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ASBESTOS CONTAINING BUILDING MATERIALS SURVEY REPORT

68 McMinn Street

Darwin, NT 0800

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1 SCOPE

SLR Consulting Australia Pty Ltd (SLR) was requested by Adrian Handford of GRC Properties (the Client) to undertake an asbestos building materials survey of 68 McMinn Street, Darwin NT 0800 (the Site) to ascertain the location, extent, type and condition of Asbestos Containing Materials (ACMs). Upon completion of the on-site assessment, this report presents the results of the inspection.

2 INSPECTION DETAILS

2.1 Site Description

The survey was conducted at 68 McMinn St on 05th July 2013. A Locality Map is presented in **Figure 1**. For the purpose of this report, McMinn Street is taken to run in a north-south direction, directly adjacent to the Site. For the purpose of this report the main entrance to the building faces west. The building was accessed from the north entrance. The survey was undertaken by Liam Munro.

The following information is known about the building:

- The building is a double storey, concrete and steel warehouse type construction, opened in 1982 and presumably built between 1980 - 1982.
- The buildings use, at the time of the survey is equipment storage. The building was previously used as a warehouse / sales floor for a furniture retailer.
- The building has not been occupied for some time.

No Site Plan was available for the Site.

Relevant photographs taken during the inspection are provided in **Appendix B**.

Figure 1: Site Location



Imagery ©2013 Sinclair Knight Merz, Sinclair Knight Merz & Fugro, Map data ©2013 Google

3 LIMITATIONS

Surveys are conducted in a conscientious and professional manner. The nature of the task and the likely disproportion between any damage or loss which might arise from the work or reports prepared, and the cost of our services, is such that SLR cannot guarantee that all asbestos building materials have been identified and/or addressed.

Due to the possibility of renovations and additions to the building(s) over time, ACMs may have been concealed (for example behind new walls, flooring, ceilings, within boxing, etc.). Such areas were inaccessible during the inspection. It is recommended that prior to any refurbishment/demolition works at the site that a full destructive asbestos building materials refurbishment/demolition survey is undertaken by a suitably qualified and experienced consultancy, such as SLR. If any materials reasonably suspected of containing asbestos are found on site, which are not identified within this report, the client's independent consultant, SLR, should be contacted to complete additional confirmatory sampling and analysis as required.

A change in building use/nature of activities could affect the control actions recommended within this report and a re-survey may be required.

Thus, while we carry out the work to the best of our ability, we totally exclude any loss or damages which may arise from services we have provided to GRC Properties and/or associated parties.

Where potentially ACMs are identified these are normally reported on to the best of the consultant's ability. Analysis is not normally included and there is no guarantee that all such materials have been identified and/or addressed.

All work conducted and reports produced by SLR are prepared for a particular Client's objective and are based on a specific scope, conditions and limitations, as agreed upon between SLR and the Client. Information and/or report(s) prepared by SLR may therefore not be suitable for any use other than the intended objective. No parties other than the Client should use any information and/or report(s) without first conferring with SLR.

Before passing on to a third party any information and/or report(s) prepared by SLR, the Client is to inform fully the third party of the objective and scope, and all limitations and conditions, including any other relevant information which applies to the information and/or report(s) prepared by SLR.

It is the responsibility of third parties to investigate fully to their satisfaction if any information and/or report(s) prepared by SLR are suitable for a specific objective.

The report(s) and/or information produced by SLR should not be reproduced and/or presented/reviewed except in full.

4 SURVEY STRATEGY

The purpose of this survey is to locate, as far as reasonably practicable, the presence, type and extent of any suspect ACMs in the building(s), to assess their condition, provide a suitable risk assessment/rating and recommended control actions based on the condition of the materials at the time of the survey.

The survey consisted of a visual inspection with limited sampling/analysis of materials undertaken by a trained and experienced surveyor. Materials are assumed to contain asbestos where:

- Laboratory analysis has confirmed the presence of asbestos in a visually similar material; or
- Materials visually appear to be asbestos containing but no sample was collected, for example due to access restraints.

Samples are typically collected using a hand tool or core borer. Hand drills and other tools are used where required. Power tools were not used during the survey.

4.1 Sample Analysis

Samples obtained from materials suspected to contain asbestos are analysed by our 'In House' NATA accredited laboratory using a combination of stereo microscopy, polarised light microscopy and dispersion staining techniques. Due to the limited extent of asbestos fibres within certain manufactured or installed materials, including but not limited to, vinyl floor tiles and decorative sprayed coatings (such as vermiculite); and where the aforementioned analytical methods determine that asbestos was not detected, it may be advisable that additional analysis be considered using Scanning Electron Microscopy (SEM) or X-ray diffraction.

4.2 Exclusions

Unless specifically noted, the survey did not cover

- Wall/ceiling panelling behind laminations/coverings.
- Concealed floor coverings beneath carpet or superficial floor coverings.
- Fuses within 'live' electrical panelling. Fuses of a certain age may contain asbestos containing flashguards.
- Hidden and/or inaccessible locations such as in or under concrete slabs, in or under vinyl/linoleum/carpet, wall cavities, hidden storage areas and the like. If the vinyl or linoleum is tested, this does not necessarily mean that the resin/glue is included in the analysis.
- Lift wells and inaccessible/unidentified shafts, cavities and the like.
- Air conditioning, heating, mechanical, electrical or other equipment.
- General exterior ground surfaces and subsurface areas e.g. asbestos in fill/soil.
- Materials dumped, hidden, or otherwise placed in locations which one could not reasonably anticipate.
- Materials other than normal building fabric, materials in laboratories or special purpose facilities and building materials that cannot be reasonably and safely assessed without assistance.

Limited access was available within the Ceiling Cavity Areas, Risers and Plant Room Areas at height due to the concentration of services, limited safe walking paths (where applicable) and lighting.

Materials other than asbestos are generally outside the scope as identification can require specialised analysis/inspection techniques.

Settled dust is generally not sampled or commented on. Settled dust may contain asbestos, particularly if it is in the vicinity of ACMs or areas where ACMs have been removed.

4.3 Risk Assessment, Control Actions & Asbestos Classification

4.3.1 Material Assessment

In order to assess the potential for fibre release from an ACM a Material Assessment is undertaken for each identified (sampled or assumed) material noted during the survey inspection.

The four principle parameters determining the amount of fibre released from an ACM when subject to disturbance are:

- Product type;
- Extent of damage or deterioration;
- Surface treatment; and
- Asbestos type.

Each of these variables are given a score of between 0 and 3 which can then be added together to obtain a Material Assessment Rating of between 2 and 12. A low Material Assessment Rating indicates a low potential for fibre release and a high Material Assessment Rating indicates a high potential for fibre release. Please note that all assumed ACMs are scored as crocidolite (ie Asbestos Type score = 3) unless there is strong evidence to show otherwise to indicate a worst case scenario. Non-asbestos containing materials are not scored.

The Material Assessment Algorithm used during the survey is provided in **Table 1** overleaf.

4.3.2 Risk Assessment Rating

The purpose of a Risk Assessment Rating is to allow informed decisions to be made about ACMs, including control measures or required remedial actions, induction and training, air monitoring, health surveillance requirements, etc. It also assists in the prioritisation of the implementation of management actions.

Further to the positive or assumptive identification of an ACM and the completion of the Material Assessment (**Section 4.3.1**), a Risk Assessment Rating is compiled for each item. The Risk Assessment Rating categories as detailed in **Table 2** have been compiled in order for appropriate ACM management procedures to be implemented.

The Risk Assessment Rating categories are described as 'High', 'Medium', 'Low', or 'Very low' and have been assigned to each positive or assumptive identification of ACMs during the survey. A 'High' Risk Assessment Rating indicates a material that will more readily release airborne fibers if disturbed.

Table 1: Asbestos Risk Assessment (Material Assessment) Algorithm

Sample variable		Score	Examples of scores
A	Product type (or debris from product)	1	Asbestos-reinforced composites (plastics, resins, mastics, roofing felts, vinyl floor tiles, semi-rigid paints or decorative finishes, BEBB, asbestos cement etc).
		2	AIB, millboards, other low-density insulation boards (LDB), asbestos textiles, gaskets, ropes and woven textiles, asbestos paper and felt.
		3	Thermal insulation (eg pipe and boiler lagging), sprayed asbestos, loose asbestos, asbestos mattresses and packing.
B	Extent of damage/deterioration	0	Good condition: no visible damage.
		1	Low damage: a few scratches or surface marks, broken edges on boards, tiles etc.
		2	Medium damage: significant breakage of materials or several small areas where material has been damaged revealing loose asbestos fibres.
		3	High damage or delamination of materials, sprays and thermal insulation. Visible asbestos debris.
C	Surface treatment	0	Composite materials that are sealed by nature (plastics, resins, mastics, roofing felts, vinyl floor tiles, semi-rigid paints or decorative finishes, BEBB), or Encapsulated FCS, AC
		1	Unsealed FCS, AC, or Encapsulated AIB, millboard, other LDB (with exposed face painted/encapsulated), asbestos textiles, gaskets, ropes and woven textiles, asbestos paper, card. Enclosed Insulation (lagging, sprays, loose asbestos, mattresses, packing).
		2	Unsealed AIB, millboard, other LDB, asbestos textiles, gaskets, ropes and woven textiles, asbestos paper and card, or Encapsulated Insulation (lagging, sprays, loose asbestos, mattresses, packing).
		3	Unsealed Insulation (lagging, sprays, loose asbestos, mattresses, packing).
D	Asbestos type	1	Chrysotile.
		2	Amphibole asbestos excluding crocidolite.
		3	Crocidolite.
Total			

Table 2: Risk Assessment Rating Based Upon Materials Assessment Algorithm

Score	Potential to release asbestos fibres
10 or more	High
7-9	Medium
5-6	Low
4 or less	Very Low

4.3.3 Control Actions

Based upon a combination of our surveyors judgment on site and the Risk Assessment Rating for each identified/assumed ACM noted on site, recommended Control Measures as detailed in **Table 3** have been applied to each occurrence in the Asbestos Containing Materials Register in **Section 5**.

4.3.4 ACM Classification

ACMs are classified as friable or non-friable in accordance with the *Work Health and Safety Regulations 2011*. SLR has classified all identified/assumed ACMs noted on site as friable or non-friable in accordance with the criteria set out in the Regulations (as noted in the Asbestos Containing Materials Register in **Section 5**). This will assist the Client with the on-going management of ACMs and any necessary abatement works.

Generally, asbestos abatement works require a license issued by a regulator. The requirement for an asbestos licence to undertake asbestos abatement works are as follows:

Class A (or friable) licence is required for works involving:

- Friable asbestos;
- Asbestos contaminated dust associated with the removal of friable asbestos.

Class B license (or bonded) (or Class A (or friable)) licence is required for works involving:

- More than 10m² of non-friable asbestos;
- Asbestos contaminated dust associated with the removal of more than 10m² of non-friable asbestos.

No license is required for works involving:

- Up to 10m² of non-friable asbestos;
- Asbestos contaminated dust:
 - That is associated with the removal of up to 10m² of non-friable asbestos.
 - That is not associated with the removal of friable/non-friable asbestos and is only a 'minor contamination'.

Table 3: Recommended Control Measures

Control Number	Action
C1	Manage <i>in-situ</i>
C2	Incorporate into a current / develop an Asbestos Management Plan
C3	Label as asbestos containing in accordance with Australian Standard 1319-1994 <i>Safety Signs for the Occupational Environment</i>
C4	Re-inspect conditions every 5 years or sooner if deemed necessary in accordance with the <i>Work Health and Safety Regulations 2011 & Code of Practice 'How to Manage and Control Asbestos in the Workplace [Safe Work Australia (2011)]</i>
C5	Consider further sampling/analysis to establish whether asbestos is present within the material
C6	Consider further sampling/analysis to establish whether asbestos is present within the associated dust
C7	Consider further sampling/analysis to establish whether asbestos is present within the sub-soil
C8	Seal damaged edges with an appropriate sealant such as Emerclad paint
C9	Encapsulate/enclose in accordance with the <i>Work Health and Safety Regulations 2011 & Code of Practice 'How to Safely Removal Asbestos [Safe Work Australia (2011)]</i>
C10	Seal-off area and erect appropriate warning signage in accordance with Australian Standard 1319-1994 <i>Safety Signs for the Occupational Environment</i>
C11	Undertake a suitable and sufficient Risk Assessment prior to access, which may include the use of appropriate PPE & RPE
C12	Restrict access to maintenance/service personnel
C13	Restrict access to all personnel
C14	Remove in accordance with the <i>Work Health and Safety Regulations 2011 & Code of Practice 'How to Safely Remove Asbestos [Safe Work Australia (2011)]</i>
C15	Remove in accordance with the <i>Work Health and Safety Regulations 2011 & Code of Practice 'How to Safely Remove Asbestos [Safe Work Australia (2011)]</i> prior to any works in the area that may disturb the material
C16	Undertake a dust sampling regime within the area in accordance with the <i>Work Health and Safety Regulations 2011 & Code of Practice 'How to Manage and Control Asbestos in the Workplace [Safe Work Australia (2011)]</i>
C17	Undertake airborne fibre monitoring within the area in accordance with the <i>Work Health and Safety Regulations 2011, Code of Practice 'How to Manage and Control Asbestos in the Workplace [Safe Work Australia (2011)]</i> and <i>Code of Practice 'How to Safely Remove Asbestos [Safe Work Australia (2011)]</i>
C18	A detailed roof inspection by a competent person, such as SLR, is recommended to investigate the potential for contamination in areas such as gutters, drains/pipes and air conditioning systems. Subsequent to this detailed inspection, recommendations can be made about the condition of the roof and an appropriate course of action detailed.

5 ASBESTOS CONTAINING MATERIALS REGISTER

The following table is a register of all identified ACMs on site, confirmed through analysis or assumed materials deemed to be homogenous or consistent in appearance and manufacture to similar samples collected. This Summary of Asbestos Materials should be read in conjunction with all sections of this report.

Item Location & Material Type	Sample No./ Assumed	Photo No.	Approx. Extent	Non-Friable/ Friable	Product Type (A)	Extent of Damage /Deterioration (B)	Surface Treatment (C)	Asbestos Type (D)	Risk Assessment (Material Assessment) Score & Rating (A+B+C+D)	Recommended Control Actions	Comments
Building Interior											
Mezzanine Level, Unpainted FCS infill panels to north elevation	680.10041.00000/012	1	200 m ²	Non-friable	1	0	1	1	3 – Very Low	C1, C2, C3, C4, C12	Material requires labelling
Mezzanine Level, Unpainted FCS infill panels to top section of west elevation	Visually similar to item ref: 680.10041.00000/012	2	50 m ²	Non-friable	1	0	1	1	3 – Very Low	C1, C2, C3, C4, C5, C12	Material requires labelling
Ground Floor, Assumed 'Bakelite' switches to electrical switchboard to north elevation of brick office compound to south of building	Assumed asbestos containing	3	0.5 m ²	Non-friable	1	0	0	3	4-Very Low	C1, C2, C3, C4, C5, C12	Material requires labelling
Ground Floor, Assumed backing board inside un-accessed electrical switchboard to north elevation of brick office compound to south of building	Assumed asbestos containing	4	1 m ²	Non-friable	1	0	0	3	4-Very Low	C1, C2, C3, C4, C5, C12	Material requires labelling
Ground Floor, Assumed asbestos insulation to spin-lock, safe-type filing cabinet to brick office compound to south of building, 3x	Assumed asbestos containing	5	2m ²	Non-friable	2	0	0	3	5- Low	C1, C2, C3, C4, C5, C12	Material requires labelling

FCS = Fibre Cement Sheeting; N/A = Not Applicable.

Refer to related notes on **Page 12**.

Notes:

- AC = Asbestos Cement; FCS = Fibre Cement Sheeting; CCS = Compressed Cement Sheeting; BEBB Black Electrical Backing Board; N/A = Not Applicable.
- The Asbestos Containing Materials Register should be read in conjunction with all sections of this report.
- Sample analysis/test results are detailed in **Section 6** of this report.
- All other similar occurrences of the ACMs identified in the summary table above should be assumed to contain asbestos, and treated accordingly, unless sampling and analysis confirms otherwise.
- The areas and approximate extents given above are approximates only and should not be used for the purpose of removal.
- Any actions taken to control asbestos materials subsequent to this report are to be recorded in the Asbestos Materials Control Log attached in **Appendix A**.
- Refer to the General Information attached in **Appendix C**.

6 SAMPLE ANALYSIS/TEST RESULTS

Table 4: Asbestos Sample Analysis Results

Asbestos Sample Number	Sample Type	Sample Location	Analysis Result
680.10041.00000/11	FCS	Mezzanine Level, painted FCS infill panels to north elevation	NAD (organic fibres detected)
680.10041.00000/12	FCS	Mezzanine Level, Unpainted FCS infill panels to north elevation	Chrysotile asbestos detected

Notes:

FCS = Fibre Cement Sheeting

7 RECOMMENDATIONS

As previously detailed in the Scope (**Section 1**), SLR were appointed to complete a survey and assessment of 68 McMinn Street with regards to the identification of ACMs. The extent of the inspection and samples collected for subsequent analysis was completed in order to confirm, as far as reasonably practicable, the location, condition and risk presented by ACMs remaining *in-situ* (and was based on the level of access available).

Further to the completion of the on-site investigation and collection/analysis of samples, there are detailed site/work-specific requirements and precautions that must be taken in the management, control and removal of ACMs. In addition to those listed on the Asbestos Containing Materials Register (**Section 5**), the following are some general recommendations and precautions that should be considered. Detailed documents, which may include Management Plans, Scope of Works, Safe Work Method Statements and Risk Assessments, should be prepared to appropriately address health and safety issues associated with specific work and site conditions.

- This document should be held as an Asbestos Register of the areas inspected and updated every 5 years or earlier where ACMs have been disturbed or a risk assessment indicates the need for re-assessment. All occupiers of the workplace are to be provided with a copy of this register and all updates to it.
- If any material that may contain asbestos is found on site the material should be sent for identification and expert advice sought. The material should be assumed to contain asbestos in the interim.
- As a precautionary measure, all materials, which may contain asbestos, should be assumed to contain asbestos and treated appropriately until sampling and analysis confirms otherwise.
- In order to comply with the *Work Health and Safety Regulations 2011*, any action taken to control asbestos and ACM in the place of work, or in plant at the place of work, is to be recorded in this register. These details are to be recorded in the Asbestos Control Log attached in **Appendix A**.
- All non-friable ACMs in an in-tact condition may remain *in-situ* provided they are not drilled, ground or otherwise disturbed. If generated, broken pieces are to be removed as soon as practicable. As part of good ongoing management we recommend regular inspections of ACMs left *in-situ* to check the condition of these materials.
- As a precautionary measure, any minor damaged, exposed/damaged edges of ACMs remaining *in-situ* may be sealed with an appropriate sealant, such as Emerclad paint, to minimise the risk of generating airborne asbestos fibres if/when these materials are disturbed.
- Any areas of the workplace that contain ACM including plant, equipment and components should be signposted with appropriate warning signs to ensure that asbestos is not unknowingly disturbed without the correct precautions being taken. These signs should be placed at all the main entrances to the work areas where asbestos is present and should conform with Australian Standard 1319-1994 *Safety Signs for the Occupational Environment*.
- If asbestos materials become significantly damaged, weathered and/or produce visible dust or significant debris, then health and safety management works are likely to be required. A suitably qualified and experienced consultant, such as SLR, can advise and assist in carrying out such works.
- Prior to renovation or demolition works a refurbishment/demolition asbestos building materials survey should be undertaken by a suitable qualified and experience consultancy, such as SLR.
- All asbestos-containing materials are to be removed prior to refurbishment or demolition.
- Prior to asbestos abatement works, a Technical Scope of Works (Work Plan) for asbestos removal should be prepared by a suitably qualified and experienced consultant, such as SLR, detailing the procedures and precautions for asbestos works/removal.

- Generally, all asbestos removal/decontamination should be undertaken by a licensed, experienced Asbestos Removal Contractor working in accordance with the above-mentioned Scope of Works.
- Safe Work Australia requires an Asbestos Licence for the removal of friable asbestos and more than 10m² of non-friable asbestos. All licensable asbestos works require WorkSafe NT notification.
- Each licensed asbestos removal contractor must have an approved “Safe Work Method Statements” and “Risk Assessments” prior to the commencement of work.
- According to the *Code of Practice How to Safely Remove Asbestos 2011*, air monitoring should be performed whenever ACMs are being removed to ensure that the control measures are effective. It is mandatory to undertake air monitoring when removing friable asbestos. Once removal is complete the area should be inspected by a suitably qualified and experienced consultant, such as SLR, and a clearance certificate issued. Obtaining a clearance certificate following friable asbestos removal is mandatory.
- The consultant conducting the air monitoring and clearance inspection should report directly to the client/principal contractor and be independent of the Asbestos Removal Contractor.
- Refer to the General Information attached in **Appendix C** of this report.

8 CONCLUSIONS

- Asbestos has been identified and/or assumed at the site.
- This document should be held as an Asbestos Materials Register of the areas inspected and updated every 5 years or earlier where ACMs have been disturbed or a risk assessment indicates the need for re-assessment. All occupiers of the workplace are to be provided with a copy of this register and all updates to it.
- If any material that may be asbestos containing is found on site the material should be sent for identification and expert advice sought. The material should be assumed to be asbestos containing in the interim.
- In order to comply with the *Work Health and Safety Regulations 2011*, any action taken to control ACMs in the place of work, or in plant at the place of work, is to be recorded in this register. These details are to be recorded in the Asbestos Materials Control Log attached in **Appendix A**.
- All non-friable ACMs in an in-tact condition may remain *in-situ* provided they are not drilled, ground or otherwise disturbed. If generated, broken pieces are to be removed as soon as practicable. As a part of good ongoing management we recommend regular inspections of asbestos materials left *in-situ* to check the condition of these materials.

9 LEGISLATION, GUIDELINES AND REGULATIONS

- Work Health and Safety Act 2011
- Work Health and Safety Regulations 2011
- Code of Practice for How to Safely Remove Asbestos [Safe Work Australia (2011)]
- Code of Practice for How to Manage and Control Asbestos in the Workplace [Safe Work Australia (2011)]
- Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [National Occupational Health and Safety Commission: 3003 (2005)]
- AS/NZS 1716-2003 - Respiratory Protective Devices
- AS/NZS 1715-1994 - Selection, Use and Maintenance of Respiratory Protective Devices
- AS 2601-2001 - The Demolition of Structures
- AS 1319-1994 Safety Signs for the Occupational Environment

10 CLOSURE

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of GRC Properties. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

ASBESTOS MATERIALS CONTROL LOG

To comply with the *Work Health and Safety Regulations 2011*, all actions taken to control asbestos and asbestos containing materials are to be recorded in the table below. It is recommended that similar details also be recorded for any other asbestos materials identified.

NAME	COMPANY	DATE	ASBESTOS MATERIAL RELATED WORK UNDERTAKEN (Include any assessment concerning asbestos that took place before the work was carried out)	REFERENCE NUMBER (Include sample numbers, report numbers, quote number and/or purchase order number etc)
Liam Munro	SLR Consulting Australia Pty Ltd	05/07/2013	Asbestos Building Materials Survey	680.10041.00000.01 ASR R0 20130724



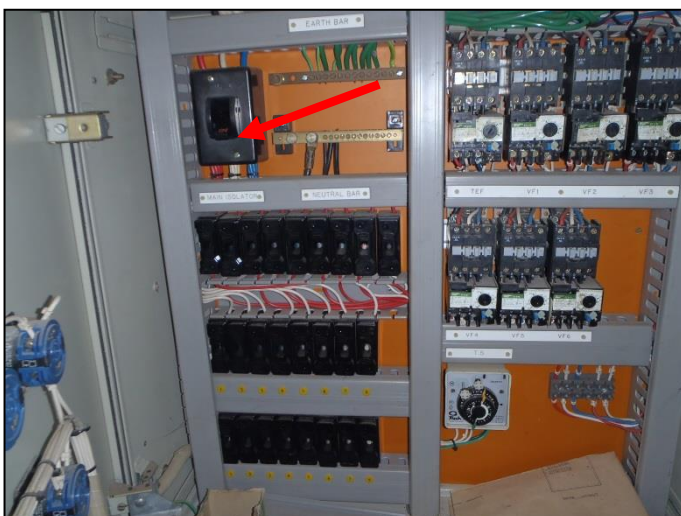
Photograph 1

FCS infill panels to north elevation, mezzanine level (**asbestos containing**).



Photograph 2

FCS infill panels to top section of west elevation, mezzanine level (**assumed asbestos containing**).



Photograph 3

Ground Floor, Assumed 'Bakelite' switches to electrical switchboard to north elevation of brick office compound to south of building (**assumed asbestos containing**).

PHOTOGRAPHS



Photograph 4

Ground Floor, Assumed backing board inside un-accessed, electrical switchboard to north elevation of brick office compound to south of building (**assumed asbestos containing**).



Photograph 5

Ground Floor, Assumed asbestos insulation to spin-lock, safe-type filing cabinet to brick office compound to south of building, 3x (**assumed asbestos containing**).

GENERAL INFORMATION

ASBESTOS**Asbestos: Description, Properties and Uses**

Asbestos is the generic term given to a group of naturally occurring fibrous minerals, based on hydrated silicates, which are found in various rock formations. Differing ratios of oxygen, hydrogen, sodium, iron, magnesium and calcium elements account for several different types of asbestos minerals, the most common varieties being Amosite (brown asbestos), Chrysotile (white asbestos), Crocidolite (blue asbestos). Other types include Anthophyllite, Actinolite and Tremolite.

The immense popularity of asbestos as a building material is attributed to its near unique properties of fire resistance, high abrasion resistance and superb acoustical characteristics coupled with its relatively low cost. Prior to 1973, asbestos was the material of choice for fire proofing, thermal insulation, sound insulation and abrasion resistance. It was used as a spray-on insulation of ceilings and steel girders; as a thermal insulation of boilers, pipes, ducts, air conditioning units, etc; as an abrasion resistant filler in floor tiles, vinyl sheet floor coverings, roofing and siding shingles; as a flexible, though resistant joining compound and filler of textured paints and gaskets; as the bulking material with the best wear characteristics for automobile brake shoes and in countless domestic appliances such as toasters, grills, dishwashers, refrigerators, ovens, clothes dryers, electric blankets, hair dryers, etc.

Asbestos: Health Effects

Many asbestos bearing materials or products are of no significant health risk whatsoever when used in the normal course of events. A health risk exists when asbestos fibres are released into the air and when that air is inhaled into the lungs. Even then, it appears that most people exposed to relatively small amounts of asbestos do not develop any related health problems. There is however no "safe" level of asbestos exposure since the risk is dependent on numerous factors including the time since exposure, exposure duration and concentration, asbestos type, the attributes of the particular individual and environmental factors such as exposure to cigarette smoke and other airborne pollutants.

There are three main diseases associated with airborne asbestos fibres:

Asbestosis - A fibrosis (or scarring) of the lung associated with relatively massive exposure to asbestos.

Lung Cancer - Indistinguishable from that caused by smoking and a common cause of death. The risk of lung cancer is much higher when there is exposure to both cigarette smoking and to airborne asbestos.

Mesothelioma - A cancer of the chest and abdominal lining, it is specific to asbestos exposure.

A feature of these diseases is that symptoms take a long time to appear, generally 5 to 40 years. Once symptoms are evident the disease progresses rapidly.

There is some evidence that Chrysotile asbestos is less carcinogenic than Amosite, and that Amosite is less carcinogenic than Crocidolite in causing mesothelioma, but the evidence is less clear for lung cancer.

Measurement of Airborne Asbestos Fibres

The *Work Health and Safety Regulations 2011* and the *Safe Work Australia Asbestos Codes of Practice & Guidance Note* set the maximum allowable time weighted average for all forms of asbestos at 0.1 fibre/mL of air.

Air monitoring is used to determine airborne fibre levels. SLR is NATA certified for Asbestos Fibre Counting and Volume Measurement to carry out such monitoring.

The *Safe Work Australia Code of Practice How to Safely Remove Asbestos 2011* states that air monitoring should be performed whenever Asbestos Containing Materials (ACMs) are being removed, to ensure the control measures are effective.

The onus to provide a safe environment rests with persons in control of a business or undertaking, persons with management or control and persons carrying out demolition or refurbishment work. To meet these obligations it is recommended that SLR be engaged by the site controller, or their representative, and not an asbestos removal contractor as there could be a conflict of interest in the latter arrangement.

Asbestos Survey

Asbestos surveys are undertaken to identify any asbestos materials/hazards and assess the risk associated with the material/hazard.

Surveys are conducted through visual inspection by experienced personnel. During the inspection material samples are taken as appropriate for analysis.

GENERAL INFORMATIONLimitations

Due to the nature of the task all asbestos surveys are limited. Since asbestos can occur in so many forms and in so many locations, and as there is no instrument to detect asbestos, it is never possible to guarantee all asbestos has been identified. Access is usually restricted, and there may be asbestos hidden behind walls or other structures. Building plans are of great assistance to consultants undertaking surveys.

Asbestos Register

An asbestos register is a record of the location, type and condition of all asbestos containing products identified in a building. Under the Codes of Practice and legislation, any place of work constructed after 31 December 2003 must have an Asbestos Register. A SLR Asbestos Survey Report includes an asbestos register.

Registers must be maintained and changes in the condition or extent of any asbestos present should be recorded. Registers should also detail the next review date, at present annually since the condition of asbestos materials, legislation, guidelines and standards change.

Management Plan

An asbestos management plan is required where asbestos materials have been identified and are to remain on site. The plan would normally be a component in the overall Hazard Management Plan for the site.

Control Options

Asbestos judged to constitute a health risk should be removed, enclosed or encapsulated by an approved asbestos contractor.

Enclosure

This involves the installation of a permanent, solid, non-porous, impervious barrier between the asbestos material and the surrounding environment. Examples include building boxes around steam pipes etc. A suspended ceiling is not permanent and, since occasional access is necessary above a suspended ceiling, enclosure is negated. Furthermore, many suspended ceilings act as return air plenums so enclosure is impossible.

Encapsulation

Encapsulation involves coating the material with a sealant. Good sealants penetrate through the asbestos material to the substrate. The encapsulating substance then hardens and binds all the asbestos fibres into a solid matrix. This is usually a short to medium term management option.

Removal

Removal is not without hazards to the occupants of the building. If not strictly controlled, the removal process can result in increased fibre counts in other areas. Technical competence, experience and integrity are of prime importance in evaluating asbestos removal plans.

We advise clients to work within the usual practised time frames of the experienced asbestos removal companies under strict supervision by a qualified person. Pressing for quicker turnaround times may result in low quality workmanship and unnecessary asbestos risk. Building owners may be in part responsible for risks created by the removal Contractor due to carelessness or negligence.

An independent consultant such as SLR, experienced in the supervision of asbestos removal, should be retained to act on the client's behalf.

Clearance Inspection

A clearance inspection must be conducted at the completion of asbestos removal works. The clearance inspection may include airborne asbestos monitoring and/or sampling/analysis of materials and should be completed by a suitably qualified and experienced consultant, such as SLR.

GENERAL INFORMATION

ASBESTOS CEMENT SHEETING

A large number of building products used in the building and construction industry have been made with asbestos and cement. Products include:

- Flat or corrugated, compressed sheeting
- Pipes for water, drainage, flues
- Roof shingles
- Building boards eg. Villaboard, Hardiflex, Wundaboard, Flexiboard
- Cable trays for electrical wiring
- Numerous preformed items such as cisterns, protective housings, etc

Provided these products are maintained in good condition, they present no health risk, however precautions must be observed during demolition, refurbishment etc.

Licensing Requirements

Asbestos-containing products are classified as **non-friable or friable**. **Asbestos cement (AC)** is classified as **non-friable asbestos** however once it is significantly broken, crushed or otherwise damaged WorkSafe NT may consider it to be friable asbestos. The rules governing **friable** asbestos are far more stringent.

A WorkSafe NT asbestos licence is required to remove 10 square metres or more of non-friable asbestos and there must be WorkSafe NT notification.

Anyone wishing to carry out friable asbestos removal must obtain a friable asbestos removal licence from WorkSafe NT. A friable asbestos removal permit must be obtained for all friable asbestos jobs.

Removal Procedures

The following procedures are recommended for demolition work involving non-friable asbestos cement sheeting in order to reduce the potential health risk to workers and to building occupants.

All asbestos removal and/or decontamination should be undertaken by a competent person working in accordance with the requirements specified in the Safe Work Australia Asbestos Codes of Practice and the *Work Health and Safety Regulations 2011*. A licensed, experienced asbestos removal contractor is required to remove friable asbestos and >10m² of non-friable asbestos.

1. Prior to commencement of asbestos removal works, suitable warning signs must be erected. All windows and doors etc in the occupied areas of these buildings should be closed so as to prevent the spread of contamination.
2. All asbestos removal operatives to wear half-face particulate filter (cartridge) respirators and approved disposable coveralls.
3. The bolts fixing the asbestos cement sheets to the main frame must be cut out and removed. Abrasive cutting or sanding discs shall not be used on asbestos cement products. Only approved power tools may be used.
4. The asbestos cement sheets should be wetted or PVA coated (polyvinyl acetate). **High water pressures should not be used.**
5. All asbestos cement sheets should be removed with minimal breakage and be **lowered** to ground level, not dropped.
6. All asbestos cement dust and residues should be cleaned from the work area using an approved vacuum cleaner.
7. All asbestos containing waste must be removed from the site as soon as possible. The bins should be plastic lined, covered and taped secure prior to removal.
8. The asbestos waste shall be disposed of in accordance with the existing regulations.
9. Prior to engagement in the work, all asbestos operatives must be trained in safe working practices. These training aspects include:
 - Health hazards of asbestos
 - Safe working procedures
 - Wearing and maintenance of protective clothing and equipment