



# METHAMPHETAMINE CONTAMINATION IN HOMES

Cause and Effect

Julie Butchart  
Occupational Hygienist

# No two meth labs are the same

- Different setups are found based on the size, sophistication and the technology used.
- Methamphetamine can be processed via a number of different methods.
- Meth labs can be setup almost anywhere eg. residential homes ( rural, semi-rural, CBD apartments), commercial properties, hotel rooms etc.
  
- In Australia in 2011 Clandestine Drug Laboratory Remediation Guidelines were published.
- In 2015 National Ice Taskforce was developed and a final report was prepared with 38 recommendations.
- There is a strong emphasis on tackling ice use and addiction to minimise the demand whilst still trying to restrict the supply.
- Some states have developed their own additional information on the remediation of meth labs in our community.

# In the USA

- In 1990 the Joint Federal Task Force publishes Guidelines for the Cleanup of Clandestine Drug Laboratories. Aimed at first responders.
- In 2007 the Methamphetamine Remediation Research Act was passed. This directed EPA to establish voluntary guidelines for the remediation of former meth labs based on the best available scientific knowledge.
- These guidelines were updated in March 2013.
- EPA has a Local Government Reimbursement Program (LGR).
- DEA maintains the National Clandestine Laboratory Register. Some states maintain their own register.
- Several states have developed meth lab remediation certification programs for contractors. As a minimum 40hr OSHA training.
- Some states require an Industrial Hygienist to conduct the preliminary assessment and post-remediation sampling.

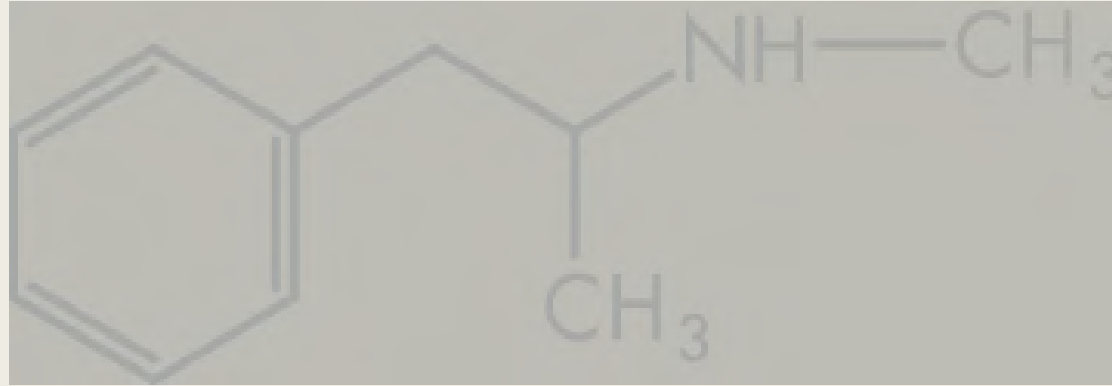
## Voluntary Guidelines for Methamphetamine Laboratory Cleanup



Provides a safety net of up to \$25,000 per incident to local governments that do not have funds available to pay for response actions.

Under the EPA LGR Program, costs associated with the gross removal of meth labs and their related wastes may be eligible for reimbursement. These costs may include overtime wages related to hours spent securing the site or performing decontamination, costs for equipment purchased specifically for the response and contractor cleanup costs incurred by the local government for gross removal.

However, costs related to long-term remediation actions as described in these voluntary guidelines (e.g., hiring a remediation contractor, conducting pre- and/or post-remediation sampling, developing a remediation cleanup plan and outdoor remediation) are generally not eligible for reimbursement under the LGR Program.



- Methamphetamine is the most common drug manufactured illicitly in Australia.
- It is easy to make, highly addictive and its production and use can have serious impacts on human health and the environment.
- Meth labs can be identified through the Victorian Police and Council process or as a result of people who have concerns that they have moved into a property that was previously a meth lab.
- The aim is to minimise risk of exposure to residual contaminants for future occupants.
- In Australia we typically conduct initial testing and then the best remediation strategy is determined from these results. This is usually the most cost effective process instead of going straight to remediation and then validation testing.

# Residues of Potential Concern

- Different methods of manufacturing will pose different risks.
  - *P2P method may leave residues of lead and / or mercury.*
  - *Red Phosphorous method can produce phosphine.*
- Airborne contaminants may include phosphine, hydrogen iodide, iodine vapour, hydrogen chloride, ammonia, volatile organic compounds.
- Due to the variety of chemicals used to manufacture meth, sampling for methamphetamine is often used as an indicator. Methamphetamine is known to be difficult to remove so if the remediation method is effective for the removal of methamphetamine, it is usually effective for the other chemicals of potential concern.
- A number of other chemicals are volatile so these will significantly reduce in concentration quickly with good ventilation.
- Residual chemicals can include acids and alkalis, precursors, reagents, catalysts, intermediates, final product, by-products, waste and solvents.
- A wide range of other hazards such as drug paraphernalia, poor hygiene standards, mould, site accessibility, unexpected visitors, dogs etc.

Red Phosphorus/Hydriodic Acid Lab Profile	
Precursor:	Ephedrine or Pseudoephedrine
Method:	Ephedrine reduction using red phosphorus, hydriodic acid and hydrochloric acid
Unique Hazards:	Phosphine gas production
	Conversion of red phosphorus to white phosphorus
	Iodine and hydriodic acid vapors
	Use of corrosive acids and bases
	Use of acid gas generators
Variations:	Use iodine and water to make hydriodic acid
	Use hypophosphorus acid instead of red phosphorus
	Use liquid from tablet extraction directly in reflux step

P2P Amalgam Lab Profile	
Precursor:	Phenyl-2-Propanone (phenylacetone)
Method:	P2P reduction using methylamine, mercuric chloride and hydrochloric acid
Unique Hazards:	Methylamine could cause severe eye and skin irritation and may cause blindness, flammable in high concentrations, a skin absorbent and a central nervous system (CNS) toxicant
	Use of lead acetate and highly toxic mercuric chloride
	Use of corrosive acids and bases
	Occasional use of methylamine compressed gas cylinders
	Use of acid gas generators
Variations:	Acidify the oil layer directly (i.e., delete solvent washing step)

# Vulnerability of children

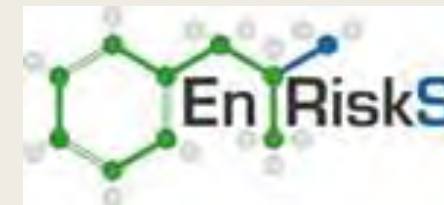


- Children have a higher metabolic rate, higher respiratory rate and a developing central nervous system.
- Their typical behaviours include frequent hand-to-mouth contact and regular physical contact with their environment.
- Together these provide a far greater risk to their health for potential exposure of chemical residues compared to adults. Most at risk 6months – 2 years.

Usual practice is to strip out carpets, walls, kitchens, air conditioners etc. once the levels become approximately 5 times higher than the IL. Incredibly costly with limited scientific knowledge on health effects. Until now...



# Latest information on health effects of children...



- Jackie Wright from Environmental Risk Sciences recently completed her PhD .
- She has published a paper in Jan 2017 in CDC Journal; "Adverse Health Effects Associated with Living in a Former Methamphetamine Drug Laboratory – Victoria, Australia, 2015".
- Her thesis is titled; "Exposure and Risk Associated with Clandestine Amphetamine-Type Stimulant Drug Laboratories."
- <http://www.enrisks.com.au>

**What did Jackie find out?**

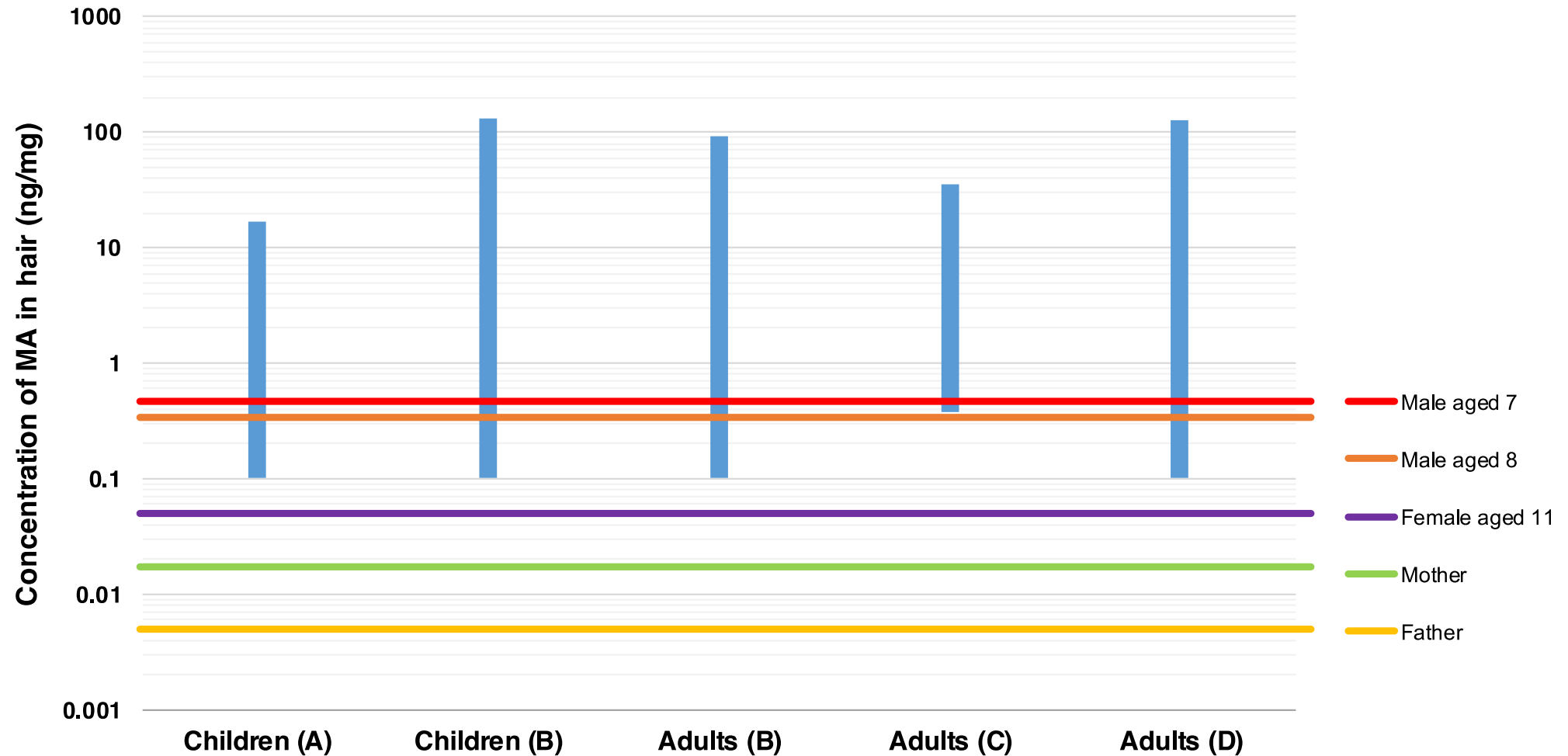
# Adverse Health Effects Associated with Living in a Former Methamphetamine Drug Laboratory

- Most useful case study for information is of a rural Victorian Family.
- Purchased their family home.
- Lived in this for 18 months with 3 children.
- At the time of testing the surface levels of methamphetamine inside the property were between 11-26ug/100cm<sup>2</sup>.

**TABLE 1. Adverse health effects reported by family members while living in and after vacating a methamphetamine-contaminated house – Victoria, Australia, 2015**

Age	Sex	Respiratory	Cognitive/Behavioral	Other adverse health effects
7	Male	Persistent cough, asthma-like symptoms	Trouble sleeping, fearfulness, vivid/scary dreams, irritability, aloof, easily distracted. BASC-2 testing: anxiety, somatization, ADHD (at-risk or clinically significant; not present before living in home)	Skin rashes; sore, watery eyes
8	Male	Asthma	BASC-2 testing: no issues identified 1 week after vacating home; anxiety and somatization reported 3 months after vacating home, while living in rented accommodation without access to personal possessions	Sore, watery eyes
11	Female	Persistent cough	Trouble sleeping, irritability. BASC-2 testing: no significant issues identified	Sore, watery eyes
40	Female	Persistent cough	Excess energy	Sore, watery eyes; weight loss; improved distance vision
38	Male	none	Trouble sleeping, decreased memory function (self-reported)	Sore, watery eyes; dizziness and blurry vision while cleaning contaminated areas

# Figure 1: Comparison of MA Levels in Hair



A – drug exposed children (methamphetamine drug laboratories and homes with users) from California<sup>2</sup>;

B – drug exposed children from clandestine drug laboratories and adult drug users in New Zealand<sup>3</sup>;

C – range reported in long-term adult drug users (based on doses of 0.25 to 4 g/day of MA)<sup>4</sup>;

D – range reported in adult workplace drug use testing<sup>5</sup>.

It is noted that for the published studies included in this figure the reporting limit for MA in hair was 0.1 ng/mg.

- Methamphetamine levels in the hair samples of the two younger children (460 pg/mg and 330 pg/mg) are consistent with the lower end of the range reported in children removed from clandestine drug laboratories (range = 100 pg/mg–131,000 pg/mg) (6,7) and chronic adult drug users (range = 100 pg/mg–128,000 pg/mg)
- Retesting for drugs in hair samples 3 months after moving out of the home (June 2015), indicated clearance of the drug, with no detection of amphetamines in the hair for most family members. Methamphetamine (60 pg/mg) was reported in the hair sample of the boy aged 8 years and was thought to be related to differences in hair growth rate and hair sample collection.
- Residual environmental methamphetamine contamination can result in adverse health effects in exposed persons, particularly in young children. Appropriate identification and management of former clandestine drug laboratories, including appropriate remediation and measures to prevent the sale of contaminated homes, is important to prevent exposures and adverse health effects.

# Clan Lab Remediation Guidelines

- In 2011 the Australian Crime Commission published the Clandestine Drug Laboratory Remediation Guidelines.
- Four phases of site remediation:
  - *1. Trigger for assessment. Hazardous chemicals notification from the Victorian Police.*
  - *2. Preliminary assessment and action. Action required by Councils.*
  - *3. Site assessment and remediation. Property Owner to engage a suitably qualified professional.*
  - *4. Validation. Council accepts final validation report post remediation.*

# Preliminary assessment and action

- The guidelines state:

“Any dwelling, within which a clandestine laboratory has been detected should be considered potentially unfit for human habitation until such time as appropriate investigation can determine the presence or absence of contamination.

In addition, the property upon which the dwelling is located, ... should also be considered potentially contaminated.”

“Where a clandestine laboratory has been operating at an out-door, semi-enclosed or other out building separate to the principal site dwelling, these areas and the property in general should also be considered potentially contaminated,”

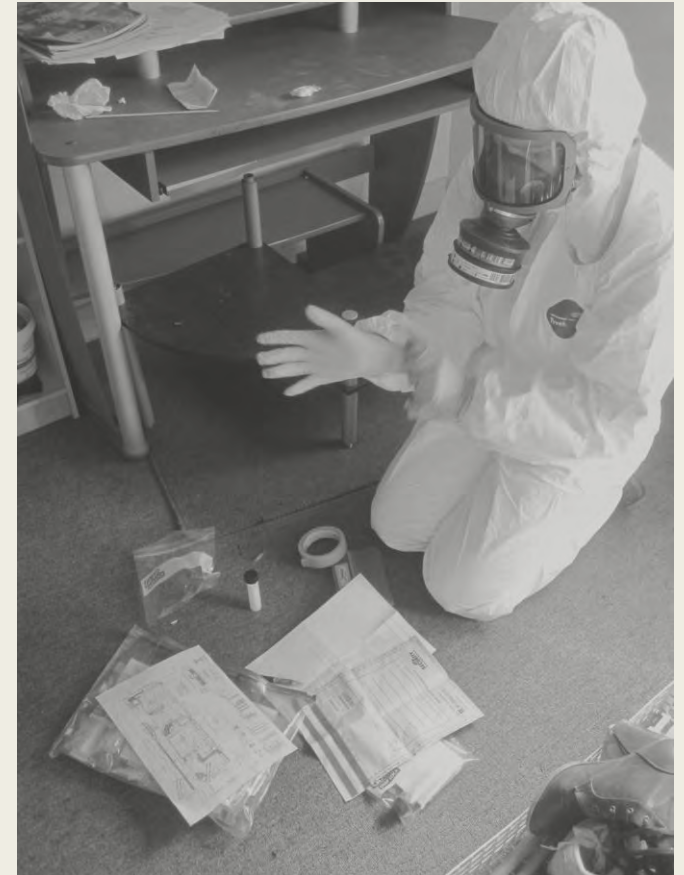
- Decisions are made at the discretion of the appropriate authority based on professional judgement.

# Site Assessment

- The guidelines state:

“Investigations of potentially contaminated dwellings or sites should be conducted by a suitably qualified expert with experience in the fields of environmental engineering, environmental science, environmental health or occupational hygiene.

- It's important to obtain as much information as possible on what was found and where and the most likely method of manufacturing. Any other information such as the size of the lab, the time frame it was operating etc. will also be useful.







- Contaminants disperse as vapours and aerosols and concentrate in certain locations based on movement of the particles. Understanding these principles help to determine sampling points.
- A sampling plan is developed based on the above information. As a minimum, 5 samples should be taken inside including every room occupied by a child.
- Need to consider waste from clan labs. Soil sampling, wastewater in septic tanks and groundwater.
- The use of meth cheks can support laboratory swab sampling.

One representative sample is taken from a room so the location of this sample is very important.

# Remediation

- Depends on the surface material if adhesion, adsorption or absorption occurs. This determines remediation strategy.
  - Adheres to surfaces such as metal and glass and removed through wiping.
  - Adsorbed onto laminates and can be removed with difficulty.
  - Absorbed into bare wood and wallpaper
  - Retained on textile fabrics such as carpets.
- A Remediation Action Plan (RAP) can be developed.
- Important to consider costs to the property owner and future plans with the building / land.
- Triple-wash process using Alkaline Detergent Solution eg. TSP
- Fogging chemicals are less labour intensive.



- New chemicals are available, usually imported from the US marketed to be dedicated to methamphetamine removal, particularly can remove high levels.
- ***Peroxide-based Proprietary Cleaners*** — While some studies indicate the use of peroxide-based proprietary cleaners may be effective at eliminating meth, it is possible that the meth oxidizes to another compound. Because it is unclear if any by-products remain after the use of peroxide-based proprietary cleaners, the true effectiveness of peroxide-based proprietary cleaners should be verified before they can be recommended for cleaning former meth labs.

# Validation

- This is important to ensure remediation strategies have been effective. Remediation is considered effective if all validation samples are below the IL.
- This final assessment report is to provide clearance of the property detailing no further action is required and there is no increased health risk to future occupants.

Current challenges are:

1. *Some remediators are now completing testing.*
2. *With the claim of specific chemicals able to remove high levels of methamphetamine, semi-porous surfaces eg. walls may not be removed when they would otherwise be.*

# Case study #1



Family purchased this house however was currently renting until deciding to move family. Raided by Police.

The surface concentration of methamphetamine in this room was  $127 \text{ ug}/100\text{cm}^2$ .

The upstairs section was completely gutted.

Property had a septic tank. High levels of VOCs down drains. High levels of toluene in septic tank.

12 samples in different rooms with methamphetamine levels above the IL.

# Case Study #2

House was being tenanted until it was raided by Police.

Modest house on a large block with plans for future development.

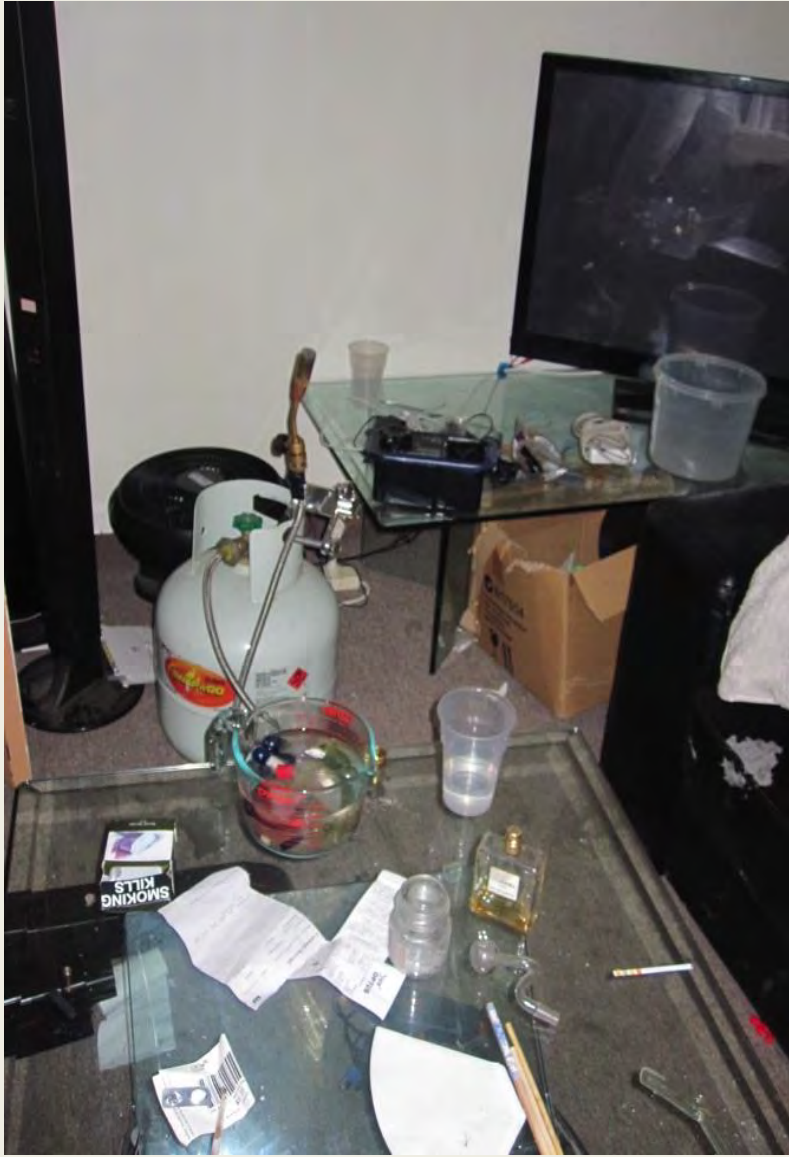
The surface concentration of methamphetamine in most rooms was 61-89ug/100cm<sup>2</sup>. The kitchen was greater than 200ug/100cm<sup>2</sup>.

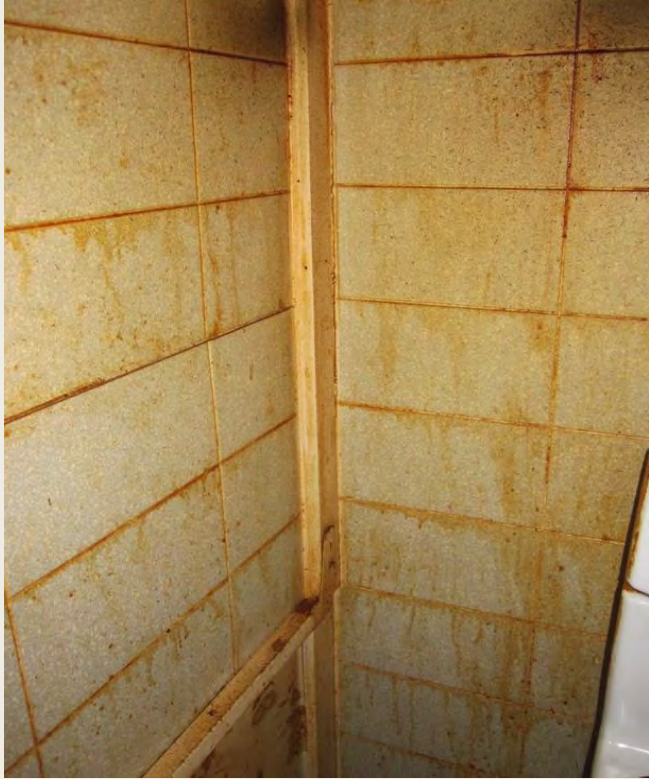
Expensive contents remained such as cars, jet ski.

High lead levels in soil outside back door.

House was completely gutted and soil removal occurred.









This house and kitchen was cleaned extensively to cover any signs of it's history. The walls had also been painted.



This house was not even going to be tested. Results all 7-17ug/100cm<sup>2</sup>. It was not identified by the Police and not notified to Council.



# The current status

- I am currently involved with a family who moved into their new family home only to be told by neighbours about the history of the previous property owners.
- After nearly six years of testing and assessing homes, I have actual information on the health effects of people, particularly a family, from living in a former meth lab that has not been remediated or not remediated effectively.
- I have more confidence with my quoting and my sampling strategy.
- This reinforces why I moved into this area of work.
- The number of people living in contaminated houses will continue to rise.

Thank you!

