管制工場內的有毒物質
CONTROL OF TOXIC SUBSTANCES IN THE WORKPLACE

勞工處
職業安全及健康部
Occupational Safety and Health Branch
Labour Department
FOREWORD

This booklet forms part of a series on the protection of workers’ health. It aims to highlight the potential hazards of toxic substances that can be encountered in industry and to offer advice on measures which can be adopted to minimise such hazards.

It is the responsibility of an employer to ensure that the working environment does not constitute a danger to the health of his employees. To achieve this, he must not only apply all recognised control measures but must be satisfied that his employees are aware of the danger of exposure to toxic substances and that they strictly adhere to the safety principles at all times.

This booklet and others in the series are available free of charge from offices of the Occupational Safety and Health Branch of the Labour Department.

Occupational Safety and Health Branch
Labour Department
CONTROL OF TOXIC SUBSTANCES IN THE WORKPLACE

Introduction

1. Fundamentally, it is the duty of every proprietor of a work place to ensure, as far as reasonably practicable, safety and health of the workers in the use of chemicals and other substances in his workplace. The object of this booklet is to outline precautionary measures as a guide to the safe use of chemicals and other potentially toxic substances in industry, with particular reference to the prevention of occupational cancer.

2. Occupational cancer has attracted considerable attention in recent years and there is a growing list of substances with varying degrees of suspicion as carcinogens through exposure at work. Occupational carcinogens are agents which induce cancer in humans as a result of their exposure to these agents in the employment.
Carcinogenicity can be considered to be one facet of the wider problem of toxicity of chemicals and other substances. For the present purpose, substances used in industry can be grouped under five headings:

3.1 Proven human carcinogen;
3.2 Suspected human carcinogen;
3.3 Animal carcinogen;
3.4 Substances known to be toxic but not carcinogenic;
3.5 Substances not known to be toxic or carcinogenic.

When a substance is known to cause cancer in humans, rigorous control measures, including prohibition where appropriate, are required to keep exposure to a minimum. Prohibition of blue and brown asbestos and particular care in the use of the other forms of asbestos are examples.
5. When a substance is suspected of being carcinogenic, increasingly strict control measures are taken, concomitant with the available evidence of carcinogenicity. For example, particular care is required in handling formaldehyde and carbon tetrachloride.

6. If a substance is known to be toxic but not carcinogenic, control measures should be appropriate to prevent the known toxic effect, e.g. prevention of inhalation of lead fume.

7. Substances which are not considered to be toxic or carcinogenic could present a problem if subsequently found to be carcinogenic since these are the substances likely to be used indiscriminately or without particular care.

8. It is therefore essential not only to exercise control measures for proven and suspected carcinogens, but also adopt a general precautionary policy for controlling the use of all substances whether or not they are known to have any harmful effect.
General precautionary measures

9. Toxic substances enter the body by one or more of the following routes: inhalation, ingestion and absorption through the skin. Exposure should be kept as low as reasonably practicable by application of occupational hygiene principles and techniques appropriate to the route of entry. Once a hazard has been identified, its effects on exposed persons should be assessed by a combination of medical and environmental monitoring as appropriate. The hazard should be measured (e.g. by sampling in the person’s breathing zone) and the results compared with occupational hygiene standards or other data relating toxic effects to exposure levels. The Occupational Safety and Health Branch of the Labour Department has published “A Reference Note on Occupational Exposure Limits for Chemical Substances in the Work Environment”. It lists out more than 200 chemicals commonly used or involved in industrial processes. Interested people may make reference to the list for assessment of the working conditions. For chemicals that are not in the list or have no known health effects, there should be a policy of keeping exposure as low as it is practicable.
Control methods

10. Occupational hygiene methods for the control of toxic substances are listed below. In most situations, a combination of various control methods must be used to provide adequate protection. Often, no single measure can be relied upon exclusively. Examples of controls are:

10.1 **Substitution with less hazardous materials** - always consider the possibility of using the least toxic substance e.g. man-made fibres such as glass wool are safer than asbestos;

10.2 **Restriction of possible exposure** - minimise the number of, and restrict access only to essential personnel; limit the duration and degree of their exposure to well within the Occupational Exposure Limit (OEL);

10.3 **Segregation of plant and people** - total enclosure of process plant; physical separation with remote handling techniques;

Advisory service

12. Further advice on any aspect of the control of toxic substances in the workplace is available from the Occupational Health Service of the Labour Department:

Address : 15/F, Harbour Building,
38 Pier Road, Central, Hong Kong

Telephone : 2852 4041
Fax : 2581 2049
E-mail : laboureq@labour.gcn.gov.hk.
Website : http://www.info.gov.hk/labour
10.3 Contamination by transfer - on protective clothing and equipment (e.g. footwear and overalls), on wheels of vehicles (including private cars), on uncovered loads, etc.;

10.4 Inadvertent discharge - e.g. chemicals escape from pressure relief systems or other parts of the plant.

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10.4 Control of emissions from the process so that a person's exposure is well within the OEL - use of ventilation techniques, particularly local exhaust ventilation applied as near as possible to the source of emissions; wetting of dusty materials; pelleting; feeding of toxic substances to process in pre-packed containers;

10.5 Personal protection - use various forms of protective clothing and respiratory protective equipment;

10.6 General hygiene - application of 'good housekeeping' techniques such as use of vacuum cleaners with suitable filters; prohibition of smoking, eating and drinking in the workplace where toxic substances are used; provision of suitable washing facilities to encourage high standards of personal hygiene.
10.7 **Supervision** - supervise the employees to ensure that all control measures are used properly.

10.8 **Health and safety education** - provide adequate information, instruction and training to the employees so that they are aware of the dangers involved in working with the hazardous substances and the control measures required.

10.9 **Maintenance** - check and maintain all the control measures to ensure their effectiveness and efficiency of performance.

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**Control measures outside the workplace**

11. **Control measures provided for the workplace should not be installed or used in ways which may affect the outside environment. Aspects which should be considered include:**

11.1 **Emissions to outside atmosphere, from both the process and its exhaust ventilation controls** - these may need, for example, the provision of filters, scrubbers, or incineration equipment before discharge to the outside air;

11.2 **Effluent discharge and waste disposal:**
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- **11.2 Effluent discharge and waste disposal:**
三. 傳遞與污染 - 例如沾染有毒物質的防護性衣物及設備（靴鞋及工衣）、汽車車輪（包括私家車）、貨物等，均可能成為污染的器具和擴散途徑。

四. 意外洩漏 - 例如：在生產中，容器內的物質經減壓系統或其它部份外洩。

11.3 Contamination by transfer - on protective clothing and equipment (e.g. footwear and overalls), on wheels of vehicles (including private cars), on uncovered loads, etc.;

11.4 Inadvertent discharge - e.g. chemicals escape from pressure relief systems or other parts of the plant.

四. 控制工序放出的污染物，以確保接觸量遠低於職業衛生標準 - 設置通風系統，特別是在靠近排放物來源處安裝局部抽氣系統；其他方法例如採用噴霧方法處理粉塵物料；將粉狀物料製成粒狀；或先將有毒物質注入密封容器內，才進行工序等；

五. 個人防護 - 穿著各種防護性衣物及使用呼吸防護設備；

六. 一般衛生 - 應用「良好廠房管理」方法，例如：使用備有適當過濾器的吸塵機；禁止在有毒物質的工場內吸煙和飲食；提供良好洗潔設施，並鼓勵工人注意個人衛生。

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THE PROTECTION OF WORKERS' HEALTH SERIES

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