Dear Greg,

**Dumas House Asbestos Air Monitoring Sampling Method**

1. **Asbestos Fibre Monitoring**

360 Environmental offers the following methods to provide a regulatory compliant and risk based approach to performing airborne asbestos fibre monitoring during friable asbestos removal activities at the Dumas House Façade Rehabilitation Project.

It is understood airborne asbestos fibre sampling will be required during friable removal activities. In order to provide comprehensive sampling methods 360 Environmental will employ three phases of monitoring, as required, during the course of the project.

1. **Background Monitoring**

Background sampling will be conducted to establish site conditions and airborne fibre levels before work commences.

2. **Control Monitoring**

Control monitoring will be performed to confirm the effectiveness of engineering controls and measures utilised to prevent the migration of asbestos fibres during removal works. Sampling locations will be assessed and determined by the 360 Environmental site consultant and include the following:

   a. Clean-side of decontamination unit;
   
   b. Change areas; and
   
   c. In areas adjacent to the work area where the consultant deems it appropriate or the client’s representative, asbestos removalist or other site occupant’s requests it, sampling may also be carried out in other locations such as adjacent occupied areas and the floor above and below the active asbestos work area.
Clearance Monitoring

Following the visual inspection, clearance monitoring will be performed in all completed friable asbestos work areas prior to enclosure sheeting being removed. The area must be dry and if the area has been sprayed with PVA or other sealant, sampling should not commence prior to the consultant allowing sufficient time for the sealant to properly dry.

Sampling pumps will be suitably placed to collect representative samples. The sampling head will be positioned one to two metres from the floor and away from walls or other solid surfaces.

Air monitoring will be carried out in accordance with the Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)].

Samples collected will be expedited to our third party NATA accredited laboratory (Lifetree Environmental) for immediate analysis.

A minimum volume of 500 L will be collected to meet the sampling criteria requirements of the Lifetree Environmental Pty Ltd, Procedures manual 3 section 3 (See Attachment 1).

Visual inspections, sampling durations and verbal clearance certification will be accomplished to order to complete the required sampling and provide laboratory analysis results prior to the end of each removal shift.

Clearance Certificates (see section 3) for all daily asbestos removal activities will be provided prior to the normal reoccupation of the building.
2. Reporting of Results and Action Levels

The results of asbestos fibre monitoring will be reported to Duratech in accordance with the project specification and will also be distributed to the asbestos removalist (LARC) and client’s representative.

The following action levels will be adopted for asbestos abatement projects where elevated asbestos fibre concentrations are detected outside the asbestos work areas:

<table>
<thead>
<tr>
<th>Fibres PER ML</th>
<th>Occupancy</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01 or above</td>
<td>Public or areas not occupied by LARC</td>
<td>Notify Duratech, Clients Representative and LARC. Immediate cessation of work, identify possible fibre migration locations and clean-up area</td>
</tr>
<tr>
<td>0.01 to 0.02</td>
<td>Area occupied by LARC</td>
<td>Notify Asbestos Removalist and check for spills or leaks</td>
</tr>
<tr>
<td>0.03 to 0.05</td>
<td>Area occupied by LARC</td>
<td>Clean-up using a P1, P2 or P3 filter with a half face respirator prior to resuming work or re-entering area. Identify spill or leak.</td>
</tr>
<tr>
<td>Greater than 0.05</td>
<td>Area occupied by LARC</td>
<td>Seal area. Full clean-up required using a Full face piece respirator fitted with a P3 filter and protective clothing. One hour clearance reading must be obtained before areas may be accessed. Reading must not be higher than 0.01 fibres/mL before work may resume. Identify cause of elevated air reading.</td>
</tr>
</tbody>
</table>

The maximum fibre concentration for preliminary and final clearances should not exceed 0.01 fibres per mL of air sampled.

3. Clearance Certification

At the completion of daily asbestos removal operations, the 360 Environmental consultant will inspect the work area in order to check that asbestos materials have been removed to a practicably achievable standard.

A Clearance Certificate will be issued following confirmation of the completion of works and successful final clearance monitoring.

The clearance certificate will detail, at a minimum, the following:

Asbestos removalist;
Period and dates of work; and
Air monitoring laboratory reports.
Should you have any questions or require any additional information please contact us at any time using the details provided below.

Kind regards,

Daniel Morgan

360 Environmental Pty Ltd

Enc:
Attachment 1: Air Sampling Procedures
3.0 AIR MONITORING PROCEDURE

3.1 DESCRIPTION OF AIR MONITORING

A sample is collected by drawing a measured volume of air through a membrane filter by means of a sampling pump. The filter (or part of the filter) is mounted on a microscope slide and rendered transparent (‘cleared’). Fibres of appropriate dimensions on a measured area of filter are counted visually using phase contrast microscopy (PCM) and the number concentration of fibres in the air calculated. The result is expressed as fibres per millilitre of air.

Air monitoring includes exposure monitoring and control monitoring.

3.2 TYPE OF AIR MONITORING

3.2.1 Exposure Monitoring for Occupational Situations

The sampling pump is normally worn attached to a waist belt with the filter holder fixed to the upper shoulder of the wearer within 300 mm of the nose and mouth, with the cowl opening facing downwards. Sampling procedures should be arranged so as to cause minimal interference with work activities. Sample duration for exposure monitoring is influenced primarily by the reason for air monitoring, the level of fibre concentration to be measured the concentration of non-fibrous dust and the requirements of the analytical method. This may result in more than one single sample being required. The total sample duration should aim at collecting a sample that is representative of the period in question, usually an entire shift.

Exposure monitoring is used to determine personal exposure to airborne asbestos fibres during any work involving asbestos. This may result in more than one single sample being required. The duration for a single sample should not less than one hour. In particular, it can be used to:

- Establish that control measures taken are adequate during maintenance, construction or removal work directly concerned with in situ asbestos containing materials (ACM).
- To assess appropriate respiratory protective equipment is being worn,
- To establish that exposure is below the Control Limit in conformance with exposure standards for occupational exposure adopted by Safework Australia (the National Occupational Health and Safety Commission)
- To provide estimates of exposure for epidemiological investigations of morbidity and mortality, and for civil or worker's compensation legal reasons.

3.1.2 Control Monitoring for Other Situations

Control monitoring uses static samples to measure the level of airborne asbestos fibres in an area and is designed to assist in assessing the effectiveness of implemented control measures. This method is intended to be used to control monitoring airborne fibres in situations that involve sampling, such as the following:

- Outside asbestos removal and encapsulating areas
- At the clean end of asbestos decontamination units
- For clearance sampling after asbestos removal and encapsulating
• Inside buildings, structures or ships which contain asbestos

A filter holder is attached to a static pump and is sited at a height of between 1 and 2 meters above the floor in an unobstructed position with the cowl opening facing downwards. Sampling pumps should be positioned to give a true representation of the sampling area. Sample duration for control monitoring is influenced primarily by the reason for monitoring, the level of fibre concentration to be measured, the concentration of non-fibrous dust and the requirements of the analytical method.

3.1.3 Flowrate, Sample Volume, and Reporting
The total sample duration should aim to collect a sample that is representative of the period in question, usually an entire shift. Therefore, a detailed knowledge of the work being conducted is necessary at all times, especially when the actual asbestos work does not cover the entire shift.

For both control and exposure monitoring, the flowrate should be selected in the range 0.4 to 8 litres/min (L/min) for a 25mm diameter filter. Less than 0.4L/min may preclude countable fibres from being collected from the airborne dust cloud and greater than 8L/min may result in interference from excessively large particles and may also cause leakage problems for most available filter holders. A flowrate of 2L/min is appropriate. Sample volumes of less than 100 litres are not recommended because of the increased loss of precision in the results obtained. Low sample volumes may also lead to higher reporting limits than may be desired.

Under conditions of very low airborne fibre concentrations or when a single sample duration is much greater than four hours are desired, it is permissible to increase the sample volume appropriately. Sample volumes in excess of 1000 litres may lead to unreadable filters in some environments. A 500 to 1000-litre sample is sufficient to maintain a lowest calculated concentration less than 0.01 fibres/mL.

For filter other than 25mm diameter, the flowrate and sampling volume used should be adjusted in proportion to the effective filter area. For example, if a 13mm filter diameter is chosen, the flowrate and sample volume should be reduced by the ratio of areas represented by diameters of 10mm (for the 13mm filter) and 22mm (for the 25mm filter). This ratio is approximately five to one. As a result, the flowrate of 2 litres per minute would be reduced to 0.4 litres per minute, and a sample volume of 500 litres would be reduced to 100 litres.

The flowrate through the filter holder should be checked at least immediately before and after monitoring. If the difference is greater than 10 per cent from the initial flowrate, the sample must be rejected, unless a valid method of estimating the total volume can be applied.

An external flowmeter is used to determine the flowrate of the pump. Care must be taken to ensure that the flowmeter does not cause unknown changes to the flowrate. The flowmeter used must be able to measure flowrate to an uncertainty of +5 per cent of the true flow at the 95 per cent confidence level.

Internal flowmeters fitted in some pumps are not sufficiently accurate and can indicate different readings depending upon the pressure drop across the filter. They should not be used to measure flowrate unless both of these factors are taken into account.
3.2 PREPARATION AND USE OF SAMPLING PUMPS

Sampling pumps are only to be set up in our main laboratory or in a clean area of a client's premises that are free from fibrous contamination and in accordance with the following procedure:

- Attach fitted cowl to the plastic tube attached to the pump and adjust the flow to the required value using the calibrated site flowmeter.
- Close the open end of the cowl with a protective bung to prevent contamination of the filter during transport.
- At the start of the sampling period remove the protective bung, start the pump and measure the flow rate using the flowmeter. Record the flow rate and start time on the Airborne Asbestos Monitoring Report (QC Form 045).
- At the end of the sampling period check the flow rate again and record the final flow rate and finish time on the Airborne Asbestos Monitoring Certificate. Stop the pump and replace the protective bung. Clean the pump before removing from location.
- If the flow rate has varied by more than 10% the sample shall be rejected.

3.3 STORAGE AND TRANSPORT OF SAMPLES

Fixatives must not be used to adhere fibres to filter because this may remove fibres from the filter face. Filters should be transported in the closed holders in which the samples were collected. All samples are then clearly and unambiguous labelled. The filters should not be marked for this purpose because of the risk of damaging the filter. The filter holders should be packed into a rigid container with some soft packing material to prevent both crushing and vibration of the filter.

3.4 FILTER CHECKS

3.4.1 ANALYTICAL BLANKS

1 filter in every 100 is to be taken from unused boxes of filters before use. Do not load this filter into a filter holder, nor draw any air through it, nor attach it to the worker. This filter is to be mounted and counted to check that they are satisfactory for use. If the filter chosen has a fibre count greater than 2 fibres in 100 fields, additional analytical blanks should be selected. In general, analytical blanks should have a count of zero fibres/100 graticule areas. If further blanks yield positive results, the batch from which the filter came must be rejected. Boxes of satisfactory filters will be marked underneath with the check date and initials of the person who undertook the check.

3.4.2 FIELD BLANKS

Field blanks can be used if added confidence is required for low ambient concentrations of dust and/or fibres. If so, for each batch of filters used for actual field tests, select and load a filter into a cowl which will not be connected to a pump to give a field blank sample. This field blank sample shall then accompany the air samples with the protective bung being removed from the field blank cowl at the same time as the bungs are removed from the sample cowls. The field blank should be mounted onto a slide and a fibre count undertaken.
as per the procedures given in Section 4 of this manual. If any field blank yields fibre counts greater than 2 fibres/100 graticule areas, the entire sampling and analytical procedures should be examined carefully to find the cause of the contamination. When the field blank count exceeds 2 fibres/100 graticule areas, and also exceeds 10% of the actual sample fibre count/100 graticule areas, the samples to which the particular blank is appropriate should be rejected and the cause of contamination must be identified and corrected.

3.5 ACCEPTABLE FIBRE LOADINGS ON FILTERS

3.5.1 MINIMUM LOADING

The minimum loading on filters as per NOHSC:3003 (2005) is 10 fibres/100 graticule areas. Note that a sample count of 10 fibres/100 graticule areas can just be distinguished from the background blank count of 2 fibres/100 graticule areas for typical sampling/analytical uncertainties prevailing in this method. For this reason, it is mandatory to ensure that blank counts are not greater than 2 fibres/100 graticule areas before accepting 10 fibres/100 graticule areas as a minimum loading.

If less than 10 fibres/100 graticule areas is observed and blank counts are not greater than 2 fibres/100 graticule areas, then the figure of 10 fibres/100 graticule areas is the minimum that can be used to calculate airborne fibre concentration.

3.5.2 MAXIMUM LOADING

As per NOHSC:3003 (2005), the filter loading should not exceed a maximum of 5 fibres/graticule area (average value for all counted fields) for the majority of sampling situations. This may need to be reduced to an average of about 1 fibre/graticule area when mixed dusts or agglomerates are present, and can sometimes be doubled or even quadrupled when only fibres are present on a clear background. Average filter loadings between 5 and 10 fibres/graticule area are subject to increased undercounting due to problems of obscuration and this should be treated with caution. Average filter loadings exceeding 10 fibres/graticule area can be accepted, providing than the fibrous and non-fibrous dust loading is sufficiently light so that it does not obscure or interfere with any of the countable fibres.

3.6 THIRD PARTIES CONDUCTING VOLUME MEASUREMENT

Third parties can conduct the sample collection for asbestos fibres in air, leading to the issue of a report including a concentration, as long as the following requirements are met by the accredited facility:

- A formal training (and retraining) program for each third party staff member is conducted, including practical and theoretical exams;
- The name of the third party (person and their company) is included on test reports;
- A note is included on test reports stating that trained third parties did the volume measurement and that the facility is responsible for the data;
3.7 Setting up a Field Laboratory for Fibre Counting

As per NATA document ‘Chemical Testing Annex B: Fibre Counting’, to qualify as a field laboratory an operation must satisfy the following three criteria:

a) It must be established to service one specific project with a finite period of no more than 18 months, not several non-specific ones.
b) It must be on the site of (or in very close proximity to) the project it is servicing
c) It must be staffed by asbestos counters who work out of the base facility.

When setting up in a field location, it is essential to implement anti-contamination procedures that are in line with procedures in base facility. A failure to ensure this could cause contamination to the samples during the sample preparation process and thus jeopardise the validity of results. The first step in preparing the field laboratory is to choose a clean room (e.g. office) which is in very close proximity to the project it is serving. Then, it is essential to remove all non-essential materials from the room, especially the top surface of the table where the phase contrast microscope (PCM) is going to be set up. Where the table surface is not able to be cleaned sufficiently, it may be possible to cover it with clean materials that are known to be fibres-free such as a layer of polythene sheet. Background air monitoring may be conducted to determine if high level of fibres may be present in the air of the room. After the laboratory is set up, the location needs to be treated as a standard laboratory area. Only clean personnel and air sampling equipment can enter the room. Before analysing any samples, it is essential to ensure that the PCM is calibrated as per Section 4.2 of Procedures Manual 3.

Records must be kept of the location of each PCM used outside the base facility, and the dates on which it was at each site. The field laboratory must be visited at least once per week by a staff member of Lifetree who is experienced in the total asbestos testing process from sample collection to issue of reports, if he is not located at the field site for the duration of its operation. A copy of NOHSC:3003 (2005) and Procedures Manual 3 must be kept in each field laboratory.