China Resources Construction Co. Ltd.

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Contract No. SS M333

Reprovisioning of Diamond Hill Crematorium

Supplementary Contamination Assessment Report (For the Existing CLP Secondary Substation at Phase I Area)

[April 2005]

Reviewed by (PM): (Florence Yuen)	Checked by: (Lawrence Tsui)	Approved by: (ET Leader – Y T Tang)

Report Version: Version 0	Date of Submission: 14 April 2005

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15 April 2004

BY POST & FAX (2524 81

Architectural Services Department
Queensway Government Offices
66 Queensway
Hong Kong

Your Ref:

Our Ref: 1148-04/E05-27061

For attention of: Mr Michael Mak

Dear Michael

Reprovisioning of Diamond Hill Crematorium
Supplementary Contamination Assessment (SCA) Report for the Existing CLP Secondary Substation at Phase 1 Area

We refer to the fax, ref.: S07904(001)/C/cglw50411 dated 14 April 2005, from MEMCL copied to us enclosing the Supplementary Contamination Assessment Report for the Existing CLP Secondary Substation at Phase I Area.

We have no comment and hereby verified the SCA Report.

Should you have any queries, please do not hesitate to contact the undersigned on 2911 2719 or Adi Lee on 2911 2729.

Yours sincerely

Coleman Ng
Independent Environmental Checker
HYDER CONSULTING LIMITED

cc MEMCL – Mr. Y. T. Tang/Ms Florence Yuen (Fax: 2891 0305)
CRCCL – Mr. Eric To (Fax: 2827 2921)

CN/AL

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1 INTRODUCTION

1.1 According to the *Environmental Permit (EP) (No. EP-179/2004) of the 'Reprovisioning of Diamond Hill Crematorium EIA (Register No. AEIAR-076/2004)*' ('The Project'), a supplementary contamination assessment (SCA) shall be carried out for the existing CLP secondary substation ('Subject Site') during the construction and demolition of certain parts of the Project (Phase I works).

1.2 Maunsell Environmental Management Consultants Limited ('The Consultant') was commissioned by the China Resources Construction Company Limited (The Contractor') to undertake the supplementary contamination assessment for the Subject Site.

1.3 A site visit was conducted on 7 October 2004. It was observed that a switch broad with wire facilities as well as a transformer were found inside the substation. In order to investigate any potential contamination caused by the leakage of transformer oil, a sampling point, TR1, was proposed underneath the existing transformer. The location of TR1 is shown in **Figure 1**.

1.4 A sampling and analysis plan ('The Plan') incorporating the site investigation and testing schedule for the assessment of polychlorinated biphenyls (PCBs) and Total Petroleum Hydrocarbons (TPH) at TR1 was prepared following the *Environmental Permit Clauses 3.6 and 3.7* and the *Particular Specification PS.G11 4.5.4* of the Project. The Plan was approved by Environmental Protection Department (EPD) on 25 January 2005. The sampling and testing schedule detailed in the Plan is presented in **Appendix A.**

1.5 The site investigation was subsequently carried out on 14 and 15 March 2005 in accordance with the sampling and testing schedule stated in the Plan. The soil boring was undertaken by the Contractor and supervised by the Consultant. The analytical testing was carried out by a laboratory accredited by the Hong Kong Laboratory Accreditation Scheme (HOKLAS).

2 OBJECTIVES OF THE SUPPLEMENTARY CONTAMIANTION ASSESSMENT (SCA) REPORT

2.1 The objectives of this Supplementary Contamination Assessment Report are to report the sampling and analysis results, identify the nature and extent of contamination, as well as quantify the contaminated soil according to the *Environmental Permit Clauses 3.6 and 3.7* and the *Particular Specification PS.G11 4.5.4* of the Project.

3 CONTAMINATION ASSESSMENT METHODOLOGY

Soil Boring and Sampling

3.1 Excavation of the trial pit, TR1, was carried out by hand tools. A total of three soil samples were collected at 0m (i.e. immediately below concrete), 1m and 2m in depth at TR1 in order to delineate the vertical profile of contamination. The soil samples were collected by hand sampling using stainless steel tools.

3.2 Before excavation and between sampling at the trial pit, the sampling equipment and all equipment in contact with the ground were thoroughly decontaminated prior to use by laboratory-grade detergent followed by distilled water rinsing.

3.3 Sufficient soil sample were taken to fill up the sample container upon sample collection. The sample container was wide mouth amber glass jar with Teflon lid liner provided by the laboratory.

3.4 The soil samples were properly labelled and stored in cool boxes chilled at a temperature of around 4°C until delivered to the analytical laboratory.

Strata Logging

3.5 Strata logging for the trial pit was undertaken during the course of digging and sampling by qualified geologist. The soil boring log is given in **Appendix B**. The log included the general stratigraphic descriptions, depth of soil sampling and sample notation. The presence of rocks/boulders/cobbles and foreign materials such as metals, wood and plastics would also be recorded. Photographic records for the trial pit were taken and are given in **Appendix C**.

Free Product and Groundwater Level Measurement

3.6 As no free product and groundwater were observed at the site, no such sampling was conducted during the site investigation.

4 ASSESSMENT CRITERIA

4.1 The assessment methodology of this Study was developed in accordance with the Practice Note ProPECC PN3/94 "*Contaminated Land Assessment and Remediation*" and "*Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards, and Car Repair / Dismantling Workshops*" issued by EPD.

4.2 The ProPECC Note PN 3/94 was used in setting the soil contamination criteria. The Practice Note makes reference to criteria developed in the Netherlands (Dutch 'ABC' Levels), which are most comprehensive and widely used for contaminated site assessment. The preliminary screening approach adopted in this study was based on the Dutch criteria which consist of 3 levels of guidelines, namely A, B, and C. The simplified explanation of the ABC levels is as follows:

- 'A' level implies unpolluted;
- 'B' level implies potential pollution present that requires further investigation or remediation; and
- 'C' level implies pollution which requires remediation.

4.3 The Dutch criteria are very stringent as they are developed based on a "good for all uses" philosophy. The EPD generally requires remediation for soil contamination above the Dutch B level. In other words, the Dutch B level is the cleanup target for remediation of soil. Relevant soil Dutch 'ABC' levels for this Study are presented in **Table 4.1**.

Table 4.1 Dutch ABC Values for Relevant Soil Testing Parameters

Parameter	Soil (mg/kg)		
	Dutch A	Dutch B	Dutch C
Total Petroleum Hydrocarbons (TPH) (as mineral oil)	100	1000	5000
Total PCBs	0.05	1	10

Note: Total PCBs = Sum of PCB 28, 52, 101, 118, 138, 153 and 180 (according to the New Dutch List).

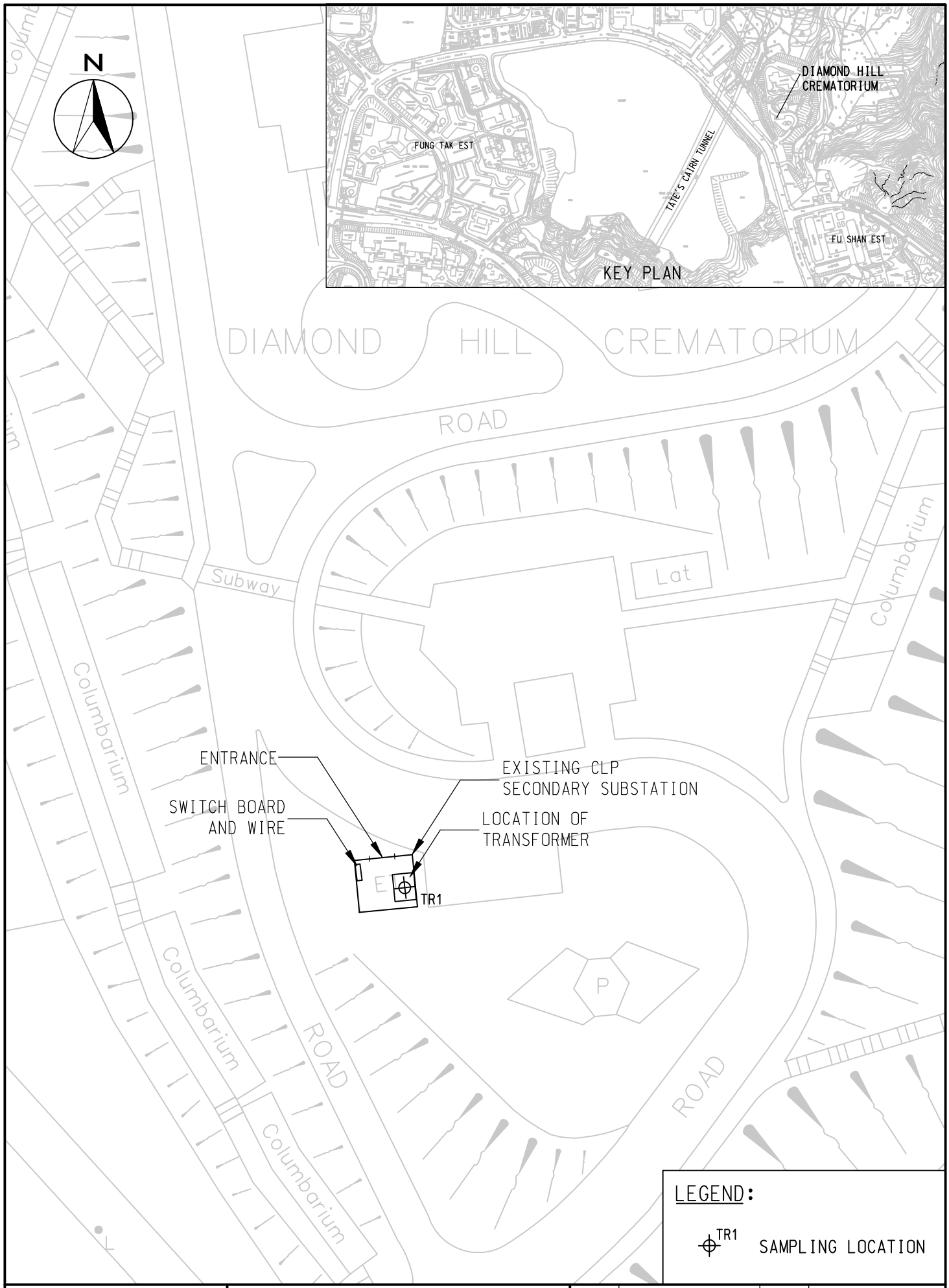
5 ANALYTICAL RESULTS AND INTERPRETATION

5.1 A total of three soil samples were collected from the TR1 for laboratory analysis. Among these collected soil samples, no exceedance of TPH and/or PCBs for Dutch B levels was found at all samples. The laboratory results are given in **Appendix D**.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 According to the results of site investigation, no exceedance of Dutch B levels for TPH and PCBs was found in the three soil samples collected from the trial pit TR1. Potential land contamination due to the transformer is therefore not expected. Remediation for soil and groundwater would not be required and there are also no special requirements for handling of soil and groundwater at the subject site. Any construction works that would disturb the ground can be proceeded at the concerned area of the existing CLP secondary substation.

FIGURE



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Maunsell Environmental Management Consultants Ltd

CONTRACT NO. SS M333 REPROVISIONING OF DIAMOND HILL CREMATORIUM

AS-BUILT SAMPLING LOCATION FOR THE EXISTING CLP SECONDARY SUBSTATION AT PHASE 1 AREA

SCALE	A4 1:500	DATE	APR 2005
CHECK	CGLW	DRAWN	TCYL
JOB No.	S07904	DRAWING No.	1
		REV	–

K:/S07904/DRAWING/REPORT/200503/SITE-INVES.DGN

APPENDIX A

SAMPLING AND TESTING SCHEDULE PROPOSED IN THE SAMPLING AND ANALYSIS PLAN

Appendix A Sampling and Testing Plan For the Existing CLP Secondary Substation

Sampling Location	Sampling Method	Sample Matrix		Testing Parameter	Detection Limit or otherwise stated	Reference Method
TR1	Trial pit excavated down to 2m below concrete layer by means of hand tools	Soil	Immediately below the concrete layer	Total PCBs TPH	Total PCBs: 0.05 mg/kg TPH: C6-C9: 2 mg/kg C10-C14: 50 mg/kg C15-C28: 100 mg/kg C29-C36: 100 mg/kg	USEPA 8270 USEPA 8015
		Soil	1m below the concrete layer	Total PCBs TPH		
		Soil	2m below the concrete layer or the greatest depth achieved by trial pit	Total PCBs TPH		
		GW	If present	Total PCBs TPH	Total PCBs: 0.2 µg/L TPH: C6-C9: 20 µg/L C10-C14: 25 µg/L C15-C28: 25 µg/L C29-C36: 25 µg/L	USEPA 8270 USEPA 8015

Remarks:
Total PCBs = Sum of PCB 28, 52, 101, 118, 138, 153 and 180 (according to the New Dutch List).
GW = Groundwater

APPENDIX B

SOIL BORING LOG

Project : Ground Investigation Works for Contract No. SSM333 Reprovisioning of Diamond Hill Crematorium at Po Kong Village Road, Kowloon.

Co-ordinates : E 839429.75 N 822875.60

Ground Level : +76.28 mPD

Logged by : B. Liu

Date logged : 15-03-2005

Checked by : F. Lui

Date checked : 16-03-2005

Excavation Dates: 15-03-2005 to 15-03-2005

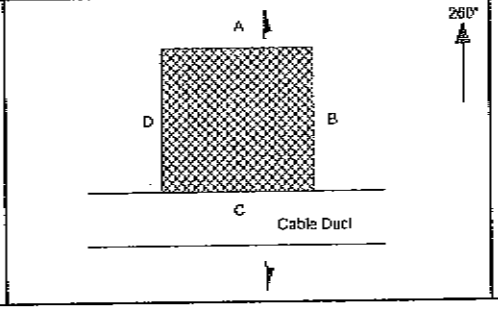
Backfill Date: 21-03-2005

Sample & Tests	Depth (m)	Sketch	Depth (m)	Legend (Face D)	Description	Grade
		Face A 1.10 m / Face B 1.00 m / Face C 1.10 m / Face D 1.00 m				
	0.15		0.15		Grey, CONCRETE, with 5mm dia. steel reinforcement. (GROUND SLAB)	
		▼0.77 ▼0.92			Grey, CONCRETE.	
	1.00		0.92		Soft, yellowish brown and reddish brown, sandy SILT, with some subangular to subrounded, medium to coarse gravel and cobbles of rock fragments, and occasional roots and nylon strings. (FILL)	
	2.00		2.00		End of the trial pit at 2.00m in FILL.	
	3.00					
	4.00					

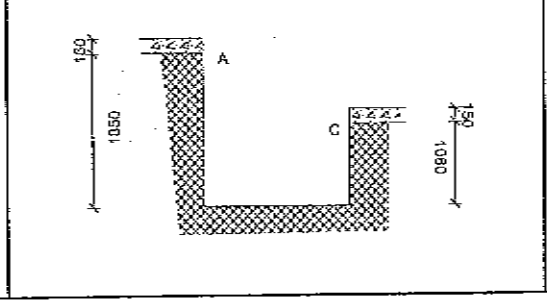
SYMBOL

- Small disturbed sample
- Large disturbed sample
- Undisturbed vertical sample
- Undisturbed horizontal sample
- Block sample
- In-situ density test
- Water sample
- Water seepage
- N - Schmidt Hammer Test

PLAN (Not to Scale)



SECTION (Not to Scale)



REMARKS

1. Shoring was used to stabilize the trial pit.
2. No groundwater was encountered.
3. 3 nos. of small disturbed samples were taken at depths 0.15m, 1.00m and 2.00m.

CHUNG SHUN BORING ENG. CO. LTD

TRIAL PIT RECORD

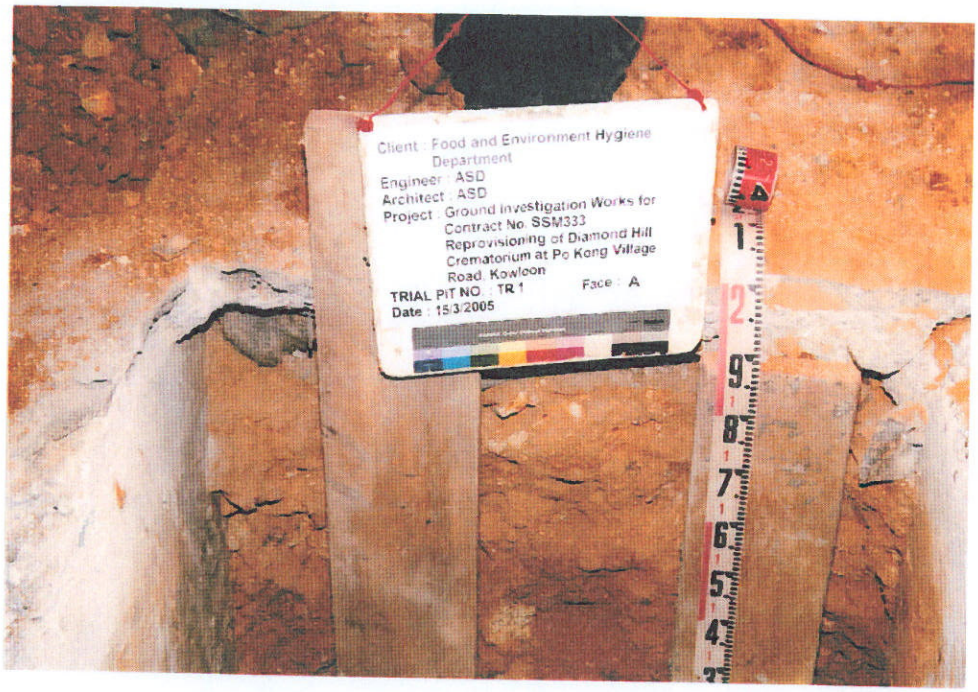
Contract No. : ---

Works Order No. ---

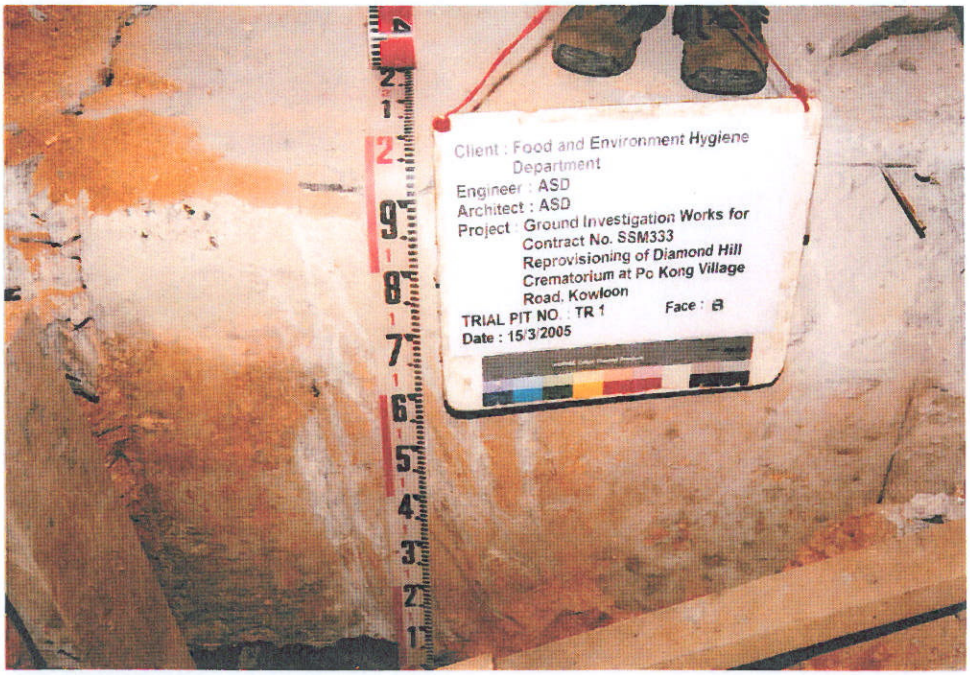
Trial Pit No. **TR1**

APPENDIX C

PHOTOGRAPHIC RECORDS OF TR1

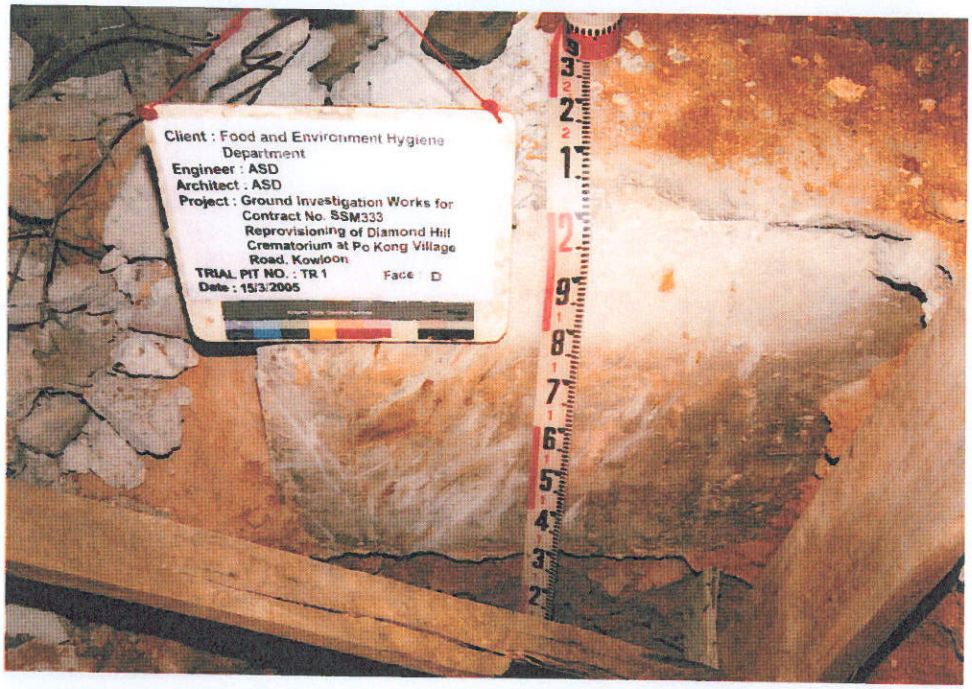

Client : Food and Environment Hygiene Department
Engineer : ASD
Architect : ASD
Project : Ground Investigation Works for Contract No. SSM333 Reprovisioning of Diamond Hill Crematorium at Po Kong Village Road, Kowloon
TRIAL PIT NO. : TR 1
Face : A
Date : 15/3/2005


Client : Food and Environment Hygiene Department
Engineer : ASD
Architect : ASD
Project : Ground Investigation Works for Contract No. SSM333 Reprovisioning of Diamond Hill Crematorium at Po Kong Village Road, Kowloon
TRIAL PIT NO. : TR 1
Face : A
Date : 15/3/2005


Client : Food and Environment Hygiene Department
Engineer : ASD
Architect : ASD
Project : Ground Investigation Works for Contract No. SSM333 Reprovisioning of Diamond Hill Crematorium at Po Kong Village Road, Kowloon
TRIAL PIT NO. : TR 1
Face : B
Date : 15/3/2005


Client : Food and Environment Hygiene Department
Engineer : ASD
Architect : ASD
Project : Ground Investigation Works for Contract No. SSM333 Reprovisioning of Diamond Hill Crematorium at Po Kong Village Road, Kowloon
TRIAL PIT NO. : TR 1
Face : B
Date : 15/3/2005


Client : Food and Environment Hygiene Department
Engineer : ASD
Architect : ASD
Project : Ground Investigation Works for Contract No. SSM333 Reprovisioning of Diamond Hill Crematorium at Po Kong Village Road, Kowloon
TRIAL PIT NO. : TR 1
Face : C
Date : 15/3/2005


Client : Food and Environment Hygiene Department
Engineer : ASD
Architect : ASD
Project : Ground Investigation Works for Contract No. SSM333 Reprovisioning of Diamond Hill Crematorium at Po Kong Village Road, Kowloon
TRIAL PIT NO. : TR 1
Face : D
Date : 15/3/2005


Client : Food and Environment Hygiene Department
Engineer : ASD
Architect : ASD
Project : Ground Investigation Works for Contract No. SSM333 Reprovisioning of Diamond Hill Crematorium at Po Kong Village Road, Kowloon
TRIAL PIT NO. : TR 1
Face : D
Date : 15/3/2005


Client : Food and Environment Hygiene
Department
Engineer : ASD
Architect : ASD
Project : Ground Investigation Works for
Contract No. SSM333
Reprovisioning of Diamond Hill
Crematorium at Po Kong Village
Road Kowloon
TRIAL PIT NO TP 1
Date : 15.3.2005
Face BOTTOM

APPENDIX D

LABORATORY RESULTS

Contract No. SS M333
Reprovisioning of Diamond Hill Crematorium

Result Summary of Soil Sampling for the Existing CLP Secondary Substation at Phase 1 Area

Sampling ID	Depth of Sampling (m below ground)	Date of Sampling Date	Concentration of Testing Parameters (mg/kg)					
			C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	Total TPH (Mineral Oil in Dutch List)	Total PCBs
Dutch A			-	-	-	-	100	0.05
Dutch B			**-**	**-**	**-**	**-**	**1000**	**1**
Dutch C			-	-	-	-	***5000***	***10***
TR1 (0m)	0m	15-Mar-05	<2	<50	<100	<100	<252	<0.1
TR1 (1m)	1m	15-Mar-05	<2	<50	<100	<100	<252	<0.1
TR1 (2m)	2m	15-Mar-05	<2	<50	<100	<100	<252	<0.1

Notes:
Total PCBs = Sum of PCB 28, 52, 101, 118, 138, 153 and 180 (according to the New Dutch List).
No exceedance of Dutch B levels for total PCBs and TPH in all soil samples
Full analytical results should be referred to laboratory report

ALS Environmental

MAUNSELL ENV MGT CNLT LTD

Attention: MS CARY WAN
YourOrder: S07904-001
SampleType:SOIL
Project:

Page-no: 1
HONG KONG
Batch-no: 34625
Sub-batch:0
No-samples:3
Received: 15/03/05
Checked:

Method	Analysis description	Units	LOR	TR1/0.0M	TR1/1.0M	TR1/2.0M
				15/03/05	15/03/05	15/03/05
EA-055	Moisture Content (dried @ 103'	%	0.1	13.8	13.3	14.8
EP-066-SS	TOTAL POLYCHLORINATED BIPHENYL	mg/kg	0.1	<0.1	<0.1	<0.1
EP-066S-SS	POLYCHLORINATED BIPHENYLS SURR					
EP-066S-SS	Tetrachloro-m-xylene	%	20	100	103	91
EP-066S-SS	Dibutylchlorendate	%	20	95	101	129

Samples analysed on an as received basis. Results reported on a dry weight basis. Sample preparation techniques: Semivolatile - Separatory Funnel and Tumbler, Volatile - Purge & Trap. Sample analysis techniques: Semivolatile components - GC/MS; TPH - GC/FID; Volatile components - GC/MS; Pesticides - GC/ECD, GC/MS. Refer to the attached

ALS Environmental

MAUNSELL ENV MGT CNLT LTD

Attention: MS CARY WAN
YourOrder: S07904-001
SampleType:QUALITY CONTROL
Project:

Page-no: 1
HONG KONG
Batch-no: 34625
Sub-batch:0
No-samples:3
Received: 15/03/05
Checked:

Method	Analysis description	Units	LOR	BLANK
EA-055	Moisture Content (dried @ 103'	%	0.1	----
EP-066-SS	TOTAL POLYCHLORINATED BIPHENYL	mg/kg	0.1	<0.1
EP-066S-SS	POLYCHLORINATED BIPHENYLS SURR			
EP-066S-SS	Tetrachloro-m-xylene	%	20	98
EP-066S-SS	Dibutylchlorendate	%	20	87

Results which appear on this report are routine laboratory checks for QUALITY CONTROL purposes.

ALS Environmental

MAUNSELL ENV MGT CNLT LTD

Attention: MS CARY WAN
YourOrder: S07904-001
SampleType:SOIL
Project:

Page-no: 1
HONG KONG
Batch-no: 34625
Sub-batch:1
No-samples:3
Received: 15/03/05
Checked:

Method	Analysis description	Units	LOR	TR1/0.0M	TR1/1.0M	TR1/2.0M
				15/03/05	15/03/05	15/03/05
EA-055	Moisture Content (dried @ 103'	%	0.1	13.8	13.3	14.8
EP-071-SS	TOTAL PETROLEUM HYDROCARBONS					
EP-071-SS	C6 - C9 Fraction	mg/kg	2	<2	<2	<2
EP-071-SS	C10 - C14 Fraction	mg/kg	50	<50	<50	<50
EP-071-SS	C15 - C28 Fraction	mg/kg	100	<100	<100	<100
EP-071-SS	C29 - C36 Fraction	mg/kg	100	<100	<100	<100
EP-080-SS	BTEX					
EP-080S-SS	Dibromofluoromethane	%	2	106	98	114
EP-080S-SS	Toluene-d8	%	2	101	103	104
EP-080S-SS	4-BFB	%	2	103	104	105

Samples analysed on an as received basis. Results reported on a dry weight basis. Sample preparation techniques: Semivolatile - Separatory Funnel and Tumbler, Volatile - Purge & Trap. Sample analysis techniques: Semivolatile components - GC/MS; TPH - GC/FID; Volatile components - GC/MS; Pesticides - GC/ECD, GC/MS. Refer to the attached

ALS Environmental

MAUNSELL ENV MGT CNLT LTD

Attention: MS CARY WAN
YourOrder: S07904-001
SampleType:QUALITY CONTROL
Project:

Page-no: 1
HONG KONG
Batch-no: 34625
Sub-batch:1
No-samples:3
Received: 15/03/05
Checked:

Method	Analysis description	Units	LOR	BLANK
EA-055	Moisture Content (dried @ 103'	%	0.1	----
EP-071-SS	TOTAL PETROLEUM HYDROCARBONS			
EP-071-SS	C6 - C9 Fraction	mg/kg	2	<2
EP-071-SS	C10 - C14 Fraction	mg/kg	50	<50
EP-071-SS	C15 - C28 Fraction	mg/kg	100	<100
EP-071-SS	C29 - C36 Fraction	mg/kg	100	<100
EP-080-SS	BTEX			
EP-080S-SS	Dibromofluoromethane	%	2	94
EP-080S-SS	Toluene-d8	%	2	102
EP-080S-SS	4-BFB	%	2	108

Results which appear on this report are routine laboratory checks for QUALITY CONTROL purposes.