

A REVIEW OF COSHH ESSENTIALS

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Dangerous substances are used in a wide range of industrial and commercial activities and, over the years, many workers have contracted occupational diseases through exposure to such substances. COSHH (Control of Substances Hazardous to Health) Essentials is published by the Health and Safety Executive (HSE) of the UK to illustrate a step-by-step process for assessing risk and identifying control measures for hazardous substance handling. This paper examines and discusses the pros and cons of COSHH Essentials.

Keywords: COSHH; COSHH assessment; hazardous substance exposure; risk assessment.

INTRODUCTION

Inappropriate handling of hazardous substances may create various occupational diseases and injuries. Typical examples include occupational dermatitis, chemical poisonings, occupational cancers, and the group of diseases known as pneumoconiosis. The potential for contracting an occupational disease varies according to the hazardous nature of the substance concerned, its form (e.g., solid, liquid, gas, dust, etc.), the route of entry into the body, the precautions taken, the dose received on a short-term, medium-term, and long-term basis, and the degree of susceptibility to the substance of the individual. The Health and Safety Executive (HSE) estimates that 3000 to 12 000 occupational cancer deaths every year are attributable to hazardous substance exposure. The 1995 work-related ill-health survey further highlighted 200 000 cases of lower respiratory disease, 66 000 cases of skin disease, and 19 000 cases of pneumoconiosis¹.

Legislative controls to reduce ill-health injuries were therefore necessary. The Control of Substances Hazardous to Health (COSHH) Regulations is the most important piece of United Kingdom legislation on the risk assessment and control of chemical hazards at work. COSHH was enacted in 1988 and began to come into force in October 1989. The Regulations were amended in 1994 and again in 1999. The principle underpinning COSHH is to protect the health of workers by requiring hazardous substances in the workplace to be identified and the potential risks to health associated with the use of those substances to be assessed.

REASONS FOR COSHH ESSENTIALS PUBLICATION

In the period 1991 to 1992, the HSE conducted a survey of how employers were getting to grips with COSHH. In total, 536 employers were consulted and the survey found that 38% were complying with COSHH, 75% had completed the assessments, but, of these, only 27% of the COSHH assessments were suitable and sufficient. The HSE

found: 'The most common fault had been for assessments to consist of little more than collections of data sheets without the all-important evaluation of the risks arising from those hazards.' This finding was especially significant in small- and medium-sized enterprises (SMEs) employing fewer than 50 workers. In 1992, the HSE commissioned a study to randomly telephone 2000 employers and found that 62% had heard of COSHH, 65% had not started their assessment, and 42% admitted they had done nothing².

These surveys implied that most employers did not understand the approach for assessing and controlling risks from chemical hazard or ignored the regulations. This was especially the case for SMEs who did not have access to professional safety advisors. The publication of COSHH Essentials is aimed at alleviating problems encountered by employers and providing a step-by-step process for assessing risk.

DISCREPANCIES OF COSHH AND COSHH ESSENTIALS

COSHH Regulations not only applies to factories, chemical plants, foundries, and machine shops, but also to less hazardous operations such as offices, banks, insurance companies, finance houses, small shops, department stores, hotels, restaurants, guest houses, schools, libraries, and so on. Only crews on board sea-going ships are exempted from these regulations.

In terms of hazardous substances control, COSHH applies to substances that are classified as being very toxic, toxic, harmful, corrosive, sensitizing, or irritant under the Chemicals (Hazard Information and Packaging for Supply) Regulations 1994, and to those substances that have maximum exposure limits (MELs) or occupational exposure standards (OESs). COSHH also covers any substances that have chronic or delayed effects, biological agents, and substances regarded as hazardous to health if they are hazardous in the form in which they occur in a work activity³. COSHH does not cover lead or asbestos, which have separate sets of regulations, nor substances that are hazardous only because

they are radioactive, asphyxiants, at high pressure, at extreme temperatures, or have explosive or flammable property. The regulations also exclude total inhalable dusts present in underground coalmines.

There is a minor difference between COSHH and COSHH Essentials in their applications. Chemicals not governed by the Chemicals (Hazard Information and Packaging for Supply) Regulations 1994, naturally occurring hazards, and biological agents, etc., are not covered by COSHH Essentials. Following COSHH Essentials to conduct assessment only conforms to part of COSHH requirements. This may mislead employers into believing that they are totally discharging their statutory duties in conducting COSHH Essentials assessment and may thus result in only partial compliance with COSHH.

EFFECTIVENESS OF COSHH ESSENTIALS

Assessment Scope

Step 1 of COSHH Essentials is to identify tasks to be assessed comprehensively encompassing activities such as mixing, weighing, transfer, storage, separation, and so on. It requires the taking into account of what may foreseeably happen in the event of accidents. COSHH Essentials hence provides guidance for non-specialists on protecting employees exposed to hazardous substances by presenting comprehensive control approaches and considerations. For example, assessment is quite simple to conduct in warehouse operations because the substances are completely contained. However, the risk becomes significant if the containment is breached, for example, if a drum is broken. It is therefore necessary to conduct a complete assessment covering foreseeable hazards. One company was taken to court because of failing to assess adequately the health hazard of circuit boards overheating in an oven⁴.

Evaluation of workplace hazards from individual chemicals should take into account likely routes of exposure and the combined effect where more than one route is possible. For example, a metal in the form of blocks is unlikely to be harmful, but in the form of fine dust or fumes can be inhaled and is therefore hazardous to health. This means that an important part of the assessment should include looking at places where exposures can occur, the forms in which the substances are present, and the routes of entry into the body. Whilst toxicity data may be available for a substance, it is quite common to find information gaps for routes of particular significance to occupational exposure. For example, there may be extensive data on the oral toxicity of a substance, to underpin its use as a food additive, but few data on its toxicity by skin contact or inhalation, the routes of greatest importance in the workplace⁵. These considerations on routes of exposure due to substances hazardous to health are covered in Step 2 of COSHH Essentials, which concerns chemicals causing harm when breathing in or contacting with skin and eyes. Making good use of this step, COSHH Essentials can provide suitable assessments for hazardous substances on routes of entry.

Competence of Persons for Assessment

Regulation 12 of COSHH requires any person responsible who carries out risk assessment to have the necessary

information, instruction, and training. The level of competence required for performing assessments can vary with the risks and complexity of the operations. Only a little special knowledge is required to perform basic assessments, such as, for the correction fluid containing 1,1,1-trichloroethane with 'harmful' label on its package. If a supplier's material safety data sheet has not been obtained, enough information may be available from the label to perform a basic risk assessment to comply with COSHH Regulations⁴. However, professionals having more knowledge and experience with the materials and familiarity with the operating practices are needed in more complex cases. The flexible requirements of COSHH allow employers to conduct risk assessments appropriate to their business size, nature, and complexity. The Construction Industry Research and Information Association (CIRIA) reported that 64% of construction companies carried out the assessment process in-house and only 32% involved consultants for some or all of their assessment work⁶. Only 50% of construction companies found the professional advisors helpful. The result of this survey indicated that in-house assessment is preferred by most employers. COSHH Essentials containing documented assessment procedures and respective control guidance may further help employers assign their own staff to conduct assessments and implement control measures.

Hazardous substances cover a wide range of materials, pure and impure, simple or complex mixtures, single chemical compounds, natural or synthetic products in the form of solids, liquids, gases, dusts, fibres, fumes, or aerosols. Some substances can be relatively risk-free in solid or liquid form, but may present a high risk to health in the form of dusts, aerosols, or vapours; for example, welding rods compared with welding fumes⁵. These difficulties may discourage those responsible from making assessments. Professor D. Taylor, Chairman (1998) of Environment, Health and Safety Committee of the Royal Society of Chemistry, stressed that 'the most important issue is to motivate employees, managers and workers to take occupational ill health seriously. Many managers especially in SMEs appear to be poorly informed about the subject. Better chemical health and safety support services in this case is necessary. Those concerned may lack the expertise to interpret safety data sheets in the context of their workplace, especially given the sort of mixed exposures that are frequently encountered.' Under these circumstances, suitably qualified consultants should be engaged in a difficult assessment or where detailed monitoring is necessary to ensure assessment effectiveness. To cater for those high-risk scenarios, COSHH Essentials thus includes a 'Control Approach 4' referring users to seek expert advice.

Complexity of Industrial Processes

If the work is very complex, more effort will be needed because it is difficult to ensure that risks have been evaluated correctly. The expertness and degree of detail needed for an assessment will hence vary from one situation to another, and depend on the risk nature and the complexity of the activities. Obviously an assessment might not be accurate and effective if it fails to identify all the hazardous materials used in or generated by a complex process. It is clear that failing accurately to identify operational activities will lead to general assessments that attempt to cover too many

activities. For example, a COSHH assessment that attempts to evaluate paint mixing and paint spraying activities in a single document is not likely to be successful⁷.

Apart from the potential hazards associated with raw materials, employers should also consider the hazards generated during their own processes from by-products to unwanted wastes. Under such circumstances, adequate safety data sheets might not be available and responsible persons must look for other sources of advice. F. M. B. Carpanini indicated it is rare for a workplace to be exposed only to a single chemical by a single route of exposure⁵. It is impossible to develop toxicity data for every combination of mixed exposures likely to occur in every workplace. Nevertheless, a comprehensive hazard evaluation process should consider the possibility of the chemical interactions in the cases of (i) addition—substances acting via a similar mechanism on the same organ or organ systems; (ii) independent action—substances acting to produce a toxic response, but not influencing the others; (iii) synergism—substances acting to produce a toxic response that is greater than the sum of effects of the substances acting individually; (iv) antagonism—substances acting to produce a toxic response that is smaller than the sum of the effects of the substances acting individually; (v) reaction—substances reacting chemically to produce other substances, which have different toxic properties from the original substances⁵. The complication of chemical interactions is not addressed by normal exposure limits; similarly, it is also not addressed in COSHH Essentials and hence increases difficulties for non-specialists in making assessments and reduces the assessment effectiveness.

Reliability of Safety Data Sheet

Compliance with the Control of Substances Hazardous to Health Regulations 1999 and COSHH Essentials mainly relies on information provided by the manufacturer or supplier, guidance material published by the HSE, technical references from scientific and technical papers, and consultancy services provided by professional institutions, and so on³. Gathering the safety data sheet for every chemical is the first step instructed by COSHH Essentials. Although labels, package requirements, and safety data sheets of chemicals are regulated by the Chemicals (Hazard Information and Packaging for Supply) Regulations 1994, manufacturers' and suppliers' safety data sheets vary enormously in quality and should not be treated as an authoritative source of information⁸. While the best can be very important sources of information, the worst are neither accurate nor understandable. The effectiveness of assessment approaches provided by COSHH Essentials relies heavily on the enforcement of the Chemicals (Hazard Information and Packaging for Supply) Regulations 1994. For this reason, the HSE is planning to spend £2 to 3 million in the period 1999 to 2005 on a review of current safety data sheet practices and the ways of communicating information on chemical hazards².

In addition, there is a risk of using an obsolete safety data sheet for COSHH assessments. Scientific and research technologies rapidly change and result in continuous updates of safety information. It is important to keep risk assessments up to date by using the latest safety data sheet. Outdated information could result in making a wrong judgement about the risks to health⁷.

Cost and Expenditure

Regulation 6 of COSHH requires employers to carry out an assessment of any substances hazardous to health. Cost for the assessment is thus incurred. The more complex the business processes, the higher the assessment cost that may result. It is reported that more than 30 000 COSHH assessments should be conducted for British Steel's processes, ranging from production of gas and coke to purification of water, in which more than 10 000 substances are employed⁷. SMEs in particular often perceive that it would be overly expensive to seek specialist health and safety advice. However, the high costs incurred for risk assessments are cost effective for the national economy as they reduce employees' ill health in the long term. Diana Simpson and W. Gordon Simpson indicated 'the costs of preparing for and implementing COSHH assessment are becoming apparent as are the savings to be made by designing projects from their inception with health and safety considerations in mind'⁷.

For exposure prevention, non-specialists, including managers, engineers, or workers in a company with knowledge of the workplace conditions, can facilitate the development and adoption of appropriate control measures for minimizing the risks associated with hazardous substances. Severity of chemical risks depends on the effectiveness of current control measures. Staff familiar with production processes, working practices, and the design of plant and equipment can further evaluate and adopt appropriate control measures enclosed in the Control Guidance Sheets. Cost and expenditure for control measures to reduce employees' risk can thus be reduced⁹.

Sufficient and Suitable Assessment

Regulation 6 of COSHH delegates employers to conduct a suitable and sufficient assessment of the risks created by providing valid information to be made about measures necessary to control substances hazardous to health associated with any activity. The HSE interprets the meaning of 'suitable and sufficient' as follow³.

- an assessment of the risks to health;
- consideration of the practicability of preventing exposure to hazardous substances;
- the steps that need to be taken to achieve adequate control of exposure where prevention is not reasonable practicable, in accordance with regulation 7; and
- identification of other action necessary to comply with regulations 8–12.

Peter Chandler⁹ explained that the 'suitable and sufficient' assessment should determine: (i) what further steps are to be taken if exposure to hazardous substances is to be prevented or adequately controlled; (ii) what new or additional control measures are required; (iii) how those measures are to be used and the frequency with which they are to be maintained, examined, and tested; (iv) what changes need to be made to existing working practices and how those changes are to be enforced; (v) what procedures are to be introduced to monitor the exposure of employees to hazardous substances; (vi) which employees should submit to routine health surveillance; and (vii) what further information, instruction, and training needs to be provided in order to acquaint employees with the health risks associated with their exposure to hazardous substances and the precautions that should

be taken⁹. Although COSHH Essentials mentions the need to consider health surveillance and exposure monitoring, no procedure is provided. A non-specialist conducting the assessment may not have adequate information to establish mechanisms to validate the working of control measures and may miss opportunities for risk reduction or elimination.

Graham Roberts-Phelps¹⁰ also indicated that risk assessment must consider (i) the hazards of the substances and their ingredients, (ii) the route into the body, (iii) the worst potential outcome, (iv) who could potentially be exposed, (v) who might be accidentally exposed, (vi) how many people may possibly be involved, (vii) how often or how intensively or how long people work with the substance. It is obvious that COSHH Essentials is precautionary and has inadequate consideration for those human factors. Some of the factors mentioned, if considered further, may allow a relaxation of control.

Control Measure Adequacy

Employers are frequently deterred by the high cost of local exhaust ventilation (LEV); personal protection equipment is commonly used as the 'fall back' but is often woefully inadequate. Such a prevailing situation is caused by a lack of understanding, time pressure, and cost. Contrary to this fallacy, source control can significantly reduce the number of people exposed and enhance the cost effectiveness of control measures. Regulation 7 of COSHH regulates that the prevention or adequate control of employee exposure to a hazardous substance be protected by measures other than the provision of personal protective equipment. This underpinning principle is to prevent employees from inappropriate use and the failure risks of personal protective equipment.

Approaches in the selection and use of suitable control measures are enclosed in the Control Guidance Sheets of COSHH Essentials. Control approaches of general ventilation, engineering control, and containment with their design specifications, examination and testing requirements, administrative control measures, and so on are provided. These enclosed control approaches can benefit non-specialists, who may adopt them according to their risk and existing devices. If a substance being used is extremely hazardous, COSHH Essentials further directs them to seek professional advice in selecting respective control measures. Besides, the Control Guidance Sheets cover various processes such as storage, transfer, weighing, mixing, etc., which can protect employees in different activities and businesses.

CONCLUSION

The processes of assessment and control in COSHH Essentials are consistent with the Robens approach on self-regulation providing employers control the risks to health and establish controls appropriately.

It is obvious that COSHH Essentials is able to provide basic risk assessment on hazardous substance exposure. Following the Control Guidance Sheets, employees' exposure can be protected by appropriate control measures. Since COSHH Essentials is developed to document a step-by-step process for assessing risks and identifying the need for

control measures, it helps employers assign non-specialists or competent persons to conduct the risk assessment accordingly. This practice can reduce assessment cost and can be an alternative to hiring subject experts. In addition, recommended engineering controls enclosed in the Control Guidance Sheets can allow employers to tailor-make their own control approaches according to existing devices and hence reduce unnecessary expenditure. Although there are few sound citations on cost incurred, it is justified in comparing cost to consider the numerous cases in occupational injuries and diseases arising annually. It is fair that those whose work creates greater risk should have more to do.

There are several drawbacks discussed, however, that could be remedied by using COSHH Essentials as a preliminary assessment. If any activity results in a possibly serious health effect through COSHH Essentials assessments, specialists' recommendation, monitoring, and analytical measurement should immediately be sought. In addition, conditions under which to conduct exposure monitoring at the workplace should be more stringent instead of occurring only under cases specified in Regulation 10 of COSHH. Certainly, the diligence of employers, enforcement and enhancement of the Chemicals (Hazard Information and Packing for Supply) Regulations 1994 are critical to the overall effectiveness of such a legislative scheme in protecting workers' occupational health against hazardous substances.

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