

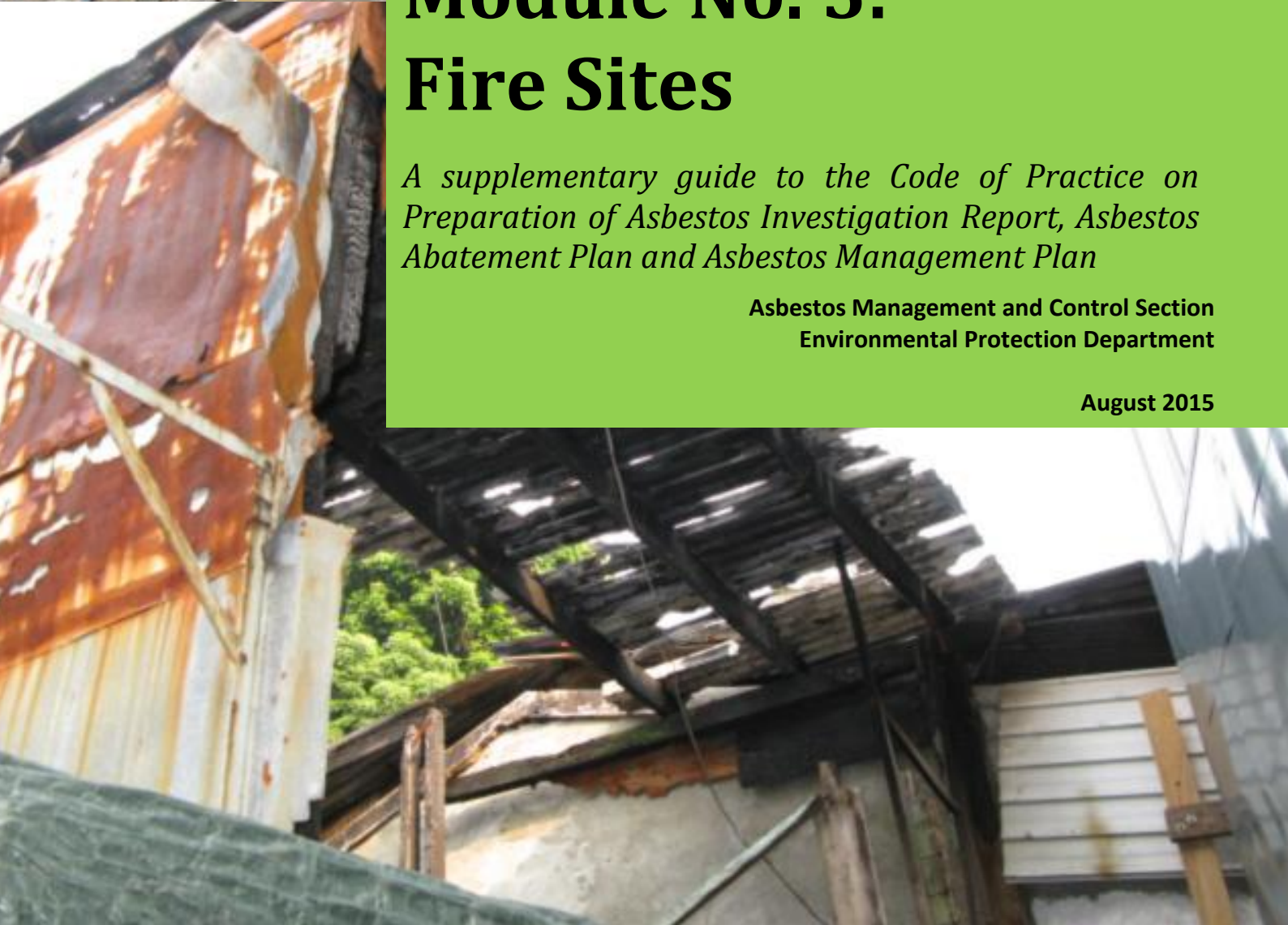
Asbestos: Investigation, Abatement & Management

Reporting Guidelines Module No. 5: Fire Sites

A supplementary guide to the Code of Practice on Preparation of Asbestos Investigation Report, Asbestos Abatement Plan and Asbestos Management Plan

Asbestos Management and Control Section
Environmental Protection Department

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Introduction

Fire in a building containing asbestos containing materials (ACMs) affects the materials in a variety of ways. ACMs can crack or spall during a fire leading to the release of asbestos fibres. Fire damage to a building structure or fittings can result in a range of asbestos debris - from fine non-visible fibrous debris mixed in with fire damaged building contents up to large damaged pieces caused by building collapse.

The amount of fibre release from a fire site containing asbestos depends on the type of ACMs present and their friability. The construction of the building and whether fire protection systems are installed also affects fibre release.

Typical fire sites containing significant quantities of ACMs in Hong Kong tend to be either secondary structures added to buildings such as extensions or roof top structures or village housing, rural work places and storage sites which have been constructed using ACMs – typically corrugated asbestos cement roof and wall sheeting. These latter structures tend to have no fire protection systems and be in areas where fire services personnel have difficulty accessing – leading to the fire burning out and partial or total building structure collapse.

Air monitoring in and around the site after a fire has shown the amount of airborne fibres to be relatively low and a fire site is not considered a significant health risk to surrounding premises. However, the fire site debris can contain significant quantities of loose asbestos debris and a proper decontamination and rubbish removal from the fire site is essential to protect workers and surrounding inhabitants.

It is the responsibility of the investigating registered asbestos consultant (RAC) to determine the level of risk from asbestos at a fire site by identifying the types of ACM that were present in the building, whether they have spread outside of the fire site, and specifying abatement procedures which will safely contain and dispose of all ACMs prior to site refurbishment or reconstruction. The RAC shall inform EPD of the situation once the RAC has reviewed the fire site.

Whilst the procedures and advice detailed in the Code of Practice and General Guidelines should be followed, these additional guidelines have been produced for preparation of asbestos investigation reports (AIR) and asbestos abatement plans (AAP) which are suitable for a fire site. Asbestos management plans (AMP) for leaving asbestos debris in-situ in a fire site are not considered acceptable practice and no guidelines for AMP are included.

This module gives specific advice for investigation of fire sites, but the general guidelines for preparation of AIR and AAP are still valid and should be referred to as well as this module.

PART ONE: PREPARATION OF ASBESTOS INVESTIGATION REPORT

Section 1 – Asbestos Investigation Planning

1.1 Planning for the asbestos investigation of a fire damaged site can involve additional procedures to those described in the General Guidelines, including:

- Determine whether the site is safe for access. Depending on how long after the fire that the asbestos investigation will be carried out, this may involve discussions with Fire Services Department and Hong Kong Police Force as well as the building owner/management.
- Because of the possibility of asbestos being carried out of the fire site during the fire and by fire-fighting activities, the scope of the investigation must include adjacent areas, particularly those that were down-wind at the time of the fire and water run-off areas, drainage channels, base of tower block staircases or lift lobbies etc. The RAC shall explain this requirement to the Employer and agree the extent of investigation. The extent of inspection of adjacent areas may have to be revised if badly damaged friable ACMs are later identified on site.
- Air testing should be carried out around the fire site at the earliest opportunity available. The RAC should ensure that the scope of works agreed with the Employer includes this requirement. In tower blocks. This may mean access to areas unaffected by the immediate fire and building management support for access should be arranged.
- An initial assessment of the site from the outside may give a good idea of the potential ACMs to be expected in the premises. If the building use is not apparent, obtain details from the Employer because this may provide information about possible ACMs present. If available, request as-built drawings from the Employer as these may give details about ACMs present.
- If the initial visual assessment, or obtained information, suggests that damaged ACMs are present, make arrangements for the provision of personal protective equipment (PPE) and basic washing facilities. If friable ACMs such as pipe insulation or coatings are known to be present, make arrangements for the provision of a decontamination unit for access and exit to the site and select appropriate respiratory protective equipment.
- Discuss with the Employer the possibility of urgent remedial action if ACM debris is found outside of the fire site.
- Notify the Employer that asbestos abatement works in a fire site are not exempt from the reporting requirements of the Air Pollution Control Ordinance (APCO) even if only low risk ACMs such as corrugated asbestos cement sheet or vinyl floor tiles are identified. The AIR/AAP must be submitted to EPD for approval.

Section 2 – Site Investigation

2.1 Preliminary site walkthrough and assessment

The initial phase of the investigation shall be a visual inspection from outside the fire site to try and identify any visible ACMs. Information gained about possible ACMs from the inspection planning stage should be confirmed if possible. The immediate area around the fire site shall be inspected for visible debris and environmental air testing arranged for around the site. Air tests should be taken around the perimeter of the fire site – ensuring that tests are taken in the prevailing down-wind locations. Adjacent areas inspected should include the following:

- Access paths/roads in the case of a stand-alone fire site.
- Access stairwells, lift lobbies and adjacent units in a multi-storey block.
- Check prevailing wind pattern and ensure thorough inspection of down-wind areas
- Immediate adjacent residents may have concerns – particularly if windows of their premises were open. With the Employers consent – offer reassurance air testing and dust bulk sampling in their premises if a strong possibility of contamination exists.
- Dust bulk sampling can be used to check for non-visible asbestos contamination, although the inaccuracies of sampling inhomogeneous dust should be stated in the AIR ⁽⁶⁾. The RAC should establish that any measured contamination around the fire site is a result of the fire and not from background levels if surrounding premises also use ACMs. This may mean taking bulk samples and air tests at a distance from the fire site to establish background levels.

2.2 At the end of the inspection planning stage and with results obtained from the preliminary walkthrough and air/dust sampling the RAC should be in a position to produce a risk assessment of the planned investigation for submission to the Employer. The risk assessment should detail the following:

- Make a quick assessment and recommend whether immediate remedial measures, e.g. cordon off / fence off areas, wetting of sites etc. shall be apply to mitigate asbestos fibre release prior to any decontamination work, and shall also inform EPD on the proposed action.
- Confirm the suitability of planned access to the fire site. The aim is to ensure that access to the site for inspection by the RAC and any other parties will not spread contamination.
- Discuss and recommend to the Employer any further security measures required to prevent any unauthorized access to the site.
- Detail planned safety procedures for entering the site - as a minimum, safety equipment should include hard hats, safety shoes, disposable coveralls, gloves and disposable half-face masks.
- Identify any preliminary areas of concern for access, e.g., suspected to be structurally unsafe, and proposed actions for inspection.
- Detail the provisional scope of the decontamination and AIR/AAP works to ensure comprehensive abatement. Any necessary discussion with the Employer regarding scope of works and contractual matters should take place during preparation of the risk assessment.
- Detail any areas of uncertainty for the investigation and proposes remedial options.

2.3 Site Inspection

The RAC shall enter the fire site using whatever access precautions and PPE that have been decided upon during the pre-planning and site assessment stage. The asbestos investigation should proceed as follows:

- The general advice for comprehensive asbestos inspection remains valid for fire sites. Refer to the site inspection section in the general guide as well as following advice in this module. It is important to carry out a systematic visual inspection inside each room/area working from top downwards. The type of building elements, fixtures and fittings used should be noted. Always keep in mind the basic use of asbestos for structural support, fire and acoustic protection and thermal/chemical protection/insulation. All building materials that could have been used for these tasks should be inspected. If an unknown or unusual material is being used for any of these purposes it should be checked by bulk sampling and/or research. A comprehensive photographic record should be taken of the inspection and materials inspected for preparation of the AIR/AAP and to help answer any future queries on the inspection.
- Establish whether visible ACMs are present in the fire site and their condition.
- Fire sites typically leave substantial quantities of burnt and charred debris on the floor from building elements, fixtures and contents. If visible ACMs are present, and breakage or spalling has occurred such that loose fibres might be present, then the burned debris should be left undisturbed and assumed to be contaminated. If ACM debris is present throughout the site and mixed with burnt debris, obtain photographic record to justify the proposed abatement procedures.
- If no visible ACMs are present then the fire debris should be carefully sifted to check if hidden or concealed ACMs are present. Use of a water mist sprayer can be useful to contain dust levels. All tools used to aid investigation have the potential to become contaminated. At the completion of the investigation they should be cleaned by wet wiping.
- Keep in mind the fact that ACMs may be concealed beneath other materials. Corrugated cement sheet may be sandwiched between non-ACM sheeting, vinyl floor tiles may be concealed beneath fitted furniture, or vinyl flooring may consist of two or more layers. Fuse boxes may have fallen off walls and be concealed in burnt debris.
- Access to all areas is important or ACMs may be missed. However, at all times the inspection of the fire site should be carried out with due regard for personal safety and the safety of others. Fire sites can be difficult or dangerous to inspect and the RAC must keep a clear record of which areas have been inspected and which are inaccessible. If structural concerns are not a problem at a particular site, then intrusive investigation measures must be taken if suspected concealed ACMs are present. Areas not inspected shall be clearly detailed in a section of the AIR dedicated to listing inaccessible areas, and also included on site drawings. The default action for un-inspected areas shall be to assume ACMs are present. The assumptions made should be consistent with the type and quantity of ACMs identified elsewhere on the site and the use of the inaccessible area.
- Take inspection notes to refer to in case of future queries about the inspection. If a material has been inspected and dismissed as non-ACM note why in the inspection record and take photographs.

- At the end of the site inspection the RAC and all other personnel attending the inspection should carry out personal decontamination and cleaning of all equipment used during the inspection. Usually a bucket of water and wet rags will be sufficient unless a decontamination unit has been erected because of the presence of high risk ACMs such as pipe/flue insulation. All cleaning materials and disposable PPE should be bagged as asbestos waste. The RAC can make arrangement for collection by chemical waste collector or leave securely on site for collection and disposal during the abatement works. Erect hazard warning labels as appropriate to prevent unauthorized site access and warn site visitors.

Section 3 - ACM Identification

- 3.1 The ACMs that may be present in a fire site depends on the construction of the building and its use before the fire. The RAC shall check with the building management / premises owner the usage and type of the building before the fire. The ACM Identification and Abatement Library should be referenced for details of potential ACMs that may occur. The RAC should bear in mind that this is not a definitive list of ACMs in Hong Kong and they must use their knowledge, experience and a thorough inspection to identify all ACMs on site.
- 3.2 As detailed in the introduction to this module, typical fire sites containing significant quantities of ACMs in Hong Kong tend to be either secondary structures added to buildings such as extensions and roof top structures or village housing, rural work places and storage sites which have been constructed using ACMs – typically corrugated asbestos cement roof and wall sheeting. Additional ACMs that may commonly be present include fuse boxes and vinyl floor tiles. If the fire site is a workshop or similar, then thermal insulation products may also be present. Perhaps the most common ACM encountered in a fire site is corrugated asbestos. The ACM Identification and Abatement Library should be consulted for all ACMs that could be associated with fire sites.
- 3.3 **Asbestos cement sheeting**
- Fires do not completely destroy asbestos cement sheeting but can extensively damage them leading to release of fibres and quantities of visible debris. Sudden high temperature increase in asbestos cement causes the water in the material to flash to steam and the expansion causes the material to explosively spall. Typical fire damaged sheeting has a “moth-eaten” appearance with many holes and pits in the cement surface. Collapse of roofs and walls during or after fire damage, or the collapse of cement roof sheeting due to extensive spalling causing structural failure, can result in further breakage of asbestos cement sheeting and asbestos debris production, which releases further airborne asbestos fibres. A typical fire site in a building which contained asbestos cement will usually consist of visible widespread cement sheet debris on the floor beneath roofs and scattered around the surrounding ground as a result of spalling and roof/wall collapse. The fibre release during spalling will be non-visible but dust sampling of burnt debris may identify contamination by fibre bundles. As a precaution the RAC should assume that all burnt debris immediately within in a fire site that contains visible cement sheet debris is also contaminated by non-visible asbestos fibres. The site inspection should establish zones of asbestos contamination, for example:
- High contamination with visible asbestos debris (usually within the fire site itself);

- Moderate contamination in adjacent areas where sporadic visible asbestos debris occurs on surrounding grounds.
- Low or no contamination in adjacent areas around the boundary of the site where no visible debris occurs but may be contaminated by non-visible asbestos.

It can be disturbing for members of the public to see asbestos cement debris from a fire scattered around. It is not unusual for RACs to be queried by concerned persons during their work. Overseas studies indicate that fibre in air contamination outside of a fire site is usually low due to dispersion of the smoke plume, and ground contamination usually consists of non-respirable fibre bundles ⁽⁷⁾. The danger to the public and workers will come from a clean-up after a fire when materials are disturbed. Explanation by the RAC of the type of contamination present and the abatement precautions to prevent further fibre release may allay public concern.

Section 4 - Bulk sampling

- 4.1 Taking bulk samples in a fire site can be difficult and due regard should be given to the safety of personnel on site and any surrounding residents. Laboratory personnel should adopt the same safety measures as the RAC.
- 4.2 If for some reason the samples are not taken by the analyzing laboratory, the RAC must notify the analysis laboratory that the samples are from a fire site since changes to asbestos fibres under high heat may affect identification.
- 4.3 Whilst bulk sampling of visible asbestos debris will confirm contamination of a fire site by ACMs, the sampling of general burnt debris in a fire site and general dust from surrounding areas is more problematical and has been the subject of much academic debate. Many online references are available for sampling dust for asbestos and RACs should familiarize themselves with the advantages and disadvantages, since dust sampling may form part of the bulk sampling strategy used to confirm zones of contamination. If dust sampling is to be used adjacent to a fire site, the RAC is reminded to establish background levels away from the fire site in case environmental asbestos is prevalent in the area. It is because of the potential inaccuracies in dust sampling that the RAC is advised to assume contamination of general burnt debris if visible asbestos debris is present nearby. Similarly it is advisable to assume low level contamination around the immediate boundary of a site even if visible inspection and bulk dust samples are negative for asbestos. When selecting bulk sampling points to establish potential contamination outside of a fire site, the RAC should consider the factors that may have spread contamination and locate sample points accordingly:
 - Thoroughly inspect down-wind areas.
 - If the fire site is on a slope or at high level, ACM debris – particularly from explosive spalling – could have fallen a considerable distance from the fire site.
 - Water run-off from fire-fighting activities, or adjacent streams or open drains, may have washed ACM debris away from the site.
 - Any persons entering the fire site afterwards may have walked or kicked debris away with their shoes. Inspect the most likely entrance points that could have been used.

Section 5 – Material and Hazard Assessment

- 5.1 The general guidelines for production of material and hazard assessments should be followed. Whichever method the RAC uses to present the assessment in the AIR it is likely that, because ACMs are usually damaged on a fire site, the assessment of material condition will be poor. The standard hazard assessment procedure – assessing activities, frequency of maintenance, number of persons present etc., are not really applicable to fire sites. The hazard assessment should be more based on the scale for the required clean-up after the fire and if this planned works will disturb ACMs.
- 5.2 The establishment of differing zones of contamination within and around a fire site will most likely have been produced by a mix of qualitative and quantitative data. This usually makes numerical-based assessment systems difficult to decide on and present. Differing assessments for the fire site and surrounding areas may be necessary. It may therefore be helpful for material and hazard assessments for fire sites to detail assumptions made and opinions held so that the assessment is more understandable and any disputes over the assessment can be more easily discussed.

Section 6 – Format of Asbestos Investigation Report

- 6.1 The requirements of the Code of Practice and general guidelines for the expected format and contents of the AIR should be followed.
- 6.2 The AIR should include the following information specific to a fire site:
- Details of the risk assessment made prior to investigating the site and the precautions taken to access the site for inspection. Recommendations should be made about further access to the site by any other persons, such as Employer personnel, contractors visiting for remedial works tendering etc. If additional site security measures need implementing these should also be included.
 - Because fire sites are difficult or dangerous to fully access and inspect, the AIR section and drawings detailing inaccessible areas should be comprehensive. The default assumption for inaccessible areas in a fire site is that ACMs exist in that area. The assumptions made should be consistent with ACM identification elsewhere on the site as well as predicted on the type of use of the inaccessible area. If dangerous areas are found on site – structurally unsafe roofs/walls, concealed pits, water wells etc., - they should be detailed in the AIR for the safety of persons who may visit the site afterwards.
 - A detailed explanation of the investigation carried out to identify zones of ACM contamination, both in and around the fire site, an explanation of air and bulk sampling data results, and the justifications and assumptions made to establish the size and degree of contaminated areas. The description of contaminated zones must be supplemented by photographs and drawings detailing the degree and extent of contaminated areas.
 - Details of any impacts to surrounding residents, details of any concerns already expressed to the RAC and advice provided.
 - Details of any remedial measures that should be implemented before full asbestos abatement works commence. This could include erection of hoardings, warning signs, canvas sheet covers over areas etc. Do additional air tests need to be taken

around the site on a regular basis? Do additional inspections need to be made after any periods of high winds or rainfall that may impact contaminated areas?

- Detail APCO requirements on asbestos reporting and abatement from a fire site – refer to section 7 of the general guidelines for further details.

Section 7 Meeting Environmental Requirements and the respective Codes of Practice

- 7.1 The general guidelines for preparation of AIR & AAP should be studied for advice and recommendations for preparing the report. The guidance in this AIR/AAP module should be studied to produce a specific AIR / AMP / AAP for EPD's vetting and comment.
- 7.2 All ACMs in fire sites are not exempted under the Government Gazette Notice and AIR / AAP must be submitted to EPD in compliance with the APCO / CoP prior to the commencement of asbestos abatement works. Abatement of resilient ACM floor and roof coverings in a fire site about to be demolished – such as vinyl floor coverings and roofing felt – requires the employment of a Registered Asbestos Contractor. It is also expected that a RAC should be employed to supervise the abatement of ACMs from a fire site. The RAC should ensure that their Employer is aware of these mandatory and expected requirements.
- 7.3 The RAC shall ensure that the AAW are carried out in compliance with other environmental / health and safety regulation, and shall include such measures in the submitted AAP / AMP.

PART TWO: PREPARATION OF ASBESTOS ABATEMENT PLAN

Section 8 – General Specification Requirements

- 8.1 The general guidelines for the preparation of Asbestos Abatement Plan all apply for the preparation of an AAP for a fire site. However, some of the general requirements may need further consideration and adjustment to make them relevant and applicable to a fire site. Fire sites commonly occur in rural areas which can be a problem to access, work in and transport asbestos waste from. A very badly damaged multi-storey building may present the same problems. Review the following requirements to ensure the registered asbestos contractors can meet the general specification for the abatement works:
- Site access requirements – any particular access restrictions for vehicles, security arrangements for the fire site?
 - Prevention of inconvenience or hazard to nearby residents. Study the fire site surrounding area. Are the general specifications for work zone setup sufficient to safeguard nearby residents, do additional measures need to be specified? For example, for a building podium fire site or a village on a slope, do residents on nearby upper floors/slope need to implement additional safety requirements? Is the standard specified height for segregated barriers sufficient, do segregated zones need enclosing totally or upper floors of buildings need scaffold fans to create

segregation barriers? Will fire escape staircases be temporary blocked during abatement works in tower blocks?

- Consider provision of water supply and electricity. In remote locations, or buildings very badly damaged by fire, supply may be a problem and mobile electrical generators and provision of temporary water tanks may be required.
- Will the Registered Asbestos Contractor be able to store his equipment / asbestos waste on site or nearby, how will it be secured during the works?
- Review discharge of waste water from hygiene facilities. Check whether proper disposal feasible or temporary storage and transport off site to a proper drainage point will be required? Such review is particularly important in some sensitive areas (e.g. water control zones).
- Review the specification for waste handling and disposal. Fire sites commonly occur in rural areas which do not allow nearby storage of waste nor access for a waste vehicle collection. Additional specification for transport of waste by trolley, agreed routes, etc., may be required. The RAC should investigate the situation and propose various options whilst on site. It may require discussion with the EPD and building / village management organisations to propose an acceptable methodology to all concerned parties. Carry out a proper assessment of the amount of asbestos waste that will be generated. If most of the contents of a fire site are identified as contaminated then waste quantities will be high. A realistic estimate of asbestos waste will help registered asbestos contractors cost a tender and properly plan for waste storage and collection.

Section 9 – Method statements for asbestos abatement

9.1 The method statements for asbestos removal should follow the format detailed in the General Guidelines as follows:

- Introduction and description of work
- Work zone setup
- Inspection of work zone setup
- Asbestos removal and inspection
- Air monitoring
- Waste management

9.2 **Introduction and description of phases of work.** The asbestos investigation report will have detailed the scale of contamination and usually identified zones of differing levels of contamination. This may require the production of separate method statements for abatement, e.g., segregated work zones for low contamination and full containment work zones for high contamination. The introduction to the asbestos abatement method statements should summarise the AIR contamination findings and clearly detail the various phases of work to secure the site, erect work zones and carry out abatement works. The following criteria shall be included:

- Detail the contamination zones and the proposed abatement method for each zone. Decontamination of low level contamination can be carried out using segregated

work zones. Decontamination of the actual fire site where loose and friable ACM debris is present should be carried out using full containment work zones. If one zone can only be cleaned after completion of another, clearly define the phases of work, access pathways etc. Drawings can help detail the work phases.

- Consider site access and whether contamination will be present. Consider how the registered asbestos contractor shall start to erect work zones and any pre-cleaning activities necessary to position decontamination units or erect timber hoarding around the site. A full timber hoarding erected around the site is recommended to secure the area and also allows for easier fixing of segregation barriers. Pre-cleaning of all or parts of low contamination areas may be necessary before hoarding is erected.
- Consider the practicalities of work zone erection. Segregated work zones are relatively easy to build, but any full containment work zone erection needs to be carefully considered. Review if some areas of the site need to be accessed and pre-cleaned to allow supports to be set for the erection of a large full containment work zone over a burnt area. Consider how the registered asbestos contractor will safely erect the roof to the full containment. Provision of step by step procedures accompanied by drawings will help explain all the necessary procedures to prepare the site for abatement.

9.3 Work Zone Set up. For each method statement a full description of the work zone set up should be included, with accompanying drawings, to detail all the procedures the registered asbestos contractor has to undertake prior to commencing asbestos abatement works. Procedures to be detailed include:

- Because of the danger from unsafe structures on a fire site and the presence of loose asbestos debris, the RAC must use this section of the AAP to clearly show how the registered asbestos contractor will safely erect work zones.
- What personnel protection measures need to be used?
- Any work zone built in the open air needs weather protection. Specify support bracings for walls and roofs of work zones. Overhead sheeting should be angled to allow rainwater runoff. Specify the measures to take, and re-inspections to carry out if the work zones are affected by bad weather.
- On larger fire sites the area may have to be divided up into a series of smaller work zones. Detail how these will fit together, do some have to be done before others, ensure that full containment areas are not too large – not only to comply with the maximum size allowed in the CoP but also to make them easier to erect, brace and maintain in bad weather. Strong winds impacting on polythene sheet walls of a full containment work zone make negative pressure levels fluctuate. The RAC must make sure that there will be sufficient margins of error in negative pressure differentials to cope with this. To avoid problems, specify work zones that are well braced, properly constructed, not too large, and that negative pressure units of sufficient power are installed. Additional canvas sheeting erected as a wind screen around a full containment work zone can also reduce the impact of strong winds. Calculations on negative pressure unit (air mover) size and air flow should be included.
- If segregated work zones are being used, consider the advisability of using air movers to induce controlled air flow. If site constraints make erection of a well enclosed segregation barrier difficult, or nearby residents are very close to the works, or residents have substantial concerns, their use may be advisable.

- Consider additional protection works to adjacent premises. In a congested area nearby residents will have to be consulted and additional segregation barriers erected to screen their properties. Windows may have to be kept shut and air conditioners switched off during any nearby decontamination works.

9.4 **Asbestos abatement:** The standard general guidelines for specifying asbestos abatement inside work zones should be followed – dependent on the ACMs being removed. Procedures specific to a fire site should also include:

- Details on disposal of site debris. All debris should be categorized by its ease of cleaning and whether it can be wet wipe and vacuum cleaned and disposed of as normal construction waste or un-cleanable and bagged and disposed of as asbestos waste. The general rule should be that debris with hard impermeable surfaces, such as metal, plastics and painted timber can be cleaned and disposed as normal waste, whilst dust, dirt, soft furnishings and fittings and unsealed timber should be disposed of as asbestos waste. A photographic table of all types of debris with cleaning/disposal actions could be included to clarify these procedures.
- Details on measures for minimizing fibre release. Applicable to both segregated and full containment work zones, details must be provided on how the abatement registered asbestos contractor will sufficiently wet friable ACMs and contaminated materials to reduce the release of fibres during waste collection, disposal and cleaning of the site. The RAC must evaluate the debris to be removed and advise the best wetting measures. Pre-soaking of debris, constant application of mist amended water spray from hand-held sprayers, and even installed plant irrigation-type water sprayers can be used in worst cases. Differing phases of work may require differing wetting measures. If high water volume systems are used the RAC must specify how waste water will be managed – its collection from runoff areas, filtering and disposal.
- Detail the sequence of abatement work. High level or structurally unsafe elements should usually be removed first. When clearing large areas it is usually advisable to commence work at the furthest point from the decontamination unit and work towards it. If a different sequence of work must take place, provide the justifications for it. Consider how workers moving around the site may introduce cross-contamination into areas and contaminate previously cleaned areas. Specify measures to prevent this.
- Concrete and brick walls in a fire site may be contaminated. Can they be cleaned by wet wiping, wire brushing and vacuum cleaning, or are they too porous or cracked? It may be advisable to specify removal of all elements of the building(s) so that only a concrete floor surface is left at the end of removal works. The RAC should specify the disposal or retention of all materials in the work zone - All loose debris inside the immediate fire site must be collected and disposed of as asbestos waste even if it is not visibly contaminated by ACMs. If the decontamination measures have specified cleaning of hard surface materials and disposal as normal construction waste consider the advisability of requiring that they are left in the work zone until after air testing - space constraints may be a problem for this.

9.5 **Air Monitoring.** Detail the air monitoring that will be carried out during abatement works. To allay public concern – particularly if there are close-by occupied premises – environmental air tests taken on a daily basis should be specified around the perimeter of the site. Consider the economic cost, if there are no sensitive receivers nearby, or leak air

testing is already specified by sensitive receivers, environmental air testing may not be necessary.

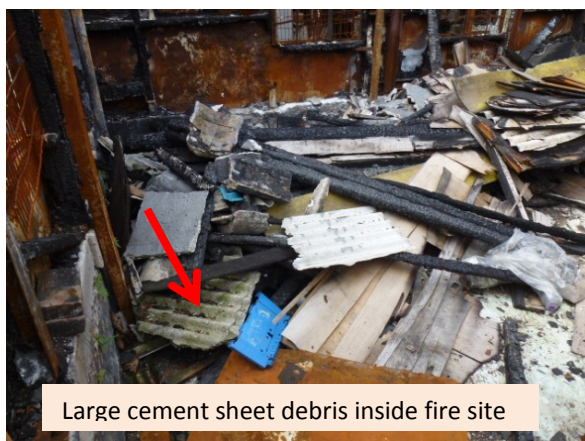
- 9.6 **Waste Management.** The RAC shall look for waste storage as close to work zone as possible, and shall avoid unnecessary transportation outside the workzone. If transportation is inevitable, further precautions shall be considered to avoid damage to ACM waste bag packing. Prior notification to nearby residents could be considered. The Emergency Procedures section of the AAP could be revised to strengthen measures for spilled debris and make them site specific. Fire sites can generate a lot of waste - specify multiple waste collections to ensure not too much waste build-up on site.

Section 10 – Asbestos Work Zone Plans

- 10.1 Detailing the extent of contamination on a fire site and the step by step abatement procedures is too complicated to be done by text description alone. Drawings must be provided to clarify procedures. At a minimum the following drawings should be included:
- i. AAP drawings showing the extent of any pre-cleaning of minor contamination that is necessary to allow erection of work zones. Dependent on how complicated the setup works are for each work zone, this may have to be a series of drawings showing sequential pre-cleaning works;
 - ii. If abatement work is being carried out in phases, drawings showing each phase of work. Usually there should be phases of segregated work zones to clean low level contamination around the site followed by final phases of full containment works at highly contaminated areas in the fire site;
 - iii. AAP drawings detailing the extent of various work zones and their type (segregation or full containment), including air monitoring locations. If work has to be carried out in a particular direction or measures are required to prevent re-contamination, show them on the drawings. As well as plan view drawings, section view and 3D drawings should be considered – particularly for work zones of a complicated shape or work sequence;
 - iv. If waste has to be transported a detailed methodology should be provided including any necessary precautions on-route. The location of waste store(s) shall be shown.

Appendix A:

Photographs of Fire Sites





Small scale debris scattered around a fire site will need clearing prior to work zone erection



Partial fire sites in tower blocks will need liaison with nearby residents for work zone setup/air tests



All fire debris that cannot be cleaned should be disposed of as asbestos waste



Large fire sites may need to be divided up into more than one work zone



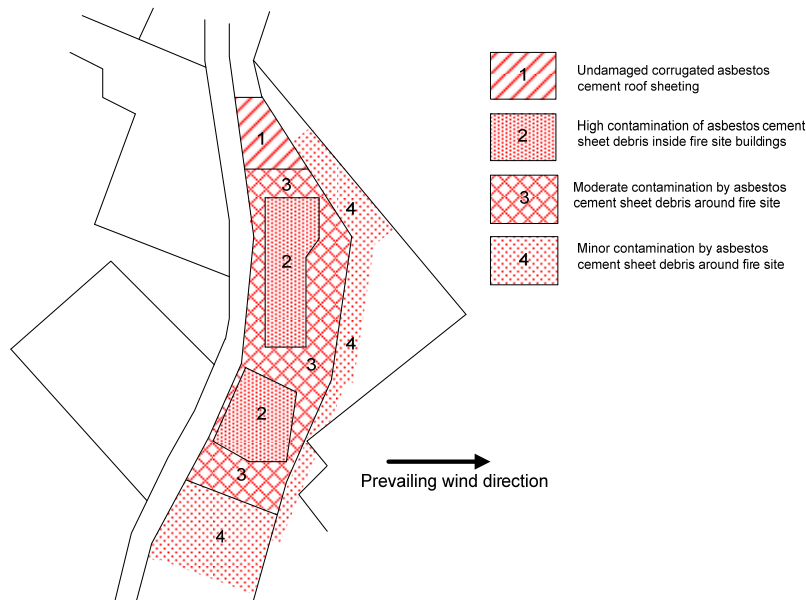
Assessments of structural safety should be made. Assume ACM are in inaccessible areas.



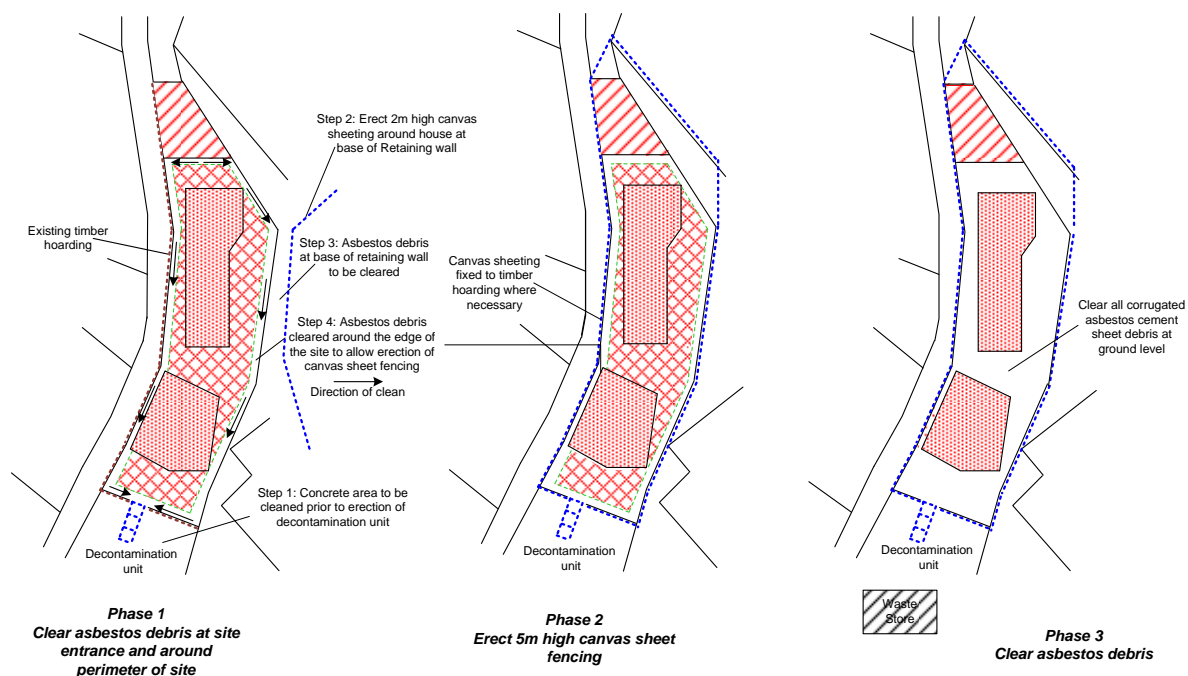
Debris should be categorized into cleanable or non-cleanable for waste disposal

Appendix B: Typical drawings and site plans

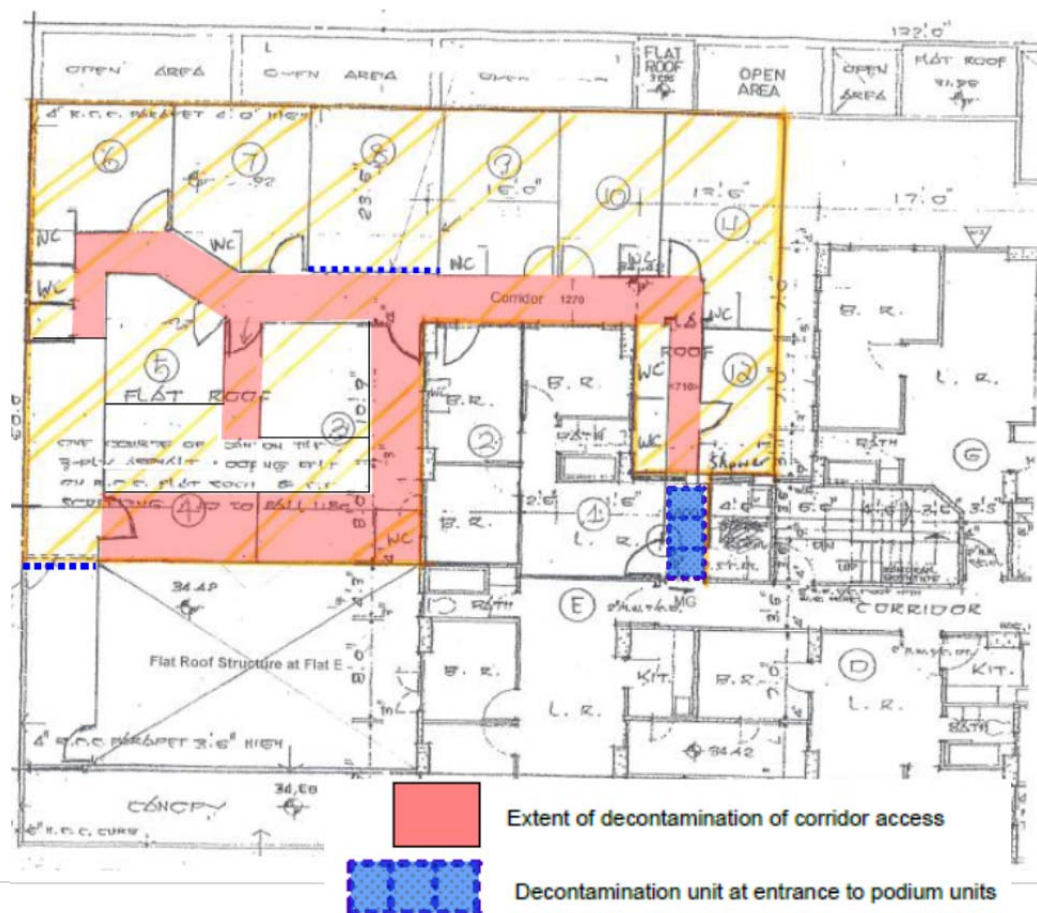
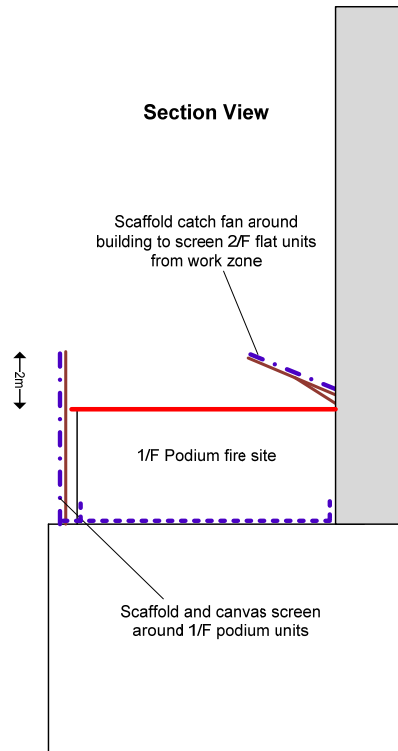
- B1 Drawings should be included in the AIR to show the extent and level of contamination. Photographs included on drawings can help describe and clarify contamination levels



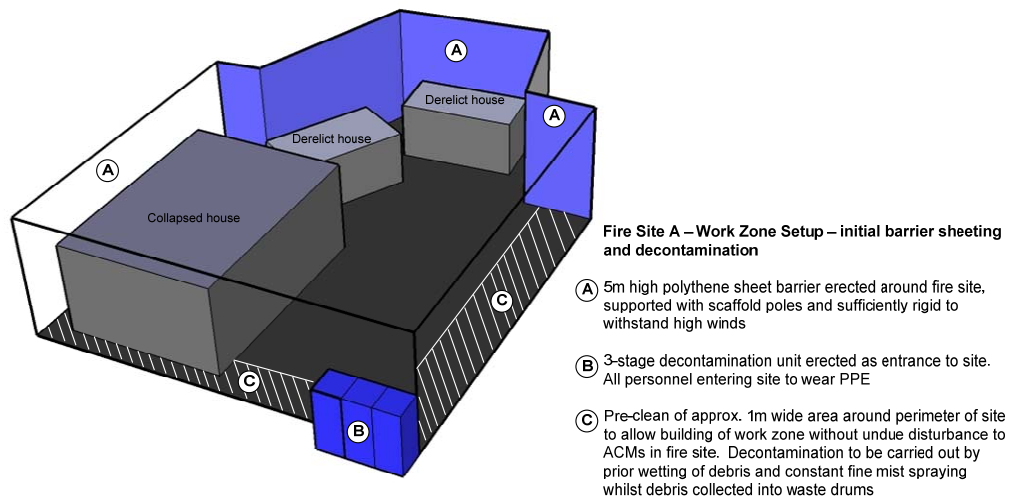
- B2 If phases of decontamination are required before erection of work zones they should be detailed in a series of drawings detailing extent of works in the AAP



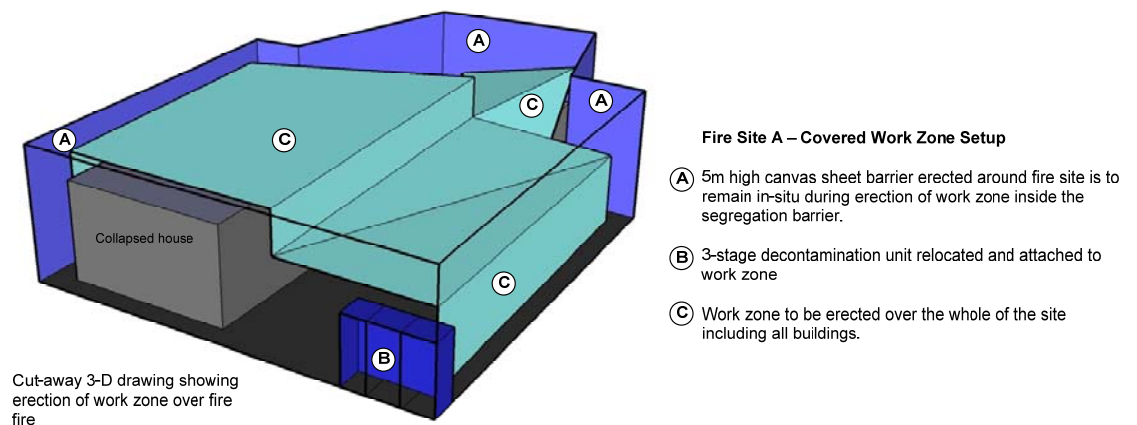
- B3 For work in tower blocks, drawings should show any screening or other works to protect nearby residents and extent of decontamination works before ACM removal.



B4 Section view or 3-D drawings can assist in clarifying scope and sequences of work



B5 They can also assist in clarifying complicated work zone erection



Appendix C: Checklist for Site Inspection

| Item | ✓ or ✗ | Actions required |
|--|--------|------------------|
| Initial Site Assessment from outside fire site | | |
| Is site safe for access? | | |
| Initial assessment – are visible ACMs present? | | |
| Does the site need to be made more secure? | | |
| Identify any visible ACM debris outside of fire site, determine its extent | | |
| Should dust bulk sampling be carried out to check for non-visible ACM debris? | | |
| Are urgent remedial actions necessary: cleaning of footpaths in use, preventing access to areas etc. | | |
| Have air tests been taken around site. Are they satisfactory? | | |
| Provide hygiene requirements for accessing site | | |
| Check personal safety equipment required for access | | |
| Asbestos investigation inside fire site | | |
| Identify areas of visible ACM debris. List their type and quantity / location. | | |
| If no visible ACMs present, sift debris for concealed ACMs. Use water sprays | | |
| Identify any inaccessible and structurally unsafe areas of the fire site. Assume ACM presence | | |
| Take comprehensive photographic record | | |
| Carry out material and hazard assessment of various contaminated areas | | |
| Record details for AAP preparation | | |
| Identify areas of low, medium and high contamination, record on site plans | | |
| Are phases of work zones required, what shall be the work sequence? | | |
| Identify where pre-cleaning need to be done to allow work zone erection? | | |
| Catalogue fire debris and detail disposal/cleaning actions. Take photo record. Assess waste quantity | | |
| Will all building elements be removed, or shall some remain? Detail abatement actions required | | |
| Assess site for access constraints and storage of waste constraints | | |
| Assess availability of water and electricity for the contractor. Review waste water disposal. | | |
| Assess practicality of work zone erection. What constraints are present? | | |
| Is liaison with nearby residents required for access, sealing works and arrangement of air tests? | | |
| Record air monitoring locations for reassurance, leak and clearance air tests | | |
| Are Environmental air tests necessary? | | |

