Australian Voluntary Code of Practice

Assessment, remediation and validation: Former clandestine drug laboratories and other methamphetamine contaminated properties

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ENVIRONMENTAL HEALTH AUSTRALIA

Prepared by:

Dr Jackie Wright
Fellow ACTRA
Flinders University and Director, enRiskS

This document has been prepared with the support of Miles Stratford

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Please also refer to Section 12 of this document in relation to adherence with this Code.

This is a Voluntary Code of Practice. It is voluntary and intended to be complementary to the "Clandestine Drug Laboratory Remediation Guidelines" published by the Australian Government in 2011 (AG & ACC 2011)

Other key guidance

Australia

enHealth Position Statement: Clandestine Drug Laboratories and Public Health Risks (enHealth 2017)

NSW Health 2015, NSW Remediation Guidelines for Clandestine Drug Laboratories and Hydroponic Drug Plantation (Wright 2015)

Western Australia: Illicit drug contamination - https://ww2.health.wa.gov.au/Health-for/Environmental-Health-practitioners/Illicit-drug-contamination

South Australia Health: Clandestine drug laboratories - https://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/protecting+public+health/drugs+poisons+chemicals+and+contaminants/clandestine+drug+laboratories

Victoria: Clandestine laboratory remediation, Environmental health practice note (Victoria Health 2012)

Queensland health: Illicit drug laboratories - https://www.health.qld.gov.au/public-health/industry-environment/environment-land-water/illicit-drug-lab; and https://www.health.qld.gov.au/healthsupport/businesses/forensic-and-scientific-services/forensic-services/forensic-chemical-testing/illicit-laboratory-remediation

Tasmania: Guide for the Management of Clandestine Drug Laboratories (DHHS 2016)

New Zealand

New Zealand Standard NZS 8510:2017 Testing and decontamination of methamphetamine-contaminated properties

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1. Foreword

Chemical contamination, including drug residues such as methamphetamine, have been identified in properties used for the manufacture and smoking of methamphetamine. More specifically methamphetamine residues have been found to persist on various surfaces inside properties, and exposure to these residues has been associated with adverse health effects, particularly for young children (enHealth 2017). For this reason, authorities around the world have established various guidelines and standards for identifying, quantifying and remediating methamphetamine residues remaining in properties.

Consistent with national approaches when dealing with contamination of land (including water and soil) and air, risk-based guidelines have been established in Australia by the Commonwealth Attorney General's Department and Australian Crime Commission (AG & ACC 2011) (Australian Guidelines). These are risk-based guidelines established to be protective of adverse health effects for occupants of residential or commercial buildings.

While the Australian Guidelines were principally developed to address the remediation of illegal clandestine drug laboratories, they and the enHealth Position Statement (enHealth 2017) recognised that methamphetamine from use (specifically smoking) has the potential to result in residues that may be of concern to the health of occupants.

The Australian Guidelines (AG & ACC 2011) recommend investigation levels, which are concentrations of methamphetamine (and other key chemicals related to the illegal manufacture of amphetamine type substances) above which remediation is required to make a property safe for occupation. The investigation levels apply regardless of whether contamination occurs as a result of manufacture or use.

Elsewhere in the world, various standards and guidelines treat methamphetamine residues from use and manufacture in the same way. They acknowledge that whether from use or manufacture, the health risks presented by methamphetamine are the same. Examples are California, Utah and Colorado in the USA. Closer to home, New Zealand developed a Standard for methamphetamine contamination testing and decontamination in 2017 (Standards New Zealand 2017).

In Australia, the Australian Guidelines together with various accompanying state guidelines and policies, provide a system or approach for Local Government Authorities and Health Departments to manage contamination from clandestine drug laboratories identified by police. However there are many more methamphetamine contaminated properties that have not been identified by police, which have a history of drug manufacture and/or use (enHealth 2017). At the time of publication, only Western Australia provides some interim advice on low level illicit drug house residues (principally from use). No other guidance or policy advice is available in Australia to deal with these properties. This has created uncertainty, for state and territory regulators, home owners, property purchasers, property agents, insurers and those involved in the testing and remediation industries as to the requirements for addressing methamphetamine contamination.

Further uncertainty arises from the complexity of the methamphetamine contamination that is present and how this relates to exposure and health (enHealth 2017; Wright et al. 2016). The manufacture of methamphetamine involves the use and generation of a wide range of chemicals, gases and vapours. More specifically methamphetamine is generated as an aerosol and vapour which is often present along with the gases and solvent vapours at the time of manufacture. When ice/methamphetamine is smoked, this creates methamphetamine vapour and aerosols, which are mostly inhaled (enHealth 2017). These vapours and aerosols also settle and accumulate on

surfaces in the home. These residues do not accumulate evenly within a room, with the accumulation significantly affected by air flow and the types of materials used in construction. Hence the residual concentrations of methamphetamine can vary with location in a property, and there can also be a significant variation between building materials. This variability will be reflected in the testing of surface residues on various surfaces in a home.

People residing in a property are exposed to a range of different surfaces and materials, with these exposures varying between different age groups and individuals. These exposures may occur through direct contact where dermal absorption and incidental ingestion may occur, as well as through the inhalation of dust and vapours. Testing is required to understand the distribution of contamination on surfaces people may be exposed to, and also to determine the extent of contamination for remediation purposes. As it is impractical to sample all surfaces in any one property, the selection of sample materials and locations becomes important in determining the exposure that is likely to occur, and the effective management of the associated risks.

When dealing with methamphetamine contaminated properties it is important to remember that the exposure occurs inside a property, where people spend most of their day (assumed to be 20 hours per day (enHealth 2012a)). In addition, it is most often the case that the homeowner, not the drug manufacturer or drug users, is financially responsible for addressing the issue. In some circumstances, insurance may cover the cost. However often this will not be the case, particularly following the purchase of a property. This financial burden adds another level of stress and can adversely impact on the owner's or occupiers' health and wellbeing.

Australian authorities have yet to publish procedures for managing the risk associated with methamphetamine residues in properties. Experience overseas, particularly in New Zealand, has identified that as there is a greater awareness of the risk, commercial service providers will offer services to determine the presence and concentrations of residual methamphetamine, and to offer remediation services. This can bring benefits, including improved and innovative methods of identification, quantification and decontamination of methamphetamine affected properties, and reduced costs.

However, it can also bring some problems.

Without a good understanding of the methods for determining the concentration and distribution of methamphetamine residues, and the requirements for remediation and reducing exposure, the outcome of decontamination work can be variable and uncertain and may not sufficiently protect homeowners and persons who may reside in these properties. In addition, service providers may offer sub-standard services or take advantage of people at a time when they are highly vulnerable, further undermining public confidence in the testing and remediation industry.

It is the purpose of this Voluntary Code of Practice to assist in addressing this problem, by providing guidance on current best practice in the assessment of methamphetamine residues in properties arising from the manufacture and/or use of methamphetamine, and in outlining the remediation and management techniques that can be applied to make the properties safe for use.

The principal goal is the protection of public health from hazards left behind as a result of Australia's ongoing involvement with and use of methamphetamine. Alongside this focus on physical health and wellbeing, is a desire to see the emotional impact of methamphetamine contamination reduce, while bringing down the economic costs of addressing issues with methamphetamine contamination.

2. Scope

The objective of this Code of Practice is to outline best practice guidance for the testing and remediation of methamphetamine contaminated properties. These are properties that have been contaminated or suspected to have been contaminated as a result of a known former clandestine drug laboratory or the use of methamphetamine.

The focus of this Code relates to the assessment of methamphetamine contamination within properties, where testing is required to inform decisions about ongoing occupancy, remediation and re-occupancy. This Code includes methods for the detection and determining the extent of methamphetamine contamination that may be present, and methods for the validation of the property after remediation has been completed.

This Code does not consider the presence of contamination outside of the building. Where necessary, the assessment of contamination in soil and/or water to evaluate contamination in media outside of the building should be undertaken in accordance with the Australian Guidelines (AG & ACC 2011) and ASC NEPM (NEPC 1999 amended 2013a).

For other aspects relevant to the assessment of properties seized by Police as known or suspected clandestine drug laboratories, additional guidance is provided in the Australian Guidelines (AG & ACC 2011) and should be addressed. Assessment of soil contamination should usually only be contemplated where manufacture is suspected and there is evidence of contamination or damage which is consistent with disposal of chemicals associated with the manufacture of methamphetamine.

For properties potentially contaminated with residues from the manufacture of other drugs, the guidance provided in this Code in relation to the sampling of surfaces can be adopted. The laboratory analysis and remediation methods outlined in this Code have been developed for methamphetamine and may not be suitable for assessing the residues of other drugs. Where the presence of other drugs is known or suspected, consideration to determine the appropriate analytical and remediation methods for these other drugs would be required.

This Code includes:

- Guidance on the ethical conduct of individuals and companies involved in the sampling and analysis, and remediation of methamphetamine contaminated properties.
- Guidance on the sampling and analysis of properties to assess the extent of methamphetamine contamination, with the key objective being to provide representative, reliable and reproducible results. The Code includes the use of screening techniques as well as methods that provide quantitative results.
- Guidance on good practice methods and procedures for the remediation of methamphetamine contaminated properties. This includes consideration of contents and the safe disposal of contents and building materials that cannot be decontaminated to a safe level.
- Guidance on the conduct of post-remediation validation testing.
- Guidance on the minimum reporting requirements for the sampling and analysis, remediation and validation of these properties.

The objective of this Code is to provide practical guidance for persons that provide services in relation to methamphetamine contamination assessment, remediation or validation, or who have duties or obligations arising from the associated risks, and to encourage consistency in the

approach to these activities. Adherence to this Code is voluntary and those involved in the sector may choose to adopt their own practices as appropriate.

The guidance outlined in this Code has been based on the state of knowledge current at the time of drafting and what is considered by the authors to be best practice. The state of knowledge develops over time, and it can be expected that methods of investigation and interpretation of information will change over time. It is assumed that any person using this Code exercise judgment as to the applicability of the content of the Code in relation to their site-specific circumstances before adopting the recommendations. This Code has been drafted on the assumption that the user will bring experience in addressing methamphetamine contamination matters and will be a person who is already suitably skilled and qualified to understand and implement the actions recommended in the Code.

It is cautioned that the information provided is general in nature and may not be suitable for all instances and circumstances in which methamphetamine contamination is suspected or identified. Any reliance placed on the content of this Code is at the individual user's own risk and judgment, and the user should be aware that site-specific considerations may require a variation to the methods that are outlined in this Code.

3. Assessment and remediation criteria

The assessment and remediation criteria adopted in this Code are based on the Australian Guidelines (AG & ACC 2011) with the derivation detailed by Wright (Wright 2009), and are applicable for the assessment of contamination derived from manufacture and/or use.

The criteria in the Australian Guidelines were reinforced by the enHealth Position Statement (enHealth 2017) and are referenced and adopted throughout Australia as detailed in state guidance issued by NSW Health (Wright 2015), Western Australia Health (WA Health 2015), Victoria Department of Health (Victoria Health 2012) , Queensland Health (Queensland Health 2015) and Tasmania (DHHS 2016). The South Australian Public Health (Clandestine Drug Laboratories) Policy 2016 under the *South Australian Public Health Act 2011* specifically references the Australian Guidelines, as does the accompanying practice guideline (SA Health 2016).

The criteria in the Australian Guidelines are risk-based investigation levels that consider the potential for human exposure to methamphetamine residues in a property, and the toxicity of methamphetamine. There is no difference in the toxicity of methamphetamine, or the way people may be exposed in a property from methamphetamine residues that may be derived from manufacture or use. Hence the investigation levels apply to residues that occur from manufacture and/or use and apply to all properties where methamphetamine is present.

The investigation levels were derived using a risk-based approach, designed to be protective of all individuals. For the assessment of methamphetamine contaminated properties, the investigation levels for surface residues of methamphetamine and the key precursors (which may also be impurities in the product) ephedrine and pseudoephedrine are relevant.

The investigation levels were derived using a risk-based approach, using a standard risk assessment methodology consistent with that outlined by enHealth (enHealth 2012b) based on land use settings for residential and commercial/industrial settings as adopted by NEPC (NEPC 1999 amended 2013b, 1999 amended 2013c):

- Residential settings – includes residential homes, units and apartments, as well as properties where children may spend a considerable amount of time such as childcare centres, kindergartens, preschools and primary schools. Hotels, private short term letting (e.g. “bed and breakfast” premises) and hostels should be included as residential settings because the duration of occupancy in such circumstances is unknown.
- Commercial/industrial settings – this includes buildings used for typical commercial or industrial purposes where adults may spend their workday inside the premises.

These investigation levels are summarised in **Table 1**.

In addition, further guidance is also provided in this Code in relation to the assessment of contamination that may remain in ceiling spaces, where these are low access areas within a property. The basis for the investigation levels adopted for these spaces is included in **Attachment A** and summarised in **Table 1**.

The criteria summarised in **Table 1** are used in this Code as both investigation levels for the determination of contamination that requires remediation, as well as remediation criteria to demonstrate when a property has been effectively remediated and is safe for occupation.

Table 1: Summary of investigation levels and remediation criteria – Methamphetamine contaminated properties (indoor environments only)

Chemical	Residential levels/criteria – indoor surfaces[1] (µg/100cm^2)	Residential levels/criteria – Roof spaces[2] (µg/100cm^2)	Commercial/Industrial levels/criteria[1] (µg/100cm^2)
Methamphetamine	0.5	10	10
Pseudoephedrine/ephedrine	600	10000	10000

1 Investigation levels presented in the Australian Guidelines (AG & ACC 2011)

2 Refer to **Attachment A** for additional detail

For guidance on outdoor environments, for a range of land use settings, and other drugs and chemicals associated with clandestine drug manufacture, refer to the Australian Guidelines (AG & ACC 2011).

4. Qualifications and ethical conduct

4.1. Who is suitably qualified?

A person who seeks to be considered suitably qualified to undertake or supervise the sampling, assessment, remediation and/or validation work on any property where methamphetamine, or other drug contamination is known or suspected, individuals, subcontractors and companies must be capable of demonstrating they have appropriate qualifications and/or training and experience sufficient to be accepted by a court of law. Note that such work has the potential for significant financial and health implications, and work carried out may be challenged in court.

The Australian Guidelines (AG & ACC 2011) and various state guidelines such as in NSW (Wright 2015) and Western Australia[1] provides some guidance on qualifications and experience which may be suitable for undertaking such work. It is noted that academic qualifications alone are not sufficient for demonstrating sufficient knowledge/experience to undertake the works required on these properties. All individuals undertaking these works must have appropriate training and experience, which they should be able to verify. The training and experience must be specifically relevant to the assessment and remediation of methamphetamine contaminated properties.

For all individuals and companies undertaking the sampling, assessment, remediation and/or validation work at known or suspected contaminated properties, verification of their capability to offer such services will include:

- Records of qualifications, training and experience;
- Records relevant to demonstrating compliance with occupational health and safety requirements (refer to **Section 5**); and
- Current insurances, that include workers compensation, public liability and professional indemnity (as a minimum).

Where a contractor is to be engaged, the company or person engaging the contractor must satisfy themselves that the contractor (and any subcontractors used) is also suitably qualified to perform the activities to the standard outlined above. The company or person engaging the contractor should retain a copy of each contractor's qualification details.

All works should be undertaken ethically (as detailed in **Section 4.2**).

4.2. Ethical conduct

Individuals, contractors and companies conducting sampling, assessment, remediation or validation of properties known or suspected to be contaminated with methamphetamine should uphold high ethical standards. For individuals, contractors and companies offering services covered by this code, ethical conduct means:

1. advancing methamphetamine contamination sampling and decontamination knowledge;
2. providing open access to methamphetamine contamination sampling and decontamination knowledge;
3. maintaining and developing their professional competencies;
4. demonstrating objectivity and integrity in their work;
5. being dependable in meeting timeframes for the completion of tasks;
6. avoiding undertaking work which creates a real or perceived conflict of interest, specifically individuals and companies conducting testing to determine contamination or validate a

[1] https://ww2.health.wa.gov.au/Articles/A_E/Clandestine-drug-labs

property should not be involved with remediation (including having financial interests in such);
7. abstaining from making misleading statements in connection with their work;
8. taking all reasonable steps to ensure their qualifications, capabilities and views are not misrepresented to, or inaccurately perceived by others, and to correct any misrepresentation which may arise;
9. abstaining from suggesting expertise or providing advice in areas of the methamphetamine contamination industry beyond their expertise; and
10. abstaining from any conduct which may bring the wider methamphetamine risk management industry into disrepute.

Responsibility to other individuals and companies within the industry

Individuals, contractors and companies should:

1. in accomplishing and publishing work, recognise fully the contribution of the input of other employees or professionals;
2. avoid the exploitation of employees or other professionals;
3. abstain from harassment of employees or other professionals on any grounds;
4. abstain from making misleading statements in connection with their work;
5. actively promote the professional development of employees or other professionals by ensuring they receive training, support and protection in work environments which may jeopardise their well-being;
6. not claim the work of others as their own;
7. not use the ideas or materials of others without their written permission, and due acknowledgement;
8. share methamphetamine contamination industry knowledge;
9. promote equal opportunity for employees or other professionals; and
10. vigorously seek to avoid discriminatory practices affecting employees or other professionals.

Responsibilities to the Community

Individuals, contractors and companies should:

1. provide support and education to the community;
2. protect confidentiality of community members;
3. not provide health advice unless suitably qualified to do so;
4. avoid misleading any member of the community; and
5. avoid exploitation of any member of the community.

Reports should include a declaration that the works have been undertaken in a professional and ethical manner.

5. Health and safety

All persons conducting a business or undertaking works must be aware of, and undertake measures to comply with, requirements of state and territory workplace health and safety legislation. Despite some differences between each jurisdiction, all are based on a statutory duty of care model, which requires employers to ensure all workplaces are safe and without risks to workers, including those of their contractors. This means identifying all reasonably foreseeable risks and eliminating, or otherwise reducing those risks so far as is reasonably practicable.

Entering and assessing premises potentially contaminated by methamphetamine may expose workers to a range of health and safety risks. The obvious risk arises from exposure to methamphetamine contamination, particularly for workers that spend significant time in such properties or are regularly engaged in assessment work. Other associated risks arise from the context in which methamphetamine is used and manufactured, and the presence of other hazardous substances or items (such as syringes) that may be present. Risk of violence and aggressive behaviour from occupants can also be a risk in this industry and should be considered.

It is an employer's primary obligation to ensure that during all stages in which a worker is required to assess a property for methamphetamine contamination, the worker is sufficiently trained and equipped to carry out the work safely and to minimise exposure to contamination, and appropriate safety measures are in place.

All states in Australia, whether operating under model Work Health and Safety (WHS) laws or not, publish Codes of Practice and guidance that provide practical guidance on risk identification and controls. Employers should consult this body of guidance to improve their systems of work. To date, there is no specific guidance for those undertaking assessment of methamphetamine contamination, and guidance and Codes of Practice addressing hazardous chemicals and substances should be used to provide guidance on minimising risk, including use of personal protective equipment and safe handling of contaminated materials.

Works conducted on a known or suspected methamphetamine contaminated property or former drug laboratory should involve the conduct of a site-specific risk assessment consistent with guidance such as SafeWork Australia's *Managing risks of hazardous chemicals in the workplace* (Safe Work Australia 2018a). When conducting this risk assessment information available from the Police report and any other relevant information on the property should be considered. Appropriate safety measures should be adopted that address the risk identified. Additional information on safety measures that may need to be considered in relation to a suspected clandestine drug laboratory are outlined in the Australian Guidelines (AG & ACC 2011).

For properties suspected to be contaminated with methamphetamine residues from former manufacture (not identified by Police) or use, a site-specific risk assessment that considers the current use, condition of the property, and any other relevant information or test results, should be undertaken, with safety measures adopted that are appropriate for the risk identified.

6. Sampling methods

6.1. General

Sampling methods that are suitable for the testing of surfaces for the presence of methamphetamine contamination are discussed in this section. The assessment of methamphetamine contamination involves the use of a wipe sampling method, where residues present on the surface of various surfaces in a property are sampled. The wipe sampling methods referenced may be suitable for use in a screening level assessment (refer to **Section 8**), a detailed assessment (refer to **Section 9**) or a validation assessment (refer to **Section 11**). Regardless of the level of assessment being undertaken, it is important that the sampling methods used are performed in accordance with the methods as outlined in this section.

Table 2 presents a summary of the various wipe sample methods that may be utilised in an assessment. The table provides an overview of:

- the suitability of results obtained from these different methods for use in a screening assessment, detailed assessment, validation assessment; and
- the suitability of data collected using these methods to
    - determine if a property is contaminated;
    - establish if the data is suitable for determining the type and extent of remediation that may need to be undertaken;
    - whether the data is sufficiently reliable to be used to support an insurance claim and/or demonstrate that a property is safe for occupation.

Details of each method are discussed in the following sections.

While it is preferred that discrete/individual NIOSH compliant wipe samples are collected (AG & ACC 2011), it is recognised that other sampling methods may be used in different situations. It should be noted that the selection of a sampling method for any level of assessment should consider the suitability of the method for making the relevant decisions, the limitations of each method, and the cost associated with the method (and any other sampling that may need to follow). These considerations should be explained to the client and an alternative sampling method should only proceed with the client's agreement on the proposed scope of work.

Table 2: Summary of suitable sampling methods

Suitable sampling method	Screening assessment (refer to Section 8)	Detailed assessment (refer to Section 9)	Validation (refer to Section 11)	Information suitable for			
				Determining if property is contaminated	Remediation required and methods suitable for remediation	Insurance claims and for legal purposes	Proof property is safe for re-occupation
NIOSH compliant discrete/ individual wipes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NIOSH compliant field composite	Yes	No	No	Yes	No	No	No
NIOSH compliant laboratory composite	Yes	Only where individual samples analysed*	Only where individual samples analysed*	Yes	Only where individual samples analysed*	Only where individual samples analysed*	Only where individual samples analysed*
Presumptive screening tests	Yes	No	No	Yes	No	No	No

* A laboratory composite may be 'de-composited' and the individual sample results utilised to either determine if the property or areas within a property are contaminated, or to support further detailed assessment sampling.

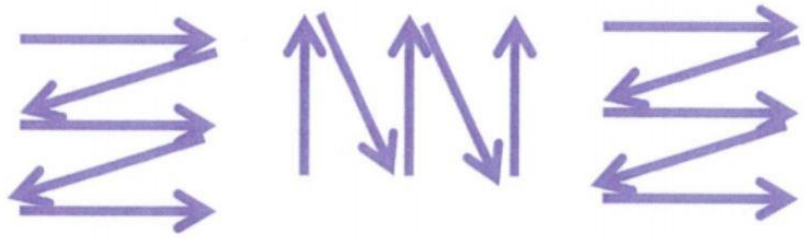
6.2. NIOSH compliant wipe sampling

Wipe sampling completed in a property should be performed in accordance with NIOSH 9111 (NIOSH 2011a).

Sampling method

For all hard surfaces including painted plasterboard and smooth finished timber surfaces, the sampling technique is as follows:

- The sampling media should be a gauze wipe pre-prepared with 3 to 4 mL of methanol
- Using a new pair of gloves, remove the gauze wipe from the protective packaging
- Place a disposable 10 cm x 10 cm template over the area to be sampled, noting that it may be taped in place along the external edge of the template
- Wipe the surface within the template with a firm pressure[2], using horizontal s/z-strokes, then fold the exposed side of the gauze wipe in on itself and wipe the surface a second time using vertical s/z-strokes, fold the gauze again and wipe the surface a third time using horizontal s/z-strokes (see illustration below). A minimum of 5 s/z strokes per wipe pass is required.
- Fold the gauze pad, exposed side in, and place in shipping container and seal with cap.



Wipe pass 1 **Wipe pass 2** **Wipe pass 3**

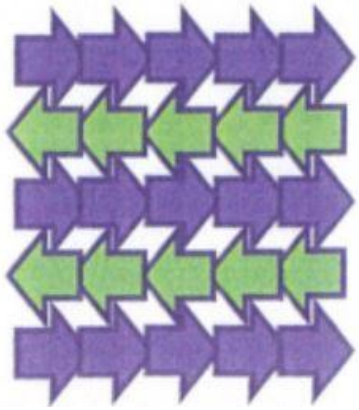
The method as described above means that each 100 cm^2 is wiped using a firm pressure three times with the same wipe, presenting a new surface of the wipe with each pass. Presenting a new surface is achieved by folding the wipe over on itself.

For rough or porous surfaces such as exposed rough timber, the sampling technique is as follows:

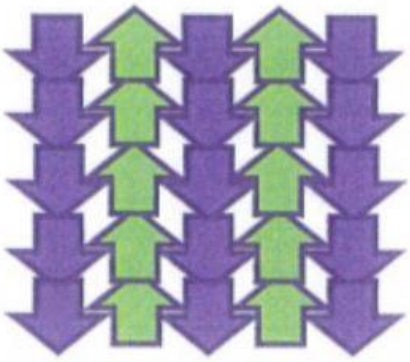
- The sampling media should be a gauze wipe pre-prepared with 3 to 4 mL of methanol
- Using a new pair of gloves, remove the gauze wipe from the protective packaging
- Place a disposable 10 cm x 10 cm template over the area to be sampled, noting that it may be taped in place along the external edge of the template
- Dab the surface left to right and vice versa, slightly overlapping as you go, repeating this at least 5 times across the width of the template. Dab just underneath the last dab and move to the other side of the template, repeating this process until the bottom of the template is

[2] "Firm pressure" is not specifically defined by NIOSH. This term is subjective and establishing what is a firm pressure can only be done with appropriate training. Hence it is important that all personnel conducting sampling work are appropriately trained.

reached. Fold the gauze in on itself and then repeat the same dabbing process in a vertical manner (see illustration below)



Dabbing pass 1



Dabbing pass 2

- Fold the gauze pad, exposed side in, and place in shipping container and seal with cap.

Maintaining sample integrity

Label each sample clearly with a unique sample identifier.

The samples should, where possible, be stored refrigerated, with NIOSH 9111 noting that the samples are stable for 30 days where refrigerated.

While the samples are stable for at least 7 days at room temperature, it is recommended that the samples are shipped under refrigeration. However, where this is not possible, the shipping timing should be minimised. Samples that cannot be shipped on the same day as sampling should be appropriately refrigerated.

Use of other sampling media (non-methanol wipes)

NIOSH 9111 also allows the use of sampling media as a gauze wipe pre-prepared with 3 to 4 mL isopropanol. Isopropanol wipes do not achieve the same level of recovery as methanol wipes, based on a study by NIOSH, as reported in NIOSH 9109 (NIOSH 2011b).

To address the lower recovery of isopropanol wipes, a second wipe is to be used after the first (with sampling conducted using the same method, over the same area). The two wipes are then combined in the same sample container and analysed as a single sample.

Where other media are proposed to be used (such as aqueous wipes), the recovery performance of the wipes needs to be determined prior to use and the sampling method confirmed to ensure the sampling results in recoveries comparable with methanol wipes (refer to the methodology outlined in NIOSH 9109 (NIOSH 2011b)) for such work.

Alternate sample areas

It is noted that there may be some circumstances where the sampling needs to be conducted over a smaller or larger area. Where this occurs, the exact size of the area sampled should be measured and documented, and the sampling conducted using the same technique as outlined above. The

results obtained from such sampling will need to be adjusted to properly reflect the units required for comparison within the guideline, which are µg/100cm^2.

For example, if the sample size was 50 cm^2, the following must be undertaken:

- The analytical laboratory will report the result (X) as the mass (in µg) detected on the wipe.
- For this example, the result will then be X µg/50cm^2. To get the correct units of µg/100cm^2, the reported result is doubled, so 2X µg/100cm^2

All such calculations must be detailed in the report provided.

6.3. Field composite

This involves the collection of a multi-wipe composite sample from a property. This is where a NIOSH compliant wipe sample is collected from each individual location, and all wipe samples (gauze materials) placed into the one sample container for laboratory analysis. This is a screening method that may be used to maximise the sample area coverage while reducing analytical cost.

This method should only be used in a screening assessment and be limited to the collection of samples from a maximum of 5 locations.

Analysis of the sample results in a total or accumulated mass of methamphetamine reported from all areas sampled. This result is not averaged over the number of samples. For example, if the analysis of a sample that included 3 locations, only one of which had a mass present in 100 cm^2 of 0.5 µg, the total mass reported for the analysis of the 3 samples would be 0.5 µg. If each of these 3 locations had a mass of 0.5 µg present in each 100 cm^2 sampled, the total mass reported from the analysis would be 1.5 µg.

It is not possible to know how the contamination is distributed over the areas sampled using this method. The method can be used to determine confirm absence or presence of contamination, and only limited comparison against the investigation levels (refer to **Table 1**) can be undertaken, as follows:

- If the total mass detected is less than the applicable investigation level, then it can be concluded that none of the sampling locations can have contamination that exceeds the investigation level, and the results interpreted as being below the investigation level.
- If the total mass detected is equal to or exceeds the applicable investigation level, it is not possible to know how the contamination is distributed in the property, and such a result can only be used to confirm that contamination is present at a level that may require further assessment.

This method cannot be used to determine the level of risk posed by contamination at a property.

6.4. Laboratory composite

A laboratory composite involves the collection of individual/discrete samples using a NIOSH compliant method. All these individual samples are sent to the laboratory for analysis. The laboratory extracts each sample as an individual sample, but then combines equal portions of the extracts to form a new sample called a laboratory composite. The laboratory composite is analysed. Analysis of the laboratory sample results in the reporting of an average concentration from all locations sampled. The laboratory analysis may include reference to a theoretical maximum (refer to discussion below). It is not possible to know how the contamination is distributed over the areas sampled using this method.

This sampling method should be limited to a maximum of 10 locations.

For the purpose of a screening or detailed assessment the composite sample may comprise discrete samples from multiple areas or different rooms. For a validation assessment (refer to **Section 11**) it is not appropriate to combine discrete samples from multiple rooms. At the validation assessment stage, the composite sample should comprise samples from the same area or room (not from different rooms in the property).

As a laboratory composite is an average concentration from all locations sampled, some preliminary review of the results may be provided only if each individual sample has been collected in accordance with NIOSH 9111 requirements (as outlined above).

The laboratory composite is likely to be reported as an average and theoretical maximum level. This is calculated as follows:

- **Calculation of a theoretical maximum** – As the laboratory composite provides an average this means that, at one extreme (in relation to the distribution of contamination in a premises) there may be one location that has a concentration that is at a level that can be calculated by multiplying the laboratory composite results by the number of individual samples in the composite. This theoretical maximum (at an unknown location) would also mean that methamphetamine is not detected at any of the other (unknown) locations sampled. Some laboratories include this in their reporting. Where it is reported, the laboratory should indicate how the theoretical maximum was calculated.

A laboratory composite can be used to determine absence or presence of contamination, and only limited comparison against the investigation level (refer to **Table 1**) can be undertaken, as follows:

- If the theoretical maximum is less than the relevant investigation level, then it can be concluded that none of the sampling locations can have contamination that exceeds the investigation level, and the results interpreted as being below the investigation level.
- If the theoretical maximum exceeds the relevant investigation level, it is not possible to know how the contamination is distributed in the property, and such a result can only be used to confirm that contamination is present at a level that may require further assessment. This method cannot be used to determine the level of risk posed by contamination at a property.

Where a laboratory composite reports the detection of methamphetamine in a property, the laboratory can then analyse the individual samples, resulting in the reporting of the discrete sample results without having to return to the property to re-sample the property. Where the results of the individual wipe samples are reported, these can be directly compared against the appropriate investigation level (**Table 1**).

It is important to note, that unless sampling associated with a detailed assessment is carried out as part of the screening assessment (refer to **Section 8**), a laboratory composite screening assessment on its own will not meet the requirements required for detailed assessment reporting (refer to **Section 9**). The collection of additional samples is likely to be required. This will necessitate a revisit to the property.

When considering the collection of laboratory composite samples, the following should also be considered:

- The more individual samples that are grouped together at the laboratory, the greater the likelihood that the theoretical maximum will exceed the applicable investigation level (**Table 1**). Any exceedance of the investigation level creates uncertainty. This uncertainty can only

be resolved through the analysis of individual samples, which increases the cost of the analysis.

- These additional costs may be able to be managed through careful consideration of sampling design. For example:
    - laboratory composites may be grouped based on an assessment of potential risk areas within a property and consideration of the number of samples to be composited; or
    - where low level detections are reported, selected samples within the composite may be analysed with the samples identified based on an assessment of risk areas within a property.

  Where there is a limited understanding of potential risk areas in a property, it may not be possible to refine the composite sampling method or analysis as described above.

- These issues and sampling considerations, including any of the various limitations and need to re-sample on the basis of composited results, should be communicated with clients when a screening assessment is being designed.

6.5. Presumptive screening tests

A range of other screening tests are available that provide an instant answer to the potential presence, or absence, of methamphetamine contamination above a defined reporting/target level. These are commonly field tests that result in a colour change or appearance (or lack of appearance) of lines where the level of methamphetamine in the sample collected exceeds a pre-determined reporting/target level. The reporting/target level can vary between different sampling kits.

These tests may be used for the purpose of screening provided the reporting/target level is at most 0.5 µg, and the samples are collected over a 100 cm^2 area. While it is preferred that the sampling technique be consistent with that outlined by NIOSH, the collection of samples in accordance with the manufacturer's recommendations relevant to the presumptive sampling kit used (provided the sampling kit has been validated, as discussed below) is also acceptable. The choice of sampling technique, particularly where it is not compliant with NIOSH, must be documented and made clear in any report.

Any screening test undertaken using a presumptive sampling kit can only confirm the absence of methamphetamine below the reporting/target level, or confirm the presence of methamphetamine contamination at or above the reporting/target level. For example:

- Any result from instant screening test that has a reporting/target level of 0.5 µg, can only be compared against the investigation level for residential properties of 0.5 µg/100 cm^2 (**Table 1**) if the sample was collected in accordance with the manufacturers requirements (or using a NIOSH wipe method) from an area of 100 cm^2.
- A positive result from such a test would indicate the presence of methamphetamine at a level above the investigation level (**Table 1**). The actual level that may be present cannot be determined from such sampling techniques, however a positive result would trigger the need to undertake a detailed assessment (**Section 9**).
- A negative result from such a test(s) would indicate that methamphetamine is not present at a level at or exceeding the investigation level (**Table 1**).

If presumptive sampling kits are used to sample an area larger than 100 cm^2 or multiple areas the results cannot be compared against the investigation level (**Table 1**). Such results can only be used

to confirm the presence or absence of methamphetamine contamination. A positive result would indicate the need to undertake a detailed assessment (**Section 9**).

The use of presumptive screening tests may, however, be used to assist in informing the location of individual NIOSH compliant samples to be collected.

Any presumptive screening tests that are used, should be validated to ensure that they provide reliable results, and there are no interferences (resulting in false positive or false negative results). Appendix B of the NZ Standard (Standards New Zealand 2017) provides guidance on how to validate these sample kits, noting that the maximum reporting/target level should be 0.5 µg. Any presumptive sampling kit used for screening should provide a statement as to whether the sampling kit has been validated, and evidence of the results of the validation test conducted in accordance with Appendix B of the NZ Standard.

6.6. Laboratory analysis methods

All samples must be stored correctly and sent under appropriate Chain of Custody (COC) procedures to the laboratory for analysis.

Analysis must only be undertaken by a laboratory that is independently accredited for the analysis of methamphetamine, and all other drugs reported in the analysis. For Australian and New Zealand laboratories the appropriate accreditation is NATA or IANZ. Where laboratories in the United States, or other countries are used, the NATA or IANZ-equivalent laboratory accreditation for the analysis of methamphetamine must be substantiated.

It is most common to report on methamphetamine, amphetamine, ephedrine and pseudoephedrine. In some cases, other drugs such as MDMA or MDA may be reported, where these are suspected to be present.

Laboratories holding relevant accreditation (i.e. NATA or IANZ) must undertake relevant quality assurance and control checks (QA/QC) as detailed in the relevant NIOSH method. While there is no requirement to report the laboratory QA/QC results on laboratory reports issued (but are required to maintain these records internally), it is noted that the reporting of laboratory QA/QC is common within the environmental assessment field (NEPC 1999 amended 2013d) and is recommended under this Code.

Laboratories providing services in the analysis of methamphetamine and other drugs should participate in external proficiency trials, which provides a good assessment of QA/QC. Use of these laboratories is preferred.

A laboratory that has no independent accreditation (i.e. NATA or IANZ) or is accredited but not for the analytical method used to analyse the wipe samples is not appropriate to use under the objectives of this Code.

All laboratory reports should be attached to all reports prepared for a property. Laboratory results should not be presented in a report without including all of the laboratory report(s).

6.7. Quality control samples

Quality assurance and quality control (QA/QC) are an essential aspect of any sampling program. This involves all of the systematic actions, procedures, checks and decisions undertaken to ensure the representativeness and integrity of samples collected for analysis, and the accuracy and reliability of the analytical results.

Laboratory QA/QC must be undertaken in accordance with the relevant NIOSH method as described in **Section 6.6**.

Field QA/QC procedures may include:

- Selection of appropriate sampling methods, suitable storage containers and sample storage requirements;
- Use of disposable templates and gloves for each sample, to prevent cross-contamination;
- Where re-usable templates (or gloves) are used it is important to collect a field sample to demonstrate that decontamination of these re-useable items between sample location is effective;
- Checking media (i.e. wipe sample material) used or supplied for use are clean (i.e. not contaminated prior to use) – media blank;
- Checking that media that may be used for sampling is not contaminated during transport or handling at the laboratory – trip blank; and
- Providing suitable storage for samples prior to shipment to the laboratory to minimise contamination or losses.

The following provides additional detail in relation to media, trip and field blanks:

- A **media blank** is required to demonstrate that the media used for collecting the wipe sample was free from contamination prior to use. This requires laboratory analysis of unused media.

  Where sampling media are provided as sealed wipes (from a manufacturer) it is still important to demonstrate that this media was clean prior to use. If the laboratory undertakes an analysis of each new batch of wipes, then inclusion of their lab reports for that work would be sufficient.

  In many cases, a media blank may be combined with a trip blank (described below).

- A **trip blank** is required to demonstrate that contamination of the media or samples does not occur during field handling, transport or handling of the samples at the laboratory. This involves the transport of an un-used media (which remains in the sample container) with the samples. This sample is then analysed by the laboratory. The sample container containing the media is not opened at the site.

  A trip blank is required regardless of whether the media being used for sampling was provided by a laboratory or prepared by the sampler.

  A media blank and trip blank sample can be combined.

- A **field blank** is only collected in the event that a re-usable template or gloves are used for the sampling of various different areas in the property. The template and gloves need to be decontaminated between locations and a field blank collected by wiping the surface of the decontaminated template or gloves. If disposable templates and gloves are used at each sample location a field blank is not required.

It is best practice for any field sampling (screening assessment, detailed assessment or validation assessment) to include 1 media/trip blank per property.

Where this is not possible, such as in a screening assessment, media/trip blanks should be reported at a ratio of 1 per 20 samples. If this approach is undertaken it is recommended that the results of

the media/trip blank be reported separately so that the results can be included in all relevant property reports.

Field blanks should be included at a ratio of 1 per 10 samples if they are necessary.

If contamination is found on the media/trip blank or field blank, the potential for contamination of samples needs to be considered in the context of the results obtained from the property. For example, where high levels of contamination are reported in a property with trace levels reported on the blank, this needs to be noted, but will not affect the overall conclusions in relation to property contamination. However, if only low levels of contamination (less than 10% of the applicable investigation level, refer to **Table 1**) are reported in the property and there are detections on the blank, the results of the media/trip or field blank may need to be subtracted from the primary field samples to account for this cross-contamination; or the results may indicate that cross contamination occurred and the data collected from the property is unreliable.

The results for the media/trip blank and field blank must be included in the report.

It is noted that for the collection of surface wipe samples, it is not possible to collect reliable field duplicates, as any duplicate sample from a location adjacent to the primary sample or from the same location is a unique sample, not a replicate of the same sample. The NIOSH method for the collection of surface wipe samples (NIOSH 2011a) does not include any requirements for field duplicates.

7. Consideration of materials and locations for sampling

7.1. Variability between materials

Within any property that is contaminated with methamphetamine from either former manufacture and/or use, the distribution and contamination within the property will vary depending on a range of factors.

When methamphetamine is used and/or manufactured, residues will generally be concentrated in those areas where the methamphetamine-related activities/behaviour took place. Where the activity locations are unknown, the sampling may take into account locations where manufacture and use are more likely to have occurred. This includes kitchens, bathrooms and bedrooms. Within these areas, the level of methamphetamine residues can vary significantly, with factors such as the areas where methamphetamine related activity was concentrated, the presence of ventilation fans and air conditioning/heating, and the nature and type of materials present in these and other areas affecting the distribution of contamination.

Further, once methamphetamine residues are deposited in a property, the rate at and extent to which they disperse (or move throughout a property over time) will vary. What is known, is that methamphetamine residues can persist for many years in the absence of effective cleaning. This means that until such time as a contaminated surface has been effectively cleaned, contamination has the potential to continue be transferred throughout a property and contaminate other surfaces and materials.

Hence selecting appropriate sampling locations in a property requires careful consideration to ensure that it captures locations (and materials) that not only indicate the presence of methamphetamine contamination (where present) but also enable the magnitude and extent of contamination in the property to be understood.

In particular there are a range of building materials and surfaces in a property that have been shown to exhibit different characteristics in terms of risk, which considers both contamination and recovery:

- High risk materials: these are materials that have a high affinity for methamphetamine (have the potential to have accumulated a significant mass of methamphetamine on or within the material) and/or there is good recovery of methamphetamine from these surfaces when sampled
- Lower risk materials: these are materials where less methamphetamine has accumulated on or within the material and/or there is a poor recovery of methamphetamine from these surfaces when sampled

There are also locations within a property where it is more likely that methamphetamine contamination would be present, as noted above in relation to known or likely locations of manufacture and use. These areas and high risk materials, summarised in **Table 3** are those that should be targeted in a screening assessment (**Section 8**).

Table 3: Materials and locations to be targeted in a screening assessment (high risk materials and areas)

High risk material types
Stained/varnished/polyurethane finished timber
Materials that have electrical current running through them– electrostatic precipitation and attraction
Oil based enamel paints
Enamel paints
Plastics
Metal (particularly coated metal)
Fabrics including carpets and curtains (while these are high risk materials they are difficult to collect a representative sample, and are not suggested to be targeted during a sampling program)
Preferred areas to sample in screening assessment – likely to have higher levels of contamination
Areas of high air flow such as range hoods, extraction fans, doorways and opening windows
Locations higher up in rooms (but not within 20cm of where vertical walls meet the horizontal surfaces/ceiling)
Locations with electrical current such as fuse boxes and power points (specifically the plates over power plugs, but not the switches themselves)
Locations less likely to have been cleaned
Locations with visible staining

Table 4 presents the materials considered to be lower risk materials. **Table 4** also presents sampling locations in a property that are *not* preferred due to these areas typically comprising lower risk materials and a likelihood of returning more variable results. Some of these materials and locations may be sampled in a detailed assessment (in conjunction with materials and locations listed in **Table 3**) to provide information on surfaces that occupants will come into contact with more often, and materials that may need to be considered in relation to remediation. In addition, there may be the need to sample some of these locations where the property has been extensively cleaned or redecorated (including painted).

Table 4: Lower risk materials and non-preferred sampling locations

Lower risk material types (may be sampled in addition to those in Table 3)
Wall paper and painted wall paper over plasterboard/gyprock
Painted plasterboard/gyprock (unless painted with enamel paints)
Unfinished or unpainted plasterboard/gyprock
Unfinished timber (unless it is the top of doors that are dirty in a freshly painted property)
Glass (unless visibly dirty)
Non-preferred areas to sample – likely to be more variable
In the middle of walls
Down low on walls
On walls adjacent to timber framed windows and doors
Inside cupboards
Behind curtains
Behind picture frames and/or furniture (they may have been moved)
Light switches and door handles (high risk of cross-contamination at these locations)

7.2. Issues to consider when deciding on sampling locations

In any sampling program not all surfaces and materials can be sampled, hence it is important to be clear as to why the samples are being collected. This will help inform the type of materials that should be sampled in each phase of the assessment. Exposures that occur within a home will involve contact with a wide range of surfaces and materials. Not all higher risk materials (such as carpets) can be effectively sampled, so the sampling of other higher risk materials may be used as an indicator of potential contamination for materials that cannot be effectively sampled.

In addition, the condition of the property at the time of sampling needs to be considered, as follows:

- cleaning – look for areas that are less likely to have been cleaned and where possible apply priority around material types;
- redecoration – look for original surface types and where possible apply priority around material types and sample site selection; and
- was the material being sampled likely to have been present when methamphetamine related activity is believed to have occurred.

The following should be considered when selecting suitable sites for sampling:

- The range of material types present (e.g., painted plasterboard, painted or varnished timber, concrete) – this is important as methamphetamine retention and recovery using surface wipes varies depending on different materials and coating types;
- The texture of the proposed sampling locations. Greater recovery rates of methamphetamine using surface wipe sampling methods is likely on smooth, non-porous surfaces;
- Locations that have large surface areas such as walls and ceilings that are likely to have relatively high contamination levels; and
- Surfaces that can be difficult to remediate, such as bare concrete, timber framing and certain types of tiles and powder-coated metals. For these materials it may be relevant to collect bulk material samples to inform remediation requirements.

For the screening assessment it is important to target materials and areas where methamphetamine contamination may be present (**Table 3**), and where reliable results can be obtained to confirm the presence or absence of contamination.

If a screening assessment does not target these areas, but only looks at low risk materials and non-preferred sampling locations, this will bias the screening assessment results.

Where a detailed assessment is being undertaken it is important to target and quantify methamphetamine contamination that may be present on high risk surfaces and areas as well as lower risk materials and locations (**Table 4**). Some of the low risk materials and locations are those which have large surface areas within a property (such as walls) and which occupants may be more exposed to. These locations may need to be sampled to understand the nature and extent of contamination on these larger surfaces to inform the need for remediation.

If economic constraints mean the property owner is not prepared or able to cover the cost of sampling lower risk material types, experience may be used to adjust the recommendations for remediation. In this way, a balance in cost can be achieved, without compromising the physical health and wellbeing of future occupants.

The sampling of a property should consider that existing uses of rooms may change in the future. Hence all rooms should be treated as areas where occupants may be exposed.

7.3. Testing recently painted or renovated properties or areas

Sampling conducted during a detailed assessment (**Section 9**) should consider instances where a property has been recently painted, cleaned or renovated as these activities may reduce or temporarily mask the presence of methamphetamine contamination and may frustrate the purpose of sampling.

Where these factors have been considered in the selection of the sampling locations, this should be documented.

If background information indicates that a property has been recently renovated, sample collection should target surfaces that have not been recently painted or were present before or at the time the contamination event or events are thought to have occurred.

To determine which surfaces to target in a recently painted or renovated area, background information should first be obtained on when and where painting and renovations have occurred (for example, walls in high-use areas may have been painted but not the insides of cupboards or wardrobes).

8. Screening assessment

8.1. Purpose

The purpose of a screening assessment is to confirm the presence or absence of methamphetamine contamination in a property using validated screening tests (refer to **Section 6**). It is important that the information provided in a screening test be fully explained and correctly communicated to any audience seeking to rely on the results.

This assessment should be carried out by a suitably qualified sampler (refer to **Section 4.1**).

Screening samplers need to be independent from remediation contractors and avoid any other potential conflicts of interest.

Levels of methamphetamine residues are expected to vary throughout a property and with different surface types (refer to **Section 7**) and hence it is important that the screening testing is undertaken to enable conclusions to be drawn.

Screening tests undertaken using discrete sampling methods together with laboratory analysis provide a quantitative test result that can be directly compared with the applicable investigation levels (**Table 1**).

However, most other screening methods (field composites, laboratory composites and presumptive samplers) can only be used to confirm the presence or absence of methamphetamine. A negative or non-detection using these methods can be used to confirm absence of contamination on the surface sampled. A positive result is indicative that contamination is present and that a detailed assessment (**Section 9**) may be required to evaluate the nature and extent of contamination.

Depending on the type of sampling undertaken in the screening assessment (refer to **Section 6**), the interpretation of positive results, including whether these can be compared against the applicable investigation level (**Table 1**), needs to be carefully considered.

The following sections outline the recommended steps in a screening assessment.

8.2. Background information

The purpose of the background information stage of a screening assessment is to gather sufficient information to develop a sampling strategy, to estimate the number and location of samples that need to be collected, and allow a site-specific risk assessment to inform safety requirements for entering and testing the property.

The following information should be obtained from the police report (where available), property owner, manager, or occupier (as appropriate):

- Copies of any reports relevant to the service being provided from previous inspections that have been conducted;
- Any past potential contamination-related activities;
- Information from a property inspection that includes areas of visible staining or presence of powder (or other) residues;
- If the property has a forced-air heating or cooling system and, if so, the location of the intakes;
- The number and location of exhaust fans from the property;
- If any renovations or extensive cleaning has occurred;
- If the occupier has been notified that testing is to occur; and

- The presence of other occupants or pets that may be present at the property, and possible risks associated with them.

8.3. Site inspection and sampling

The purpose of the site inspection stage of a screening assessment is to gather the information needed to determine the presence or absence of methamphetamine in the property. Samples are collected from locations that are most likely to have elevated levels of methamphetamine contamination on them. These are discussed further in **Section 7** and listed in **Table 3**. Sampling these higher risk surfaces reduces the likelihood that methamphetamine contamination, when present, will not be detected.

An assessment of factors, such as surfaces recently cleaned, renovated, or painted, that can reduce the presence of methamphetamine on surfaces available to be sampled should be undertaken, and a record made of sample sites selected.

Professional judgement and experience is needed to determine the most appropriate sampling locations to target in the screening assessment. During a screening assessment, targeting locations most likely to have elevated levels of methamphetamine is appropriate. However, if undertaken in isolation from a detailed assessment (i.e. a detailed assessment is not undertaken), the screening assessment that only targets areas of elevated levels is not suitable for determining the need and extent of remediation.

Sampling should be undertaken using suitable and approved methods (**Section 6**).

Where the nature of the material or location being sampled means a 10 cm x 10 cm template cannot be used for taking a sample, the area of the sample collected should be accurately measured and recorded, and the results obtained appropriately adjusted such that they are reported in the correct units of µg/100 cm^2. For unusual shapes such as vents on air intakes or exhausts, an estimated sampling area of 100 cm^2 is sufficient, however the fact that it is an estimate must be recorded. Samples collected from such estimated areas are not considered to be quantitative but can be used for the purpose of indicating that contamination is present.

For the screening assessment, the following should be undertaken as a minimum:

- One sample be collected from each room. Where this is not possible, at least 5 samples should be collected from within the building, including the following:
    - Areas that show evidence of contamination (if present)
    - Surfaces in areas known to have been used in the manufacture of drugs (if known) or areas where smokers have spent time (if known) or likely to have spent time
    - Any room that is inhabited by a child aged 16 years and under (if known)
    - Collection of samples from surfaces, materials and areas with known high-risk materials and areas likely to have higher levels of methamphetamine contamination (refer to **Table 3**).

Surfaces that have been recently painted or renovated should be avoided in the screening assessment.

Any additional samples collected by the screening sampler should be done in consultation with the property owner or manager.

Sampling locations need to be accurately recorded using one or a combination of the following methods:

- Written description of sample location;
- Offset measurements from a fixed point (for example, a doorway);
- Photographs;
- A floor plan; or
- Video recordings.

As a minimum, sample location records need to include the type of area, the type of surface sampled (such as tiles, coated or uncoated timber, concrete, painted plasterboard walls) and the location within the area where the sample was taken.

The sampling must include relevant quality control samples, refer to **Section 6.7**.

Where presumptive sampling kits are used in a screening test, photographs of the results of each test must be included in the screening report that clearly identified which sample the result relates to.

8.4. Evaluating the results of a screening test

It is important that results obtained in a screening assessment are appropriately evaluated and communicated.

Only testing conducted in compliance with this Code should be considered appropriate for determining the presence, or otherwise, of methamphetamine contamination in a property (refer to **Section 6.1** for the suitability of sampling methods).

If discrete sampling has been undertaken, with analysis by a laboratory, the results can be directly compared against the investigation levels (**Table 1**). This comparison can determine if the materials sampled are contaminated, and inform whether further testing is required to determine remediation requirements.

Sampling using other screening methods (composites and presumptive tests) can only be reviewed in line with guidance provided in **Section 6** of this document.

Should a screening test be required to be repeated, it should be conducted in a manner consistent with the initial sampling targeting the same types of materials. If a secondary screening test targets different materials, in particular materials that do not have a high affinity for the retention of methamphetamine, then these results cannot be directly compared with those collected from higher affinity surfaces.

8.5. Reporting

A screening assessment report should include the following as a minimum:

- The date of the screening assessment;
- The address or description of the property or asset;
- The identity of the person who conducted the screening assessment, including their qualifications, a declaration of any interest the screening sampler has in the property or asset, for example as the property owner, landlord, purchaser, tenant, vendor, or manager;
- A description of the property layout that describes the sampling locations;
- All information collected as part of the initial site visit or inspection, including observations and a copy of the Police report (where available);
- The method used to collect samples, including where any samples were collected that were from an area different to 100 cm^2;
- The methodology employed to analyse the samples;

- Details on the locations selected for sampling;
- The limitations of the sampling and testing methodology employed, including but not limited to: areas not sampled and the rationale for this; and factors which may influence the outcome of the test result, such as prior cleaning or renovation of surfaces;
- The results of the sampling, including photographs of screening tests, or copies of any laboratory analytical report(s) (which need to be appended, if relied upon);
- Quality control sample results and interpretation;
- A conclusion confirming the presence or absence of methamphetamine contamination at the property. The conclusions of a screening assessment should also make it clear what the screening results can be used for (refer to additional information in **Section 6** on evaluating results from the screening test).

The report should also include any relevant recommendations for further testing, should it be required in the detailed assessment (**Section 9**).

Where sampling was undertaken using individual NIOSH compliant samples and sufficient samples have been taken to provide a representative assessment of the potential for exposure, the report may include an assessment of the suitability of the property for occupancy.

9. Detailed assessment

9.1. Purpose

The purpose of a detailed assessment is to determine the extent and magnitude of any methamphetamine contamination and inform the design of any remediation works and waste disposal plan (if required). It is important that a detailed assessment includes a quantitative assessment of the distribution of methamphetamine contamination in a building, targeting surfaces and materials that need to be considered in the remediation works.

The conduct of a detailed assessment should consider all aspects relevant to potential exposures that may occur in a property. Exposure occurs via direct contact with contaminated materials as well as through the inhalation of dust and vapours. Hence the sampling should target materials and locations relevant to both direct contact as well as those materials where contamination is present that may contribute to (or partition to) vapours inside the building. The detailed assessment should not only consider the current use of the property, as uses of rooms may vary over time, including as a result of renovations.

The detailed assessment includes comparing the results of the laboratory analysis with applicable investigation levels (**Table 1**) to determine whether the property requires remediation.

A detailed assessment may follow a positive screening assessment, or bypass such an assessment if contamination is already suspected or known to exist at a level that exceeds the investigation levels (**Table 1**).

A detailed assessment should be carried out by an independent, appropriately qualified sampler.

9.2. Background information

The purpose of the background information stage of a detailed assessment is to gather sufficient information to develop a sampling strategy in order to estimate the number and location of samples that need to be collected, and to generate a site-specific risk assessment to inform safety requirements for entering and testing the property.

The following information should be obtained from the police form/information, property owner, property manager, or occupier (as appropriate):

- Copies of any reports on previous inspections that have been conducted;
- Copies of any available reports or correspondence that identify whether a property has been contaminated by methamphetamine;
- Information that would indicate soil contamination, such as areas where pits or holes have been previously dug (and likely filled in) and areas of dead or dying vegetation;
- If the property has a forced-air heating or cooling system and, if so, the location of the intakes;
- Details regarding the presence/absence of high risk/high affinity materials (refer to **Table 3**);
- If any recent renovations or extensive cleaning has occurred;
- The number and location of exhaust fans within the property;
- If the site has an on-site waste water system;
- If occupant consent has been given for testing to occur;
- The presence of other occupants or pets at the property.

For properties where high levels of contamination are expected to be present or where the property was seized by police as a known or suspected clandestine drug laboratory, the detailed assessment

should consider the need to test for contaminants other than methamphetamine. Further detail on the range of contaminants that may need to be considered is provided in the Australian Guidelines (AG & ACC 2011).

Advanced notice should be provided to the analysing laboratory of the likelihood of samples arriving for analysis which will higher than average. This will allow the laboratory to make the adjustments to process necessary to maintain optimal performance.

9.3. Site inspection and sampling

A visual inspection of the property, including the grounds, should be undertaken to identify any risks or hazards, indicators of former manufacture or the disposal of waste in burn pits, or other outside areas, or evidence of chemical storage. Photographs and notes should be taken to record any observations made. These observations may include the following:

- Stains
- Areas where hazardous materials may have been stored
- Presence of odours (describe nature of the odour)
- If the property has a septic system
- Presence of ventilation systems and location of vents and exhaust fans
- Structural feature that may indicate separate functional spaces such as attics, false ceilings, crawl spaces, basements, closets and cabinets
- Burn pits, outside disposal areas (such as corroded or eroded drains) and outside storage areas.

The site-specific health and safety risk assessment should be developed or adjusted to address the hazards identified.

Detailed sampling should be conducted using discrete surface wipe sampling methods (refer to **Section 6**). It is not appropriate to use composite sampling methods or screening/presumptive samples for this phase of the assessment. The exception is the use of laboratory composites, provided the data relied on is based on analysis of the individual samples (previously composited at the laboratory).

For the detailed assessment, the following should be undertaken as a minimum:

- The number of samples collected from the premises should include at least one sample from each room, or from each room where contamination has been previously identified in the screening assessment. It is preferred that for rooms with a floor area greater than 10 m^2, the sampling rate is 1 sample per 10 m^2 floor area. This allows for variability in the spatial distribution of methamphetamine contamination to be accounted for. However, it is noted that this may not be cost effective in all situations. The location and number of samples collected needs to balance up the need to characterise contamination in the property and cost.
- If a screening assessment has not been undertaken, or the assessment undertaken was not of a suitable standard or not quantified the contamination levels on individual samples, sampling should include surfaces, materials and areas with a known high risk materials and areas likely to have higher levels of methamphetamine contamination (refer to **Table 3**). This approach is taken to minimise the potential for methamphetamine residues that may be present at levels above the investigation levels (**Table 1**), to be missed (i.e. not detected).
- If individual screening assessment samples were collected and analysed, in addition to the screening assessment samples, samples should also be collected from other surfaces in the

property to enable an assessment of the extent of contamination. This should involve the collection of additional samples from materials and surfaces in the property that may need to be considered in relation to any remediation. This may include other surfaces that are considered high risk (as per **Table 3**), with other materials (listed in **Table 4**) and locations such as the roof space also included where necessary.

- If a screening assessment has not been undertaken, the sampling undertaken should include the requirements outlined in the screening assessment (as a minimum, refer to **Section 8**) as well as the collection of any additional samples from various materials and surfaces in the property (as noted in the dot point above) to inform remediation.

Sampling locations need to be accurately recorded using one or a combination of the following methods:

- Written description of sample location;
- Offset measurements from a fixed point (for example, a doorway);
- Photographs;
- A floor plan; or
- Video recordings.

As a minimum, sample location records need to include the type of area, the type of surface (such as tiles, coated or uncoated timber, concrete, painted plasterboard walls) and the location within the area and property where the sample was taken.

9.4. Sampling contents or possessions

It is highly likely that personal items and contents of a methamphetamine contaminated property will become contaminated through the transfer and movement of residues and dust in a property. Personal possessions are items that individuals may be more exposed to in a property (due to frequent contact) and many items, such as soft furnishings (cloth lounges and bedding), are very difficult clean and validate so they can be considered safe for ongoing use. It is also not possible, or cost effective, to sample methamphetamine residues on all personal property in a home. Hence guidance is provided in this Code, based on guidance from the United States (Kentucky Department for Environment Protection 2009; USEPA 2013) and NSW Health (Wright 2015) to assist in the management of personal possessions.

Sampling of possessions should only be undertaken with the permission of the owner of those possessions.

Table 5 provides some general guidance as actions may need to be carried out for various categories of possessions in a property. Different actions may be available if sampling is conducted on the various items.

Table 5: Recommended actions for items inside premises based on value and potential for exposure/contact (example items)

High value - High contact/exposure items	High value - Low contact/exposure items
- Mattresses – discard - Carpeting – discard - Upholstered items - discard - Window furnishings (blinds and curtains) – discard - Food preparation surfaces* – discard - Plastic furniture – discard	- Photographs – may be salvaged without cleaning - Large appliances (non-food related) – may be cleaned (inside and out) - Electronics – may be cleaned (where cleaning does not damage item)
Low value - High contact/exposure items	**Low value - Low contact/exposure items**
- Clothing – may be washed (three times) or else discard - Children's toys – if they cannot be washed (three times) then discard - Toothbrushes – discard - Kitchen items* – discard - Books and household paper items – discard	- Garage tools – may be cleaned - Garden tools – may be cleaned

* Items and areas that may not need to be discarded if additional testing of these items and areas show levels of contamination below the relevant guideline, or if these items can be effectively cleaned during remediation.

There may, however, be some items that an owner may want to retain (following cleaning – where possible). For these items, it is important that they are sampled either prior to and post remediation, or post remediation only to determine if they have been effectively cleaned and can be re-used in a property. Such items may include those with high sentimental, monetary or legal value.

For any items where sampling and analysis may be considered, the cost of sampling and analysis and remediation needs to be weighed up against the cost of replacement.

The type of sampling and analysis that can be undertaken on contents includes presumptive screening tests (to demonstrate the presence of contamination at or above a predetermined level) or use of a discrete wipe sample (laboratory analysis). The basis for selecting the method of sampling used for evaluating contents should be explained in the report.

It is noted that there are no specific investigation levels relevant to results obtained from contents or possessions in the property. However, is should be noted that contents within a property will include many materials and items which people can come into contact with throughout a day. The investigation levels were developed on the basis of a residue level that remains on surface which people come into contact throughout a day. Hence it would be appropriate to adopt the applicable investigation level (refer to **Table 1**) for evaluating the suitability, or otherwise, of contents in a property.

9.5. Quality control samples

Quality assurance and quality control (QA/QC) samples should be collected in all detailed investigations, refer to **Section 6.7** for further detail.

9.6. Evaluating the results from a detailed assessment

Where a detailed assessment is completed as outlined in this code of practice, the results of discrete samples can be directly compared against the applicable investigation level (**Table 1**). Comparison against the investigation level can be used to determine:

- If the results of sampling of surfaces in a property are below the investigation levels; or
- If the results of sampling indicates some (or all) surfaces and materials are above the investigation levels, and if remediation is required to ensure the property can be made safe for ongoing/future occupation.

It is important that the results of the detailed assessment are correctly reported, with conclusions and recommendations for further work, should this be necessary, provided in a clear and detailed manner, such that the property owner can understand what is required in further works, if required.

For properties where levels are identified in excess of the investigation levels (**Table 1**), an appropriately qualified professional should develop and implement a Remediation Action Plan (RAP) to ensure the property is correctly remediated. A testing company/individual may develop a RAP, only if suitably experienced. It is not appropriate for remediation of a contaminated property to be conducted by an untrained or generic cleaning company, a company in which the testing company has direct or indirect financial interest or for the property owner or manager or other person with a direct or indirect financial interest in the property to decide what is required to remediate the property.

9.7. Reporting

The purpose of the detailed assessment report is to provide the property owner or manager with advice on the extent to which their property is affected by methamphetamine residues and what they should expect to have happen as next steps. Those next steps may include further investigation and/or remediation. The information presented in the detailed assessment should put prospective remediation contractors in a position where they can make an assessment of the works required to reduce levels to meet the remediation criteria, which are the same as the investigation levels (refer to **Table 1**).

A detailed assessment report should include the following as a minimum:

- The date of the screening assessment;
- The address or description of the property;
- The sampler who conducted the screening assessment, including their qualifications, a declaration of any interest the sampler has in the property or asset, for example as the property owner, landlord, purchaser, tenant, vendor, or manager;
- Information and details relevant to the property obtained during the site visit/inspection, observations made within the property and a copy of the police report on the property (if available). Where this information was provided in the screening assessment report, it should be repeated in the detailed assessment report, together with any additional observations made during the detailed sampling;
- A description of the property layout that describes the sampling locations;
- Dimensions of the areas sampled to demonstrate that sufficient samples have been collected based on floor area;

- The location of each sample and the rationale for the sampling locations chosen;
- The method used to collect samples;
- The method used to analyse the samples;
- The limitations of the sampling and testing methodology employed, including but not limited to:
    - areas sampled and the rationale for this; and
    - factors which may influence the outcome of the test result, such as prior cleaning or renovation of surfaces.
- The results of the sampling including copies of laboratory analytical report(s);
- Results of all quality control samples, and interpretation of these results;
- A conclusion confirming the extent and magnitude of contamination at the property, and the level of risk posed to persons who may reside in the property and whether there are requirements for persons to vacate the property.

The detailed report may also include the following:

- Details of building materials, electrical fittings and personal and unfixed property present;
- Identification of areas where recent redecoration works have occurred (painting etc);
- Site information that may be relevant to any further stages of investigation or remediation, such as areas or materials that could not be sampled due to access restrictions; and
- Recommendations on next steps (if required), which may include:
    - Details of the remediation required;
    - A remediation action plan (RAP); and
    - Any requirements for vacating the property prior to and/or during remediation for health and safety reasons, as applicable.

9.8. Remediation recommendations

The purpose of providing recommendation for remediation is to guide the design of any remediation works that may be required for the property. The recommendations should be made on the basis of the nature and extent of contamination identified and detailed within the detailed assessment report, taking into account the materials sampled and other materials that are present (but not sampled) and other limitations to the sampling and assessment (such as access issues). The recommendations should be made on an area-by-area basis and specify the areas and materials that require remediation, and should be based on evidence, published research, good practice and judgment informed by experience.

The remediation recommendations can be included as part of the detailed assessment report or may be reported separately.

The recommendations should identify specific areas or materials that require remediation.

It is ultimately the choice of the owner as to implementation of the recommendations in relation to remediation. Accordingly, the approach taken to remediation is a matter to be agreed between the owner and the remediation contractor. The testing company may provide additional input into these decisions, where suitably qualified, however, a well-executed assessment report should be capable of providing sufficient information for the owner and remediation contractor to proceed without the need for ongoing advice from the testing company.

When considering what approach to take to remediation, consideration should be given to the order of the total cost of addressing contamination that can be expected to result from adopting different approaches, to assist the property owner in making a decision as to the approach that is preferred.

For example, options may include cleaning vs replacement of contaminated material. It may be necessary for cost estimates to be prepared by contractors who would carry out the work, and for further investigation to be carried out to provide greater certainty regarding the requirements and costs.

10. Remediation

10.1. Objective

The objective of remediation is to reduce the methamphetamine contamination levels in a property so that they do not exceed the investigation levels, which are also adopted as remediation criteria (refer to **Table 1**) and the property is safe and habitable for future occupation. The remediation should also be undertaken in a manner that ensures the total cost of the loss to the owner (testing, remediation, reinstatement, time taken) is minimised, without introducing additional contamination as a result of the remediation approach adopted.

Remediation should be completed in accordance with the RAP (and any variations to the RAP agreed by the party commissioning the remediation) and the property should not be considered to be remediated/safe and habitable for future occupation/use until validation sampling has been completed (**Section 11**).

If validation sampling is not completed the property cannot be demonstrated to be effectively remediated or safe and habitable. In addition, without validation there is no accountability for remediation contractors.

Validation testing should be undertaken prior to redecoration and/or reinstatement works are commenced.

10.2. Hazards and contaminants

Adequate safety precautions need to be undertaken by everyone entering a contaminated property before remediation has been completed. Where the property also constitutes a workplace under safety law, this responsibility primarily sits with those who are in management or control of the property and the activities that may give rise to a risk.

The hazards relevant to the remediation phase of works, including consideration of contamination that has been identified in the detailed assessment, as well as hazards associated with the presence of other chemicals that may be present from a former clandestine drug laboratory (where relevant) and remediation methods to be employed, should be considered and all exposures minimised. These activities will, in the vast majority of instances, require compliance with all relevant workplace health and safety (WHS) laws and regulations because the property will constitute a workplace during assessment, remediation and validation of the contamination (refer to **Section 5**). Compliance will involve the conduct of a site-specific risk assessment consistent with workplace safety guidance applicable in that jurisdiction (e.g. see: (Australia 2018; Safe Work Australia 2018a). The risks identified in the risk assessment, along with appropriate safety measures should be presented in a way which is accessible to all workers attending the site. For guidance, a “Safe Work Method Statement”, which is a type of job safety analysis prescribed for high-risk construction workplaces, is a universally-recognised approach to identifying risk control measures applicable to a specific site (Safe Work Australia 2014a).

It should also be noted that other hazardous building materials may also be present in a property such as lead paint or asbestos. Each state and territory prescribe strict legislative requirements regarding the identification and management of asbestos and lead risks in workplaces. As noted above, a property undergoing assessment, remediation or validation – including those domestic in nature – becomes a workplace whilst workers are present. Guidance and codes of practice are provided by all state and territory regulators on compliance with these risks. The relevant regulators advise that all workers participating in such activities must be trained to appreciate the risks of asbestos and lead and how to identify circumstances in which either may be present. For example,

any building constructed before 2003 may contain asbestos, and any building constructed before 1980 is generally considered *likely* to have used asbestos. If it is determined that asbestos is present or is likely to be present and the nature of the remediation works being undertaken means this material will be disturbed, then asbestos risk assessment should be conducted. In some instances an asbestos register may already be available for review – particularly with state or territory-owned housing (Safe Work Australia 2018b). If a register is not available and the age of the property suggests asbestos is present, then a survey and recommendations for removal must be undertaken. Asbestos containing materials that will be disturbed by the decontamination works to be undertaken must only be removed from the premises by a licensed asbestos removal company. The presence of methamphetamine contamination, and any additional safety measures that may be required, should be communicated to the asbestos removal company.

For properties where lead paint may be present, works should be managed appropriately in accordance with the relevant guidance from Safe Work Australia or other state-specific guidance where relevant (Safe Work Australia 2014b, 2018a).

10.3. Remediation Action Plan (RAP)

The RAP provides a scope of works for the remediation of the property and should be based on the information provided in the detailed assessment (**Section 9**).

The RAP should include the following details, where relevant:

- Site-specific health and safety plan, including any isolation procedures and PPE required for the works;
- Site information and characterisation of contamination;
- Area(s) to be decontaminated;
- Remediation level to be achieved (i.e. relevant remediation criteria as per **Table 1**);
- A list of the items to be removed from the property;

Items to be cleaned on-site and off-site;

- Location, layout, and procedures for on-site decontamination;
- A list of the surfaces to be cleaned on-site;
- Cleaning materials and procedures;
- A list of building materials to be removed from the property;
- If there are areas to be encapsulated after cleaning, these need to be identified and the methods and materials of encapsulation outlined (**NB** encapsulation should be limited to structural items only);
- Methods of ventilation, and steps to secure the property and protect against adverse weather conditions during ventilation;
- Methods to prevent cross-contamination (e.g. having a dedicated area for the robing and disrobing of PPE);
- Methods to be used to prevent off-site contamination;
- Methods of waste disposal of all contaminated material (including liquid and solid waste generated during remediation), consistent with state or territory waste and environment protection laws; and
- Contingencies in the event that remediation does not succeed.

Additional detail in relation to many of the above aspects is also provided in the Australian Guidelines (AG & ACC 2011).

10.4. Remediation measures - general

This section addresses the key aspects of remediation that are required for all properties, as well as discussion on the use of various different remediation methods, where and when these may be applicable. It should be noted that it is likely that new and innovative remediation methods and techniques will develop over time. Any new techniques can be considered for use in the remediation of contaminated properties where these methods and techniques have been independently confirmed to be effective.

For all properties where methamphetamine contamination has been reported above the investigation levels (refer to **Table 1**), the following should be considered regardless of how much above the guideline the contamination is reported to be within the property:

- Ventilation of the property – this should be undertaken before (for a minimum of 24 hours), during and after (for a minimum of 48 hours) remediation, where practicable. This should involve opening all doors, window and the use of fans, blowers or negative air machines equipped with a high-efficiency particulate air (HEPA) filter (required to capture contaminated dust movement in the property). Heating, ventilation or air conditioning systems present in the property should not be used. Care should be taken to prevent the venting or discharge of air from the premises to adjacent structures (where windows or ventilation inlets are located in close proximity, potentially within 5 metres).
- Removal and disposal of soft furnishings such as carpets and curtains (as these are sinks for methamphetamine contamination in a property, are difficult to effectively clean and can remain sinks for methamphetamine that may move around the property).
- Removal and disposal of extraction fans along with associated ducting from the property as the cost for replacement is much lower than cleaning and validation.
- The property should be protected against weather events during remediation.
- The property should be kept secure throughout all stages of remediation.

Different actions may be undertaken in a property where it can be confirmed that the work undertaken has properly addressed and reduced the risks to an acceptable level (i.e. validation to demonstrate levels are below the remediation criteria in all materials, refer to **Table 1** and **Section 11**).

10.5. Remediation measures - specific considerations

Kitchen and laundry appliances

Where contamination is present in the kitchen area at levels above the investigation levels (**Table 1**), kitchen appliances used for the storage and preparation of food should be discarded or cleaned. Cleaning should only be considered where reasonably practicable and where cleaning does not damage the item. This does not include dishwashers and washing machines, which should be able to be easily cleaned.

Ventilation, heating and air conditioning systems

Heating and air conditioning systems differ significantly between different systems and hence it is important that remediation conducted is appropriate for the type of system present, balancing out risks and cost. Some examples and considerations are outlined as below:

- There are some heat pump or forced air ventilation system ducts that cannot be decontaminated due to the nature of the materials they are lined with, such as fibreglass (which can be sinks for methamphetamine). In addition, flexible ducting often contains a

porous inner surface that in most cases cannot be decontaminated. For these systems, remediation can only be guaranteed by discarding and replacing the duct work.

- Some systems do not recover air from within the property and have components under positive pressure, where decontamination may be appropriate.
- Some heat pump and other duct work can be decontaminated with appropriate cleaning products while running the system to ensure that the chemicals move throughout all of the duct work.
- Where the level of methamphetamine contamination is below 5 µg/100cm^2, some forced air systems (such as split system air conditioning units) may be professionally cleaned and serviced.

It is important that if a forced air system is decontaminated that it is validated as clean (by collecting a surface wipe sample from the duct work) when operating.

Noted that care needs to be taken that extraction fan systems vent externally and not into the roof space or intake area of the forced air system. If they do, the air intake system may have been compromised, requiring removal and replacement of the entire system.

Ceiling insulation

If the levels of methamphetamine contamination within the property are above the investigation level adopted for ceiling/roof spaces (refer to **Table 1**), then the ceiling insulation should be removed and appropriately disposed. For properties with levels of methamphetamine contamination below the investigation level adopted for ceiling spaces, these materials may be retained where those spaces are not otherwise to be disturbed. Retention is not appropriate for walls or ceilings that are to be removed or for ceiling spaces or walls that are regularly accessed (e.g. attic storage space or area that can be made into a separate room) or the ceiling insulation materials comprise loose fill materials such as mineral wool or chopped glass wool insulation (as these materials are sinks of contamination and can more easily result in the formation of contaminated dust over time, or movement into the home when disturbed).

Avoiding recontamination

To avoid recontamination of cleaned areas and items:

- Items that are cleaned on-site should be bagged or wrapped in plastic after they have been cleaned, or removed and cleaned and stored off-site;
- Areas that do not require decontamination work and cleaned areas should be sealed off from those areas in the property where decontamination work is ongoing. This is particularly important where the approach to decontamination involves removal of building materials. This will create dust. Movement of this dust around the property can result in cross contamination.
- Removed items should be safely isolated and only returned after the items have been tested and shown to be decontaminated; and
- Items should not be returned to the property until the property has been validated (refer to **Section 11**).

Removal and disposal

Items where their ongoing safe use cannot be sufficiently guaranteed and must be considered for disposal include (also refer to **Attachment B**):

- Materials that are visibly stained, emitting odour (noticeable in ambient air), damaged, or likely to have been used in methamphetamine production processes, such as a refrigerator used for storing precursor chemicals;
- Materials that are absorbent and difficult to clean, including carpeting, wallpaper, soft board and unpainted plasterboard building materials, paper materials (books, documents), and soft furnishings such as couches, mattresses, pillows and curtains; and
- Items with a high potential for human contact and not able to be readily decontaminated, such as children's toys, bottles and food-preparation surfaces and items.

All contaminated items need to be made unusable so they cannot be recycled or reused, as they are not safe for re-use in any other situation.

Vacuuming

Interior surfaces in the property should be vacuumed using a HEPA filter vacuum. This should be done after removing contaminated materials and items that are to be discarded from the property. Any vacuuming done in the property should be using a HEPA filter vacuum as this removed particulate matter contains contamination as well as dust and cobwebs that may interfere with cleaning.

HEPA filter vacuuming cannot be used as the only method of cleaning a property as it does not remove methamphetamine residues on most surfaces.

A normal vacuum cannot be used as it lacks adequate filtration and will distribute methamphetamine contaminated dust throughout the property.

Filters from the HEPA vacuum should be appropriately disposed as waste (refer to discussion below).

Building materials - When to decontaminate and when to remove building materials

The decision whether to clean or remove building materials, or some combination of these, should be made on the basis of a number of considerations including the level of contamination present, the materials present and its ability to absorb methamphetamine residues, the material present and its physical response to remediation efforts, cost of remediation as part of the overall cost of reinstatement of a contaminated property, whether the surface/material is a critical part of the structure (noting advice from a suitably qualified structural engineer may be required to determine this) and the time associated with the different approaches to decontamination . These decisions should be made in consultation with the property owner.

Based on experience and good practice guidance the following may be considered:

- Where methamphetamine contamination in a property or part of a property is less than 30 µg/100cm^2, depending on the extent of contamination in a property and the materials present:
    - It is often found that remediation may be effective using various cleaning methods (described below). The cost to clean such a property should be compared with the cost to remove contaminated materials.

    - For contamination levels above 30 µg/100cm^2 the removal of building materials including plasterboard and doors may be required, as it is less likely that these can be effectively (or cost effectively) cleaned. Window frames may also need to be stripped back or replaced depending on the materials present.
- For some properties where significantly elevated levels of methamphetamine are present, costs involved in the careful removal and reinstatement of building materials may be more than the replacement cost of the home. In these situations, or where significant structural damage has occurred as a result of a fire/explosion then demolition of the building should be considered.

Cleaning of surfaces and materials

Cleaning of methamphetamine contaminated surfaces and materials should only be undertaken using products that have been independently demonstrated to be effective, and by trained personnel who are knowledgeable and skilled in the application of these products and following the manufacturer's instructions where available and applicable. Operators using these products should be trained in the proper use of the products and methods to prevent cross-contamination. Methamphetamine contamination cannot be cleaned effectively through the use of common household cleaning products.

There are a range of cleaning products available that are suitable for the cleaning of methamphetamine contaminated surfaces and materials. The cleaning products that may be used must:

- Be used in a safe manner in accordance with the manufacturer's specifications, Safety Data Sheet (SDS) and instructions (a WHS obligation);
- Be effective for removing methamphetamine contamination from the surfaces the product is to be applied to;
- Be effective for removing absorbed methamphetamine contamination from materials the product is to be applied to (note that this is very difficult to achieve, and absorbent materials are often removed); and
- Have no long-term adverse effects for future occupants.

  It is preferred that cleaning products do not contain ammonia or strong oxidising agents. However, there are some products that contain strong oxidising agents that can provide effective decontamination when applied correctly with appropriate training. Where such products are used, they may damage some surfaces and the remediation cost needs to be weighted up against the cost of repair.

Depending on the products used and the contamination level that was present in the property, the cleaning process may need to be repeated a number of times to achieve the relevant remediation criteria (refer to **Table 1**).

Plumbing features and traps

Plumbing fixtures and fittings with visible signs of contamination or damage, such as etching or staining caused by hazardous substances used in the manufacture of methamphetamine should be removed and permanently discarded as they will be difficult to clean. Porcelain and stainless steel fixtures in which the surface is not pitted or damaged can be cleaned effectively. When staining is noted around plumbing fixtures or if a strong odour is emitted by the plumbing system, the drain system should be flushed using a generous amount of water. Further use of an alkaline cleaner will release built up grease in the trap. The entire plumbing system should be flushed at the same time.

It is important for practitioners to check the waste and environment protection laws in their jurisdiction particularly where a sucker truck or grease trap removalist is to be engaged.

Encapsulation

Encapsulation is not a substitute for decontamination and should not be used as a sole remediation method for surfaces and materials in a property. Encapsulation should only be used as the final measure when all other methods have failed and removal of the item or building material is not possible without compromising the structural integrity of the building. In such circumstances encapsulation must only occur after validation testing has been undertaken (refer to **Section 11**), so the effectiveness of this work can be demonstrated and the residual risk noted. It is preferred that plasterboard that cannot be remediated to the remediation criteria (**Table 1**) should be removed from the premises, rather than encapsulated.

Encapsulation of surfaces with primers, paint, and other sealants will provide additional protection against the migration of contaminants to the surface of the material.

Oil-based or epoxy or other products tested and shown to be effective (following remediation) can be used. The manufacturer's recommendations for application methods, thickness, and drying or curing time between coats should be followed. Complete coverage of the surface is important and may require multiple applications of finish.

Spray application can provide more thorough coverage than hand-rolling, and prevents the lifting or mixing of residual surface contamination during application, and is therefore recommended where practical.

If an unremediated surface within a property has been encapsulated (i.e. painted prior to testing and any opportunity for cleaning), then the only way to ensure that the contamination behind the paint will not migrate back through the painted surface, or the contamination will not be mobilised if renovation works are undertaken in the future (involving sanding or cutting), is to remove these materials from the property.

Disposal of contaminated water

Wash and rinse water can typically be disposed via the property's drainage system, provided that it is connected to the public sewer. Wastewaters that remain on site from methamphetamine production operations must be disposed of to a licensed waste disposal facility, and should not be discharged to the sewer.

Where the property is not connected to the public sewer, wash and rinse water needs to be collected for proper off-site disposal, as cleaning solutions can affect the function of an on-site septic system. Alternatively, the septic system may be able to be pumped before remediation starts to provide storage capacity in the tank for wash and rinse water, and emptied again before the liquid reaches the effluent outlet of the tank.

Disposal of waste

All contaminated waste must be disposed of to landfill, and not diverted for reuse or recycling. In addition, the following should be noted:

- Where contamination in the property exceeds the commercial/industrial investigation level of 10 µg/100cm^2 (**Table 1**), waste bins should be lined and covered with a minimum of 200 micron polyethylene before removal of waste; and

- All materials removed from the contaminated site should be disposed in a manner equivalent to crush and bury. There are no waste classifications relevant to the presence of methamphetamine contamination on items or materials removed from a contaminated property. Methamphetamine that is present in waste materials will degrade in a landfill environment and waste materials are therefore not considered to require a specific waste classification for disposal. **Attachment B** provides additional discussion on the issues related to waste disposal.

10.6. Remediation report

Following completion of remediation and validation testing (refer to **Section 11**), the following should be provided in a remediation report provided by the remediation contractor:

- The address, description and layout of the property;
- Names and qualifications of the remediation contractors and technicians;
- A summary of the remediation requirements as per the RAP;
- Variations made to the RAP and an explanation for each;
- Confirmation that all agreed remediation actions were completed, including a description (including photos) of the areas that were remediated and the methods used;
- Waste management procedures used, including the handling of waste and evidence of the proper disposal of materials and waste;
- When validation testing has determined that cleaning has been as effective as possible and encapsulation is required to be undertaken to complete the works, details of the location and extent of any areas where encapsulation was undertaken, including the nature of the encapsulation and a note that disturbance of these areas may result in methamphetamine contamination, should be recorded;
- Reinstatement and testing of any services temporarily disengaged during remediation (such as HVAC or septic systems); and
- A declaration by the remediation contractors that remediation was undertaken in accordance with the RAP and any agreed variations.

10.7. Post remediation of tools and equipment

Following completion of remediation, a remediation contractor must adopt the following protocol for cleaning their tools and equipment:

- Where possible, all tools used to clean up a methamphetamine contaminated site should be cleaned on-site before packing up;
- If off-site cleaning is necessary, these items should be treated as per all other items that are cleaned off-site, and placed in sealed containers for transport; and
- Vacuum cleaners, air movers, air scrubbers and any other fan assisted or open vented tools such as power tools, once used in a methamphetamine contaminated site, should be dedicated for use only in methamphetamine remediation works. These dedicated tools should be stored in sealed containers during storage and transport. To eliminate the risk or cross contamination, these items should not be used for any other site, other than methamphetamine remediation works.

11. Validation

11.1. Objectives

The purpose of the collection of validation samples following completion of remediation is to demonstrate that remediation has been satisfactorily completed, and any remaining residues are below the relevant remediation criteria (refer to **Table 1**) and can be considered, in the opinion of the validation consultant, safe and habitable.

Remediation cannot be determined to be complete, or the property safe and habitable unless validation sampling is completed.

11.2. Validation sampling

When the agreed remediation work on a property, as outlined in the RAP, including the removal of contaminated material, has been completed by the remediation contractor, the property should be further tested to determine the effectiveness of the remediation and a validation report prepared.

Validation sampling should be undertaken by an independent sampler. This means the sampler should not be from the remediation company, or have any financial links with the remediation company or owner of the property. At least 48 hours should be allowed between the completion of remediation work and the conduct of validation sampling to ensure all cleaned surfaces are sufficiently dry for sampling to be properly undertaken.

Sampling and testing should take place prior to re-occupancy of the property to be of any value.

If sampling and testing results indicate that contamination is still present above the investigation levels/remediation criteria (refer to **Table 1**), the safety and habitability of the property cannot be confirmed. In this situation further remediation work will be required, in consultation with the independent sampler, with further validation undertaken at the completion of the additional remediation work.

11.3. Sampling plan

For the conduct of validation sampling, a validation sampling plan is recommended. The sampling plan should be based on appropriate and suitable sampling methods (as outlined in **Section 6**) to ensure the results provided are reliable and can be compared with the relevant investigation levels/remediation criteria (**Table 1**).

An effective validation sampling plan will include:

- The size and layout (complexity) of the property;
- Information from the detailed assessment (**Section 9**) in relation to the distribution of contamination within the property (prior to remediation);
- The remediation works completed, including consideration of the building materials and contents that may remain within the property; and
- The location and extent of any encapsulated materials and areas.

The sampling plan should include the location of samples, the material(s) to be sampled, and the tests to be performed on each sample. The sampling plan should be designed to assess the effectiveness of remediation conducted.

Sampling sites may be amended from those in the sampling plan based on site observations. For example, a reason for amending sampling sites is that areas appear to be dirty or dusty or both, suggesting remediation was not completed to a satisfactory standard.

11.4. Validation sampling requirements

When undertaking a validation assessment, the following should be considered:

- Sampling should be undertaken using appropriate methods as discussed in **Section 6**. As the results of the sampling are required to be compared with the investigation levels/remediation criteria (**Table 1**), appropriate sampling methods that provide results that are suitable for direct comparison against the investigation levels/remediation criteria can only be used;
- Sampling should include appropriate quality control samples, including relevant media and field blanks (refer to **Section 6.7**);
- At least one sample should be collected from each surface previously tested (prior to remediation) where levels were above the relevant investigation levels and where those surfaces remain in-situ. The samples should be collected from locations in the general vicinity of the locations previously sampled. For rooms with a floor area larger than $10m^2$, one sample per $10m^2$ should be collected where cost effective and appropriate;
- At least one sample should be collected from areas where there may be a high risk of cross-contamination during remediation (identified following discussion with remediation contractors, where relevant); and
- Where encapsulation has been undertaken, the sampling should include appropriate samples from these locations to demonstrate the effectiveness of the encapsulation.

Additional samples should be collected based on consideration of the factors outlined in **Section 11.3**.

11.5. Validation report

A validation report should include, as a minimum:

- The purpose of the remediation works completed;
- The date of the work;
- Details of the validation sampler;
- Scope of the remediation works completed (with reference to the remediation report where possible);

The report should also include a declaration by the independent sampler as to

- Their independence and being in a position of having no conflict of interest regarding the remediation contractor and property owner;
- The sampling undertaken and rationale for the collection of the samples (including a site plan and photographs showing sample locations);
- Details of the sampling and analytical methods used, including reference to all materials where encapsulation has been used;
- Presentation of the results, including copies of relevant laboratory reports (where applicable);
- Quality control sample results and interpretation; and
- An explanation of the validation sampling results as to whether or not the results support that the remediation meets the relevant investigation levels/remediation criteria (**Table 1**) for re-occupation of the property.

12. Adherence with this Code

Any report that states that assessment, remediation or validation activities have been completed in accordance with this Code must be capable of verification by an audit.

Any misrepresentation made that this Code has been adhered to is likely to offend state, territorial or Commonwealth criminal or civil laws, including fraud and misleading and deceptive conduct as well as environment protection and workplace safety laws.

Should there be any dispute in relation to work undertaken in accordance with this Code, it is recommended that the dispute be investigated and resolved by an independent third party, which may include the police or a state, territorial or Commonwealth regulator.

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Attachment A: Criteria for Ceiling/Roof Spaces

The Clandestine Drug Laboratory Remediation Guidelines (AG & ACC 2011) provide surface residue criteria for the assessment and remediation of indoor surfaces in residential homes and commercial buildings. For residential homes, the criteria derived are relevant to living areas where there is frequent daily direct contact by adults and children with various surfaces. The criteria presented in the guidelines have been derived (Wright 2009) using a risk-based approach where the nature, type, duration and frequency of these exposures has been calculated and evaluated in conjunction with the toxicity of the contaminants.

The relevance of these criteria, however, to less accessible areas such as roof spaces, however requires further consideration.

In relation to the presence of surface contamination in a roof space (not accessed and used as a living space), the potential for exposure will be minimal. Exposure to contamination on surfaces within the roof space can occur via the following mechanisms:

- **Direct contact**, where residents or trades-people may enter the roof space for the purpose of home renovations or repairs. These exposures are of limited duration and infrequent (i.e. for a few hours or days a year only) and will be relevant to adults or older children (teenagers asked to assist with home renovations). This is significantly different to the exposure scenario used to establish the residential guidelines, namely direct contact of surfaces by young children (toddlers) every day of the year (where contact includes frequent mouthing of hands and objects that come into contact with the contaminated surfaces). Hence the residential surface criteria will not be relevant for roof spaces.

  Without recalculating specific criteria for exposures that may occur in the roof space, it is noted that the exposure assumptions adopted in establishing the commercial surface criteria are more relevant to those in the roof space. The commercial criteria were derived on the basis that direct contact with surfaces was by adults where the hands and potentially lower arms came into contact with surfaces, hands were placed in the mouth for up to 1 hour each day for 240 days of the year. These exposure assumptions, while still conservative, are more relevant to the potential exposures that may occur when accessing the roof space for maintenance/repairs.

  On this basis it would be appropriate (and conservative) to adopt the commercial surface criteria for the purpose of assessing the suitability of surfaces in a residential roof space.

- **Indirect contact**, which may occur when dust (containing contamination) enters the living space beneath via cracks and gaps in the walls and ceilings. This can only occur if the contamination that remains is in a form that is dislodgeable (i.e. as a dust). Methamphetamine residues that may have entered the roof space may be somewhat dislodgeable (though typically not as a dust) prior to remediation, however following remediation where all dust has been removed this mechanism is no longer relevant.

  If the roof space were not remediated, the potential for residues associated with drug manufacturing or use to be present as a dust that can move into the living spaces below is limited, however it is recommended that ceiling spaces are assessed and remediated/cleaned to remove dust such that the surface residue criteria established for commercial areas is met.

The concept of having different clean-up criteria for different areas of a house based on different levels of exposure (or potential for contact) has been adopted in the derivation of action levels for lead in indoor surface dust established by the USEPA (USEPA 2000). Action levels for floors, that are regularly accessed by young children, are 5 to 8 times lower than those established for window sills and troughs, which are infrequently touched by young children. Hence the approach of adopting a different guideline for the roof space of residential homes formerly used for the manufacture of drugs is not new and is recognised as an appropriate approach to ensuring contaminated surfaces in homes are cleaned appropriately such that the risks to human health are adequately protected.

On the basis of the above a remediation criteria presented in the Guidelines equal to that set for commercial premises can be applied to residential roof spaces (that are not living areas), and are considered to be adequately protective of health.

Attachment B: Disposal of methamphetamine contaminated building materials

This attachment provides additional information on the disposal of waste materials from methamphetamine contaminated properties.

Hazardous materials (sharps, bulk chemicals or liquid/chemical wastes, chemical sludges, acids or caustic materials) need to be disposed under existing state and territory legislation which regulate these types of waste material.

However, for materials (including building products, white good, electrical items and furnishings) known to be contaminated with methamphetamine and precursor residues, there are no guidelines available in Australia or New Zealand to classify these types of waste materials. The Australian Guidelines (AG & ACC 2011) only indicate these materials need to be disposed to an appropriate waste facility.

Where methamphetamine residues are present on household items that cannot be remediated, and require disposal, it is important that these items are rendered unserviceable so they cannot be reused or recycled in any way.

A study has been undertaken (Pal et al. 2009; Pal et al. 2011) to evaluate the ecotoxicity and fate of drugs, such as methamphetamine, MDA (3,4-methtlenedioxyamphetamine) and MDMA (3,4-methylenedioxymethamphetamine), precursors and intermediate chemicals from the of drug manufacture process. The behaviour of the various chemicals in soil is complex, and the laboratory studies undertaken are only indicative of potential environmental behaviours. The data, however, indicates the following:

- Some intermediate chemicals from drug manufacture processes can degrade in soil to form methamphetamine. Hence the disposal of drug manufacturing waste material may result in the formation of some methamphetamine and amphetamine in soil
- In sterile soil (i.e. there are no microbes present), methamphetamine was not found to degrade
- In the presence of microbial activity methamphetamine did degrade, with the half-life for methamphetamine in the three soil-types tested in the range of 131 to 502 days (Pal et al. 2012). Methamphetamine was also found to be of moderate mobility (both sorption and desorption processes) in the environment (Pal et al. 2015)
- Pseudoephedrine was found to be most mobile in the environment, however it was also the most rapidly degraded, with half lives in the range of 3.7 to 30.1 days (Pal et al. 2015; Pal et al. 2012).

Methamphetamine would be expected to degrade via de-methylation under aerobic/humic conditions.

No data is available on the behaviour of methamphetamine residues as present on or adsorbed within building materials and furnishings, in a landfill environment. However, in a landfill environment, where microbial activity is present and aerobic/humic conditions may also be present, it is expected that methamphetamine residues on materials in a landfill will have some capacity to desorb from these materials, adsorb to soil and also undergo degradation over time.

It is unlikely that these materials would need to be disposed of as hazardous waste, however it may be relevant to consider the class and type of landfill to which the waste materials are disposed, and whether there is a need to stipulate that the landfill should be managed. In cases where waste

materials are disposed to a municipal landfill, the materials are typically taken from a collection point and interred within the landfill, rendering them largely inaccessible. However, many regional and remote landfills are not actively managed and create the possibility for the public to both come into contact with waste materials or indeed, recover and seek to recycle or re-use the material. Disposal at such facilities, where recycling and re-use may occur (regardless of whether the materials and items have been destroyed) should be avoided.