINITION	EXAMPLE
Address	The street address of the premises where sampling was carried out	10 Another Place, Hightown, L38 9EF
Analytical Method	A unique identification or code which will identify the analytical method utilised to quantify the substance monitored	NIOSH method S114, MDHS 25 etc.
Associate Sample	The air sample in question forms part of a series of air samples and the result of this associate sample can be used in the calculation of 8-hour Time Weighted Average (TWA) or the shift exposure to the substance monitored	The sample in question is one of the three separate personal samples collected in the breathing zone of a person during the working day and can be used to calculate the 8-hour TWA to the substance
CAS No	The 'Chemical Abstract Services' number (if any) of the substance monitored	71-43-2 (Benzene)
Confined Space	A space in which dangerous fumes and lack of oxygen are liable to be present to such an extent as to involve risk of persons being overcome thereby	tank, vat, pit etc.
Continual Exposure	Workplace exposure to the substance monitored took place during the work shift and the work pattern did not vary significantly throughout	A welder exposed to Zinc fume for an 8-hour working day
Date of Sampling	The date (dd-mm-yy) on which the air sample was collected	03-08-95
Department	The geographical section of the premises as named by the occupier, in which the air sample was collected	Moulding Department
Dilution Ventilation	The control of exposure to the substance monitored was dependant on the dilution of the contaminated air with uncontaminated air moving under it's own momentum or with the help of a fan	Use of a wall mounted fan to effect dilution or open doors and windows
Duration of Sampling	The length of the air sampling period in minutes	128 minutes
Economic Activity Code	A relevant Code which describes the principal economic activity at the premises where the air sample was collected	NACE code: 10.100 - coal mining ISIC code: 21- coal mining

DATA ELEMENT	DEFINITION	EXAMPLE
Economic Activity	The principal economic activity undertaken at the premises where the air sample was collected. All activities of an economic nature including commercial, financial and industrial activities	Banks - NACE:65.120; ISIC:8101
EEC No	EEC number of the substance monitored	200-001-8 (formaldehyde)
Enclosed Space	A space which is covered on all sides but is not a confined space	A normal work room
Exposure Pattern	The temporal variability of exposure to the substance monitored	occasional / intermittent / continuous
Duration of Exposure (Exposure Time)	The length of exposure period (in minutes) to which the sample collected will provide a representative measurement. This period is normally longer than the duration of sampling	400 minutes
Fixed Point Sample	The air sample was collected at a fixed location in the work area	Sampling device on a work bench
Full Containment	The manipulation / handling of the substance monitored took place in a closed system	In a fully sealed reaction vessel or a pipe
Intermittent Exposure	The exposure, to the substance monitored, varied in duration and frequency because the work functions/tasks varied throughout the work period, may be interrupted and not approximating to an 8-hour total per day	Exposure to welding fume took place at 7 different occasions during the day and in each case the duration of exposure varied.
Job Title	The job title by which the sampled worker is employed	Machine Operator, Foreman
Local Exhaust Ventilation (LEV)	The containment of the substance monitored was achieved by the use of a suitably designed and installed LEV system	Fume Cabinet
Measured Concentration	The numerical value of the airborne concentration (averaged for the sampling period) of the substance monitored	29, unit should be included
Name of the Premises	The legal name of the premises or occupier where the air sample was collected	JNR Fastenings Ltd.
Occasional Exposure	Exposure to the substance monitored takes place from time to time and not as a part of a usual work cycle	Exposure during the annual maintenance of a reaction vessel
Open Air	The open air environment	Surface dressing of a road

DATA ELEMENT	DEFINITION	EXAMPLE
Pattern of Control	Exposure control measures in use to minimise or prevent the exposure to the substance monitored	LEV, Segregation , Dilution Ventilation, use of a dusty material in pellet form etc.
Personal Sample	The process of air sampling was carried out using a personal sampler	A diffusive monitor placed on the lapel of the monitored worker
Process	A series of operations / tasks involved during the provision of any service, in making or manufacturing of goods and products	Production of bronze castings in which a number of tasks and operations will be carried out. Weighing, crushing, transfer into furnace, melting, pouring into moulds, cleaning the casting etc.
Process Code	A relevant code which describes the process associated with the air sample	1231
Product Identifier	Trade or generic name of the product / mixture which contains the substance monitored	Zenbake 512, coal tar etc.
Profession/ Occupation Code	A relevant code	ILO code for professions
Profession/ Occupation	The specific name of the profession to which the sampled worker belongs	Engineer, welder , nurse, accountant etc.
Representative Survey	A survey undertaken to assess the magnitude of exposures to a substance by a group of employees whose personal exposures are similar enough so that monitoring the personal exposure of any worker in the group is likely to provide exposure data useful for predicting exposures of the remaining workers	6 furnace operators out of a group of 10 similarly exposed operators in a furnace area
RPE	Respiratory Protective Equipment	Disposable face mask, breathing apparatus and others
Sample Status	Describes whether the air sampling of a given exposure duration consists of a single or associate samples	Associate sample - 3 discrete samples were collected in the breathing zone of a worker during the day
Sample No.	A unique number by which the air sample can be related to other core information relating to the sample	LA32
Sampling Times	The start and finishing times of the sampling period for a specific sample (24 hour clock)	11:22 - 13:15

DATA ELEMENT	DEFINITION	EXAMPLE
Sampling Method Code	A relevant code which describes the air sampling devices used	DMC (diffusive monitor filled with carbon)
Segregation	Exposure control to the substance sampled was dependant on physical distance between the source and the person monitored	Use of a long handled ladle to transfer molten metal into dies
Single Sample	The air sample in question has no other associate samples to calculate the 8-hour/15 min/shift TWA exposure	One personal sample during a working day
Size of the Enterprise	The size of the enterprise by the approximate number of people employed	Small: 1 - 50; Medium: 51 - 99; Large : >100
Source Sample	The air sample was taken close to the source which emitted the substance monitored	On the lip of a mixing bowl
Substance (name of the)	The name of the substance monitored/sampled	Acetone
Task	The major task activity(ies) undertaken by the monitored worker during the period of sampling or the representatives period	Pouring - of molten metal into a mould during the production process of bronze castings
Time Weighted Average	A specified period of time for which the measuring procedure yields a single value	8-hours or 15-minutes
Type of Sample	Where was the sample collected - What does the sample represent?	Personal, Fixed Point and Source
Unit	The unit of measurement of the airborne concentration of the substance monitored	(mgm^{-3}, ppm, fml^{-1})
Work Area	The specific area within the department where the air sample was collected	Furnace area
Worst-case Survey	An air sampling survey to identify episodes of high personal exposures	High exposures resulting from certain work activities due to prevailing conditions - spray painting with high degree of over-spray

ANNEX B

Equivalent Terms

English	French	German
Address	Adresse	Anschrift
Analytical Method	Méthode d'analyse	Analysenverfahren
Associate Sample	Prélèvement partiel	Probe einer Probenserie
CAS no	Numéro CAS	CAS-Number
Chemical Agent	Substance	Substanz
Confined Space	Espace confiné	Raum
Continual Exposure	Exposition continue	Kontinuierliche Exposition
Date of Sampling	Jour de prélèvement	Datum der Probenahme
Department	Atelier, département	Teilbetriebsart (Betriebsbereich)
Dilution Ventilation	Ventilation générale	Luftung
Duration of Exposure (Exposure Time)	Durée de l'exposition	Fur die Messung relevant (verfahrensspezifische) Expositionsdauer
Duration of Sampling	Durée du prélèvement	Probenahmedauer
Economic Activity Code	Code de l'activité économique	Hauptbetriebsart (Gewerbezweig), Kodiert
Economic Activity	Activité économique	Hauptbetriebsart (Gewerbezweig)
EINECS No	Numéro EINCECS	EINECS-Numer
Enclosed Space	Espace fermé	Geschlossener Raum
Exposure Modifier	Facteurs modifiant l'exposition	Einflussfaktoren auf die Exposiition wahrend der Mesung
Exposure Pattern	Profil d'exposition	Expositiomuster
Fixed Point Sample	A poste fixe	Stationäre Messung

English	French	German
Full Containment	Système clos	Einhausung, geschlossenes Verfahren
Intermittent Exposure	Exposition discontinue	Diskontinuierliche Exposition
Job Title	Nom de l'emploi	Funktion (des Beschäftigten)
Local Exhaust Ventilation (LEV)	Captage à la source (captage localisé)	Erfassungs-/Absaugungseinrichtung
Measured Concentration	Concentration mesurée	KonzentrationsmeBwert
Measurement Strategy	Statégie de mesurage	MeBstrategie, Art der Messung
Measuring Procedure	Procédure de mesurage	MeBverfahren
Name of the Premises	Nom de l'établissement	Name des Betriebes
Occasional Expsoure	Exposition ponctuelle	Gelegentliche Exposition
Open Air	Air libre	Im Freien
Other types of survey	Autre types de campagnes	Andere Arten von Messungen
Pattern of Control	Modalités (mode) de contrôle	Konzentrationsüberwachung (während der Probenahme/Messung)
Personal Sample	Prélèvement personnel	Personengetragene Probennahme (im Atmungsbereich)
Premises	Etablissement	Betrieb
Process Code	Code procédé	Produktionsverfahren, Kodiert
Process Name	Procédé	Produktionsverfahren, Arbeitsverfahren
Product	Produit	Einsatzmaterial/-produkt: Materialbezeichnung
Product Identifier	Identifiant du produit	Einsatzmaterial/-produkt: Handelsname
Profession/Occupation	Profession	Beruf des Beschäftigten
Reference	Référence	Referenz
Report Reference	Référence du rapport	Berichtsreferenz
Representative Survey	Campagne représentative	Repräsentative MeBkampagne

English	French	German
Respiratory Protective Equipment (RPE)	Équipment de protection respiratoire	Atemschutz
Results	Résultat	Ergebnis
Sample No	Numéro du prélèvement	Probennummer
Sample Status	Statut du prélèvement (code)	Probenstatus
Sampling Method Code	Méthode de prélèvement (code)	Probennahmeverfahren, (codiert)
Sampling Device Code	Code de l 'appareil de prélèvement	Probennahmesystem, (kodiert)
Sampling Time	Temps de prélèvement (début et fin)	Dauer der Probennahme
Segregation	Séparation	(Messung im) Abstand zur Emissionsquelle
Single Sample	Prélèvement unique	Einzelprobe
Size of Enterprise - small, midium, large	Taille de l'établissement - petite,moyenne, grande	Anzahl der Mitarbeiter (des Betriebes)
Source Sample	Prélèvement à la source	Probennahme am Emissionsort (Messung der Emission)
Substance (Name of the Measured)	Nom de la substance	Name der (zu messenden) Substanz
Task	Tâche	Tätigkeit/Aufgabe (des Beschaftigten)
Time Weighted Average	Moyenne pondérée sur le temps	Zeitgewichteter Mittelwert
Type of Sample	Type de prélèvement	Art der Messung (expositionsbezogen/ohne Expositionsbezug
Unit	Unité	MaBeinheit des MeBergebnisses
Work Area	Zone de travail	Arbeitsbereich (Betrieblicher)
Worker Activity	Activité du travailleur	Tätigkeit des Beschäftigten
Workplace	Lieu de travail	Individueller betrieblicher Arbeitsbereich
Worst-Case Study	Prélèvement dans les plus mauvaises conditions (pire des cas) - campagne en conditions majorantes	Expositionsmessung (ungünstiger Fall)

European Foundation for the Improvement of Living and Working Conditions

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A proposal for core information for workplace exposure measurements on chemical agents

Collecting and analysing data on health and safety at the workplace is an essential starting point for setting up priorities and action plans, as well as for evaluating the measures taken.

Since 1988 the Foundation has been working on this topic at a European level in order to seek a more co-ordinated approach to the monitoring of working conditions relating to health and safety. A number of European networks and working groups have been established in order to assist the Foundation in this process.

One of the networks which exchange information on "hard data" on health and safety at the workplace concerns "Product Registers in Europe".

In a previous publication the network has reported on the possibilities for comparison between the data bases exemplified by xylene measurements.

This second publication provides a guide to promote a common approach to the collection, storage and exchange of core workplace exposure measurements on chemical agents.

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