

**INFORMATION ON HAZARDS OF MATERIALS IN THE  
WORKPLACE ENVIRONMENT  
PROVISION AND USE IN A LARGE NON-CHEMICAL  
ENTERPRISE**

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**ABSTRACT**

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In order to meet a requirement to provide information about hazards of materials a scheme was devised to produce Data Sheets describing the characteristics of each material, the requirements for safe working, and giving advice on remedial action in case of accident. A separate series of Information Sheets explains some of the terms and concepts used in the Data Sheets. The scheme's objective is to help individual managements to devise safe working procedures with potentially hazardous materials.

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The Health and Safety at Work Act of 1974 introduced many new ideas to industry in the United Kingdom and two of them, with which this paper is concerned, were that anyone supplying materials for use in manufacturing should tell the manufacturer about the possible hazards associated with the materials and that the manufacturer, in turn, should tell employees about the hazards and the steps necessary to avoid them.

Many suppliers were already in the habit of including some advice about safe working practices in their promotional literature but there was no legal obligation to do this, except for some particularly hazardous materials, until the new Act came into operation. Whilst the proposals for legislation were still under discussion many suppliers decided not to wait for the laws to be made and started to put out information which they expected they would be called upon to do in the future.

To the people at the receiving end it was soon very clear that individual suppliers had very different ideas of what was needed and the presentations varied enormously from the simple statement "this substance will be perfectly safe if properly used" to a multipage document including every sort of minute toxicological and other detail. Because of this lack of uniformity it was clear that a manufacturer could not honestly carry out the duty put upon him by the Act, to advise employees about hazards, simply by passing on suppliers' information. Thought was therefore given to how the company could fulfill, in the most

economical and effective manner, its obligation to warn and advise those who might be at risk.

#### COMPANY BACKGROUND AND KIND OF RISK

The business of the Company is mainly that of making packages in metal, paper and plastic, but it also makes some pots and pans, containers for use in the home, steel radiators and boilers, and machinery, most of it for making packages. The list of different materials bought runs into many thousands and amongst the manufacturing activities are the casting of steel and aluminium, extrusion of aluminium, forming of tinplate and aluminium, printing on metal, paper and plastic, extrusion and injection moulding of plastic materials, lamination of metal, plastic and paper films, metal cutting, turning, spinning, soldering and welding.

In comparison with such industries as fishing or mining, the sort of things which the Company does are not very hazardous and there are none of the obvious potential risks which would be associated with, for instance, chemicals or petroleum. There are one or two situations where particular care is necessary, for instance, in the foundries and working with lead. These dangers had been recognized and safe working practices established. However, there is an enormous range of materials used in all kinds of operations throughout the Company about which there was little definite information about possible hazard or safe working practice. In many instances the chemical composition was a "trade secret". A large number of materials are used and by a large number of people, not just a limited number of specialists. For example, about 15% of the Company's employees work in printing operations, which call for the use of a variety of different solvents needing care in the way they are used.

#### INFORMATION NEEDED

What seemed to be needed was information about the potential hazard of each material and advice on how to use it safely, presented in a way which would be helpful to managements and safety committees in setting out rules for safe working procedures. The information should be well set out, easy to understand and everyone with a genuine need to see it should be able to do so. However, it was recognized that working instructions had to be based on the needs of each particular workplace and take account of such things as the amount of a material used and the skills of the operators. Therefore, no attempt should be made in the Data Sheets to go into precise detail. The Data Sheets were to provide general guidelines, the people directly concerned with the workplace must use the Data Sheets and any other information and advice to establish the safe working practices to be used in that workplace.

It was decided not even to suggest the most likely place where a material might be used because this might encourage local managements to look for a material only in the situation noted on the Data Sheet and perhaps miss some obscure use, unknown to those preparing the Sheets.

There is nothing new in the idea of Data Sheets and organizations use the format which best meets their own particular needs. A note was taken of what some other people had done and, in particular, Trevethick's book, "Environmental and Industrial Health Hazards",<sup>4</sup> was extremely helpful. The starting point for this set of Data Sheets, as it must be with any other collection of information, were the needs of the expected user.

In most of the Company's establishments there are few or no people with a specialist scientific training. It was, therefore, important to write things which intelligent people, but without specialist skill, could understand and set the information out in a way which was easy to use. It was realized that to make things "understandable" might mean the sacrifice of some scientific precision. This will be referred to in the discussion about the classification of the material in the Sheets.

It was decided to try to collect the same kind of basic information about each material and to set this out in a clear manner so that the same subject was dealt with in the same place on each Sheet. In this way it was hoped that users would find the information they needed easy to get at and this would of itself encourage more use of the Sheets. From the beginning it was recognized that if potential users found the Sheets difficult to use they would be of little value to the Company and its employees and merely a waste of valuable resources in preparation.

#### **Data Sheet contents**

For a Data Sheet to be of value, the first need is to characterize the material named so that the reader is able to relate the information given to the can or drum or bag of whatever substance it is in use in the factory. The second is to note the hazards of the material, the third to advise on precautions and the fourth to instruct on what to do if, for some reason, things go awry. A last item serves to draw attention to some of the regulations which might apply.

#### *Characteristics of Materials*

*Title* It was decided from the beginning to use as a title the words or code letters and numbers with which the user would be most familiar. This raised a small problem. A fairly simple substance may be known in different places in the Company under several different names, some of them trade names. The outcome was a firm resolve not to use cross referencing, because this might discourage some potential users of the Sheets but, instead, to prepare a Data Sheet under each of the names for which the material was known. One such series is "Trimethyl Benzenes", "Aromasol" and "Solvesso 100". To regard these three names as equivalent is not scientifically accurate, Aromasols include ethyl toluenes as well as trimethyl benzenes and Solvesso 100 is a different mixture. However, for the purposes of hazards identification the three descriptions are close enough and, the names apart, the Data Sheets are the same for all three.

*Chemical Formula* If the chemical has a defined chemical formula this is given. No reference is made to additives present in such small quantities that these have no effect on the hazards or the precautions.

*Warning Symbols* If the EEC Hazardous Substance Directive allocates hazard warning symbols to the material these are used in the headings. In some instances, symbols are used even if the Commission has not yet got round to them. For instance, the Commission has not yet dealt with mixtures but a "Flammable" symbol is used for a mixture of materials if each component on its own would need to carry the symbol.

*Other Names* Lists the names under which the material is known within the Company.

*Description* This is not elaborate, just enough to relate the material being described with the Data Sheet.

*Threshold Limit Value* This presents some difficulty. It is not a physical characteristic, it is something allocated upon the judgement of people who are no doubt fallible, based on an assessment of evidence which is constantly being augmented. What is more, it is not part of the description of the material but is a bench mark against which a hygienist can compare the atmospheric contamination level and be helped in a decision as to whether continued exposure to that atmosphere could be harmful.

The TLV is, of course, used loosely as a comparative measurement of toxicity. The introduction to the American Conference of Governmental Hygienists list<sup>1</sup> and the foreword to the Guidance Note put out by the UK Health and Safety Executive<sup>3</sup> both point to the possible hazards of using the TLVs in this way. Nevertheless, TLVs are so used and, rather than leave them out it was decided to include them but to try also to explain both their proper use and the pitfalls of using them comparatively in a separate document. This is referred to later.

*Flash Point* This is included because it not only gives some indication of flammability but is also important in relation to UK legislation on storage, transport, and labelling.

*Boiling Point* Some measure of volatility is helpful in explanations of why TLV comparisons can be misleading. Boiling Point is slightly easier to use with non technically trained people than partial vapour pressure.

*Lower Explosive Limit* Flammable materials are used in many parts of the Company and there are Flammable Gas Detectors on a number of sites. All the operations are open ones so that there is never the possibility of safe working above the Upper Explosive Limit and this is not therefore included. As with Threshold Limit Values a separate document has been prepared about Flammable Gas Detectors and Explosive Limits.

*Safe Working*

*Hazard* Although different materials present different degrees of risk there is no universal scale which can be applied to risks, even of the same kind. It is possible to judge, after considering as much of the available evidence as can be collected, that, for instance, one material may be more irritant than another and, if the difference is large, few people will disagree with the judgement. Making fine distinctions or trying to put a range of materials into a limited number of categories of irritancy is much more difficult. What has been attempted is to use expressions which relate to the actual product being described so that if two materials offer similar hazards the wording is similar and, obviously, if the hazards are very different then the wording used indicates this.

The people using these Data Sheets need to use the materials described as part of their daily work. The hazard description must be realistic and not provoke either unnecessary anxiety nor careless irresponsibility. There is no doubt that it is possible to quarrel with the descriptions used and to argue about the lack of discrimination in some instances or excessive discrimination in others. All that can be said is that the wording now used represents the present views of the people responsible for the editing and they are well aware that the wording must be subject to change in the light of new information and the authoritative opinion of others concerned with the chemicals and skilled in industrial hygiene and industrial medicine.

*Precautions* As with *Hazards* the wording of *Precautions* makes distinctions between different materials with different degrees of risk. Following the principles noted earlier it gives general advice, for instance to use gloves or protective clothing, but the precise specification of which kind of glove or other article to use is something to be decided at the workplace.

*Storage* Storage is a matter of following the supplier's recommendations plus any commonsense or general precautions or legal requirements, for instance, those for handling compressed gases in cylinders.

*Remedial Action*

*First Aid* The advice is simple and positive. There is no encouragement for the unqualified to take on any medical responsibility. For example, the advice for "Ingestion" is always "Obtain immediate medical attention". In all the Company's establishments in the UK some form of medical assistance is available during the day and on any substantial shift work. It is part of the managerial responsibility to ensure that there is access to adequate medical assistance at all times, which may call for making special arrangements with a local doctor or hospital to cover the needs, for instance, of a small night shift.

*Fire Fighting Procedure* The advice offered is for dealing with small fires on Company premises and is limited to the fire fighting equipment and materials in the Company.

*Spillage* This paragraph presents a few difficulties because the treatment of a spillage must vary with the amount spilled. There is bound to be a difference between the procedure for dealing with a tipped 25 ml measuring cylinder and a burst 200 litre drum. However, as explained earlier, the idea is that the Data Sheets would be used to provide some of the information on which local operating procedures will be designed. The local operating procedure for the use of small quantities of chemicals in a laboratory will envisage a different way of handling a spillage from the procedure in a solvent store attached to a printing factory.

The two remaining items are the EEC Warning Phrases which are recommended for use with the material, if there are any, and a note of any relevant UK legislation.

Each Data Sheet also has the date of issue and the issue number.

#### **Information Sheets**

Some of the concepts used in preparing the Data Sheets are unfamiliar to people without a specialist interest in occupational hygiene. As a companion to the Data Sheets, a series of Information Sheets explains some of the items in the Data Sheets, gives background information and, in one instance, gives the instruction for carrying out Company policy. Subjects include "Threshold Limit Values", "Hazard Warning Labels", "Flammable Gas Detectors", and the Information Sheet defining a Company Policy "Asbestos".

It is not the aim of the Data Sheets or the companion Information Sheets to make every member of every management team into an expert in industrial hygiene. However, the number of specialist advisors in the Company is limited and if the people with immediate safety responsibility have a basic understanding of the principles of safe working with potentially hazardous materials they are able to use the services of the specialists in the most effective way.

New ideas, new information, new demands, will call for changes in any system, and although this work has been going on for only three or four years changes have already been made, not only in the revision of individual Data Sheets but in recommending the way in which they are used. At first it was thought that a safety procedure for each individual material should be developed in each place in which it was used. However, it was soon realized that this was an extremely cumbersome procedure and now work is starting on a scheme of material classification so that, for the most part, materials coming into the factory can be classified as falling into one or other of approximately eight categories about which general safety procedures will be written.

Some materials will, of course, resist being forced into the strait jacket of a particular category. For them there must be special procedures and special instructions on how to handle safely. It is not anticipated that this will provide any difficulty. The training which each individual receives includes instruction in the specific safety procedures he or she must use in the work for which the training is given. For jobs which use materials falling happily within the defined categories instruction will follow the lines of the general safety procedures. If the

work calls for materials with characteristics falling outside those defined in the general procedures the instruction will recognize the special problems these particular materials present.

Another idea being developed is the use of a sort of omnibus Data Sheet for gathering together materials used in very similar circumstances. Examples are film forming materials used in metal decoration and protection. Because the materials have similar properties a single Sheet listing hazards, precautions, storage, first aid, fire fighting, and spillage advice can be used to cover them all. A second Sheet, the Constituent Materials Sheet, lists the varnishes, coating, lacquers, by the supplier's identification wording and number, and identifies the solvents in each. An immediate aim is to provide Data Sheets for each individual solvent listed in the omnibus sheets. This seems to be one instance where there is no practicable alternative to cross referencing.

It cannot be stressed too much that the whole package of Hazards of Materials Data Sheets, Information Sheets and material classification is not intended to be a rigid structure laying down rules to be followed throughout the Company but a source of assistance to help the various units within the Company create and maintain a safe and healthy working environment.

This whole exercise was started because there was seen to be a need to provide information about hazards of materials in an accessible form which could be understood by people without specific technical training. It is easy to quarrel with some of the ideas, particularly the inclusion of the TLVs, and not everyone will agree with each individual note on a "Hazard" or a "Precaution". However, to get everyone's agreement on every point would have meant no Data Sheets at all.

Of more concern is the lack of any more helpful medical guidance. It is one thing to say in the First Aid Measures "Obtain immediate medical attention" but this is of little value if the medical personnel involved have no real knowledge of the toxicology of the individual materials. Dr Trevethick did provide some guidance with his Medical Data Sheets but there is little else that we are aware of which could be of real practical value. Even the UK Health and Safety Executive Guidance Notes raise perhaps as many problems as they solve. Perhaps more consideration could be given to the application of the theoretical results of industrial toxicological investigation to some practical outcomes. Is this an area in which an organization such as the Permanent Commission may have a role to play?

#### REFERENCES

1. *American Conference of Governmental Industrial Hygienists*. Threshold Limit Values for Chemical Substances 1976, Cincinnati, Ohio.
2. *Health and Safety at Work Act*. HMSO, London, 1974.
3. *Health and Safety Executive*. Threshold Limit Values for 1976. Guidance Note EH15/76 HMSO London.
4. *Trevethick, R.A.* Environmental and Industrial Health Hazards, William Heinemann Medical Books Ltd., London 1973.