

**Reprovisioning of Diamond Hill  
Crematorium Demolition EIA: Asbestos Assessment**

**Diamond Hill Crematorium  
Asbestos Investigation Report**

**March 2003**

## DOCUMENT TITLE PAGE

<b>Client :</b>	<b>Hong Kong Productivity Council</b>	<b>Contract No. (if any) :</b>
<b>Project Title :</b>	<b>Reprovisioning of Diamond Hill Crematorium Demolition EIA: Asbestos Assessment</b>	<b>Project No. :3574</b>
<b>Document No. :</b>	<b>3574-0R001-00</b>	<b>Controlled Copy No. :</b>
<b>Document Title : Diamond Hill Crematorium Asbestos Investigation Report</b>		
<b>Covering Letter / Transmittal Ref. No. :</b>		<b>Date of Issue :</b>
<b>3574/PD2/ELT14684/BC/OG002</b>		<b>05 March 2003</b>

## Revision, Review and Approval/Authorization Records

Revision	Description	Prepared by / date	Reviewed by / date	App. or Auth. by / date
00	First Issue	Various /	David Green 5/3/03 PP. BAC	B Chiu 5/03/03 BAC

## Distribution (if insufficient space, please use separate paper)

Controlled Copy No.	Issued to
1	EPD
2	HKPC
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Note : App. and Auth. mean "Approved" and "Authorized" respectively

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## SUMMARY

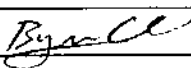
- I. The Diamond Hill Crematorium (DHC) site consists of the main building (DHC), Staff Quarters, a small Toilet Block in the lower garden area and a CLP Power Transformer Room there is a modest Refuse Collection Area (RCP) and a Car Park (CP).
- II. This Asbestos Investigation for the Premises has confirmed the presence of ACM. ACM has been identified in:
  - the crematorium room in the cloth outer insulation on the chimney serving the crematoriums
  - in the machine room on gaskets of flanges to the so called air burners
  - in adhesives under vinyl floor tiles in the offices of the main building.
- III. ACM was not found in the Toilet Block, Transformer Room, Store Room block (formerly quarters) or Car Park. The extent of ACM is limited.
- IV. Whereas the external structure of the crematoriums was examined closely the internal lining to the furnaces could not be examined as the crematoriums are in operation every day and are too hot to access at all times. Likewise the access flange on the chimney could not be removed to examine the flange of the chimney as the chimney is in operation every day. Whereas experience suggests that a large amount of ACM would not necessarily be present in these areas they must be re-examined when the crematoriums and chimney are eventually switched off or decommissioned and cool enough to access safely.
- V. Due to the good physical condition, low likelihood of fibre release, if undisturbed, restricted accessibility and lack of population in the immediate vicinity the overall hazard is low to moderate.
- VI. ACM from the Premises is programmed for removal, in line with the main demolition works tentatively scheduled no earlier than 2005, lasting up to one year.
- VII. The ACM will be removed using methods in line with codes of practice (COP) for Asbestos Control for the *Safe Handling of Low Risk ACM and Removal of ACM using Full Containment or Mini Containment Method*. Arrangements for the supervision of the works and the appointment of Registered Asbestos Contractors will be made at a later stage in line with statutory requirements of the Air Pollution Control Ordinance.
- VIII. It is recommended that an Asbestos Management Plan including Asbestos Abatement Plan and Operation and Maintenance Plan be prepared following this report to cover the period up to the removal of the ACM.

## 1 INTRODUCTION

### 1.1 Background

- 1.1.1 The Hong Kong Productivity Council (HKPC) engaged the services of Atkins China Ltd (ACL) to prepare an Asbestos Investigation Report for the Diamond Hill Crematorium (DHC). An Asbestos Investigation Report has therefore been prepared following survey to identify the extent to which Asbestos Containing Materials (ACM) are present at Diamond Hill Crematorium (the Premises). The particulars of the owners and the signature of the Registered Asbestos Consultant(s) are presented in Table 1.1.

Table 1.1 : Particulars of Owner, Consultant and Laboratory

Item		
Owners Name	Government of HKSAR	
Owners Address	Diamond Hill Crematorium, Po Kong Village Road	
Owners BRN / ID	N/A	
Certificate of Incorporation	N/A	
Owners Contact Number	2788 5059	HKPC re Demolition
Company / Premises Controllers	Mr. Lam (2325 9996)	EMSD/FEHD
Registered Asbestos Consultant(s)	Byron Chiu	David W.J. Green
Signature		
Registration Number	1058	1019
Expiry Date	29 <sup>th</sup> January 2004	7 <sup>th</sup> January 2004
Registered Asbestos Laboratory	Materialab	Tel. 2450 8233
Registration Number	4001	Donney Leung

- 1.1.2 The DHC comprises several elements as well as the main Crematorium building there is a small toilet block, staff quarters (currently used as a store) and a CLP Power substation. There is a car park adjacent to the main crematorium building (Figure 1.1). This AIR concerns itself with all the structures at the Premises.
- 1.1.3 The main Crematorium building (DHC) has six cremators which are currently fully operational (Figure 1.1). A feature of the DHC is a 10m tall chimney-stack located on the roof. The main plant, which is housed in the main building of the Crematorium will not be decommissioned until a replacement facility has been built.
- 1.1.4 There was no indication that any asbestos investigation and asbestos abatement programmes have been conducted in the past. The client indicated that it was not possible to identify any plans or drawings of the crematorium construction. A search of internet sources indicated that the manufactures do not routinely use asbestos containing materials in the refractory linings of furnaces in the cremators.

- 1.1.5 This AIR contains the results of asbestos investigations, which identify, define, and document where possible, the existence and absence of asbestos containing materials (ACM) associated with remaining structures at the Premises.

## **1.2 DHC Demolition**

- 1.2.1 The DHC has been scheduled to be demolished to make room for a replacement facility. The demolition of a municipal incinerator constitutes a designated project under the provisions of the Environmental Impact Assessment Ordinance (EIAO). A study brief for the EIA of the demolition of DHC was issued by EPD under the EIAO. HKPC subsequently compiled a Study Brief (SB) for consultants and appointed Atkins China Ltd to provide professional consulting services for the Asbestos Investigation.
- 1.2.2 At this stage it does not appear that the operation of the elements of the DHC has given rise to any residual ACM with Asbestos Containing Materials (ACM) dust or fibre. However there are some remaining ACM which will require removal before the buildings and chimneys are demolished but these are not currently a hazard to the public or staff as they are in good condition and not readily accessible to the public.
- 1.2.3 The Study Brief issued by HKPC assumes that any ACM present in the crematorium plant, chimney and structures will be removed before commencement of the demolition works and in theory this is the preferable approach.
- 1.2.4 The presence of ACM does not necessarily imply that there are any implications for staff or public health. The purpose of the AIR is to allow the consultants to assess if and when asbestos abatement is required, taking into account the likely programme and method of demolition. ACM will eventually be removed throughout the Premises in due course, however, the exact programme for demolition is yet to be determined. This report therefore is related to general Asbestos Management prior to and if necessary during demolition. It is recommended that an Asbestos Management Plan should also be prepared including Operational Management Plan and Asbestos Abatement Plan (AAP) to identify the management of the ACM remaining on the premises and a scope of works for the eventual abatement processes as and when they take place in phase with demolition of the Premises.

## **1.3 Structure of the Report**

- 1.3.1 In addition to this introduction this AIR includes sections covering the following:
- Section 2 Description of the Premises and Location.
  - Section 3 Method of Investigation.
  - Section 4 Detailed Description of the Field Inspection and Sampling Programme.
  - Section 5 Analytical Results
  - Section 6 Hazard Assessment
  - Section 7 Conclusions and Abatement Strategy.

## **2 DESCRIPTION OF THE PREMISES AND LOCATION**

### **2.1 The Location**

2.1.1 The Premises is located at Po Kong Village Road, Diamond Hill, Kowloon. Figure 1.1 shows the location and indicates the substantial distances to the nearest habitation and places of work. The site is not too close to any sensitive receivers or residential premises.

### **2.2 The Premises**

2.2.1 The DHC comprises several elements as well as the main cremation plant.

2.2.2 The structures which remain to be demolished at DHC are summarised in Table 2.1.

**Table 2.1 : Structures to be demolished at DHC**

<b>Building</b>	<b>Brief Description</b>
DHC Chimneys	A reinforced concrete chimneys, <20m high, 1.5m in cross section.
DHC Building	Reinforced concrete structure of approximately 5,000m <sup>2</sup> on plan
CLP Power Substation	Single Storey Transformer House (adjacent to access road)
Toilets, Sitting Out Area and Garden	Open landscaped area with landscaping, lighting and sitting areas
Store Rooms (former staff quarters)	Reinforced concrete structure of approximately 100m <sup>2</sup> on plan

2.2.3 It has been assumed that the demolition for DHC will take place as soon as possible. The start date has not yet been scheduled.

### **3 METHOD OF INVESTIGATION**

#### **3.1 Basic Approach**

3.1.1 To accomplish this Asbestos Investigation, the following were carried out.

- Review of the available plans and drawings;
- Visual survey and physical inspection of the structures within the Premises; and
- Preparation of the following report that addresses the potential for on-site environmental liabilities associated with asbestos.

3.1.2 No previous surveys were available for review.

3.1.3 The methodology employed for the investigation of potential ACM was based upon a combination of professional judgement, expertise and qualified assumptions based upon knowledge of the site layout. In addition, plans and suitable diagrams of the site have been made. This has enabled confirmation by visual identification and sampling and analysis (wherever possible) of the remaining ACM and other potential ACM. Details are provided in the later sections of this Asbestos Investigation Report.

3.1.4 In conducting the asbestos investigation the Premises was examined, adopting a systematic approach, whereby each individual room was inspected. For ease of identification each level and the rooms have been designated a title based on the use of the area and the numbering convention adopted by the staff at the Premises.

#### **3.2 Plans and Drawings**

3.2.1 Drawings for the site buildings and layout were inspected and used to produce the figures and tables presented below.

#### **3.3 Record Review, Renovations and Maintenance**

3.3.1 No detailed records of previous maintenance were made available. However, where evidence was available, records of earlier asbestos investigations are incorporated in this report.

3.3.2 The remaining structures in the main buildings and offices appear to have remained essentially unmodified and appear to be essentially as built, except for general maintenance and minor renovations (painting etc.).

#### **3.4 Interviews and Inspections**

3.4.1 Dr. David Green and Mr. Byron Chiu carried out the inspections of the Premises (February 2003). The survey was limited to exposed areas of the Premises which were readily accessible to the Consultant without the removal of external or internal building fabric, fixtures or fittings. The Consultant did not, for the purposes of this survey, examine in detail any unexposed areas of the Premises, such as concealed inner linings of the furnaces, the inner lining of the chimney or underground water pipes, cables, mains, etc. or any areas of the Premises which were dangerous or hazardous to the Consultant. However all areas were inspected and there were no inaccessible areas other than the furnaces and upper section of the chimney at the time of survey.

3.4.2 In this connection, we declare that we had made every effort to have all materials on the premises visually examined and where appropriate sampled and analyzed by a registered asbestos laboratory to ascertain the presence or otherwise of asbestos containing material.



- 3.4.3 Based on previous inspections of other premises of a similar age and design, initial inspection of the Premises showed that few if any locations had materials of a type known from numerous premises, to be ACM. However vinyl floor tiles were present in some locations and some types are known to be ACM. One typical asbestos resin gaskets on the air burners typical asbestos cloth wrapping were also identified on the cremator air filtration system and chimney. Staff, employed at the site could not recollect any asbestos abatement having taken place. No major issues emerged other than general concerns for safety.

### **3.5 Sampling Strategy**

- 3.5.1 During the investigation a cautious approach was taken to ensure that in incidences of doubt all potential ACM would be treated as ACM.
- 3.5.2 The samples were taken and analyzed for the presence and type of asbestos according to the HOKLAS Laboratory's accredited testing procedures.
- 3.5.3 Because the construction of the Premises is essentially from non-asbestos materials, close examination of the building materials did not find many typical ACM. However all materials were examined and some samples were taken to reconfirm no fibre or ACM was present.

## **4 DETAILED DESCRIPTION OF THE FIELD INSPECTION AND SAMPLING PROGRAMME**

### **4.1 General Validity of Records and Drawings**

- 4.1.1 Figures 4.1 provide the general layout plan of the main buildings based on a sketch provided by the local staff. Photographs of the facility are provided in Appendix A to add further information on the current condition of the site. Close up photographs of the materials sampled are also presented in Appendix B; with the analytical certification. Sample locations are also shown in Appendix B.

### **4.2 Systematic Inspection of Functional Zones**

- 4.2.1 The main elements of the DHC are presented in Figure 1.2. The areas are reviewed in turn below.

#### ***CLP Substation***

- 4.2.2 The single storey substation is located at the south end of the DHC site (Photo 1). The walls, floors and ceiling are painted cement. There are metal doors. No fibrous wall or floor penetration seals were present and no potential ACM was identified.

#### ***Toilet Block and Garden***

- 4.2.3 The single storey substation is located at the middle of the DHC site (Photo 3). The walls and floors of the Toilets are ceramic tiles (Photo 4) and ceilings are painted cement. There are metal doors. No potential ACM was identified.

#### ***Staff Quarters / Store Rooms***

- 4.2.4 The single storey structure is located at the north east end of the DHC site (Figure 1.1). The walls, floors and ceiling are painted cement. No potential ACM was identified.

#### ***Car Park***

- 4.2.5 No potential ACM was identified in the Car Par (Photo 33).

#### ***Main Building***

- 4.2.6 The single storey building is located at the middle of the DHC site (Photo 34). The main building is constructed from brick and reinforced concrete. General and specialist crematorium service equipment is present throughout in the main building but none of this appears to contain any potential ACM. The buildings have undergone some refurbishment and modern electrical equipment, switchgear and fuse boxes, have been installed in most places (Photos 7 & 9). The available plan appears to accurately reflect the existing construction of the main building fabric (Figure 1.2).

#### ***Service Halls***

- 4.2.7 There is a Christian Service Hall and a General Service Hall which have a similar layout (Photos 5, 6 and 11). Floors are wooden and the walls painted cement. In the air conditioning system there were no visible potential asbestos components such as cloth flexible joints on the air handler units for the air conditioning plant.

#### ***Reception Area, General Office, Priests Rooms and Waiting Rooms***

- 4.2.8 The floors are concrete with green / grey vinyl floor tiles (Photos 8 & 12). Two samples (PE30090/11 & 12) of tiles and adhesives were taken. In both cases the tiles were not ACM but the adhesive underneath contains asbestos fibres. All such materials are assumed to be ACM. However, such materials are low risk and are exempted from AIR and AAP under the

provisions of the APCO. Flooring elsewhere is either plain cement screed or a ceramic floor tile.

#### *Lavatories*

- 4.2.9 The walls and floors of the lavatories men and women are ceramic tiles and ceilings are painted cement. No potential ACM was identified.

#### *Mortuary, Meter Room, Cremulation Room and Store Rooms*

- 4.2.10 The walls and floors are ceramic tiles and ceilings are painted cement (Photos 9, 10 & 14). No potential ACM was identified.

#### *Staff Rooms*

- 4.2.11 The walls and floors are ceramic tiles and ceilings are painted cement (Photo 13). There are two air conditioning service ducts with typical plaster and polystyrene insulation. The surface plaster coating was not visibly fibrous but two check samples were taken which were not ACM (PE30090/9 & 10). No potential ACM was identified.

#### *Committal Room*

- 4.2.12 The walls and floors are ceramic tiles and ceilings are painted cement (Photo 15). There are six metal entrance openings to the cremators. The metal jackets of the cremators did not have any visible fibrous insulation (Photo 22). The inner furnace brickwork of cremator five was not in use and was opened (Photos 19 and 20). The inner furnace brickwork of cremators does not typically contain ACM and the brickwork is typically assembled without mortar. Where necessary gaps are usually plugged with non-fibrous high alumina type cement products. No surface plaster coating was visible and no fibrous materials could be identified. No other potential ACM was identified in these areas. However it is recommended that the other furnaces be inspected in detail when they are cooled for maintenance or relining or before decommissioning as an opportunity arises.

#### *Cremator Room*

- 4.2.13 The walls and floors are ceramic tiles and ceilings are painted cement (Photo 16). There are six metal cremators with multiple entrances to rake, manipulate and retrieve ashes (Photo 21). The door to one opening on cremator 4 (Photo 21) was opened while raking was in progress and the inner door seal did not have a fibrous seal. The metal jackets of the cremators did not have any visible fibrous insulation (Photo 18) but a plaster lining material was found in crevasses and openings at the tops of the cremators 1, 2, 3 and 4. Three samples (PE30090/4, 5 & 6) of the plaster/cement were taken from cremators 1, 3 and 4. In all cases the material samples were not ACM and contained no asbestos fibres. All such materials are assumed not to be ACM at this stage. However, it is recommended that the other furnaces be re-inspected in detail when they are cooled and as they can be carefully dismantled before decommissioning as an opportunity arises.
- 4.2.14 The buildings have undergone some refurbishment and modern electrical equipment, switchgear and fuse boxes, have been installed in most places (Photos 7 & 9). However there is one older type switchbox in the cremator room which could not be switched off for examination (Photo 25). It is recommended that this switchbox be re-inspected in detail when it can be switched off as an opportunity arises.

#### *Machine Room*

- 4.2.15 The walls and floors are ceramic tiles and ceilings are painted cement. There are six metal machines labelled Air Burner Unit (1A, 1B, 2A, 2B, 3A and 3B). There are typical ACM fibrous gaskets on Air Burner Units 1B and 2A (Photo 23) and the left hand side Fan Duct gasket (Photo 24). Three samples (PE30090/1, 2 & 3) of gaskets were taken. In all cases the gaskets were ACM. All such materials are assumed to be ACM. However, such materials are low risk and are exempted from AIR and AAP under the provisions of the APCO. Gaskets and flexible joints were rubber or vinyl. No other potential ACM was identified.

#### *Chimney*

- 4.2.16 The chimney runs from the Machine Room through the Cremator Room and up to the roof. The chimney itself appears to be a circular steel tube running up to the first floor (Photos 16 & 26). In the cremator room the chimney is lined with rock wool underneath a typical asbestos cloth wrapping (grey cylindrical structure on left of Photo 16). The cloth wrapping has been painted more than one layer of aluminium grey paint. Two samples (PE30090/7 & 8) of the insulation were taken from chimney in the cremator room. It was not possible to access the chimney in other locations. In both cases the insulation material samples were ACM. All such materials along the length of the chimney are assumed to be ACM at this stage. It is recommended that the access plate to the chimney at roof level (Photos 26 & 27) be removed and re-inspected in detail when the cremators are off, cool and as they can be safely inspected before decommissioning as an opportunity arises.

#### *Roof*

- 4.2.17 The roofs are made of ceramic tiles and non-fibrous aggregate tiles (Photos 29 & 30). Chiller and ventilation units and pipework (Photos 29 & 31 and 32) did not contain any fibrous materials. No potential ACM was identified.

### **4.3 Overall View of ACM Condition and Risk**

- 4.3.1 Asbestos containing materials have only been identified in the structures in the form of the chimney insulation, three gaskets and the vinyl floor tiles. In the case of the flooring the asbestos is in the adhesive layer beneath the vinyl floor tiles. The asbestos gaskets and the vinyl floor tiles are all low risk materials. The chimney insulation appears to be in moderate condition.
- 4.3.2 The asbestos in the floor adhesive is effectively encapsulated beneath the vinyl floor tiles. The asbestos contained in the gaskets is in a resin matrix and unlikely to result in the release of asbestos fibres even when eventually removed. The asbestos contained in the chimney lining has been painted over and unlikely to result in the release of asbestos fibres unless deliberately disturbed. Providing that sensible precautions are taken, the asbestos materials can remain undisturbed in routine operation, until such time as the removal work can take place.
- 4.3.3 Due to the moderate to good physical condition of the ACM, low likelihood of fibre release, if undisturbed, the overall hazard is low. The asbestos at the Premises does not present a significant hazard and will be programmed for removal, in due course in line with general renovations.
- 4.3.4 Whereas the access is limited in places these limitations are not sufficient to prevent the removal of the asbestos containing adhesive from the above locations in line with the recommendations of the APCO. Care will be required but the abatement should generally be able to progress in line with methods recommended in the codes of practice for asbestos removal under the APCO. These shall be detailed in an Asbestos Abatement Plan.

#### **4.4 General Safety Measures**

- 4.4.1 Any staff requiring access to the site should be made aware that the subsequent abatement works are to be progressed. Access should be restricted to essential staff for the duration of the removal works. These matters shall be covered in the AMP.
- 4.4.2 It is noted that most remaining asbestos is encapsulated in the adhesive matrix under the vinyl tiles and in the resin matrix of the gasket. The chimney lining would not be disturbed in routine operations. In general operation of the Premises is unlikely to have given rise to any residual contamination of the buildings with asbestos dust or fibre.
- 4.4.3 The asbestos will be removed using methods in line with code of practice for the *Safe handling of Low Risk ACM* or the code of practice for the *Removal of ACM using Full Containment* and supervised accordingly in due course. Details will be presented in an Asbestos Abatement Plan for the Premises, recommended to be prepared in tandem with this report.
- 4.4.4 It is recommended that details of the AAP will be presented in an Asbestos Management Plan Abatement Plan, including Operation and Maintenance Plan which shall be prepared after this report.

## 5 ANALYTICAL RESULTS

### 5.1 Sampling Locations

- 5.1.1 No results of previous sampling are available.
- 5.1.2 The types of asbestos found in each functional zone are presented in Table 5.1. Further information is presented in Appendix B and Section 6.
- 5.1.3 Materials such as Type 1, and Type 2 ACM have been located.

**Table 5.1 : Results of ACM Analysis of materials samples during site investigation.**

Photograph	Location	Material	Sample Number	Results
23	Machine Room	Gasket	PE30090/1	Type 2
23	Machine Room	Gasket	PE30090/2	Type 2
24	Machine Room	Gasket	PE30090/3	Type 2
16/17	Cremator Furnace No. 1, Cremation Room.	Furnace Insulation	PE30090/4	Nil
16/17	Cremator Furnace No. 3, Cremation Room.	Furnace Insulation	PE30090/5	Nil
16/17	Cremator Furnace No. 4, Cremation Room.	Furnace Insulation	PE30090/6	Nil
16/17	Cremation Room	Chimney Insulation	PE30090/7	Type 2
16/17	Cremation Room	Chimney Insulation	PE30090/8	Type 2
13	Staff Room	Staff Room	PE30090/9	Nil
13	Staff Room	Staff Room	PE30090/101	Nil
12	General Office	Vinyl Floor Tile	PE30090/11	Type 1
8	Waiting Room	Vinyl Floor Tile	PE30090/12	Type 1

Notes: \* Photographs are shown in Appendix A and Appendix B

## **6 HAZARD ASSESSMENT**

### **6.1 Friability**

- 6.1.1 The ACM at the offices and waiting rooms in the vinyl floor tiles is not friable. The ACM in the gaskets is friable. The ACM at the chimney insulation is friable but covered with layers of paint.
- 6.1.2 The ACM in the floor tiles is effectively immobilised in the vinyl / resin matrix of the tile. The tiles encapsulate the adhesive below the tile. The ACM in the gaskets is effectively immobilised by the gasket flange until disturbed at removal. The ACM in the cloth insulation is effectively encapsulated by the paint coating.

### **6.2 Physical Condition and Possible Fibre Release**

- 6.2.1 The ACM present in the gaskets and vinyl floor tiles appears to be in good condition and unlikely to result in the release of asbestos fibres even if deliberately disturbed due to the fibres being immobilised in the matrices of the materials present.
- 6.2.2 The ACM present in the chimney insulation is in a moderate to condition and encapsulated unlikely to result in the release of asbestos fibres unless deliberately disturbed.

### **6.3 Access**

- 6.3.1 Access is limited to contractors and Government staff. Public would not generally be expected to enter the areas where the ACM has been found. Staff at the DHC should be instructed to keep a watching brief and ensure that the ACM is not damaged.

### **6.4 Location with respect to Ventilation**

- 6.4.1 The site has window mounted or split level air conditioners and there is no other forced ventilation system therefore the possibility of release of fibres and entrapment of asbestos fibres into the ventilation system is not an issue.

### **6.5 Population**

- 6.5.1 The only population in the immediate vicinity of the ACM would be staff or contractors. Staff and visitors may pass close to the entrance to the relevant areas but the possibility of exposure to asbestos fibres is negligible in normal operation.

### **6.6 Overall Hazard Assessment**

- 6.6.1 Due to the good physical condition, low likelihood of fibre release if undisturbed, overall the hazard is low. Table 6.1 summarises the hazard assessment.

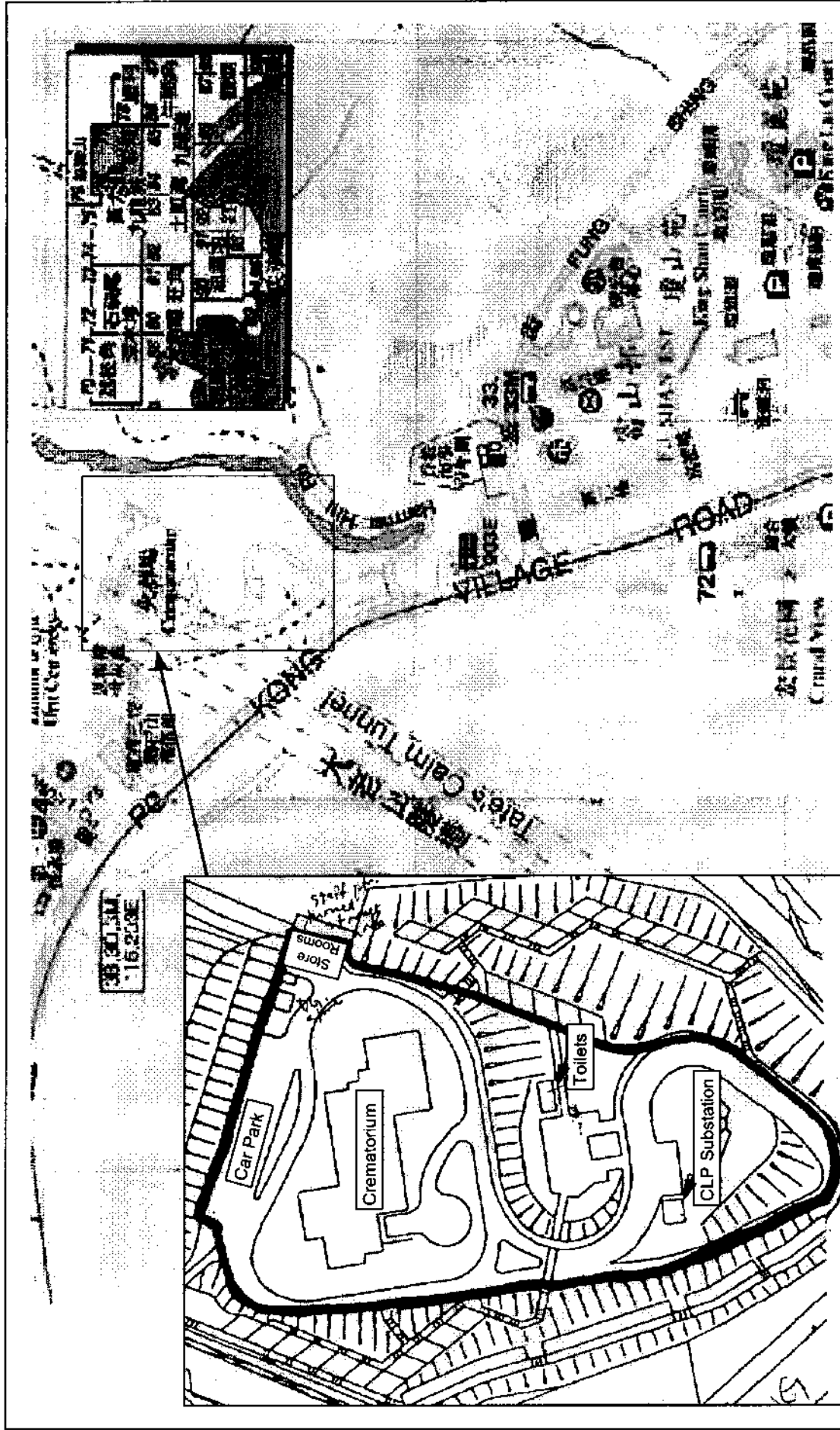
**Table 6.1 : Homogeneous Areas Identified by Functional Zone**

ACM Item No.	Functional Space	Homogeneous Material	Location	Homogeneous Area	Estimated Quantity Approx. (m <sup>2</sup> )	Friability	Condition	Sample No.	Type and Content of Asbestos	Accessibility	Asbestos Material	Overall Hazard Assessment
DHC-01	Offices and Waiting Room	Vinyl Floor Tile Adhesive	All Offices and Waiting Rooms	Tile Adhesive	100	No	Good	PE30090/11&12	Chrysotile <5%	Very Low	Type 1	Low
DHC-02	Machine Room	Gaskets	Air Burners and Fan Ducts	Cloth gasket	<1	Yes (enclosed)	Good	PE30090/1, 2 & 3	Chrysotile 80-90%	Low	Type 2	Low
DHC-03	Crematorium Room	Cloth Insulation	Chimney Duct	Cloth Insulation	<3	Yes (encapsulated)	Good	PE30090/7 & 8	Chrysotile 80-90%	Low	Type 2	Moderate



## **7 CONCLUSION AND ABATEMENT STRATEGY**

- 7.1.1 ACM is present at the DHC and the EIA prepared by HKPC will propose to remove ACM from the locations described above. In order to facilitate the progress of the AAP report the consultants will assume that the ACM will be removed using methods in line with code of practice for the *Safe Handling of Low Risk ACM* or code of practice for the *Removal of ACM using Full or Mini Containment* and supervised accordingly. Details will be presented in the Asbestos Abatement Plan for these premises, which has been recommended to be prepared in tandem with this report.



Designed: DG

Drawn: DG

Approved: DG

Project: Asbestos Abatement  
Diamond Hill  
Crematorium  
Po Kong Village Road,  
Kowloon,  
Hong Kong

Prepared by  
**ATKINS**  
supported by

David Green Limited  
Independent Environmental Consultant

安建顧問有限公司  
Atkins China Ltd



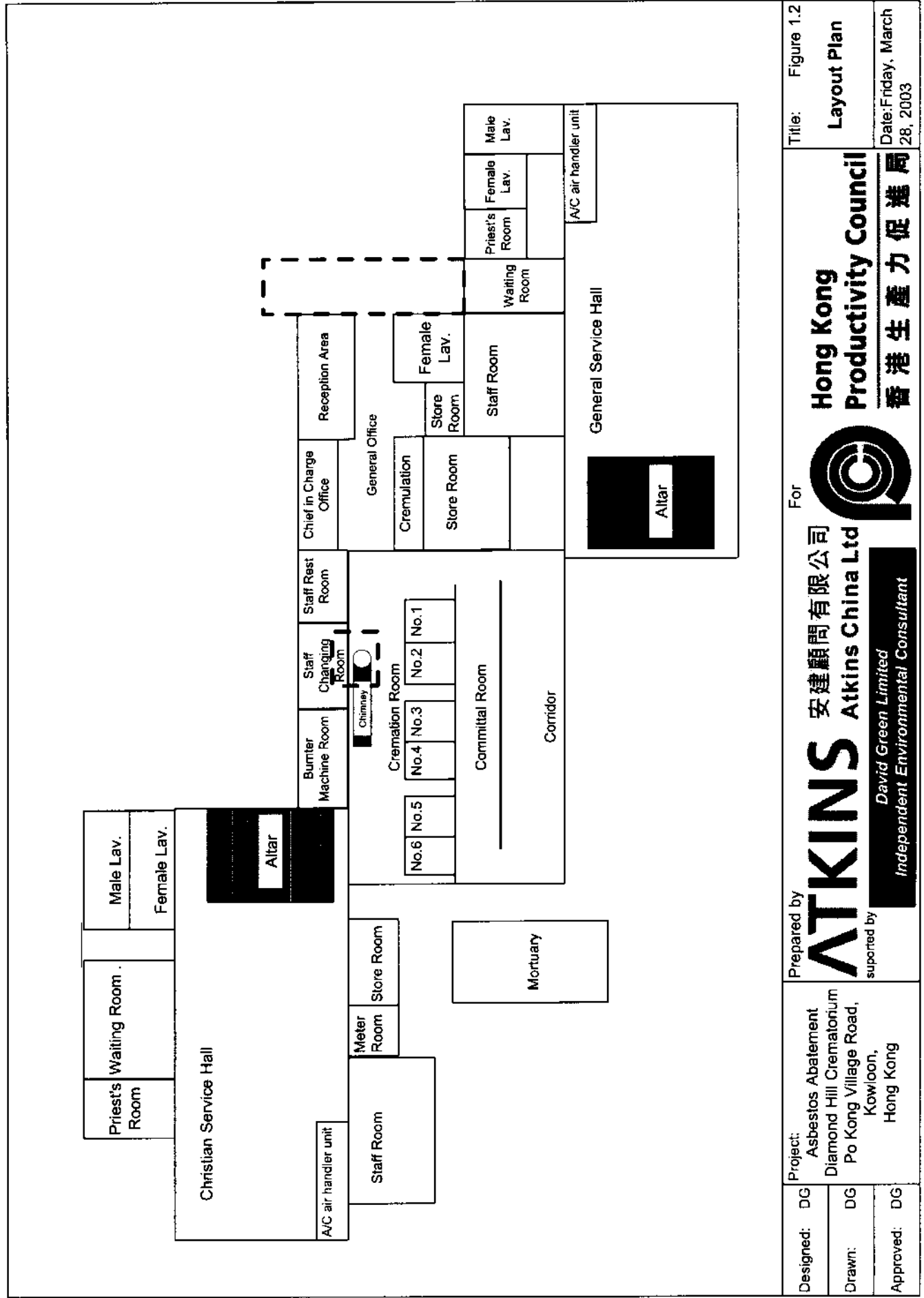
Hong Kong  
Productivity Council

香港生產力促進局

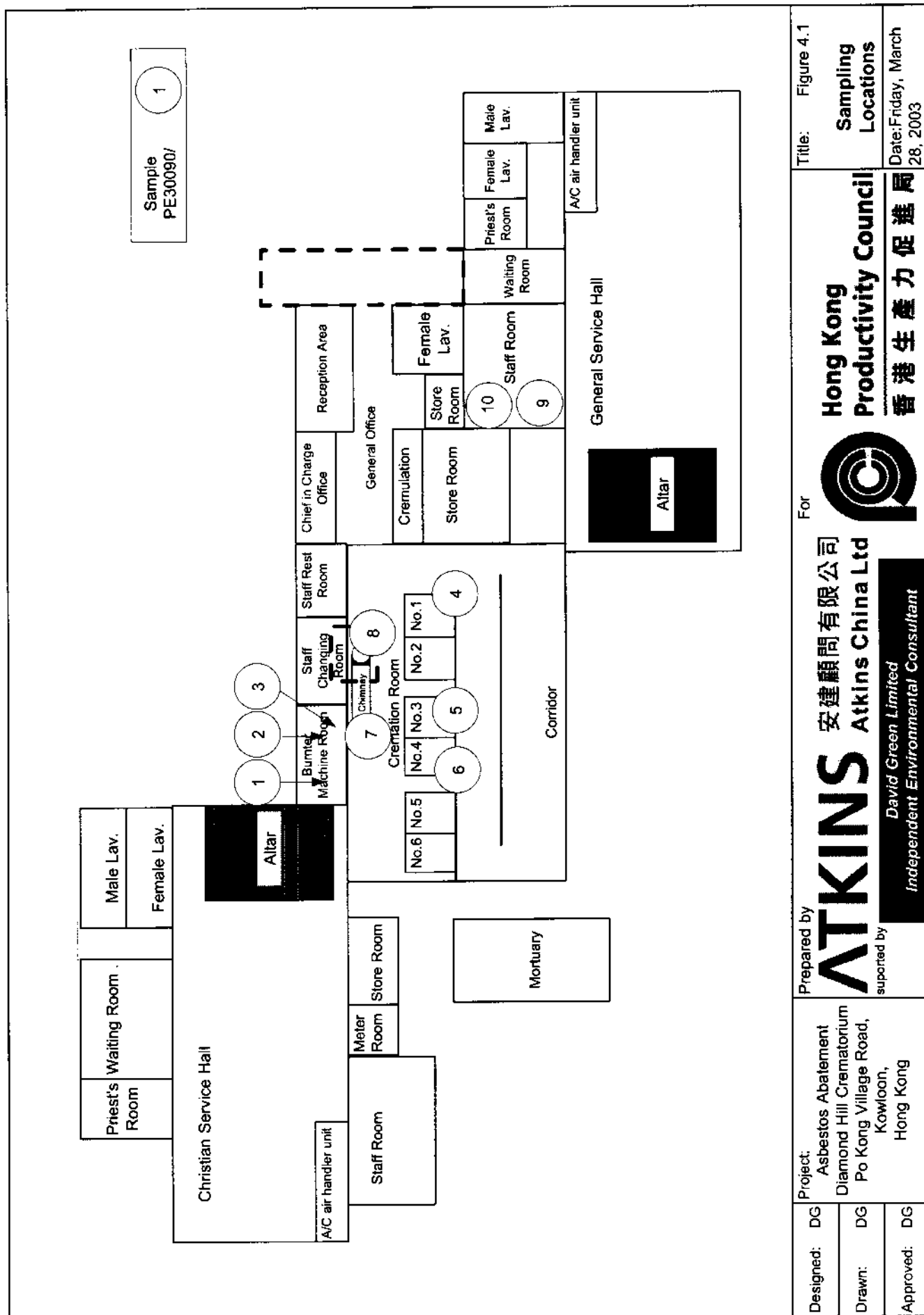
Title: Figure 1.1

Locality Plan

Date: Friday, March  
28, 2003



Designed: DG	Project: Asbestos Abatement Diamond Hill Crematorium Po Kong Village Road, Kowloon, Hong Kong	Prepared by <b>ATKINS</b> supported by David Green Limited Independent Environmental Consultant	For 安建顧問有限公司 Atkins China Ltd	Hong Kong Productivity Council 香港生產力促進局	Title: Figure 1.2 Layout Plan
Drawn: DG					Date: Friday, March 28, 2003
Approved: DG					



## **Appendix A**

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# **Photographs Showing Location of Main Functional Zones DHC**

## Appendix A      Photographs of the Site

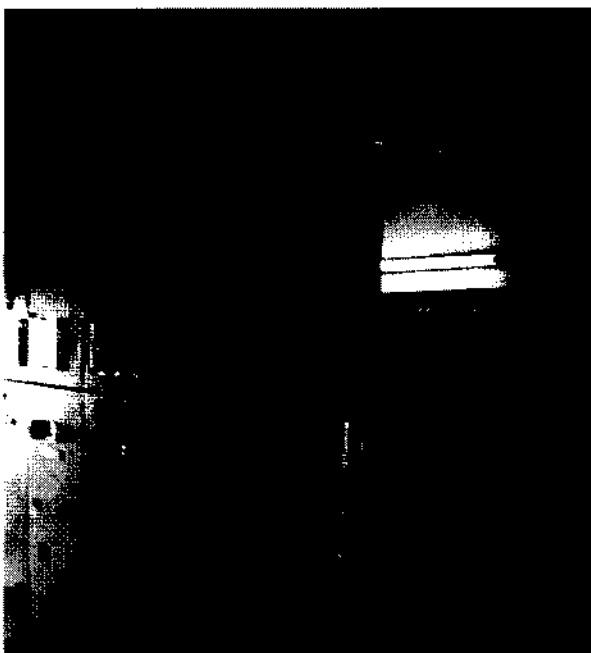
Photograph 1:      CLP Substation



Photograph 3:      Toilet Block

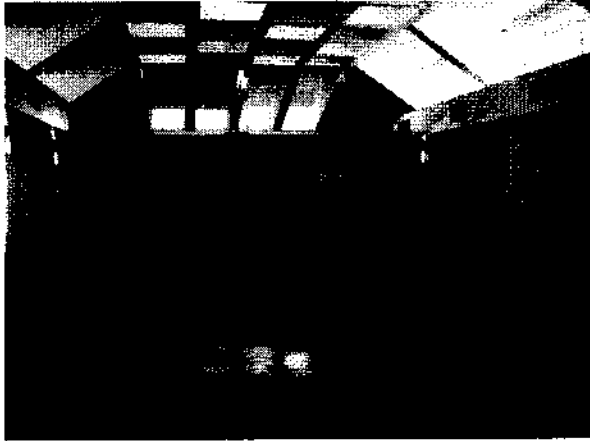


Photograph 2:      CLP Substation Transformers

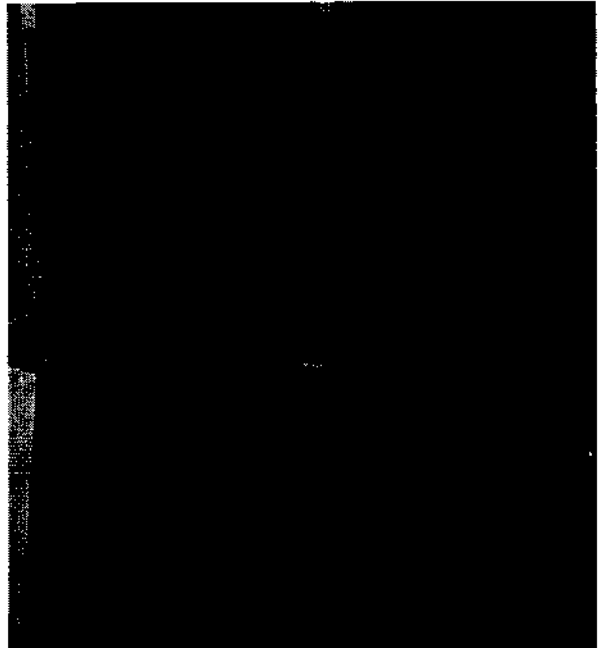


Photograph 4:      Typical Toilet Fittings

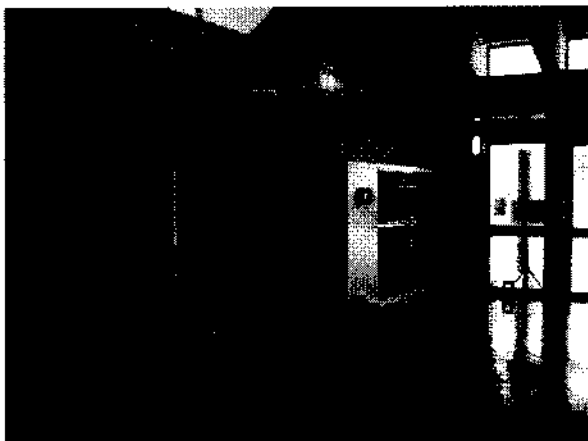
**Photograph 5: Christian Service Hall**



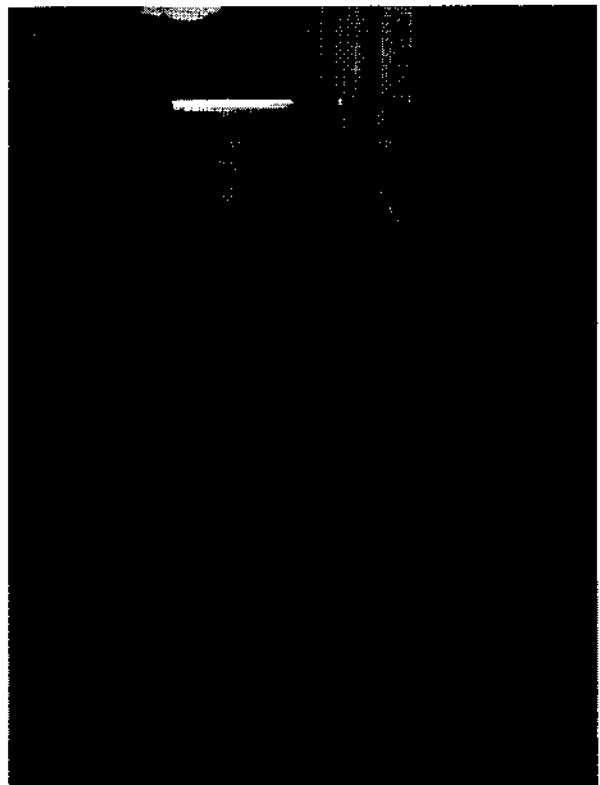
**Photograph 7: Typical Switchbox**



**Photograph 6: Typical Air Handler Unit**



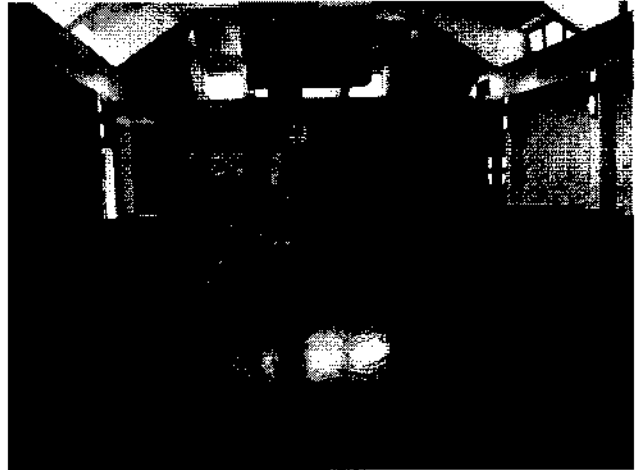
**Photograph 8: Vinyl Floor Tiles Waiting Room  
(Sample PE30090/11)**



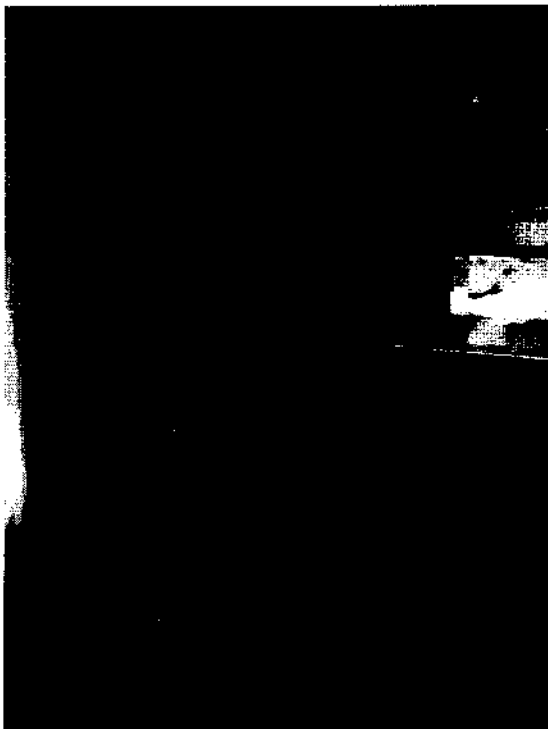
**Photograph 9: Meter Room**



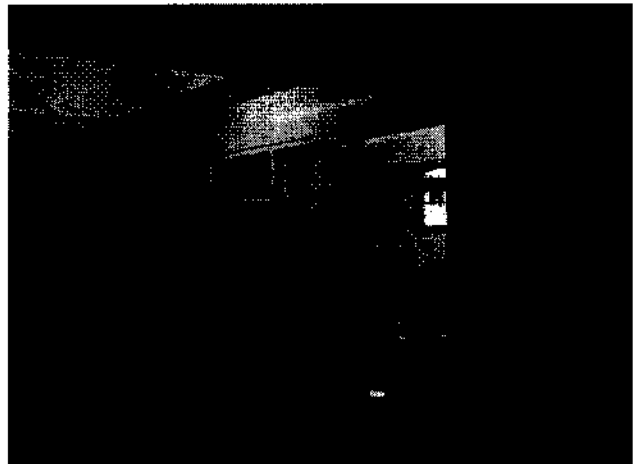
**Photograph 11: General Service Hall**



**Photograph 10: Store Room**

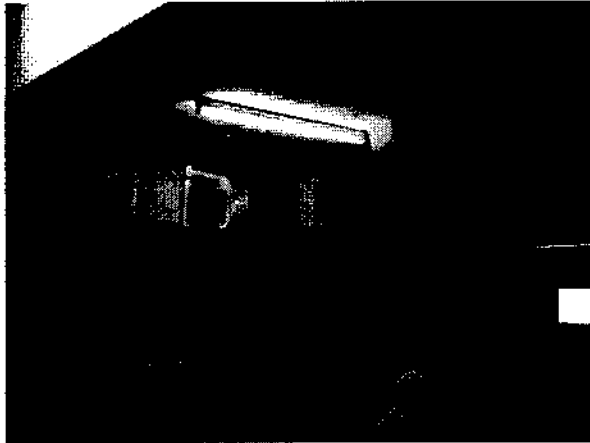


**Photograph 12: General Office (Sample PE30090/12)**

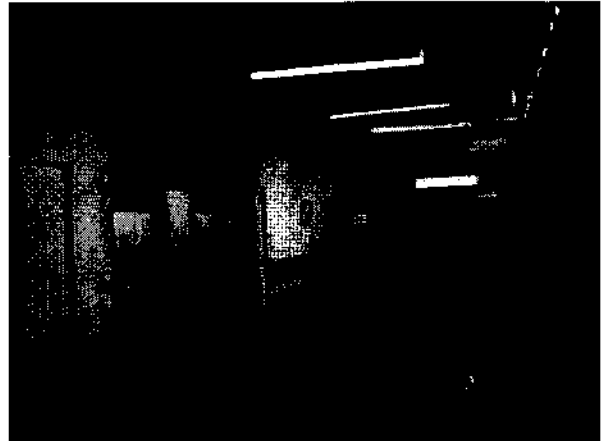




**Photograph 13: Staff Room (Samples PE30090/9 & 10)**



**Photograph 15: Committal Room**



**Photograph 14: Store Room**



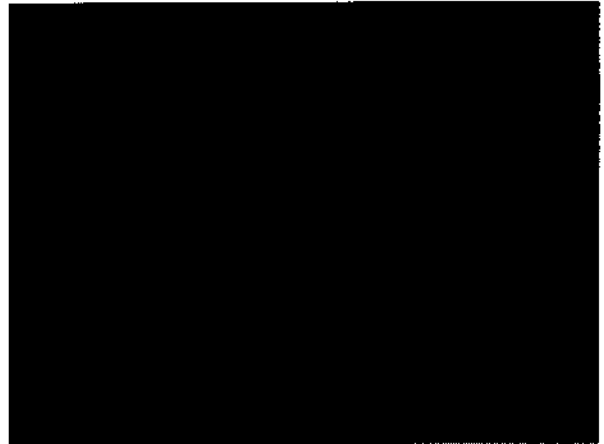
**Photograph 16: Cremator Room (Samples PE30090/7 & 8)**



**Photograph 17: Cremator Tops**



**Photograph 19: Typical Cremator Lining**



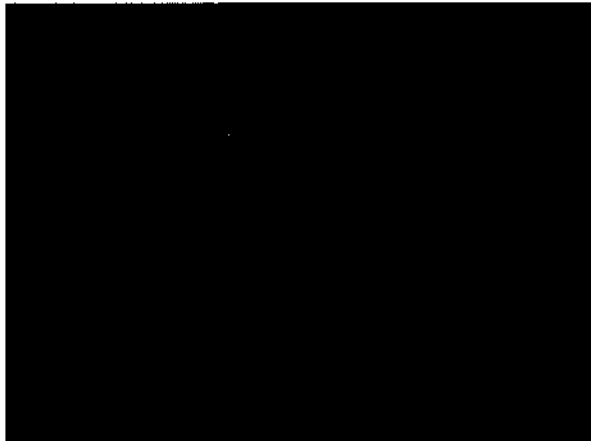
**Photograph 18: Typical Cremator Top Detail  
(Samples PE30090/4, 5 & 6)**



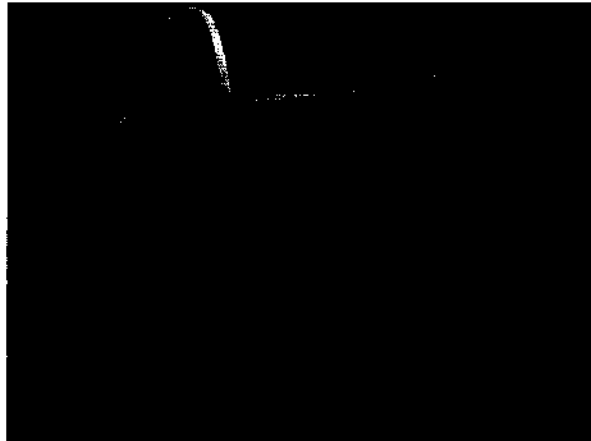
**Photograph 20: Cremator Base Lining**



**Photograph 21: Cremator Door Lining**



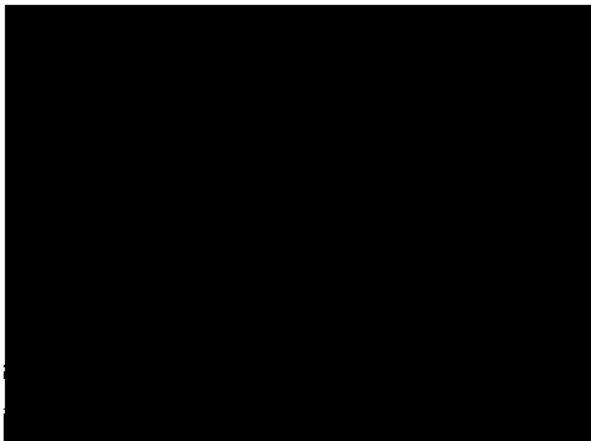
**Photograph 23: Burnter Fans, Machine Room  
(Samples PE30090/1 & 2)**



**Photograph 22: Cremator Wall Lining**



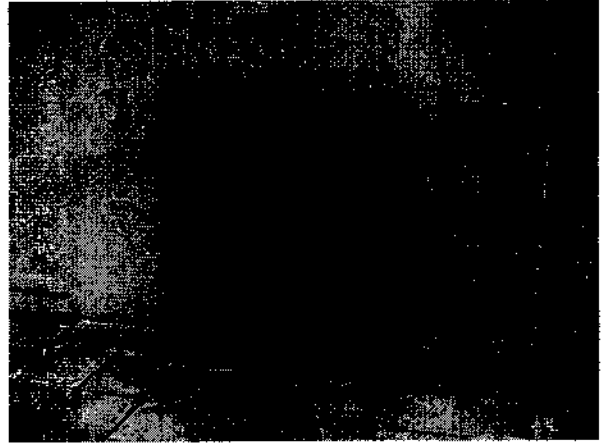
**Photograph 24: Fan Gaskets, Machine Room  
(Sample PE30090/3)**



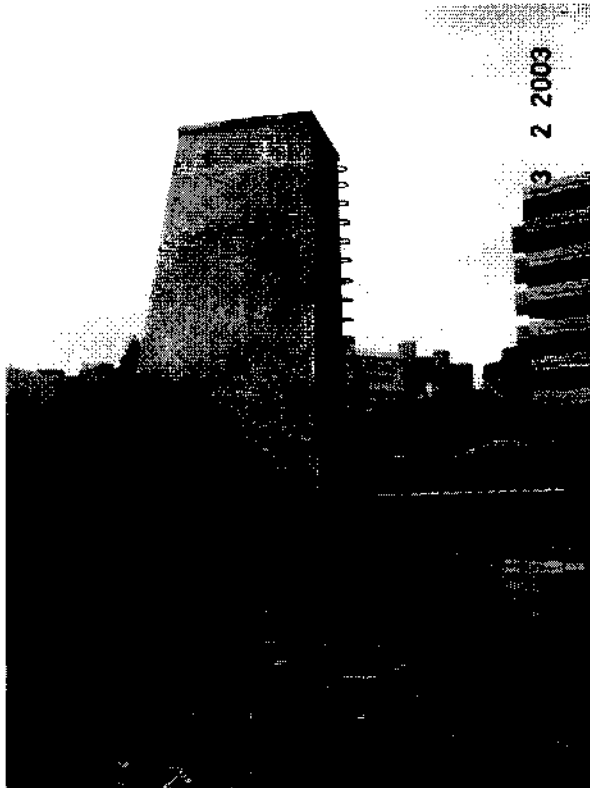
**Photograph 25: Old Switchbox, Cremator Room**



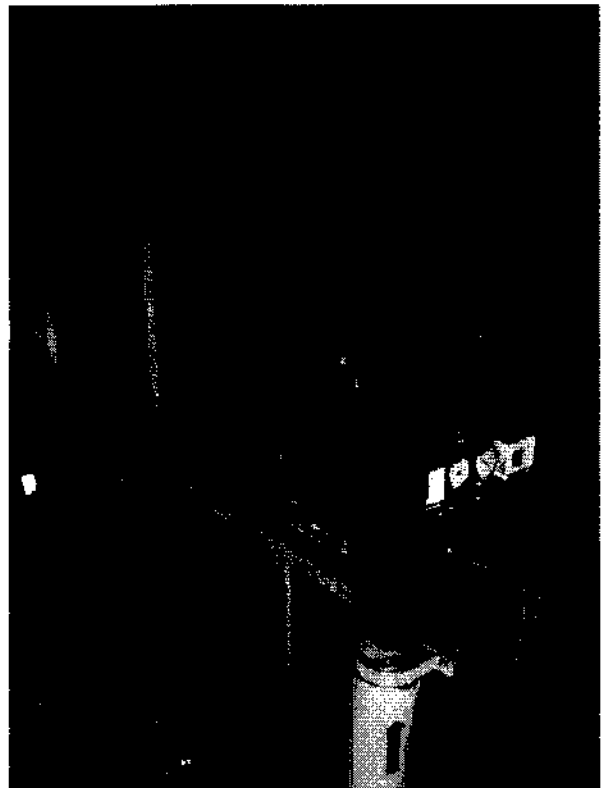
**Photograph 27: Chimney Stack Access Panel**



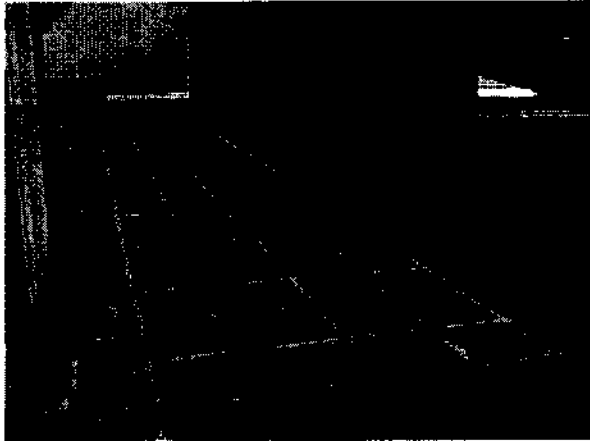
**Photograph 26: Chimney Stack**



**Photograph 28: Roof Air Handler Unit.**



**Photograph 29: Roof Aggregate and Ceramic Tiles**



**Photograph 32: Chiller Unit Pipe Work**



**Photograph 30: Roof Mosaic Tiles**



**Photograph 33: Car Park**



**Photograph 31: Roof Chiller Units**



**Photograph 34: General View of Crematorium**



## **Appendix B**

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# **Laboratory Report with Photographs of Sampling Points and Results Certificates DHC**

**Report On  
Sampling And Analysis of Bulk Materials**

**Client : Atkins China Ltd.**

**Project : Asbestos Testing For Diamond Hill Crematorium**

**Report No. : 022518PE30090**

## **Contents**

- I. Test Report on Sampling and Analysis of Bulk Materials
- II. Sampling Location Plan
- III. Photographic Record

### **Appendix**

Supplementary Report on Bulk Sample Analysis



## FUGRO TECHNICAL SERVICES LIMITED

MaterialLab Division,  
Fugro Development Centre,  
5 Lok Yi Street, 17 M.S. Castle Peak Road,  
Tai Lam, Tuen Mun, N.T., Hong Kong.

Tel : +852-2450 8233  
Fax : +852-2450 6138  
E-mail : matlab@fugro.com.hk  
Website : www.fugro.com

**MaterialLab**

### Report On Sampling And Analysis of Bulk Materials

Client : Atkins China Ltd.

Project : Asbestos Testing For Diamond Hill Crematorium

Report No. : 022518PE30090

# FUGRO TECHNICAL SERVICES LIMITED

MaterialLab Division,  
Fugro Development Centre,  
5 Lok Yi Street, 17 M.S. Castle Peak Road,  
Tai Lam, Tuen Mun, N.T., Hong Kong.

Tel : +852-2450 8233  
Fax : +852-2450 6138  
E-mail : matlab@fugro.com.hk  
Website : www.fugro.com

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Report No. : 022518PE30090

Page 1 of 10

## Contents

- I. Test Report on Sampling and Analysis of Bulk Materials
- II. Sampling Location Plan
- III. Photographic Record

## Appendix

Supplementary Report on Bulk Sample Analysis

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MaterialLab Division,  
Fugro Development Centre,  
5 Lok Yi Street, 17 M.S. Castle Peak Road,  
Tai Lam, Tuen Mun, N.T., Hong Kong.

Tel : +852-2450 8233  
Fax : +852-2450 6138  
E-mail : matlab@fugro.com.hk  
Website : www.fugro.com

**MaterialLab**

Report No. : 022518PE30090

### I. TEST REPORT ON SAMPLING AND ANALYSIS OF BULK MATERIALS



#### Information Supplied by Client

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Client : Atkins China Ltd.  
Client address : 15/F, Miramar Tower, 132 Nathan Road, Tsim Sha Tsui, Kowloon, H.K.  
Project : Asbestos Testing For Diamond Hill Crematorium  
Test required : 1. Presence of asbestos  
2. Type of asbestos, if present  
3. Determination of ACM by visual examination

#### Laboratory Information

Lab. sample I.D. : PE30090/1 to 12  
Sample description : 12 nos. of bulk materials sampled from the project site  
Date of sampling : 13/02/2003  
Sampling method : In-house methods G-T-021 to G-T-022  
Sampled by : C.H. Wong  
Date of test completed : 18/02/2003  
Test method : In-house methods G-T-023 & G-T-028

#### Test Results :

Lab. Sample I.D.	Sample Nature	Sampling Location	Sampling Method	Asbestos Fibres		ACM/ Non-ACM
				Presence	Type	
PE30090/1	Pipe Gasket	Machine Room, G/F	G-T-022	Present	Chrysotile	ACM
PE30090/2	Pipe Gasket	Machine Room, G/F	G-T-022	Present	Chrysotile	ACM
PE30090/3	Pipe Gasket	Machine Room, G/F	G-T-022	Present	Chrysotile	ACM
PE30090/4	Cremated Furnace Insulation	Cremated Furnace No. 1, Cremation Room, G/F	G-T-021	Not detected	-	Non-ACM

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MaterialLab Division,  
Fugro Development Centre,  
5 Lok Yi Street, 17 M.S. Castle Peak Road,  
Tai Lam, Tuen Mun, N.T., Hong Kong.

Tel : +852-2450 8233  
Fax : +852-2450 6138  
E-mail : matlab@fugro.com.hk  
Website : www.fugro.com

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Report No. : 022518PE30090

**Test Results :**

Lab. Sample I.D.	Sample Nature	Sampling Location	Sampling Method	Asbestos Fibres		ACM/ Non-ACM
				Presence	Type	
PE30090/5	Cremated Furnace Insulation	Cremated Furnace No. 4, Cremation Room, G/F	G-T-021	Not detected	-	Non-ACM
PE30090/6	Cremated Furnace Insulation	Cremated Furnace No. 3, Cremation Room, G/F	G-T-021	Not detected	-	Non-ACM
PE30090/7	Chimney lagging	Cremation Room, G/F	G-T-021	Present	Chrysotile	ACM*
PE30090/8	Chimney lagging	Cremation Room, G/F	G-T-021	Present	Chrysotile	ACM*
PE30090/9	Air duct lagging	Cremulation Room, G/F	G-T-021	Not detected	-	Non-ACM
PE30090/10	Air duct lagging	Cremulation Room, G/F	G-T-021	Not detected	-	Non-ACM
PE30090/11	Floor tile with adhesive material	General Office, G/F	G-T-022	Present	Chrysotile	See Remark 3
PE30090/12	Floor tile with adhesive material	Waiting Room, G/F	G-T-022	Present	Chrysotile	See Remark 3

- Remarks: 1. The sample is either classified as an ACM (>1 % asbestos by weight) or a non-ACM (not >1% asbestos by weight) as defined in the Air Pollution Control Ordinance.
2. \* Asbestos fibres were found in the outer textile layer of the sample and this layer is determined to be an ACM.
3. Asbestos fibres were found in the bottom asphalt adhesive residue layer of the sample. Determination of ACM for this layer is subject to further analysis by gravimetric and/or point-counting methods.
4. Estimated contents of asbestos are presented in Supplementary Report No. 022518PE30090(1).

Tested by : C.F. LamCertified by :   
Approved Signatory: Donney M.W. LeungDate : 27/02/2003

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Fugro Development Centre,  
5 Lok Yi Street, 17 M.S. Castle Peak Road,  
Tai Lam, Tuen Mun, N.T., Hong Kong.

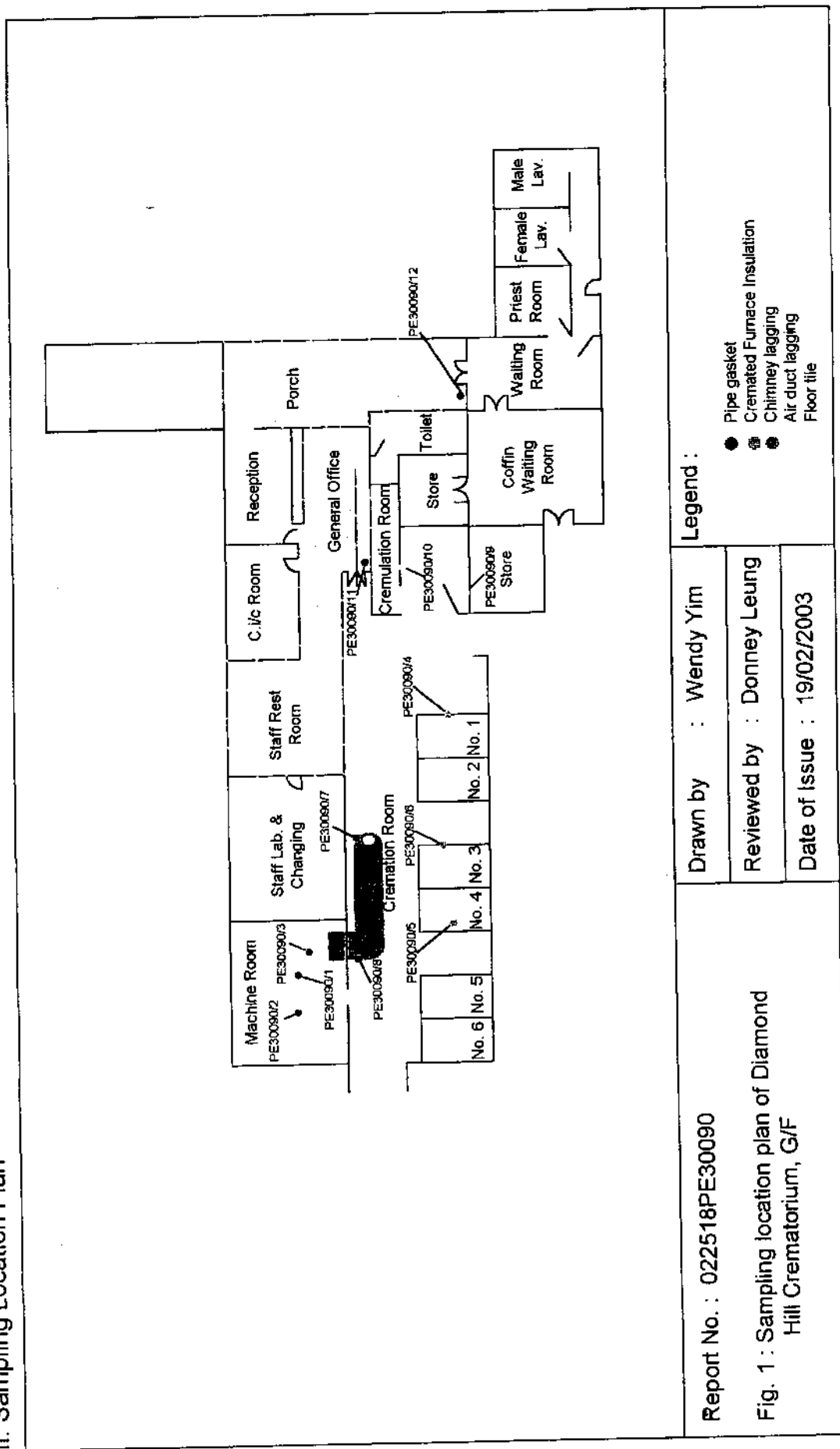
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Fax : +852-2450 6138  
E-mail : matlab@fugro.com.hk  
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## II. Sampling Location Plan

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Fugro Development Centre,  
5 Lok Yi Street, 17 M.S. Castle Peak Road,  
Tai Lam, Tuen Mun, N.T., Hong Kong.

Tel : +852-2450 8233  
Fax : +852-2450 6138  
E-mail : matlab@fugro.com.hk  
Website : www.fugro.com

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Report No. : 022518PE30090

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### III. Photographic Records

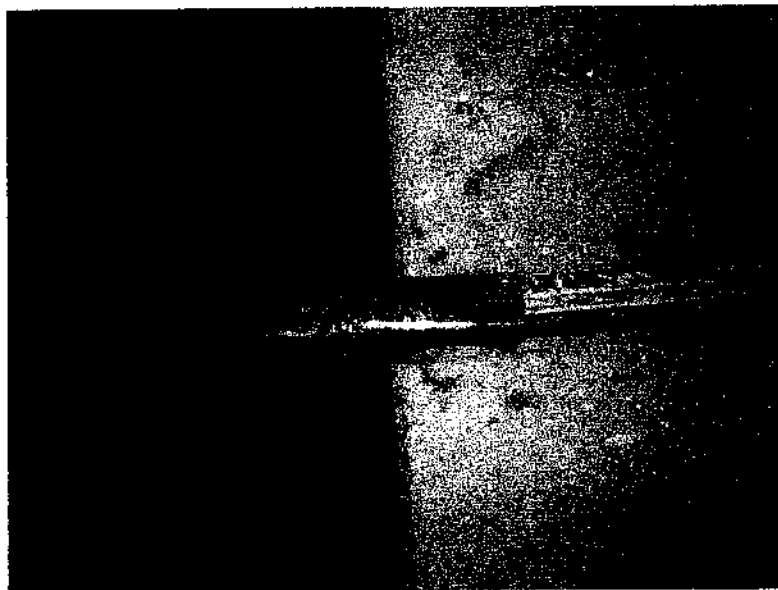


Photo 1 : Pipe gasket, Machine Room, G/F (PE30090/1)



Photo 2 : Pipe gasket, Machine Room, G/F (PE30090/2)

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MaterialLab Division,  
Fugro Development Centre,  
5 Lok Yi Street, 17 M.S. Castle Peak Road,  
Tai Lam, Tuen Mun, N.T., Hong Kong.

Tel : +852-2450 8233  
Fax : +852-2450 6138  
E-mail : matlab@fugro.com.hk  
Website : www.fugro.com

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TECHNICAL SERVICES DIVISION

Report No. : 022518PE30090

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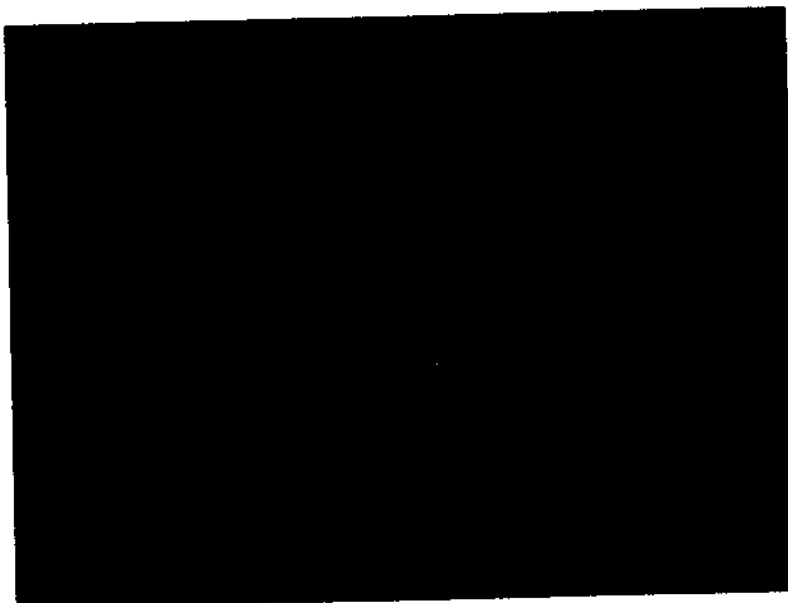


Photo 3 : Pipe gasket, Machine Room, G/F (PE30090/3)

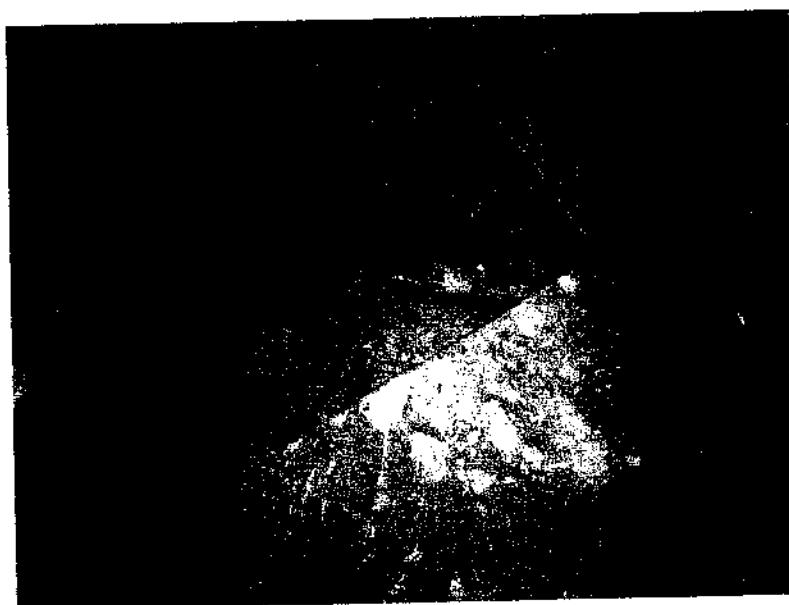


Photo 4 : Cremated Furnace Insulation, Cremated Furnace No. 1, Cremation Room, G/F (PE30090/4)

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MaterialLab Division,  
Fugro Development Centre,  
5 Lok Yi Street, 17 M.S. Castle Peak Road,  
Tai Lam, Tuen Mun, N.T., Hong Kong.

Tel : +852-2450 8233  
Fax : +852-2450 6138  
E-mail : matlab@fugro.com.hk  
Website : www.fugro.com

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Photo 5 : Cremated Furnace Insulation, Cremated Furnace No. 4, Cremation Room, G/F  
(PE30090/5)



Photo 6 : Cremated Furnace Insulation, Cremated Furnace No. 3, Cremation Room, G/F  
(PE30090/6)

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MaterialLab Division,  
Fugro Development Centre,  
5 Lok Yi Street, 17 M.S. Castle Peak Road,  
Tai Lam, Tuen Mun, N.T., Hong Kong.

Tel : +852-2450 8233  
Fax : +852-2450 6138  
E-mail : matlab@fugro.com.hk  
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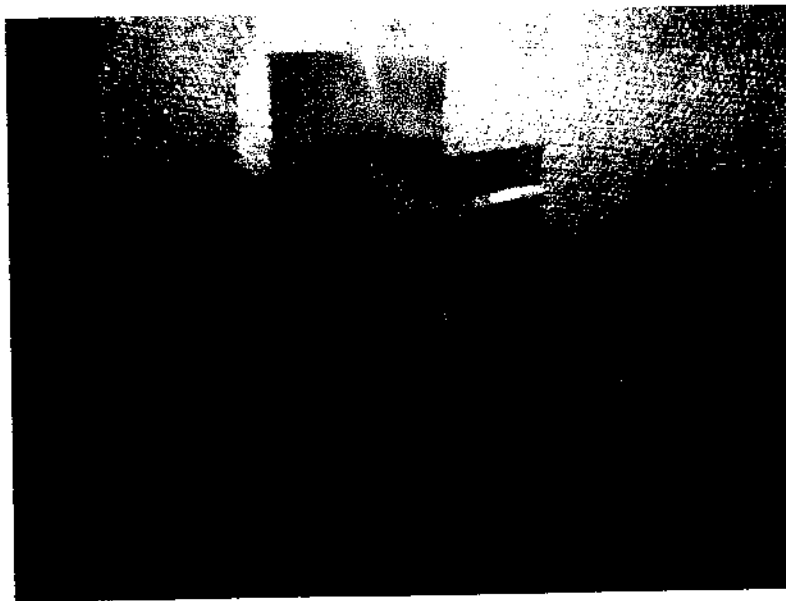


Photo 7 : Chimney lagging, Cremation Room, G/F (PE30090/7)

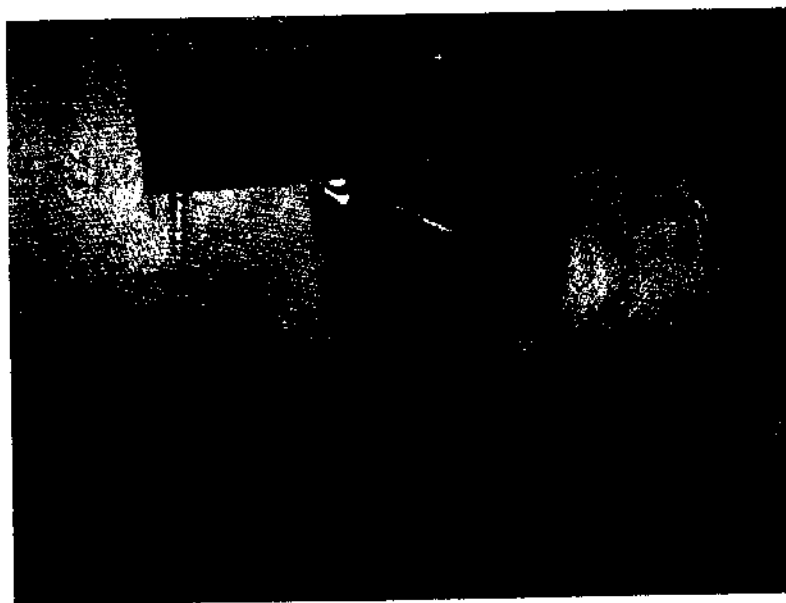


Photo 8 : Chimney lagging, Cremation Room, G/F (PE30090/8)

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Fugro Development Centre,  
5 Lok Yi Street, 17 M.S. Castle Peak Road,  
Tai Lam, Tuen Mun, N.T., Hong Kong.

Tel : +852-2450 8233  
Fax : +852-2450 6138  
E-mail : [matlab@fugro.com.hk](mailto:matlab@fugro.com.hk)  
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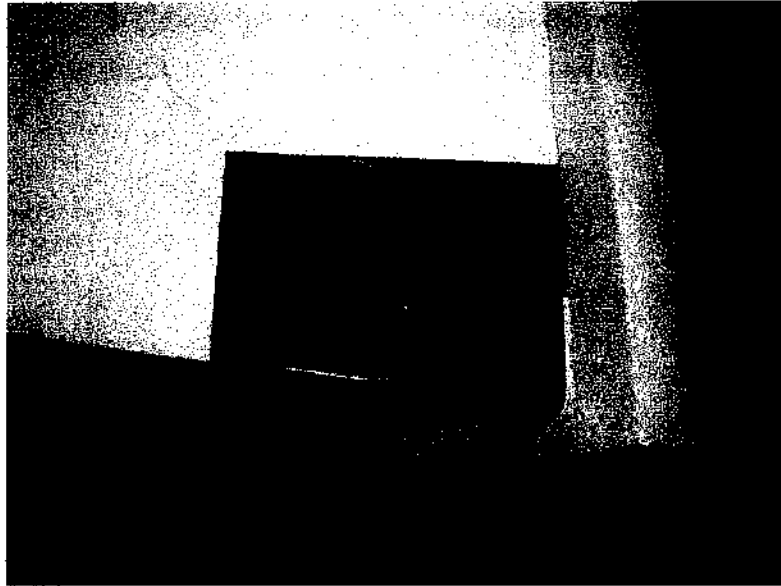


Photo 9 : Air duct lagging, Cremulation Room, G/F (PE30090/9)



Photo 10: Air duct lagging, Cremulation Room, G/F (PE30090/10)

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MaterialLab Division,  
Fugro Development Centre,  
5 Lok Yi Street, 17 M.S. Castle Peak Road,  
Tai Lam, Tuen Mun, N.T., Hong Kong.

Tel : +852-2450 8233  
Fax : +852-2450 6138  
E-mail : matlab@fugro.com.hk  
Website : www.fugro.com

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Report No. : 022518PE30090

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Photo 11: Floor tile with adhesive material, General Office, G/F (PE30090/11)



Photo 12: Floor tile with adhesive material, Waiting Room, G/F (PE30090/12)

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MaterialLab Division,  
Fugro Development Centre,  
5 Lok Yi Street, 17 M.S. Castle Peak Road,  
Tai Lam, Tuen Mun, N.T., Hong Kong.

Tel : +852-2450 8233  
Fax : +852-2450 6138  
E-mail : mallab@fugro.com.hk  
Website : www.fugro.com

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MaterialLab Division, Fugro Development Centre, 5 Lok Yi Street, 17 M.S. Castle Peak Road, Tai Lam, Tuen Mun, N.T., Hong Kong.

Report No. : 022518PE30090(1)

**SUPPLEMENTARY REPORT ON ANALYSIS OF BULK MATERIALS**

Page 1 of 1

(Supplement To Report No.022518PE30090)

Testing required : Quantitation of asbestos – Percentage by weight  
Method used : Estimation of asbestos content by visual examination

**Results :**

Lab. sample I.D.	Estimated asbestos content % by weight	Other fibres present
PE30090/1	Chrysotile : 80-90%	-
PE30090/2	Chrysotile : 80-90%	-
PE30090/3	Chrysotile : 80-90%	-
PE30090/4	-	Paper fibre & glass fibre
PE30090/5	-	Paper fibre & glass fibre
PE30090/6	-	Paper fibre & glass fibre
PE30090/7	Chrysotile : 80-90% (% of the outer textile layer)	Polymer fibre & glass wool
PE30090/8	Chrysotile : 80-90% (% of the outer textile layer)	Polymer fibre & glass wool
PE30090/9	-	-
PE30090/10	-	-
PE30090/11	Chrysotile : <5% (% of the bottom asphalt adhesive residue layer)	-
PE30090/12	Chrysotile : <5% (% of the bottom asphalt adhesive residue layer)	-

Tested by : C.F. Lam

Certified by :   
Approved Signatory : Donney M.W. Leung

Date : 27/02/2003