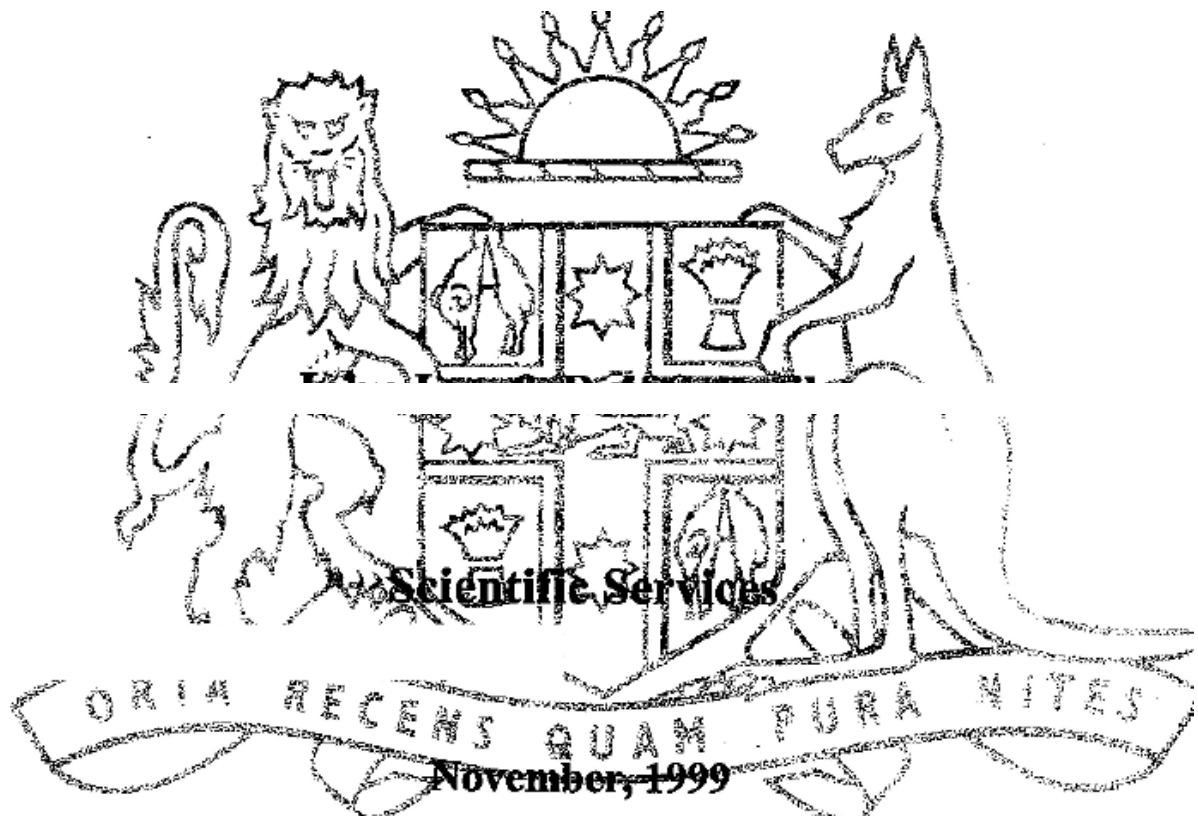
WORKCOVER
NEW SOUTH WALES

Assessment of Lead Exposure Associated with Ceiling Dust Removal



Scientific Services

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Introduction

As a result of the damage to roofs in Sydney's eastern and southern suburbs by the hailstorm of 14 April 1999, WorkCover received many inquiries from residents, contractors, community action group and other government organisations concerned about the health effects of the dust in the ceiling voids of older houses.

In previous studies'[1,2,3] ceiling dust has been shown to contain generally less than 1% lead. The lead that had accumulated over many years came from the exhaust emissions of vehicles using leaded petrol and from the use of lead-based paints manufactured before 1976.

The purpose of this investigation, from an occupational hygiene perspective, was threefold:

- to assess the risk to health, with respect to lead, for contractors involved in the removal of the *in-situ* dust before and/or after the demolition of ceilings. Part of the assessment involved the monitoring of their occupational exposure to airborne lead particulate during the dust removal work.
- to comment on the work procedures involved in the removal of ceiling dust by contractors.
- to make recommendations on the position WorkCover should take on this matter based on the results of the assessment.

[1] Bawden-Smith, J. (1992) *Environmental Lead Contamination - The Mort Bay Pilot Study,* Masters Thesis, Applied Science in Environmental Studies, UNSW, Sydney, Australia

[2] Whicker, C.L., Hayes, W., Khoo, C. S. and Bhathal, R. S. (1997) *Heavy Metals in Ceiling Dust of Some Sydney Houses, New South Wales, Australia,* in "Journal and Proceedings of the Royal Society of NSW", Sydney, Australia, vol. 130 parts 3-4, 65-78.

[3] Woodward-Clyde (1999) *Remediation Action Plan, Dulux Cabarita,* Sydney, Australia

Investigation

The investigation *of in-situ* and airborne lead dust in domestic ceiling voids was carried out with the assistance of several ceiling dust removal companies and roof insulation companies. Their cooperation allowed us to monitor the situation and provide advice to contractors and residents.

Process

Access to the ceiling cavity was usually gained through existing manholes (Photograph 1) inside the building, in the case of dust removal contractors engaged in work related to the hailstorm damage. In contrast, contractors who had previously worked on the Sydney Aircraft Noise Insulation Project followed the prescribed method (Appendix C2), and gained access to the roof cavity via a temporary opening in the roof (Photograph 2).

A pair of workers, who rotated between the different jobs, usually carried out the ceiling dust removal. These jobs included the removal of any ceiling insulation batts and all solid debris, before vacuuming. The way in which the insulation batts and debris were removed from the ceiling cavity varied between contractors. Some contractors bagged all the waste before removing it from the roof cavity, while other contractors took the waste out in open containers, for disposal.

The industrial vacuum cleaners used for removing the dust were usually large and mounted on trailers (Photographs 3 & 4). The units were all fitted with high efficiency particulate air (HEPA) filters and used long runs of flexible hosing to reach into the ceiling. Most of these vacuum cleaners used fan units powered by petrol driven motors, to supply the suction. The noise level and exhaust emissions, including carbon monoxide, associated with the petrol motors may be a problem in some situations.

Personal Protective Equipment

Personal protective equipment worn while work was being carried out in the ceiling cavity included disposable coveralls (eg Tyvek® suits), gloves and approved respirators ranging from disposable PI particulate respirators to full face particulate filter respirators fitted with a P3 cartridge. Eye protection was not normally worn.

Sampling Method

Personal air monitoring for inspirable dust was carried out in the breathing zone of the workers. The workers breathing zone is describe by a hemisphere of 300 mm radius extending in front of their face and measured from a midpoint of an imaginary line joining the ears. Operators were monitored while removing debris from inside the ceiling voids before the dust removal, and during the actual removal of dust, using industrial vacuum filters fitted with HEPA filters.

The sampling and gravimetric analysis was carried out in accordance with AS 3640 Workplace Atmospheres - Method for sampling and gravimetric determination of inspirable dust. *The samples were also analysed for their lead content, using X-Ray Spectrometry and UniQuant® or Flame Atomic Absorption Spectrophotometry.*

Settled dust samples were also taken at selected locations, to determine the extent of surface contamination, using a modified method (Appendix CI) based on a standard procedure[4,5]*. These samples were analysed for their lead content, using either X-Ray Spectrometry and UniQuant® or Flame Atomic Absorption Spectrophotometry.*

[4] Appendix C - Standard Practice for Determination of Lead in Surface Dust, *Australian Standard AS4361.2-1998*

[5] Method 9100 - Lead in Surface Wipe Samples, *NIOSH Manual of Analytical Methods (NMAM), fourth edition, 1994*

Result

Table 1: Lead in Bulk Samples

Date	Sample ID	Sampling Details	Lead Content. % w/w
3-8-99	25774	Florence St, St Peters / Ceiling Cavity	0.30
3-8-99	25775	Fitzroy St, Newtown / Ceiling Cavity	0.19
11-8-99	25801	Addison St, Kensington / Ceiling Cavity	0.38[a]
1-9-99	25822	Kensington Rd, Kensington / Ceiling Cavity	0.18
6-9-99	25824	Samual St, Sydenham / Ceiling Cavity	0.17
21-9-99	25839	Tweedmouth Ave, Roseberry / Ceiling Cavity	0.25
21-9-99	25840	Tweedmouth Ave, Roseberry / Floor	0.17
8-10-99	25859	Lynwen Cres, Banksia / Ceiling Cavity	*0.10*[a]
14-10-99	25869	Flinders St, Darlinghurst / Floor	0.15
14-10-99	B1000	Flinders St, Darlinghurst / Stair Tread	0.23[b]
14-10-99	B1001	Flinders St, Darlinghurst / Stair Tread	0.36[b]
14-10-99	B1002	Flinders St, Darlinghurst / Shelving	0.26[b]
3-11-99	25888	Ocean Ave, Double Bay / Ceiling Cavity	0.28[a]
15-11-99	25894	Old Taren Point Rd, Taren Point / Ceiling Cavity	0.18
15-11-99	25895	Grevillea Grove, Heathcote / Ceiling Cavity	0.03

Note:

[a] Also carried out air monitoring

[b] Result obtained from wipe sample and also used in Table 4

Table 2: NOHSC Classification[6] [7]

The following classification for lead was adopted by the National Occupational Health & Safety Commission (NOHSC).

Cut-off Criteria	Risk Phrase
Concentration equal to or greater than 5% w/w	• May cause harm to the unborn child • Possible risk of impaired fertility • Harmful by inhalation • Harmful if swallowed • Danger of cumulative effects
Concentration equal to or greater than 1% and less than 5% w/w	• May cause harm to the unborn child • Harmful by inhalation • Harmful if swallowed • Danger of cumulative effects
Concentration equal to or greater than 0.5% and less	• May cause harm to the unborn child • Danger of cumulative effects
Concentration less than 0.5% w/w	Not classified

NOHSC (Worksafe) has classified lead as a hazardous substance based on the reproductive and cumulative effects. Lead is ubiquitous in the urban environment, resulting from industrial processes, leaded paint manufactured before 1976 and as a by-product from the combustion of leaded petrol.

[6] Approved criteria for classifying hazardous substances [NOHSC: 1008(1999)], National Occupational Health & Safety Commission April 1999

[7] List of designated hazardous substances [NOHSC:10005(1999)], National Occupational Health & Safety Commission April 1999

Table 3: Lead in Air Tests

Date/ Sample ID	Location / Sampling Details	Inspirable Dust Conc. (mg/m^3)	Sampling Time (min)	Lead Conc. (mg/m^3)	% Lead in Dust
11-8-99 4337	Addison St, Kensington / Picking up debris before vacuuming ceiling cavity	177	118 [c]	0.35	0.20
11-8-99	Addison St, Kensington / Worker #1	*N.R.* [d]	*N.R.* [d]	*N.R.* [d]	*N.R.* [d]
12-8-99 4339	Addison St, Kensington / vacuuming in ceiling cavity	*75*	114 [c]	0.18	0.24
12-8-99 4340	Addison St, Kensington / vacuuming in ceiling cavity	23	125 [c]	0.05	0.21
6-9-99	Samual St, Sydenham / Worker #2	*N.R.* [d]	*N.R.* [d]	*N.R.* [d]	*N.R.* [d]
8-10-99 4346	Lynwen Cres, Banksia / vacuuming in ceiling cavity	14	50 [c]	0.02	0.13
8-10-99 4347	Lynwen Cres, Banksia / vacuuming in ceiling cavity	12	54 [c]	<0.02	0.10
3-11-99 4347	Ocean Ave, Double Bay / Picking up debris & vacuuming in ceiling cavity	67	134 [c]	0.10	0.15
3-11-99 4349	Ocean Ave, Double Bay / Picking up debris & vacuuming in ceiling cavity	39	135 [c]	0.14	0.36
Occupational Exposure Standard [8]		**10 [e]**		**0.15 [f]**	

Note:

[C] Sampling times were usually for the time worked between breaks, such as morning tea and lunch. The work carried out during this period was similar to work carried out during the remainder of the work shift.

[d] *N.R.* means *No Result* owing to equipment malfunction

[e] Refers to the National Occupational Exposure Standard for dusts not otherwise classified (nuisance dust)

[f] Refers to the National Occupational Exposure Standard for inorganic lead dust

[8] Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:1003 (1995)]

Table 4: Lead in Surface Dust

Date	Sample ID	Location / Sampling Details	Lead Conc. ($\mu g/cm^2$)
21-9-99	25841	Tweedmouth Ave, Roseberry Portable stereo in lounge room	0.06
21-9-99	25842	Tweedmouth Ave, Roseberry Window sill in study	0.04
21-9-99	25843	Tweedmouth Ave, Roseberry Display cabinet shelving in lounge room	0.03
14-10-99	B1000	Flinders St, Darlinghurst Sample from 2nd floor stair tread taken before ceilings in rear rooms were dropped	3.3 [g]
14-10-99	B1001	Flinders St, Darlinghurst Sample from 3rd floor stair tread taken before ceilings in rear rooms were dropped	3.8 [g]
28-10-99	B1002	Flinders St, Darlinghurst Dust sample from shelf in rear bedroom cupboard taken after completion of ceiling	2.0 [g]
28-10-99	B1003	Flinders St, Darlinghurst Dust on wall in rear bedroom taken after completion of ceiling replacement and cleaning	0.02
Recommended Standard *U.S. Maryland State Regulations recommend less than 0.2 µg of Lead per cm^2 as a "safe" level for surface contamination in living areas*			0.2

Note:

[g] Ceiling space was not cleaned before dropping

Discussion

NOHSC (Worksafe) has classified lead as a hazardous substance based on the reproductive and cumulative effects. Lead is ubiquitous in the urban environment, resulting from industrial processes, leaded paint manufactured before 1976 and as a byproduct from the combustion of leaded petrol. Therefore a high dust accumulation is likely to be found in older homes near major roads. Our investigation found that the lead content of the ceiling dusts tested ranged from less than 0.1% to 0.38%, with an average *of 0.22%* (Table 1) for heavy vehicular traffic areas.

Our occupational monitoring results indicate that the removal of ceiling dust has the potential to exceed exposure standards for inspirable dust and lead. Therefore, in accordance with the Occupational Health and Safety Act (Hazardous Substances) Regulation 1996, the risk must be assessed before any work is carried out in removing the dust accumulated in the ceiling space. Furthermore, health surveillance and biological monitoring is warranted and should be carried out in accordance with the Control Code[9].

The results of inspirable dust listed in Table 3 indicate that the ceiling dust removal process is inherently dusty even with the use of vacuum cleaners. All air monitoring results for inspirable dust exceeded the 10mg/m^3 National Exposure Standard for nuisance dust. Whenever the inspirable dust levels were excessive, then so were the airborne lead levels. If the inspirable dust levels can be controlled in the ceiling cavity by modified work methods, then airborne lead levels should reduce proportionately.

In the majority of sites tested to date, there has been a good correlation between the lead content of airborne dust samples and the lead content of bulk ceiling dust tested from the same site. This correlation could be used to estimate airborne lead concentrations during ceiling dust removal, based on inspirable dust measurements, and the lead content of the bulk ceiling dust at any location.

Since it is difficult to use engineering controls in this type of work situation, to control airborne dust levels, there is a great reliance on personal respirator^ protection, to provide a safe working environment for the workers carrying out this type of job. It was found in some situations that workers were not sufficiently clean-shaven, for the respirators to provide optimum protection. In situations of sole traders, it was found that work methods and standards of personal hygiene were below acceptable levels (Refer Photograph 9). It can be concluded that workers require training in the correct work procedures, including the selection, use and maintenance of personal protective equipment.

[9] Control of inorganic lead at work [NOHSC:2015] by Worksafe Australia

The Australian/New Zealand Standard AS/NZS 1715 *Selection, use and maintenance of respiratory protective devices* states that the selection of respiratory protective devices will be influenced by the following factors:

(a) Contaminant.

(b) Task.

(c) Operator.

The Standard provides guidance on selection of adequate protection. The information provided in the Standard should not be viewed as minimum protection requirements. Over-specifying is warned against as generally this will result in increased body burden without any improvement in protection.

Approved respiratory protection should be worn during the removal process. Disposable respirators (PI) are suitable up to 10 times the exposure standard based on an 8 hour working day. As the cleaning operation can be of short term duration, disposable respirators would give adequate protection. However, they should be replaced when breathing becomes difficult, overloaded with dust or when there is a break in work ie lunch and tea breaks. The used respirators should be disposed of immediately upon replacement. Further, to achieve good facial fit of the respirator, operators must be clean-shaven.

When wearing half face respirators, the eye protectors should be selected and used in accordance with Australian/New Zealand Standard AS/NZS 1336 *Recommended practices for occupational eye protection* and conform with the Australian/New Zealand Standard AS/NZS 1337 *Eye protectors for industrial applications.*

The use of full-face respirators is recommended especially when work is carried out over longer work periods. A full-face respirator also has a protection factor up to 50 times the exposure standard as well as providing protection for the eyes. However, non-disposable respirators need to be maintained, stored correctly and the operators trained in their correct wear and care. Respirators should be selected, used and maintained in accordance with the Australian/New Zealand Standard AS/NZS 1715 *The selection, use and maintenance of respiratory protective devices.* Further, a respiratory protection program should be set up by management in accordance with AS/NZS 1715 - Section 7 *The Respiratory Protection Program.* Alternately, a powered air-purifying particulate respirator (PAPR) with P2 filter, suitable up to 50 times the exposure standard may be worn. The selection of this type of respirator may be warranted when considering other hazards in the work environment such as heat stress during summer months. However, these respiratory protective devices must also be maintained and a respiratory protection program put in place.

The hair should be covered and gloves should be selected based on the requirements of the task. Assistance on the selection may be obtained from the Control Code[9].

[9] Control of inorganic lead at work [NOHSC:2015] by Worksafe Australia

To comply with current and proposed legislation, a risk assessment must be carried out for all hazards in the workplace. For the removal of lead containing dust such as ceiling dust, the risk assessment should include, but not limited to:

- heavy metals
- heat stress
- electrical safety
- noise
- carbon monoxide
- biologically active agents

Recommendations

WorkCover has advised building contractors engaged in ceiling and other repair work to adopt the following procedures, in order to minimise health risks from exposure to the lead normally found in ceiling dust. These procedures include:

- ❖ Ceilings must be cleaned of accumulated dust before commencing any work involving partial or complete removal of the ceiling itself.
- ❖ To minimise contamination of living areas of the dwelling, airless spraying with PVA to seal the cleaned surfaces is recommended before dropping any ceiling.
- ❖ The sealing of any openings between living areas of the dwelling and the ceiling void prior to the commencement of any work to prevent dust entering the living area.
- ❖ The use of vacuum cleaners fitted with HEPA (High Efficiency Particulate Air) filters to prevent the release of any lead dust while it is being removed.
- ❖ The vacuum cleaner should comply with the Australian Standard AS 3554 *Industrial vacuum cleaners for particulates hazardous to health*
- ❖ The use of personal protective equipment, including:
  - respirators complying with Australian/New Zealand Standards AS/NZS 1715 and AS/NZS 1716.
  - disposable coveralls with fitted hood (the type suitable for use in agricultural spraying & asbestos removal works and changed at regular interval).
  - gloves suitable for the task.
  - eye protection, complying with Australian/New Zealand Standards AS/NZS 1336 and AS/NZS 1337 whenever full face piece respirators are not worn.

The adoption of thorough decontamination procedures before each work break, including the observance of a high standard of personal hygiene. This can be achieved by:

- provision of soap and adequate washing facilities.
- washing of hands before eating, drinking and smoking.
- employers providing laundering of work clothes.
- used disposable overalls should be put into marked bags and sealed for disposal with other waste.

❖ The containment and disposal of the removed dust in accordance with EPA requirements.

❖ The preparation of an industry based health risk assessment including health surveillance, biological and air monitoring.

❖ Providing workers with training including:

- the hazards associated with this type of work.
- an understanding of the health risk assessment process.
- an understanding of the results of biological monitoring.
- the selection, use and maintenance of respirators.
- good work methods.
- personal hygiene techniques.

❖ All training must be fully documented and a register of training must be kept.

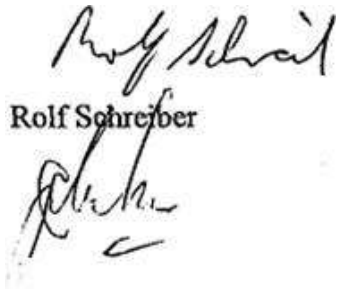
Conclusion

The results of our findings indicate that the removal of lead containing dusts is covered by the OHS (Hazardous Substances) Regulation 1996 as the dust being removed contains hazardous substances and has the potential to expose workers to levels in excess of the recommended Exposure Standards. To comply with legislation, a risk assessment must be carried out. Further, based on the results, health surveillance and biological monitoring is warranted and should be carried out in accordance with the Control Code[9].

There are a number of guidance notes already in place, for example:

- Procedures used in the Sydney Aircraft Noise Insulation Project (SANIP)
- Ceiling Dust and Hail Storms (Vol7 N^{o}2 of Lead Action News) by The LEAD Group Inc.
- Management of Lead Contamination (in Draft) by the Lead Reference Centre, EPA
- Code of Practice for Ceiling Dust Removal (in Draft) from Australian Dust Removalists Association ADRA)
- Control of Inorganic Lead at Work by Worksafe Australia

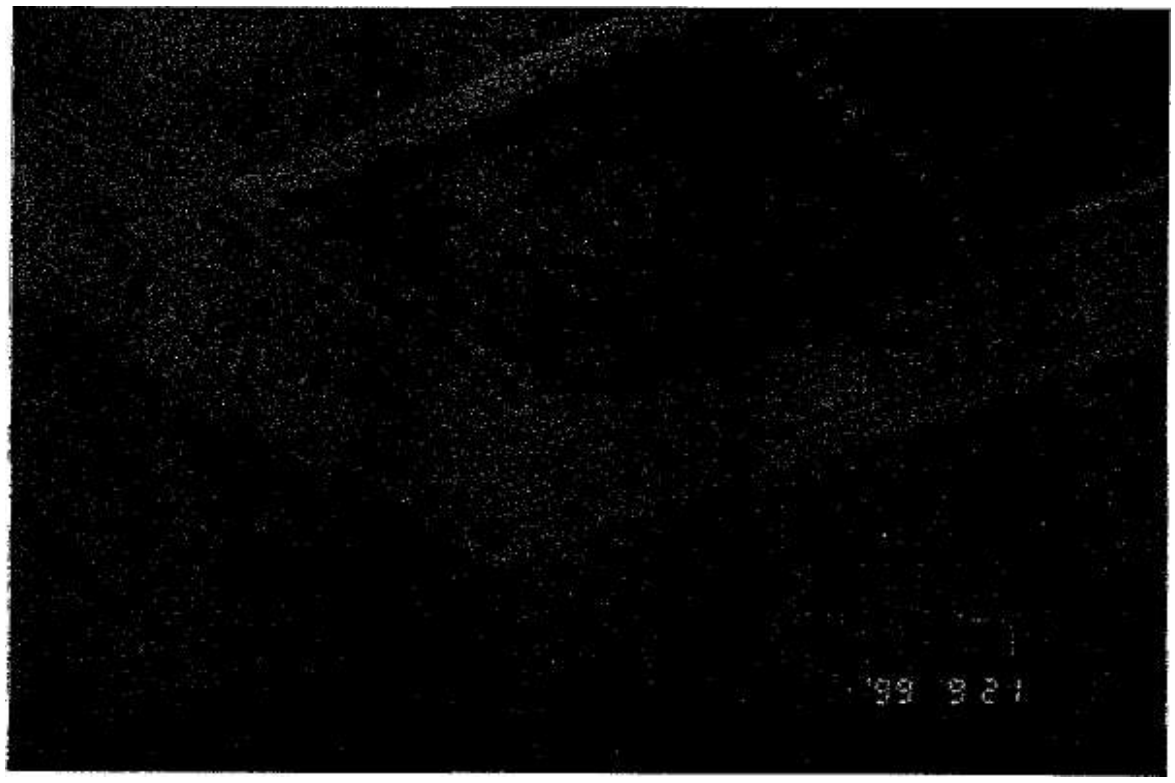
Contractors and workers involved in the cleaning, repairing, or demolition of ceilings should be aware of these documented procedures and guidance notes. If these contractors and workers observe these guidance notes and adopt the work procedures as recommended in this report, they should comply with all the requirements of the Occupational Health and Safety (Hazardous Substances) Regulation.



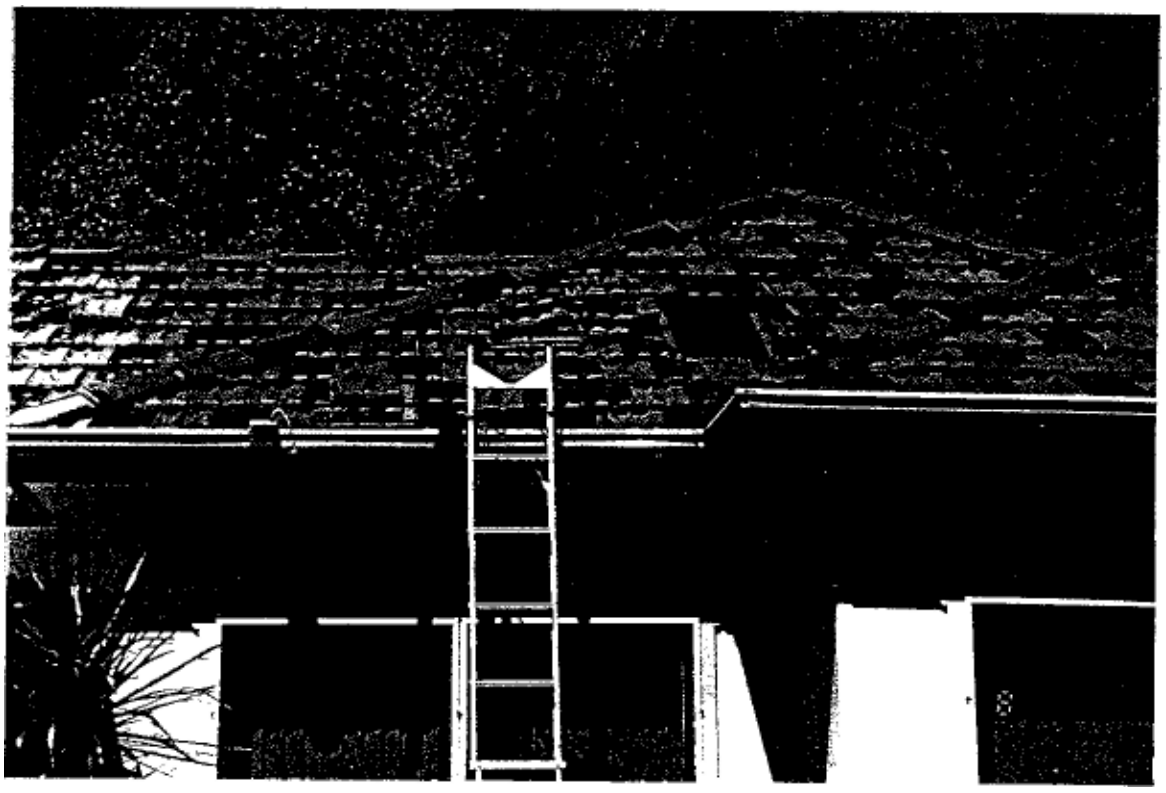
John Lee
Occupational Hygienists

[9] **Control of inorganic lead at work [NOHSC:2015] by Worksafe Australia**

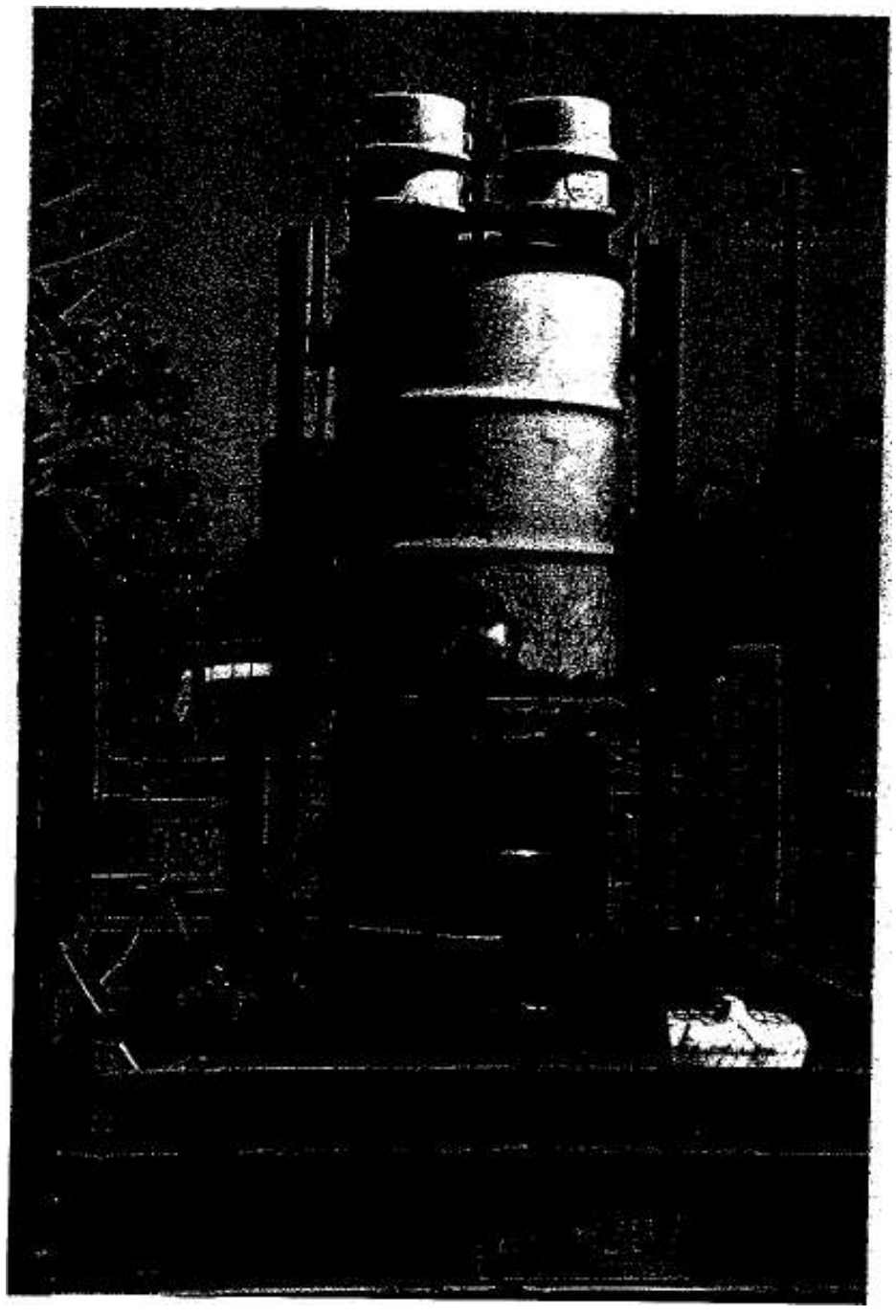
Appendix



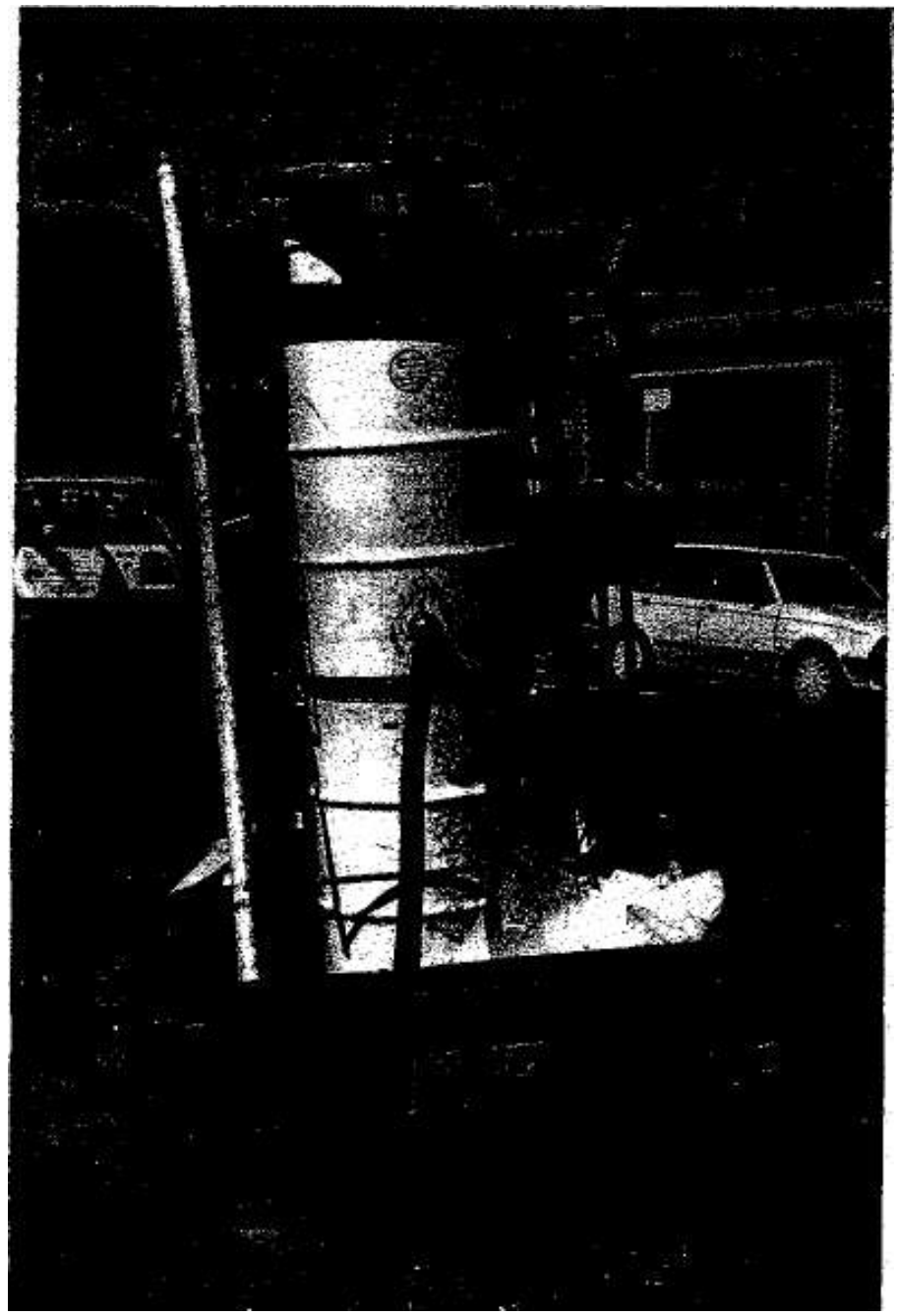
Photograph 1: Existing manhole used for access to the ceiling cavity



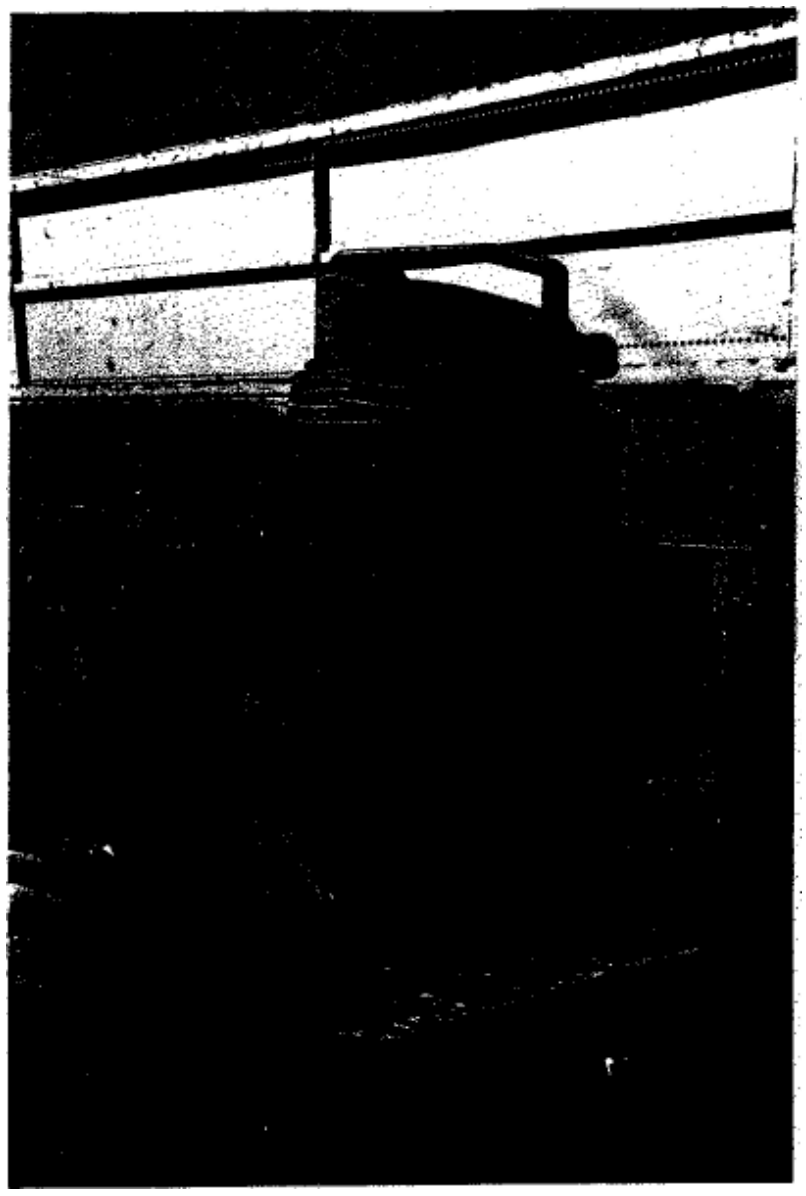
Photograph 2: Temporary openings made in the roof for access to the ceiling cavity



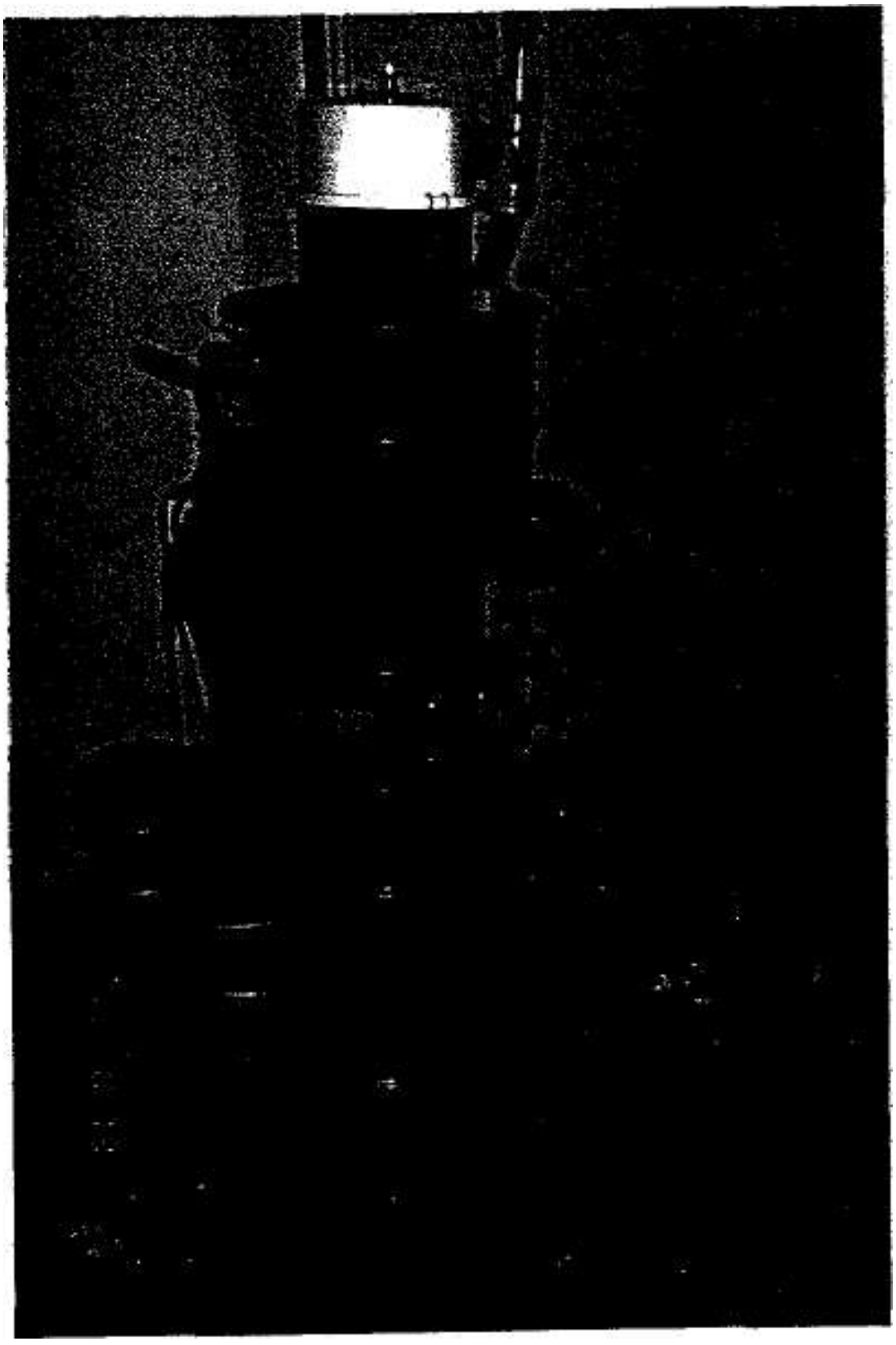
Photograph 3: Trailer mounted industrial vacuum cleaner fitted with a HEPA filter. The unit is powered by a petrol driven motor



Photograph 4: Same design of industrial vacuum cleaner used by a number of ceiling dust removal companies

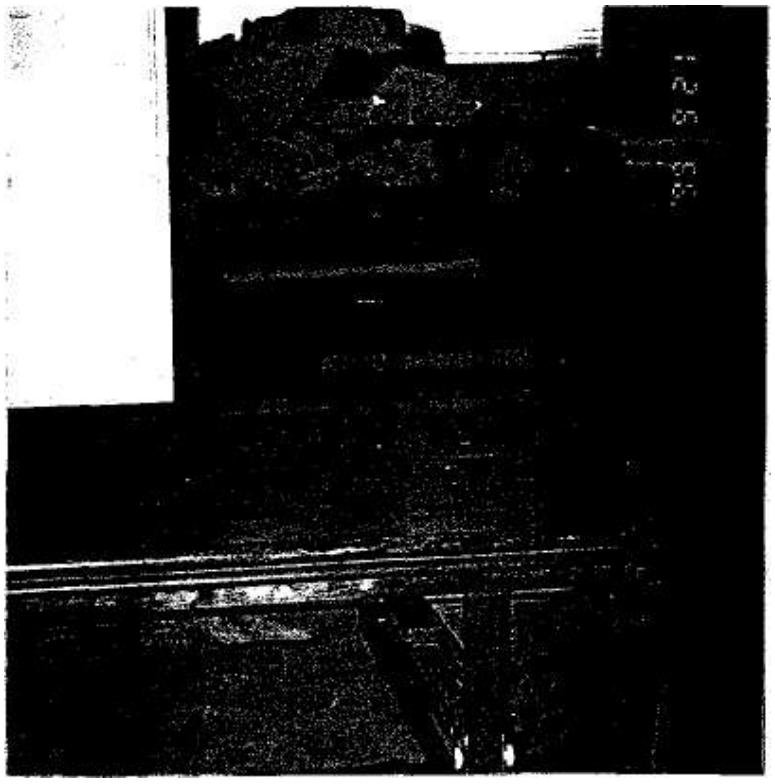


Photograph 5: Portable type of industrial vacuum cleaner fitted with a HEPA filter. This unit is electrically powered

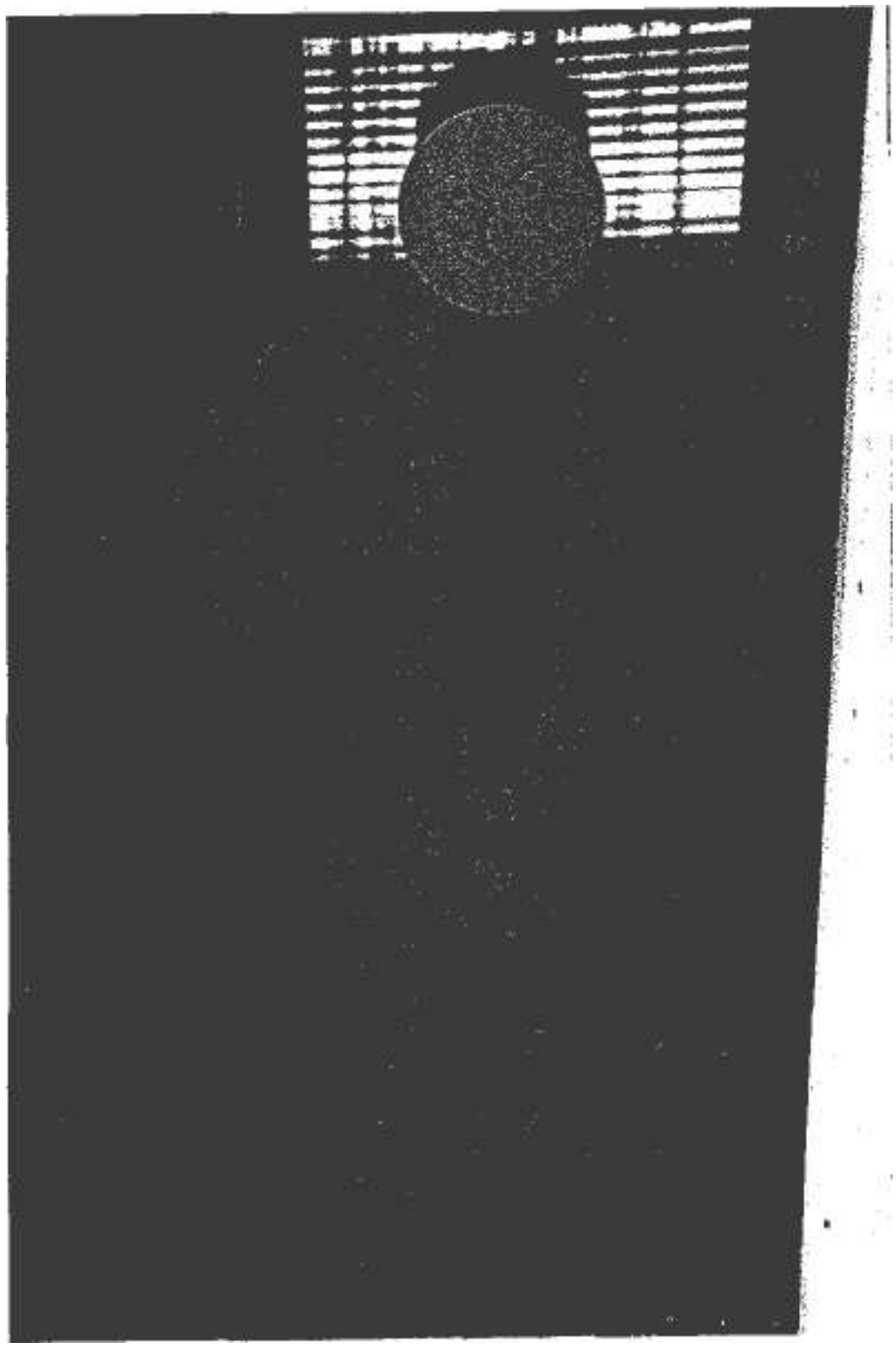


Photograph 6: Trolley mounted industrial vacuum cleaner fitted with a HEPA filter. This unit is electrically powered

Photograph 7: Personal possessions and soft toys packed but not covered up before work commenced



Photograph 8: Chests of drawers not fully assembled before work commenced



Photograph 9: Appropriate personal protective equipment and a high standard of personal hygiene are important in this line of work

Appendix

Appendix B

Australian Standards

1. Australian/New Zealand Standard AS/NZS 1336 *Recommended practices for occupational eye protection*

2. Australian/New Zealand Standard AS/NZS 1337 *Eye protectors for industrial applications*

3. Australian/New Zealand Standard AS/NZS 1715 *Selection, use and maintenance of respiratory protective devices*

4. Australian/New Zealand Standard AS/NZS 1716 *Respiratory protective devices*

5. Australian Standard AS 3640 *Workplace atmospheres-Method for sampling and gravimetric determination of inspirable dust*

6. Australian Standard AS 4361.2 *Guide to paint management. Part 2: Residential and commercial buildings*

7. Australian Standard AS 3554 *Industrial vacuum cleaners for particulates hazardous to health*

Appendix C1 Determination of Lead in Surface Dust Using Wipe Sampling Techniques[4 5]

Scope

This method covers the sampling and analysis of lead in dust on accessible surfaces within a building or around its outside.

Background

Since ingestion of lead dust is the most common exposure pathway to lead for humans, measuring the amount of lead present on surfaces (called the loading) can be used to determine the likelihood and effect of lead exposure. Good correlation between lead on surfaces and blood lead levels has been reported.

This method may be used to determine the adequacy of containment during ceiling dust removal work, or the adequacy of clean-up following such work. Measuring the lead loading on surfaces can also be used to assess the hazard from disturbance of accumulated dust in void spaces, or of lead deposition in a building from external sources. Background surface dust sampling may also be performed prior to any ceiling dust removal work.

Although most useful on hard, non-absorbent surfaces, this method can also be used to determine the amount of lead dust on the surface of carpet, although the results may be less reliable. There is at present no accepted method for determining the total amount of lead deep in the carpet, and other methods such as vacuum sampling are reported as being even less reliable than surface wipes.

Materials and Equipment

The following materials and equipment are required:

(a) Ruler or measuring tape.

(b) Masking tape.

(c) Disposable gloves.

(d) Commercially available wipes - moistened with a non-alcoholic wetting agent (but which do not contain aloe).

(e) Sample containers).

(f) Camera (optional).

[4] **Appendix C - Standard Practice for Determination of Lead in Surface Dust, Australian Standard AS4361.2-1998**

5 Method 9100 - Lead in Surface Wipe Samples, NIOSH Manual of Analytical Methods (NMAM), fourth edition, 1994

Selection of Sampling Locations

The number of locations at which surface dust is to be sampled for clearance testing will depend on the nature and extent of the ceiling dust removal work performed. Sampling should be conducted on hard non-absorbent surfaces. These typically include windows, floors, shelves and exterior parts of buildings such as windowsills, tiled verandas and garden furniture.

If only dust-free methods were used and no dust is visibly present after completion of the work, dust sampling may not be necessary. Where significant ceiling dust removal work was carried out, at least one floor sample and one sample from an elevated surface (e.g. windowsill or shelving) should be taken from each room where the work was performed. Additional floor samples should be taken from adjoining passageways or halls. If dust is visibly present on surfaces more sampling may be appropriate.

Sampling Procedure

An area is marked out on the surface to be sampled. The area should preferably be 900 cm^2, corresponding to a 30cm square. In any event the area should not be less than 100cm^2, depending on the amount of dust present. The sample area is marked effusing masking tape, the lengths of the sides of the sample area are measured and the surface area is calculated and noted.

To prevent cross-contamination, disposable gloves are worn and changed after each sample. A commercially available moistened wipe is folded to form a firm swab. The swab is placed flat onto the surface in one corner of the area to be sampled and rubbed across the entire area in an 'S' pattern. The wipe is re-folded to that the collected dust is on the inside and is again rubbed across the area at 90° to the first 'S'. The wipe is again folded with the dust inside and placed in the sterile sample container, which is then fully labeled.

The container is labeled with the sample number and a description of the sample location and surface. Careful documentation of the exact sample location is kept for future reference. A photographic record of the sample area should be taken if possible.

The sample is then sent to WorkCover's Laboratory Services for determination of the amount of lead by Atomic Absorption Spectroscopy (AAS). The result (in micrograms), when received from the laboratory, should be divided by the area sampled (in square centimetres) to give a lead loading expressed in **µg/cm^2**.

Reporting/Record Keeping

The following documentation should be recorded:

(a) Name and location of building.
(b) Date of sampling.
(c) Name of person/firm taking the sample.
(d) Visual evidence of dust.
(e) Specific sampling location, including distance from work areas (walls, windows, doorways), details of the type of work carried out and other possible sources of lead contamination.
(f) Nature of surface and area sampled, expressed in square centimetres (cm^2).
(g) Name and address of analytical laboratory use.
(h) Laboratory result, giving the total amount of lead on the swab expressed in micrograms.
(i) Calculated lead loading, expressed as micrograms of lead per square centimeter ($\mu g/cm^2$).

Copies of all test results including the test certificate from the laboratory should be maintained for a minimum of three years after completion of the project or assessment.

THE PROCEDURES USED IN THE SYDNEY AIRCRAFT NOISE INSULATION PROJECT.

PLEASE NOTE THAT THESE SPECIFICATIONS ARE ONLY FOR THE PURPOSE OF OUR PROJECT

JENNY KING

1.3 CONTAMINATED DUSTS AND PAINTS

1.3.1 Sequence of Events

In order to avoid contaminated dust from (he ceiling areas spreading to other parts of the building during building work seal all vents, cracks and fissures in and around the ceiling and walls first.

All other building work resulting in penetrations to ceilings and/or walls is to be carried out after the dust removal had been completed.

1.3.2 Minimising the Creation and Spread of Lead Contaminated Ceiling Dust

Air monitoring to date of typical residences has shown that no detectable levels of airborne lead dust have been generated inside the building below the ceiling while dust removal was taking place the roof area. The Contractor shall continue to arrange for the air monitoring in order to retain the current good practices. All in compliance with N.S.W. Work Authority.

The Contractor shall adhere to the following general procedure for ceiling space decontamination:

- All occupants are to vacate the premises during the ceiling dust removal:
- Sealing of all cracks/fissures that may permit gross ingress of ceiling dust into building. This includes the temporary sealing of ceiling access point;
- Entry into ceiling space is to be via a temporary opening in the roof:
- AH employees directly involved in the removal shall wear personal protective equipment conforming to AS17I6 (Respiratory Protective Devices) and be sufficiently trained in their use:
- All employees directly involved in the removal shall wear disposable overalls fitted with hoods and must at all times keep their suits fully on and in good condition;
- Personal monitoring of all employees directly involved with the removal conforming to AS3640 Workplace Atmospheres - method for sampling and Gravimetric Determination of Inspirable Dust;
- Static monitoring inside the building conforming to AS3640 is to be performed to ensure there is no ingress and lead dust into the buildings during decontamination of the ceilings;
- All dust is to be removed using HEP A fitted vacuum cleaners (an industrial truck mounted unit may be appropriate);
- At no time is dust to be swept or shovelled into bags.
- Removal of dust shall start from the roof entry point and work shall be continued from here towards the edge of the ceiling so as to minimise the disturbance of the dust:
- Contaminated dust shall be removed from all surfaces in the ceiling/roof space. This includes but is not limited to ceilings, top of rafters, purlins, collar ties and any other surfaces where dust has collected.
- All collected dusts are to be bagged in 200um thick plastic bags, sealed and stored near the roof entry point
- The entire ceiling space and bagged wastes are to be sprayed with a PVA solution applied by an airless spray prior to removal from the ceiling space:
- Personal decontamination procedures are to be followed and will involve spraying down of disposable suits with the PVA solution in the ceiling space, and washing

hands and face with clean water outside the building with all waste water directed to sewer;

- All employees involved in dust removal shall adopt good hygiene practices and ensure hands and faces are thoroughly washed before leaving the site and prior to smoking or eating;
- All employees entering the ceiling space within 1 hour of dust removal shall wear approved respiratory protection conforming to AS1716;

1.3.3 Minimising the Spread of Lead-Containing Paint Debris

Control measures will be required for all works that have the potential to create lead paint debris, and personal protection may be required in cases where deteriorated paints can generate airborne dusts. These will need to be determined on a case by case basis.

The Contractor shall comply with the following to minimise the spread of paint debris:

- All work is to be performed above disposable drop sheets fixed flush to the wall;
- Dust accumulated on the drop sheets shall be removed immediately using a HEPA vacuum;
- All drop sheets are to be sufficiently large to contain any debris created:
- In the event that internal debris extends beyond the drop sheet it shall be vacuumed up immediately using a HEPA vacuum. External debris on soil shall be collected with a shovel;
- Every attempt is to be made to ensure the debris is not re-disturbed;
- Upon completion of the job all surfaces of the drop sheet are to be sprayed with solution of PVA applied by an airless spray;
- After sufficient period for the PVA to dry, the drop sheet can be removed and disposed of appropriately;
- All external work with the potential to create lead containing paint debris is to cease if weather conditions have the potential to disturb collected debris. The drop sheet is to be secured to prevent the spread of debris from water run off or wind. This may be achieved by turning the sheet onto itself and taping the free end to the wall;
- All employees involved in dust removal shall adopt good hygiene practices and ensure hands and faces are thoroughly washed before leaving the site and prior to smoking or eating.

1.3.4 Quality Control Procedures

Any sub-contractor employed for ceiling dust removal must be accredited to work with such hazardous substances and be familiar with this management plan. The Contractor shall ensure all sites are inspected prior to any work commencing and the sites' condition recorded and photographed if necessary. Particular attention shall be given to the presence of any paint debris and dusts, and the condition of painted surfaces.

The Contractor shall inspect any enclosures and gap sealing to ensure they are adequate for the task prior to dust removal commencing.

The Contractor shall provide a competent supervisor to inspect the site at the completion of the days work to ensure the site is left secure and cleaned up thoroughly. This shall be performed whilst the employees or sub contractors are still present in the case of further clean up being required.

1.3.5 Waste Management

The Contractor shall dispose of dust and paint waste at a special waste centre because of the elevated lead content All waste sent to such centres must undergo a Toxicity Characteristic Leachability Process (TCLP) assessment.

1.4 SPECIFICATION SECTION TITLES

Section titles and paragraphs under same are incorporated herein for convenience only and shall not be taken as a correct or complete aggregation of the several units of material and labour. No responsibility, either direct or implied, is assumed by SANIP or the Owner for omissions or duplications by the Contractor or his sub-Contractors. Due to real or alleged error in arrangement of matter in this Specification and the Scope of Works.

LEAD Action NEWS

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Ceiling Dust and Hail Storms

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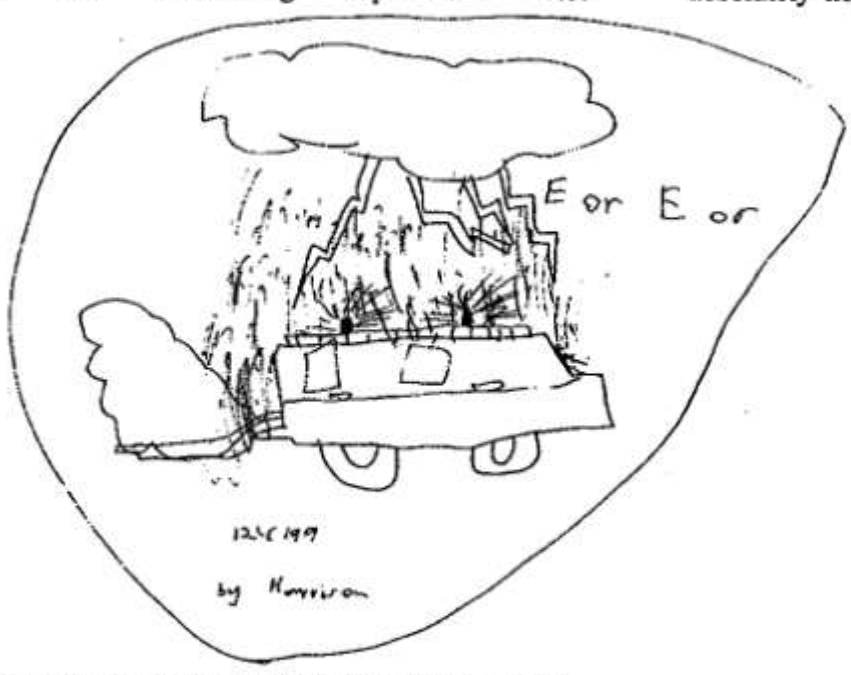
Editorial

On the night of the fourteenth of April, 1999, as everyone in Sydney knows, there was a hailstorm that damaged twenty thousand houses - nearly all had damaged roofs, and therefore damaged ceilings. From the next day onwards, the Lead Advisory Service received a massive influx of calls on the subject of the health effects of the ceiling void dust that was now getting into homes as a result of the hail. Our networking capabilities were working overtime as we endeavored to find the information people needed to work out the best course of action. There were people having asthma attacks 'and other respiratory problems in their homes as well as thousand of contractors moving in for repair work and unaware of the dangers in the ceiling dust. Then came the problem that some insurance companies refused to pay for the absolutely necessary ceiling dust removal prior to the demolition of ceilings to be replaced.



"Firetruck on the night of the hail" by Harrison, aged 8

Thankyou to the forty five people to whom I sent the drafts of the three major articles in this newsletter, and especially the two dozen people who rushed their comments and responses back to me. Thanks also to all the staff of the Lead Advisory Service (David, Susy, Helen and Elizabeth) who have given up their holidays to help rush this edition of LEAD Action News to the businesses helping in the recovery for the hail victims in Eastern Sydney. Thanks again to the volunteers of The LEAD Group, Margaret Johnston and Charis Picardo for their great typing and to Michael Marshall for computer support.

CONSULTATION DRAFT
SEPT 99

MANAGEMENT OF LEAD CONTAMINATION

Please refer all comments to the Lead Reference Centre phone 02 9879 4988 or fax 02 9879 4056 or post to:

Lead Reference Centre
Environment Protection Authority
P.O. Box 1135 CHATSWOOD 2057

L 19 7:88

Australian Dust Removalists Association (ADRA)
c/o The LEAD Group Inc.
PO Box 161 Summer Hill
NSW Australia 2130
Phone: (02) 9716 0966 Fax: (02) 9716 9005
Email: info@lead.org.au
Webpage http://www.lead.org.au

Australian Dust Removalists Association
Draft Code of Practice for Ceiling Dust Removal

CONTAMINATED DUSTS

Triggers for Ceiling Dust Removal

The extent of dust removal will be dependent on the extent of the disturbance and the proposed usage of the space following the work. For example, triggers for full dust removal would include:-

- Demolishing ceiling or cavity walls
- Cutting in to ceilings for installation of an attic ladder
- Adding a second storey extension

and triggers for at least partial dust removal would include:-

- Cutting in to ceilings for installation of a skylight, light fitting, ceiling ventilation fan, etc
- Installing insulation or new electrical wiring
- Decision by the building owner based on concerns about health risks arising from dust leakage through cornices, picture rails, skirting boards, architraves, window and door frames, wall vents, ceiling vents, fire places and the like, or future storms or other trauma which could damage the ceiling.

Sequence of Events

In order to avoid contaminated dust from the ceiling areas spreading to other parts of the building during building work, seal all vents, cracks and fissures in and around the ceiling and walls before commencing work in the ceiling cavity.

All other building work resulting in penetrations to ceilings and/or walls is to be carried out after the dust removal had been completed.

Minimising the Creation and Spread of Lead Contaminated Ceiling Dust

The Contractor shall adhere to the following general procedure for ceiling space decontamination:

- All contractors should exercise relevant OHS procedures to comply with relevant NSW WorkCover Authority legislation;
- All occupants are advised to vacate the premises during the ceiling dust removal. Children in particular should be absent during the work;
- Sealing of all cracks/fissures that may permit gross ingress of ceiling dust into building is the responsibility of the home owner. This includes the temporary sealing of the ceiling access point;
- Entry into ceiling space is generally via a temporary opening in the roof;
- At time of quoting the contractor should furnish to the home owner a fact sheet on ceiling dust by the Lead Group
- All employees directly involved in the removal shall wear personal protective equipment conforming to AS1716 (Respiratory Protective Devices) and be sufficiently trained in their use;

- All employees directly involved in the removal shall wear disposable overalls fitted with hoods and must at all times keep their suits fully on and in good condition;
- All employees directly involved in the removal shall undergo personal biological monitoring for exposure to contaminants in ceiling dust
- Records shall be kept of the results of the employees personal biological monitoring
- All dust is to be removed using HEPA fitted vacuum cleaners. The cleaning unit and the dust collection system would preferably remain external of the building;
- At no time is dust to be swept or showelled into bags;
- Removal of dust shall start from the roof entry point and work shall be continued from here towards the edge of the ceiling so as to minimise the disturbance of the dust;
- Surfaces with contaminated dust to be removed is to be identified to the home owner at time of quoting;
- All collected dust is to be contained in sealed drums or 200 um (micrometre) plastic bags and transported by EPA licensed transporters and disposed of at an EPA licensed waste facility;
- All employees involved in dust removal shall adopt good hygiene practices and ensure hands and faces are thoroughly washed prior to smoking or eating;
- Smoking is not allowed within the confines of the premises;
- All employees entering the ceiling space within 1 hour of dust removal shall wear approved respiratory protection conforming to AS1716;
- Personal decontamination procedures are to be followed including disposal of used overalls with the dust and washing hands and face with clean water outside the building before leaving the site, with all waste water directed to sewer;
- All contractors should have Certificate of Currencies for a minimum public liability cover of $5,000,000 and relevant workers compensation insurance.

Quality Control Procedures

Any sub-contractor employed for ceiling dust removal must be accredited by ADRA (Australian Dust Removalists Association) to work with such hazardous substances and be familiar with this Code of Practice. The Contractor shall ensure all sites are inspected prior to commencing any work and the sites' condition recorded and photographed if necessary. Particular attention shall be given to the presence of any dust.

The Contractor shall inspect and ensure that all openings into ceiling cavity are adequately sealed before commencing dust removal.

The Contractor shall provide a competent supervisor to inspect the site at the completion of the days work to ensure the site is left secure and cleaned up thoroughly. This shall be performed whilst the employees or sub contractors are still present in the case of further clean up being required.

Waste Management

The Contractor shall handle, transport and dispose of dust waste in accordance with the NSW EPA guidelines on classification and management of waste.

Disclaimer

No responsibility, either direct or implied, is assumed by ADRA for omissions or duplications by the Contractor or his sub-Contractors due to real or alleged error in this Code of Practice. The information contained in this Code of Practice was compiled using the information available at the time of writing.

CONTROL OF INORGANIC LEAD AT WORK

National Standard for the Control of Inorganic Lead at Work [NOHSC:1012(1994)]

National Code of Practice for the Control and Safe Use of Inorganic Lead at Work [NOHSC:2015(1994)]

OCTOBER 1994