

## **Appendix G2**

### **Results of Sediment Sampling in 2005**

**Appendix G2**  
**Information extracted from the Sediment Quality Report for Phase 2B Works**  
**(report ref. 2047/E/SQR2B/Issue 2) dated August 2005**

**Table 2.2**  
**Grid Coordinates of Sampling Points**

Proposed Channel	Sampling Point	Eastings	Northings
KT13	KT13A	824567	830220
	KT13B	824809	830356
	KT13C	824930	830636
	KT13D	825066	830953
Reference sediment	RS1	850234	820057

**Table 4.1**  
**Analysis of the Result of Chemical Tests**

Sample location	From_m to_m		Inorganic chemical test									Organic chemical test			
			Cd	Cr	Cu	Ni	Pb	Zn	Hg	As	Ag	PAHs L	PAHs H	PCBs	TBT
			(unit: mg/kg dry wt.)									(unit: µg/kg dry wt.)			
RS1	N/A	N/A	0.1	26	13	19	34	62	0.36	5.9	<0.1	<55	<170	<2	<0.015
KT13A	0.90	1.35	0.3	4.2	16	1.6	<b>110</b>	120	0.4	<1	0.3	<55	<170	<2	<0.015
KT13A	1.90	2.35	<0.1	13	2.6	10	11	130	0.31	4.5	<0.1	<55	<170	<2	<0.015
KT13A	2.90	3.35	<0.1	12	1.7	8.4	12	190	0.21	2.2	0.7	<55	<170	<2	<0.015
KT13A	5.90	6.35	<0.1	19	3.2	8.2	6.5	58	0.2	1.2	<0.1	<55	290	<2	<0.015
KT13A	2.40	2.85	0.1	18	1.6	10	8.1	98	0.23	2.3	<0.1	<55	<170	<2	<0.015
KT13B	0.00	0.45	<0.1	1.0	8	<1	29	54	0.13	<1	<0.1	<55	<170	<2	<0.015
KT13B	2.40	2.85	0.2	9.4	3.5	5.7	16	190	0.24	2.4	0.1	<55	<170	<2	<0.015
KT13B	2.90	3.35	0.2	10	3.3	5.7	12	<b>250</b>	0.21	3.4	<0.1	<55	<170	<2	<0.015
KT13B	5.90	6.35	0.4	12	4.2	7	12	<b>220</b>	0.34	2	0.7	<55	<170	<2	<0.015
KT13C	0.00	0.45	<0.1	2.8	6.2	1.9	36	66	0.16	<1	<0.1	<55	<170	<2	<0.015
KT13C	0.90	1.35	<0.1	2.9	7.7	1.3	28	80	0.19	<1	0.6	<55	<170	<2	<0.015
KT13C	1.90	2.35	<0.1	3.5	2.5	<1	<b>85</b>	39	0.17	<1	0.4	<55	<170	<2	<0.015
KT13C	3.40	3.85	<0.1	9	3.6	3.9	48	150	0.24	<1	0.1	<55	<170	<2	<0.015
KT13C	5.90	6.35	0.4	14	6.2	7.7	41	<b>260</b>	0.42	2	0.1	<55	<170	<2	<0.015
KT13D	0.00	0.45	<0.1	1.5	2.9	<1	8.7	43	0.14	<1	<0.1	<55	<170	<2	<0.015
KT13D	0.90	1.35	0.4	9.7	2.8	5.1	73	150	0.09	3.3	<0.1	<55	<170	<2	<0.015

Notes:

- Figures in **bold** are contaminant levels exceeding the Lower Chemical Exceedance Level (LCEL).
- Figures in **bold and underlined** are the contaminant levels exceeding the Upper Chemical Exceedance Level (UCEL).
- Figures in *italic and underlined* are the contaminant levels exceeding 10 times the LCEL.
- The unit for TBT is mg TBT/L in Interstitial water.

**Table 4.2**  
**Classification of Sediments**

Sample location	From (m)	To (m)	Category	Contaminant level >10 x LCEL	Biological Testing required
RS1	N/A	N/A	L		–
KT13A	0.90	1.35	M		√
KT13A	1.90	2.35	L		–
KT13A	2.90	3.35	L		–
KT13A	5.90	6.35	L		–
KT13A	2.40	2.85	L		–
KT13B	0.00	0.45	L		–
KT13B	2.40	2.85	L		–
KT13B	2.90	3.35	M		√
KT13B	5.90	6.35	M		√
KT13C	0.00	0.45	L		–
KT13C	0.90	1.35	L		–
KT13C	1.90	2.35	M		√
KT13C	3.40	3.85	L		–
KT13C	5.90	6.35	M		√
KT13D	0.00	0.45	L		–
KT13D	0.90	1.35	L		–

Note:

X : Category H without any contaminant levels exceeding 10 times the LCEL

√ : Category H with one or more contaminant levels exceeding 10 times the LCEL, and Biological Testing is required.

– : Biological Testing not required.

**Table 5.1**  
**Composite Sample Arrangement for Biological Testing**

Package	No. of samples	Sample location	Sample depth	
			From (m)	To (m)
Package D	8	KT13B	2.90	3.35
		KT13B	5.90	6.35
	9	KT13C	1.90	2.35
		KT13C	5.90	6.35
	10	RS1	NA	NA

**Table 5.2**  
**Summary of the amphipod survival on Day 10 in relation to reference sediments**

Package	Sample ID	Survival percentage of amphipod on Day 10 (%)								Survival in relation to reference site (%)	Difference between sample and reference sediment (t-test)	Decision (Pass/Fail)
		R1	R2	R3	R4	R5	Mean	SD				
Package D	NC	90	95	100	100	90	95.0	5.0	-	-	-	
	8	75	75	90	70	80	78.0	7.6	86.7	NA <sup>1</sup>	Pass	
	9	95	75	75	90	100	87.0	11.5	96.7	NA <sup>1</sup>	Pass	
	Reference Sediment	95	90	100	75	90	90.0	9.4	-	-	-	

R1: Replicate 1

NC: Negative Control with sediment

NA<sup>1</sup>: As the average survival of the amphipods for the test sediment was no less than 80% of that of the reference sediment, statistical analysis is not required.

**Table 5.3**  
**Summary of the total dry weight of polychaetes on Day 20 in relation to reference sediments**

Package	Sample ID	R1	R2	R3	R4	R5	Mean	SD	Survival in relation to reference site (%)	Difference between sample and reference sediment (t-test)	Decision (Pass/Fail)
Package D	NC	43.62	52.19	55.66	43.43	73.16	53.6	12.2	-	-	-
	8	40.07	40.72	47.73	49.91	65.25	48.7	10.2	78.1	Significantly different, t critical = 1.86, t stat = -2.204, p = 0.0209, (one tail)	Fail
	9	51.50	52.86	37.70	45.01	54.03	48.2	6.8	77.2	Significantly different, t critical = 1.86, t stat = -3.125, p = 0.071, (one tail)	Fail
	Reference Sediment	50.14	60.27	66.49	68.08	67.21	62.4	7.5	-	-	-

R1: Replicate 1

NC: Negative Control with sediment

NA<sup>1</sup>: As the average survival of the amphipods for the test sediment was no less than 90% of that of the reference sediment, statistical analysis is not required.



**Table 5.4**  
**Summary of the normality survival of bivalve larvae in relation to reference sediments**

Package	Sample ID	R1	R2	R3	R4	R5	Mean	SD	Normality survival in relation to reference site (%)	Difference between sample and reference sediment (t-test)	Decision (Pass/Fail)
Package D	NC	89.3	91.3	91.3	84.4	84.8	88.2	3.4	-	-	-
	8	2.0	5.5	2.5	8.5	9.5	5.6	3.4	7.4	Significantly different, t critical = 1.86, t stat = -14.297, p = 0.0000, (one tail)	Fail
	9	7.5	7.5	6.5	9.5	9.5	8.1	1.3	10.8	Significantly different, t critical = 1.86, t stat = -14.388, p = 0.0000, (one tail)	Fail
	Reference Sediment	93.3	69.9	72.4	71.4	68.4	75.1	10.3	-	-	-

**Table 5.5**  
**Summary of Biological Testing Results**

Package	No. of samples	Sample location	Sample depth		Category	Biological Test (Note 1)
			from _m	to _m below seabed		
Package D	8	KT13B	2.90	3.35	M	Fail
		KT13B	5.90	6.35	M	
	9	KT13C	1.90	2.35	M	Fail
		KT13C	5.90	6.35	M	
	10	RS1	NA	NA	L	-

Note 1 : The sediment is deemed to have failed the biological test if it fails in any one of the three toxicity tests.

**Table 6.1**  
**Summary of Sediments Classification**

Package	Sample location / Investigation Station No.	Sample depth		Category	Disposal Type
		From (m)	To (m)		
Package D	KT13A	0.9	1.35	M	Type 2
	KT13A	1.9	2.35	L	Type 1
	KT13A	2.9	3.35	L	Type 1
	KT13A	5.9	6.35	L	Type 1
	KT13A	2.4	2.85	L	Type 1
	KT13B	0	0.45	L	Type 1
	KT13B	2.4	2.85	L	Type 1
	KT13B	2.9	3.35	M	Type 2
	KT13B	5.9	6.35	M	Type 2
	KT13C	0	0.45	L	Type 1
	KT13C	0.9	1.35	L	Type 1
	KT13C	1.9	2.35	M	Type 2
	KT13C	3.4	3.85	L	Type 1
	KT13C	5.9	6.35	M	Type 2
	KT13D	0	0.45	L	Type 1
	KT13D	0.9	1.35	L	Type 1



Lam Environmental Services  
Test Specialists and Environmental Analysts

**CED Contract No. GE/2002/28**  
**Chemical and Biological Testing of Marine Sediment**  
**(Term Contract)**

**Work Order No. GE/2002/28.28**

**Agreement No. CE 67/98, Yuen Long, Kam Tin, Nau Tam Mei**  
**& Tin Shui Wai Drainage Improvement, Stage 1, Phase 2B**

**Final Report (Package D)**

Checked in accordance with  
Contract No. GE/2002/28  
requirements and accepted.

Signed SCW Date 1/6/05

**CLIENT:**

**Geotechnical Projects Division**  
Geotechnical Engineering Office  
Civil Engineering and Development Department  
Civil Engineering and Development Building  
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**CERTIFIED BY:**

Yi Zhang  
PAAC

**DATE:**

31 March 2005

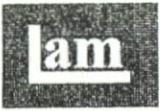


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Test Specialists and Environmental Analysts

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## Chemical Analysis





**Lam Environmental Services**  
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## Metals and Metalloid

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TEST REPORT

**Certificate Number** : A29403  
**Project Name** : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B  
**Client Name** : Geotechnical Projects Division, Geotechnical Engineering office,  
 : Civil Engineering and Development Department  
**Client Address** : 8/F Civil Engineering and Development Building, 101 Princess Margaret Road,  
 : Kowloon, Hong Kong  
**Contract No.** : GE/2002/28  
**Works Order No.** : GE/2002/28.28  


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**Lab. Job No.** : J209  
**Lab. Sample Ref. No.** : 14331,14338,14345,14357,14365,14369  
**No. of Sample(s)** : 28 samples said to be sediment samples  
**& Description**  
**Sample Receive Date** : 22 - 30 December 2004  
**Test Date** : 23 December 2004 - 10 January 2005

## Test Parameter(s)

CODE	Parameter	Reporting Limits		Test Method
		Sediment/Soil		
		mg/kg		
Cd	Cadmium	0.1		S/M/DIG-RAR & M/ICP-MS
Cr	Chromium	1		S/M/DIG-RAR & M/ICP-MS
Cu	Copper	1		S/M/DIG-RAR & M/ICP-MS
Ni	Nickel	1		S/M/DIG-RAR & M/ICP-MS
Pb	Lead	1		S/M/DIG-RAR & M/ICP-MS
Zn	Zinc	10		S/M/DIG-RAR & M/ICP-MS
Hg	Mercury	0.05		S/M/DIG-RAR & M/ICP-MS
As	Arsenic	1		S/M/DIG-RAR & M/ICP-MS
Ag	Silver	0.1		S/M/DIG-RAR & M/ICP-MS

- Notes :
1. Results relate to samples as received.
  2. Results are based on dry sample weight.
  3. < = less than
  4. N/A = Not applicable
  5. Test results satisfy all in-house QA/QC protocols as attached.
  6. Test description (for in-house methods) as follows:  
 S/M/DIG-RAR: Acid digestion.  
 M/ICP-MS: ICP-MS Quantification.

Approved Signatory :


  
Y. T. Wong

Date: 30 Mar. 2005

Remark(s) : This report shall not be reproduced, except in full, without prior approval from Lam Geotechnics Ltd.

Lam Geotechnics Limited Unit 12, 14/F, Honour Industrial Centre, 6 Sun Yip Street, Chaiwan, Hong Kong. Tel: 2897 3282 Fax: 28975509  
 Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation.

TEST REPORT

Certificate Number : A29403  
 Project Name : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B  
 Client Name : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department  
 Contract No. : GE/2002/28  
 Works Order No. : GE/2002/28.28  
 Lab. Sample Ref. No. : 14331,14338,14345,14357,14365,14369

## Test Parameter(s)

Client Reference Drillhole No.	Sample				Cd mg/kg	Cr mg/kg	Cu mg/kg	Ni mg/kg	Pb mg/kg	Zn mg/kg	Hg mg/kg	As mg/kg	Ag mg/kg
	Depth, m			Type Specimen Depth, m									
	No.	From	To										
KT13B	N/A	0.00	0.45	N/A	<0.1	1.0	8.0	<1	29	54	0.13	<1	<0.1
KT13A	N/A	0.90	1.35	N/A	0.3	4.2	16	1.6	110	120	0.40	<1	0.3
KT13A	N/A	1.90	2.35	N/A	<0.1	13	2.6	10	11	130	0.31	4.5	<0.1
KT13A	N/A	2.90	3.35	N/A	<0.1	12	1.7	8.4	12	190	0.21	2.2	0.7
KT13A	N/A	5.90	6.35	N/A	<0.1	19	3.2	8.2	6.5	58	0.20	1.2	<0.1
KT13A	N/A	2.40	2.85	N/A	0.1	18	1.6	10	8.1	98	0.23	2.3	<0.1
KT13B	N/A	2.40	2.85	N/A	0.2	9.4	3.5	5.7	16	190	0.24	2.4	0.1
KT13B	N/A	2.90	3.35	N/A	0.2	10	3.3	5.7	12	250	0.21	3.4	<0.1
KT13B	N/A	5.90	6.35	N/A	0.4	12	4.2	7.0	12	220	0.34	2.0	0.7
KT13C	N/A	0.00	0.45	N/A	<0.1	2.8	6.2	1.9	36	66	0.16	<1	<0.1
KT13C	N/A	0.90	1.35	N/A	<0.1	2.9	7.7	1.3	28	80	0.19	<1	0.6
KT13C	N/A	1.90	2.35	N/A	<0.1	3.5	2.5	<1	85	39	0.17	<1	0.4
KT13C	N/A	3.40	3.85	N/A	<0.1	9.0	3.6	3.9	48	150	0.24	<1	0.1
KT13C	N/A	5.90	6.35	N/A	0.4	14	6.2	7.7	41	260	0.42	2.0	0.1
KT13D	N/A	0.00	0.45	N/A	<0.1	1.5	2.9	<1	8.7	43	0.14	<1	<0.1
KT13D	N/A	0.90	1.35	N/A	0.4	9.7	2.8	5.1	73	150	0.09	3.3	<0.1
KT12A	N/A	3.30	3.80	N/A	0.3	11	12.0	2.2	25	80	0.36	4.8	0.1
KT12A	N/A	3.85	4.35	N/A	0.3	7.5	7.5	2.1	23	69	0.19	5.6	0.3
KT12A	N/A	5.90	6.40	N/A	0.1	11	21	2.9	17	81	0.18	2.5	<0.1
KT12A	N/A	6.45	6.95	N/A	0.2	6.6	21	2.4	23	75	0.16	2.2	<0.1

Approved Signatory :


  
 Y.T. Wong

Date : 30 Mar. 2005



TEST REPORT

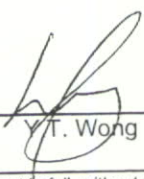
Certificate Number : A29403  
 Project Name : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B  
 Client Name : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department  
 Contract No. : GE/2002/28  
 Works Order No. : GE/2002/28.28  
 Lab. Sample Ref. No. : 14331,14338,14345,14357,14365,14369

## Test Parameter(s)

Client Reference Drillhole No.	Sample				Cd mg/kg	Cr mg/kg	Cu mg/kg	Ni mg/kg	Pb mg/kg	Zn mg/kg	Hg mg/kg	As mg/kg	Ag mg/kg
	Depth, m			Type Specimen Depth, m									
	No.	From	To										
KT12B	N/A	0.00	0.50	N/A	0.3	9.0	11	4.1	65	130	0.26	8.9	0.3
KT12B	N/A	1.70	2.75	N/A	<0.1	4.5	5.5	2.4	43	63	0.25	3.6	0.3
KT12B	N/A	2.80	3.85	N/A	<0.1	4.9	3.9	1.8	29	46	0.47	1.3	0.3
KT12B	N/A	3.90	4.95	N/A	0.2	7.0	13	3.4	14	94	0.21	1.6	0.2
KT12B	N/A	5.00	6.05	N/A	0.4	7.9	26	5.0	15	130	0.30	3.7	<0.1
KT12A	N/A	0.00	1.05	N/A	0.4	11.0	16	5.3	120	140	0.18	37	<0.1
KT12A	N/A	1.10	2.15	N/A	0.3	3.6	6	1.2	52	37	0.17	4.8	0.3
KT12A	N/A	2.20	3.25	N/A	0.2	6.3	13	1.8	60	71	0.18	1.6	0.2

-----End of Report-----

Approved Signatory :

  
 Y.T. Wong

Date : 30 Mar. 2005



QC REPORT

**Project Name** : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B  
**Client Name** : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department  
 8/F Civil Engineering and Development Building, 101 Princess Margaret Road,  
**Contract No.** : GE/2002/28  
**Works Order No.** : GE/2002/28.28  
**Lab. Sample Ref. No.** : 14331,14338,14345,14357,14365,14369

**Test Parameter(s)****1.1 Sample Duplicate (Relative deviation)**

Client Reference Drillhole No.	Sample				Batch	Cd %	Cr %	Cu %	Ni %	Pb %	Zn %	As %	Hg %	Ag %	
	Depth, m			Type											Specimen Depth m
	No.	From	To												
KT13B	N/A	0.00	0.45		N/A	1	*na	12	0.1	*na	30	5.6	*na	10	*na
KT12B	N/A	0.00	0.50		N/A	2	6.9	0.9	3.0	22	2.7	6.7	4.0	24	11
Control Limits						+/- 30 % of the mean									

**1.2 Method Spike (Standard Addition)**

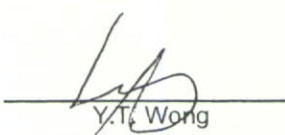
Client Reference Drillhole No.	Sample				Batch	Cd %	Cr %	Cu %	Ni %	Pb %	Zn %	As %	Hg %	Ag %	
	Depth, m			Type											Specimen Depth m
	No.	From	To												
KT13B	N/A	0.00	0.45		0.90m	1	112	106	85	100	109	106	99	113	118
KT12B	N/A	0.00	0.50		5.90m	2	103	103	91	99	84	90	97	88	102
Control Limits						75 - 125 %									

Note: 1. \*na = Relative deviation(RD) for duplicates cannot be evaluated as the value determined is lower than reporting limited.

2. Results are based on dry sample weight

3. < = less than

Approved Signatory :

  
Y.T. Wong

Date : 30 Mar. 2005

Remark(s) :

QC REPORT

Project Name : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B

Client Name : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department  
 8/F Civil Engineering and Development Building, 101 Princess Margaret Road,

Contract No. : GE/2002/28

Works Order No. : GE/2002/28.28

Lab. Sample Ref. No. : 14331,14338,14345,14357,14365,14369

## Test Parameter(s)

## 1.3 Sample Reference Material (ISE 2002.3.3)


Reference	Sample					Batch	Cd %	Cr %	Cu %	Ni %	Pb %	Zn %	As %	Hg %	Ag %
	Depth, m			Type	Specimen Depth m										
	No.	From	To												
ISE 2002.3.3	N/A	N/A	N/A		N/A	1	94	93	94	85	99	98	85	88	99
ISE 2002.3.3	N/A	N/A	N/A		N/A	2	99	93	89	84	98	92	86	100	78
Control Limits						75 - 125% of nominal value									

## 1.4 Method Blank

Reference	Sample					Batch	Cd	Cr	Cu	Ni	Pb	Zn	As	Hg	Ag
	Depth, m			Type	Specimen Depth m										
	No.	From	To												
N/A	N/A	N/A	N/A		N/A	1	<0.1	<1	<1	<1	<1	<10	<1	<0.05	<0.1
N/A	N/A	N/A	N/A		N/A	2	<0.1	<1	<1	<1	<1	<10	<1	<0.05	<0.1
Control Limits						Less than reporting limit									

Note: 1. Results are based on dry sample weight  
 2. < = less than

Approved Signatory :

  
 Y.T. Wong

Date : 30 Mar. 2005

Remark(s) :



PAHs

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**TEST REPORT**

Certificate No. : A29401  
 Project Name : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B  
 Client Name : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department  
 Client Address : 8/F Civil Engineering and Development Building, 101 Princess Margaret Road,  
 Kowloon, Hong Kong  
 Contract No. : GE/2002/28  
 Works Order No. : GE/2002/28.28  
 Lab. Job No. : J209  
 Lab. Sample Ref. No. : 14331, 14338, 14345, 14357, 14365, 14369  
 No. of Sample(s) : 28 samples said to be sediment samples  
 & Description  
 Sample Receive Date : 22 December 2004 - 30 December 2004  
 Test Date : 23 December 2004 - 10 January 2005

**Test Parameter(s)****1. Low Molecular Weight Polyaromatic Hydrocarbons, LMW PAHs**

CODE	Parameter	Reporting Limits	Test Method
		Sediment/Soil ug/kg	
NAP	Naphthalene	55	S/O/PAH
ANY	Acenaphthylene	55	S/O/PAH
ANA	Acenaphthene	55	S/O/PAH
FLU	Fluorene	55	S/O/PAH
PHE	Phenanthrene	55	S/O/PAH
ANT	Anthracene	55	S/O/PAH

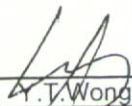
**2. High Molecular Weight Polyaromatic Hydrocarbons, HMW PAHs**

CODE	Parameter	Reporting Limits	Test Method
		Sediment/Soil ug/kg	
CHR	Chrysene	170	S/O/PAH
BaA	Benzo(a)anthracene	170	S/O/PAH
BbF	Benzo(b)fluoranthene	170	S/O/PAH
BkF	Benzo(k)fluoranthene	170	S/O/PAH
BaP	Benzo(a)pyrene	170	S/O/PAH
DBA	Dibenz(ah)anthracene	170	S/O/PAH
FLT	Fluoranthene	170	S/O/PAH
IPY	Indeno(1,2,3-cd)pyrene	170	S/O/PAH
PYR	Pyrene	170	S/O/PAH
BPE	Benzo(ghi)perylene	170	S/O/PAH

- Notes :
1. Results relate to samples as received.
  2. Results are based on dry sample weight.
  3. < = less than
  4. N/A = Not applicable
  5. Test results satisfy all in-house QA/QC protocols as attached.
  6. Test description (for in-house methods only) as follows:  
S/O/PAH: Ultra-Sonic extraction and GC-MS Quantification.

Approved Signatory :

Date: 30 Mar. 2005



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TEST REPORT

**Certificate Number** : A29401  
**Project Name** : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B  
**Client Name** : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department  
**Contract No.** : GE/2002/28  
**Lab. Sample Ref. No.** : 14331,14338,14345,14357,14365,14369

### 1. Low Molecular Weight Polyaromatic Hydrocarbons, LMW PAHs

Client Reference Drillhole No.	Sample				NAP ug/kg	ANY ug/kg	ANA ug/kg	FLU ug/kg	PHE ug/kg	ANT ug/kg	
	Depth, m			Type							Specimen Depth m
	No.	From	To								
KT13B	N/A	0.00	0.45		N/A	<55	<55	<55	<55	<55	<55
KT13A	N/A	1.90	2.35		N/A	<55	<55	<55	<55	<56	<55
KT13A	N/A	2.90	3.35		N/A	<55	<55	<55	<55	<56	<55
KT13A	N/A	5.90	6.35		N/A	<55	<55	<55	<55	<56	<55
KT13A	N/A	2.40	2.85		N/A	<55	<55	<55	<55	<56	<55
KT13B	N/A	2.40	2.85		N/A	<55	<55	<55	<55	<56	<55
KT13B	N/A	2.90	3.35		N/A	<55	<55	<55	<55	<56	<55
KT13B	N/A	5.90	6.35		N/A	<55	<55	<55	<55	<56	<55
KT12B	N/A	0.00	0.50		N/A	<55	<55	<55	<55	<56	<55
KT13C	N/A	0.00	0.45		N/A	<55	<55	<55	<55	<56	<55
KT13C	N/A	0.90	1.35		N/A	<55	<55	<55	<55	<56	<55
KT13C	N/A	1.90	2.35		N/A	<55	<55	<55	<55	<56	<55
KT13C	N/A	3.40	3.85		N/A	<55	<55	<55	<55	<56	<55
KT13C	N/A	5.90	6.35		N/A	<55	<55	<55	<55	<56	<55
KT13D	N/A	0.00	0.45		N/A	<55	<55	<55	<55	<56	<55
KT13D	N/A	0.90	1.35		N/A	<55	<55	<55	<55	<56	<55
KT12A	N/A	3.30	3.80		N/A	<55	<55	<55	<55	<56	<55
KT12A	N/A	3.85	4.35		N/A	<55	<55	<55	<55	<56	<55
KT12A	N/A	5.90	6.40		N/A	<55	<55	<55	<55	<56	<55
KT12A	N/A	6.45	6.95		N/A	<55	<55	<55	<55	<56	<55

Approved Signator :



Y.T. Wong

Date: 30 Mar. 2005

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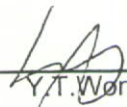
TEST REPORT

Certificate Number : A29401  
 Project Name : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B  
 Client Name : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department  
 Contract No. : GE/2002/28  
 Lab. Sample Ref. No. : 14331,14338,14345,14357,14365,14369

## 2. High Molecular Weight Polyaromatic Hydrocarbons, HMW PAHs

Client Reference	Sample				Specimen Depth m	CHR ug/kg	BaA ug/kg	BbF ug/kg	BkF ug/kg	BaP ug/kg	DBA ug/kg	FLT ug/kg	IPY ug/kg	PYR ug/kg	BPE ug/kg	
	Drillhole No.	Depth, m														Type
		No.	From	To												
KT13B	N/A	0.00	0.45		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
KT13A	N/A	1.90	2.35		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
KT13A	N/A	2.90	3.35		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
KT13A	N/A	5.90	6.35		N/A	<170	<170	<170	<170	<170	<170	<170	290	<170	<170	
KT13A	N/A	2.40	2.85		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
KT13B	N/A	2.40	2.85		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
KT13B	N/A	2.90	3.35		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
KT13B	N/A	5.90	6.35		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
KT12B	N/A	0.00	0.50		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
KT13C	N/A	0.00	0.45		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
KT13C	N/A	0.90	1.35		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
KT13C	N/A	1.90	2.35		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
KT13C	N/A	3.40	3.85		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
KT13C	N/A	5.90	6.35		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
KT13D	N/A	0.00	0.45		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
KT13D	N/A	0.90	1.35		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
KT12A	N/A	3.30	3.80		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
KT12A	N/A	3.85	4.35		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
KT12A	N/A	5.90	6.40		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
KT12A	N/A	6.45	6.95		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	

Approved Signatory :


  
 Y.T. Wong

Date : 30 Mar. 2005

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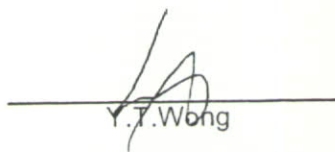
TEST REPORT

**Certificate Number** : A29401  
**Project Name** : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B  
**Client Name** : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department  
**Contract No.** : GE/2002/28  
**Lab. Sample Ref. No.** : 14331,14338,14345,14357,14365,14369

**1. Low Molecular Weight Polyaromatic Hydrocarbons, LMW PAHs**

Client Reference	Sample				NAP	ANY	ANA	FLU	PHE	ANT	
	Drillhole No.	Depth, m		Type							Specimen
		No.	From								
KT12B	N/A	0.00	0.50		N/A	<55	<55	<55	<55	<55	
KT12B	N/A	1.70	2.75		N/A	<55	<55	<55	<55	<55	
KT12B	N/A	2.80	3.85		N/A	<55	<55	<55	<55	<55	
KT12B	N/A	3.90	4.95		N/A	<55	<55	<55	<55	<55	
KT12B	N/A	5.00	6.05		N/A	<55	<55	<55	<55	<55	
KT12A	N/A	0.00	1.05		N/A	<55	<55	<55	<55	<55	
KT12A	N/A	1.10	2.15		N/A	<55	<55	<55	<55	<55	
KT12A	N/A	2.20	3.25		N/A	<55	<55	<55	<55	<55	

Approved Signator :


  
 Y.T. Wong

Date: 30 Mar. 2005

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TEST REPORT

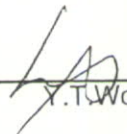
**Certificate Number** : A29401  
**Project Name** : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B  
**Client Name** : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department  
**Contract No.** : GE/2002/28  
**Lab. Sample Ref. No.** : 14331,14338,14345,14357,14365,14369

## 2. High Molecular Weight Polyaromatic Hydrocarbons, HMW PAHs

Client Reference Drillhole No.	Sample				Specimen Depth m	CHR	BaA	BbF	BkF	BaP	DBA	FLT	IPY	PYR	BPE
	Depth, m			Type		ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
	No.	From	To			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	
KT12B	N/A	0.00	0.50		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170
KT12B	N/A	1.70	2.75		N/A	<170	<170	<170	240	<170	<170	<170	<170	<170	<170
KT12B	N/A	2.80	3.85		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170
KT12B	N/A	3.90	4.95		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170
KT12B	N/A	5.00	6.05		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170
KT12A	N/A	0.00	1.05		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170
KT12A	N/A	1.10	2.15		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170
KT12A	N/A	2.20	3.25		N/A	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170

-----End of Results-----

Approved Signatory :

  
 Y.T. Wong

Date : 30 Mar. 2005

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QC REPORT

**Project Name** : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B  
**Client Name** : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department  
**Contract No.** : GE/2002/28  
**Lab Sample Ref. No.** : 14331,14338,14345,14357,14365,14369

## 1. Low Molecular Weight Polyaromatic Hydrocarbons, LMW PAHs

### 1.1 Sample Duplicate

Client Reference Drillhole No.	Sample				Batch	NAP %	ANY %	ANA %	FLU %	PHE %	ANT %	
	Depth, m			Type								Specimen Depth m
	No.	From	To									
KT13B	N/A	0.00	0.45		N/A	1	na*	na*	na*	na*	na*	
KT12B	N/A	0.00	0.50		N/A	2	na*	na*	na*	na*	na*	
Control Limits						+/- 30 % of the mean						

### 1.2 Sample Spike (Spike Level = 5 ug)

Client Reference Drillhole No.	Sample				Batch	NAP %	ANY %	ANA %	FLU %	PHE %	ANT %	
	Depth, m			Type								Specimen Depth m
	No.	From	To									
KT13B	N/A	0.00	0.45		N/A	1	108	103	98	110	111	93
KT12B	N/A	0.00	0.50		N/A	2	104	105	100	111	106	93
Control Limits						70 - 130 %						

Notes :

- na\* = Relative deviation (RD) for duplicates cannot be evaluated as the value determined is lower than reporting limit.

Approved Signatory :

  
 Y.T. Wong

Date : 30 Mar. 2005

Remarks :

QC REPORT

Project Name : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B

Client Name : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department

Contract No. : GE/2002/28

Lab. Sample Ref. No. : 14331,14338,14345,14357,14365,14369

**2. High Molecular Weight Polyaromatic Hydrocarbons, HMW PAHs****2.1 Sample Duplicate**

Client Reference Drillhole No.	Sample				Batch	CHR	BaA	BbF	BkF	BaP	DBA	FLT	IPY	PYR	BPE
	Depth, m			Type		Specimen Depth m	%	%	%	%	%	%	%	%	%
	No.	From	To				%	%	%	%	%	%	%	%	%
KT13B	N/A	0.00	0.45		N/A	1	na*	na*	na*	na*	na*	na*	na*	na*	na*
KT12B	N/A	0.00	0.50		N/A	2	na*	na*	na*	na*	na*	na*	na*	na*	na*
Control Limits						+/- 30 % of the mean									


**2.2 Sample Spike (Spike Level = 5 ug)**

Client Reference Drillhole No.	Sample				Batch	CHR	BaA	BbF	BkF	BaP	DBA	FLT	IPY	PYR	BPE
	Depth, m			Type		Specimen Depth m	%	%	%	%	%	%	%	%	%
	No.	From	To				%	%	%	%	%	%	%	%	%
KT13B	N/A	0.00	0.45		N/A	1	95	90	86	109	98	88	92	82	92
KT12B	N/A	0.00	0.50		N/A	2	102	92	97	114	87	80	94	96	93
Control Limits						70 - 130 %									

## Notes :

1. na\* = Relative deviation (RD) for duplicates cannot be evaluated as the value determined is lower than reporting limit.

Approved Signatory :


  
 Y. T. Wong

Date : 30 Mar. 2005

Remark(s) :

QC REPORT

**Project Name** : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B

**Client Name** : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department

**Contract No.** : GE/2002/28

**Lab Sample Ref. No.** : 14331,14338,14345,14357,14365,14369

**1. Low Molecular Weight Polyaromatic Hydrocarbons, LMW PAHs****1.3 QC Sample (SETOC 2001.2.2)**

Client Reference	Sample					Batch	NAP	ANY	ANA	FLU	PHE	ANT	
	Drillhole No.	Depth, m			Type								Specimen Depth m
		No.	From	To									
SETOC 2001.2.2	N/A	N/A	N/A		N/A	1	107	95	95	92	111	101	
SETOC 2001.2.2	N/A	N/A	N/A		N/A	2	102	95	107	100	108	93	
Control Limits							70 - 130 % of nominal value						

**1.4 Method Blank**

Client Reference	Sample					Batch	NAP	ANY	ANA	FLU	PHE	ANT	
	Drillhole No.	Depth, m			Type								Specimen Depth m
		No.	From	To									
N/A	N/A	N/A	N/A		N/A	1	<55	<55	<55	<55	<55	<55	
N/A	N/A	N/A	N/A		N/A	2	<55	<55	<55	<55	<55	<55	
Control Limits							Less than reporting limit						

Approved Signatory :


  
 Y.T. Wong

Date : 30 Mar. 2005

Remark(s) :



**QC REPORT**

Project Name : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B

Client Name : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department

Contract No. : GE/2002/28

Lab. Sample Ref. No. : 14331,14338,14345,14357,14365,14369

**2. High Molecular Weight Polyaromatic Hydrocarbons, HMW PAHs**


**2.3 QC Sample (SETOC 2001.2.2)**

Client Reference	Sample					Batch	CHR	BaA	BbF	BkF	BaP	DBA	FLT	IPY	PYR	BPE	
	Drillhole No.	Depth, m			Type		Specimen Depth m	%	%	%	%	%	%	%	%	%	%
		No.	From	To				%	%	%	%	%	%	%	%	%	
SETOC 2001.2.2	N/A	N/A	N/A		N/A	1	96	100	92	87	86	111	93	87	96	95	
SETOC 2001.2.2	N/A	N/A	N/A		N/A	2	100	94	90	84	92	106	93	90	96	99	
Control Limits							70 - 130% of nominal value										

**2.4 Method Blank**

Drillhole No.	Sample					Batch	CHR	BaA	BbF	BkF	BaP	DBA	FLT	IPY	PYR	BPE	
	Drillhole No.	Depth, m			Type		Specimen Depth m	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
		No.	From	To				ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg		
N/A	N/A	N/A	N/A		N/A	1	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
N/A	N/A	N/A	N/A		N/A	2	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	
Control Limits							Less than reporting limit										

Approved Signatory :

  
 Y.T. Wong

Date : 30 Mar. 2005

Remark(s) :





**Lam Environmental Services**  
Test Specialists and Environmental Analysts

---

**PCBs**

---

TEST REPORT

**Project Name** : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B  
**Client Name** : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department  
**Client Address** : 8/F Civil Engineering and Development Building, 101 Princess Margaret Road,  
 Kowloon, Hong Kong  
**Contract No.** : GE/2002/28  
**Works Order No.** : GE/2002/28.28  


---

**Laboratory Job No.** : J209  
**Lab. Sample Ref. No.** : 14331,14338,14345,14357,14365,14369  
**No. of Sample(s)** : 28 samples said to be sediment samples  
**& Description**  
**Sample Receive Date** : 22 December 2004 - 30 December 2004  
**Test Date** : 23 December 2004 - 10 January 2005  


---

Test Parameter(s)

CODE	Parameter	Reporting Limits	Test Method
		Sediment/Soil ug/kg	
8	2,4' dichlorobiphenyl	2	S/O/PCB
18	2,2',5 trichlorobiphenyl	2	S/O/PCB
28	2,4,4' trichlorobiphenyl	2	S/O/PCB
44	2,2',3,5' tetrachlorobiphenyl	2	S/O/PCB
52	2,2',5,5' tetrachlorobiphenyl	2	S/O/PCB
66	2,3',4,4' tetrachlorobiphenyl	2	S/O/PCB
77	3,3',4,4' tetrachlorobiphenyl	2	S/O/PCB
101	2,2',4,5,5' pentachlorobiphenyl	2	S/O/PCB
105	2,3,3',4,4' pentachlorobiphenyl	2	S/O/PCB
118	2,3',4,4',5 pentachlorobiphenyl	2	S/O/PCB
126	3,3',4,4',5 pentachlorobiphenyl	2	S/O/PCB
128	2,2',3,3',4,4' hexachlorobiphenyl	2	S/O/PCB
138	2,2',3,4,4',5' hexachlorobiphenyl	2	S/O/PCB
153	2,2',4,4',5,5' hexachlorobiphenyl	2	S/O/PCB
169	3,3',4,4',5,5' hexachlorobiphenyl	2	S/O/PCB
170	2,2',3,3',4,4',5 heptachlorobiphenyl	2	S/O/PCB
180	2,2',3,4,4',5,5' heptachlorobiphenyl	2	S/O/PCB
187	2,2',3,4,5,5',6 heptachlorobiphenyl	2	S/O/PCB

- Notes :
1. Results relate to samples as received.
  2. Results are based on dry sample weight.
  3. < = less than
  4. N/A = Not applicable
  5. Test results satisfy all in-house QA/QC protocols as attached.
  6. Test description (for in-house methods only) as follows:  
S/O/PCB:Ultra-Sonic extraction and GC-MS Quantification.

Approved Signatory :


  
 Y.T. Wong

Date: 30 Mar. 2005

Remark(s) : This report shall not be reproduced, except in full, without prior approval from Lam Geotechnics Ltd.

TEST REPORT

**Project Name** : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B  
**Client Name** : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department  
**Contract No.** : GE/2002/28  
**Lab. Sample Ref. No.** : 14331,14338,14345,14357,14365,14369

Client Reference Drillhole No.	Sample				8	18	28	44	52	66	77	101	105	
	Depth, m			Type										Specimen Depth m
	No.	From	To											
KT13B	N/A	0.00	0.45		N/A	<2	<2	<2	<2	<2	<2	<2	<2	
KT13A	N/A	1.90	2.35		N/A	<2	<2	<2	<2	<2	<2	<2	<2	
KT13A	N/A	2.90	3.35		N/A	<2	<2	<2	<2	<2	<2	<2	<2	
KT13A	N/A	5.90	6.35		N/A	<2	<2	<2	<2	<2	<2	<2	<2	
KT13A	N/A	2.40	2.85		N/A	<2	<2	<2	<2	<2	<2	<2	<2	
KT13B	N/A	2.40	2.85		N/A	<2	<2	<2	<2	<2	<2	<2	<2	
KT13B	N/A	2.90	3.35		N/A	<2	<2	<2	<2	<2	<2	<2	<2	
KT13B	N/A	5.90	6.35		N/A	<2	<2	<2	<2	<2	<2	<2	<2	
KT12B	N/A	0.00	0.50		N/A	<2	<2	<2	<2	<2	<2	<2	<2	
KT13C	N/A	0.00	0.45		N/A	<2	<2	<2	<2	<2	<2	<2	<2	
KT13C	N/A	0.90	1.35		N/A	<2	<2	<2	<2	<2	<2	<2	<2	
KT13C	N/A	1.90	2.35		N/A	<2	<2	<2	<2	<2	<2	<2	<2	
KT13C	N/A	3.40	3.85		N/A	<2	<2	<2	<2	<2	<2	<2	<2	
KT13C	N/A	5.90	6.35		N/A	<2	<2	<2	<2	<2	<2	<2	<2	
KT13D	N/A	0.00	0.45		N/A	<2	<2	<2	<2	<2	<2	<2	<2	
KT13D	N/A	0.90	1.35		N/A	<2	<2	<2	<2	<2	<2	<2	<2	
KT12A	N/A	3.30	3.80		N/A	<2	<2	<2	<2	<2	<2	2.5	5.4	
KT12A	N/A	3.85	4.35		N/A	<2	<2	<2	<2	<2	<2	<2	<2	
KT12A	N/A	5.90	6.40		N/A	<2	<2	<2	<2	<2	<2	<2	<2	
KT12A	N/A	6.45	6.95		N/A	<2	<2	<2	<2	<2	<2	<2	<2	

Approved Signatory :


  
 Y.T. Wong

Date : 30 Mar. 2005

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TEST REPORT

Project Name : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B

Client Name : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department

Contract No. : GE/2002/28

Lab. Sample Ref. No. : 14331,14338,14345,14357,14365,14369

Client Reference Drillhole No.	Sample				118 ug/kg	126 ug/kg	128 ug/kg	138 ug/kg	153 ug/kg	169 ug/kg	170 ug/kg	180 ug/kg	187 ug/kg
	Depth, m			Type Specimen Depth m									
	No.	From	To										
KT13B	N/A	0.00	0.45	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT13A	N/A	1.90	2.35	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT13A	N/A	2.90	3.35	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT13A	N/A	5.90	6.35	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT13A	N/A	2.40	2.85	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT13B	N/A	2.40	2.85	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT13B	N/A	2.90	3.35	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT13B	N/A	5.90	6.35	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT12B	N/A	0.00	0.50	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT13C	N/A	0.00	0.45	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT13C	N/A	0.90	1.35	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT13C	N/A	1.90	2.35	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT13C	N/A	3.40	3.85	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT13C	N/A	5.90	6.35	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT13D	N/A	0.00	0.45	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT13D	N/A	0.90	1.35	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT12A	N/A	3.30	3.80	N/A	4.2	<2	4.5	4.1	4.0	6.9	4.8	5.0	3.3
KT12A	N/A	3.85	4.35	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT12A	N/A	5.90	6.40	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT12A	N/A	6.45	6.95	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2

Approved Signatory :   
 Y.T. Wong

Date : 30 Mar. 2005

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TEST REPORT

**Project Name** : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B  
**Client Name** : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department  
**Contract No.** : GE/2002/28  
**Lab. Sample Ref. No.** : 14331,14338,14345,14357,14365,14369

Client Reference	Sample				8	18	28	44	52	66	77	101	105
	Drillhole No.	Depth, m		Type	Specimen Depth m	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
		No.	From										
KT12B	N/A	0.00	0.50		N/A	<2	<2	<2	<2	<2	<2	<2	<2
KT12B	N/A	1.70	2.75		N/A	<2	<2	<2	<2	<2	<2	<2	<2
KT12B	N/A	2.80	3.85		N/A	<2	<2	<2	<2	<2	<2	<2	<2
KT12B	N/A	3.90	4.95		N/A	<2	<2	<2	<2	<2	<2	<2	<2
KT12B	N/A	5.00	6.05		N/A	<2	<2	<2	<2	<2	<2	<2	<2
KT12A	N/A	0.00	1.05		N/A	<2	<2	<2	<2	<2	<2	<2	<2
KT12A	N/A	1.10	2.15		N/A	<2	<2	<2	<2	<2	<2	<2	<2
KT12A	N/A	2.20	3.25		N/A	<2	<2	<2	<2	<2	<2	<2	<2

Approved Signatory :


  
 Y.T. Wong

Date : 30 Mar. 2005

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TEST REPORT

Project Name : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B

Client Name : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department

Contract No. : GE/2002/28

Lab. Sample Ref. No. : 14331,14338,14345,14357,14365,14369

Client Reference	Sample					118	126	128	138	153	169	170	180	187
	Drillhole No.	Depth, m			Type	Specimen Depth m	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
		No.	From	To										
KT12B	N/A	0.00	0.50		N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT12B	N/A	1.70	2.75		N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT12B	N/A	2.80	3.85		N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT12B	N/A	3.90	4.95		N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT12B	N/A	5.00	6.05		N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT12A	N/A	0.00	1.05		N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT12A	N/A	1.10	2.15		N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
KT12A	N/A	2.20	3.25		N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2

-----End of Results-----

Approved Signatory :


  
 Y.T. Wong

Date : 30 Mar. 2005

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QC REPORT

Project Name : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B

Client Name : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department

Contract No. : GE/2002/28

Lab. Sample Ref. No. : 14331,14338,14345,14357,14365,14369

## 1.1 Sample Duplicate

Client Reference Drillhole No.	Sample				Batch	8	18	28	44	52	66	77	101	105
	Depth, m			Type		Specimen Depth m	%	%	%	%	%	%	%	%
	No.	From	To				%	%	%	%	%	%	%	%
KT13B	N/A	0.00	0.45		N/A	1	na*	na*	na*	na*	na*	na*	na*	na*
KT12B	N/A	0.00	0.50		N/A	2	na*	na*	na*	na*	na*	na*	na*	na*
Control Limit						+/- 30% of the mean								


## 1.2 Sample Spike (Spike Level = 1 ug)

Client Reference Drillhole No.	Sample				Batch	8	18	28	44	52	66	77	101	105	
	Depth, m			Type		Specimen Depth m	%	%	%	%	%	%	%	%	
	No.	From	To				%	%	%	%	%	%	%		
KT13B	N/A	0.00	0.45		N/A	1	94	94	92	78	80	105	112	82	99
KT12B	N/A	0.00	0.50		N/A	2	101	93	93	75	77	107	107	78	102
Control Limit						70-130 %									

## Notes :

- na\* = Relative deviation (RD) for duplicates cannot be evaluated as the value determined is lower than reporting limit.

Approved Signatory :


  
 Y.T. Wong

Date : 30 Mar. 2005

Remark(s) :



QC REPORT

Project Name : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B

Client Name : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department

Contract No. : GE/2002/28

Lab. Sample Ref. No. : 14331,14338,14345,14357,14365,14369

**1.3 Sample Duplicate**

Client Reference Drillhole No.	Sample				Batch	118	126	128	138	153	169	170	180	187
	Depth, m			Type		Specimen Depth m	%	%	%	%	%	%	%	%
	No.	From	To				%	%	%	%	%	%	%	
KT13B	N/A	0.00	0.45		N/A	1	na*	na*	na*	na*	na*	na*	na*	na*
KT12B	N/A	0.00	0.50		N/A	2	na*	na*	na*	na*	na*	na*	na*	na*
Control Limit						+/- 30% of the mean								

**1.4 Sample Spike (Spike Level = 1 ug)**

Client Reference Drillhole No.	Sample				Batch	118	126	128	138	153	169	170	180	187	
	Depth, m			Type		Specimen Depth m	%	%	%	%	%	%	%	%	
	No.	From	To				%	%	%	%	%	%	%		
KT13B	N/A	0.00	0.45		N/A	1	112	113	110	95	96	105	99	104	83
KT12B	N/A	0.00	0.50		N/A	2	113	108	103	90	94	84	116	99	76
Control Limit						70-130 %									

## Notes :

- na\* = Relative deviation (RD) for duplicates cannot be evaluated as the value determined is lower than reporting limit.

Approved Signatory :


  
 Y.T. Wong

Date : 30 Mar. 2005

Remark(s) :



QC REPORT

Project Name : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B

Client Name : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department

Contract No. : GE/2002/28

Lab. Sample Ref. No. : 14331,14338,14345,14357,14365,14369

## 2.1 QC Sample (SETOC 2001.1.4)

Client Reference	Batch	28	52	101	105	118	128	138	153	180
Drillhole No.		%	%	%	%	%	%	%	%	%
SETOC 2001.1.4	1	102	91	87	111	108	89	117	113	118
SETOC 2001.1.4	2	100	107	88	102	103	89	87	109	104
Control Limit		70 - 130% of nominal value								

## 2.2 Method Blank

Client Reference	Sample				Batch	8	18	28	44	52	66	77	101	105
	Drillhole No.	Depth, m		Type Specimen		ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
		No.	From	To										
N/A	N/A	N/A	N/A	N/A	1	<2	<2	<2	<2	<2	<2	<2	<2	<2
N/A	N/A	N/A	N/A	N/A	2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Control Limit					less than reporting limit									

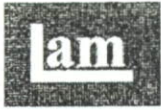
Client Reference	Sample				Batch	118	126	128	138	153	169	170	180	187
	Drillhole No.	Depth, m		Type Specimen		ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
		No.	From	To										
N/A	N/A	N/A	N/A	N/A	1	<2	<2	<2	<2	<2	<2	<2	<2	
N/A	N/A	N/A	N/A	N/A	2	<2	<2	<2	<2	<2	<2	<2	<2	
Control Limit					less than reporting limit									

Approved Signatory :


  
 Y.T. Wong

Date : 30 Mar. 2005

Remark(s) :



TBT

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TEST REPORT

Certificate No. : A29402  
 Project Name : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B  
 Client Name : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department  
 Address : 8/F Civil Engineering and Development Building, 101 Princess Margaret Road,  
 Kowloon, Hong Kong  
 Contract No. : GE/2002/28  
 Works Order No. : GE/2002/28.28

---

Laboratory Job No. : J209  
 Lab. Sample Ref. No. : 14331, 14338, 14345, 14357, 14365, 14369  
 No. of Sample : 28 samples said to be water samples  
 & Description  
 Sample Receive Date : 22 December 2004 - 30 December 2004  
 Test Date : 23 December 2004 - 10 January 2005

---

Test Parameter(s)

CODE	Parameter	Reporting Limits	Test Method
		Water	
		ug TBT /L	
TBT	Tri-Butyl Tin	0.015	W/O/TBT

- Notes :
1. Results relate to samples as received.
  2. < = less than
  3. N/A = Not applicable
  4. Test results satisfy all in-house QA/QC protocols as attached.
  5. Test description ( for in-house methods) as follows:  
 W/O/TBT: Solvent extraction and GC-MS Quantification.

Approved Signatory :

Y.T. Wong

Date : 30 Mar. 2005

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Lam Geotechnics Limited Unit 12, 14/F, Honour Industrial Centre, 6 Sun Yip Street, Chaiwan, Hong Kong. Tel: 2897 3282  
 Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS)  
 for specific laboratory activities as listed in the HOKLAS directory of accredited laboratories.

The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation.




TEST REPORT

Certificate No. : A29402  
 Project Name : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B  
 Client Name : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department  
 Contract No. : GE/2002/28  
 Lab. Sample Ref. No. : 14331,14338,14345,14357,14365,14369

Client Reference Drillhole No.	Sample				TBT ug TBT / L	
	Depth, m			Type		Specimen Depth m
	No.	From	To			
KT13B	N/A	0.00	0.45		N/A	<0.015
KT13A	N/A	1.90	2.35		N/A	<0.015
KT13A	N/A	2.90	3.35		N/A	<0.015
KT13A	N/A	5.90	6.35		N/A	<0.015
KT13A	N/A	2.40	2.85		N/A	<0.015
KT13B	N/A	2.40	2.85		N/A	<0.015
KT13B	N/A	2.90	3.35		N/A	<0.015
KT13B	N/A	5.90	6.35		N/A	<0.015
KT12B	N/A	0.00	0.50		N/A	<0.015
KT13C	N/A	0.00	0.45		N/A	<0.015
KT13C	N/A	0.90	1.35		N/A	<0.015
KT13C	N/A	1.90	2.35		N/A	<0.015
KT13C	N/A	3.40	3.85		N/A	<0.015
KT13C	N/A	5.90	6.35		N/A	<0.015
KT13D	N/A	0.00	0.45		N/A	<0.015
KT13D	N/A	0.90	1.35		N/A	<0.015
KT12A	N/A	3.30	3.80		N/A	<0.015
KT12A	N/A	3.85	4.35		N/A	<0.015
KT12A	N/A	5.90	6.40		N/A	<0.015
KT12A	N/A	6.45	6.95		N/A	<0.015

-----End of report-----

Approved Signatory :


  
 Y.T. Wong

Date : 30 Mar. 2005

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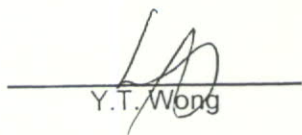
TEST REPORT

Certificate No. : A29402  
 Project Name : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B  
 Client Name : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department  
 Contract No. : GE/2002/28  
 Lab. Sample Ref. No. : 14331,14338,14345,14357,14365,14369

Client Reference Drillhole No.	Sample				TBT ug TBT / L	
	Depth, m			Type		Specimen Depth m
	No.	From	To			
KT12B	N/A	0.00	0.50		N/A	<0.015
KT12B	N/A	1.70	2.75		N/A	<0.015
KT12B	N/A	2.80	3.85		N/A	<0.015
KT12B	N/A	3.90	4.95		N/A	<0.015
KT12B	N/A	5.00	6.05		N/A	<0.015
KT12A	N/A	0.00	1.05		N/A	<0.015
KT12A	N/A	1.10	2.15		N/A	<0.015
KT12A	N/A	2.20	3.25		N/A	<0.015

-----End of report-----

Approved Signatory :

  
 Y.T. Wong

Date : 30 Mar. 2005

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QC REPORT

**Project Name** : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B  
**Client Name** : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department  
**Contract No.** : GE/2002/28  
**Lab. Sample Ref. No.** : 14331,14338,14345,14357,14365,14369

**1.1 Sample Duplicate (Relative deviation)**

Client Reference Drillhole No.	Sample				Batch	TBT %	
	Depth, m			Type			Specimen Depth m
	No.	From	To				
KT13B	N/A	0.00	0.45		N/A	1	na*
KT12B	N/A	0.00	0.50		N/A	2	na*
Control Limit							+/- 30% of the mean

**1.2 Sample Spike (Spike Level = 50 ng)**

Client Reference Drillhole No.	Sample				Batch	TBT %	
	Depth, m			Type			Specimen Depth m
	No.	From	To				
KT13A	N/A	1.90	2.35		N/A	1	106
KT12B	N/A	1.70	2.75		N/A	2	85
Control Limit							70-130 %

## Notes :

- na\* = Relative deviation (RD) for duplicates cannot be evaluated as the value determined is lower than reporting limit.

Approved Signatory :

  
 Y. T. Wong

Date : 30 Mar. 2005

Remark(s) :



QC REPORT

Project Name : Chemical and Biological Testing of Marine Sediment (Term Contract)  
 Agreement No. CE67/98 Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai  
 Drainage Improvement-Stage 1 Phase 2B

Client Name : Geotechnical Projects Division, Geotechnical Engineering office,  
 Civil Engineering and Development Department

Contract No. : GE/2002/28

Lab. Sample Ref. No. : 14331,14338,14345,14357,14365,14369

## 1.3 QC Sample (Spike level = 50 ng)

Client Reference	Sample					Batch	TBT %	
	Drillhole No.	Depth, m			Type			Specimen Depth m
		No.	From	To				
MB Spike	N/A	N/A	N/A		N/A	1	100	
MB Spike	N/A	N/A	N/A		N/A	2	80	
Control Limit							+/- 30% of the mean	

## 1.4 Method Blank

Client Reference	Sample					Batch	TBT ug TBT / L	
	Drillhole No.	Depth, m			Type			Specimen Depth m
		No.	From	To				
N/A	N/A	N/A	N/A		N/A	1	<0.015	
N/A	N/A	N/A	N/A		N/A	2	<0.015	
Control Limit							Less than reporting limit	

Approved Signatory :

  
 Y.T. Wong

Date : 30 Mar. 2005

Remark(s) :



**Lam Environmental Services**  
Test Specialists and Environmental Analysts

---

## Biological Testing



**Lam Environmental Services**  
Test Specialists and Environmental Analysts

---

## Sample Identity Reference





Agreement No. CE67/98  
 Yuen Long, Kam Tin, Nau Tam Mei &  
 Tia Shai Wai Drainage Improvement, Stage 1, Phase 2B

Table B Sample Details for Package D

Sample ID	No. of samples	Sample location	Sample depth		Category	Sample Type	Biological Test	Biological test on sediment sample			Ancillary test
			from_m	to_m below seabed				10-day burrowing amphipod toxicity test	20-day burrowing polychaete toxicity test	48-96 hour larvae (bivalve or echinoderm) toxicity test	
Composite No.1	8	KT13B	2.90	3.35	M	Composite sample	Biological Screening	√	√	√	√
		KT13B	5.90	6.35	M						
Composite No.2	9	KT13C	1.90	2.35	M	Composite sample	Biological Screening	√	√	√	√
		KT13C	5.90	6.35	M						
Reference Sediment	10	RS1	NA	NA	L	Individual	Biological Screening	√	√	√	√



**Lam Environmental Services**  
Test Specialists and Environmental Analysts

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## Amphipod Test



TEST REPORT

Certificate No. : A30209  
 Project Name : Agreement No. CE67/98, Yuen Long, Kam Tin, Ngau Tam Mei & Tin Shui Wai Drainage Improvement, Stage 1, Phase 2B, Package D  
  
 Client Name : Geotechnical Projects Division, Geotechnical Engineering Office, Civil Engineering and Development Department  
 Client Address : 8/F Civil Engineering and Development Building, 101 Princess Margaret Road, Kowloon, Hong Kong  
 Contract No. : GE/2002.28  
 Works Order No. : GE/2002.28.28  


---

 Lab. Job No. : J209  
 Lab. Sample Ref. No. : 14508/1-2,14437/7  
 No. of Sample(s) & Description : 3 no. of sediment (grab and vibrocore) as the following:  
 Composite sample No.1-2 prepared from vibrocore samples as per client's instruction  
 1 reference sediment sample  
 Sample Receive Date : 16-24 December, 2004  
 Test Date : 28 January - 7 February, 2005  



---

Test Parameter

Parameter	Test Method
Amphipod Sediment Bioassay	USEPA 1994

- Note(s):
1. Results relate to samples as received.
  2. NA = Not applicable.
  3. Uncertainty is calculated as 2 SD.
  4. Standard Method: Methods for Assessing Toxicity of Sediment-associated Contaminants with Estuarine and Marine Amphipods. EPA/600/R-94/025, USEPA, 1994.

Approved signatory:

  
 Y. Zhang/ S.W. Kung

Date: 30-Mar-2005

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Test report

Certificate no.: A30209

1. Method

This 10-day toxicity test with *Leptocheirus plumulosus* was conducted using the USEPA method (1994) "Methods for Assessing the Toxicity of Sediment-associated Contaminants with Estuarine and Marine Amphipods". *Leptocheirus plumulosus* is exposed to the test sediment overlaid with seawater for a 10-day test period and survival rate is determined as the primary endpoint.

2. Sample storage and pretreatment

Composite samples were prepared as per client's instruction from the extruded vibrocore sections and homogenized thoroughly. Debris and indigenous organisms present in the sediment were removed and the sediment samples were stored at 4°C in dark until analyzed.

3. Test organism

Species: *Leptocheirus plumulosus*  
 Source: Purchased from research organism supplier from USA, mortality during shipping was 1.5 %  
 Size/age: 3-4 mm in length  
 Acclimation: under test conditions with feeding provided, as per USEPA 1994, mortality during acclimation was 0.0 %  
 Health condition: healthy

4. Summary of test particulars

Type of test: static  
 Duration: 28 January - 7 February, 2005  
 Control sediment: mud and sand collected from a clean area on the eastern coast of the New Territories and Hong Kong Island respectively, shipped to the laboratory on the same day, sieved through 425 micrometer mesh sieve, mixed and stored at 4°C in dark until use  
 Control seawater: reconstituted seawater prepared with the Instant Ocean salt at 20 ppt, aerated for two days after preparation  
 Test temperature: 25±1°C  
 Lighting: continuous  
 Aeration: provided (around 100 bubbles/min)  
 Test vessel: 1000ml glass jars  
 Volume of sediment: 175ml  
 Volume of overlying water: 775 ml

Approved signatory:

Y. Zhang/ S.W. Kung

Date: 30-Mar-2005

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Test report

Certificate no.: A30209

No. of replicates: 5  
 No. of organisms/replicate: 20  
 Feeding: none  
 Monitoring: temperature, DO, pH and salinity in overlying water everyday, ammonia in overlying water at test initiation and termination  
 Reference toxicant test: 96 hour water only test with CdCl<sub>2</sub>

5. Summary of test results

Table 1. Survival of amphipods on Day 10

Sample ID	Number of living amphipod on Day 10					Mean	SD
	Replicate 1	Replicate 2	Replicate 3	Replicate 4	Replicate 5		
Negative Control with sediment	18	19	20	20	18	19.0	1.0
Composite sample No.1	15	15	18	14	16	15.6	1.5
Composite sample No.2	19	15	15	18	20	17.4	2.3
Reference sediment	19	18	20	15	18	18.0	1.9

Table 2. Survival percentage of amphipods on Day 10

Sample ID	Survival percentage of amphipod on Day 10 (%)					Mean	SD
	Replicate 1	Replicate 2	Replicate 3	Replicate 4	Replicate 5		
Negative Control with sediment	90	95	100	100	90	95.0	5.0
Composite sample No.1	75	75	90	70	80	78.0	7.6
Composite sample No.2	95	75	75	90	100	87.0	11.5
Reference sediment	95	90	100	75	90	90.0	9.4

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Y. Zhang/ S.W. Kung

Date: 30-Mar-2005

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Table 3. Summary of the amphipod survival in relation to the reference sediment

Sample ID	Survival in relation to reference site (%)	Difference between sample and reference sediment (t-test)
Composite sample No.1	86.7	NA <sup>1</sup>
Composite sample No.2	96.7	NA <sup>1</sup>

NA <sup>1</sup>. As the average survival of the amphipods for the test sediment was no less than 80% of that of the reference sediment, statistical analysis is not required.

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Date: 30-Mar-2005

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6. Test validity

Table 4. Test validity criteria and water quality ranges in the amphipod test

Parameter	Minimum during the test period	Maximum during the test period	Acceptable Range in USEPA 1994
Overlying salinity	20 ppt	20 ppt	19-21 ppt
Dissolved oxygen	6.7 mg/L	7.2 mg/L	>4.7 mg/L <sup>1</sup>
Overlying pH	7.8	8.3	NA <sup>2</sup>
Temperature	24.2 °C	25.0 °C	22.0-28.0 °C time-average 24.0-26.0 °C
Total ammonia in overlying water (initiation/termination)	<0.03 mg/L	0.46 mg/L	<60 mg/L <sup>3</sup>
Interstitial salinity (initiation)	19 ppt	19 ppt	1.5-32 ppt
Interstitial pH (initiation)	7.8	7.9	NA <sup>2</sup>
Amphipod survival in the negative control	90-100 % , averagely 95 %		≥ 90% average ≥ 80% in any individual replicate
96-h LC <sub>50</sub> obtained from the reference toxicant test	1.26 mg/L		1.27±1.03 mg/L
1. 60% of saturation level at 20 ppt 2. pH is not adjusted or controlled 3. The acceptance level for overlying ammonia was < 20 mg/L in ETWB TCW 34/2002. When this level is exceeded, additional set of amphipod test is conducted with purging of sediment.			

As shown in Table 4, the water quality parameters during the test period ranged within acceptable limits: temperature ranged from 24.2 to 25.0 °C, the dissolved oxygen level ranged from 6.7 to 7.2 mg/L, pH ranged from 7.8 to 8.3, the salinity remained 20 ppt. As a result, the data are interpretable.

The tests were validated by acceptable survival of control organisms. The average survival rate in controls was greater than 90% and survival rate in any control replicates greater than 80%.

Approved signatory:

 A handwritten signature in black ink, appearing to be 'Y. Zhang'.
   
 \_\_\_\_\_  
 Y. Zhang/ S.W. Kung

Date: 30-Mar-2005

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 \_\_\_\_\_

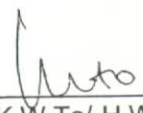
Test report

Certificate no.: A30209


The organisms also demonstrated comparable sensitivity to the reference toxicant (cadmium). The 96-hr  $LC_{50}$  for *Leptocheirus plumulosus* obtained was 1.26 mgCd/L and found within the laboratory control limits (Mean $\pm$ 2STD, i.e., 1.27 $\pm$ 1.03 mgCd/L). Therefore, the data are acceptable.

End of report

Data entry checked by:

  
K.W.To/ H.W.Yau

Approved signatory:

  
Y. Zhang/ S.W. Kung

Date: 30-Mar-2005

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## Polychaete Test



TEST REPORT

Certificate No. : A30210  
 Project Name : Agreement No. CE67/98, Yuen Long, Kam Tin, Ngau Tam Mei & Tin Shui Wai Drainage Improvement, Stage 1, Phase 2B, Package D  
  
 Client Name : Geotechnical Projects Division, Geotechnical Engineering Office, Civil Engineering and Development Department  
 Client Address : 8/F Civil Engineering and Development Building, 101 Princess Margaret Road, Kowloon, Hong Kong  
 Contract No. : GE/2002.28  
 Works Order No. : GE/2002.28.28  


---


 Lab. Job No. : J209  
 Lab. Sample Ref. No. : 14508/1-2,14437/7  
 No. of Sample(s) & Description : 3 no. of sediment (grab and vibrocore) as the following:  
 Composite sample No.1-2 prepared from vibrocore samples as per client's instruction  
 1 reference sediment sample  
 Sample Receive Date : 16-24 December, 2004  
 Test Date : 8-28 February, 2005

Test Parameter

Parameter	Test Method
Polychaete Sediment Bioassay	PSEP 1995

- Note(s):
1. Results relate to samples as received.
  2. NA = Not applicable.
  3. Uncertainty is calculated as 2 SD.
  4. Standard method: Puget Sound Estuary Program Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments, USEPA, Revised July 1995.

Approved signatory:

  
 \_\_\_\_\_  
 Y. Zhang/ S.W. Kung

Date: 30-Mar-2005

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Test report

Certificate no.: A30210

1. Method

This 20-day toxicity test on sediment with *Neanthes arenaceodentata* was conducted using the PSEP method (1995) "Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments". *Neanthes arenaceodentata* is exposed to the test sediment overlaid with seawater for a 20-day test period. The endpoints are survival and growth.

2. Sample storage and pretreatment

Composite samples were prepared as per client's instruction from the extruded vibrocore sections and homogenized thoroughly. Debris and indigenous organisms present in the sediment were removed and the sediment samples were stored at 4°C in dark until analyzed.

3. Test organism

Species:	<i>Neanthes arenaceodentata</i>
Source:	Purchased from research organism supplier from USA, mortality during shipping was 0.0 %
Age/size:	3-4 mm in length
Acclimation:	under test conditions with feeding provided, as per USEPA 1994, mortality during acclimation was 0.0 %
Health condition:	healthy
Mean initial dry weight:	0.84 mg/worm

4. Summary of test particulars

Type of test:	renewal every three days
Duration:	8-28 February, 2005
Control sediment:	mud and sand collected from a clean area on the eastern coast of the New Territories and Hong Kong Island respectively, shipped to the laboratory on the same day, sieved through 425 micrometer mesh sieve, mixed and stored at 4°C in dark dark until use
Control seawater:	reconstituted seawater prepared with the Instant Ocean salt at 28 ppt, aerated for two days after preparation
Test temperature:	20±1°C
Lighting:	continuous
Aeration:	provided (around 100 bubbles/min)

Approved signatory:

Y. Zhang/ S.W. Kung

Date: 30-Mar-2005

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Test report

Certificate no.: A30210

Test vessel: 1000ml glass jars  
 Volume of sediment: 175ml  
 Volume of overlying water: 775 ml  
 No. of replicates: 5  
 No. of organisms/replicate: 5  
 Feeding: Tetramarin powder, 8 mg per worm each time, once every two days  
 Monitoring: temperature, DO, pH and salinity in overlying water everyday, ammonia in overlying water at test initiation and termination  
 Reference toxicant test: 96 hour water only test with CdCl<sub>2</sub>

5. Summary of test results

Table 1. Survival of polychaetes on Day 20

Sample ID	Number of living polychaete on Day 20					Mean	SD
	Replicate 1	Replicate 2	Replicate 3	Replicate 4	Replicate 5		
Negative control with sediment	5	5	5	4	5	4.8	0.4
Composite sample No.1	5	5	5	5	5	5.0	0.0
Composite sample No.2	5	5	5	5	5	5.0	0.0
Reference sediment	5	5	5	5	5	5.0	0.0

Table 2. Survival percentage of polychaetes on Day 20

Sample ID	Survival percentage of polychaete on Day 20 (%)					Mean	SD
	Replicate 1	Replicate 2	Replicate 3	Replicate 4	Replicate 5		
Negative control with sediment	100	100	100	80	100	96.0	8.9
Composite sample No.1	100	100	100	100	100	100.0	0.0
Composite sample No.2	100	100	100	100	100	100.0	0.0
Reference sediment	100	100	100	100	100	100.0	0.0

Approved signatory:

  
Y. Zhang/ S.W. Kung

Date: 30-Mar-2005

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Test report

Certificate no.: A30210



Table 3. Total dry weight of polychaetes on Day 20

Sample ID	Total dry weight of polychaete on Day 20 (mg)						Mean	SD
	Replicate 1	Replicate 2	Replicate 3	Replicate 4	Replicate 5			
Negative control with sediment	43.62	52.19	55.66	43.43	73.16	53.6	12.2	
Composite sample No.1	40.07	40.72	47.73	49.91	65.25	48.7	10.2	
Composite sample No.2	51.50	52.86	37.70	45.01	54.03	48.2	6.8	
Reference sediment	50.14	60.27	66.49	68.08	67.21	62.4	7.5	

Table 4. Summary of the total dry weight of polychaetes in relation to the reference sediments

Sample ID	Total dry weight in relation to reference site (%)	Difference between sample and reference sediment (t-test)
Composite sample No.1	78.1	Significantly different, t critical=1.86, t stat=-2.420, p=0.0209 (one tail)
Composite sample No.2	77.2	Significantly different, t critical=1.86, t stat=-3.125, p=0.0071 (one tail)

End of page

Approved signatory:

  
Y. Zhang/ S.W. Kung

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Certificate no.: A30210

6. Test validity

Table 5. Test validity criteria and water quality ranges in the polychaete test

Parameter	Minimum during the test period	Maximum during the test period	Acceptable Range
Overlying salinity	27 ppt	28 ppt	26-30 ppt
Dissolved oxygen	6.2 mg/L	6.9 mg/L	not specified
Overlying pH	7.9	8.2	NA <sup>1</sup>
Temperature	20.0 °C	20.4 °C	19-21°C
Unionized ammonia in overlying water (initiation/termination)	0.0028 mg/L	0.30 mg/L	NA <sup>2</sup>
Interstitial salinity (initiation/termination)	26 ppt	28 ppt	>20ppt
Interstitial pH (initiation/termination)	7.8	7.9	NA <sup>1</sup>
Polychaete survival in the negative control	80-100 % , averagely 96.0 %		≥ 90% average ≥ 80% in any individual replicate
96-h LC <sub>50</sub> obtained from the reference toxicant test	9.10 mg/L		14.42±6.00 mg/L

1. pH is not adjusted or controlled  
2. Overlying ammonia is not controlled. Results could be qualified as possible false positive when unionized ammonia greater than 0.7 mg/L

As shown in Table 5, the water quality parameters during the test period ranged within acceptable limits: temperature ranged from 20.0 to 20.4 °C, the salinity ranged from 27 to 28 ppt. As a result, the data are interpretable.

The tests were validated by acceptable survival of control organisms. The average survival rate in controls was greater than 90% and survival rate in any control replicates greater than 80%.

Approved signatory:

  
Y. Zhang/ S.W. Kung

Date: 30-Mar-2005

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Test report




Certificate no.: A30210

The organisms also demonstrated comparable sensitivity to the reference toxicant (cadmium). The 96-hr LC<sub>50</sub> for *Neanthes arenaceodentata* obtained was 9.10 mgCd/L and found within the laboratory control limits (Mean±2STD, i.e., 14.42±6.00 mgCd/L). Therefore, the data are acceptable.

End of report

Data entry checked by:

  
K.W.To/ H.W.Yau

Approved signatory:



Y. Zhang/ S.W. Kung

Date: 30-Mar-2005

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**Bivalve Test**

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TEST REPORT

Certificate No. : A30211  
 Project Name : Agreement No. CE67/98, Yuen Long, Kam Tin, Ngau Tam Mei & Tin Shui Wai Drainage Improvement, Stage 1, Phase 2B, Package D  
  
 Client Name : Geotechnical Projects Division, Geotechnical Engineering Office, Civil Engineering and Development Department  
 Client Address : 8/F Civil Engineering and Development Building, 101 Princess Margaret Road, Kowloon, Hong Kong  
 Contract No. : GE/2002.28  
 Works Order No. : GE/2002.28.28  


---


 Lab. Job No. : J209  
 Lab. Sample Ref. No. : 14508/1-2,14437/7  
 No. of Sample(s) & Description : 3 no. of sediment (grab and vibrocore) as the following:  
 Composite sample No.1-2 prepared from vibrocore samples as per client's instruction  
 1 reference sediment sample  
 Sample Receive Date : 16-24 December, 2004  
 Test Date : 1-3 February, 2005

Test Parameter

Parameter	Test Method
Bivalve Larvae Sediment Bioassay	PSEP 1995

- Note(s):
1. Results relate to samples as received.
  2. NA = Not applicable.
  3. Uncertainty is calculated as 2 SD.
  4. Standard method: Puget Sound Estuary Program Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments, USEPA, Revised July 1995.

Approved signatory: \_\_\_\_\_

  
 Y. Zhang/ S.W. Kung

Date: 30-Mar-2005

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Test report

Certificate no.: A30211

1. Method

This bivalve larvae test with *Crassostrea gigas* was conducted using the PSEP method (1995) "Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments". Bivalve adults are induced to spawn and gametes are fertilized. After fertilization the embryos are immediately exposed to the test sediment overlaid with seawater and allowed to develop for 48-60 hours. The normality survival of larvae is determined as endpoint.

2. Sample storage and pretreatment

Composite samples were prepared as per client's instruction from the extruded vibrocore sections and homogenized thoroughly. Debris and indigenous organisms present in the sediment were removed and the sediment samples were stored at 4°C in dark until analyzed.

3. Test organism

Species:	<i>Crassostrea gigas</i>
Source:	purchased from a research organism supplier in UK
Acclimation:	24 hours under test conditions, as per PSEP 1995, mortality during acclimation was 0 %
Conditions of eggs:	mature and clean
Conditions of sperms:	active
Fertilization rate:	90.3%
Mean initial stocking:	20,036 fertilized eggs per test chamber

4. Summary of test particulars

Type of test:	static and non-renewal
Duration:	1-3 February, 2005, 48 hours in total
Control seawater:	collected from a clean area on the eastern coast of the Hong Kong Island, filtered through 0.45 mm filter paper, adjusted to 28 ppt, aerated for two days after preparation
Test temperature:	20±1°C
Lighting:	14h light : 10h dark cycle

Approved signatory:

A handwritten signature in black ink, appearing to be 'Y. Zhang'.

Date: 30-Mar-2005

Y. Zhang/ S.W. Kung

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Test report

Certificate no.: A30211



Aeration: provided (around 100 bubbles/min)  
 Test vessel: 1000ml glass jars  
 Volume of sediment: 18g  
 Volume of overlying water: 900 ml  
 No. of replicates: 5  
 Feeding: none  
 Monitoring: temperature, DO, pH and salinity in overlying water everyday, and termination ammonia in overlying water at test initiation  
 Reference toxicant test: 48 hour water only test with CdCl<sub>2</sub>

5. Summary of test results

Table 1. Total number of normal larvae in each test chamber at test termination

Sample ID	Number of normal larvae in each test chamber at test termination					Mean	SD
	Replicate 1	Replicate 2	Replicate 3	Replicate 4	Replicate 5		
Negative Control with Seawater I	16600	17600	18000	15200	19900	17460.0	1740.1
Negative Control with Seawater II	17900	18300	18300	16900	17000	17680.0	687.0
Composite sample No.1	400	1100	500	1700	1900	1120.0	679.7
Composite sample No.2	1500	1500	1300	1900	1900	1620.0	268.3
Reference sediment	18700	14000	14500	14300	13700	15040.0	2068.3

Approved signatory:

Y. Zhang/ S.W. Kung

Date: 30-Mar-2005

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Tel: 2897 3282 Fax 2897 5509

Test report

Certificate no.: A30211



Table 2. Combined normality/survival of the bivalve larvae at test termination

Sample ID	Normality survival of bivalve larvae at test termination (%)						
	Replicate 1	Replicate 2	Replicate 3	Replicate 4	Replicate 5	Mean	SD
Negative Control with Seawater I	82.9	87.8	89.8	75.9	99.3	87.1	8.7
Negative Control with Seawater II	89.3	91.3	91.3	84.4	84.8	88.2	3.4
Composite sample No.1	2.0	5.5	2.5	8.5	9.5	5.6	3.4
Composite sample No.2	7.5	7.5	6.5	9.5	9.5	8.1	1.3
Reference sediment	93.3	69.9	72.4	71.4	68.4	75.1	10.3

Table 3. Summary of the normality survival of bivalve larvae in relation to the reference sediments

Sample ID	Normality survival in relation to reference site (%)	Difference between sample and reference sediment (t-test)
Composite sample No.1	7.4	Significantly different, t critical=1.86, t stat=-14.297, p=0.0000 (one tail)
Composite sample No.2	10.8	Significantly different, t critical=1.86, t stat=-14.388, p=0.0000 (one tail)

End of page

Approved signatory:

Y. Zhang/ S.W. Kung

Date: 30-Mar-2005

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Test report

Certificate no.: A30211

6. Test validity

Table 4. Test validity criteria and water quality ranges in the bivalve test

Parameter	Minimum during the test period	Maximum during the test period	Acceptable Range
Overlying salinity	27 ppt	28 ppt	27-29ppt
Dissolved oxygen	6.4 mg/L	7.0 mg/L	>4.5mg/L <sup>1</sup>
Overlying pH	7.8	7.9	NA <sup>2</sup>
Temperature	20.1 °C	20.4 °C	19.0-21.0°C
Unionized ammonia in overlying water (initiation/termination)	<0.002 mg/L	0.0081 mg/L	NA <sup>3</sup>
Larvae normality survival in the negative control	75.9-99.3 % , averagely 87.7 %		≥ 70% averagely
48-h EC <sub>50</sub> obtained from the reference toxicant test	1.41 mg/L		1.30±0.64 mg/L
1. 60% of saturation level at 28 ppt 2. pH is not adjusted or controlled 3. Overlying ammonia is not controlled. Results should be qualified as possible false positive when ammonia (unionized) is greater than 0.13 mg/L			

As shown in Table 4, the water quality parameters during the test period ranged within acceptable limits: temperature ranged from 20.1 to 20.4 °C, the dissolved oxygen level ranged from 6.4 to 7.0 mg/L, pH ranged from 7.8 to 7.9, the salinity ranged from 27 to 28 ppt. As a result, the data are interpretable.

The tests were validated by acceptable normality survival of control organisms. The average normality survival rate in controls was greater than 70%.

The organisms also demonstrated comparable sensitivity to the reference toxicant (cadmium). The 48-hr EC<sub>50</sub> for *Crassostrea gigas* obtained was 1.41 mgCd/L and found within the laboratory control limits (Mean±2STD, i.e., 1.30±0.64 mgCd/L). Therefore, the data are acceptable.

End of Report

Data entry checked by:

  
K.W. To/ H.W. Yau

Approved signatory:

  
Y. Zhang/ S.W. Kung

Date: 30-Mar-2005

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## Ancillary Tests





## Interstitial Ammonia

TEST REPORT

**Certificate No.** : TTR0767  
**Project Name** : Agreement No. CE67/98, Yuen Long, Kam Tin, Ngau Tam Mei & Tin Shui  
 Wai Drainage Improvement, Stage 1, Phase 2B, Package D

**Client Name** : Geotechnical Projects Division, Geotechnical Engineering  
 Office, Civil Engineering and Development Department  
**Client Address** : 8/F Civil Engineering and Development Building, 101 Princess  
 Margaret Road, Kowloon, Hong Kong

**Contract No.** : GE/2002.28  
**Works Order No.** : GE/2002.28.28

---

**Lab. Job No.** : J209  
**Lab. Sample Ref. No.** : 14508/1-2  
**No. of Sample(s) & Description** : 2 no. of sediment (grab and vibrocore) as the following:  
 Composite sample No.1-2 prepared from vibrocore samples  
 as per client's instruction

**Sample Receive Date** : 16-24 December, 2004  
**Test Date** : 19-Feb-05

---

Test Parameter

Parameter	Test Method
Interstitial ammonia	APHA 4500-NH3 F. Phenate Method

Note(s): 1. Results relate to samples as received.  
 2. NA = Not applicable.

Signatory: \_\_\_\_\_

  
 Y. Zhang/ S.W. Kung

Date: 30-Mar-2005

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 Tel: 2897 3282 Fax 2897 5509

Test report

Certificate no.: TTR0767

Client reference	Interstitial ammonia (mgNH <sub>3</sub> /L)
Composite sample No.1	0.91
Composite sample No.2	2.8
Detection limit	0.03

## Sample duplicate


Client reference	Relative deviation (%)
Composite sample No.1	0.52
Control limits	±20% from the mean

## Sample Spike


Client reference	Spike recovery (%)
Composite sample No.1	109
Control limits	80-120% from the nominal value

End of Report

Data entry checked by:

  
 K.W.To/ H.W.Yau

Signatory:

  
 Y. Zhang/ S.W. Kung

Date: 30-Mar-2005

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**Interstitial Salinity**

---



TEST REPORT

Certificate No. : TTR0766  
 Project Name : Agreement No. CE67/98, Yuen Long, Kam Tin, Ngau Tam Mei & Tin Shui  
 Wai Drainage Improvement, Stage 1, Phase 2B, Package D

Client Name : Geotechnical Projects Division, Geotechnical Engineering  
 Office, Civil Engineering and Development Department  
 Client Address : 8/F Civil Engineering and Development Building, 101 Princess  
 Margaret Road, Kowloon, Hong Kong

Contract No. : GE/2002.28  
 Works Order No. : GE/2002.28.28

---

Lab. Job No. : J209  
 Lab. Sample Ref. No. : 14508/1-2  
 No. of Sample(s) : 2 no. of sediment (grab and vibrocore) as the following:  
 & Description : Composite sample No.1-2 prepared from vibrocore  
 samples as per client's instruction

Sample Receive Date : 16-24 December, 2004  
 Test Date : 19-Jan-05


---

Test Parameter

Parameter	Test Method
Interstitial salinity	APHA 2502 B

Note(s): 1. Results relate to samples as received.  
 2. NA = Not applicable.

Signatory: \_\_\_\_\_

  
 Y. Zhang/ S.W. Kung

Date: \_\_\_\_\_ 30-Mar-2005

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 Tel: 2897 3282 Fax 2897 5509

Test report

Certificate no.: TTR0766

Client reference	Interstitial salinity (ppt)
Composite Sample No.1	0
Composite Sample No.2	0
Detection limit	NA

## Sample duplicate

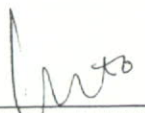
Client reference	Relative deviation (%)
Composite Sample No.1	0.0
Control limits	±20% from the mean

## Standard check


Client reference	Recovery (%)
Reference standard	99.4
Control limits	80-120% from the nominal value

## End of Report

Data entry checked by:

  
 K.W.To/ H.W.Yau

Signatory:

  
 Y. Zhang/ S.W. Kung

Date: 30-Mar-2005

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Tel: 2897 3282 Fax 2897 5509



**Lam Environmental Services**  
Test Specialists and Environmental Analysts

---

**TOC, Grains Size &  
Moisture Content**

---

TEST REPORT

Certificate No. : TTR0765  
 Project Name : Agreement No. CE67/98, Yuen Long, Kam Tin, Ngau Tam Mei & Tin Shui Wai Drainage Improvement, Stage 1, Phase 2B, Package D  
  
 Client Name : Geotechnical Projects Division, Geotechnical Engineering Office, Civil Engineering and Development Department  
 Client Address : 8/F Civil Engineering and Development Building, 101 Princess Margaret Road, Kowloon, Hong Kong  
  
 Contract No. : GE/2002.28  
 Works Order No. : GE/2002.28.28  


---

 Lab. Job No. : J209  
 Lab. Sample Ref. No. : 14508/1-2  
 No. of Sample(s) : 2 no. of sediment (grab and vibrocore) as the following:  
 & Description : Composite sample No.1-2 prepared from vibrocore samples as per client's instruction  
  
 Sample Receive Date : 16-24 December, 2004  
 Test Date : 25 January - 1 March, 2005  


---

Test Parameter

Parameter	Test Method
Grain size	Geospec 3: Test 8.1
Moisture content	Geospec 3: Test 5.2
Total Organic Carbon	ALS Method Code EP-009

- Note(s):
1. Results relate to samples as received.
  2. NA = Not applicable.
  3. The TOC samples were subcontracted to ALS Technichem (HK) Pty Ltd.

Signatory: \_\_\_\_\_

  
 Y. Zhang/ S.W. Kung

Date: \_\_\_\_\_ 30-Mar-2005

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Test report

Certificate No. : TTR0765

Project Name : Agreement No. CE67/98, Yuen Long, Kam Tin, Ngau Tam Mei & Tin Shui Wai Drainage Improvement, Stage 1, Phase 2B, Package D

Client Name : Geotechnical Projects Division, Geotechnical Engineering Office, Civil Engineering and Development Department

Contract No. : GE/2002.28

Works Order No. : GE/2002.28.28

Lab. Sample Ref. No. : 14508/1-2

Client reference	Grain Size < 63 mm (%)	Moisture Content <sup>1</sup> (%)	TOC (% Wet Weight)	TOC (% Dry Weight)
Composite sample No.1	52	29	<0.05	<0.1
Composite sample No.2	40	21	<0.05	<0.1
Detection Limit	NA	NA	0.05	0.1

Note 1. Moisture content is calculated as: (Sample Wet Weight – Sample Dry Weight) / Sample Dry Weight x 100%


End of Report

Data entry checked by:



K.W.To/ H.W.Yau

Signatory:

  
 Y. Zhang/ S.W. Kung

Date:

30-Mar-2005

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## Particle Size Distribution

**TEST REPORT ON DETERMINATION OF PARTICLE SIZE DISTRIBUTION**

CED Contract No. GE/2002/28 Chemical and Biological Testing of Marine Sediment

Agreement No. CE 67/98, Yuen Long, Kam Tin, Nau Tam Mei & Tin Shui Wai

Project : Drainage Improvement, Stage 1, Phase 2B, Package D

Client Name : Geotechnical Projects Division, Geotechnical Engineering Office, Civil Engineering and Development Department

& Address : 8/F Civil Engineering and Development Building, 101 Princess Margaret Road, Kowloon, Hong Kong

Lab Job No : J209 Works Order No: GE/2002/28.28 Lab. Sample Ref. No: 14508/1

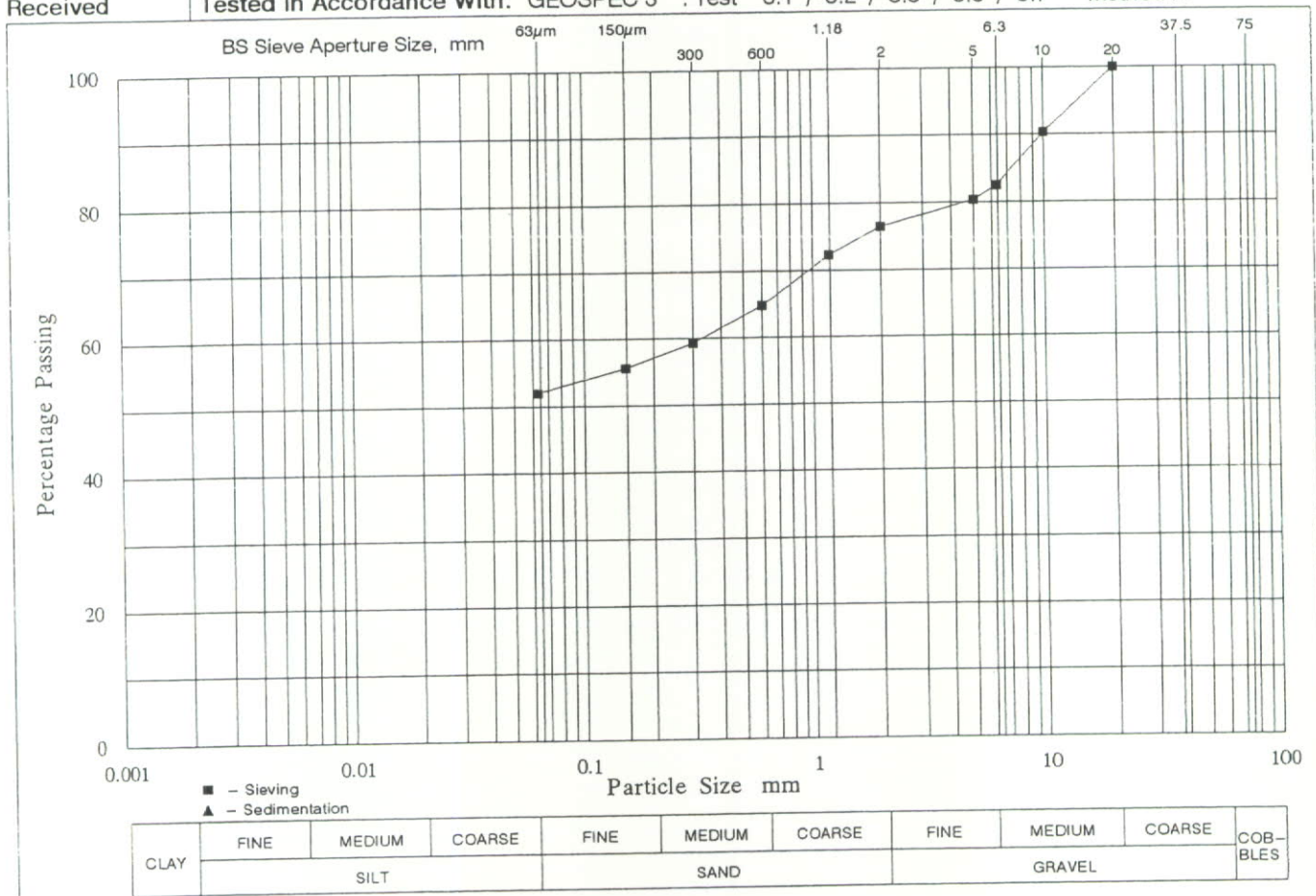
Drillhole No : Sample No: Depth m: Specimen Depth m:

Sample Type: B Spec. Ref: Geological Origin: Marine Sediment

Description : Yellowish brown, slightly gravelly, slightly sandy CLAY

Date Sample: 31/1/2005 Date Tested: 15/2/2005 Tested By: C. F. Fong

Received Tested in Accordance With: GEOSPEC 3 : Test 8.1 / ~~8.2~~ / 8.5 / 8.6 / ~~8.7~~ Method A



Remarks:

SUMMARY :	GRAVEL	24 %	Approved Signatory: <i>Lo Kam Chuen</i> Lo Kam-chuen / Lee Ming-fat
	SAND	24 %	
	SILT &	52 %	
	CLAY		
			Date: 1-3-2005

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TEST REPORT ON DETERMINATION OF PARTICLE SIZE DISTRIBUTION

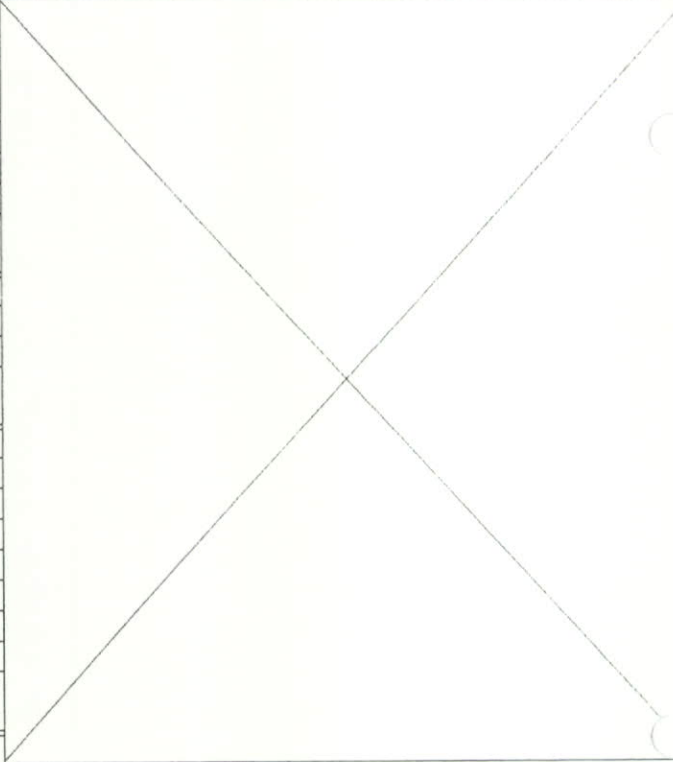
Certificate No: A30204

CED Contract No. GE/2002/28 Chemical and Biological Testing of Marine Sediment Agreement No. CE 67/98, Yuen Long, Kam Tin, Nau Tam Mei & Tin Shui Wai

Project : Drainage Improvement, Stage 1, Phase 2B, Package D  
 Client Name : Geotechnical Projects Division, Geotechnical Engineering Office, Civil Engineering and Development Department  
 & Address : 8/F Civil Engineering and Development Building, 101 Princess Margaret Road, Kowloon, Hong Kong  
 Lab Job No : J209 Works Order No: GE/2002/28.28 Lab. Sample Ref. No: 14508/1  
 Drillhole No : Sample No: Depth m: Specimen Depth m:

Sample Type: B Spec. Ref: Geological Origin: Marine Sediment  
 Description : Yellowish brown, slightly gravelly, slightly sandy CLAY  
 Date Sample: 31/1/2005 Date Tested: 15/2/2005 Tested By: C. F. Fong  
 Received Tested in Accordance With: GEOSPEC 3 : Test 8.1 / ~~8.2~~ / ~~8.5~~ / ~~8.6~~ / ~~8.7~~ Method A

SIEVE ANALYSIS				
Initial Dry Mass of Soil m1 g: 207.56				
BS Test Sieve mm	Mass Retained g	Corr. Mass Retained g	Percent Retained %	Percent Passing %
75.0			0.0	100.0
37.5			0.0	100.0
20.0			0.0	100.0
Passing m2 20.0	207.56	cum. mass ret. + m2 =		207.56
Riffled m3 20.0	207.56	difference from m1 % =		0.00
Washed m4	99.61	Note: m4 = mass >63um		
10.0	20.21	20.21	9.7	90.3
6.3	16.20	16.20	7.8	82.5
Passing m5 6.3	63.20	cum. mass ret. + m5 =		99.61
Riffled m6 6.3	63.20	difference from m4 % =		0.00
5.00	4.34	4.34	2.1	80.4
2.00	8.03	8.03	3.9	76.5
1.18	8.76	8.76	4.2	72.3
0.600	15.46	15.46	7.4	64.8
0.300	11.49	11.49	5.5	59.3
0.150	7.73	7.73	3.7	55.6
0.063	7.30	7.30	3.5	52.0
Pan mE	0.03			
cum. mass ret. + mE =				63.14
difference from m6 % =				0.09



Blank space for additional notes or observations.


Approved Signatory: *Lo Kam Chuen* Date: 1-3-2005  
 Lo Kam-chuen / Lee Ming-fat





**TEST REPORT ON DETERMINATION OF PARTICLE SIZE DISTRIBUTION**

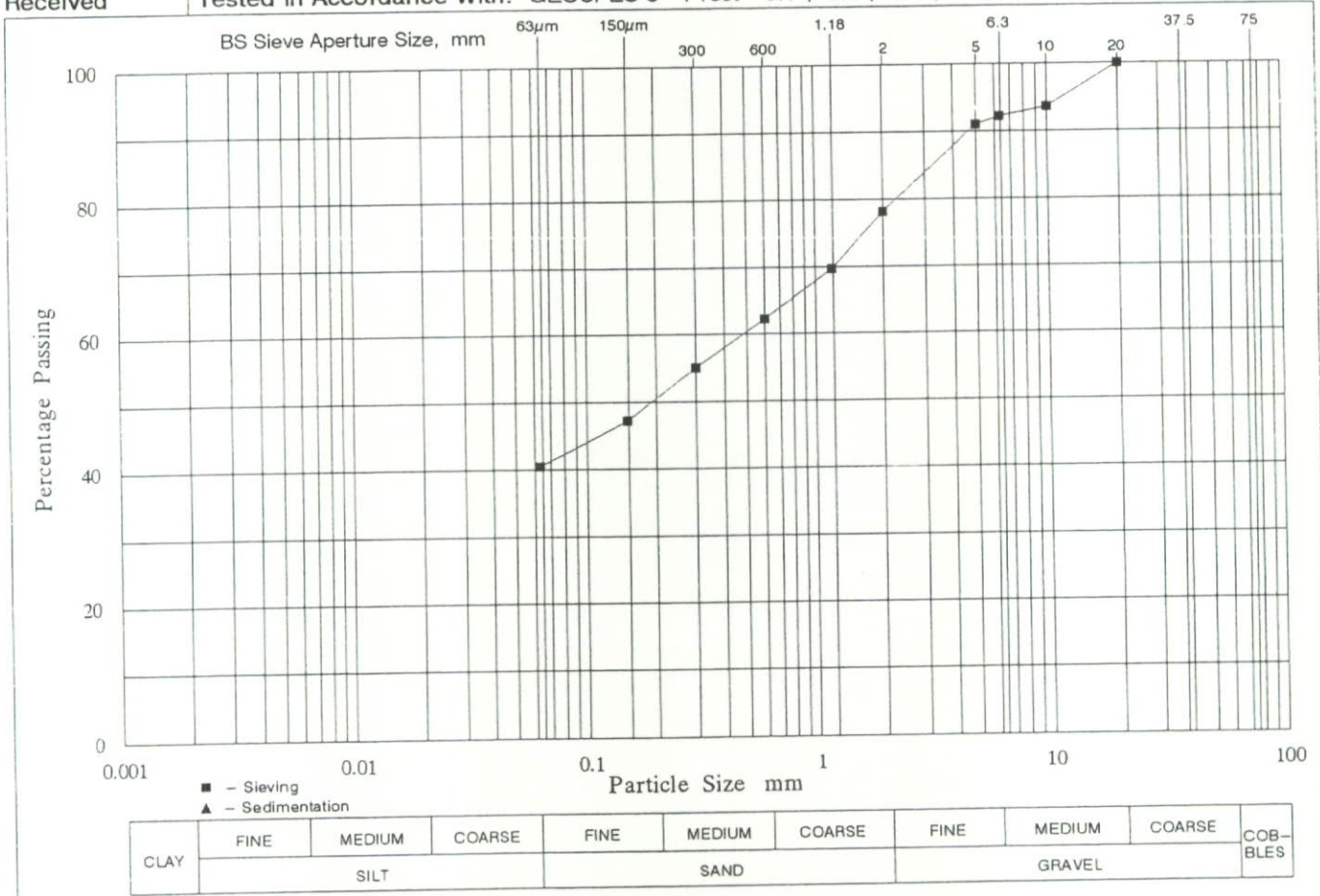
(Page 1 of 2)

CED Contract No. GE/2002/28 Chemical and Biological Testing of Marine Sediment  
 Agreement No. CE 67/98, Yuen Long, Kam Tin, Nau Tam Mei & Tin Shui Wai

Certificate No: A30205

Project : Drainage Improvement, Stage 1, Phase 2B, Package D  
 Client Name : Geotechnical Projects Division, Geotechnical Engineering Office, Civil Engineering and Development Department  
 & Address : 8/F Civil Engineering and Development Building, 101 Princess Margaret Road, Kowloon, Hong Kong  
 Lab Job No : J209 Works Order No: GE/2002/28.28 Lab. Sample Ref. No: 14508/2  
 Drillhole No : Sample No: Depth m: Specimen Depth m:

Sample Type: B Spec. Ref: Geological Origin: Marine Sediment  
 Description : White, yellowish brown, slightly gravelly, sandy CLAY  
 Date Sample: 31/1/2005 Date Tested: 15/2/2005 Tested By: C. F. Fong  
 Received Tested in Accordance With: GEOSPEC 3 : Test 8.1 / ~~8.2~~ / ~~8.5~~ / ~~8.6~~ / ~~8.7~~ Method A



Remarks:

<b>SUMMARY :</b>	GRAVEL	22 %
	SAND	38 %
	SILT & CLAY	40 %

Approved Signatory: *Lo Kam Chuen*  
 Lo Kam-chuen / Lee Ming-fat  
 Date: 1-3-2005

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**TEST REPORT ON DETERMINATION OF PARTICLE SIZE DISTRIBUTION**

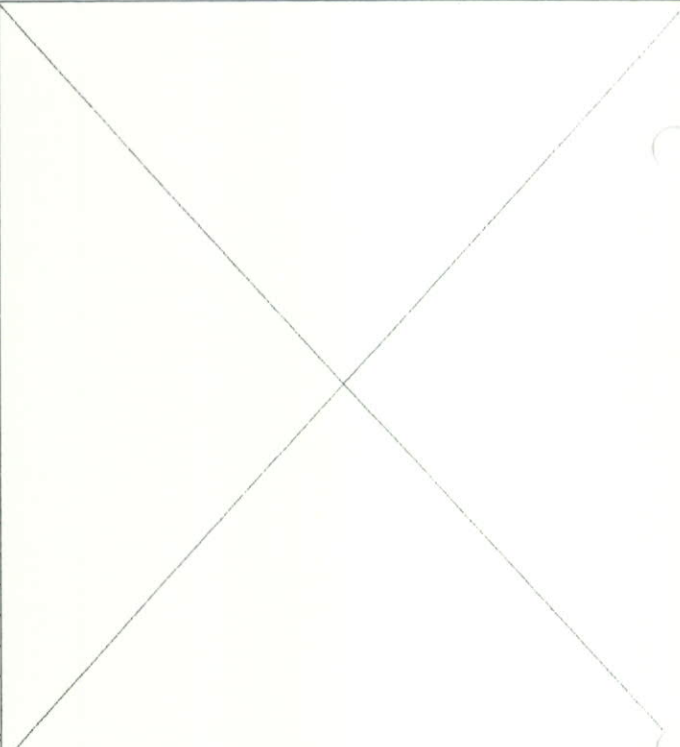
(Page 2 of 2)

CED Contract No. GE/2002/28 Chemical and Biological Testing of Marine Sediment Agreement No. CE 67/98, Yuen Long, Kam Tin, Nau Tam Mei & Tin Shui Wai

Project : Drainage Improvement, Stage 1, Phase 2B, Package D  
 Client Name : Geotechnical Projects Division, Geotechnical Engineering Office, Civil Engineering and Development Department  
 & Address : 8/F Civil Engineering and Development Building, 101 Princess Margaret Road, Kowloon, Hong Kong  
 Lab Job No : J209 Works Order No: GE/2002/28.28 Lab. Sample Ref. No: 14508/2  
 Drillhole No : Sample No: Depth m: Specimen Depth m:

Sample Type: B Spec. Ref: Geological Origin: Marine Sediment  
 Description : White, yellowish brown, slightly gravelly, sandy CLAY  
 Date Sample: 31/1/2005 Date Tested: 15/2/2005 Tested By: C. F. Fong  
 Received Tested in Accordance With: GEOSPEC 3 : Test 8.1 / 8.2 / 8.5 / 8.6 / 8.7 Method A

SIEVE ANALYSIS					
Initial Dry Mass of Soil m1		g: 213.76			
BS Test Sieve mm	Mass Retained g	Corr. Mass Retained g	Percent Retained %	Percent Passing %	
75.0			0.0	100.0	
37.5			0.0	100.0	
20.0			0.0	100.0	
Passing m2	20.0	213.76	cum. mass ret. + m2 = 213.76		
Riffler m3	20.0	213.76	difference from m1 % = 0.00		
Washed m4		127.39	Note: m4 = mass > 63um		
	10.0	13.57	13.57	6.3	93.7
	6.3	3.09	3.09	1.4	92.2
Passing m5	6.3	110.73	cum. mass ret. + m5 = 127.39		
Riffler m6	6.3	110.73	difference from m4 % = 0.00		
	5.00	2.50	2.50	1.2	91.0
	2.00	27.64	27.64	12.9	78.1
	1.18	18.00	18.00	8.4	69.7
	0.600	15.90	15.90	7.4	62.2
	0.300	15.28	15.28	7.1	55.1
	0.150	16.94	16.94	7.9	47.2
	0.063	14.35	14.35	6.7	40.4
Pan mE		0.08			
		cum. mass ret. + mE =		110.69	
		difference from m6 % =		0.04	




Approved Signatory: *Lo Kam-chuen* Date: 1-3-2005  
 Lo Kam-chuen / Lee Ming-fat



## Moisture Content





Certificate No: A30207

## TEST REPORT ON DETERMINATION OF MOISTURE CONTENT

(By oven drying at 105°C ± 5°C)

CED Contract No. GE/2002/28 Chemical and Biological Testing of Marine Sediment

Agreement No. CE 67/98, Yuen Long, Kam Tin, Nau Tam Mei &amp; Tin Shui Wai

Project : Drainage Improvement, Stage 1, Phase 2B, Package D

Client Name : Geotechnical Projects Division, Geotechnical Engineering Office, Civil Engineering and Development Department

&amp; Address : 8/F Civil Engineering and Development Building, 101 Princess Margaret Road, Kowloon, Hong Kong

Lab Job No : J209 Works Order No : GE/2002/28.28

Date Samples Received : 31/1/2005

Tested in Accordance With : GEOSPEC 3: Test 5.2

Drillhole No.	Sample			Lab. Sample Ref. No.	Date Tested	Tested By	Description	Geological Origin	Moisture Content %
	No.	Depth m	Type						
			B	14508/1	15/2/05	FCF	Yellowish brown, slightly gravelly, slightly sandy CLAY	Marine Sediment	29
			B	14508/2	15/2/05	FCF	White, yellowish brown, slightly gravelly, sandy CLAY	Marine Sediment	21

Remarks:

Approved Signatory:

*Lo Kam Chuen*  
Lo Kam-chuen / Lee Ming-fat

Date: 1-3-2005

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TOC

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**ALS Environmental**  
**CERTIFICATE OF ANALYSIS**

**CONTACT:** MS IRENE KUNG  
**CLIENT:** LAM GEOTECHNICS LIMITED  
**ADDRESS:** RM 1412 14/F HONOUR IND CTR  
NO 6 SUN YIP ST  
CHAI WAN HONG KONG

**Batch:** HK33615  
**Sub Batch:** 0  
**LABORATORY:** HONG KONG  
**DATE RECEIVED:** 25/01/2005  
**DATE OF ISSUE:** 15/02/2005  
**SAMPLE TYPE:** SEDIMENT  
**No. of SAMPLES:** 2

**ORDER No.:** S2738/J209/YZ(7)

**PROJECT:**

**COMMENTS**

3 samples were picked up from client by ALS Technichem (HK) staff in a chilled condition. Sample analysed and reported on an as received basis. The completion date of analysis is 07 February, 2005. Sample ID: Sample #1 KT13B (2.9-3.35)+(5.9-6.35) and sample #2 KT13C (1.9-2.35)+(5.9-6.35).

**NOTES**

This is the Final Report and supersedes any preliminary reports with this batch number. Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

**ISSUING LABORATORY: HONG KONG**

**Address**

ALS Technichem (HK) Pty Ltd  
11/F.,  
Chung Shun Knitting Centre,  
1-3 Wing Yip Street  
Kwai Chung, N.T.,  
Hong Kong.

**Phone:** 852-2610 1044  
**Fax:** 852-2610 2021  
**Email:** hongkong@alsenviro.com

Paul Vogel  
Laboratory Manager – Hong Kong  
HOKLAS Approved Signatory

**Other ALS Environmental Laboratories**

**AUSTRALASIA**

Brisbane  
Melbourne  
Sydney  
Newcastle

Hong Kong  
Singapore  
Kuala Lumpur  
Bogor

**AMERICAS**

Vancouver  
Santiago  
Antofagasta  
Lima

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**Abbreviations:** % SPK REC denotes percentage spike recovery  
CHK denotes duplicate check sample  
LOR denotes limit of reporting  
LCS % REC denotes Laboratory Control Sample percentage recovery

Batch: HK33615  
 Sub Batch: 0  
 Date of Issue: 15/02/2005  
 Client: LAM GEOTECHNICS LIMITED  
 Client Reference:

# CERTIFICATE OF ANALYSIS



				SAMPLE IDENTIFICATION								
		Laboratory I.D.		1	2							
		Date Sampled		27/01/2005	27/01/2005							
				KT13B	KT13C							
METHOD	ANALYSIS DESCRIPTION	UNIT	LOR									
EP-009	Total Organic Carbon	%	0.05	<0.05	<0.05							

Batch: HK33615  
 Sub Batch: 0  
 Date of Issue: 15/02/2005  
 Client: LAM GEOTECHNICS LIMITED  
 Client Reference:

# QUALITY CONTROL REPORT



		SAMPLE IDENTIFICATION											
		Laboratory I.D.		1	2	200	201						
		Date Sampled											
METHOD	ANALYSIS DESCRIPTION	UNIT	LOR	KT13B % SPK REC	KT13C CHK	BLANK	LCS % REC						
		CHECKS AND SPIKES											
EP-009	Total Organic Carbon	%	0.05	95	<0.05	<0.05	93						