



IN THE HEART OF
BIRMINGHAM

GUIDANCE ON THE TRANSPORT OF HAZARDOUS MATERIALS



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Introduction

This guidance document is concerned with the safe movement of materials which may be hazardous by virtue of their chemical, physical or biological properties, e.g. their toxicity, flammability, pressure, temperature. At Aston, these movements include the frequent transport of a range of solvents (including flammables), other chemicals, cryogenic liquids and solids, compressed gases, etc., throughout university buildings, from storage to work area, between work areas and - for certain waste, surplus or redundant materials - from work areas back into safe storage prior to disposal. These activities may involve either transport cross-campus, between buildings and within buildings and, under certain circumstances, may require the issue of Permits-to-Work, as discussed later.

This guidance is applicable to all individuals involved in the transport of hazardous materials, including employees, postgraduate students, contractors, delivery drivers/personnel.

Health & Safety Legislation

There is a range of health and safety legislation, both general and specific, relating to the transport of hazardous materials, brief details of which are set out in the Appendix to this document on page 7.

Of particular relevance are the Management of Health & Safety at Work Regulations (MHSW), the Control of Substances Hazardous to Health Regulations (COSHH), and the Manual Handling Operations Regulations. Under these Regulations it is a requirement to consider the hazards associated with materials and systems of work and to undertake a written assessment of significant risks.

Training and Competence

Legislation requires that employees are made aware of the hazards and risks associated with their activities and are given suitable and sufficient information, advice and training.

In many areas, it is common practice for postgraduate students to participate in transport arrangements; their role, status and training needs must be carefully considered before allowing them to undertake these tasks. It is the responsibility of a student's supervisor to ensure that any risks are assessed and minimised.

Undergraduate students will never be involved in undertaking the majority of these duties. However, it may be acceptable, for example, for final year project students to collect suitably packaged materials from a stores area, subject to appropriate risk assessments having been undertaken.

In summary, it must be ensured that all workers involved in the transport of hazardous materials are adequately trained and competent. This, in the first instance, will involve workers becoming familiar with this guidance document and having received any relevant training, which must be organised and delivered locally.

Identifying Hazards & Assessing the Risks

The following points should be taken into account:

- Manual handling operations must be risk assessed and the appropriate control measures implemented, e.g. specifying the use of trolleys/trucks, or identifying certain procedures as being a two-person operations (for instance, when moving large loads along corridors an assistant may be required to operate doors and to generally assist with handling the load).
- The quantity of solvents (particularly flammable solvents) moved at any one time should be limited to minimise the chance of a major incident occurring in the event of spillage/fire/explosion. Consideration should also be given to the harmful effects of exposure to liquids, vapours or combustion products.
- All containers (bottles, drums, etc.) and associated protective packaging should be of a suitable construction, kept in good condition, properly maintained and replaced as required. They should not be over-filled (the minimum free space above the liquid should be 10%) to minimise the risk of bursting, breakage and hence spillage.
- It is the responsibility of the School, Subject Group or Department to provide a sufficient number of suitable emergency spillage kits, which should be made available, as required¹, to accompany materials being transported.
- Trolleys and other mechanical handling devices should be appropriate for the task and properly maintained.
- 'Incompatible' materials (i.e. those which will mix and react vigorously and dangerously, e.g. explode, or produce toxic products) must be segregated (e.g. transported separately) to prevent mixing and reaction in the event of breakage or spillage.
- When assessing procedures involving the use of lifts, consideration must be given both to the type(s) of materials(s) being transported and risks associated with persons becoming trapped with the load. Note that liquid cryogens should **never** be accompanied; see page 5.
- If significant quantities¹ of hazardous materials are to be transported, then the proposed procedures and plans should first be discussed with the appropriate officers² of the University.
- It is the responsibility of the School, Subject Group, or Department to provide, maintain and replace, as required, the necessary personal protective clothing and equipment.
- If the delivery or removal of materials requires access to potentially high hazard areas (such as radiation, NMR and laser laboratories) by persons who are not normally based in those areas, it may be necessary - depending upon the Local Rules - for local Permits-to-Work to be issued before entry to such areas is allowed.

¹ as determined by the risk assessment.

² for example, the Head of Security, the Fire Safety Adviser and the University Safety Adviser.

Safe Working Practices for the Transport of Hazardous Materials

This section provides guidance on the operational aspects of the transport of hazardous materials which will also be useful when undertaking risk assessment, and when planning and organising transport arrangements and procedures.

General

To reduce the risk of breakage, spillage or leakage of hazardous materials during transport, it should be ensured that:

- materials are only transported in suitable containers;
- quantities of materials per consignment are kept to a minimum;
- incompatible materials are suitably segregated.

Trolleys or other Wheeled Transport

The use of a trolley is the normal method of transporting hazardous materials between work or storage areas, although it is acceptable to carry moderate amounts for short distances, using purpose-designed carriers. For example, 2.5 litre bottles³ can be safely carried for short distances using double or single carriers; it is advised that a person carries only one carrier at a time. If larger containers⁴ or several Winchesters are to be moved, they must be transported on a trolley (or other suitable wheeled device).

The transport must be:

- of suitable quality of construction, fitted with carriers, or on which carriers can be placed. The design should provide as smooth a ride as possible to eliminate, as far as practicable, damage to the containers, possible spillage, etc.
- able to negotiate safely any moderate unevenness or gaps in the floor covering, such as may occur between the lift landing and the floor of a lift car. To this end, it must have suitably large (both in diameter and width), smooth running, soft-treaded wheels. The containers must be in carriers and placed so that the centre of gravity of the whole unit is kept as low as possible. The carriers should preferably be liquid-tight and the shelves lipped to assist in containing spills.
- kept, where possible, only for the purpose of transporting solvents and similar laboratory reagents.
- regularly maintained; particular attention should be given to the wheels and tyres.

³ standard 2.5 litre capacity glass bottles are commonly referred to as 'Winchesters'.

⁴ for example, 25 litre steel or polypropylene drums are occasionally used for dispensing solvents within the laboratory. Depending upon the specific gravity of the solvent, the contents of a full 25 litre container can weigh from about 20 kg to over 60 kg.

Vertical Transportation

The use of lifts

Currently, the following lifts have been designated as being acceptable for the transportation of hazardous materials and can be controlled using an 'override key'⁵:

Main Building:

- 'G' lift - the Hazardous Goods Lift⁶
- 'E' lift - passenger/goods lift
- 'D' lift - small passenger lift

North Wing:

- 'J' lift - The large passenger/goods lift

Chemical Engineering Building:

- The large goods lift

The use of a designated lift is subject to the following general requirements:

- a) The transportation should be organised to coincide with times when passenger usage of lifts is known to be low, e.g. during lecture periods in term time.
- b) Ideally, materials - particularly volatile solvents - should not be accompanied by any persons (and **never** in the case of liquid cryogens) - lifts should be operated between the starting and finishing floors using the lift 'override' key. This will often require a two-person operation.
- c) Passengers must never be carried in the lift during the transportation procedure.
- d) Depending on the materials being transported, and the risk assessment, a suitable emergency spillage kit must be carried with the consignment.
- e) If a designated lift (as listed above) cannot be fully overridden for any reason then a suitable free-standing warning placard must be placed inside the lift car directly in front of the load, displaying wording similar to:

“WARNING – DO NOT ENTER. This lift is currently being used for the transport of hazardous material. Please use an alternative route.”

⁵ a key-operated switch (which is in addition to the 'car override key') enables the operator to take full control of the lift operation.

⁶ currently for this lift, the simultaneous use of the override key and the car preference key is required for full key control. (Note - the lift only serves Lower Ground, 4th & 7th floors under full key control).

The use of stairs:

It is acceptable to carry small loads between floors via the stairs, subject a satisfactory risk assessment having been undertaken, and the materials being carried in suitable containers/carriers.

Particular care should be taken to avoid slips, trips or falls and any associated spills.

Additional Requirements for Cryogenic Liquids and Solids

All of the general principles described above are also applicable to the transport of cryogenic liquids and solids. In addition, these materials present specific hazards associated with low temperatures and their highly volatile nature - rapid evaporation in enclosed areas can quickly result in oxygen depletion.

Important notes on transport and handling:

- i. The preferred route for the vertical transport of these materials is via one of the designated lifts.
- ii. Workers transporting cryogenic liquids must **never** travel in the lift with the consignment.
- iii. Cryogenic liquids must never be transported in open beakers or similar vessels either inside or outside the laboratory.
- iv. 'Dry Ice' (i.e. solid carbon dioxide) is normally supplied as bagged pellets and must be handled using insulated gloves and transported in a thermally insulated box or bag; this will aid handling and significantly reduce the sublimation rate. If, for any reason, an insulated carrier cannot be used, the material must be transported in a similar way to cryogenic liquids, i.e. using unaccompanied lift transportation.

Arrangements for the 'Out-of-Hours' Delivery of Liquid Helium

The delivery of liquid helium is currently made by prior arrangement between the supplier and user, and may take place outside normal working hours which, in the case of the main building, could mean that the goods entrances are closed. If this is the case, it is acceptable to use the South Wing passenger lift providing the following requirements are met:

- a. The South Wing Lift is only used to transport the material between the foyer and the 1st floor, South Wing. The material is then moved across the link to the 1st Floor Main Building;
- b. The whole operation is controlled by two persons - one loading, the other assisting during the transport operation, e.g. awaiting delivery at the 1st floor;
- c. A warning placard is placed inside the lift (see item e, page 4).

Compressed Gas Cylinders

All of the general principles described above regarding the use and operation of the lifts, suitability of transport, emergency leakage control, etc., are also applicable to compressed gases.

In addition, the following special precautions must be taken:

- a. Before transporting a cylinder, it must be ensured that the cylinder valve is fully closed and gas-tight and that the regulator has been removed.
- b. Cylinders must be secured into, and transported using, properly maintained cylinder trolleys.

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APPENDIX

Legislation

The general duties of the University as an employer are set out in Section 2 of the Health and Safety at Work etc. Act 1974 (the HASAW Act); paragraph 2(2)(b) includes the duty to make “arrangements for ensuring ... safety and absence of risks to health in connection with the use, handling, storage and transport of articles and substances”. Regulations⁷ made under the HASAW Act flesh out these general duties; in relation to the activities covered by this document, these may include the following:

- Management of Health & Safety at Work Regulations 1999 (MHSW)
- The Control of Substances Hazardous to Health Regulations 2002 (COSHH)
- The Pressure Systems and Transportable Gas Containers Regulations 1989
- The Manual Handling Operations Regulations 1992
- The Personal Protective Equipment at Work Regulations 1992
- The Provision and Use of Work Equipment Regulations 1998
- The Ionising Radiations Regulations 1999
- The Dangerous Substances and Explosive Atmosphere Regulations 2002
- Chemicals (Hazard Information and Packaging for Supply) Regulations 2005

Under Regulation 3 of MHSW, an employer has a statutory duty to ensure that all working practices and procedures are subject to a suitable and sufficient assessment of the associated risks. Under Regulation 4, an employer has a duty to make and record arrangements for the planning, organisation, control, monitoring and review of the preventative and protective measures.

When undertaking an assessment of the risks associated with the use of hazardous materials in the laboratory environment, it is easy to overlook the need to assess⁸ the arrangements for transporting these materials to, from and between work areas, etc., and the suitability and safety of the equipment used to effect the transport, e.g. trolleys, lifts, stairs, etc. Similarly, the handling and movement of waste materials must be taken into account and may require special consideration.

Any detailed assessment of risk arising from the chemical properties of a material will, of course, be carried out under the requirements of COSHH. The results of that assessment will then form part (it may be a major part) of the overall assessment under MHSW.

⁷ the dates of these Regulations were correct at the time of issue of this document.

⁸ either as part of the overall assessment of a particular process or procedure, or as an activity in its own right.