



Guidance note on the management of fire damaged asbestos

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User Guide

For easy reference to the management process see the Figure 2 flowchart on page 5 and the management checklist on page 17. Not all steps may be necessary for simpler or more limited contamination situations.

For advice on acceptable site specific alternatives to the provisions in this Guidance Note please approach Department of Health in the first instance as outlined under “Agency and other contacts”.

Key management messages

Contamination as result of urban or bush fires involving asbestos containing buildings requires more specialized management than is normally the case in other asbestos situations. This is because:

- A greater number of State and local agencies may be involved, both in immediate response as well as recovery arrangements;
- There is considerable potential for the asbestos to be spread beyond the building involved, and in a form that has or could release dangerous respirable fibres;
- There is often considerable associated personal emotional stress as well as community concern; and
- The asbestos contamination may be on a very large scale and intermixed with other types of contamination such as copper-chrome arsenate (CCA) treated wood residues.

This Guidance Note is designed to address these and other asbestos fire related issues in a protective and practical manner. This is a process that should be readily achieved with no undue burden on the building owners and other stakeholders. The general process consists of taking appropriate immediate management measures at the time of the fire, followed by a more thorough sequence of contamination assessment, remediation, validation and reporting.

As the Guidance Note incorporates the requirements of a number of other agencies, they may be an alternative to the Department of Health if extra information is required, as listed at the end of the document. Local Government Environmental Health Officers (LG EHOs) should not hesitate to contact the Department of Health for assistance when necessary.

Also for ease of use, please consult the procedural flow diagram (Figure 2) on page 5 and the management checklist (Appendix 1) on page 17.

Purpose

This Guidance Note provides a recommended process in regard to the management of fire damaged asbestos to protect public health, although it refers to and is consistent with occupational health requirements. It is primarily for the use of LG EHOs in a regulatory capacity and also for asbestos professionals responsible for managing the contamination.

Scope

The document applies mainly to asbestos that has been affected in buildings or structures as a result of a fire, which includes urban settings and bushfires. Although not designed to address other emergency response situations involving asbestos, such as explosions, destructive winds and flooding, the same general principles to managing any disturbed asbestos may still apply.

The guidance is likely to be most relevant to asbestos cement materials, because these are historically (by far) the most prevalent asbestos products in the public domain, both in terms of extent and quantities.

Legislation

The following pieces of legislation are those most relevant to this Guidance Note:

- *Health (Asbestos) Regulations 1992* or later edition (HAR)
- *Environmental Protection Act 1986* (EPA 1986)
- *Environmental Protection (Controlled Waste) Regulations 2004* (CWR 2004)
- *Occupational Safety and Health Act 1984* (OHSA), *Occupational Safety and Health Regulations 1996* and *Code of Practice – Safe Removal of Asbestos - 2005*.
- *Contaminated Sites Act 2003* (CSA 2003) and *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia – 2009* (Asbestos Guidelines).

Regulatory roles

When uncontrolled fires occur, the first response agency is likely to be the Department of Fire and Emergency Services (DFES), supported by the police. The Department of Environment Regulation (DER)(Pollution Response - PR) will also quickly attend in support of DFES if there is the possibility of significant environmental contamination or initial potential risk to the public occurring. In rural areas first responders may be the Department of Parks and Wildlife (DPW) and/or the local volunteer bushfire brigade (VBFB).

Where there is a potential public health risk, Local Government Environmental Health Officers (LG EHOs) should attend when possible to assess and help mitigate that risk, including from the potential release of asbestos fibres (HAR). The role of the Environmental Health Directorate (EHD) of the Department of Health (DOH) would normally be to provide public health technical and regulatory advice to other agencies, in particular LG EHOs. EHD is also primary adviser to DER in regard to application of the Asbestos Guidelines.

Any involvement by WorkSafe will largely relate to the site as a workplace during the response or subsequent management, and in regard to legislation applying to asbestos removal and removers (OSHA).

During the site management process DER legislation will also apply in relation to asbestos disposal (CWR 2004) and any soil contamination that remains at the site (CSA 2003), including by asbestos.

At the beginning of each management section, the main responsible agencies at the time are identified, including how they may need to interact with other stakeholders such as owners, consultants and insurers.

Asbestos contamination character

Most asbestos will likely be present as cement sheeting (i.e. bonded) for walls, eaves, roofs or fences. Occasionally it may occur in other forms in limited amounts such as the backing for vinyl floor tiles, some fibre boards and as non-bonded (friable) material for insulation purposes.

The types of asbestos most commonly encountered are crocidolite (blue), amosite (brown) and most especially chrysotile (white) asbestos, sometimes as mixtures. Crocidolite is considered the most dangerous and chrysotile the least, albeit still a major potential health risk. The toxicity difference may be by more than 100 fold in regard to causing the invariably fatal disease mesothelioma. Crocidolite and amosite have better water resistance and so were a common component of products in need of this property, such as cement roofing.

The asbestos is of most concern if it has the potential to generate free respirable fibres in situations where people may be exposed as a result of fire-related dispersal. Asbestos cement

material tends to pose the greatest risk from a fire, not only because of its prevalence but also due to the potential explosive shattering (spalling, de-lamination) of the sheets and material dispersal, when entrained moisture turns into steam. This type of release is less likely for other less rigid or less bonded asbestos products.

Asbestos itself does not burn but can denature into less toxic forms (by loss of some fibrous characteristics) if exposed to high enough temperatures (>400° C) for sufficient time. Research indicates that asbestos material expelled from the site by explosive shattering is not appreciably denatured, probably due to the very short fire exposure time.

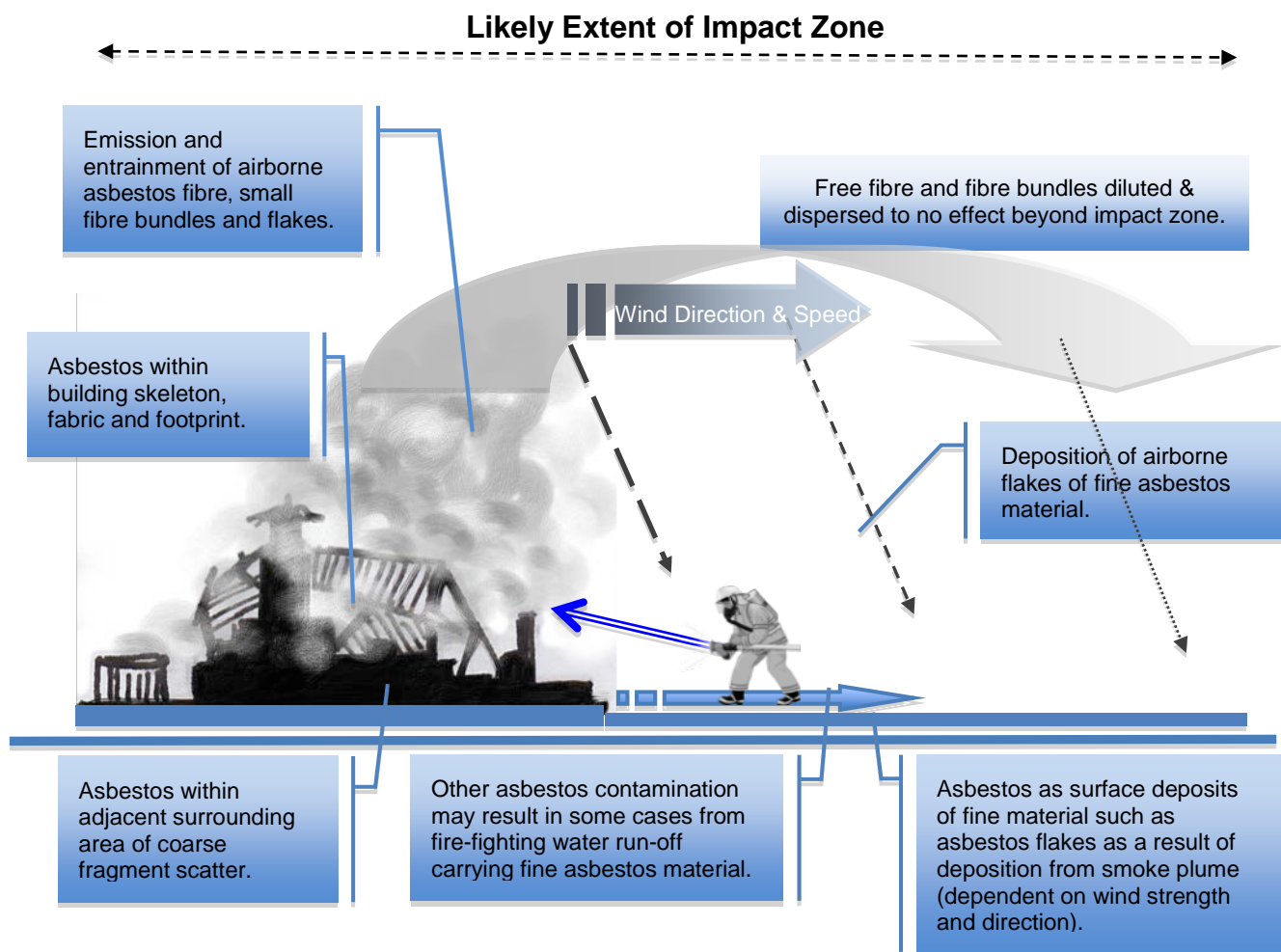
Asbestos contamination may be divided loosely into the following four general types:

- building skeleton and footprint;
- adjacent circular area of coarse fragment scatter;
- surface deposits of fine material (such as flakes) as a result of deposition from the smoke plume (dependent on wind direction and strength); and
- airborne free fibre and small fibre bundles.

Other contamination may also result in some cases from fire fighting water runoff carrying fine asbestos material. These different types of impacts are shown in Figure 1.

Figure 1 – Asbestos Impacted Fire Scene

(Prepared by David E Jackson Peer Review Services)

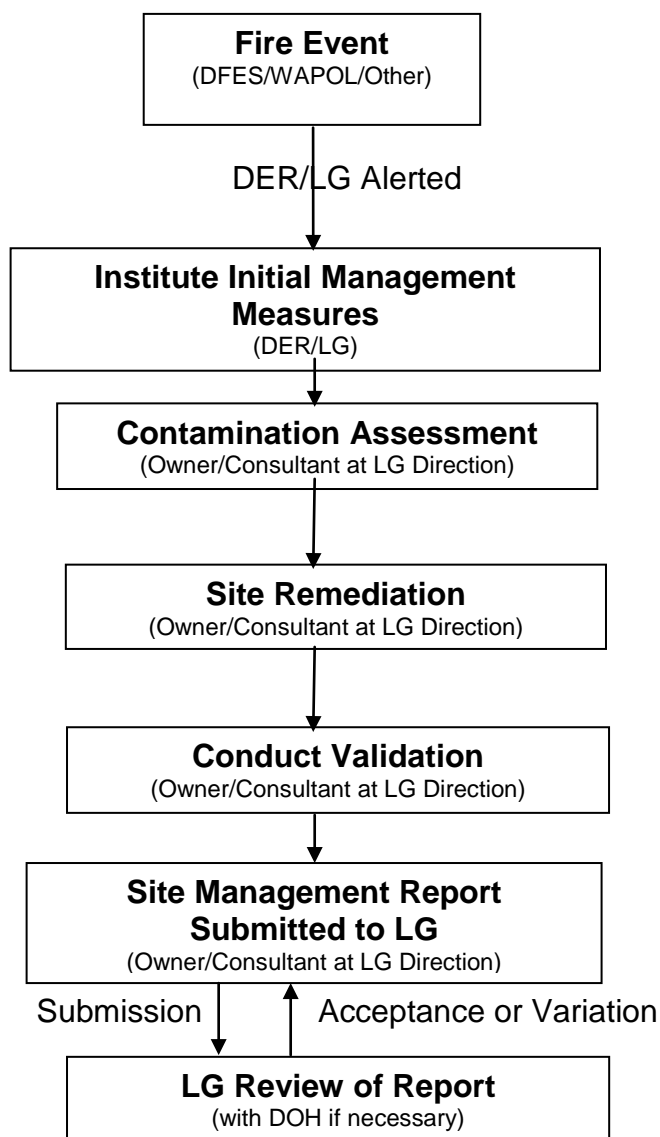


The building skeleton and footprint contamination is usually readily managed because it is localised, however it may not be possible to separate the asbestos materials from other building debris. The dispersed coarse fragments and fine material often require more specialised management because they have spread into other areas and may have contaminated soils and a surrounding built environment. Studies have shown that the free fibre and fibre bundles released by the fire are greatly dispersed and diluted to the extent that they are comparable with background levels in air, and therefore pose a very low risk. However, it is important to also manage public perception otherwise.

Most fire affected asbestos material should be considered brittle and/or friable and managed according to the greater risks that these pose.

For other catastrophic events such as earthquakes, major storms, explosions and flooding, any asbestos structural elements present will most likely be subject to simple fragmentation rather than significant fibre release, except for pre-existing friable material or very major explosive events. Therefore the assessment and management may primarily be directed to the areas of asbestos fragments or debris, using a visual delineation and material collection approach. See Attachment 5 for an outline of disaster asbestos impact features and public risk exacerbating factors.

FIGURE 2 - Asbestos fire response and management process



Management process

Management of the contamination and risks associated with asbestos fires changes as the site progresses from an emergency response to a clean-up and recovery situation. The fire event and initial management measures are undertaken by the first responders as outlined on page 3 and below. Subsequently, a more thorough and formal contamination assessment and management process commences, involving key regulators and asbestos professionals funded by the owner, insurer and/or sometimes by the Government (i.e. major events such as bushfires).

Figure 2 provides an outline of the generalised management process. More detailed information is included in the following sections. Attachment 1 comprises a checklist for the implementation of the series of management measures - not all steps may be required for simpler or more limited contamination situations.

It should be noted that there are often other hazardous materials associated with a building fire. Some may result in the emission of dangerous fumes and gases, such as from burning plastics during the fire event but these will quickly disperse to below levels of concern after the fire has been extinguished.

In addition to asbestos, there may be other hazardous residues around the site, such as burnt residues of copper-chrome-arsenate (CCA) treated timber, which may be disturbed and pose (in particular) a respiratory hazard. Although these other residues may be quite varied and episodic in occurrence, they still require careful consideration when dealing with asbestos. It is important to encompass them into any asbestos management process if practical, noting that such residues may come under general contamination legislation, for instance the CSA 2003.

1. Fire event

During the fire, the emergency services efforts will be primarily directed to containing and extinguishing the blaze. Depending on the fire size and circumstances, environment and health agencies may also quickly become involved to help mitigate environmental and community risks. Any actions while the fire is being brought under control would normally be initiated by the lead agency, usually DFES, or be under its direction.

In the first instance, response actions of area exclusion and possibly evacuation of the public should relate to dangers from the fire itself and potential acute effects from fumes, smoke and other hazardous airborne contaminants, which are likely associated with the visible plume. The special risks associated with any asbestos present can persist after the fire event and require other follow-on management measures.

2. Initial management measures

The likelihood of asbestos being present largely depends on the age of the buildings or structures. Asbestos was used before and after World War II but reached its peak in the 1960s-1970s, before production starting reducing until it was banned for building products by 1990.

Experienced personnel may be able to identify asbestos, including by using a magnifying glass and/or employing burn test (cellulose fibre will burn) but, if in doubt, possible asbestos material should be assumed to contain asbestos and to be managed accordingly, pending the results of laboratory analysis.

The agencies responsible for contamination management after a fire are the Department of Environment Regulation (DER) and the Local Government Environmental Health Officers (LG EHOs). In Perth and nearby urban centres DER is likely to be notified by DFES of major industrial and commercial fires, but not smaller ones including residential, and to be an early

responder to such events due to the potential for pollution. LG is often alerted to a fire by DFES or by informal means, such as media reports, and its attendance is likely to be later.

The first contamination agency 'on the spot' should work with, and under the direction of, DFES to limit public access to the site and any further dispersal of asbestos materials. If DER undertakes this activity then it should, if possible, document what is done and include it in a handover briefing for LG EHOs on their arrival. LG EHOs will normally have the main post-fire responsibilities in handling the management of any asbestos-related risks. In the case of bushfires it is more likely that the LG EHOs will be the main contamination management agency, both initially as well as through to completion, seeking assistance from DOH as necessary. In either case LG should make certain that relevant owners are notified of the fire as soon as practical.

Recommended immediate management measures when the affected areas are first accessible to contamination management agencies should include those listed below. This should occur within 24 hours or several days depending on the particular action and the site circumstances:

- Restricting access only to properly trained officers with sufficient site risk information and appropriate personal protective equipment (PPE). Ideally LG officers should have PPE equipment already available and easily accessible, at least the minimum recommended gear. See Entry Safety Analysis Checklist as provided as Attachment 2.
- Confirming the presence of asbestos material by submitting representative suspect samples for analysis to a National Association of Testing Authorities (NATA) accredited asbestos laboratory. Identification of amosite and especially crocidolite, often present in cement roofs, should prompt more rigorous application of this Guidance Note as these are less common but more dangerous than chrysotile. In urgent situations submission of samples may be done by the LG EHO pending the owner taking management responsibility.
- Delineating, to the extent practical, the impacted areas, including any possibly contaminated runoff, being conservative if in doubt. Presence of significant amounts of asbestos cement sheeting, especially as roofing, is likely to cause increased dispersal.
- Limited amounts of fine flake settlement at a distance (often downwind) from the site (e.g. 100 metres) particularly in a rural setting would not be deemed contamination in terms of the Asbestos Guidelines (Reference 3) investigative criteria. Indications of the presence of fine material may be best identified on flat and smooth surfaces especially on vehicles.
- Keeping damp or stabilising the surfaces of the areas of contamination, especially the footprint and adjacent areas.
- Maintaining site access and disturbance restrictions, especially from vehicles. Erecting warning signs, and fencing if appropriate and practical. These may be temporary ones until professional management is instigated. Also, if necessary and safe to do so, owners properly equipped with, and supervised, may visit the site to reclaim personal effects.
- In some cases an emergency clean-up of certain affected areas may be necessary such as main roads. Road cleaning may be achieved by handpicking, wet street sweeping and/or gentle hosing into contained areas for subsequent clean-up. In such cases asbestos qualifications of the cleaning personnel may not be necessary or may be waived (by the site agency in charge) as long as they work under proper supervision with an appropriate

procedure and equipment. This waiver does not apply to the clean-up of the building/structure itself.

- As a priority, briefing and providing guidance and reassurance to the concerned or affected public. See Attachment 6, *Asbestos Fire Contamination*.
- After the fire, some actions may be appropriate for nearby houses or buildings (if not already taken), usually for precautionary purposes, such as turning off ventilation systems, occupants employing hygienic practices, and possibly evacuation in severe situations.
- Considering perimeter air monitoring (asbestos fibre and CCA contaminants), though this is probably only appropriate for major contamination or reassurance purposes if requested, especially if there are occupied residences or sensitive buildings nearby, such as schools. Experience and research indicates that it is unlikely to get airborne asbestos respirable fibre readings above the 0.01 f/ml limit using the membrane filter method, which can be deemed a safe limit for up to 6 months (see Reference. 3 - Asbestos Guidelines, Section 1.2.5).

3. Detailed assessment

Further assessment work will be necessary if asbestos contamination is confirmed. Even if asbestos is not identified, the footprint of any building of appropriate age and structure should be suspected of containing asbestos and managed accordingly, unless there is evidence to the contrary. Therefore most fires where asbestos is known or suspected will require an assessment and management program. It will mainly be the degree and extent of the work which will vary.

The assessment and subsequent management (next section) stages require a planned, thorough and formal approach to potential contamination problems. In many cases these activities will need to be prompted and managed by the LG EHOs. To be done properly these take much more time and involve owners, insurers and asbestos professionals. These professionals at the supervisory level should be asbestos competent persons, such as members of the Australian Institute of Occupational Hygienists or of the Australian Contaminated Land Consultants' Association (especially for contaminated soil). Both groups are listed later under Agency and Other Contacts heading. Attachment 3 provides a general outline of the responsibilities of each group as employed by Engtech Risk Consultants.

In situations where there may be contamination of soil by asbestos (for instance associated with bushfire damaged buildings) then DER may need to be involved under the CSA 2003. However, if any such contamination is remediated based on this Guidance Note (or if appropriate the Asbestos Guidelines) under agency supervision (LG EHO or DOH), and documented accordingly, then this is likely to be sufficient without formal DER involvement. If there is unwillingness by owners or insurers to apply the Guidance Note then DOH should be consulted if not already occurring. If really necessary, the site may need to be notified by LG to DER as possibly asbestos contaminated and then a formal legal assessment and possibly management process will apply. This may result in Memorial on the Title of the property and a slower mechanism to address the issue.

In cases of localised building fires, the LG EHO may need to issue a notice on the owner under the HAR 1992 *Health (Asbestos) Regulations 1992* to undertake necessary assessment and remediation work, preferably within a few days at least for smaller events. The directions in the notice should be based on the recommendations in this Guidance Note, taking account of the site specific circumstances. The notice should ideally require the owner to address the full extent of the potential contamination, and recommend that this work include going beyond the

limits of that person's property if contamination extends there. The extension of the work is encouraged and may have to be negotiated because the HAR 1992 do not have the authority to require this. In any case it is highly desirable that one clean-up group do all of the necessary work in a consistent and systematic manner based on a single comprehensive asbestos plan. This may need notices to be placed on the owners of surrounding properties that are potentially affected. Including the insurance agencies directly in negotiations may facilitate the process.

In cases of larger scale fires such as major bushfires it is possible a Government recovery support agency such as the Western Australian Natural Disaster Relief and Recovery Arrangements (WANDRRA) may become involved and finance a large part of, and possibly the entire cleanup. In such cases, it is easier for the one coordinated and comprehensive program of clean-up to occur. If not all of the clean-up is covered by such an agency, an effort should still be made to have the other asbestos impacts dealt with in a manner consistent with the major work. In practice this consistent good practice may be difficult for the LG EHO to arrange given the range and number of asbestos possible contamination situations and the sensitivity of the owners and their desire to quickly clean-up their properties.

The following series of steps should be taken to properly assess the nature of the asbestos impact for the purposes of informing the subsequent remediation. This may take from a few days to a week or two to complete depending on the scale of the event:

- In the case of broad area or multiple building/structure fires, the same consultants should be employed, and, regardless, the same procedures and standards should apply.
- External assessment guidance that would be most applicable are the Safe Removal of Asbestos (NOHSC 2005) and the Asbestos Guidelines (which include asbestos in soil investigation and remediation levels), especially in regard to contaminated soil.
- As part of the assessment and management process it is desirable to also address the possible presence of other hazardous materials such as burnt copper-chrome-arsenate (CCA) treated timber.
- Compile information in relation to the nature of asbestos in the building (possibly through building plans and asbestos registers) and details of the likely contamination (from briefing notes and interviews with responders).
- Undertake site visit. For entry, proper PPE should be worn, safety precautions taken and disturbance to the impacted area minimised especially in regard to potential contaminated dust generation. See the Entry Safety Analysis Checklist provided as Attachment 2.
- The initial management measures should be upgraded if necessary especially if remediation may take some time. For instance the introduction of better signposting and fencing of the site. It may also be desirable to use a longer term alternative to wetting such as by applying a PVA glue (in solution with water) or other surface binder, possibly tinted with bright paint or dye (blue recommended) to identify treated areas.
- Based on all relevant site information develop a detailed assessment and sampling plan (if necessary), acceptable to LG.
- Asbestos material in the building footprint should be treated as friable. The coarse fragments adjacent may be non-friable or simply brittle unless showing spalling characteristics or mixed

in with fine material or flakes. All fine material or flakes should be treated as friable and the associated assessment criteria should apply.

- Delineation based primarily on a proper grid based (e.g. 5 by 5 metres) walkover and visual assessment may be adequate, taking into account the fire circumstances, wind conditions and any disturbance of the site during or following fire emergency response. This assumes there has been no soil disturbance. Soil sampling for laboratory analysis (NATA accredited) may not be necessary. Note that contamination of nearby building roofs may be present and require special assessment and management measures. A cautionary approach should be taken in regard to any uncertainty.
- If soil sampling is undertaken for laboratory analysis then a broad shallow surface sample is recommended, of minimum 500 ml, at a frequency consistent with the Asbestos Guidelines.
- Another sampling method that may be used on flat artificial surfaces (for instance house window ledges) to identify very fine material is by applying transparent tape. This can then be mounted by adhering onto a clear plastic sheet and sending to an analytical laboratory.
- The assessment report, as well as indicating the nature and extent of contamination, should recommend remediation measures, and possibly include a proposed Scope of Works. In cases of uncertainty and/or particular community concern, a more conservative approach may be appropriate.

4. Remediation and validation

Based on the assessment work, a remediation and validation approach should be developed and outlined in an asbestos control or management plan which is agreed to by all of the involved parties including the LG EHO. These activities may take from several days to many months to complete depending on the scale of the event.

4.1 General considerations

- Preferably, the consultants who conducted the contamination assessment should be used for the remediation and validation stages due to their familiarity with the site. However, for non-soil contamination an independent competent person may need to do the validation.
- Remediation of hard artificial surfaces should be based on this Guidance Note and on relevant occupational guidance such as the *Code of Practice for the Safe Removal of Asbestos 2005*. Attachment 4 is a copy of the Code's recommended asbestos removal control plan components. The control plan should among other things:
 - employ a standardised procedure, noting that there may be some site specific and group differences;
 - include contingency arrangements in case previously undetected or inadequately assessed contaminations are found;
 - include communications and complaints arrangements for the affected public - normally communications are primarily undertaken by the Local Government; and
 - outline measures to manage the risk of public exposure to disturbed asbestos during the remediation process including PPE to be used by site visitors.

- Remediation and validation of contaminated soil areas should be based on this Guidance Note and for more severe or complicated situations on the Asbestos Guidelines (Ref. 3).
- All remediation and validation should be on a grid and/or staged sector basis with procedures implemented to avoid recontamination from non-remediated areas.
- Note that special arrangements may be necessary for very large fires, ones in remote areas or if there are substantial amounts of asbestos in poor and potential friable condition.

4.2 Remediation

- The contractors who undertake the removal of asbestos material must have a license for friable material (unrestricted license in WA), although a non-friable license may be possible for the corresponding type of contamination or as WorkSafe sees fit, such as under supervision following a prescribed process, or under certain conditions.
- The removalists must be supervised by the consultant and work to an agreed and documented procedure. This should take the form of safe work method statements and joint safety analysis protocols tailored, as necessary, to each site (if there is more than one).
- The restricted access area corresponding to the boundaries of suspected contamination should be expanded to include a decontamination zone and truck loading area.
- Ongoing wetting down and other dust management measures should be employed during the removal process. Asbestos (and possibly CCA dust) air monitoring is also appropriate based on the Asbestos Guidelines and/or local OHS requirements, especially during any structure demolition/removal or if soil excavation occurs. Past experience suggests that respirable asbestos fibre found in air are at low and acceptable levels during clean-up activities, provided proper dust management measures are used. The levels are usually below the level of detection for boundary static sampling.
- Remediation of larger fragments around the site may be simply subject to a thorough hand pick on a grid basis (e.g. 5 by 5 metres). This should include at least two passes at right angles. If there is any suspicion or evidence of fine friable material, asbestos fibre bundles or free fibre associated with soil, some excavation may be required (as shallow as is practical e.g. 5 cm deep).
- For hard surfaces with suspected free fibre and fibre bundle contamination, HEPA vacuuming may be necessary, possibly followed by wet wiping or mopping. Wet wiping can also be used on broad leafed plants if they are to be retained.
- To the extent practical, any fine settlement debris or flakes found further from the source area should be removed by handpicking or targeted HEPA vacuuming. The occasional fine flake (e.g. every few metres) towards the boundary of the contamination is unlikely to be of concern, especially in rural areas.
- In the case of the building structure and footprint, careful mechanical excavation is normally required for at least down to any slab, or up to 20 cm into the underlying soil. If demolition of a damage structure is required then WorkSafe demolition legislation applies. It may be

necessary to go outside the footprint if there is an overflow of debris. The clean-up procedures should follow OHS regulatory requirements.

- If there are adjacent unburnt properties that may have been impacted, or as a reassurance to their owners, these may need to be cleaned in a manner appropriate to the potential type of contamination.
- In the case of adjacent building roofs and gutters, large fragments should be handpicked, possibly using a “cherry picker” mobile crane, and finer debris be hosed into downpipes for collection with a filter system at an interception point.
- If soil excavation is necessary it should be done while wet and on a systematic grid basis with efforts made to ensure no cross-contamination of previously remediated areas. However, to the extent possible, debris should be handpicked from the surface beforehand.
- Any excavated material should be wetted and preferably loaded into lined trucks or skip bins immediately for removal rather than being stockpiled. OHS regulations apply. Care should be taken that removal vehicles do not track any asbestos contamination beyond the site.
- Although double bagging is normally required for asbestos waste, it may be impractical for bulk materials such as building debris and excavated impacted soil. In such cases, the truck trays and/or skip bins should be lined and covered to ensure there is no escape of impacted dust. Dust control is particularly important at this stage.
- The greatest precautions should apply to excavation and loading of material in a building footprint as it is likely to have the greatest amount of asbestos in the poorest condition.
- Unless asbestos can effectively be separated from building debris there should be no construction and demolition material recycling of the non-asbestos parts of the building.
- Asbestos contaminated materials should be contained, transferred and disposed of in accordance with OHS and environmental requirements, including the tracking of loads on a site specific basis and keeping disposal receipts with details of the hazardous material load.

4.3 Validation

- All remediated areas should be validated afterwards by close visual examination and, where necessary, soil or tape sampling. Repeat remediation may be necessary, possibly on a “hot spot” basis.
- Successful validation should be formalised by the issue of a clearance certificate by a competent person, such as the consultant, and reported as indicated below. Such clearance and reporting arrangements are primarily requirements of the OSHA and CSA 2003, respectively. Therefore WorkSafe or DER (DOH in the first instance), respectively should be consulted if necessary for additional advice in these regards.
- If there is any uncertainty about the adequacy of the validation, the LG EHO should conduct a final visual inspection of the site. For additional reassurance, 10 cm of certified clean fill can be introduced as a surface cover for remediated or associated areas.

5. Reporting

- The basis and effectiveness of the remediation should be documented in a report submitted to the relevant regulatory agency, usually LG in the first instance. This may cover multiple sites. The report should include:
 - site description and fire event details;
 - an outline of the contamination assessment process and copies of any analytical or air monitoring results; and
 - details of the remediation and validation process, including copies of any analytical or air monitoring results, clearance certificate, and disposal receipts - attaching the asbestos removal control or management plan may assist this.
- In the case of potentially contaminated soil the report should conform to the guidance in the Asbestos Guidelines and may be referred on by the responsible agency to the DOH, in conjunction with DER, to verify the adequacy of the work.
- The main thing that the report needs to demonstrate is that the work undertaken at the site was sufficient to indicate that any human health risk has been reduced to a very low or negligible level.
- If the report is not deemed adequate by the agencies, clarification and possible additional remediation and validation work may be necessary.

Lessons learned from past fire events

Fires involving asbestos are an occasional, specialised and sometimes large scale contamination management issue. Consequently, LG EHOs as key regulators may not always have the requisite skills, process knowledge, resources and management systems. The most challenging fires are major industrial fires near residential areas, and large scale bushfires affecting communities. For all fires it has been important to have good line of communication between agencies and stakeholders including up-to-date key contact officers and all hours contact details.

In addition to the information in the main part of this Guidance Note, the following points relate to real experiences that are useful for LG in dealing with the aftermath of asbestos fires.

Urban Fires

- For small fires such as single residences LG may not become aware of the issue and any associated asbestos contamination in a timely fashion. If, and when, it is alerted it is important to ensure that any clean-up already undertaken was effective by visually inspecting the relevant area and requiring more work if necessary.
- After the fire is controlled it is important for LG to be briefed by the first responders (i.e. DFES) and/or DER in regard to fire circumstances and status of the contamination management before assuming responsibility for some or all of that management.
- Any large building fire, especially involving an asbestos roof, will result in fragment dispersal up to 30 metres away and significant deposition of fine asbestos material from the smoke

plume of the order of 200 metres distance downwind of the site, or more, depending on wind conditions. Consequently, widespread impacts on the surrounding built up area are possible.

- Large urban fires can affect many properties and it is highly desirable that these all be managed to a consistent high standard. So, to the extent practical, the LG should encourage the use of this Guidance Note by the same suitable professionals, visually check the adequacy of the remediation afterwards, and review the remediation and validation report, including asbestos removal clearance certificates.

Bushfires

- Any external agencies involved should work closely and supportively with LG, who should be involved at a very early stage.
- Being frank, regular and proactive in keeping the community informed.
- In regard to community consultation:
 - Be realistic about timeframes, especially since remediation goal posts may change.
 - Ensure that owners have an appreciation of the risks and how they should be managed, preferably through the provision of information sheets. It is important, however, to also address perceived risks, which are often exaggerated.
 - Ensure good consultations with property owners, including agreeing on the schedule of work for demolition and site clean-up. Also owners need to be provided with clear and detailed scopes of work to sign off on, with informed agreement as to what structures to keep and what to clear.
 - Explain in detail the demolition process and what has to be removed to ensure asbestos clearance. Explain the testing procedure and the need to revisit, if required, areas that may still be contaminated.
 - Explain cross contamination from adjoining destroyed properties.
 - Explain the ‘end result’ in achieving an ‘all clear’ of asbestos contamination so that future property record searches are accurate.
- Determining the possible presence of asbestos on some properties may be difficult. Some jurisdictions have taken the precautionary approach of assuming its presence and applying high levels of management. This may result in a higher contractor cost but lower consultant cost, quicker turnaround time and more reliable clean-up.
- It is desirable to have a contract with just one analytical laboratory which can undertake any fragment, soil and air sample analytical work in a suitable standardised manner and with fast turn-around times.
- Be aware of the value of having dedicated project managers for the remediation and associated tasks. LG and other responsible agencies may not have time or project expertise, including in regard to financial issues and experience working with insurers.

- Note that there may be tension between undertaking a proper tendering process and meeting political and community timeframe expectations.
- The tendering process may be assisted by having a pre-tender meeting of prospective service providers who can help ensure the scope of work is adequate for the purpose and cost estimates can be better made.
- The tendering, contract award and payment process should be completely transparent.
- Ensure there are clear lines of responsibility, good coordination and also close supervision (on-site) of the remediation process.
- Consider undertaking the work on a staged basis so that sites in particular areas can be attended to first depending on priorities.
- Consider the possibility of varying regulatory requirements on a special needs or site specific basis to achieve timely and practical, yet still risk acceptable, contamination management (e.g. in disposing of asbestos waste).
- Make maximum use of LG records and information about the affected properties, including age and building materials used.
- Ensure other possible contaminants are addressed with asbestos management (e.g. CCA treated timber residues), noting that they may have different disposal requirements.
- Apply robust management measures, including systematic processes, to avoid recontamination of remediated areas as this has been a problem with many sites, especially from machinery tracking.

Agency and other contacts

Department of Environment Regulation (DER)

In the first instance contact should be with the Pollution Response Unit, and as necessary the Contaminated Sites Branch may become involved.

Pollution Response - T: 1300 784 782 E: <mailto:pollutionwatch@der.wa.gov.au>

Contaminated Sites Branch - T: 1300 762 982 E: <mailto:contaminated.sites@der.wa.gov.au>

Asbestos Disposal – <http://www.der.wa.gov.au/our-work/controlled-waste>

Department of Health (WA Health)

Asbestos advice can be obtained from the Environmental Health Hazards Unit on 08 9388 4999

Email: reception.GVH@health.wa.gov.au

WorkSafe

General Enquiries: 1300 30 78 77

Asbestos Removalists:

<http://www.commerce.wa.gov.au/worksafe/assessors-licence-holders-and-training-providers>

Australia Institute of Occupational Hygienists (AIOH)

Consultant Search: <http://www.aioh.org.au/consultantsearch.aspx>

Australian Contaminated Land Consultants' Association (ACLCA)

Members: <http://www.aclca.org.au/wa-our-members>

Key references

1. Management of occupational hygiene hazards arising from the February 2009 Victorian bushfires, A Aiezza, H Ahmet, 2009
http://www.researchgate.net/publication/237638043_Management_of_Occupational_Hygiene_Hazards_Arising_from_the_February_2009_Victorian_Bushfires
2. Report on the investigation of the effect of fire on asbestos fibre contamination, Noel Arnold & Associates, 2006
<http://www.noel-arnold.com.au/content/uploads/pdfs/Articles/Fire/Asbestos%20info%20for%20web.pdf>
3. *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia – May 2009 and National Environmental Protection (Assessment of Site Contamination) Measure.*
<http://www.public.health.wa.gov.au/cproot/3763/2/Guidelines%20for%20Asbestos-Contaminated%20Sites%20-%20May%202009.pdf>
<http://www.scew.gov.au/nepms/assessment-site-contamination>
4. *Code of Practice – Safe Removal of Asbestos* – Safe Work Australia 2005
<http://www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/cp2005saferemovalofasbestos2ndedition>

Attachment 1 - Asbestos fire contamination management checklist

This checklist outlines the main steps that should be taken when possible and appropriate in managing contamination and protecting the public from health risks resulting from an asbestos fire. Greater detail is provided in the main text of this Guidance Note as per page number references.

Fire asbestos contamination usually consists of: the building skeleton and footprint; close surrounding area of coarse fragment scatter; surface deposits of fine material from smoke plume deposition; and airborne free fibre and small fibre bundles. In the case of asbestos cement, the latter are usually too dispersed by the fire to present a significant risk unless subsequently generated by disturbance of the other types of contamination. Sometimes there may also be asbestos contamination as a result of firefighting water run-off.

Other hazardous fire residues should be managed in conjunction with the asbestos, such as CCA treated timber.

Actions	Agencies
<p>1. <i>Fire Event</i> (page 6)</p> <ul style="list-style-type: none"> • Site public exclusion and possible local evacuation due to all hazardous emissions 	<p>DFES, WAPOL (DPW, VBFB possibly)</p>
<p>2. <i>Initial Management Measures</i> (page 6)(within <u>24hrs to several days</u> depending on particular action and site circumstances)</p> <ul style="list-style-type: none"> • Identify possible presence of asbestos, based on age, appearance and burn test - assume presence, subject to laboratory confirmation • Apply PPE and safety access restrictions. See Safety Checklist – Attachment 2 • Delineate possible asbestos contaminated areas • Wet down (ongoing) • Erect warning signage and fencing if necessary. Minimise disturbance, e.g. vehicles • Undertake some emergency clean-up if necessary e.g. for major roads • Advise owners about the fire and undertake public communication. See Attachment 6 brochure • Consider possible actions for adjacent residences or buildings, e.g. evacuation • Consider the need for air monitoring for asbestos fibre 	<p>DER (if present) <input type="checkbox"/> LG (including briefing)</p>
<p>3. <i>Detailed assessment</i> (page 8)(a <u>few days to a week or two</u> to complete)</p> <ul style="list-style-type: none"> • LG initiate formal management process by owners and/or WANDRRA, invoking OHS, health or environmental legislation if necessary. See Attachment 3 for group roles • Appointment of competent person, occupational hygienist or environmental consultant (depending on contamination circumstances) as asbestos management leader • If possible, the same asbestos professionals should be employed throughout the assessment and management process using suitable 	<p>LG Owner/Insurer WANDRRA (bushfires) Asbestos professionals</p>

<p>standardised procedures</p> <p>Asbestos professionals:</p> <ul style="list-style-type: none"> • Use NOHSC 2005 and/or Asbestos Guidelines as external main references • Consider parallel assessment and management of other hazardous materials • Compile available site asbestos information including from initial survey and records • Undertake site visit with suitable PPE and safe procedures. See Safety Checklist – Attachment 2 • Upgrade the initial management measures if necessary e.g. fencing • Develop a detailed agreed assessment and sampling (if necessary) plan including: <ul style="list-style-type: none"> – treating certain specified types of asbestos contamination as friable – delineating visible material contamination boundaries using a grid-based walkover – delineating invisible material boundaries by context, and sampling if necessary • Implement the plan, adapting as necessary to site circumstances and developments • Provide details of the assessment methodology, results and recommended remediation actions in a written report, quoting guidance material used 	
<p>4. <i>Remediation and Validation</i> (page 10)(may take <u>from several days to many months</u> to complete)</p> <ul style="list-style-type: none"> • All agencies should agree on a remediation and validation approach as outlined in an Asbestos Removal Control or Management Plan prepared by the competent person etc. See Attachment 4 <p>4.1 <i>General considerations</i> (page 10)</p> <p>Asbestos professionals:</p> <ul style="list-style-type: none"> • The consultants who conducted the contamination assessment should be used for the remediation and validation stages • Use NOHSC 2005 and/or Asbestos Guidelines as external main references for plan • The plan should include, among other topics: <ul style="list-style-type: none"> – employ a standardised procedure, subject to site differences – include contingency arrangements e.g. for unexpected impacts – include communications and complaints arrangements – outline public risk management measures • All remediation and validation should be staged, sector-based with recontamination prevented • Special arrangements may be necessary for very large or remote fires 	<p>LG Owner/Insurer WANDRRA (bushfires) Asbestos professionals</p>

<p><i>4.2 Remediation (page 11)</i></p> <ul style="list-style-type: none"> • The asbestos removalists for friable material must have an unrestricted license • Removalists must be consultant supervised and work to an agreed plan • A decontamination zone and truck loading area should be established • Ongoing dust management measures and asbestos air monitoring to be implemented • Scattered still bonded larger fragments should be subject to a grid based hand pick and, if necessary, a soil surface skim • Possible asbestos free fibre or fibre bundles on hard surfaces should be subject to HEPA vacuuming followed by wet mopping • Smoke plume asbestos flake deposits should be handpicked or HEPA vacuumed • The building structure and footprint material should normally be subject to mechanical removal followed by final clean-up • Special procedures may be necessary for impacted adjacent roofs or potential impacted adjacent properties • Any soil excavation should done wet and systematically in stages • Any excavated contaminated material should be wetted and immediately removed from the site • Bulk contaminated material for practical reasons can be placed directly into properly lined skips or truck trays and fully enclosed during transport - dust control is critical • There should be no recycling of non-asbestos parts of the building unless non-contamination is demonstrated • Asbestos contaminated materials should be contained, transferred and disposed of in accordance with OHS and environmental requirements <p><i>4.3 Validation (page 12)</i></p> <ul style="list-style-type: none"> • All remediated areas should be validated visually and, in the case of friable or fine material, also by sampling and analysis • A clearance certificate should be issued by a competent person • The LG EHO may conduct a final visual check 	
<p><i>Reporting (page 13)</i></p> <ul style="list-style-type: none"> • A remediation and validation report should be submitted to LG demonstrating the adequacy of the work - further clarification and/or more work should be undertaken if necessary 	<p>LG Owner/Insurer WANDRRA (bushfires) Asbestos professionals</p>

Attachment 2 - Asbestos site entry – safety analysis checklist

This Checklist is intended for LG EHOs personal use at any stage of asbestos fire management but may be used by others involved. Full application may not be necessary especially for minor fires or lower hazard management stages.

Information Compilation

Briefing from (tick):

- Controlling Agency (e.g. DFES) WAPOL DER LG Owner Advice
 Building records Other? Describe:

Is it adequate? Yes No Maybe If answer is no or maybe then additional information should be sought or a more cautionary approach taken to any site entry.

Hazard Identification and Rating

Presence of the following hazards (tick/comment):

Hazard	Likely	Unlikely	Unknown	Comment
Fire/heat				
Friable/brittle asbestos				
Bonded asbestos, e.g. pieces				
Other hazardous material /fumes				
Structural or physical				
Electrical				
Other:				
Other:				

Management Measure Selection

Use of the following management measures (tick/comment):

Measure	Yes	No/NA	Unknown	Comment
First responder escort				
Other relevant escort				
Work partner/s				
Movement plan				
PPE & possibly related processes				
Other:				
Other:				

For PPE use please tick relevant equipment. Minimum normally is a Class P2 respirator, safety boots/glasses and gloves.

- Respirator Gloves Safety Shoes Hard hat Eye protection Coveralls Other (describe):

Final Review and Decision

Based on the information available, hazards identified and management measures planned is the site safe to visit?

- Yes Proceed with inspection but review process as necessary
 No Seek advice from line manager and/or expert external agencies

Name:.....Signature:.....Date:.....

Attachment 3 - Bush fire asbestos contamination assessment and remediation roles and responsibilities

Entity	Roles and Responsibilities
Local Government	<ul style="list-style-type: none"> • Overall administration • Overall management • Community consultation • Contractual engagement of consultants & contractors • Inspections, monitoring & corrective actions • HSE* as a mutual “duty of care” & of own personnel when on site
Consultant	<ul style="list-style-type: none"> • Site contamination assessment • Specific environmental guidance/direction • Inspections, monitoring and corrective actions • Air monitoring • Soil validation sampling • Laboratory analysis • Reporting • HSE as a mutual “duty of care” & of own personnel when on site
Demolition & Clean-up Contractors	<ul style="list-style-type: none"> • Site security • Supervision of works • Demolition & clean-up • Transportation and disposal • Equipment and machinery de-contamination • Provision of appropriate PPE • Site reinstatement • HSE as a mutual “duty of care”, own personnel, site visitors & community protection

Table based on approach used by Engtech Risk Consultants

*HSE – Health Safety & Environment

Attachment 4 - Extract from Code of Practice – Safe Removal of Asbestos – Safe Work Australia 2005

Table 1 – Components of the Asbestos Removal Control Plan

Information to be included in the asbestos removal control plan		Buildings and Structures		Plant and equipment		Friction products
		Friable	Non-friable	Friable	Non-friable	
Identification						
a	Details of the ACM to be removed (e.g. the location(s), whether it is friable or non-friable, type, condition and the quantity to be removed). See section 7.2.4.	✓	✓	✓	✓	✓
Preparation						
b	Consultation See section 7.1.					
c	Assigned responsibilities for the removal	✓	✓	✓	✓	✓
d	Program of commencement and completion dates	✓	✓	✓	✓	✓
e	Emergency plans See section 8.2.	✓	✓	✓	✓	✓
f	Asbestos removal boundaries, including the type and extent of isolation required and the location of any signs and barriers. See sections 9.1 and 9.2.	✓	✓	✓	✓	✓
g	Control of electrical and lighting installations See section 9.3.	✓	✓	✓	✓	-
h	Personal protective equipment (PPE) to be used, including respiratory protective equipment (RPE). See section 9.7.	✓	✓	✓	✓	✓
i	Details of air monitoring program. See section 9.8.	✓	-	✓	-	-
j	Waste storage and disposal program See section 9.10.	✓	✓	✓	✓	✓
Removal						
k	Methods for removing the ACM (wet or dry methods) See section 9.5.	✓	✓	✓	✓	✓
l	Asbestos removal equipment (spray equipment, asbestos vacuum cleaners, cutting tools, etc) See section 9.6.	✓	✓	✓	✓	✓
m	Details on required enclosures (see sections 10.1, 10.2 and 10.3), including details on their size, shape, structure, etc, smoke testing enclosures (see section 10.2.2) and the location of negative pressure exhaust units (see section 10.1).	✓	-	✓	-	-

Information to be included in the asbestos removal control plan		Buildings and Structures		Plant and equipment		Friction products
		Friable	Non-friable	Friable	Non-friable	
n	Details on temporary buildings required by the asbestos removalist (e.g. decontamination units) (see sections 10.1 and 10.2, including details on water, lighting and power requirements, negative air pressure exhaust units (see section 10.1) and the locations of decontamination units (see sections 10.2.3 and 10.2.4).	✓	-	✓	-	-
o	Other control measures to be used to contain asbestos within the asbestos work area.	✓	✓	✓	✓	✓
Decontamination						
p	Detailed procedures for workplace decontamination, the decontamination of tools and equipment, personal decontamination and the decontamination of non-disposable PPE and RPE. See section 9.9.	✓	✓	✓	✓	✓
Waste disposal						
q	Methods of disposing of asbestos wastes (see section 9.11), including details on the disposal of: <ul style="list-style-type: none"> disposable protective clothing and equipment, and the structure(s) used to enclose the removal area 	✓	✓	✓	✓	✓
		✓	-	✓	-	-

Attachment 5 - Asbestos contamination resulting from disaster events

In the case of asbestos impacts resulting from other disasters the management process may be often simpler and in some cases different from what is experienced with fire, especially major fires. Some of the features that may be associated with disaster related asbestos impacts are provided in the accompanying table. Also listed below are some of the situational factors that may require a more rigorous assessment and management process in regard to any asbestos contamination problem:

- Uncontrolled recovery demolition and soil disturbance
- Larger quantities of material
- Asbestos present as roofing and therefore elevated
- Poorer condition of the pre-existing asbestos material
- Dry and windy conditions
- Presence of amosite (brown asbestos) and in particular crocidolite (blue asbestos)
- Nearby undamaged residences, schools or buildings containing sensitive populations

Asbestos Contamination Event	General Contamination Features	Contamination Management Aspects
Cyclone/major wind storm	On site & potentially widespread downwind scatter of asbestos fragments, pieces & sheets Largely well bonded asbestos debris, so lower risk	Building fabric & footprint Scatter remediation by visual mechanical /manual removal and handpicking unless inadvertent burial
Earthquake	Likely in-situ contamination, except possibly any toppling multi-storey buildings Largely well bonded asbestos debris, so lower risk	Largely building fabric & footprint specific remediation
Explosion (without fire)	Potentially larger area of circular contamination Possibility of brittle material but not in the form of flakes	Building fabric & footprint Also focus on visible scattered possible brittle fragments
Fire (urban or bush)	See Guidance Note	See Guidance Note
Flood Damage	Potentially widespread down flow spread of asbestos pieces & sheets Possibility of material being buried in other areas under debris & sediment	Building fabric & footprint Scatter remediation by visual mechanical /manual removal and handpicking Possibly sampling & excavation related to buried material
Hail Storm	Largely damage to asbestos roofing resulting fragments in roof space & roof compromise	Handpicking & preferably roof replacement rather than repair

Attachment 6 - Asbestos fire contamination

In Western Australia asbestos was extensively used in building products nearly until 1990. Therefore many older residential and commercial buildings may contain asbestos, mainly as cement sheeting in walls, ceilings, eaves, fences and roofs. If these are burnt it can lead to the spread of asbestos contamination which needs to be managed.

However, if asbestos contamination is properly managed it poses virtually no risk to the public.

Fire and Asbestos

There are countless fires in WA each year in urban and rural areas. Sometimes these occur as major bushfires affecting many buildings.



Although asbestos present does not burn, it may be physically damaged during a fire and possibly disperse into adjacent areas.

Asbestos Contamination

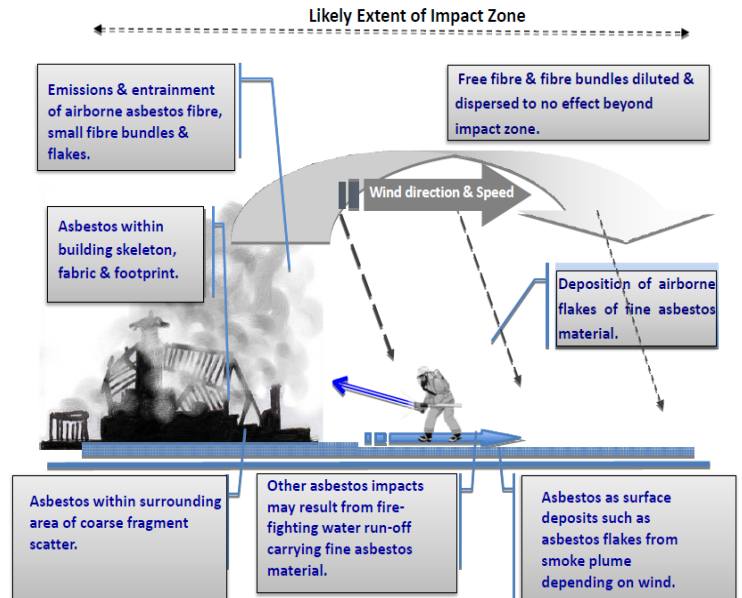
For asbestos cement sheets (10-15% asbestos), this damage often occurs as shattering from the explosive release of contained moisture into sheeting pieces and flakes as shown. The fire asbestos impact areas include;

- dispersed airborne free fibre and small fibre bundles;
- building skeleton and footprint;
- adjacent circular zone of coarse fragment scatter;
- areas of fine surface material (such as flakes) from smoke plume deposition (depending on wind); and
- sometimes, contamination from fire fighting water runoff carrying fine asbestos material.

Possible Asbestos Health Effects

The asbestos contamination of most concern is that which can generate tiny fibres able to penetrate deep into the lungs.

Inhalation of these tiny fibres in sufficient quantities can result in asbestos-related diseases such as the deadly mesothelioma.



Fortunately the likelihood of these diseases is very low and everyone has been exposed to small amounts of asbestos fibres in air during our lives without health effects.

Studies and air monitoring during and just after a fire show that the amounts of the tiny asbestos fibres are comparable to background levels and what the Department of Health considers as safe. This is due to limited initial fibre release as well as massive air dilution and dispersal.

However, as it is important to minimize any asbestos exposure, careful clean up any asbestos fragments is still necessary.¹ These asbestos materials are usually brittle or friable material and if disturbed can release the dangerous fibres.

¹ It is also important to be aware of other possible hazards of a fire site such as damaged structures, electrical wiring and residues of copper-chrome-arsenate (CCA) treated timber.

Management of Asbestos Impacts

Following a fire, emergency services and environmental and health agencies take interim measures to prevent disturbance of asbestos contamination. These include erecting temporary fencing if practical and cleaning of priority traffic areas. Evacuation of adjacent buildings due to asbestos contamination is only rarely necessary.

The following more thorough assessment and clean up of the asbestos contamination is usually the responsibility of the site owner. The Local Government Environmental Health Officer (LG EHO) is normally the relevant regulatory authority under the *Health (Asbestos) Regulations 1992*, and supervises the process. In some cases, such as large bushfires, the Western Australian Natural Disaster Relief and Recovery Arrangements may take charge of some or all of the clean up and work with the LG EHO in this regard.

It is important that the assessment and clean up is done in a systematic way by asbestos professionals, using the Department of Health's *Guidance Note on the Management of Fire Damaged Asbestos 2014* and the *Safe Work Australia Code of Practice - Safe Removal of Asbestos 2005*.

Specifically, the asbestos contamination normally must be cleaned up by an asbestos removalist with an unrestricted WorkSafe license and this should be by following a plan devised by and be under the guidance of an asbestos consultant.

In this way any asbestos fire contamination and associated public health risks will be fully addressed.



Key Contacts

After a fire, the key agencies or groups you may need to contact in regard to management of public health risks are the LG EHO, the Department of Health, and/or asbestos professionals.

Local Government Environmental Health Officer

The LG EHO will provide direction as to how the asbestos contamination needs to be managed by law. Contact your Local Government from the following directory and ask for the EHO:

[Department of Local Government and Communities - Local Government Directory](#)

Department of Health

The Department's Environmental Health Directorate can provide specialised technical and regulatory advice on asbestos fire contamination, if necessary, in addition to that provided by the LG EHO. The contact details are:

(08) 9388 4999 and
<mailto:ehinfo@health.wa.gov.au>

Asbestos Professionals

Asbestos Consultants – In the case of artificial surface and/or limited soil contamination this should be an occupational hygienist or asbestos competent person. See

<http://www.aioh.org.au/consultantsearch.aspx>

In the case of extensive soil contamination, e.g. a large bushfire, this should be an environmental consultant. See <http://www.aclca.org.au/wa-our-members>

A list of asbestos removalists with an unrestricted license may be found at:

http://www.commerce.wa.gov.au/sites/default/files/atoms/files/unrestricted_asbestos_licence_0.pdf

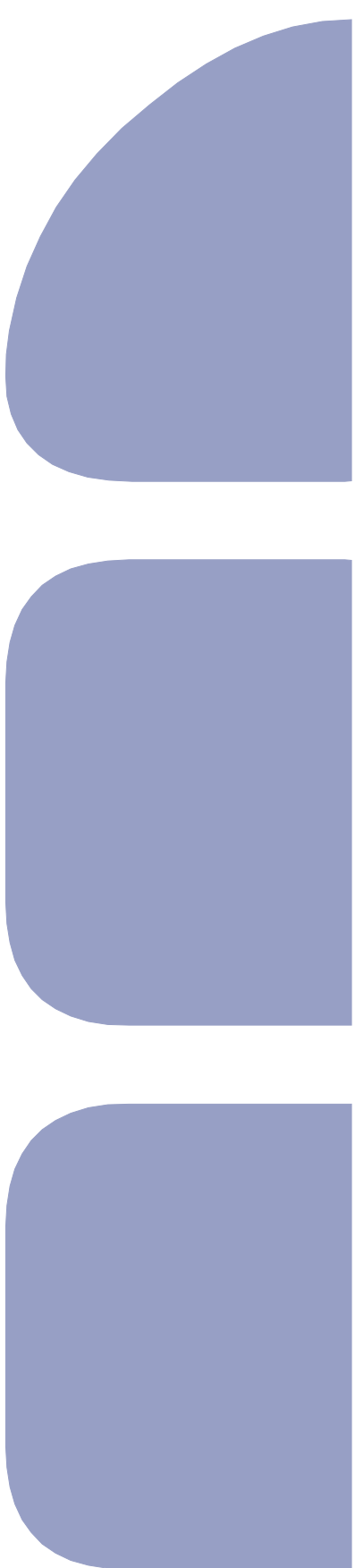
Guidance Documents

DOH *Guidance Note on the Management of Fire Damaged Asbestos 2014*:

http://www.public.health.wa.gov.au/3/1143/2/asbestos_and_public_health.pm

Safe Work Australia *Code of Practice – Safe Removal of Asbestos –2005*:

<http://www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/cp2005saferemovalofasbestos2ndedition>



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