

**S|MN Scott + MacNeill**

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Asbestos Awareness

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Asbestos Awareness

The following presentation has been compiled by Paddy MacNeill B'Arch. FRIAI, Dip.SHWW CMIOSH as a general discussion document and is intended as a general guidance for discussion purposes based on his present understanding and opinion of existing Health and Safety Legislation.

The presentation does not purport to represent expert legal opinion and is not intended to provide a definitive approach in any situation. The presentation must therefore be considered in the context of professional judgment exercised by competent clients, employers, employees, project supervisors and professional designers. Reference to legislation is in most cases in summary form. Readers should therefore read the full text to ascertain the full details of the Legislation.

Appropriate legal and insurance advice should be sought as necessary

Asbestos Awareness

**4,000**

Asbestos Awareness

**Estimated deaths in  
UK by 2020-  
10,000**

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**Steve McQueen**  
**Malcolm McLaren**  
**Christy Hennessey**  
**Paul Rudolph**

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## WHAT IS ASBESTOS?

A naturally occurring silicate mineral.

**Chrysotile (White)**  
**Crocidolite (Blue)**  
**Amosite (Brown)**

And lesser common types:  
 Actinolite  
 Anthophyllite  
 Tremolite

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## SAMPLE



Asbestos ore

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## PROPERTIES

- High Mechanical Strength
- Heat resistant
- Chemical Resistant
- Plentiful
- Cheap

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## HISTORY

Asbestos comes from the Greek for "unquenchable" or "inextinguishable".

Samples found in Finland 2500 BC to strengthen utensils and cooking pots.

Pliny the Elder in Roman times recognised the detrimental effects of Asbestos on slaves.

Charlemagne had a table cloth made of asbestos.

Major increase in use during late 19<sup>th</sup> Century for building and industrial uses.

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## HISTORY

First commercial mine in 1874 in Quebec

World's largest asbestos mine located in a town in Quebec called – "Asbestos"

By mid 20<sup>th</sup> Cent used in manufacture of multiple products including cigarette filters!

Huge demand during World War 2- filters in gas masks, ship building.

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## PRODUCTION 1980

**Chrysotile**---- 4,500,000 tonnes  
 (Soviet Union, Canada, Zimbabwe, Swaziland, Cyprus, Italy , US, China Brazil)

**Crocidolite**--- 300,00 tonnes  
 (South Africa, Australia, Bolivia, Zambia)

**Amosite** ----- 150,000 tonnes  
 (Transvaal, India)

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## PRODUCTION 2010

- Russian Federation** – 1,000,000 tonnes
- China** – 380,000 tonnes
- Brazil** – 288,000 tonnes
- Kazakhstan** – 230,000 tonnes
- Canada** – 150,000 tonnes
- India** – 19,000 tonnes

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## CURRENT USAGE

Large quantities of asbestos still being used in the developing countries- China, India, Brazil mainly in the production of Asbestos cement products.

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## IMPORT TO UK

- 1973 – Peaked at 195,000 tonnes
- 1984 – 40,000 tonnes
- 1989 – 25,000 tonnes
- 1973 – Import of Crocidolite ceased
- 1983 – Import of Amosite ceased
- All** Asbestos imports banned to EU 2005.

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## PRODUCTION PROCESSES

Ore contains about 10% asbestos which must be removed by milling and vibration processes.

Mining underground

Opencast mining and spiralling flat terracing

Block caving where large section are undercut to force collapse

Huge potential for contamination, release of fibres and environmental damage.

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## OPENCAST MINE



Open cast mine 1985

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**OPENCAST MINING**



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**WITTENOOM**

**Wittenoom- NW Australia-** Ghost mining town built to service Blue Asbestos mine. Town now abandoned when mine closed in 1966. Estimated that 700 residents will have died from asbestos related illness by 2020.



Children playing in Asbestos dust


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**WITTENOOM**



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**WITTENOOM 1950s**



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**FIBRE GROUPS**

2 Fibre Groups:

**Amphibole-** Ambiguous

**Serpentine-** Snakelike

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**FIBRE GROUPS**


<b>Amphibole:</b> Crocidolite (Blue) Amosite (Brown)	<b>Serpentine:</b> Chrysotile (White)
+3 other less common types Actinolite Anthophyllite Tremolite	



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## AMPHIBOLE (Blue and Brown)


Straight / needle like  
Splits along length  
Barbed effect  
Elastic  
Stiff  
Acid resistant  
Hydrophobic- doesn't absorb water.



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## SERPENTINE (White)

Flexible  
Inelastic  
Curly  
Long  
Poor acid resistance  
Hydrophilic- absorbs water



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## HEALTH EFFECTS

All types of asbestos are classified as Category 1 Carcinogens

Amphiboles (Crocidolite, Amosite) are extremely dangerous substances

Serpentines (Chrysotile) are slightly less dangerous than Amphiboles because they will slowly dissolve in acid.

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## HEALTH EFFECTS

Asbestos exposure becomes a health problem when high concentrations of respirable fibres are inhaled over a long period of time.

Fibres small enough to penetrate into the pleura

Become embedded in the lung tissue and last for a very long time.

Fibres with a length:width ratio of >3:1 and >5 microns long.

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## ASBESTOSIS

**Asbestosis:** (Latent Period from first exposure 15-60 years average)-  
Scarring of lung tissue  
Caused by all types of asbestos  
Results in progressive breathlessness  
Associated with the development of lung cancer.

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## MESOTHELIOMA

**Mesothelioma:** (Latent Period from first exposure 30-40 years average)-  
Cancer of the cells lining the lungs  
Linked with Crocidolite and other Amphiboles  
Can be caused by relatively low exposures.

40% survive 1 year  
20% survive 2 years  
10% survive 3 years.

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## ASBESTOS RELATED LUNG CANCER

**Lung Cancer:** (Latent Period from first exposure 20-30 years average)- Malignant tumour of the lung air passages.

The synergistic effect of cigarette smoking and the presence of asbestos fibres in the lungs dramatically increases the incidence of lung cancer.

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## NON-FATAL (BENIGN) CONDITIONS

**Plural Plaques**  
--Calcified deposits in pleura

**Pleural Thickening**  
--Diffused fibrosis in pleura

**Plural Effusion**  
--Fluid build up in pleural cavity

**Asbestos Warts/ Corns**  
--Fibres embedded below surface of skin.

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## WHO IS AT RISK?

**Most at risk from asbestos related diseases:**

- general construction workers (carpenters in particular)
- building maintenance
- shipbuilding
- vehicle maintenance
- asbestos production/ extraction.

**HSE Report:**  
1 in 10 Carpenters born in the 1940s who worked in their trade for 10 years before they were 30 are likely to contract asbestos related cancer.

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## HEALTH EFFECTS

First Asbestos related death recorded in 1906

First diagnosis of asbestosis in UK in 1924

Term mesothelioma first used in 1931.

Asbestos exposure becomes a health problem when high concentrations of fibres are inhaled over along period of time.

All types of asbestos fibres are known to cause serious health hazards in humans.

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## DEATHS

**UK: 2008-** 4498 asbestos related deaths.  
Will peak in 2020 with an estimated 10,000 deaths.

1978- 400 deaths due to Mesothelioma  
2002- 1800 deaths due to Mesothelioma

**NI** 80-100 per annum- mostly associated with shipbuilding.

**Ireland** 4-5 cases per annum.

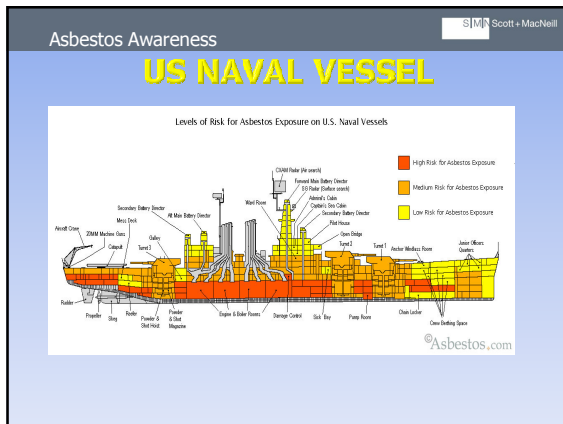
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## DEATHS

**US:** 10,000 deaths per annum.  
100,000 deaths estimated from shipbuilding alone.

14 in every 1,000 WW2 shipyard workers died / will die from Mesothelioma.

Litigation in US:  
800,000 claimants / 8,400 defendants as of 2006.



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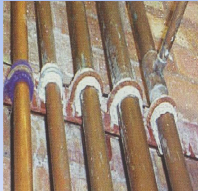
## ASBESTOS IN BUILDINGS

**Textiles :**

- Lagging on Pipes
- Jointing and Packing
- Oven and flue sealing
- Tubing to electrical cabling

100% Asbestos  
Crocidolite and Chrysotile

High potential for fibre release



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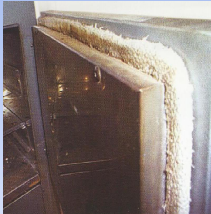
## ASBESTOS IN BUILDINGS

**Textiles :**

- Ropes, yarns and gaskets
- Domestic and industrial plant

90-100% Asbestos  
Crocidolite used for acid resistance

High potential for fibre release if damaged



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## ASBESTOS IN BUILDINGS

**Textiles :**

- Packing on pipes , door frames

Amosite / Chrysotile.

May be dry and damage easily when removed.

Medium potential for fibre release.

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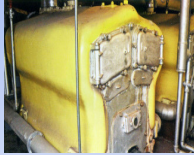
## ASBESTOS IN BUILDINGS

**Boiler lagging :**

- Asbestos containing plaster/ plastic coating
- 15-30% Amosite

Wet mixed hand applied asbestos mix for bends joints and repairs.

Low potential for fibre release if maintained in good condition.



Amosite lagged boiler

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## ASBESTOS IN BUILDINGS

**Millboard**

- Heat insulation and fire protection

37-97% Asbestos in matrix  
Chrysotile

Easy to break  
Medium potential for fibre release.



Millboard panels inside fire door

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## ASBESTOS IN BUILDINGS

Asbestos insulating board (AIB) (Asbestolux)


- Fire protection
- Thermal & acoustic insulation.

15-25 % Amosite or mixture of Amosite and Chrysotile.

Can be broken giving significant fibre release



AIB behind school radiator panel


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## ASBESTOS IN BUILDINGS


**Cement Products**  
Roofing  
Wall cladding  
Permanent shuttering.

10-15% Asbestos Crocidilite and Amosite to 1980  
Chrysotile 1980- 1999


Will release increased levels of fibres if abraded, hand sawn or if worked with power tools.




Roof, down pipe, hopper and sheeting

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## ASBESTOS IN BUILDINGS



AC Roof



AC Soffit

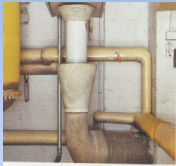
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## ASBESTOS IN BUILDINGS


**Cement Products**  
Flues

10-15% Asbestos Crocidilite and Amosite to 1980  
Chrysotile 1980- 1999

Will release increased levels of fibres if abraded, hand sawn or if worked with power tools.



Boiler flue

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## ASBESTOS IN BUILDINGS

**Textured coatings**


3-5% Asbestos Chrysotile

'Artex'. 'Suretex' 'Pebblecoat' 'Marblecoat'

Will release low levels of fibres if sanded.



Chrysotile pebble-dash exterior wall coating

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## ASBESTOS IN BUILDINGS


**Flooring:**

PVC / Vinyl- 5-7% Chrysotile  
Thermoplastic -up to 25%

Chrysotile backing paper, underlay, mastics.

Fibre release unlikely



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## ASBESTOS IN BUILDINGS


**Reinforced plastic and resin Composites :**

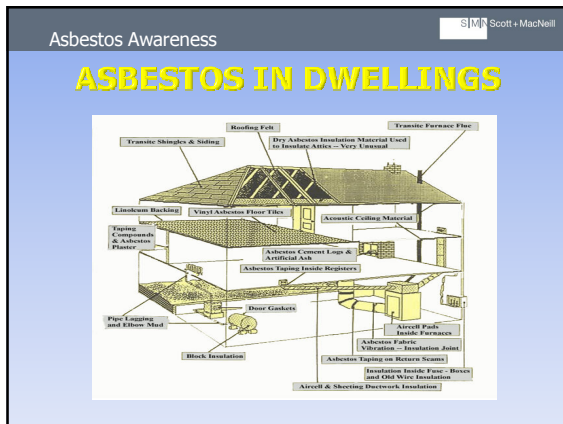
Toilet cisterns, seats, banisters.

1-10% Chrysotile asbestos

Amosite used to give improved resistance to acid.

Fibre release unlikely.





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## LEGISLATION

Safe Health and Welfare at Work ( Exposure to Asbestos) Regulations 2006

Safe Health and Welfare at Work ( Exposure to Asbestos) (Amendment) Regulations 2010.

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## LEGISLATION

**Duties of employers:**

Assess the risk to employees  
Determine the nature and degree of exposure  
Lay down the necessary measure for protection.

**Schedule 2-** Sets down specific procedures to ensure for the Safety and Health of Employees.

- Place procedures
- Eating and drinking procedures
- Protective clothing procedures

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## LEGISLATION

**When / where is there a risk ?**

Sets limit values of exposure (ELV) above which an employee should not be exposed –

0.1 Fibres/cm<sup>2</sup> as an 8 hour time weighted average.

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## LEGISLATION

An employer shall not undertake or permit to be undertaken any work which would expose or which would be likely to expose an employee to dust arising from asbestos unless he /she has undertaken a risk assessment to determine whether asbestos or materials containing asbestos are present or likely to be present.

Must undertake an Asbestos Survey of the premises.

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## LEGISLATION

Employer must:

- assess if ACMs are liable to be present making a presumption that materials contain asbestos unless you have strong evidence that they do not;
- make and keep up to date records of the location and condition of the ACMs or presumed ACMs in your premises;

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## LEGISLATION

- assess the risk from the material (Possible exposure levels) ;
- prepare a plan that sets out in detail how he/she will manage the risk from this material;
- take the steps needed to put the plan into action, review and monitor;
- set up a system for providing information on the location and condition of the material to anyone who is liable to work on or disturb it.

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## LEGISLATION

- limit the number of employees likely to be exposed to dust arising from asbestos;
- ensure that work processes and systems of work are designed to ensure against the release of asbestos dust into the air.

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## LEGISLATION

**Notification to HSA-**

Where the work is not of low intensity and where the ELVs will be exceeded the employer must notify the HAS no less than 14 days before the activity is to take place.

Types of Asbestos  
Plan of work  
Risk assessments

Generally for works involving- Loose/ lagging asbestos, Sprayed coatings , AIB.

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## LEGISLATION

Notification to the HSA is not required:

Where exposure limit value not surpassed;

Short non-continuous maintenance activities in which non friable materials are handled;

Removal of non-degradable materials firmly linked in a matrix (AC Cement );

Encapsulation or sealing of ACMs which are in good condition.

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## ASBESTOS SURVEY

**2 types of survey:**

Management  
Refurbishment and Demolition

**Management :**  
To identify and locate ACMs in the premises in order to assess their condition and provide for their management / removal.

Will involve minor intrusive work/ disturbance.  
For inaccessible areas must assume the presence of ACMs.

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## ASBESTOS SURVEY

**Refurbishment and Demolition Survey:**

Required before any Refurbishment or Demolition work to locate and describe all ACMs in the area where refurbishment will be carried out or in the whole building if demolition is to take place.

Both types of survey must be undertaken by a competent surveyor and should be undertaken in accordance with the provision of HSG 264.

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## MATERIAL ASSESSMENT

### Material Assessment Algorithm

Product type  
Extent of damage  
Surface treatment  
Asbestos type

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## PRIORITY ASSESSMENT

### Priority Assessment Algorithm

Occupancy Activity  
Likelihood of disturbance  
Human exposure potential  
Maintenance activity

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## MATERIAL ASSESSMENT

Appendix 4: Material assessment algorithm

Example scenario	Score	Examples of factors that reduce the score (de-risk)
Removal of asbestos from products (e.g. asbestos from products)	1	Asbestos removed from products (e.g. asbestos from products, roofing tiles, and floor tiles, water pipe gaskets or decorative finishes, asbestos cement tiles)
	2	Asbestos removed from products (e.g. asbestos from products, roofing tiles, and floor tiles, water pipe gaskets or decorative finishes, asbestos cement tiles)
	3	Asbestos removed from products (e.g. asbestos from products, roofing tiles, and floor tiles, water pipe gaskets or decorative finishes, asbestos cement tiles)
Extent of damage/deterioration	0	Good condition - no visible damage
	1	Low damage - few scratches or surface marks, broken edges on tiles, etc.
	2	Medium damage - significant loss of material or several small areas where material has been damaged (usually by loose asbestos fibres)
	3	High damage or deterioration of materials, spalling and thermal cracking - where asbestos is exposed
Surface treatment	0	Complete removal, covering asbestos with paint, plaster, etc.
	1	Enclosed areas and lagging, full and regular face painting or encapsulated asbestos cement sheets etc.
	2	Unenclosed AIB, or encapsulated lagging and pipes.
	3	Unenclosed lagging and pipes.
Asbestos type	1	Chrysotile
	2	Amphibole asbestos including crocidolite
	3	Crocidolite
Total		
Score		Potential to release asbestos fibres
10 or more		High
7-9		Medium
4-6		Low
1-3 or less		Very low

*Note: asbestos materials have no potential to release asbestos fibres*

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## ASBESTOS WASTE

All materials containing asbestos is classified as Hazardous Waste.

Must be double bagged, labelled and disposed of only to a hazardous waste licensed facility  
-Oxygen, Rialta

No hazardous waste facility in Ireland

Some landfill facilities will accept in certain circumstances- dedicated cell, asbestos bound in matrix which will not degrade.

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## CONCLUSION

Considerable amount of Asbestos in buildings built in 60s,70s and 80s.

Asbestos related deaths will continue to rise for another 8-10 years.

Low exposures can lead to the development of Mesothelioma.

Construction workers must therefore recognise the dangers and take the necessary precautions.