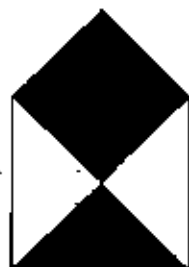


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DISASTER SALVAGE TEAM

Correspondence to:
the Robert McDougall Art Gallery PO Box 2626 Christchurch
Phone (03) 3650 915 Fax (03) 3653 942

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NEWS LETTER No. 1 APRIL 1992

DANGEROUS GOODS

Guest Editor: Lynn Campbell

Executive Committee



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STORAGE AND USE OF DANGEROUS GOODS

By J Travis, Dangerous Goods Inspector

Dangerous Goods Storage And Use

I feel that the most obvious place to start is to define the various classes of Dangerous Goods and the authorities responsible for the supervision of those dangerous goods.

There are nine different classes of Dangerous Goods and I'll align them to authorities as they were in Christchurch prior to the 1st October 1991. The reason I have chosen that date, is that the Resource Management Act came into force and there are some areas of confusion as to where boundaries of responsibility lie.

- Class 1 **Explosives**
Occupational Safety and Health Explosives Inspectors
Phone: 652-600
- Class 2 **Gases**
- Class 3 **Flammable Liquids**
- Class 4 **Flammable Solids**
- Class 5 **Oxidisers & Organic Peroxides**
Christchurch City Council
Local authority
Dangerous Goods Inspectors
Phone: 791-660
- Class 6 **Toxic, Poisonous, Infectious Harmful Substances**
- Class 7 **Radioactive Substances**
- Class 8 **Corrosives**
- Class 9 **Unknown Substances**
Canterbury Area Health Board
Health Protection Unit
Phone: 799-480

Having defined all the classes, I should now say that the use involved in Museums and Libraries in respect of designated Dangerous Goods would be Class 3 and Class 5. However there may be some small use of Class 2 Gases, by way of LPG gas rings or gas cutting plants using the small oxygen and acetylene

cylinders. This small and minimal use will mean the cylinders will be small and easily moved in the event of fire or accident and instructions to this end should be addressed in any emergency contingency plan.

Class 3 Flammable Liquids

This category is further subdivided into A B and C sub classes. Class 3A being the more volatile, having a flash point below 23°C (i.e. Petrol, Methylated Spirits, thinners, preserving alcohol). Class 3B products having a flash point between 23°C and 61°C (i.e. Oil based points, Turpentine, Kerosine, Fibreglass Resins, Gelcoat Paint Colouring) Class 3c Fuel Oil (Normally Oil burners for space heating provided from approved tank installations). The definition of flashpoint is the lowest temperature at which the substance liberates vapour at a rate sufficient to produce an explosive mixture with air. This mixture still requires an external source of ignition and should not be confused with the auto ignition temperature often listed in product specifications.

USE of Class 3 Flammable Liquids

I assume such use in this business, would be for cleaning and preserving specimens and articles, using the more volatile products. This should always be done allowing the minimum exposure to atmosphere of the vapours. It is stated in regulations that sources of ignition must be kept 1.5m away from such exposure. Where this cannot be achieved it will be necessary to provide mechanical means of ventilation (i.e. fume cupboards, spray booths or cabinets.). However it must also be said adequate ventilation is essential wherever flammable liquids are exposed.

The use of the lesser volatiles (i.e. Class 3B) would mean this isolation distance maybe reduced to 6m. The small quantities used would in the main, mean only hand painting or laying of fibreglasses would be undertaken. The flammables used in this area would be Resins, Gelcoat, Oil based paints, Turpentine etc.

Should any spraying be undertaken a spray booth or cabinet must be provided and consultations with Occupational Safety and Health, factory inspectors should be undertaken, in respect of construction and ventilation.

Where use of Class 3 Flammable Liquids is in excess of 60 litres of Class 3A or 200 litres of Class 3B, a purpose built dangerous goods workroom must be provided. Since I believe use in this particular profession will not be of such magnitude, I will not go into any detail, suffice to say regulations are quite clear as to the type and construction of any room required.

STORAGE of Class 3 Flammable Liquids

Storage facilities depend to a large degree on the amount of flammable liquids required to be stored. This quantity will determine the construction (see attached the top of the line in dangerous goods depots.) A type D in the most robust of the dangerous goods depots can store containers up to and including 210 litre size to a total capacity of 2000 litres, where the depot is inside another building or 5000 litres where it is outside. This can be compared to a simple one hour fire rated room that will have the capability of storing 450 litres in 20 litre container size or less referred to as a type 'E'. If in fact the quantities are much smaller than this a metal cabinet may be used to store up to 100 litres in containers 20 litres or less. All of these storage facilities are approved subject to the flammable products being stored in closed containers and one should ensure all tops, caps and lids are secured before the containers are placed back in their stored place. It is also essential that this storage of Class 3 flammable liquids should not be stored with other dangerous goods, in particular the Class 5, we will talk of next. The siting of the store within the building is also important, keeping in mind egress for personnel and the route for flammable liquid containers being brought in for storage. Other dangers, such as switch

boards or heating plants or forges should be viewed for potential incident.

Class 5 Oxidisers and Organic Peroxides

This class is divided into Class 5A Oxidisers and Class 5B organic peroxides.

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- 1 The oxidisers, most commonly used would be Calcium Hypochlorite and hydrogen peroxide in water purification. As the name implies these products will produce oxygen when involved in fires so care should be taken in avoiding storage by combustibles or other dangerous goods. The limitations on storage are not as restrictive as Class 3 and up to 500 kg may be stored inside a building, however information should be sought from the appropriate authority for any reasonable quantities requiring to be stored.
- 2 The Organic Peroxides, most commonly used would be MEKP in the fibreglassing process. This product acts as the catalyst for hardening the fibreglass. Although only small amounts would be used the potential for dangerous explosion and fire are very real. This product can cause spontaneous reaction if brought in contact with dirt or organic materials, oil, etc. It is imperative that great care is taken handling this product and it is not recommended to pour left overs back into the main storage container. The equipment and storage facility should be kept clean at all times. The regulations allow for storage up to 10 kg inside a building without providing expensive goods storage facilities. Since the containers are normally 3.5 kg or 5 kg plastic bottles, it would mean only one container is stored at a time. In this case it is recommended to store in a clean tin with a lid, carrying a conspicuous warning notice.

CLASS 2

GASES, being

- (a) Gases (other than those included under any other paragraph of this Class) when compressed, liquefied or dissolved under pressure e.g. gaseous oxygen.
- (b) Ethane, ethylene, hydrogen, methane, and any other flammable gas (other than those included under any succeeding paragraph of this class).
- (c) Acetylene, compressed or dissolved, and contained within a porous substance.
- (d) Liquefied petroleum gas, and any other liquefied flammable gas.
- (e) Chlorine
- (f) Anhydrous ammonia
- (g) Liquid Oxygen

CLASS 3

FLAMMABLE LIQUIDS

- (a) Liquids, mixtures of liquids and liquids containing solids in solution or suspension, which in each case has a flash point lower than 23 degrees and nitrocellulose with by mass, a nitrogen content not exceeding 12.6% wetted with by mass, not less than 45% flammable liquids with a flashpoint less than 23 degrees Celsius e.g. Petrol, Methylated Spirits, Clear Gas, Solvents, Thinners, Solvent based Paints.
- (b) Liquids, mixtures of liquids, and liquids containing solids in solution or suspension, which in each case has a flashpoint of 61 degrees Celsius or lower, but not lower than 23 degrees Celsius, and nitrocellulose with by mass, a nitrogen content not exceeding 12.6% wetted with by mass not less than 45% flammable liquids with a flashpoint of 61 degrees

Celsius or lower but not less than 23 degrees Celsius e.g: Turpentine, Kerosene, Oil Based Paints.

- (c) Fuel oil.

CLASS 4

Flammable solids, being substances liable to spontaneous combustion or substances which, on contact with water, emit flammable gases, and which consist of the following divisions and categories:

Division 4.1 - Flammable solids, being solids other than those classed as explosives, possessing the common property of being easily ignited by external sources e.g. Nitrocellulose, Picric acid, Photographic celluloid film, Matches.

Division 4.2 - Substances liable to spontaneous combustion, being solids or liquids possessing the common property of being liable spontaneously to heat and to ignite e.g., Phosphorus, Fish meal, Iron Oxide, Sulfide Ores.

Division 4.3 - Substances which, in contact with water, emit flammable gases, being substances which by interaction with water, are liable to become spontaneously flammable or to emit flammable gases in dangerous quantities e.g: Potassium metal, Zinc powder, Calcium carbide.

CLASS 5

Oxidising substances being:-

Bromates, chromates, and dichromates, chlorates, chlorites, chromium trioxide (anhydrous) hypochlorites (with more than 39% available chlorine), inorganic peroxides, nitrates, perborates, perchlorates, permanganates, persulphates, potassium nitrate,

Fire Extinguishers

There are several suitable fire fighting mediums that may be used. It is recommended that a hand held fire extinguisher of 1.5 kg to 2 kg (multi-purpose type) be provided for each storage facility and if this is remote from the use site another should be provided at use site. It should be adjacent to and not directly at these locations, since if a fire starts it may well inhibit the ability to get to the fire extinguisher. Remember the use of water to fight a flammable liquids fire is not advised since it will just tend to spread the burning liquid through the building.

Sources Of Ignition

It should be noted that sources of ignition are not just open flames (i.e. smoking, matches, gas lighters) but can also cover such things as light switches, light bulb failures, switchboards, radios, electrically operated hand equipment drills, sanders etc. This will of course mean no standard lights or switches will be permitted in storage places or in the direct vicinity of use. Special flame proof and intrinsically safe equipment will normally be required and advice may be sought from the Dangerous Goods Inspector or the Electrical Inspector.

TYPE 'D' DANGEROUS GOODS DEPOT

CLASS 3

FLAMMABLE LIQUID REGULATIONS 1985

LOW LEVEL VENTILATION
METAL TUBE TYPE 200 - 230MM

HIGH LEVEL VENTILATION
EQUAL TO 200 - 230MM (INSIDE
BUILDING(S)) 500 MICRON
BRASS GAUZE

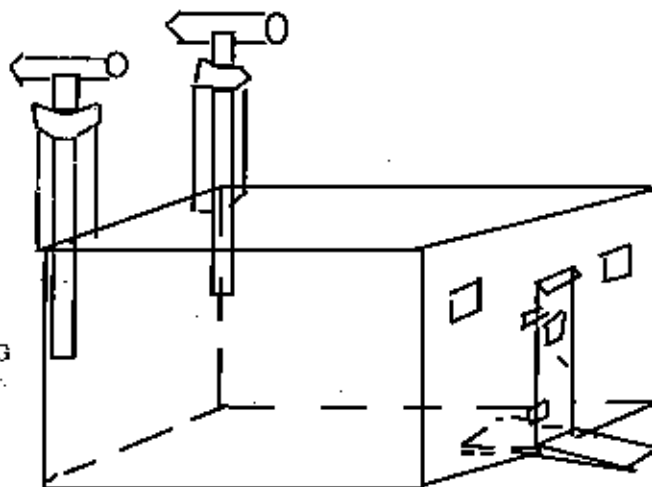
DOOR INSIDE BUILDING(S)
TWO HOUR FIRE RATING SELF CLOSING
MECHANISM OPERATED OUTWARDS
FROM DEPOT INTERIOR

COMPOUND RAMP OR SILL
ACROSS DOORWAY TO RETAIN
LEAKAGE AND SPILLAGE

FIRE RATING (DEPOT)
FOUR HOUR WITH ROOF OR SIMILAR
RATING FOR CONTAINERS EXCEEDING
60 LITRE CAPACITY (SUBJECT TO LOCATION)

FIRE RATING VENTILATION DUCTS
LOW LEVEL TUBE VENTILATION
BETWEEN DEPOT ROOF AND BUILDING
ROOF - ONE HOUR MINIMUM WITH
SPACE FILLED WITH VERMICULITE OR
SIMILAR

DEPOT LOCATION
AS APPROVED BY DANGEROUS GOODS
INSPECTOR



DEPOT STORAGE APPROVAL
AS PERMITTED BY CLASS 3 FLAMMABLE
LIQUID REGULATIONS

WARNING NOTICE
DEPOT DOOR
"FLAMMABLE LIQUIDS STORE - NO SMOKING"

tetranitrome than, urea hydrogen peroxide, hydrogen peroxide, zirconium picramate wetted with not less than 20% water;

Organic peroxides e.g. methyl ethyl ketone Peroxide (MEKP)

NOTE: The examples given are by no means the total substances within any category. If there is any doubt please contact the CCC Dangerous Goods inspector for your area.

Please contact the Dangerous Goods Section at:

The Christchurch City Council
791-660 (Civic Offices)
Fendalton Service Centre
3517-109
Linwood Service Centre
3891-477
Sockburn Service Centre
3485-119

Dust

"It is unwise to assume that loose foreign matter (dust) is innocuous or that it can be left as a thick layer on objects in store. Dust is commonly an amazing mixture of fragments of human and animal skin, textile fibres, carbon particles (soot), and grease from unburned hydrocarbon fuels. There are often salts in dust (for example sodium chloride carried in from sea spray or on skin fragments), and sharp, gritty silica crystals are often present."
(Quotation from Science For Conservators - Book 2)

Mould spores and fungi live in the organic component of dust and as much of the dirt is hygroscopic (i.e. it attracts water molecules) the tendency is to encourage the growth of moulds and to increase the corrosiveness of salts. This could be disastrous in the case of museum objects made of organic materials like wood, cloth, woven flax, leather etc. Metal objects too are at risk.

Mechanical cleaning methods, which merely break the adhesion of the dirt and move it away, have certain advantages for the object. But it must be realised that in practice it is rarely possible to separate dirt from the object without taking some of the object too. The difficulties arise from the natural or corrosion-induced porosity of the surface, and the extreme fineness of the dirt as it starts to coat the object. (Soot particles in smoke may be as small as one micron in diameter i.e. one thousandth of a millimetre, and will penetrate the finest crevices of a surface.

To remove only dirt when it is intimately mixed with the object is not easy. So it follows that since the finest residues of dirt cannot be completely removed, and since dirt objects at the proper level of humidity which has been decided for that kind of object.

From our shopping correspondent:

For supplies of barrels, bottles, buckets, crates, trolleys, tubs, bins, boxes, casks, tanks, trays, pottles, pallets and pails have a look at Payless Plastics, 43 Lichfield Street, ph (03) 790-412; and Plastic Wholesalers, 43 Tuam Street, ph (03) 899-165. It is possible to get a product catalogue from Plastic Wholesalers by giving them a phone call. There is material in these that can solve or prompt solutions to all kinds of transporting or storage problems.

Richard Taylor
Canterbury Museum

Environmental Problems That Could Damage Collections

Most materials, particularly organic materials, disintegrate with time. It is impossible to stop this process but it can usually be slowed down. Historical items that have survived the longest are those that have been stored in cool, dark, dry, stable environments. Many of us cannot afford to spend money on expensive air-conditioning equipment but there are simple ways of preventing deterioration problems that can cause damage to artwork. This includes:

Light

ALL LIGHT CAUSES DAMAGE although ultraviolet is the most harmful. We all know about the fading of materials such as curtains that are exposed to light. Strong light over a short time will cause as much if not more damage than weak light over a longer period of time. An object's life can be prolonged by reducing the brightness of the lights or by reducing the time the object is exposed to the light.

The International measure of light is known as Lux. A 100 watt bulb will produce 150 Lux on a surface two metres away. Sunlight through a window could easily measure 10 000 Lux. Maximum suggested light levels for paper are 50 Lux - much lower than either the bulb or sunlight.

Humidity (Damp)

If the environment is too damp mould can grow and spread, destroying pigments, paper and producing acids which can destroy or irrevocably change the nature of the object visually and chemically.

If the environment becomes dry certain objects will become brittle and crack. Wood in particular will crack.

A relative humidity of between 50-55% is a good level to aim for.

Temperature

Heat is a danger as the higher the temperature the more likely chemical reactions will occur at a quicker speed causing deterioration. Hot temperatures will also dry out the air.

A temperature of 18°C - 20°C is acceptable.

Dirt and Pollution

extensive damage as they can erode the object, be a source of food for mould and chemicals in pollution, can cause deterioration and possible disintegration. Sulphur Dioxide + water gives rise to sulphuric acid - which causes yellowing and brittleness in paper.

Insects and Pests

Silverfish, borer and many other pests are common destroyers of organic materials. Borer can be found in wood. Silverfish feed on starch and cellulose common in paper and textiles eating their way through paper, textiles. Mice can chew up paper and leave stains which are impossible to remove. Insects and pests do not like to be disturbed and dislike cleanliness. Therefore good housekeeping can be an effective enemy of these problems.

People

With the best will in the world people can cause untold damage. Many treasures are 'cleaned' by their owners effectively destroying the object. Always seek the advice of a conservator.

SOME DO'S AND DON'TS

DON'TS

1. Light - **DO NOT** put pictures in direct daylight.
2. Damp Do not place objects you treasure in damp areas e.g. bathrooms or kitchens.
3. Temperature Do not place in hot areas over 18°C - 20°C.
4. Do not attempt to clean your treasured objects - take them to a professional conservator.

DO'S

1. Housekeeping Do keep an eye on your collection. The sooner damage is seen the easier it can be dealt with and it will be cheaper.
2. Make sure any matting and framing is of Museum Quality and done to Museum standards.
3. Handle as carefully as possible and with respect.

LYNN CAMPBELL
CONSERVATOR / COORDINATOR

PLANNING FOR SAFE STORAGE

The Canterbury Disaster Salvage Team held a day long workshop in February at the Canterbury Museum focusing on planning for safe storage.

Twenty one delegates attended from a wide geographical area and from diverse organisations, including libraries, museums and art galleries.

A list of Hazardous chemicals in the small museum and the general guide-lines for salvage procedures, the things to do and not to do (part of the regional team disaster plan book) were included in the registration packs.

Some of the topics covered during the day included the prevention of environmental disasters in the museum environment. Here some very practical and sensible storage options and suggestions were offered well illustrated with slides.

The Dangerous Goods inspector provided a huge amount of information in his talk and because of the complexity of the subject, full notes to go with it. The Fire Safety Officer spoke on the response that can be expected of the Fire Service to fires. A particular point was made of his preference for sprinkler systems in institutions and he supported his stand with some impressive figures on the functioning and efficiency of sprinklers where small fires are concerned.

The Okains Bay Museum fire and the response to this was used as a case study to illustrate the sort of problems that can be encountered in a disaster situation.

One of the highlights of the day was the visit by the group to the purpose built National Archives building in Peterborough St. This showed just what can be done if adequate finance is available.

ROSEMARY O'NEILL
ARCHIVES LIBRARIAN
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Disaster Salvage
at Okains Bay Museum
February 1991