### Exposure dose and apportionment in asbestos claims: the basics

This information sheet explains the basic principles of exposure dose assessment. The aim is to assist legal professionals dealing with asbestos related disease claims to understand the process.

A dose assessment is an attempt to quantify the amount of asbestos dust inhaled by a person over a particular period of time. It is sometimes referred to as a cumulative exposure assessment.

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### The basic equation for a dose assessment is: **Exposure dose = average concentration of asbestos fibre inhaled x period of exposure**

The average concentration of asbestos fibres inhaled is an estimate of the average number of asbestos fibres in a volume of air inhaled by a person. This value should include an estimate of the effect of any respiratory protection used.

In asbestos sampling, the volume of air is typically measured in millilitres. The units used for fibre concentration are therefore usually 'fibres per millilitre', written as 'fibres/ml' or 'f/ml'.

The period of exposure is measured in working years. A working year is typically taken to be to 8 hours per day, 5 days per week, 48 weeks per year. There are 1,920 working hours in a working year.

The units for exposure dose are therefore derived from fibres/ml multiplied by years = fibres/ml.years

### Understanding the units

A concentration of 1 fibres/ml means that there will be 1 asbestos fibre in each millilitre of air. An asbestos concentration of 1 fibres/ml is the same as 1 fibre per cm<sup>3</sup> which is the same as 1,000,000 asbestos fibres per m<sup>3</sup> of air.

An apparent low concentration in fibres/ml does not necessarily mean a small number of asbestos fibres. For example, 0.01 is a small number and therefore 0.01 fibres/ml sounds like a small quantity of asbestos fibres. However, a concentration of 0.01 fibres/ml means that in every cubic meter of air, there would be 10,000 asbestos fibres.

Put another way, there would be 1,000,000 asbestos fibres in a room measuring 8m x 5m x 2.5m: a reasonable sized office or a small classroom perhaps.

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#### 1st employment period

An employee was exposed to a concentration of asbestos dust of 2 fibres/ml for 2 hours per day and did this on two days per week. He was employed for a total of 7 years.

The employee's average daily asbestos exposure was **0.5 fibres/ml**. The employee did this on a total of 672 days or **2.8 working years**. The employee's cumulative exposure during this employment period was **1.4 fibres/ml.years**.

#### 2nd employment period

The employee was then exposed to a concentration of asbestos dust of 10 fibres/ml every day over a total of 24 weeks.

The employee's average daily exposure was **10 fibres/ml** 

The employee did this on a total of 120 days or **0.5** working years.

The employee's cumulative exposure during this employment period was **5 fibres/ml.years.** 

The employee's total exposure dose is therefore 1.4 + 5 = 6.4 fibres/ml.years.

Apportionment of dose The exposure can be apportioned and expressed as a percentage:	Period	Dose	Proportion of total of 6.4 fibres/ml years (apportionment)
	1st period	1.4	22%
	2nd period	5	78%
	TOTALS	6.4	100%

There are significant and usually unquantifiable uncertainties in any asbestos dose assessment. One of our experts would be pleased to explain the principles to you and would be happy to assist in any queries you may have.

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