Asbestos in Schools

The case for reassurance air monitoring with Scanning Electron Microscopy (SEM)

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Introduction

It has long been recognised that the disturbance of asbestos containing materials in post war schools can lead to harmful fibres being released, becoming airborne and being inhaled. This can lead to damaging health effects in both teachers and children.

To safeguard the occupants of schools there is legislation in place that places various responsibilities on duty holders to assess and manage the risks from asbestos to employees and others.

These responsibilities include regular inspections and checks on the condition of any asbestos containing materials and if any damage is identified then remedial action on these materials is necessary.

Currently, asbestos air testing in schools is only routinely carried out following asbestos removal and disturbance to asbestos containing building materials (ACM) to a standard referred to as the 'clearance indicator'. This is described by the HSE as being a transient indication of site cleanliness, in conjunction with a thorough visual inspection, and not as an acceptable, permanent environmental level.

Against a background of growing public concern over the potential harmful effects of asbestos in schools, modern air monitoring and analytical techniques now have the capability to detect much lower concentrations of any asbestos fibres present.

In particular, as this paper describes, a formal programme of reassurance air monitoring using powerful scanning electron microscopy (SEM) can more effectively measure occupational exposure concentrations for asbestos in school premises than other techniques.

This in turn enables more effective risk measurement, identification and assessments to be undertaken, in contrast to lower level current practices of more basic hazard identification, and thus represents a progression in best practice.

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The dangerous and harmful legacy of a ‘wonder’ material

The versatility, strength, heat and chemical resistance of asbestos led to it becoming known as the wonder mineral of the 1950s and 60s, with widespread use in building materials and products.

Although it has been illegal to use asbestos in the construction or refurbishment of any building since 1999, crocidolite (blue), amosite (brown) and chrysotile (white) asbestos were used extensively from the 1950s to the mid-1980s in building materials of all types and for a variety of purposes, including fireproofing and insulation.

As a result, asbestos was commonly used to improve the performance of everything from sprayed coatings, laggings and insulating board, used in ceiling tiles and wall panels, to decorative textured coatings and vinyl floor tiles.

Various forms of workplace and asbestos-specific regulations have progressively tightened asbestos controls in the UK. The Asbestos Licensing Regulations 1983 introduced licensing requirements from the Health and Safety Executive (HSE) for contractors working with asbestos insulation. In 1985, the UK banned the import and use of blue (crocidolite) and brown (amosite) asbestos. This rule was replaced in 1992 with a law that also banned some uses of white (chrysotile) asbestos, traditionally considered less lethal than the other forms of the mineral. In 1999, the UK government banned the use and import of chrysotile asbestos.

The UK's Control of Asbestos at Work Regulations were first introduced in 1987 and included the need to identify the type of asbestos present as well as providing information, instruction and training as part of adequate control measures to prevent the spread of debris.

Various amendments to the Control of Asbestos at Work Regulations were introduced culminating in the 2006 Regulations which brought together the Control of Asbestos at Work Regulations 2002, the Asbestos (Licensing) Regulations 1983 and the Asbestos (Prohibitions) Regulations 1992. The 2006 law prevented new uses of the mineral but allowed existing asbestos to remain intact if it remained in good condition and undisturbed. In this way the 2006 legislation introduced the ‘duty to manage’ requirement, set maximum exposure limits and demanded that anyone who was at risk of encountering asbestos on the job be trained in the proper handling of the material.

The following asbestos products and work activities relating to asbestos were banned in the UK by the Control of Asbestos Regulations, unless the products were manufactured prior to November 1999:

- Spraying of asbestos materials as a surface coating
- Use of low-density insulating or soundproofing materials made from asbestos
- Importation of asbestos-containing products
- Use of asbestos cement
- Use of boards, panels or tiles covered in asbestos paint or plasters

The Control of Asbestos Regulations 2012 updated the previous regulations to comply with the European Commission’s opinion that the UK had yet to completely implement the European Union Directive on asbestos exposure. This measure didn’t change prior regulations, but it rather added more requirements to improve safety measures of non-licensed asbestos work including updates to deal with sporadic and low intensity exposure.

In addition, these updated measures included reporting non-licensed asbestos work to the relevant enforcing authority, keeping written records of the work and having workers under medical surveillance.

Limits for the concentration of airborne asbestos fibres were introduced soon after the Asbestos Regulations 1969 came into force[1]. Initially the limits were focussed on the asbestos manufacturing industry to determine safety conditions for employers and employees, but the focus of control of later legislation switched to setting safe or acceptable levels of exposure, or control limits among asbestos removal workers.

However, rather than setting a safe or acceptable level of exposure the control limits became a trigger for the implementation of certain additional control measures (such as the use of PPE) over and above measures to minimise the release of fibres at source.

The effect of the various asbestos-related regulatory introductions has been to progressively lower control limits, with the current limit of 0.1 fibres/cm^3 being one thirtieth of the 3 fibres/cm^3 limit that applied in 1970.

The history of occupational hygiene is generally a case of 'too little, too late' and this is exemplified by asbestos legislation. The current asbestos control limits were relevant to asbestos manufacturing and asbestos removal. They are in no way relevant or suitable to managing asbestos materials in-situ.

As it would appear that it is government policy to measure asbestos in-situ, the legislation could be improved by introducing meaningful control limits for all buildings where high risk asbestos materials are present. Without this, fibre levels are benchmarked against historic, dangerously high concentrations.

Asbestos in schools

Given the widespread use of asbestos in building materials and products until it was banned in late 1999, its presence in many different types and parts of school premises should not come as a surprise.

In particular, prefabricated system buildings such as the Consortium of Local Authorities Special Programme (CLASP) and later systems such as the Second Consortium of Local Authorities (SCOLA) and MACE were widely used for the construction of school premises from 1945 to 1980 and used substantial amounts of asbestos in their construction, including asbestos insulating board (AIB) used in structural columns to support the building.

The current regulations, introduced in 2006, consider that where asbestos remains in good condition and is unlikely to be damaged or disturbed, it does not pose a significant risk to staff or pupils as long as it is properly managed. Only when ACMs are disturbed or damaged is the risk of exposure increased through the release of airborne fibres.

It follows that the most common way that ACMs in schools might be disturbed is during maintenance, repair or other building works. Maintenance, repair or other building work in schools can release high levels of asbestos fibres, and if carried out without rigorous controls can expose the people carrying out the work and the occupants.

Rigorous systems of asbestos management are also needed to prevent school staff and pupils disturbing ACMs that are accessible to them. Some classroom activities such as attaching pupils' work to walls or the movement of furniture against walls, as well as vandalism, accidental damage and boisterous behaviour, may also cause damage to building materials and so increase the potential health risks associated with the release of fibres.

The condition of all school building materials therefore requires careful monitoring and management at all times. Regular inspections and checks by the duty holder of the condition of ACMs are essential and this should include details of any precautionary or safeguarding measures that are needed.

"Asbestos is a killer - but we must target our understanding and resources properly. We must risk assess and control the real risks properly" [17]

Specifically, an asbestos register and management plan is required that incorporates all relevant information about the existence and location of any known or presumed asbestos-containing materials on school sites. The plan also needs to be updated regularly and to be made available to anyone visiting or working on a school site.

Most teachers and school staff are not directly involved in managing the buildings or in carrying out repair or maintenance work. However, they will need to know the location of any ACMs and how they can be damaged or disturbed and all staff must report damage or deterioration of school fixtures or fittings that could lead to the release of asbestos fibres.

Against this background various estimates have been made on the extent to which asbestos is present in the UK school buildings estate. However, the reported percentages of schools that contain asbestos vary widely, illustrating the need for an official national register of public buildings which contain asbestos.

For example, the HSE's Post Implementation Review of the Control of Asbestos Regulations 2012[1], uses an overall estimate of 37% of buildings likely to contain asbestos, meaning that of Britain's 28,000 schools, an estate of approximately 11,000 schools is likely to contain asbestos containing materials (ACMs).

This is in marked difference to the figure included in a 2013 report[2], where it was estimated that more than 75% schools in the UK have some buildings which contains asbestos and also in an early 2017 report[3] by the Education Funding Agency (EFA), which found that asbestos was present in 83% of schools who participated in a 2016 survey.

In this latter report, involving more than 5,500 schools, it was concluded that the majority (around 80%) appeared to be managing asbestos well and in full compliance with the legislation and guidance. However, around 20% were not fully compliant, in that they did not have fully documented plans, processes and procedures in place at the time of the data collection; or did not know if asbestos was present.

The survey also revealed that there were also 114 schools where there was "significant cause for concern", but after contacting them, the EFA reported that assurances had been provided that asbestos, where it is still present, was being managed effectively.

This concern over the number of schools which were not properly managing the risks of asbestos did prompt the EFA to issue new guidance[4] that included details such as reminding teachers not to put drawing pins into walls as this can release asbestos fibres where the material is present.

On a similar theme it has also been reported that slamming doors and general abrasive wear and tear on building columns in schools means that asbestos fibre concentrations in classrooms can be up to eight hundred times greater than background levels. As these building materials continue to age these fibre emissions are likely to rise.

According to a 2012 report from the All-Party Parliamentary Group on Occupational Health and Safety on asbestos in schools[5] over 140 school teachers died from mesothelioma in the previous ten years. An unknown number of cleaners, admin staff and caretakers have also died.

At a 2013 House of Commons Select Committee hearing[6] evidence was presented by mesothelioma widower Michael Lees of an increase in the number of school teachers dying from mesothelioma in Britain from 3 a year in the 1980s to a total of 243 in the period since 1980.

Because schools are unique workplaces in that they also contain children and it would seem reasonable to assume that the widespread exposure of a large number of people at a very young age has contributed to the exceptional mesothelioma incidence in Britain.

Statistics based on death certificates provide some indication of the number of teacher deaths from mesothelioma, but since these are limited to deaths under 75, the often later diagnosis of the disease may lead to some undercounting. However, because of the long latency period, it is not known how many children have subsequently died, although in the USA it has been estimated that for every teacher's death nine former pupils will subsequently die from their asbestos exposure at school.

On this matter, the Department of Health's Committee on Carcinogenicity[7] concluded that, due to their increased life expectancy compared to adults and the long latency period for the disease to develop, children have an increased lifetime risk of developing mesothelioma if exposed to a given dose of asbestos. It has been estimated that exposed at five, a child is 5.3 times more likely to develop mesothelioma by the age of 80 than an adult aged 30.

Against this background, and as the UK moves towards 'peak' mesothelioma there is a rising number of annual cases. For example, national news reports revealed that councils in England have paid out at least £10m in compensation[8] to people who developed illnesses because of asbestos in schools, with 32 councils settling claims from former teachers, school staff or pupils in the last decade.

At the same time, Kent County Council[9] confirmed the presence of asbestos containing materials in 344 schools at all levels from infant and special schools to sixth forms and pupil referral units. On a similar theme Liverpool City Council[10] said that 51 out of 87 schools in the area had been identified as potentially having asbestos present in their buildings.

Calls for action

Studies have shown that the cumulative asbestos fibre exposure to staff and pupils through the routine occupation of system built schools is considerable and has prompted the creation of a number of groups focussed on addressing the problem with campaigns, reports and calls for remedial actions to be taken.

An initial campaign to make schools safer from the dangers of asbestos was started by the Asbestos in Schools Group, which was formed in 2007 by Michael Lees, whose wife, a primary school teacher, died of mesothelioma.

Now under the chair of Rachel Reeves MP, the group draws together organisations and individuals with the relevant expertise and an interest in the issue in support of a number of aims including encouraging openness in the UK Government's policy towards asbestos in schools.

AiS has been joined in this respect by the Joint Union Asbestos Committee (JUAC), founded in 2010, and which includes teachers, head teachers and support staff unions. Over the years the joint campaign of AiS and JUAC has been given added weight by reports from the All Party Parliamentary Group (APPG) on Occupational Health and Safety.

In its 2012 report on Asbestos In Schools - the Need for Action – the APPG made a number of recommendations as the basis to providing a long term solution to the problem of asbestos in schools. This highlighted the need for a policy of openness and transparency, with parents, teachers and support staff being informed and updated annually on the presence of asbestos and management plans to deal effectively with it.

There were also recommendations to set standards in asbestos training, to establish a national database of asbestos in schools and allocate adequate resources to enable the removal of the most dangerous asbestos and continued management of any remaining asbestos in schools.

Calls were also made for a new 'environmental asbestos fibre level' to be set for schools, linked to the development of a system of widespread air sampling in schools. In the longer term the group said a programme for the phased removal of asbestos from all schools should be adopted.

In 2015 the group reiterated this latter recommendation, saying that regulations should be put in place for the phased and planned removal of all asbestos in workplaces and public buildings by no later than 2035, and by 2028 in the case of schools.

A 2017 online survey[11] by the National Union of Teachers showed nearly 50% of all respondents had not been told whether their school contained asbestos. The survey said that less than 5% had been told their school did not contain asbestos, and while 46% of respondents were aware that their school contained asbestos, half did not know where it was located, leaving them unable to take steps to avoid disturbing it.

Survey respondents also reported incidents such as children punching holes in walls for example, or picking at plaster covering areas where asbestos was located.

Duty to manage asbestos

There are strict Health and Safety Executive (HSE)[12] and legal duties on schools aimed at reducing the risks to health that asbestos poses and there should no longer be any excuse for anyone being exposed to potentially dangerous levels of airborne asbestos fibres.

The Health and Safety At Work Act 1974 says, 'It shall be the duty of every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all employees'.

More specifically, the Control of Asbestos Regulations 2012, Regulation 4.8, (Duty to Manage) Asbestos[13], states that a determination of the risk from any asbestos known to be present is made, moreover, "the regulation is designed to make sure anyone who carries out any work in non-domestic premises and any occupants of the premises are not exposed to asbestos from ACMs that may be present".

This responsibility falls to the duty holder, which in many cases is the person or organisation that has clear responsibility for the maintenance or repair of the premises.

In particular, the dutyholder is required to assess and manage the risks from asbestos to employees and others, and must ensure that anyone who is likely to work on, or disturb, asbestos is provided with information about its location and condition.

Government policy considers that asbestos that remains in good condition and unlikely to be damaged or disturbed is not a significant risk to health as long as it is properly managed. Only when ACMs are disturbed or damaged is the risk of exposure increased through the release of airborne fibres.

Rigorous systems of asbestos management are therefore needed to prevent school staff and pupils disturbing ACMs that are accessible to them. This involves the careful monitoring and management of school building materials at all times. Regular inspections and checks by the duty holder of the condition of ACMs are essential and this should include details of any precautionary or safeguarding measures that are needed.

Specifically, an asbestos register and management plan is required that incorporates all relevant information about the existence and location of any known or presumed asbestos-containing materials on school sites. The plan also needs to be updated regularly and to be made available to anyone visiting or working on a school site.

As part of this requirement an assessment of the risk associated with each identified occurrence of asbestos in the school, is required. The assessment must take into account the type of building material present and the type of asbestos it contains and a priority assessment of the likelihood of someone disturbing the material based on a number of factors.

These latter factors include occupant activity, the likelihood of disturbance, frequency of use of an area and most importantly the level of planned or unplanned maintenance activity in the area.

A total risk assessment is calculated by a combination of the material and priority assessments to provide a comparison of the risk presented by each item of ACM present so that priorities can be set and appropriate management plans developed.

Assessing the hazard or managing the risk?

Most teachers and school staff are not directly involved in managing the buildings or in carrying out repair or maintenance work. However, they will need to know the location of any ACMs and how they can be damaged or disturbed and all staff must report damage or deterioration of school fixtures or fittings that could lead to the release of asbestos fibres.

The hazard is the presence of asbestos, but the risk to the occupants is when the asbestos fibres become airborne and can be inhaled. An asbestos survey identifies the hazard, but on its own rarely identifies the risk present to an effective level; the key requirement is to target resources by properly assessing the risk present and controlling the real risks effectively.

There have been a number of reported cases in schools where air sampling has identified situations where asbestos fibres were being released into rooms, but without regular monitoring it is impossible to tell how many years this may have been taking place unnoticed. For example, the impact of any release of fibres from classroom cupboards, slamming doors, damage to walls and columns or from heaters might only be properly identified by periodic air sampling.

Currently, where there is the possibility of the release of asbestos fibres into the environment, the HSE provides guidance on air sampling to ensure worker protection - most typically after building repairs or asbestos removal work – but there is no requirement for widespread air sampling in schools to identify whether or not asbestos fibres are being released into the rooms on a day to day basis.

Current asbestos management is largely based on identifying the hazard and managing the material - in short, this is hazardous material management rather than managing the risk of fibres being inhaled.

"The dutyholder may not understand the numbers but the competent analyst should, and should be looking to prove 'safety' as far as possible" [17]

Removal or reassurance

There have been calls in recent years for the complete removal of asbestos from all buildings to eradicate the legacy of asbestos and to completely eradicate the risk posed by damage to and deterioration of ACMs.

The All-Party Parliamentary Group on Occupational Safety and Health previously issued a report[14] calling for the introduction of urgent action to address the legacy of asbestos that remains in Britain's buildings.

Among the measures raised by the report was that all commercial, public, and rented domestic premises built or refurbished before 2000 should have a full asbestos survey undertaken by 2022. In addition, it said that where asbestos is identified, all refurbishment, repair or remedial work done in the vicinity of the asbestos containing material should include its full removal.

If no such work is planned then the owner must develop and implement a plan for the complete removal of all asbestos by 2035. For public buildings and educational establishments, such as schools, the report called for the eradication work to be undertaken no later than 2028.

Of course, whilst it is commendable that these concerns are being voiced publicly, and that everyone continues to recognise the risks to health associated with asbestos, full consideration needs to be given to the practicalities and scale of work that would be required to meet these ambitions.

The design of many older education buildings means that the only way to completely remove any asbestos present would be to almost completely dismantle parts of them or demolish the entire building. Against this sort of measure, there are no projections on what the cost of this work would be to the UK economy or how any removal costs would compare to the costs of alternative forms of management and reassurance monitoring now available to duty holders and occupiers of buildings. Due to finite finance and resources, it is clearly not feasible to remove all asbestos in the short term.

Clearly nobody should be complacent about the risks associated with asbestos. It is completely correct that the regulations surrounding asbestos should be reviewed regularly and that improvements in best practice be widely adopted in order to better manage asbestos in-situ.

Rather than resorting to full removal of asbestos, modern air monitoring and analytical techniques provide the means to accurately measure any risks to occupants that might be present and enable the appropriate remedial actions to be taken. In the short and medium term the focus should therefore be on the improved management of asbestos in schools and other public buildings.

In this way, air analysis utilising powerful scanning electron microscopy can ratify the efficacy of existing asbestos management techniques and prove that asbestos fibres levels are not elevated, providing the reassurance needed that children and teachers are not being exposed to harmful fibre levels.

The legal framework

The responsibilities of employers in terms of protecting employees from the risks associated with the presence of ACMs are encapsulated in a number of pieces of legislation. The main items of legislation are as follows:

The Health and Safety at Work Act, 1974
General duties of employers to their employees.

(1) It shall be the duty of every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees.

(2) Without prejudice to the generality of an employer's duty under the preceding subsection, the matters to which that duty extends include in particular-

(a) the provision and maintenance of plant and systems of work that are, so far as is reasonably practicable, safe and without risks to health;

(b) arrangements for ensuring, so far as is reasonably practicable, safety and absence of risks to health in connection with the use, handling, storage and transport of articles and substances;

(c) the provision of such information, instruction, training and supervision as is necessary to ensure, so far as is reasonably practicable, the health and safety at work of his employees;

(d) so far as is reasonably practicable as regards any place of work under the employer's control, the maintenance of it in a condition that is safe and without risks to health and the provision and maintenance of means of access to and egress from it that are safe and without such risks;

(e) the provision and maintenance of a working environment for his employees that is, so far as is reasonably practicable, safe, without risks to health, and adequate as regards facilities and arrangements for their welfare at work.

The Management of Health and Safely at Work Regulations 1999, Regulation 3)
Risk Assessment: "Every employer shall make a suitable and sufficient assessment of-(a) the risks to the health and safety of his employees to which they are exposed whilst they are at work; (The Management of Health and Safely at Work Regulations 1999, Regulation 3).

The Control of Asbestos Regulations 2012, Regulation 4
Duty to manage asbestos in non-domestic premises

(8) Where the assessment shows that asbestos is or is liable to be present in any part of the premises, the dutyholder must ensure that-

(a) a determination of the risk from that asbestos is made;

The Control of Asbestos Regulations 2012, Regulation 11
Prevention or reduction of exposure to asbestos

(11) 1 Every employer must-

(a) prevent the exposure to asbestos of any employee employed by that employer so far as is reasonably practicable;

With the Joint Union Asbestos Committee (JUAC)[15] reporting that, since 1980 at least 319 teachers have died from mesothelioma and also that teachers are now dying at an average of 17 per year compared to 3 per year in 1980, it could be argued that schools are not meeting their legal responsibilities.

The risk from asbestos in schools is one of fibre inhalation. Current practice is not sufficient, because ambient occupational exposure air monitoring, commonly used for numerous other toxins, is not commonly carried out.

In conclusion, the asbestos fibre levels in schools are largely unknown in direct contravention of Regulation 3 of the Management of Health and Safety at Work Regulations 1999, despite techniques being available that are capable of providing this information and to prove the safety (or otherwise) on an ongoing basis of those schools which contain high risk asbestos materials.

Air monitoring

With the possibility that teachers and pupils could be inhaling raised levels of asbestos for six or seven hours a day, in 1983 the Department for Education considered a proposal for an 'environmental' limit to be created specifically for schools.

The proposal suggested that, because of the particular vulnerability of children, a level 1/100 of the workplace control levels would not be unreasonable in schools. However, an environmental level has never been introduced and workplace clearance limits are instead still applied to classrooms.

The clearance indicator is intended to indicate that a working environment is notionally safe following asbestos removal works and is used as part of an in-depth post work assessment process called the 'four stage clearance' procedure included in HSG 248: Asbestos: The analysts' guide for sampling, analysis and clearance procedures[16].

In the UK, when working with asbestos containing materials without an enclosure, asbestos concentration should be kept below a 4- hour control limit of 0.1 f/ cm^3 and a peak level measured over 10 minutes of 0.6 f/ cm^3. A 'disturbed air' test with a clearance indicator of 0.01 f/ cm^3 in air is used to assess whether it is safe to take down an enclosure after asbestos removal has been completed and the area thoroughly cleaned.

The clearance indicator has now remained the same for over 30 years and employers and duty holders often regard them as a true indication of safety, despite the HSE stressing that should not be regarded as 'safe' level and work activities involving asbestos should be designed to be as far below the control limit as possible.

Specifically, the clearance indicator is defined by HSE in L143 (the ACOP for Managing and working with asbestos Control of Asbestos Regulations 2012 paragraph 453) as: a transient indication of site cleanliness, in conjunction with the thorough visual inspection, and not as an acceptable, permanent environmental level.

In fact there are many that argue that, rather than a safe level, the clearance limit simply reflects the limits of quantification allowed by the measurement techniques available at the time it was introduced and does not take into account modern advances and improvements to sampling and analytical techniques.

This is supported in a 2014 article by the British Occupational Hygiene Society (BOHS)[17] that makes the point that, although no level can be regarded as safe, published studies say that school buildings with asbestos products in good condition have an airborne concentration up to about 0.0005f/ cm^3 (or 500 fibres per cubic metre).

"All that matters is whether or not kids are breathing in asbestos and, until you find that out, everything else is hot air" [18]

Analysis of air samples – the benefits of SEM

The current post work clearance process and air monitoring of airborne dust process is designed to be used as part of a rigorous system to provide reassurance that a work environment has been properly cleaned.

The recommended standard analysis of samples gathered from air monitoring provides quick results but it does not differentiate between asbestos fibres and other sorts of fibres that may be present such as clothing fibres.

In this respect better thought out sampling strategies and air monitoring would significantly improve the current leak testing of asbestos enclosures and general reassurance testing.

This issue is particularly important in school premises where many different types of airborne fibres can be present but where most of them are also likely to originate from clothing or other potential sources (including organic fibres or so called MMMF/man-made mineral fibres) rather than ACMs.

In such circumstances, the analysis of air filter samples using scanning electron microscopy (SEM) can be undertaken in much greater detail than is possible with standard techniques. SEM's ability to more accurately determine whether asbestos fibres are present means it can better identify the level of any risk that might be present.

In particular, SEM enables asbestos in air to be quantified to very low levels, typically achieving lower limits of detection to 0.0005 fibres/ cm^3 and below, compared to the 0.01 fibres/cm^3 capability of standard phase contrast microscopy (PCM). SEM can also distinguish between different asbestos fibre types and other non-organic fibres using energy dispersive x-ray analysis (EDXA).

As a result, SEM is invaluable for the detailed sampling of ambient or indoor air where the anticipated fibre levels are low or for periodic monitoring of areas to check the potential cumulative exposure on teachers, pupils and those using the premises.

- To back up re-inspection surveys. Re-inspections are an exercise in assessing the condition of known hazards as a proxy for measuring the risk. SEM gives an actual risk level at the time of sampling
- To provide actual and direct asbestos risk measurement in locations
- To prioritise risk and target spending on abatement accordingly by avoiding areas that do not present a risk
- To provide longer term occupation exposure assessment
- To answer the question, "is my room safe?" and identify where fibre levels are elevated before this question is asked
- To bolster any defence against a future claim the duty holder will need to demonstrate that the best available practicable technique was used to enable a suitable and sufficient risk assessment to be made.

In this way SEM provides the means for duty holders to find out whether occupants of rooms are breathing in much lower concentrations of asbestos, thus greatly enhancing the ability to manage the asbestos risk present.

In this respect, with an emphasis on preventing potential exposure to asbestos fibres, the detailed forensic records and diagnostic testing provided by SEM analysis, not only represents good safety management practice but can also provide proof of prevailing schoolroom conditions at any particular time.

With schools, colleges and local authorities increasingly facing health-related compensation claims, SEM can provide the evidence needed to demonstrate that buildings containing asbestos are being well maintained and that those present are not being exposed to dangerous levels of airborne fibres.

Safeguarding against future actions

In asbestos related disease there is usually a time interval of decades after the exposure and before the onset of disease.

For the person responsible in law for the provision of a safe working environment, the prospects of civil litigation arising at some time in the future from a very small contribution to the asbestos exposure of someone who subsequently develops mesothelioma should not be overlooked.

It is therefore important to keep all records in order to show a judge the levels of contemporaneous fibre exposure and to present your case and the facts accurately.

Measurement of the current concentrations of asbestos in air can be used to estimate contemporary exposures. As a result, when carrying out air monitoring in schools, if civil liabilities are to be avoided or at worst defended, it will often be necessary to demonstrate that airborne asbestos concentrations do not significantly exceed background levels.

To be relevant the sampling needs to coincide with suitable and representative site activities and conditions – however, the impact of false positives associated with the inclusion in samples of non-asbestos fibres can be considerable. In such circumstances, PCM will give only a total fibre concentration rather than an asbestos fibre concentration, so the ability of SEM to discriminate between asbestos and non-asbestos fibres can provide a true reading.

Conclusion

The potential problem of asbestos in schools is becoming an increasingly public concern. The evidence indicates that the level of asbestos in many schools significantly exceeds the background ambient level.

The concern is therefore whether the ACMs are being properly managed and assessed for potential damage or disturbance and the extent to which teachers and pupils could be inhaling asbestos fibres.

Campaign groups have long called for the introduction of a proactive programme of air sampling in schools, and the establishment of an Environmental Limit for Schools. SEM analysis techniques are able to provide the basis of a risk assessment programme that uses known airborne fibre levels to ensure the provision of a safe environment in schools.

Current analysis using PCM has a limit of detection wholly unsuitable for risk assessment in an occupied environment and is only really valid for asbestos removal monitoring. SEM measurement and analysis, on the other hand, enables the fibre levels to be detected to much lower levels.

The technology to properly and effectively test asbestos fibre levels present in the air is therefore now readily available and a programme of re-inspection utilising scanning electron microscopy should be used to demonstrate compliance with the regulations.

Crucially, by providing an accurate measurement of any airborne asbestos fibres present in our schools, occupational risks can be properly assessed and prioritised. This means that often scarce maintenance resources can be properly allocated for the treatment and removal of the most dangerous asbestos, with the continued management of any remaining asbestos in UK schools being gradually replaced by a phased programme of asbestos removal.

In this way new best practice reassurance monitoring using scanning electron microscopy has the capability to set a new benchmark for minimum compliance measures in schools and establish a new understanding of what is reasonably practicable in protecting the health of our teachers and children.

Asbestos in Schools Group

The aim of the AIS group (and website) is to inform parents, teachers and support staff about asbestos in schools. It gives guidance on how to improve the management of asbestos in schools. It aims to encourage openness in the UK Government's policy towards asbestos in schools.

http://www.asbestosexposureschools.co.uk/ and
http://www.asbestosinschools.org.uk/

Joint Union Asbestos Committee

The Joint Union Asbestos Committee (JUAC) is formed from the union members of the Asbestos in Schools Group (AIS). JUAC is a non-political group that is chaired by John McClean. JUAC and AIS have a common interest in making UK schools and colleges safe from the dangers of asbestos, both for staff and pupils. http://www.juac.org.uk/

All Party Parliamentary Group on Occupational Safety and Health

The All Party Parliamentary Group on Occupational Safety and Health provides a forum for the discussion and promotion of issues relating to occupational health and safety; to provide information to members of both houses of parliament on topical issues; to publish reports as and when necessary. It is chaired by Ian Lavery MP.

https://www.publications.parliament.uk/pa/cm/cmallparty/register/occupational-safety-and-health.htm

Sources indicated in text:

1 - Post Implementation Review of the Control of Asbestos Regulations 2012. Para 153. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/598574/post-implementation-review-of-the-control-of-asbestos-regulations-2012.pdf

2 - http://bc-legal.co.uk/images/pdf/asbestoslookingtothefuture.pdf

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