

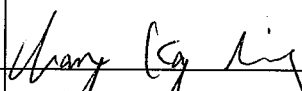
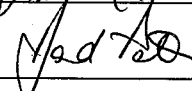
Dragages – Bouygues Joint Venture

**MTRC Express Rail Link Contract 821
Shek Yum to Mei Lai Road Tunnels**

**Land Contamination Assessment at
Kwai Chung Ventilation Works Area**

**Supplementary Contamination Assessment
Report and Remediation Action Plan for Kwai
Chung Ventilation Building Works Area (Site
H)**

March 2011

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MTR Corporation Limited

HONG KONG SECTION OF GUANGZHOU –
SHENZHEN – HONG KONG EXPRESS RAIL LINK
(No. EP-349/2009/B)

Supplementary Contamination Assessment Report
And Remediation Action Plan for
Kwai Chung Ventilation Building Works Area
(Revision C) – Addendum Page

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MTR Corporation Limited

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1 INTRODUCTION

1.1 Background information

- 1.1.1 The Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) will be a 26-km long underground rail line on a dedicated track that runs from the terminus located in West Kowloon to the boundary at Huanggang. The project is a designated project under Items A.2, A.4, A.7 and Q.1 of Part 1, Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO).
- 1.1.2 In accordance with the EIAO, an Environmental Impact Assessment (EIA) for the Hong Kong Section of XRL was conducted and approved on 28 September 2009 (Register No. AEIAR-143/2009) and an Environmental Permit (EP) No. EP-349/2009 was granted by the Director of Environmental Protection (DEP) on 16 October 2009. The EP (No. EP-349/2009) was then amended under application for Variation of an Environmental Permit No. VEP-323/2010 and has been replaced by Environmental Permit No. EP-349/2009/A on 27 September 2010. The EP (No. EP-349/2009/A) was then further amended under application for Variation of an Environmental Permit No. VEP-323/2010 and has been replaced by Environmental Permit No. EP-349/2009/B on 24 January 2011.
- 1.1.3 During the time of the EIA study, Site H, a scrap yard located at Kwai Chung Ventilation Building Works Area (KCV) was identified as an area with potential land contamination concerns. The location of Site H is shown in **Figure XRL/821/M57/001**. Land Contamination Assessment including submission of Contamination Assessment Plan (CAP), Contamination Assessment Report (CAR) and Remediation Action Plan (RAP) has been carried out during the EIA on Site H. A total of 6 boreholes were proposed to assess the potential land contamination impacts due to dumping and scrap packing activities undertaken within the site. Given the middle and southern portion of Site H was still in operation at the time of site investigation, SI works were only carried out in the northern portion of the site at H-01 to H-03 (Stage 1 site investigation). It is recommended in the EIA report that Stage 2 site investigation (SI) should be carried out after the EIA study upon hand over of the site (Section 9.35(v) of EIA report referred).
- 1.1.4 Pursuant to EP Condition 2.21, a revised contamination assessment plan (rCAP) with an updated sampling and testing schedule based on current and historical site conditions of Site H was therefore prepared and submitted to Environmental Protection Department (EPD) in July 2010 with endorsement granted by EPD in the same month. Given no additional hotspots have been identified in latest site walkover, the approved rCAP proposed to carry out Stage 2 sampling and testing as recommended in the EIA report.
- 1.1.5 Owing to the tight programme schedule, the Stage 2 SI works were carried out during the period from 9 June to 6 July 2010. The site investigation, comprising rotary drilling of boreholes, excavation of trial pits, logging of ground materials and reinstatement of excavations was conducted by Vibro (HK) Limited under the supervision of MTR. Laboratory analyses were carried out by ALS Technichem (HK) Pty Limited (ALS HK) and ALS Brisbane.
- 1.1.6 Based on the findings of the Stage 1 site investigation, one sample collected at 0.5m from sampling location H-02 was found to have bis-(2-Ethylhexyl)phthalate exceeding relevant RBRG levels. In order to ensure complete isolation of the contaminated area and setup of “no works” area for the commencement of phased construction works and to determine the most practical remediation option, additional sampling to delineate the extent of contamination was conducted on 1 February 2011. The sampling exercise was conducted by Dragages-Bouygues Joint Venture (DBJV) while laboratory analysis was carried out by ALS under AECOM's appointment.

- 1.1.7 AECOM Asia Company Limited (AECOM) was commissioned by DBJV as the environmental consultant to collate investigation and laboratory derived information for the preparation of this supplementary Contamination Assessment Report (supp. CAR) in accordance with the requirement stipulated in Condition 2.21 of the EP. For the sake of integrity, investigation and laboratory findings under Stage 1 SI as well as remediation action plan (RAP) will be reported in this CAR/RAP.

1.2 Objectives

- 1.2.1 This supplementary CAR/RAP (supp. CAR/RAP) is prepared to summarize findings of both Stage 1 and 2 SI (including fieldworks and laboratory analyses) and to determine the nature and extent of contamination based on the findings of the SI works conducted at Site H (**Section 3**). The remediation proposal of appropriate remediation actions for the identified contaminated area at Site H will be provided in a Remediation Action Plan (RAP) in **Section 4**.
- 1.2.2 This supp.CAR/RAP is submitted for endorsement by DEP in accordance with Condition 2.21 of the EP.

2 FINDINGS OF PREVIOUS LAND CONTAMINATION ASSESSMENT

- 2.1.1 According to the approved rCAP/EIA, the potential land contaminative activities identified at Site H are summarized in **Table 2.1**.

Table 2.1 Potential Contaminative Land uses within Site H

Potential Contaminative Area	Potential Contamination Impact
Scrap Packing Area	- Oil drums were noted adjacent to the scrap baler during both site visits undertaken during the EIA and in April/May 2010. Potential spillage or leakage of fuels from the drums may be a cause for concern in relation to contamination. - A variety of scrap materials were identified at the site. Therefore there may be potential for contamination if scrapped materials were not handled appropriately. Site investigations were therefore carried out at the scrap storage area and near the entrance of Site H during the EIA.
Scrap Storage Area	
Access Road	

- 2.1.2 Based on findings of the Stage 1 site investigation, bis-(2-Ethylhexyl)phthalate concentrations exceed the relevant industrial Risk Based Remediation Goal (RBRG) at location 2108/XRL/EDH27 (H-02) within the scrap storage area. A calculated 17.5m³ of soil exceeding the relevant RBRG are proposed to be treated using either biopiling or *ex-situ* chemical oxidation are recommended as the most appropriate remediation methods in the EIA report. Specific remediation method chosen will be discussed in **Section 4**.
- 2.1.3 As discussed in **Section 1.1.3**, a total of 6 sampling locations were proposed within Site H based upon historical operations at the site, observation of stains/ground discolouration and areas where potentially contaminative activities may have been undertaken. During the EIA, authorization for site investigation was only granted for 3 sampling locations (2108/XRLEDH27 (H-02) and EDH28 (H-03) located at the scrap storage area and 2108/XRL/D329 (H-01) located near the entrance of Site H). Since no additional hotspots were identified during the latest site walkover in April/May 2010, the remaining 3 sampling locations (i.e. H-04 to H-06) were proposed to be constructed per the approved rCAP. The rationale for selecting sampling locations detailed in the approved rCAP (for Stage 2 SI) and EIA (for Stage 1 SI) is provided in **Appendix A**.

3 CONTAMINATION ASSESSMENT REPORT

3.1 Assessment Methodology

Soil Boring and Sampling

- 3.1.1 A total of 6 boreholes (3 locations from the Stage 1 SI and 3 locations from the Stage 2 SI) have been constructed within Site H with a total of 9 soil samples (including duplicates) collected.
- 3.1.2 Stage 1 SI was carried out from 23 September to 15 October 2008 by Geotechnics and Concrete Engineering (HK) Limited while the Stage 2 SI was conducted from 9 June to 8 July 2010 by Vibro (HK) Limited. Both SI works were supervised by land contamination specialists from MTR. Sampling details are summarized in **Table 3.1** below. It should be noted that several of the sampling locations listed in **Table 3.1** were denoted using a different nomenclature system during the sampling exercises. For consistency, all sampling locations will be presented referring to the new system as shown in **Table 3.1** in this supp. CAR.

Table 3.1 Sampling Locations

Sampling Locations		Co-ordinates	
Nomenclature during SI	New Nomenclature under this CAR	Easting	Northing
<i>Stage 1 SI (September – October 2008)</i>			
2108/XRL/D329	H-01	831793.42	824512.35
2108/XRL/EDH27	H-02	831814.58	824493.63
2108/XRL/EDH28	H-03	831798.51	824470.53
<i>Stage 2 SI (June – July 2010)</i>			
H-04B*	H-04B*	831789.37	824462.08
H-05A*	H-05A*	831785.77	824483.75
H-06A*	H-06A*	831798.85	824500.22

Note: * Ground conditions encountered required sampling locations to be relocated.

- 3.1.3 During the SI, several amendments were made to the generic plan detailed in the rCAP/EIA in order to accommodate specific site conditions encountered. Soil boring at H-02 and H-03 (under Stage 1 SI) and H-04 to H-06 (under Stage 2 SI) were slightly relocated due to boulders and rocks encountered within the first 1.5m below ground and site constraints during SI works. The relocated positions denoted H-01, H-02, H-03, H-04B H-05A and H-06A are considered to be representative with reference to the original locations. The locations of the original proposed locations and boreholes finally established are shown in **Figure XRL/821/M57/001**.
- 3.1.4 The shallow rock head level, however, is expected all over the site with reference to established geological drill hole log (2108/XRL/EDH27, EDH28, D328 and D329) as shown in **Appendix D** and **Figure XRL/821/M57/002**. Based on GI logs in **Appendix D**, rock head is expected to be encountered at approximately 0.7m to 3m BBC
- 3.1.5 According to the Section 4.4 and 4.5 of approved rCAP/EIA, soil samples were proposed to be collected at approximately 0.5m, 1.5m, 3m, 4.5m and 6m below base of concrete (BBC) for all boreholes. Where an inspection pit was excavated, disturbed samples were proposed to be collected at 0.5m and 1.5m BBC and undisturbed samples were proposed collected from all other depths. However, deviation from the sampling plan resulted from encountered rock head at shallow depth and therefore soil samples were unable to be collected at these planned

depths for laboratory testing. Deviations from the sample collection and laboratory analyses plan are summarized in **Table 3.2**. The laboratory results for H-01 to H-03 have been incorporated in the approved CAR/EIA.

Table 3.2 Summary of SI Works

Borehole	Proposed Sampling Depth	Changes Made	Justification
<i>Stage 1 SI (September – October 2008)[#]</i>			
H-01	0.5m, 1.5m and 3.0m BBC	No change	N/A
.H-02	0.5mBBC	No change	N/A
H-03	0.5mBBC	No change	N/A
H-01	3.33 to 6m BBC	No sample collected for testing	Coarse gravel and Grade III granite were encountered; material unsuitable for laboratory analysis
.H-02	1.5m BBC to 6m BBC	No sample collected for testing	Rock head encountered at shallow depth. Concrete and granite encountered from 0.7m BBC to the termination of the borehole
H-03	1.5m BBC to 6m BBC	No sample collected for testing	Rock head encountered at shallow depth. Concrete and granite encountered from 0.7m BBC to the termination of the borehole
<i>Stage 2 SI (June – July 2010)</i>			
H-04B*	0.5mBBC	Sample collected at 0.2m below road surface	Concrete encountered at approximately 0.2m to 0.38m below grade. Rock head encountered at shallow depth (0.43m BBC)
H-05A*	0.5mBBC	Sample collected at 0.15m below road surface	High percentage of cobbles encountered at proposed sampling depth precluding representative soil sample collection
H-06A*	0.5mBBC	Sample collected at 0.2m below road surface	Rock head encountered at proposed soil sampling depth
H-04B*	1.5m BBC to 6m BBC	No sample collected for testing	Rock head encountered at shallow depth (0.43m BBC)
H-05A*	1.5m BBC to 6m BBC	No sample collected for testing	Rock head encountered at shallow depth (0.7m BBC).
H-06A*	1.5m BBC to 6m BBC	No sample collected for testing	Rock head encountered at shallow depth (0.39m BBC).

Note: * relocated borehole nomenclature

[#] the findings of Stage 1 have been incorporated into the approved CAR/EIA.

- 3.1.6 At each sampling location prior to drilling/trial pit construction, sampling tools and all equipment in contact with the ground were thoroughly decontaminated using laboratory-grade detergent and steam cleaning/high-pressure water jetting.
- 3.1.7 Soil samples were appropriately labelled and stored in cool boxes at approximately 4°C until delivery to laboratory for analysis. ALS HK was appointed to undertake chemical testing of samples collected under the Stage 1 SI while ALS HK and ALS Brisbane, a NATA accredited laboratory (mutual recognition arrangement partner of HOKLAS) were commissioned to analyse samples collected under Stage 2 SI works. All soil samples collected during the SI were analyzed in accordance with the analytical schedules detailed in the approved rCAP/EIA. However, with respect to petroleum carbon fractions and semi volatile organic compounds analyses; ALS HK indicated that due to matrix interference the limits of reporting (LOR) for

these parameters had to be raised. The raised LOR for hexachlorobenzene for a soil sample collected from H-06A_0.2m (below road surface) exceeded the relevant RBRG value and whilst concentrations detected remain below the raised LOR, the screening level exceedance may lead to misinterpretation of this result. Therefore, a duplicated sample was also submitted to ALS Brisbane which was able to achieve a lower LOR and below relevant industrial RBRG values. The results of laboratory analyses are presented in **Appendix C**.

Strata Logging

- 3.1.8 Strata logging for boreholes was undertaken during the course of drilling and sampling by a qualified geologist. The logs 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 was also recorded. Soil boring logs are provided in **Appendix B**.

Groundwater Sampling

- 3.1.9 No groundwater was encountered in any of the boreholes established therefore, groundwater monitoring wells were not installed and groundwater samples were not collected for both Stage I and Stage II SI.

3.2 Assessment Criteria

Criteria for Soil and Groundwater Contamination

- 3.2.1 The assessment methodology adopted is in accordance with the *Guidance Note for Contaminated Land Assessment and Remediation* (Guidance Note 1), *Guidance Manual for Use of Risk-Based Remediation Goals for Contaminated Land Management* (Guidance Manual) and *Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards, and Car Repair/Dismantling Workshops* (Guidance Note 2) issued by the EPD.
- 3.2.2 Interpretation of results has made reference to those Risk-Based Remediation Goals (RBRGs) presented in Table 2.1 and Table 2.2 as stipulated in the Guidance Manual.
- 3.2.3 The RBRGs are developed based on a risk assessment approach to suit the local environmental conditions and community needs in Hong Kong. Decisions on contaminated soil and groundwater remediation are based on the nature and extent of the potential risks that are posed to human receptors as a result of exposure to chemicals in the soil and/or groundwater. RBRGs are developed for four different land use scenarios reflecting the typical physical settings in Hong Kong under which people could be exposed to contaminated soil and groundwater. A description of each land use scenario is as follows:
- **Urban residential** – Sites located in an urban area where main activities involve habitation by individuals. The typical physical setting is a high rise residential building situated in a housing estate that has amenity facilities such as landscaped yards and children's playgrounds. The receptors are residents who stay indoors most of the time except for a short period each day, during which they are outdoors and have the chance of being in direct contact with soil at landscaping or play areas within the estate.
 - **Rural residential** – Sites located in a rural area where the main activities involve habitation by individuals. These sites typically have village-type houses or low rise residential blocks surrounded by open space. The receptors are rural residents who stay at home and spend some time each day outdoors on activities such as gardening or light sports. The

degree of contact with the soil under the rural setting is more than that under the urban setting both in terms of the intensity and frequency of contact.

- **Industrial** – Any site where activities involve manufacturing, chemical or petrochemical processing, storage of raw materials, transport operations, energy production or transmission, etc. Receptors include those at sites where part of the operation is carried out directly on land and the workers are more likely to be exposed to soil than those working in multi-storey factory buildings.
- **Public parks** – Receptors include individuals and families who frequent parks and play areas where there is contact with soil present in lawns, walkways, gardens and play areas. Parks are considered to be predominantly hard covered with limited areas of predominantly landscaped soil. Furthermore, public parks are not considered to have buildings present on them.

3.2.4 In addition to the RBRGs, screening criteria (soil saturation limits, Csat, developed for Non-aqueous Phase Liquid [NAPL] in soil and water solubility limits for NAPL in groundwater) for the more mobile organic chemicals must be considered to determine whether a site requires further action.

3.2.5 As reviewed in the approved rCAP, Site H will be occupied for railway facilities. According to the Guidance Manual, the corresponding RBRG land use for railway related facilities would be “Industrial”. Relevant soil and groundwater RBRGs level for this land contamination assessment including soil saturation limit and solubility limit are presented in **Table 3.3**.

Table 3.3 Relevant RBRGs for Soil and Groundwater - Industrial

Chemical	Soil (mg/kg)		Groundwater (µg/L)	
	RBRGs for Industrial	Soil Saturation Limits	RBRGs for Industrial	Solubility Limits
VOCs				
Acetone	10,000	***	10,000,000	***
Benzene	9.21	336	54,000	1,750,000
Bromodichloromethane	2.85	1,030	26,200	6,740,000
2-Butanone	10,000	***	10,000,000	***
Chloroform	1.54	1,100	11,300	7,920,000
Ethylbenzene	8,240	138	10,000,000	169,000
Methyl tert-Butyl Ether	70.1	2,380	1,810,000	***
Methylene Chloride	13.9	921	224,000	***
Styrene	10,000	497	10,000,000	310,000
Tetrachloroethene	0.777	97.1	2,950	200,000
Toluene	10,000	235	10,000,000	526,000
Trichloroethene	5.68	488	14,200	1,100,000
Xylenes (Total)	1,230	150	1,570,000	175,000
SVOCs				
Acenaphthene	10,000	60.2	10,000,000	4,240

Chemical	Soil (mg/kg)		Groundwater (µg/L)	
	RBRGs for Industrial	Soil Saturation Limits	RBRGs for Industrial	Solubility Limits
Acenaphthylene	10,000	19.8	10,000,000	3,930
Anthracene	10,000	2.56	10,000,000	43.4
Benzo(a)anthracene	91.8	NA	NA	NA
Benzo(a)pyrene	9.18	NA	NA	NA
Benzo(b)fluoranthene	17.8	NA	7,530	1.5
Benzo(g,h,i)perylene	10,000	NA	NA	NA
Benzo(k)fluoranthene	918	NA	NA	NA
bis-(2-Ethylhexyl)phthalate	91.8	NA	NA	NA
Chrysene	1,140	NA	812,000	1.6
Dibenzo(a,h)anthracene	9.18	NA	NA	NA
Fluoranthene	10,000	NA	10,000,000	206
Fluorene	10,000	54.7	10,000,000	1,980
Hexachlorobenzene	0.582	NA	695	6,200
Indeno(1,2,3-cd)pyrene	91.8	NA	NA	NA
Naphthalene	453	125	862,000	31,000
Phenanthrene	10,000	28	10,000,000	1000
Phenol	10,000	7,260	NA	NA
Pyrene	10,000	NA	10,000,000	135
Metals				
Chromium III	10,000	NA	NA	NA
Chromium VI	1960	NA	NA	NA
Copper	10,000	NA	NA	NA
Lead	2290	NA	NA	NA
Zinc	10,000	NA	NA	NA
Cadmium	653	NA	NA	NA
Nickel	10,000	NA	NA	NA
Mercury	38.4	NA	6790	NA
Petroleum Carbon Ranges				
C6 - C8	10,000	1000	1,150,000	5,230
C9 - C16	10,000	3000	9,980,000	2,800
C17 - C35	10,000	5000	178,000	2,800
PCB				
PCB	0.748	NA	5,110	31
Other Inorganic Compound				

Chemical	Soil (mg/kg)		Groundwater (µg/L)	
	RBRGs for Industrial	Soil Saturation Limits	RBRGs for Industrial	Solubility Limits
Cyanide, Free	10,000	NA	NA	NA

Note: NA - Not Available

*** indicates that the Csat value/ solubility limit exceeds the 'ceiling limit' therefore the RBRG applies

3.3 Analytical Results and Interpretation

Findings of Stage 1 SI works

Laboratory Analytical Results

Results of Soil Analysis

- 3.3.1 Except for the changes detailed in **Section 3.1**. The Stage 1 SI works were undertaken in accordance with the sampling plan detailed in the approved EIA. Soil boring logs for Stage 1 SI works are presented in **Appendix B**. According to the approved EIA, a total of 5 soil samples were collected during Stage 1 SI for laboratory analysis. A summary table of laboratory testing results with laboratory reports and standard forms adopted from Guidance Manual for assessing the soil samples is presented in **Appendix C**.
- 3.3.2 From the soil samples collected, a single sample recorded bis-(2-Ethylhexyl)phthalate concentrations that exceed the relevant RBRG. **Table 3.5** summarizes the finding of exceedances.

Table 3.4 Summary of Soil Samples Exceeding the RBRG Level /Csat for Stage 1 SI Works

Sample I.D.	Depth (m BBC)	Contaminant	Relevant RBRG/Csat Level (mg/kg)		Concentration Detected (mg/kg)	Exceedance of RBRG/Csat?
			Csat	RBRG		
Stage 1 SI works						
H-02	0.5m	bis-(2-Ethylhexyl)phthalate	NA	91.8	134	>RBRG only

Note: NA = Not applicable.

- 3.3.3 Given the reported concentration of bis-(2-Ethylhexyl)phthalate exceeded the relevant RBRG level as detailed in **Table 3.5**, remediation of the concerned contaminant is required at H-02.

Findings of Stage 2 SI works

Laboratory Analytical Results

Results of Soil Analysis

- 3.3.4 A total of 4 soil samples (including 1 duplicate sample) were collected during Stage 2 SI for laboratory analysis. A summary table of laboratory testing results with laboratory reports and standard forms adopted from Guidance Manual for assessing the soil samples is presented in **Appendix C**.

- 3.3.5 From the soil samples collected, a sample recorded C₁₇-C₃₅ petroleum carbon fraction and anthracene concentrations exceeding their respective C_{sat} limits. **Table 3.5** summarizes the finding of exceedances.

Table 3.5 Summary of Soil Samples Exceeding the RBRG Level /C_{sat} for Stage 2 SI works

Sample I.D.	Depth (m BBC)	Contaminant	Relevant RBRG/Csat Level (mg/kg)		Concentration Detected (mg/kg)	Exceedance of RBRG/Csat?
			Csat	RBRG		
Stage 2 SI works						
H-06A	immediately below base of concrete (i.e.0.2m below road surface)	anthracene	2.56	10,000	<5.0*	>Csat only
		petroleum carbons C ₁₇ -C ₃₅	5000	10,000	7,520	>Csat only

Note: NA = Not applicable.

* ALS HK reported that detection level were raised due to matrix interferences

- 3.3.6 Given the concentration of C₁₇-C₃₅ petroleum carbon fraction did not exceed the RBRG and soil samples recovered did not exhibit unnatural colouration or otherwise notable odours that may imply contaminant impact (i.e. no evidence of NAPL), remediation at H-06 is not considered necessary.

Results of QA/QC Analysis

- 3.3.7 QA/QC is the practice of ensuring that sample collection and analytical techniques provide precise and accurate information. This process is undertaken to validate that levels of contamination measured in the environmental samples reflect the actual environmental levels and are not due to accidental contamination of the sample or sample container. Under the Stage 2 contamination assessment, a duplicate sample, field blank, equipment blank and trip blank were analyzed.
- 3.3.8 The laboratory results for QA/QC samples are presented in **Appendix C**. The majority of parameters analysed for were not detected in the blank samples however phenol and cyanide were detected in equipment blank and field blank collected during soil sampling. The potential source of contamination could be due to (i) sampling or laboratory testing equipment not being adequately decontaminated and/or (ii) contamination arising from the blank container itself. As reported by the land contamination specialist from MTR, all procedures were implemented in accordance to the requirement set in the approved rCAP during sampling at the site. Given that the contaminants detected in the equipment and field blank samples did not show strong correlation with the contaminants found in soil, the results are not considered to have significant influence the outcome of this assessment. QA/QC procedures for sample collection and preparation are therefore considered acceptable.
- 3.3.9 In order to assess the sampling and laboratory reproducibility and precision, the relative percent difference (RPD) of the duplicate samples was determined. The calculations, as presented in **Appendix C**, show that for the majority of soil sample parameters, RPDs were not calculated as the primary or duplicate (or both) sample concentrations detected were below the limit of reporting. RPD values were only calculated for copper, lead, nickel, zinc, trivalent chromium and petroleum carbon fractions C₉-C₁₆/C₁₇-C₃₅. All calculated RPD values are considered acceptable as they are within the range of 0-50% for soil.

3.4 Estimated Extent of Contamination

- 3.4.1 Based on the analytical results presented above, according to the relevant RBRG, soil contaminated with bis-(2-Ethylhexyl)phthalate was identified at 0.5m BBC for H-02. As discussed in the EIA/approved RAP (Appendix 9.2, Section 2.28 referred), a 5m x 5m area, centered at the sampling location is adopted to define the extent of contamination identified at H-02_0.5m BBC. The validity of this approach will be confirmed by a comparison of analytical results from soils collected from the excavation boundaries at 0.5m against the adopted screening criteria. If there are risk based exceedances at the excavation boundaries, the excavation will be incrementally extended until the samples collected at the excavation boundaries meet the remediation target value. In respect of the vertical distribution of contaminants, a conservative estimation of the depth of contamination is assumed to be 0.5m above and below the particular sampling depth where contamination is identified. Due to the presence of concrete and granite from 0.7m BBC to the termination at H-02, the vertical extent of excavation would be slightly adjusted to 0.7m BBC.

Additional Sampling

- 3.4.2 To delineate the extent of contamination, additional sampling was conducted on 1 February 2010 by DBJV based on the proposed location and depth in the approved EIA report. A total of four samples were collected at the boundary of the estimated contaminated areas shown in **Figure XRL/821/M57/001**. Soil samples were collected at depths shown in **Table 3.6**. Sampling and testing procedures as detailed in **Section 3.1.6** and **3.1.7** were followed.

Table 3.6 Details of Soil Samples Collected from Delineation Assessment

Additional Sampling Location	Sampling Depth (m BBC)	Collection Date	Testing Parameters
CS1-01	0.5m	1 February 2011	bis-(2-Ethylhexyl)phthalate
CS1-02			
CS1-03			
CS1-04			

Pre-remediation Assessment Results

- 3.4.3 Of the four soil samples collected from the pre-remediation assessment works, no exceedance of relevant RBRG levels was identified. All sampling works were completed on 1 February 2011.
- 3.4.4 Based on the laboratory results from the pre-remediation works, the horizontal extent of contamination is delineated by the 4 additional samples as shown in **Figure XRL/821/M57/001**. The estimated contaminated soil quantity based on the as-built additional sampling location is summarized in **Table 3.7**.

Table 3.7 Estimated Soil Contamination Extent

Borehole ID	Depth with Contaminated Soil Found (m BBC)	Contaminant	Estimated Contamination Extent*		
			Vertical Extent (m BBC) (Thickness)	Horizontal Extent (m ²)	Volume (m ³)
H-02	0.5	bis-(2-Ethylhexyl)phthalate	0-0.7m*	25	17.5
Estimated Total Volume of Contamination=17.5m³*					

Note:

* Presence of concrete and granite from 0.7m BBC to the termination of the borehole

3.5 Conclusions and Recommendations

- 3.5.1 According to the results of site investigation, a total of 9 soil samples (including duplicates) were collected within Site H under Stage 1 and 2 SI works, in which only 1 soil sample was found to have a bis-(2-Ethylhexyl)phthalate concentration exceeding the relevant RBRG level. The in-ground volume of contaminated soil is calculated to be approximately 17.5m³. Groundwater was not encountered and no groundwater samples were collected during both Stages of SI works.
- 3.5.2 In accordance with the Guidance Note and Guidance Manual, remedial actions for soil are required and remediation action plan as stipulated in the EIA report should be followed. As delineated in the approved RAP under EIA study, biopiling and ex-situ chemical oxidation are considered as the most suitable remediation method for the contaminated soil. **Section 4** will therefore present the method selected for the remediation actions for contaminated soil prior to construction works commencement at Site H.

4 REMEDIATION ACTION PLAN

4.1 Objective

4.1.1 This section presents the remediation proposals and recommends appropriate remediation actions for the contaminated area found.

4.1.2 The objectives of the remediation action plan (RAP) are as follows:

- (i) To propose remediation method(s) for the soil contamination
- (ii) To propose a means to confirm completed excavation of contaminated soil;
- (iii) To provide guidelines regarding handling and/or disposal of contaminated soil

4.2 Potential Remediation Methods

4.2.1 Soil remediation options applicable to the contaminated area at Site H were addressed based on the followings criteria:

- nature and extent of the contamination;
- soil characteristics;
- cost effectiveness and time required for remediation;
- environmental benefits and disbenefits; and
- experience.

4.3 Soil Remediation

Nature of bis-(2-Ethylhexyl)phthalate

4.3.1 Bis-(2-ethylhexyl)phthalate, is an organic chemical commonly abbreviated as DEHP with the formula $C_{26}H_{54}O_4$. The feedstock chemical is semi-volatile, with a vapour pressure of only 1.32 mm Hg at 200°C (while vapour pressure of benzene is 100 mm Hg at 26.1 °C). It is insoluble in water but soluble in mineral oil, hexane, and most organic solvents. It is widely used as a plasticizer in manufacturing of articles made of polyvinyl chloride (PVC). DEHP released to soil will neither evaporate nor leach into groundwater. DEHP has a strong tendency to adsorb to soil and sediments.

Suitable Soil Remediation Methods

4.3.2 A number of soil remediation technologies considered suitable for this nature of contaminant are selected for further examination. The applicability and limitations of the candidate treatment technologies are detailed in **Table 4.1** below.

Table 4.1 List of Possible Remedial Measures for Contaminated Soil

Remediation Option	Descriptions	Applicability and Environmental Benefits	Limitations and Environmental Dis-benefits
Biopiling	<i>Ex-situ</i> bioremediation method that bacteria grow in the piled contaminated soil and degrade the waste into harmless products.	- Effective to TPH and other wide range of organic contaminants with some successful local case studies, e.g. decontamination works at the Cheoy Lee Shipyard at Penny's Bay, reclamation works at North Tsing Yi Shipyard site. - Most cost-effective for large volumes of contaminated soil - All materials and equipment are commercially available - Can be designed to be a closed system; vapour emissions can be controlled	- Labour-intensive; require considerable maintenance - Time-consuming and not cost-effective for treating small volume of soil. - Space required for biopile construction
<i>Ex Situ</i> Chemical Oxidation	<i>Ex-situ</i> chemical oxidation is a contaminant mass reduction technology. Chemical oxidants are directly applied in a controlled manner to excavated soils. Mixing optimizes intimate contact between soil and oxidant which promotes contaminant destruction or breaks down the chemical structure to enhance natural biodegradation processes.	- Effective to a broad range of soil and groundwater contaminants including Bis-(2-ethylhexyl)phthalate - Preparatory oxidants are available which leave behind very little residue, and which do not have a negative effect or interfere with efficient natural attenuation or enhanced bioremediation processes and do not detrimentally impact the quality of the groundwater. - Rapid oxidation of target compounds facilitates timely completion of remediation works.	- Restricted access to the working site until completion of backfilling - Strong oxidizers require safe storage and handling by personnel specifically trained for handling and storage of hazardous materials. - Oxidizers must be stored away from combustible materials, reducing agents, acids, bases, and sources of heat
Soil Venting	<i>In situ</i> bioremediation method that uses indigenous bacteria to degrade contaminants. Activity of the bacteria is enhanced by inducing air flow (using extraction or injection wells) and, if necessary, by adding nutrients.	- Effective for reduction of semi volatile organic compounds (SVOCs) - Suitable for remediation in built up areas because wells can be placed between or below buildings - Applicable to large sites with widespread contamination - Uses readily available equipment; easy to install - Vapour emissions can be controlled but not to the extent of biopiling due to underground soil <i>in-situ</i> properties	- Effectiveness is limited by underground soil features e.g. soil moisture content, permeability, etc. - May induce possible air emission to the sensitive receivers, off-gas treatment required. - Require large space for the system development

Remediation Option	Descriptions	Applicability and Environmental Benefits	Limitations and Environmental Dis-benefits
Landfarming	<i>Ex-situ</i> bioremediation method that mixes the soil with bacteria involving the spread and exposure of contaminated soil to atmosphere	• Very effective in treating hydrocarbons • Simple to design and implement	• May induce possible dust and vapour emission to the sensitive receivers (surrounding factories and buildings) and relatively different to control • Require large flat space for the system development • Slow bioremediation rate and require long operation period (as long as 2 years) which may affect future development schedule
Natural Attenuation	<i>In-situ</i> bioremediation method which includes a variety of physical, chemical, or biological processes that, under favourable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater. The <i>in-situ</i> processes include biodegradation, dispersion, dilution, sorption, volatilization, chemical or biological stabilisation, transformation, or destruction of contaminants.	• Applicable to non-halogenated VOCs/SVOCs and fuel hydrocarbons • Minimal technologies are required • No disturbance to on-going site operation • Can be adopted in inaccessible locations, e.g. below buildings. • No operations and maintenance requirements • No large scale excavation is required • Access to the site is mostly allowed	• Prevailing site conditions must be suitable to support the attenuation process • Extensive amounts of data must be collected and analyzed to determine contaminant plume behaviour • Not applicable when the plume is expanding • Intermediate degradation products may be more mobile and more toxic than the original contaminant • Contaminants may migrate before they are degraded • Routine monitoring is required • Time line for cleanup at the site is long (take over years) depending on optimal environmental / site conditions e.g. hydrogeology and geochemistry of the site

4.4 Proposed Remediation Method

- 4.4.1 An in ground volume of approximately 17.5m³ of soil with bis-(2-Ethylhexyl)phthalate concentrations in excess of the industrial land use RBRG requires treatment.
- 4.4.2 Considering the quantity of soil, potential timescale for completion, cost effectiveness, the applicability and feasibility of carrying out other remediation techniques listed in **Table 4.1**, excavation followed by biopiling is identified as the best approach, This remedial technique is one of the two approved methods proposed in the approved EIA Report.
- 4.4.3 Biodegradation is a process which makes use of the biodegrading ability of naturally occurring or specifically added bacteria to break down the contaminants in the soil or to convert them into harmless substances. The organic nature of bis-(2-Ethylhexyl)phthalate renders this chemical suitable for biological degradation and biopiling methods have a successful track record in Hong Kong. Biopiling has been adopted as a soil remediation techniques at sites such as Former Kai Tak Airport, Choi Lee Shipyard and North Tsing Yi Shipyard.
- 4.4.4 Considering the site will be occupied as railway facilities, the remediation target for bis-(2-Ethylhexyl)phthalate is proposed to be the industrial landuse RBRG i.e. 91.8 mg/kg. Once remediation is completed the decontaminated soil will be suitable for reuse at other areas of the site or as public fill.. Based on the quantity of contaminated soil identified and the existing contamination level (134mg/kg), it is estimated that approximately 3-12 months is expected to be required for treatment using a biopiling methods.

4.5 Outline Process

Excavation

- 4.5.1 Based on the findings of pre-remediation works mentioned in **Section 3.4** of the report, the contaminated area is delineated by the four additional sampling locations established (CS1-01 – CS1-04). This area will be demarcated as an exclusion zone, fenced off and appropriately signed. No construction works will be conducted within this area until the removal of contaminated soil is completed.
- 4.5.2 Detailed design drawings for planned excavations in the indicated areas should be prepared by the Contractor. Factors such as excavation areas and depths, engineering properties and stability of the soils should be considered for safe working conditions. The excavations should be designed in accordance with the geotechnical properties of the soils and appropriate safety factors as determined by the Engineer. The excavated areas should be set out by an appropriate qualified and licensed land surveyor. Proposed contaminated zones requiring excavation are shown in **Figure XRL/821/M57/001** and summarized in
- 4.5.3 **Table 4.2**.

Table 4.2 Estimated Soil Excavation Extent

Borehole ID	Depth with Contaminated Soil Found (m BBC)	Contaminant	Estimated Contamination Extent*		
			Vertical Extent (m BBC) (Thickness)	Horizontal Extent (m ²)	Volume (m ³)
H-02	0.5	bis-(2-Ethylhexyl)phthalate	0-0.7m**	25	17.5
Estimated Total Volume of Contamination=17.5m³					

Note:

** Presence of concrete and granite from 0.7m BBC to the termination of the borehole

- 4.5.4 During the remediation process, the excavation sequence would be as follows:

- At each location as set out by the surveyor, the contaminated soil would be excavated and transferred to a lined treatment area for homogenization. Free product (if encountered) during excavation should be recovered and drummed properly and collected by licensed chemical waste collector for proper handling and treatment.
- Following excavation and prior to backfilling, confirmatory sampling and analyses should be carried out at the base of the excavation, to confirm that all the contaminated soil has been removed. Soil samples should be collected for laboratory analysis of the defined contaminant (bis-(2-Ethylhexyl)phthalate). If the analytical results exceed the relevant RBRG level(s), additional soil should be excavated (in 0.5m increments vertically). However, due to the presence of concrete and granite from 0.7m BBC to the termination at H-02, additional samples would not be able to be collected and analysed. If the analytical results are below the relevant RBRG, removal of contaminated soil should be considered complete and the open excavations then backfilled with suitable imported or reworked site materials.

Closure Assessment for Excavation

- 4.5.5 The purpose of the closure assessment is to confirm that all contaminated soils have been excavated from the contaminated areas identified.
- 4.5.6 In addition to the findings from the additional samples taken from each sidewall of the excavation, one confirmatory sample should be collected from the pit base. In respect of the vertical distribution of contaminants, a conservative estimation of the depth of contamination is assumed to be 0.5m above and below the particular sampling depth where contamination is identified. Due to the presence of concrete and granite from 0.7m BBC to the termination at H-02, the vertical extent of excavation would be slightly adjusted to 0.7m BBC. Proposed locations for confirmatory sampling are shown in Figure Nos. **Figure XRL/821/M57/001**. In all cases, if there are any visible indications of potential contamination (e.g. stain, odour) in the contaminated zone (i.e. Zone H-02), additional samples should be collected.
- 4.5.7 Although the contaminant strongly sorbs to soil particles, it has very low water solubility and is not expected to leach, however, to mitigate the risk of cross contaminating unimpacted ground, spoil generated during excavation works should be placed on an impermeable surface within the soil treatment area.
- 4.5.8 All construction activities should be carried out by persons appropriately trained in health and safety and appropriated personal protective equipment should be used by the persons engaged in decontamination activities. The following guidelines of health and safety should be strictly followed by all site personnel working on the contaminated area(s) at all times:
- Temporary fencing or warning ribbons will be provided to the boundary of excavation, slope crest and temporarily stockpiled areas. Where necessary, the exposed areas should be temporarily covered with impermeable sheeting during heavy rainstorm.
 - Workers are required to wear appropriate protective clothing and safety equipment.
 - Smoking, eating, drinking is strictly prohibited.
 - Relevant occupational health and safety regulations and guidelines during excavation should be observed.
- 4.5.9 The excavation and confirmatory sampling works should be supervised by a Land Contamination Specialist. Subsequent construction activities could only be carried out after closure assessment for excavation at the contaminated zone is completed as agreed by the Land Contamination Specialist.
- 4.5.10 The essential steps of biopiling are outlined in the following paragraphs:

Biopiling

- 4.5.11 Biopiling is a commonly accepted ex-situ bioremediation method for the restoration of sites contaminated with biodegradable organic contaminants. By using microorganisms to degrade contaminants in soil, biopile(s) transform hazardous / toxic materials into harmless elements such as water, carbon dioxide, and other innocuous products. The essential steps of biopiling are outlined in the following paragraphs:

Biopile Formation

- 4.5.12 The formation of a biopile should be created in a longitudinal direction. Uniform starting concentrations will facilitate the control of the bioremediation and optimize cleanup times (as decontamination will not be controlled by patches of soil with high initial concentrations). Compaction of the biopile by excavation machinery shall be avoided in order maintain a uniform soil density within the biopile. Bulking agents are not usually added as these may affect the geotechnical properties of the soil and be difficult to compact during backfilling. The biopile should be covered by impermeable sheeting to avoid fugitive emissions of dust from the biopile affecting the surrounding environment. Adequate turning should be undertaken during biopile formation and operation to maximize air circulation and enhance aerobic conditions for optimal microbial growth.
- 4.5.13 Impermeable sheeting shall be placed at the base of the biopile. As discussed in **Section 4.4**, bis-(2-ethylhexyl)phthalate has strong tendency to adsorb to soils does not leach, however a simple temporary bund will be maintained around the stockpile to prevent migration of any surface runoff during wetting, if necessary.

Biopile Operation

- 4.5.14 Based on the limited volume of soil requiring treatment, the residual concentrations identified and semi-volatile nature of bis-(2-ethylhexyl)phthalate with its strong tendency to absorb to soil, the "evaporation" or volatilization of bis-(2-Ethylhexyl)phthalate contamination through mechanical induction of air is expected to be extremely low. An active aeration system is therefore not required within the biopile. The soil will be mechanically turned using a standard excavator bucket in order to introduce sufficient air for bacterial growth.
- 4.5.15 In addition to the above, moisture would be periodically added to the soil to maintain the moisture content within 10-20%. Regular progress monitoring of the soil conditions should be conducted to ascertain these conditions have been maintained.

Biopile Cleanup Progress Monitoring

- 4.5.16 The objective of the operation progress monitoring is twofold: i) to maintain the progress of contaminant cleanup, and ii) to ensure suitable conditions of the soil to support microbial growth. Progress monitoring would involve periodic soil sampling, and physical parameter monitoring.
- 4.5.17 It is proposed to undertake soil sampling monthly for the analysis of moisture content. However subject to actual remedial progress this frequency may be amended. Analyses for bis-(2-Ethylhexyl)phthalate for soil samples shall be conducted at least once every 3 months or higher frequency. Monitoring should continue until the cleanup targets are achieved. Once the cleanup targets for a location have been achieved, soil sampling at that particular location may discontinue. Progress of soil monitoring results will also indicate when the biopile decontamination process stops.

Biopile Closure Assessment

- 4.5.18 Biopile closure assessment should be conducted to ensure that the soil contaminant levels in the biopile are meeting the cleanup target for bis-(2-Ethylhexyl)phthalate.
- 4.5.19 The sampling frequency is proposed to be one sample per 10 m³ for biopile closure assessment considering the small volume of contaminated soil identified.
- 4.5.20 All soil samples shall be analyzed for bis-(2-Ethylhexyl)phthalate. The laboratory results are considered satisfactory when the levels of bis-(2-Ethylhexyl)phthalate meet the cleanup target (industrial RBRG) using method USEPA Method 8270 (or equivalent). Industrial RBRG limit is selected as the future land uses of the areas would be railway development. Such acceptance testing shall be conducted for each 10 m³ of soil treated by biopiling.
- 4.5.21 Upon treatment by biopiling, the decontaminated soil shall be used as filling material or re-use on site with reference to the landuse scenario in the RBRG.

4.6 Demarcated “No Works” Area

- 4.6.1 Based on the laboratory results of additional sampling, no exceedances of the relevant RBRG for bis-(2-Ethylhexyl)phthalate were identified from the excavation sidewalls at H-02. A “no works” area will be therefore be set out around H-02. No construction works will be allowed within the demarcated “no works” area upon completion of delineation works. The demarcated “no works” areas are shown in **Figure XRL/821/M57/001**. Fencing and warning signs will be provided at the boundary of this Area to preclude working within these areas.

4.7 Remediation Report

- 4.7.1 Construction activities are required to be carried out after the excavation closure assessment at the demarcated contaminated zone set around H-02. A Technical Note summarizing the findings should therefore be prepared by Land Contamination Specialist to confirm that all the contaminated soil has been removed from the contaminated zone for treatment. All relevant information, including details of closure assessment, sampling results and photographs should be included in this technical note. Upon completion of soil remediation, a Remediation Report should be prepared by the Land Contamination Specialist to report on the remediation process and demonstrate that contaminated materials are all handled and treated to meet the relevant standards. All relevant information, including details of closure assessment, sampling results photographs and the quantity of treated soil and the final backfill site of treated soil should be included in the RR. The technical note will also be included in the Final RR for completeness.
- 4.7.2 Both Technical Note and Remediation Report should be submitted for EPD's approval upon completion of excavation works and remediation works respectively. Following successful delineation, the excavation will be backfilled with uncontaminated soil, to free up this area and the contaminated soil will be treated at a less critical location within the site.H-02

4.8 Mitigation Measures and Safety Measures

- 4.8.1 In order to minimise the potentially adverse environmental impacts arising from the handling of potentially contaminated materials, the following environmental mitigation measures are proposed during the course of the site remediation:
- Excavation profiles must be properly designed and executed.
 - Stockpiles shall be sited on impermeable surfacing within the treatment area and covered to reduce dust emission. If this is not practicable, regular watering shall be applied.
 - Speed control for the trucks carrying contaminated materials should be enforced.
 - Vehicle wheel and body washing facilities at the site's exist points shall be established and used.

4.8.2 In order to minimise the potentially adverse environmental impacts arising from the handling of potentially contaminated materials during the course of site remediation, the Occupational Safety and Health Ordinance (OSHO) (Chapter 509) and its subsidiary regulations shall be followed by all site personnel working on the site at all times. In addition, the following basic health and safety measures should be implemented as far as possible:

- Set up a list of safety measures for site workers;
- Provide written information and training on safety for site workers;
- Keep a log-book and plan showing the contaminated zones and clean zones;
- Maintain a hygienic working environment;
- Avoid dust generation;
- Provide face and respiratory protection gear to site workers;
- Provide personal protective clothing (e.g. chemical resistant jackboot, liquid tight gloves) to site workers; and
- Provide first aid training and materials to site workers.

5 CONCLUSION

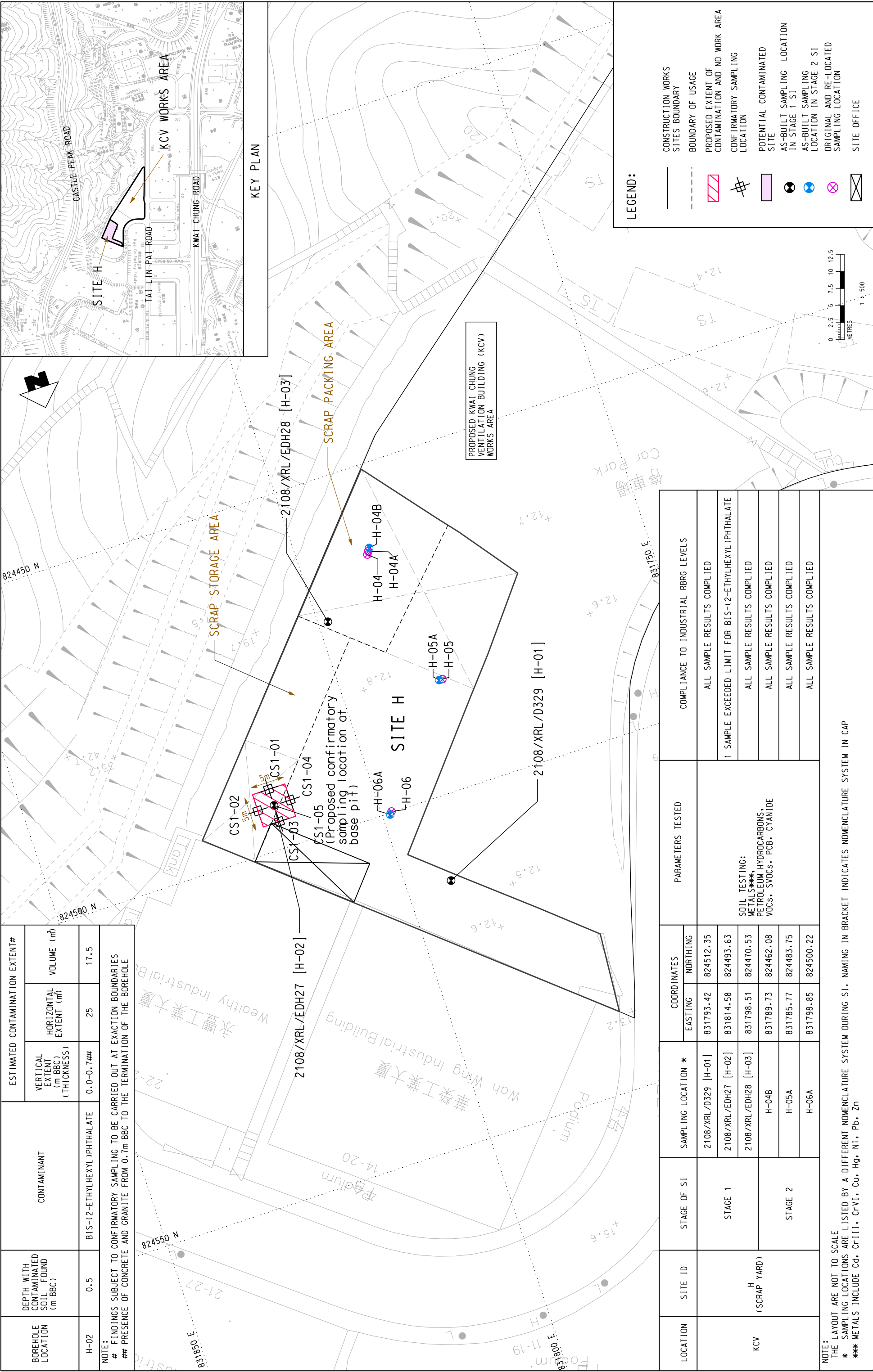
- 5.1.1 Based on the findings of site investigation conducted in the period of 23 September to 15 October 2008 and 9 June to 8 July 2010, only 1 out of the 9 soil samples collected was found to have a concentration of bis-(2-Ethylhexyl)phthalate in exceedance of the industrial land use RBRG. No other RBRG exceedances or soil saturation exceedances were identified.
- 5.1.2 To delineate the contaminated area, additional sampling was conducted in February 2011; the analytical results indicate no exceedance of the relevant RBRG, therefore confirming the extent of contamination. However, the vertical extent of contamination cannot be confirmed prior to excavation. Confirmatory testing will be conducted at the base of the excavation to determine the vertical extent of contamination and to ensure complete removal of contaminated soil during excavation. In respect of the vertical distribution of contaminants, a conservative estimation of the depth of contamination is assumed to be 0.5m above and below the particular sampling depth where contamination is identified. Due to the presence of concrete and granite from 0.7m BBC to the termination at H-02, the vertical extent of excavation would be slightly adjusted to 0.7m BBC. The volume of contaminated soil requiring remediation is calculated to be approximately 17.5m³.
- 5.1.3 Considering the contaminant is organic and biodegradable, *biopiling* is considered the most suitable remediation method for the contaminated soil. The remediation target for the contaminated soil is proposed to be the RBRG (industrial) for the post-restoration land use associated with railway development.
- 5.1.4 A Technical Note and a Remediation Report should be submitted for EPD's approval upon completion of excavation works and the remediation works respectively. Following successful delineation, the excavation will be backfilled with uncontaminated soil, to free up this area and the contaminated soil will be treated at a less critical location within the site. Appropriate environmental mitigation measures have been proposed to minimize the potential environmental impacts of the remediation activities. Health and safety measures should be followed to minimize safety hazard posed to site workers.

FIGURE

BOREHOLE LOCATION	DEPTH WITH CONTAMINATED SOIL FOUND (m BBC)	CONTAMINANT	ESTIMATED CONTAMINATION EXTENT#		
			VERTICAL EXTENT (m BBC) (THICKNESS)	HORIZONTAL EXTENT (m ²)	VOLUME (m ³)
H-02	0.5	BIS-(2-ETHYLHEXYL)PHTHALATE	0.0-0.7##	25	17.5

NOTE:
FINDINGS SUBJECT TO CONFIRMATORY SAMPLING TO BE CARRIED OUT AT EXACTION BOUNDARIES
PRESENCE OF CONCRETE AND GRANITE FROM 0.7m BBC TO THE TERMINATION OF THE BOREHOLE

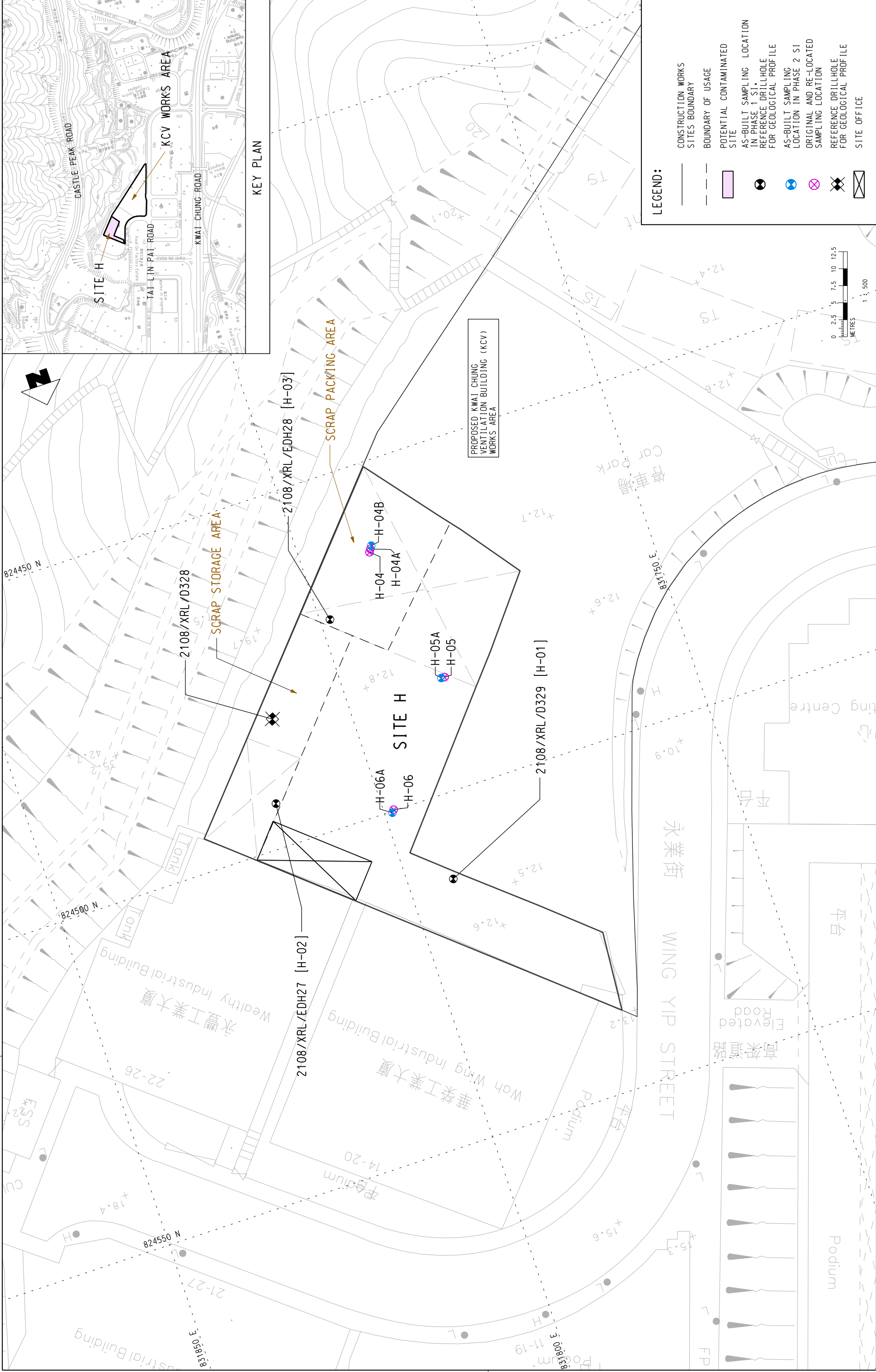
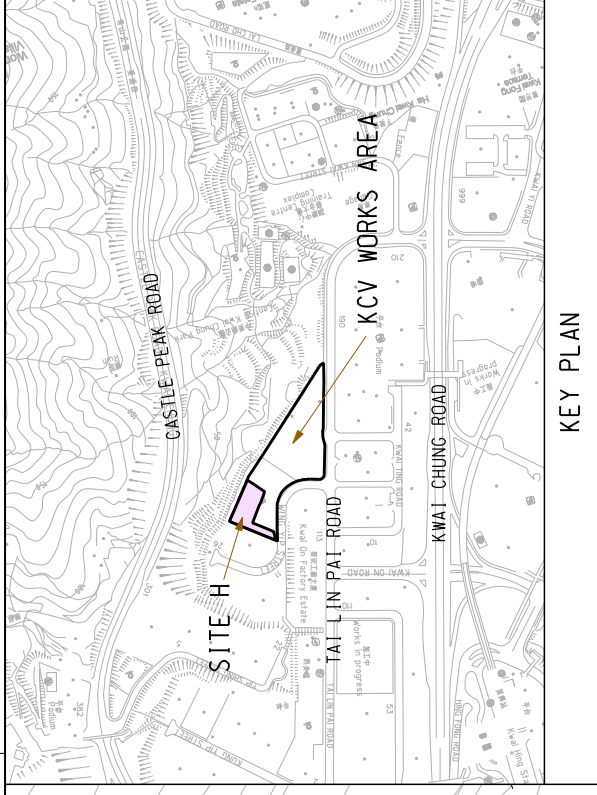
NOTE:
FINDINGS SUBJECT TO CONFIRMATORY SAMPLING TO BE CARRIED OUT AT EXACTION BOUNDARIES
PRESENCE OF CONCRETE AND GRANITE FROM 0.7m BBC TO THE TERMINATION OF THE BOREHOLE



LOCATION	SITE ID	STAGE OF SI	SAMPLING LOCATION *	COORDINATES		PARAMETERS TESTED	COMPLIANCE TO INDUSTRIAL RBRG LEVELS
				EASTING	NORTHING		
KCV (SCRAP YARD)		STAGE 1	2108/XRL/D329 [H-01]	831793.42	824512.35	SOIL TESTING: METALS***, PETROLEUM HYDROCARBONS, VOCs, SVOCs, PCB, CYANIDE	ALL SAMPLE RESULTS COMPLIED
			2108/XRL/EDH27 [H-02]	831814.58	824493.63		1 SAMPLE EXCEEDED LIMIT FOR BIS-(2-ETHYLHEXYL)PHTHALATE
			2108/XRL/EDH28 [H-03]	831798.51	824470.53		ALL SAMPLE RESULTS COMPLIED
			H-04B	831789.73	824462.08		ALL SAMPLE RESULTS COMPLIED
		STAGE 2	H-05A	831785.77	824483.75	ALL SAMPLE RESULTS COMPLIED	
			H-06A	831798.85	824500.22	ALL SAMPLE RESULTS COMPLIED	

NOTE:
THE LAYOUT ARE NOT TO SCALE
* SAMPLING LOCATIONS ARE LISTED BY A DIFFERENT NOMENCLATURE SYSTEM DURING ST. NAMING IN BRACKET INDICATES NOMENCLATURE SYSTEM IN CAP
*** METALS INCLUDE Cd, CrIII, CrVI, Cu, Hg, Ni, Pb, Zn

[illegible]



REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED	DATE	SCALE	FIGURE NO.	REV.
											1 : 500 (A3)	XRL/821/M57/002	A
MTRC XRL CONTRACT 821 LAND CONTAMINATION ASSESSMENT AT KCV AS-BUILT SAMPLING LOCATIONS AND REFERENCE DRILLHOLES FOR GEOLOGICAL PROFILE													
TITLE SCALE													
DRAWN DESIGNED													
CHECKED POHM													
APPROVED DATE													
DO NOT SCALE DRAWINGS. ALL DIMENSIONS SHALL BE BASED ON THE AS-BUILT DRAWINGS. NO MTC CORPORATION LIMITED 2008 COPYRIGHT IN RESPECT OF THIS DRAWING / DOCUMENT IS USED BY THE REPRODUCTION OF THE DRAWING / DOCUMENT OR ANY PART THEREOF WITHOUT CONSENT OF THE MTC CORPORATION LIMITED. 23/AUG/2010													
ORIGINATOR CADD REF.													
													

APPENDIX A
SAMPLING AND TESTING SCHEDULE PROPOSED IN THE
APPROVED rCAP and EIA

Stage 1 SI

Consultancy Agreement No. NOL/ERL-300
Environmental Impact Assessment of Hong Kong Section of
Guangzhou-Shenzhen-Hong Kong Express Rail Link
Contamination Assessment Plan

MTR Corporation Limited

Proposed Sampling Location	Hotspots Identified and/or Respective Sample ID	Sampling Method	Sample Matrix	Parameters to be Tested							Rationale of Sampling and Testing Parameters	Reference Figures		
				Metals	Petroleum Carbon Ranges	VOC		SVOC#					PCB	Cyanide
						BTEX only	Full List	PAH only	Full List					
KCV														
Site H (Scrap yard) Area occupied for contaminative land uses: ~1,000m ²	Access Road	H-01	Soil	0.5, 1.5, 3.0, 4.5, 6.0 m BBC	Cd, CrIII, CrVI, Cu, Hg, Ni, Pb, Zn	X	-	X	-	X	X	To assess potential land contamination impacts during (i) transportation of scrap to the site and general ground condition, (ii) scrap storage and (iii) scrap packing process and the potential contamination from the storage of oil drums close the baler, 1 borehole is proposed near the entrance of the yard as a conservative approach, 2 boreholes are proposed near the scrap storage area and 1 borehole is proposed near the packing machine.		
	Scrap Storage Area	H-02 H-03												
	Scrape Packing Area	H-04												
	Supplementary SI: H-05 – H-06		G.W.	If present	Hg only	X	-	X	-	X	-	As the scrap could be from various industrial sources, various heavy metals are proposed as testing parameters together with VOCs and SVOCs. Cyanide is also included for screening. 2 supplementary SI locations are proposed to assess other areas of the site.	NOL/ERL/300/C/XR L/M57/019	

Stage 2 SI

Table 4.1 Sampling and Testing Plan for Site H

Proposed Sampling Location	Sampling Method	Sample Matrix ^{2,3}	Parameters to be Tested ⁴					Rationale
			Petroleum Carbon Ranges	Full List of VOC ⁵	Full List of SVOC ⁵	Heavy Metals	PCB	
H04 (Scrap Packing Area/Oil Drums Storage Area)	Borehole	Soil	X	X	X	Cd, CrIII, CrVI, Cu, Hg, Ni, Pb, Zn	X	To assess the potential for land contamination resulting from the packing process and potential leakage/spillage of oil from oil drums stored at the packing area.
		Soil	X	X	X	Cd, CrIII, CrVI, Cu, Hg, Ni, Pb, Zn	X	
		Soil	X	X	X	Cd, CrIII, CrVI, Cu, Hg, Ni, Pb, Zn	X	
		Soil	X	X	X	Cd, CrIII, CrVI, Cu, Hg, Ni, Pb, Zn	X	
		Soil	X	X	X	Cd, CrIII, CrVI, Cu, Hg, Ni, Pb, Zn	X	
		Soil	X	X	X	Cd, CrIII, CrVI, Cu, Hg, Ni, Pb, Zn	X	
H05-06 (General, packing area and the eastern portion of the site)	Borehole	GW	X	X	X	Hg	X	To assess the potential land contamination concern at the middle and the western portion of the site in general.
		Soil	X	X	X	Cd, CrIII, CrVI, Cu, Hg, Ni, Pb, Zn	X	
		Soil	X	X	X	Cd, CrIII, CrVI, Cu, Hg, Ni, Pb, Zn	X	
		Soil	X	X	X	Cd, CrIII, CrVI, Cu, Hg, Ni, Pb, Zn	X	
		Soil	X	X	X	Cd, CrIII, CrVI, Cu, Hg, Ni, Pb, Zn	X	
		Soil	X	X	X	Cd, CrIII, CrVI, Cu, Hg, Ni, Pb, Zn	X	

Remarks:

- Locations are shown in **Figures C8016/C/XRL/ENS/M57/011**.
- BBC= below base of concrete slab; GW=groundwater
- Exact sampling depth shall be determined on site and subject to fine adjustment due to site specific conditions (e.g. hard rocks or groundwater encountered (if any)).
- X = testing proposed
- Since RBRG value of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, bis-(2-Ethylhexyl)phthalate, Dibenzo(a,h)anthracene, Indeno(1,2,3-cd)pyrene and Phenol were not available for groundwater, the captioned chemicals parameters would not be tested in groundwater sample.

[^] Samples will only be collected if groundwater is encountered during SI works.

APPENDIX B

SITE BORING LOG

Stage 1 SI



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D329

SHEET **1** OF **5**

DRILLHOLE RECORD

CONTRACT NO. **NEX/2108**

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **DR128**

E 831793.42

DATE FROM **23/09/2008** TO **09/10/2008**

N 824512.35

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.62 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
25/09/2008	PX	08:00							+12.62	0.00			Extremely weak, reddish yellow spotted dark greenish grey and white, completely decomposed, fine grained GRANITE. (Silty fine to coarse SAND with some fine gravel)
25/09/2008		18:00	0					INSPECTION PIT		0.99		V	
26/09/2008		08:00							+11.12	1.50		V	Extremely weak, greenish grey spotted light grey and white, mottled yellowish brown, completely decomposed, fine grained GRANITE. (Silty fine to coarse SAND with some fine to occasional medium gravel)
			88				180 bls			1.85			
	PX 3.00								+9.62	3.00		V	Extremely weak, yellowish brown spotted dark greenish grey, mottled white, completely decomposed, fine grained GRANITE. (Clayey/silty sandy fine to coarse GRAVEL)
	HX		82				234 bls			3.33			
									+8.11	4.51		III	Moderately strong, pink spotted dark greenish grey, mottled yellowish brown, moderately decomposed, fine grained GRANITE. Joints are very closely to closely spaced, locally medium spaced, rough stepped and rough undulating, extremely narrow, locally very narrow, iron and manganese oxide stained, chlorite and kaolin (thickness from <0.5mm up to 1mm) infilled, dipping at 40° to 50° and 60° to 70°, locally 20° to 30°.
26/09/2008		2.50m at 18:00	100	66	66	NI		T2IOI		4.80			
29/09/2008		2.80m at 08:00	100	79	69			T2IOI		5.32			
			100	71	44			T2IOI		6.09			
			100	60	53	>20		T2IOI		6.77			
			96	96	71	8.2		T2IOI		7.75			
			98	53	32	20.0		T2IOI		8.12			
						2.6			+4.50			II	Strong, pink spotted dark greenish grey, light grey and white, locally mottled dark greenish grey, slightly decomposed, fine grained GRANITE with some microfractures dipping at 10° to 20°, 20° to 30°, 40° to 50°, 60° to 70° and 80° to 90°.
			100	87	67	12.0		T2IOI		9.20			Joints are closely to medium spaced, locally extremely closely to very closely and widely spaced, rough stepped and rough undulating, locally smooth planar and smooth stepped, extremely narrow, locally very narrow, chlorite.

- | | |
|---------------------------|-----------------------------|
| ● SMALL DISTURBED SAMPLE | △ WATER SAMPLE |
| □ LARGE DISTURBED SAMPLE | ▲ PIEZOMETER TIP |
| ▨ SPT LINER SAMPLE | □ STANDPIPE |
| ▨ U76 UNDISTURBED SAMPLE | □ STANDARD PENETRATION TEST |
| ▨ U100 UNDISTURBED SAMPLE | □ PERMEABILITY TEST |
| ▨ MAZIER SAMPLE | □ IMPRESSION PACKER TEST |
| ▨ PISTON SAMPLE | □ IN-SITU VANE SHEAR TEST |
| | □ PACKER TEST |

LOGGED **D.Y. Yip**

DATE **10/10/2008**

CHECKED **James Lu**

DATE **11/10/2008**

REMARKS

- Acoustic televiewer survey was carried out from the depths of 4.20m to 47.44m.
- Packer tests were carried out from the depths of 8.00m to 14.00m, 14.00m to 20.00m, 20.00m to 26.00m, 26.00m to 32.00m, 32.00m to 38.00m and 38.00m to 47.99m.
- Standpipe was installed at a depth of 30.00m.



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D329

SHEET **2** OF **5**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT Contract NEX/2108 Ground Investigation Works for Express Rail Link

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **DR128**

E 831793.42

DATE FROM **23/09/2008** TO **09/10/2008**

N 824512.35

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.62 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
10			100	44	18					10.00			
11		2.50m at 18:00	100	80	62	5.3		T2IOI		10.12			white kaolin (thickness from <0.5mm up to 1mm) and locally quartz infilled, dipping at 10° to 20°, 20° to 30°, 40° to 50°, 60° to 70° and 80° to 90°, locally 0° to 10°. From 8.19m to 8.91m : With 80° to 90° joints. From 9.03m to 9.19m : With a coarse gravel sized pocket of pegmatite. From 9.05m to 11.40m : With 80° to 90° joints where incipient from 9.37m to 9.62m, 9.70m to 9.85m and 10.53m to 10.67m.
12		2.50m at 08:00	100	80	62	5.3		T2IOI		11.58			From 11.90m to 12.05m : With a pegmatite vein of maximum thickness 22mm dipping at 70° to 80°.
13			100	74	71	9.1		T2IOI		12.91			From 12.23m to 15.09m : With 80° to 90° joints where incipient from 12.23m to 12.51m and 13.96m to 14.34m.
14			100	76	49	13.4		T2IOI		14.10			From 13.13m to 13.28m : With pegmatite veins of maximum thickness 30mm dipping at 20° to 30° and 80° to 90°.
15			100	63	48	11.1		T2IOI		15.39			From 15.24m to 16.48m : With 80° to 90° joints.
16		2.50m at 18:00	100	89	89	5.1		T2IOI		16.58			From 15.94m to 16.31m : Silicified granite.
17		2.50m at 08:00	100	89	89	5.1		T2IOI		17.84			From 16.46m to 16.67m : Silicified granite.
18			100	72	72	19.3		T2IOI		17.84			From 17.50m to 17.84m : With 80° to 90° joints where incipient from 17.50m to 17.80m.
19			100	80	62	3.2		T2IOI		18.93			From 19.20m to 19.23m : Moderately strong, moderately decomposed.
20			100					T2IOI		19.90			

- SMALL DISTURBED SAMPLE
- ◄ LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- MAZIER SAMPLE
- PISTON SAMPLE
- △ WATER SAMPLE
- PIEZOMETER TIP
- STANDPIPE
- STANDARD PENETRATION TEST
- PERMEABILITY TEST
- IMPRESSION PACKER TEST
- IN-SITU VANE SHEAR TEST
- PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/10/2008**
CHECKED **James Lu**
DATE **11/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D329

SHEET **3** OF **5**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT Contract NEX/2108 Ground Investigation Works for Express Rail Link

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **DR128**

E 831793.42

DATE FROM **23/09/2008** TO **09/10/2008**

N 824512.35

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.62 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
20			100	95	93	5.6		T2101		20.00	+	III	From 20.44m to 20.68m : Moderately strong, moderately decomposed.
21			100	99	97			T2101		21.28	+	II	From 21.19m to 21.38m : Silicified granite.
22			100	100	94			T2101		22.75	+	III	From 22.01m to 22.58m : Moderately strong, moderately decomposed.
23			100	100	94			T2101		22.75	+	II	From 22.01m to 22.58m : Moderately strong, moderately decomposed.
24			100	92	82			T2101		24.20	+		From 24.27m to 25.01m : With an 80° to 90° joint where incipient from 24.46m to 25.01m.
25		2.00m at 18:00	100	98	85			T2101		25.19	+		From 24.78m to 24.99m : Chloritized granite.
26		2.60m at 08:00	100			>20 4.0		T2101			+		
27			100	81	81	>20 5.3		T2101		26.58	+		From 26.49m to 27.16m : With an 80° to 90° joint.
28			100	77	59			T2101		27.92	+		From 27.16m to 27.27m : Silicified granite.
29			100			18.8 >20 5.7		T2101			+	III	From 28.59m to 28.64m : With a pegmatite vein of maximum thickness 35mm dipping at 40° to 50°.
30			100	73	59	>20 5.0		T2101		29.35	+	II	From 28.72m to 28.82m : Moderately strong, moderately decomposed.
								T2101			+	III	From 29.70m to 30.35m : With a slickensided

- SMALL DISTURBED SAMPLE
- LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- PIEZOMETER TIP
- STANDPIPE
- ↓ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- II IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⚡ PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/10/2008**
CHECKED **James Lu**
DATE **11/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D329

SHEET **4** OF **5**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **DR128**

E 831793.42

DATE FROM **23/09/2008** TO **09/10/2008**

N 824512.35

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.62 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
30										30.00			
								T2IOI		30.65		II	undulating fracture dipping at 80° to 90°. From 29.74m to 29.89m : Moderately strong, moderately decomposed.
			100	100	100	8.1		T2IOI		31.27		III	From 30.11m to 30.30m : Fine grained granodiorite.
			100	94	74	2.9		T2IOI		31.27		II	From 30.44m to 30.80m : With an 80° to 90° joint.
								T2IOI		32.54			From 30.75m to 30.88m : Moderately strong, moderately decomposed.
		2.50m at 18:00						T2IOI		32.54			At 30.82m : With a slickensided undulating fracture dipping at 73°.
04/10/2008		2.80m at 08:00	100	92	67			T2IOI		33.70			From 31.40m to 32.05m : With an 80° to 90° joint where incipient from 31.40m to 31.57m.
06/10/2008								T2IOI		34.31			
								T2IOI		35.53			From 33.15m to 33.33m : With an 80° to 90° joint where incipient from 33.29m to 33.33m.
			100	100	100	3.5		T2IOI		35.53			
			100	97	82			T2IOI		36.99			From 35.11m to 36.32m : With 80° to 90° joints.
								T2IOI		37.85			
		2.50m at 18:00						T2IOI		37.85			From 36.75m to 37.49m : With 80° to 90° joints.
30/6/10/2008		2.80m at 08:00	100	64	43			T2IOI		39.32			From 37.30m to 37.44m : Autolith of fine grained granodiorite.
08/10/2008								T2IOI					From 37.36m to 37.48m : Silicified granite.
			100	100	95	7.7		T2IOI					At 37.55m : Coarse grained granite vein of maximum thickness 20mm dipping at 60° to 70°.
								T2IOI					From 37.64m to 38.02m : Finely feldsparphyric rhyolite dipping at 40° to 50°.
								T2IOI					From 37.66m to 37.97m : With 80° to 90° joints.
			100	87	87			T2IOI				III	From 39.29m to 39.75m : Moderately strong, moderately decomposed.
40								T2IOI				II	From 39.70m to 39.94m : With an 80° to 90°

- SMALL DISTURBED SAMPLE
- LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- MAZIER SAMPLE
- PISTON SAMPLE
- △ WATER SAMPLE
- PIEZOMETER TIP
- STANDPIPE
- STANDARD PENETRATION TEST
- PERMEABILITY TEST
- IMPRESSION PACKER TEST
- IN-SITU VANE SHEAR TEST
- PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/10/2008**
CHECKED **James Lu**
DATE **11/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D329

SHEET **5** OF **5**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **DR128**

E 831793.42

DATE FROM **23/09/2008** TO **09/10/2008**

N 824512.35

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.62 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
40			100	97	97					40.00			
			100	97	97			T2101		40.09	+		joint.
41			100	100	92	3.9		T2101		41.21	+		From 40.03m to 40.09m : Silicified granite of maximum thickness 40mm with a quartz vein of maximum thickness 4mm dipping at 50° to 60°.
42			100	100	100			T2101		42.44	+		From 40.50m to 41.18m : With an 80° to 90° joint.
43			100	100	100			T2101			+		
44		2.50m at 18:00	100	95	90	>20		T2101		43.80	+		
45		2.90m at 08:00	100	100	100			T2101		45.26	+		
46			100	48	48	4.7		T2101		46.21	+		From 46.04m to 47.31m : With 80° to 90° joints where incipient from 47.17m to 47.31m.
47			100	92	88			T2101		46.83	+		
48		2.60m at 18:00						T2101		47.99	+		
49													Hole completed at 47.99m.
50													

- SMALL DISTURBED SAMPLE
- LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- MAZIER SAMPLE
- PISTON SAMPLE
- △ WATER SAMPLE
- PIEZOMETER TIP
- STANDPIPE
- STANDARD PENETRATION TEST
- PERMEABILITY TEST
- IMPRESSION PACKER TEST
- IN-SITU VANE SHEAR TEST
- PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/10/2008**
CHECKED **James Lu**
DATE **11/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/EDH27

SHEET **1** OF **3**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **D51**

E 831814.58

N 824493.63

DATE FROM **13/10/2008** TO **15/10/2008**

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.83 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
13/10/2008	PX	08:00							+12.83	0.00			
		0.60m at 18:00	0						+12.73	0.10			CONCRETE surface.
13/10/2008										0.60			
14/10/2008		0.60m at 08:00	90						+12.12	0.71			Greyish brown mottled white, brown and green, silty sandy angular fine to coarse GRAVEL sized concrete and tile fragment. (FILL with intense offensive smell)
	PX 1.23		100					T2IOI		1.23			CONCRETE with plastic sheeting underneath.
	HX		100	26	0	NI		T2IOI	+11.17	1.66			
			100	57	28			T2IOI		2.13			Strong, pink spotted dark greenish grey and white, locally mottled dark grey, slightly decomposed, fine grained GRANITE with intense microfractures dipping at 20° to 30°, 40° to 50°, 60° to 70° and 80° to 90°.
	HX 2.13		100			>20		T2IOI		2.88			Joints are closely to medium spaced, locally very closely and widely spaced, smooth and rough stepped and undulating, locally smooth planar and rough planar, extremely narrow, chlorite and white kaolin (<0.5mm thick) infilled, locally iron oxide stained, dipping at 20° to 30°, 40° to 50° and 60° to 70°, locally 10° to 20° and 80° to 90°.
			100	98	98	4.2		T2IOI		4.33			From 1.66m to 2.13m : Silicified granite with quartz veining of maximum thickness 15mm.
			100	100	82			T2IOI		5.75			
			100			15.9		T2IOI		7.32			
			100	100	85	2.2		T2IOI		8.82			From 5.31m to 5.42m : Moderately strong, moderately decomposed.
			100	95	73	5.0		T2IOI					
			100			>20		T2IOI					
14/10/2008		0.55m at 18:00											
15/10/2008		0.75m at 08:00	100	100	89	8.2		T2IOI					
						>20							
						10.9							

- SMALL DISTURBED SAMPLE
- LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- ▨ U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- STANDPIPE
- ↓ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- ⊥ IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⬮ PACKER TEST

LOGGED **D.Y. Yip**
DATE **16/10/2008**
CHECKED **James Lu**
DATE **17/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/EDH27

SHEET **2** OF **3**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **D51**

E 831814.58

DATE FROM **13/10/2008** TO **15/10/2008**

N 824493.63

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.83 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
10			100	96	71	>20 4.9		T2IOI		10.21	+		From 10.01m to 10.54m : With 80° to 90° joints.
11			100	100	79	>20 4.4		T2IOI		11.78	+		
12			100	90	79			T2IOI		13.28	+		
13			100	90	86	1.9		T2IOI		14.77	+		From 15.27m to 15.52m : With a fault plane dipping at 80° to 90°.
14			100	96	93			T2IOI		16.31	+		From 16.71m to 17.56m : With an 80° to 90° joint where incipient from 16.98m to 17.56m.
15			100	100	87			T2IOI		17.80	+		From 17.73m to 17.83m : With a fault plane dipping vertically.
16			100	100	84			T2IOI		19.29	+		
17													
18													
19													
20													

- SMALL DISTURBED SAMPLE
- ⬆ LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- ▨ U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- ⬆ PIEZOMETER TIP
- STANDPIPE
- ⬆ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- ⊥ IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⬆ PACKER TEST

LOGGED **D.Y. Yip**
DATE **16/10/2008**
CHECKED **James Lu**
DATE **17/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/EDH27

SHEET **3** OF **3**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **D51**

E 831814.58

DATE FROM **13/10/2008** TO **15/10/2008**

N 824493.63

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

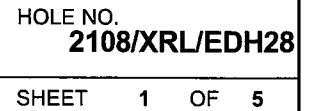
GROUND LEVEL **+12.83 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
20										20.00			
21			100	100	100			T2101		20.81	+		
22						1.1		T2101		22.35	+		
23		0.60m at 18:00	100	100	100			T2101		23.85	+		
15/10/2008									-11.02				
24													Hole completed at 23.85m.
25													
26													
27													
28													
29													
30													

- SMALL DISTURBED SAMPLE
- ◄ LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- STANDPIPE
- ↓ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- ⊥ IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⊥ PACKER TEST

LOGGED **D.Y. Yip**
DATE **16/10/2008**
CHECKED **James Lu**
DATE **17/10/2008**

REMARKS



CONTRACT NO. NEX/2108

GROUND LEVEL **+12.90 mPD**

● SMALL DISTURBED SAMPLE ▲ WATER SAMPLE ▲ LARGE DISTURBED SAMPLE ▲ PIEZOMETER TIP □ SPT LINER SAMPLE □ STANDPIPE ▨ U76 UNDISTURBED SAMPLE ▨ STANDARD PENETRATION TEST ■ U100 UNDISTURBED SAMPLE ▨ PERMEABILITY TEST ▨ IMPRESSION PACKER TEST ▨ MAZIER SAMPLE ▨ IN-SITU VANE SHEAR TEST ▨ PISTON SAMPLE ▨ PACKER TEST	LOGGED <u>D.Y. Yip</u> DATE <u>10/10/2008</u> CHECKED <u>James Lu</u> DATE <u>11/10/2008</u>	REMARKS 1. Packer tests were carried out from the depths of 4.00m to 10.00m, 10.00m to 16.00m, 16.00m to 22.00m, 22.00m to 28.00m, 28.00m to 34.00m, 34.00m to 40.00m and 40.00m to 48.55m. 2. Acoustic televiwer survey was carried out from the depth of 2.34m to 48.40m.
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GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/EDH28

SHEET **2** OF **5**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT Contract NEX/2108 Ground Investigation Works for Express Rail Link

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. GCE/2008/001/SI/R

MACHINE & NO. **D51**

E 831798.51

DATE FROM **03/10/2008** TO **09/10/2008**

N 824470.53

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.90 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
10										10.00			
11			100	86	59			T2IOI		11.02			
12		0.80m at 18:00				>20		T2IOI		12.42			
13		0.80m at 08:00	100	58	41	>20		T2IOI	+0.02	12.88		III	
14			100	74	33	15.2		T2IOI	-0.21	13.11		IV	
15			100	86	59			T2IOI		14.53		II	
16			100	100	67	10.0		T2IOI		16.08			
17			100	78	44	>20		T2IOI		17.58			
18						7.3		T2IOI		19.06			
19			100	95	87			T2IOI					
20													

From 12.04m to 12.52m : Chloritized and silicified granite with quartz veins.
At 12.40m : With a quartz-galena vein of maximum thickness 30mm dipping at 30° to 40°.
From 12.52m to 12.88m : Moderately strong, moderately decomposed.
At 12.62m : With a quartz-galena vein of maximum thickness 15mm dipping at 50° to 60°.
Weak to moderately weak, light greenish grey spotted light grey, pink and dark greenish grey, highly decomposed, fractured, fine grained GRANITE.

Strong, pink spotted dark greenish grey, light grey and white, locally mottled dark greenish grey, locally greenish grey, slightly decomposed, fine grained GRANITE.
Joints are very closely to closely spaced, locally extremely closely and widely spaced, smooth and rough planar, stepped and undulating, extremely narrow, calcite and chlorite infilled, locally iron oxide stained, dipping at 20° to 30°, 40° to 50° and 60° to 70°, locally 70° to 80° and 80° to 90°.

From 13.11m to 13.91m : Moderately strong, moderately decomposed.
From 15.21m to 15.42m : With an 80° to 90° joint.

From 17.10m to 17.39m : Chloritized and silicified granite.

- SMALL DISTURBED SAMPLE
- LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- STANDPIPE
- ↓ STANDARD PENETRATION TEST
- └ PERMEABILITY TEST
- II IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⋈ PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/10/2008**
CHECKED **James Lu**
DATE **11/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/EDH28

SHEET **3** OF **5**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **D51**

E 831798.51

DATE FROM **03/10/2008** TO **09/10/2008**

N 824470.53

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.90 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
20										20.00			
			100	77	70	10.3		T2IOI		20.57	+		From 20.19m to 20.49m : With 80° to 90° joints.
21						5.9		T2IOI			+		
			100	86	58			T2IOI		22.07	+		From 21.28m to 21.95m : Chloritized and silicified granite.
22											+		
23						13.3		T2IOI			+		From 22.87m to 23.36m : With an 80° to 90° joint.
		0.90m at 18:00	100	91	80	>20		T2IOI		23.55	+		
24		0.95m at 08:00				6.5		T2IOI			+		
			100	95	92			T2IOI		24.99	+		From 24.66m to 24.81m : With an 80° to 90° joint.
25											+		
26			100	99	93			T2IOI		26.51	+		
27								T2IOI			+		
28			100	100	88			T2IOI		28.05	+		
29								T2IOI			+		
			100	100	97			T2IOI		29.56	+		
30											+		

- SMALL DISTURBED SAMPLE
- LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- STANDPIPE
- ↓ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- ⊥ IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⊥ PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/10/2008**
CHECKED **James Lu**
DATE **11/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/EDH28

SHEET **4** OF **5**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT Contract NEX/2108 Ground Investigation Works for Express Rail Link

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. GCE/2008/001/SI/R

MACHINE & NO. **D51**

E 831798.51

DATE FROM **03/10/2008** TO **09/10/2008**

N 824470.53

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.90 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
30										30.00			
31			100	94	94	>20 5.0		T2101		31.02			
32			100	90	67			T2101		32.58			
33			100	96	80	>20 5.0		T2101		34.05			From 33.84m to 34.03m : With intense microfractures oriented randomly.
34			100	65	53			T2101		35.47			
35			100	81	72	13.6		T2101		36.97			From 36.21m to 37.00m : With 80° to 90° joints where incipient from 36.92m to 37.00m.
36			100	98	59			T2101		38.46			
37		0.90m at 18:00	100					T2101					
38		0.90m at 08:00	100					T2101					
39													
40										39.95			

- SMALL DISTURBED SAMPLE
- ↑ LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- ▨ U76 UNDISTURBED SAMPLE
- ▨ U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- ⬆ PIEZOMETER TIP
- STANDPIPE
- ⬇ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- ⊥ IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⬇ PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/10/2008**
CHECKED **James Lu**
DATE **11/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/EDH28

SHEET **5** OF **5**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT Contract NEX/2108 Ground Investigation Works for Express Rail Link

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. GCE/2008/001/SI/R

MACHINE & NO. **D51**

E 831798.51

DATE FROM **03/10/2008** TO **09/10/2008**

N 824470.53

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.90 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
40			100	81	63			T2101		40.00	+		
41			100	91	65	>20		T2101		41.39	+		
42			100	100	86	16.7		T2101		42.89	+		
43			100	95	83	7.1		T2101		44.41	+		
44			100	85	44	1.4		T2101		45.92	+		
45			100	41	29	>20		T2101		47.36	+		
46			100	41	29	>20		T2101		48.55	+		
47			100	41	29	>20		T2101		48.55	+		
48			100	41	29	>20		T2101		48.55	+		
49			100	41	29	>20		T2101		48.55	+		
50			100	41	29	>20		T2101		48.55	+		

From 41.52m to 42.00m : With intense quartz veins of thickness from <0.5mm up to 5mm dipping at 60° to 70° and 80° to 90°.
From 41.56m to 41.59m : Chloritized granite.

From 47.06m to 47.88m : Chloritized and silicified granite.
From 47.53m to 48.55m : With 80° to 90° joints where incipient from 47.53m to 47.75m.
From 47.96m to 48.31m : Chloritized and silicified granite.

Hole completed at 48.55m.

- SMALL DISTURBED SAMPLE
- LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- MAZIER SAMPLE
- PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- STANDPIPE
- ↓ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- ⊥ IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⊥ PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/10/2008**
CHECKED **James Lu**
DATE **11/10/2008**

REMARKS

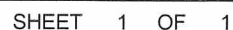
Stage 2 SI

		VIBRO (H.K.) LIMITED SITE INVESTIGATION DEPARTMENT				DRILLHOLE No. H-04B																																																																																																																																																																																																																																																																																																
		DRILLHOLE RECORD				SHEET 1 OF 1																																																																																																																																																																																																																																																																																																
PROJECT		Site Investigation of Ground Contamination for Kwai Chung Vent Building Area, Wing Yip Street				CONTRACT No.																																																																																																																																																																																																																																																																																																
METHOD		Hand Excavation		CO-ORDINATES		E 831789.37																																																																																																																																																																																																																																																																																																
MACHINE & No.		Nil				DATE																																																																																																																																																																																																																																																																																																
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				ORIENTATION		Vertical																																																																																																																																																																																																																																																																																																
<table border="1"> <thead> <tr> <th rowspan="2">Drilling Progress</th> <th rowspan="2">Casing Depth/Size</th> <th rowspan="2">Water Depth (m)</th> <th rowspan="2">Water Returns %</th> <th rowspan="2">Total core Recovery %</th> <th rowspan="2">Solid core Recovery %</th> <th rowspan="2">R.Q.D.</th> <th rowspan="2">Fracture Index</th> <th rowspan="2">F.I. Depths</th> <th rowspan="2">Test Depths</th> <th rowspan="2">Tests</th> <th colspan="2">Samples</th> <th rowspan="2">Reduced Level (mPD)</th> <th rowspan="2">Depth (m)</th> <th rowspan="2">Legend</th> <th rowspan="2">Grade</th> <th rowspan="2">Description</th> </tr> <tr> <th>No.</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>06/07/2010</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>+12.95</td> <td>0.00</td> <td></td> <td></td> <td>Concrete surface.</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>+12.85</td> <td>0.10</td> <td></td> <td></td> <td rowspan="4">Brownish grey, fine to coarse SAND with much angular to subangular fine to medium gravel sized moderately decomposed and slightly decomposed rock fragments. (FILL)</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>+12.65</td> <td>0.30</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>+12.47</td> <td>0.48</td> <td></td> <td></td> </tr> <tr> <td>06/07/2010</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>+12.30</td> <td>0.65</td> <td></td> <td></td> </tr> <tr> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>CONCRETE.</td> </tr> <tr> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Dark grey, sandy angular to subangular fine to medium GRAVEL sized moderately decomposed rock fragments and asphalt fragments. (FILL)</td> </tr> <tr> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Strong, pinkish grey, dappled pinkish brown, greenish grey, slightly decomposed medium grained GRANITE.</td> </tr> <tr> <td>4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Joints are closely to medium spaced, rough planar and rough stepped, very narrow to extremely narrow, chlorite coated, dipping 10° to 20° and 40° to 50°.</td> </tr> <tr> <td>5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>End of Investigation Hole at 0.65m</td> </tr> <tr> <td>6</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>7</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>8</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>9</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>10</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>								Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Returns %	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	F.I. Depths	Test Depths	Tests	Samples		Reduced Level (mPD)	Depth (m)	Legend	Grade	Description	No.	Type	06/07/2010													+12.95	0.00			Concrete surface.														+12.85	0.10			Brownish grey, fine to coarse SAND with much angular to subangular fine to medium gravel sized moderately decomposed and slightly decomposed rock fragments. (FILL)														+12.65	0.30																+12.47	0.48			06/07/2010													+12.30	0.65			1																	CONCRETE.	2																	Dark grey, sandy angular to subangular fine to medium GRAVEL sized moderately decomposed rock fragments and asphalt fragments. (FILL)	3																	Strong, pinkish grey, dappled pinkish brown, greenish grey, slightly decomposed medium grained GRANITE.	4																	Joints are closely to medium spaced, rough planar and rough stepped, very narrow to extremely narrow, chlorite coated, dipping 10° to 20° and 40° to 50°.	5																	End of Investigation Hole at 0.65m	6																		7																		8																		9																		10																	
Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Returns %	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index												F.I. Depths	Test Depths						Tests	Samples		Reduced Level (mPD)	Depth (m)	Legend	Grade	Description																																																																																																																																																																																																																																																																					
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1																	CONCRETE.																																																																																																																																																																																																																																																																																					
2																	Dark grey, sandy angular to subangular fine to medium GRAVEL sized moderately decomposed rock fragments and asphalt fragments. (FILL)																																																																																																																																																																																																																																																																																					
3																	Strong, pinkish grey, dappled pinkish brown, greenish grey, slightly decomposed medium grained GRANITE.																																																																																																																																																																																																																																																																																					
4																	Joints are closely to medium spaced, rough planar and rough stepped, very narrow to extremely narrow, chlorite coated, dipping 10° to 20° and 40° to 50°.																																																																																																																																																																																																																																																																																					
5																	End of Investigation Hole at 0.65m																																																																																																																																																																																																																																																																																					
6																																																																																																																																																																																																																																																																																																						
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10																																																																																																																																																																																																																																																																																																						
											LOGGED	T. C. Yip		REMARKS 1. An inspection pit was excavated to 0.65m. 2. Three environmental soil samples were collected at 0.20m.																																																																																																																																																																																																																																																																																								
											DATE	08/07/2010																																																																																																																																																																																																																																																																																										
											CHECKED	E. Leung																																																																																																																																																																																																																																																																																										
											DATE	09/07/2010																																																																																																																																																																																																																																																																																										

		VIBRO (H.K.) LIMITED SITE INVESTIGATION DEPARTMENT				DRILLHOLE No. H-05A			
		DRILLHOLE RECORD				SHEET 1 OF 1			
PROJECT		Site Investigation of Ground Contamination for Kwai Chung Vent Building Area, Wing Yip Street				CONTRACT No.		807	
METHOD		Hand Excavation		CO-ORDINATES		E 831785.77		WORKS ORDER No.	N/A
MACHINE & No.		Nil				N 824483.75		DATE	06/07/2010 to 06/07/2010
FLUSHING MEDIUM		NIL		GROUND LEVEL		+ 12.96 mPD		ORIENTATION	Vertical

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Returns %	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	F.I. Depths	Test Depths	Tests	Samples			Reduced Level (mPD)	Depth (m)	Legend	Grade	Description
											No.	Type	Depth					
06/07/2010														+12.96	0.00			Concrete surface.
														+12.86	0.10			Dark grey, fine to coarse SAND with much angular to subangular fine to coarse gravel sized moderately decomposed rock fragments, asphalt and refuse. (FILL)
06/07/2010														+12.19	0.80			Pinkish grey and brown, angular COBBLE (SDG) with some angular to subangular fine to coarse gravel sized highly decomposed and moderately decomposed rock fragments. (FILL)
1																		Strong, pinkish brown, dappled pinkish grey, slightly decomposed medium grained GRANITE.
2																		Joints are closely to medium spaced, locally very closely spaced, rough planar and rough stepped, very narrow to extremely narrow, iron and manganese stained, dipping 0° to 10°, 20° to 30° and 40° to 50°.
3																		End of Investigation Hole at 0.85m
4																		
5																		
6																		
7																		
8																		
9																		
10																		

	LOGGED	T. C. Yip	REMARKS 1. An inspection pit was excavated to 0.65m. 2. Three environmental soil samples were collected at 0.20m.
	DATE	08/07/2010	
	CHECKED	E. Leung	
	DATE	09/07/2010	



APPENDIX C

LABORATORY RESULTS AND STANDARD FORMS 3.2 and 3.4 – SOIL DATA SUMMARY AND COMPARISON TO RBRGS AND C_{SAT}

Soil Tesing Result Table

Parameters			BTEX						VOCs								PAHs														SVOCs		Metals										Petroleum Carbon Ranges																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
			Benzene	Ethylbenzene	Toluene	meta- & para-Xylene	ortho-Xylene	Xylenes (Total)	Acetone	Bromodichloromethane	2-Butanone	Chloroform	Methyl tert-Butyl Ether	Methylene Chloride	Styrene	Tetrachloroethene	Trichloroethene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b) & Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene	bis-(2-Ethylhexyl)phthalate	Hexachlorobenzene	Phenol	Cadmium	Copper	Lead	Nickel	Zinc	Mercury	Trivalent Chromium	Hexavalent Chromium	C6 - C8 Fraction	C9 - C16 Fraction	C17 - C35 Fraction	PCBs			Cyanide, free																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
Unit			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
LOR (Stage 2 SI)			0.2	0.5	0.5	1.0	0.5	1.5	50	0.04	5	0.04	0.5	5	0.50	0.04	0.04	0.5	0.5	0.5	0.5	0.5	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5.0	0.2/0.05***	0.5	0.2	1	1	1	1	0.2	1	1	5	200	500	0.1	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
LOR (Stage 1 SI)			0.5	0.5	0.5	1.0	0.5	1.5	5	0.5	5	0.5	5.0	5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5.0	0.2	0.5	0.2	1	1	1	1	0.2	1	1	5	200	500	0.1	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
RBRGs of Industrial			9.21	8240	10000*	--	--	1230	10000*	2.85	10000*	1.54	70.1	13.9	10000*	0.777	5.68	10000*	10000*	10000*	91.8	9.18	17.8	10000*	1140	9.18	10000*	10000*	91.8	453	10000*	10000*	91.8	0.582	10000*	653	10000*	2290	10000*	10000*	38.4	10000*	1960	10000*	10000*	10000*	0.748	10000*																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
Saturation Limit			336	138	235	--	--	150	***	1030	***	1100	2380	921	497	97.1	488	60.2	19.8	2.56	--	--	--	--	--	--	54.7	--	125	28	--	--	--	7260	--	--	--	--	--	--	--	--	--	1000	3000	5000	--	--																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
Sample Location		Sampling Depth (m BBC)	Date of Sampling																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
Stage 2 SI conducted in 2010																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
H04B	0.1 (i.e. 0.2m below road surface)	06-Jul-10	<0.2	<0.5	<0.5	<1.0	<0.5	<1.5	<50	<0.04	<5.0	<0.04	<0.5	<5	<0.50	<0.04	<0.04	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0	<0.2	<0.5	0.2	24	60	20	109	<0.2	5	<1	<5	310	1990	<0.1	<1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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Note:
* Since the elevated LOR in Hexachlorobenzene testing carried by ALS-HK will cause failure in determination the soil grade, testing carried out by ALS brisbane will be used for analysis instead.
^ Testing conducted by ALS Brisbane

*** 0.2mg/kg refer to the LOR in Hexachlorobenzene testing of ALS-HK while 0.05 mg/kg refer to that of ALS Brisbane
Elevated LOR by dilution due to matrix interference
BBC= Below Base of Existing Concrete

LOR= Level of Reporting
Underlined result indicates exceedance in saturation limit
Square hatched in black indicates exceedance in RBRG

Relative Percentage Difference

Parameters			BTEX						VOCs								PAHs																SVOCs				Metals								Petroleum Carbon Ranges				
			Benzene	Ethylbenzene	Toluene	meta- & para-Xylene	ortho-Xylene	Xylenes (Total)	Acetone	Bromodichloromethane	2-Butanone	Chloroform	Methyl tert-Butyl Ether	Methylene Chloride	Styrene	Tetrachloroethene	Trichloroethene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b) & Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene	bis-(2-Ethylhexyl)phthalate	Hexachlorobenzene	Hexachlorobenzene	Phenol	Cadmium	Copper	Lead	Nickel	Zinc	Mercury	Trivalent Chromium	Hexavalent Chromium	C6 - C8 Fraction	C9 - C16 Fraction	C17 - C35 Fraction	PCBs	Cyanide, free
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		
			LOR	0.2	0.5	0.5	1.0	0.5	1.5	50	0.04	5	0.04	0.5	5	0.5	0.04	0.04	0.5	0.5	0.5	0.5	0.5	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	0.2	0.2	0.5	0.2	1	1	1	1	0.2	1	1	5	200	500
Sample Location	Sampling Depth (m BBC)	Date of Sampling																																															
Stage 2 SI																																																	
H04B	0.2	6-Jul-2010	<0.2	<0.5	<0.5	<1.0	<0.5	<1.5	<50	<0.04	<5.0	<0.04	<0.5	<5	<0.50	<0.04	<0.04	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0	<0.2	<0.07	<0.5	0.2	24	60	20	109	<0.2	5	<1	<5	310	1990	<0.1	<1	
H04B (Duplicate)	0.2	6-Jul-2010	<0.2	<0.5	<0.5	<1.0	<0.5	<1.5	<50	<0.04	<5.0	<0.04	<0.5	<5	<0.50	<0.04	<0.04	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0	<0.2	<0.07	<0.5	<0.2	24	67	14	91	<0.2	5	<1	<5	310	1790	<0.1	<1	
RPD = [(Primary-Duplicate)]/(Mean of Results*100%)			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	0.0%	11.0%	35.3%	18.0%	NC	0.0%	NC	NC	0.0%	10.6%	NC	NC		

Note:
BBC= Below Base of Existing Concrete
NC= Not calculated, at least one result was ND
LOR= Level of Reporting
BOLD indicates detection

Parameters				BTEX						VOCs								PAHs														SVOCs			Metals										Petroleum Carbon Ranges								
				Benzene	Ethylbenzene	Toluene	meta- & para-Xylene	ortho-Xylene	Xylenes (Total)	Acetone	Bromodichloromethane	2-Butanone	Chloroform	Methyl tert-Butyl Ether	Methylene Chloride	Styrene	Tetrachloroethane	Trichloroethene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b) & Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene	bis-(2-Ethylhexyl)phthalate	Hexachlorobenzene	Phenol	Cadmium	Copper	Lead	Nickel	Zinc	Mercury	Trivalent Chromium	Hexavalent Chromium	C6 - C8 Fraction	C9 - C16 Fraction	C17 - C35 Fraction	PCBs	Cyanide, free				
Unit				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L						
LOR				5	5	5	10	5	15	500	5	50	5	5	50	5	5	5	2.0	2.0	2.0	2.0	2.00	1.00	2.00	1.0	2.0	2.0	2.0	2.00	2.0	2.0	2.0	2.0	20.0	4.0	2.0	0.2	1	1	1	10	0.5	20	20	20	500	500	0.20	10			
Sample Location			Sampling Depth (m bgs)	Date of Sampling		<5	<5	<5	<10	<5	<15	<500	<5	<50	<5	<5	<50	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5			
Equipment Blank				06-Jul-10		<5	<5	<5	<10	<5	<15	<500	<5	<50	<5	<5	<50	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		
Field Blank				06-Jul-10		<5	<5	<5	<10	<5	<15	<500	<5	<50	<5	<5	<50	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		
Trip Blank				06-Jul-10		<5	<5	<5	<10	<5	<15																																										

Note:
BBC= Below Base of Existing Concrete
LOR= Level of Reporting
UNDERLINED result indicate result not below LOR

Additional Soil Tesing Result Table

Parameters			bis-(2-Ethylhexyl)phthalate
Unit			mg/kg
LOR for Addition Samples			5.0
RBRGs of Industrial			91.8
Saturation Limit			--
Sample Location	Sampling Depth (m BBC)	Date of Sampling	
CS1-01	0.50	01-Feb-11	<5.0
CS1-02	0.50	01-Feb-11	<5.0
CS1-03	0.50	01-Feb-11	<5.0
CS1-04	0.50	01-Feb-11	<5.0

Note:

Elevated LOR by dilution due to matrix interference

BBC= Below Base of Existing Concrete

LOR= Level of Reporting

Underlined result indicates exceedance in saturation limit

Square hatched in black indicates exceedance in RBRG

-- Saturation limit exceeds the "celling limit" therefore the RBRG applies

Standard Form 3.2 – Soil Data Summary and Comparison to RBRGs and Csat

Chemical	Frequency of detection (x/y)	Range of Detected Concentration	Limit of Reporting (LOR in Phase 2 SI / LOR in Phase 1 SI)	Analytical Method	Relevant Land Use Categories	Lowest RBRG(s) (mg/kg)	Csat (mg/kg)	Maximum Detected Concentration Exceeds (check if applicable)	
								RBRG	Csat
BTEX									
Benzene	0/9	ND	0.2 / 0.5	USEPA 8260B	RBRGs of Industrial	9.21	336	NA	NA
Ethylbenzene	0/9	ND	0.5 / 0.5			8240	138	NA	NA
Toluene	0/9	ND	0.5 / 0.5			10000*	235	NA	NA
Xylenes (Total)	0/9	ND	1.5 / 1.5			1230	150	NA	NA
Volatile Organic Chemicals									
Acetone	0/9	ND	50 / 5	USEPA 8260B	RBRGs of Industrial	10000*	***	NA	NA
Bromodichloromethane	0/9	ND	0.04 / 0.5			2.85	1030	NA	NA
2-Butanone	0/9	ND	5 / 5			10000*	***	NA	NA
Chloroform	0/9	ND	0.04 / 0.5			1.54	1100	NA	NA
Methyl tert-Butyl Ether	0/9	ND	0.5 / 5.0			70.1	2380	NA	NA
Methylene Chloride	0/9	ND	5 / 5			13.9	921	NA	NA
Styrene	0/9	ND	0.50 / 0.5			10000*	497	NA	NA
Tetrachloroethene	0/9	ND	0.04 / 0.5			0.777	97.1	NA	NA
Trichloroethene	0/9	ND	0.04 / 0.5			5.68	488	NA	NA
Polycyclic Aromatic Hydrocarbons									
Acenaphthene	1/9	<5.0 [#]	0.5 / 0.5	USEPA 8270D	RBRGs of Industrial	10000*	60.2	NIL	NIL
Acenaphthylene	1/9	<5.0 [#]	0.5 / 0.5			10000*	19.8	NIL	NIL
Anthracene	1/9	<5.0 [#]	0.5 / 0.5			10000*	2.56	NIL	Yes
Benzo(a)anthracene	1/9	<5.0 [#]	0.5 / 0.5			91.8	NA	NIL	NA
Benzo(a)pyrene	1/9	<5.0 [#]	0.5 / 0.5			9.18	NA	NIL	NA
Benzo(b) & Benzo(k)fluoranthene	1/9	<10.0 [#]	1.0 / 1.0			17.8	NA	NIL	NA
Benzo(g,h,i)perylene	1/9	<5.0 [#]	0.5 / 0.5			10000*	NA	NIL	NA
Chrysene	1/9	<5.0 [#]	0.5 / 0.5			1140	NA	NIL	NA
Dibenzo(a,h)anthracene	1/9	<5.0 [#]	0.5 / 0.5			9.18	NA	NIL	NA
Fluoranthene	1/9	<5.0 [#]	0.5 / 0.5			10000*	NA	NIL	NA
Fluorene	1/9	<5.0 [#]	0.5 / 0.5			10000*	54.7	NIL	NIL
Indeno(1,2,3-cd)pyrene	1/9	<5.0 [#]	0.5 / 0.5			91.8	NA	NIL	NA
Naphthalene	1/9	<5.0 [#]	0.5 / 0.5			453	125	NIL	NIL
Phenanthrene	1/9	<5.0 [#]	0.5 / 0.5			10000*	28	NIL	NIL
Pyrene	1/9	<5.0 [#]	0.5 / 0.5			10000*	NA	NIL	NA
Semi-Volatile Organic Chemicals									
bis-(2-Ethylhexyl)phthalate	2/9	<50 [#] , 134	5.0 / 5.0	USEPA 8270D	RBRGs of Industrial	91.8	NA	Yes	NA
Hexachlorobenzene	4/9	<0.06 [#] , <0.07 [#]	0.05 / 0.2			0.582	NA	NIL	NA
Phenol	1/9	<5.0 [#]	0.5 / 0.5			10000*	7260	NIL	NIL
Metals									
Cadmium	4/9	0.2-1.5	0.2 / 0.2	USEPA 6020	RBRGs of Industrial	653	NA	NIL	NA
Copper	8/9	6-139	1 / 1			10000*	NA	NIL	NA
Lead	9/9	7-155	1 / 1			2290	NA	NIL	NA
Nickel	7/9	14-89	1 / 1			10000*	NA	NIL	NA
Zinc	9/9	91-1220	1 / 1			10000*	NA	NIL	NA
Mercury	1/9	0.3	0.2 / 0.2	APHA 3112B	RBRGs of Industrial	38.4	NA	NIL	NA
Trivalent Chromium	8/9	2-112	1 / 1	APHA 3500 Cr:B		10000*	NA	NIL	NA
Hexavalent Chromium	0/9	ND	1 / 1			1960	NA	NA	NA
Petroleum Carbon Ranges									
C6 - C8 Fraction	0/9	ND	5 / 5	USEPA 8015C	RBRGs of Industrial	10000*	1000	NA	NA
C9 - C16 Fraction	3/9	310-370	200 / 200			10000*	3000	NIL	NIL
C17 - C35 Fraction	5/9	730-7520	500 / 500			10000*	5000	NIL	Yes
Dioxins / PCBs									
PCBs	2/9	0.1-0.2	0.1 / 0.1	USEPA 8270D	RBRGs of Industrial	0.748	NA	NIL	NA
Other Inorganics Compounds									
Cyanide, free	1/9	1	1 / 1	APHA 4500 CN, C, N	RBRGs of Industrial	10000*	NA	NIL	NA

Note:

Elevated LOR by dilution due to Matrix Interference

* indicates a "ceiling limit" concentration

*** indicates that the Csat value exceeds the 'ceiling limit' therefore the RBRG applies

NIL= Maximum concentration detected is below respective RBRGs or solubility limit

ND = The concentration of the chemical is lower than the detection limit

NA= Not Applicable

Duplicate Samples are included in the summary.

Chemical	List Samples		Concentration (mg/kg)	Check if RBRG Exceeded	Check if Csat Exceeded	Approximate Size of Affected Area* (m ²)
	Sample Number	Sample Depth (m, BBC)				
BTEX						
Benzene	NA	NA	ND	NA	NA	NA
Ethylbenzene	NA	NA	ND	NA	NA	NA
Toluene	NA	NA	ND	NA	NA	NA
Xylenes(Total)	NA	NA	ND	NA	NA	NA
Volatile Organic Chemicals						
Acetone	NA	NA	ND	NA	NA	NA
Bromodichloromethane	NA	NA	ND	NA	NA	NA
2-Butanone	NA	NA	ND	NA	NA	NA
Chloroform	NA	NA	ND	NA	NA	NA
Methyl tert-Butyl Ether	NA	NA	ND	NA	NA	NA
Methylene Chloride	NA	NA	ND	NA	NA	NA
Styrene	NA	NA	ND	NA	NA	NA
Tetrachloroethene	NA	NA	ND	NA	NA	NA
Trichloroethene	NA	NA	ND	NA	NA	NA
Polyaromatic Hydrocarbons						
Acenaphthene	H06A	immediately below base of concrete (i.e. 0.2m below road surface)	<5.0 [#]	NIL	NIL	NA
Acenaphthylene			<5.0 [#]	NIL	NIL	NA
Anthracene			<5.0 [#]	NIL	Yes **	NA
Benzo(a)anthracene			<5.0 [#]	NIL	NA	NA
Benzo(a)pyrene			<5.0 [#]	NIL	NA	NA
Benzo(b) & Benzo(k)fluoranthene			<10.0 [#]	NIL	NA	NA
Benzo(g,h,i)perylene			<5.0 [#]	NIL	NA	NA
Chrysene			<5.0 [#]	NIL	NA	NA
Dibenzo(a,h)anthracene			<5.0 [#]	NIL	NA	NA
Fluoranthene			<5.0 [#]	NIL	NA	NA
Fluorene			<5.0 [#]	NIL	NIL	NA
Indeno(1,2,3-cd)pyrene			<5.0 [#]	NIL	NA	NA
Naphthalene			<5.0 [#]	NIL	NIL	NA
Phenanthrene			<5.0 [#]	NIL	NIL	NA
Pyrene			<5.0 [#]	NIL	NA	NA
Semi-Volatile Organic Chemicals						
bis-(2-Ethylhexyl)phthalate	H06A	immediately below base of concrete (i.e. 0.2m below road surface)	<50 [#]	NIL	NA	NA
	2108/XRL/EDH27 (H-02)	0.50	134	Yes	NA	25m ²
Hexachlorobenzene	H04B	0.1 (i.e. 0.2m below road surface)	<0.07 [#]	NIL	NA	NA
	H04B (Duplicate)	0.1 (i.e. 0.2m below road surface)	<0.07 [#]	NIL	NA	NA
	H05A	0.05 (i.e. 0.15m below road surface)	<0.06 [#]	NIL	NA	NA
	H06A	immediately below base of concrete (i.e. 0.2m below road surface)	<0.07 [#]	NIL	NA	NA
	H06A	immediately below base of concrete (i.e. 0.2m below road surface)	<5.0 [#]	NIL	NIL	NA
Metals						
Cadmium	H04B	0.1 (i.e. 0.2m below road surface)	0.2	NIL	NA	NA
	H05A	0.05 (i.e. 0.15m below road surface)	0.6	NIL	NA	NA
	H06A	immediately below base of concrete (i.e. 0.2m below road surface)	1.5	NIL	NA	NA
	2108/XRL/EDH27 (H-02)	0.50	0.3	NIL	NA	NA
Copper	H04B	0.1 (i.e. 0.2m below road surface)	24	NIL	NA	NA
	H04B (Duplicate)	0.1 (i.e. 0.2m below road surface)	24	NIL	NA	NA
	H05A	0.05 (i.e. 0.15m below road surface)	54	NIL	NA	NA
	H06A	immediately below base of concrete (i.e. 0.2m below road surface)	139	NIL	NA	NA
	2108/XRL/EDH27 (H-02)	0.50	46	NIL	NA	NA
	2108/XRL/EDH28 (H-03)	0.50	12	NIL	NA	NA
	2108/XRL/D329 (H-01)	1.50-1.85	6	NIL	NA	NA
	2108/XRL/D329 (H-01)	3.00-3.33	9	NIL	NA	NA

Chemical	List Samples		Concentration (mg/kg)	Check if RBRG Exceeded	Check if Csat Exceeded	Approximate Size of Affected Area* (m ²)
	Sample Number	Sample Depth (m, BBC)				
Lead	H04B	0.1 (i.e. 0.2m below road surface)	60	NIL	NA	NA
	H04B (Duplicate)	0.1 (i.e. 0.2m below road surface)	67	NIL	NA	NA
	H05A	0.05 (i.e. 0.15m below road surface)	108	NIL	NA	NA
	H06A	immediately below base of concrete (i.e. 0.2m below road surface)	155	NIL	NA	NA
	2108/XRL/EDH27 (H-02)	0.50	57	NIL	NA	NA
	2108/XRL/EDH28 (H-03)	0.50	59	NIL	NA	NA
	2108/XRL/D329 (H-01)	0.50-0.95	7	NIL	NA	NA
	2108/XRL/D329 (H-01)	1.50-1.85	143	NIL	NA	NA
	2108/XRL/D329 (H-01)	3.00-3.33	62	NIL	NA	NA
Nickel	H04B	0.1 (i.e. 0.2m below road surface)	20	NIL	NA	NA
	H04B (Duplicate)	0.1 (i.e. 0.2m below road surface)	14	NIL	NA	NA
	H05A	0.05 (i.e. 0.15m below road surface)	17	NIL	NA	NA
	H06A	immediately below base of concrete (i.e. 0.2m below road surface)	89	NIL	NA	NA
	2108/XRL/EDH27 (H-02)	0.50	27	NIL	NA	NA
	2108/XRL/EDH28 (H-03)	0.50	14	NIL	NA	NA
	2108/XRL/D329 (H-01)	1.50-1.85	16	NIL	NA	NA
Zinc	H04B	0.1 (i.e. 0.2m below road surface)	109	NIL	NA	NA
	H04B (Duplicate)	0.1 (i.e. 0.2m below road surface)	91	NIL	NA	NA
	H05A	0.05 (i.e. 0.15m below road surface)	163	NIL	NA	NA
	H06A	immediately below base of concrete (i.e. 0.2m below road surface)	795	NIL	NA	NA
	2108/XRL/EDH27 (H-02)	0.50	287	NIL	NA	NA
	2108/XRL/EDH28 (H-03)	0.50	124	NIL	NA	NA
	2108/XRL/D329 (H-01)	0.50-0.95	149	NIL	NA	NA
	2108/XRL/D329 (H-01)	1.50-1.85	158	NIL	NA	NA
	2108/XRL/D329 (H-01)	3.00-3.33	1220	NIL	NA	NA
Mercury	NA	NA	ND	NA	NA	NA
Trivalent Chromium	H04B	0.1 (i.e. 0.2m below road surface)	5	NIL	NA	NA
	H04B (Duplicate)	0.1 (i.e. 0.2m below road surface)	5	NIL	NA	NA
	H05A	0.05 (i.e. 0.15m below road surface)	7	NIL	NA	NA
	H06A	immediately below base of concrete (i.e. 0.2m below road surface)	112	NIL	NA	NA
	2108/XRL/EDH27 (H-02)	0.50	18	NIL	NA	NA
	2108/XRL/EDH28 (H-03)	0.50	4	NIL	NA	NA
	2108/XRL/D329 (H-01)	1.50-1.85	34	NIL	NA	NA
	2108/XRL/D329 (H-01)	3.00-3.33	2	NIL	NA	NA
Hexavalent Chromium	NA	NA	ND	NA	NA	NA
Petroleum Carbon Ranges						
C6 - C8 Fraction	NA	NA	ND	NA	NA	NA
C9 - C16 Fraction	H04B	0.1 (i.e. 0.2m below road surface)	310	NIL	NIL	NA
	H04B (Duplicate)	0.1 (i.e. 0.2m below road surface)	310	NIL	NIL	NA
	H06A	immediately below base of concrete (i.e. 0.2m below road surface)	370	NIL	NIL	NA
C17 - C35 Fraction	H04B	0.1 (i.e. 0.2m below road surface)	1990	NIL	NIL	NA
	H04B (Duplicate)	0.1 (i.e. 0.2m below road surface)	1790	NIL	NIL	NA
	H05A	0.05 (i.e. 0.15m below road surface)	730	NIL	NIL	NA
	H06A	immediately below base of concrete (i.e. 0.2m below road surface)	7520	NIL	Yes **	NA
	2108/XRL/EDH27 (H-02)	0.50	1950	NIL	NIL	NA
Dioxins / PCBs						
PCBs	2108/XRL/EDH28 (H-03)	0.50	0.2	NA	NA	NA
	2108/XRL/D329 (H-01)	0.50-0.95	0.1	NA	NA	NA
Other Inorganics Compounds						
Cyanide, free	2108/XRL/EDH28 (H-03)	0.50	1	NIL	NA	NA

Note:

Elevated LOR by dilution due to Matrix Interference

* Confirmatory tests would be carried out to further confirm size of affected area

** Soil sample recovered did not show unnatural colouration / notable odour

NA= Not Applicable

BBC= below base of concrete

NIL= Concentration detected is below respective RBRG or solubility limit

Laboratory Reports

Stage 1 SI

MTR CORPORATION
EXPRESS RAIL LINK (XRL)
CONTRACTOR'S SUBMISSION FORM (CSF)



Project Management - XRL Department
 4/F MTR Kam Tin Bldg., 23 Kam Ho Road, NT
 Tel : (852) 2208-3333 Direct Fax : (852) 2208-3283

FROM : GEOTECHNICS & CONCRETE ENGINEERING (H.K.) LTD. 6 KO SHAN ROAD, GROUND FLOOR, HUNG HOM, KOWLOON		TO : CONSTRUCTION MANAGER CONTRACT NEX/2108 MTR CORPORATION HONG KONG		CSF No. : NEX2108/SUB/587	
				FILE REF : _____	
				SIGNED : <i>P. P. John Fung</i>	
				DATE : 06 November 2008	
DOCUMENT TITLE	* N / R	DOCUMENT NO	SRF / ERF NO	CONTRACTOR'S COMMENTS	
Preliminary environmental lab test results for drillhole no. 2108/XRL/D329	N	GCE/NEX/2108/2008/S587			
REGISTRATION	INTERNAL DISTRIBUTION			EXTERNAL DISTRIBUTION	
Receipt date : _____					
Registration No : _____					

*

N = New Submission R = Re-submission

PIMS/PN/11-4/F9.A1

w/encl.

c.c. MTRCL by Fax No. 2208 3283 (Mr. Derek KWOK)

DKWOK@mtr.com.hk

SWL by Fax No. 2428 9922 (Mr. Benjamin SUN / Mr. Sam LAM)

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GCE Mr. S.L. HAU / Mr. Tom LO / Mr. Eric YEUNG

ALS Technichem (HK) Pty Ltd

ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES



CERTIFICATE OF ANALYSIS

Client	: MASS TRANSIT RAILWAY CORPORATION	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 9
Contact	: MR TOM LO	Contact	: Wong Wai Man, Alice	Work Order	: HK0816122
Address	: 6 KO SHAN ROAD, GROUND FLOOR, HUNG HOM, KOWLOON, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong	Amendment	: 1
E-mail	: tom@gce.com.hk	E-mail	: Alice.Wong@alsenviro.com		
Telephone	: +852 2365 9123	Telephone	: +852 2610 1044		
Facsimile	: +852 2765 8034	Facsimile	: +852 2610 2021		
Project	: MTR CORPORATION LIMITED CONTRACT NEX_2108 GROUND INVESTIGATION WORKS FOR EXPRESS RAIL LINK	Quote number	: ----	Date Samples Received	: 26-SEP-2008
Order number	: ----			Issue Date	: 04-NOV-2008
C-O-C number	: H004105			No. of samples received	: 2
Site	: ----			No. of samples analysed	: 2

General Comments

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release. When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client. The completion date of analysis is: 14-OCT-2008

Key: LOR = Limit of reporting; CAS Number = Chemistry Abstract Services number

Specific comments for Work Order: HK0816122

Sample(s) were received in an ambient condition.

Soil sample(s) analysed on an as received basis. Result(s) reported on a dry weight basis.

Sample(s) as received, digested by in-house method E-ASTM D3974-81 based on ASTM D3974-81, prior to the determination of metals.

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This document has been electronically signed by those names that appear on this report and are the authorised signatories. Electronic signing has been carried out in compliance with procedures specified in the Electronic Transactions Ordinance of Hong Kong, Chapter 553, Section 6.

Signatories

Anh Ngoc Huynh
Fung Lim Chee, Richard

Position

Senior Chemist
General Manager

Authorised results for

Organics
Inorganics

ALS Laboratory Group

Trading Name: **ALS Technichem (HK) Pty Ltd**

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A Campbell Brothers Limited Company



Analytical Results

Sub-Matrix: SEDIMENT

Client sample ID

2108/XRL/D329

2108/XRL/D329

(1.5-1.85)

(3.0-3.33)

Client sampling date / time

26-SEP-2008 13:45

26-SEP-2008 15:15

Compound	CAS Number	LOR	Unit	HK0816122-001	HK0816122-002
EA/ED: Physical and Aggregate Properties					
EA055: Moisture Content (dried @ 103° C)	---	0.1	%	10.5	11.4
ED/EK: Inorganic Nonmetallic Parameters					
EK025: Free Cyanide	----	1	mg/kg	<1	<1
EG: Metals and Major Cations					
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	<0.2
EG020: Copper	7440-50-8	1	mg/kg	6	9
EG020: Lead	7439-92-1	1	mg/kg	143	62
EG020: Mercury	7439-97-6	0.2	mg/kg	<0.2	<0.2
EG020: Nickel	7440-02-0	1	mg/kg	16	<1
EG020: Zinc	7440-66-6	1	mg/kg	158	1220
EG049: Trivalent Chromium	16065-83-1	1	mg/kg	34	2
EG3060: Hexavalent Chromium	18540-29-9	1	mg/kg	<1	<1
EP-071HK: Total Petroleum Hydrocarbons (TPH)					
C9 - C16 Fraction	---	200	mg/kg	<200	<200
C17 - C35 Fraction	---	500	mg/kg	<500	<500
C6 - C8 Fraction	----	5	mg/kg	<5	<5
EP-074A: Monocyclic Aromatic Hydrocarbons (MAH)					
Benzene	71-43-2	0.5	mg/kg	<0.5	<0.5
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	1.0	mg/kg	<1.0	<1.0
Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5
EP-074B: Oxygenated Compounds					
2-Propanone (Acetone)	67-64-1	5	mg/kg	<5	<5
2-Butanone (MEK)	78-93-3	5	mg/kg	<5	<5
EP-074E: Halogenated Aliphatics					
Methylene chloride	75-09-2	5	mg/kg	<5	<5
Trichloroethene	79-01-6	0.5	mg/kg	<0.5	<0.5
Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	<0.5
EP-074G: Trihalomethanes (THM)					
Chloroform	67-66-3	0.5	mg/kg	<0.5	<0.5
Bromodichloromethane	75-27-4	0.5	mg/kg	<0.5	<0.5
EP-074L: Methyl-tert-butyl Ether					
Methyl tert-Butyl Ether (MTBE)	1634-04-4	5.0	mg/kg	<5.0	<5.0



Sub-Matrix: SEDIMENT				Client sample ID	2108/XRL/D329 (1.5-1.85) 26-SEP-2008 13:45 HK0816122-001	2108/XRL/D329 (3.0-3.33) 26-SEP-2008 15:15 HK0816122-002			
				Client sampling date / time					
Compound	CAS Number	LOR	Unit						
EP-075A: Phenols									
Phenol	108-95-2	0.5	mg/kg		<0.5	<0.5			
EP-075B: Polyaromatic Hydrocarbons (PAHs)									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5			
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5			
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5			
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5			
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5			
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5			
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5			
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5			
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5			
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5			
Benzo(b) & Benzo(k)fluoranthene	205-99-2 207-08-9	1.0	mg/kg		<1.0	<1.0			
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5			
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5			
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5			
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5			
EP-075C: Phthalate Esters									
Bis(2-ethylhexyl)phthalate	117-81-7	5.0	mg/kg		<5.0	<5.0			
EP-075G: Chlorinated Hydrocarbons									
Hexachlorobenzene (HCB)	118-74-1	0.2	mg/kg		<0.2	<0.2			
EP-066: Polychlorinated Biphenyls									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	<0.1			
EP-080S: TPH(Volatile)/BTEX Surrogate									
Dibromofluoromethane	1868-53-7	0.1	%		85.0	86.3			Surrogate control limits listed at end of this report.
Toluene-D8	2037-26-5	0.1	%		97.0	96.5			
4-Bromofluorobenzene	460-00-4	0.1	%		103	103			
EP-074S: VOC Surrogates									
Dibromofluoromethane	1868-53-7	0.1	%		85.0	86.3			Surrogate control limits listed at end of this report.
Toluene-D8	2037-26-5	0.1	%		97.0	96.5			
4-Bromofluorobenzene	460-00-4	0.1	%		103	103			
EP-075S: Acid Extractable Surrogates									
2-Fluorophenol	367-12-4	0.1	%		45.5	51.3			Surrogate control limits listed at end of this report.
Phenol-d6	13127-88-3	0.1	%		44.2	52.8			
2,4,6-Tribromophenol	118-79-6	0.1	%		41.1	44.0			
EP-075T: Base/Neutral Extractable Surrogates									
Surrogate control limits listed at end of this report.									

Page Number : 4 of 9
 Client : MASS TRANSIT RAILWAY CORPORATION
 Work Order : HK0816122, Amendment 1



Sub-Matrix: SEDIMENT				Client sample ID	2108/XRL/D329 (1.5-1.85)	2108/XRL/D329 (3.0-3.33)			
				Client sampling date / time	26-SEP-2008 13:45	26-SEP-2008 15:15			
					HK0816122-001	HK0816122-002			
Compound	CAS Number	LOR	Unit						
EP-075T: Base/Neutral Extractable Surrogates - Continued				Surrogate control limits listed at end of this report.					
Nitrobenzene -d5	4165-60-0	0.1	%	50.7	61.1				
2-Fluorobiphenyl	321-60-8	0.1	%	43.8	48.0				
4-Terphenyl-d14	1718-51-0	0.1	%	40.3	52.8				
EP-066S: PCB Surrogate				Surrogate control limits listed at end of this report.					
Tetrachlorometaxylene	877-09-8	0.1	%	100	104				
Dibutylchlorodate	1770-80-5	0.1	%	105	99.6				



Laboratory Duplicate (DUP) Report

Matrix: SOIL		Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 775082)								
HK0815962-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	24.7	25.0	1.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 781255)								
HK0815703-001	Anonymous	EK025: Free Cyanide	---	1	mg/kg	<1	<1	0.0
EG: Metals and Major Cations (QC Lot: 775789)								
HK0816122-002	2108/XRL/D329 (3.0-3.33)	EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Mercury	7439-97-6	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Copper	7440-50-8	1	mg/kg	9	11	19.8
		EG020: Lead	7439-92-1	1	mg/kg	62	69	10.1
		EG020: Nickel	7440-02-0	1	mg/kg	<1	<1	0.0
		EG020: Zinc	7440-66-6	1	mg/kg	1220	1320	8.3
EG: Metals and Major Cations (QC Lot: 775790)								
HK0816122-002	2108/XRL/D329 (3.0-3.33)	EG3060: Hexavalent Chromium	18540-29-9	1	mg/kg	<1	<1	0.0
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 775478)								
HK0816122-001	2108/XRL/D329 (1.5-1.85)	C6 - C8 Fraction	---	5	mg/kg	<5	<5	0.0
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 775479)								
HK0816122-001	2108/XRL/D329 (1.5-1.85)	C9 - C16 Fraction	----	200	mg/kg	<200	<200	0.0
		C17 - C35 Fraction	---	500	mg/kg	<500	<500	0.0
EP-074A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 773317)								
HK0815703-001	Anonymous	Benzene	71-43-2	0.5	mg/kg	<0.5	<0.5	0.0
		Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0
		Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0
		Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	0.0
		ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0
		meta- & para-Xylene	108-38-3	1.0	mg/kg	<1.0	<1.0	0.0
			106-42-3					
EP-074B: Oxygenated Compounds (QC Lot: 773317)								
HK0815703-001	Anonymous	2-Propanone (Acetone)	67-64-1	5	mg/kg	<5	<5	0.0
		2-Butanone (MEK)	78-93-3	5	mg/kg	<5	<5	0.0
EP-074E: Halogenated Aliphatics (QC Lot: 773317)								
HK0815703-001	Anonymous	Trichloroethene	79-01-6	0.5	mg/kg	<0.5	<0.5	0.0
		Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	<0.5	0.0
		Methylene chloride	75-09-2	5	mg/kg	<5	<5	0.0
EP-074G: Trihalomethanes (THM) (QC Lot: 773317)								
HK0815703-001	Anonymous	Chloroform	67-66-3	0.5	mg/kg	<0.5	<0.5	0.0
		Bromodichloromethane	75-27-4	0.5	mg/kg	<0.5	<0.5	0.0
EP-074L: Methyl-tert-butyl Ether (QC Lot: 773317)								
HK0815703-001	Anonymous	Methyl tert-Butyl Ether (MTBE)	1634-04-4	5.0	mg/kg	<5.0	<5.0	0.0



Matrix: SOIL					Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EP-075A: Phenols (QC Lot: 773321)								
HK0815703-001	Anonymous	Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.0
EP-075B: Polyaromatic Hydrocarbons (PAHs) (QC Lot: 773321)								
HK0815703-001	Anonymous	Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0
		Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0
		Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0
		Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0
		Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0
		Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0
		Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0
		Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0
		Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0
		Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0
		Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0
		Indeno(1,2,3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0
		Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0
		Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0
		Benzo(b) & Benzo(k)fluoranthene	205-99-2 207-08-9	1.0	mg/kg	<1.0	<1.0	0.0
EP-075C: Phthalate Esters (QC Lot: 773321)								
HK0815703-001	Anonymous	Bis(2-ethylhexyl)phthalate	117-81-7	5.0	mg/kg	<5.0	<5.0	0.0
EP-075G: Chlorinated Hydrocarbons (QC Lot: 773321)								
HK0815703-001	Anonymous	Hexachlorobenzene (HCB)	118-74-1	0.2	mg/kg	<0.2	<0.2	0.0
EP-066: Polychlorinated Biphenyls (QC Lot: 773320)								
HK0815703-001	Anonymous	Total Polychlorinated biphenyls	---	0.1	mg/kg	<0.1	<0.1	0.0

Method Blank (MB), Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report

Matrix: SOIL		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentratio n	LCS	DCS	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 781255)											
EK025: Free Cyanide	---	1	mg/kg	<1	---	---	---	---	---	---	---
				---	9.48 mg/kg	101	---	85	115	---	---
EG: Metals and Major Cations (QC Lot: 775789)											
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	90.2	---	85	115	----	----
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	93.0	---	85	115	----	----
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	94.7	----	85	115	----	----
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	97.5	---	85	115	----	----
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	94.4	---	85	115	----	----
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	88.4	---	85	115	----	----



Matrix: SOIL		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					n	LCS	DCS	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 775790)											
EG3060: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<1	2.5 mg/kg	93.7	---	85	115	---	---
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 775478)											
C6 - C8 Fraction	---	5	mg/kg	<5	3 mg/kg	102	---	63	135	---	---
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 775479)											
C9 - C16 Fraction	---	200	mg/kg	<200	31 mg/kg	106	---	45	122	---	---
C17 - C35 Fraction	---	500	mg/kg	<500	75 mg/kg	# 114	---	50	111	---	---
EP-074A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 773317)											
Benzene	71-43-2	0.5	mg/kg	<0.5	0.5 mg/kg	114	---	57	144	---	---
Toluene	108-88-3	0.5	mg/kg	<0.5	0.5 mg/kg	115	---	66	128	---	---
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	0.5 mg/kg	112	---	76	134	---	---
meta- & para-Xylene	108-38-3 106-42-3	1.0	mg/kg	<1.0	1.0 mg/kg	108	---	69	142	---	---
Styrene	100-42-5	0.5	mg/kg	<0.5	0.5 mg/kg	104	---	69	126	---	---
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	0.5 mg/kg	109	---	72	139	---	---
EP-074B: Oxygenated Compounds (QC Lot: 773317)											
2-Butanone (MEK)	78-93-3	5.0	mg/kg	---	5.0 mg/kg	109	---	16	138	---	---
				<5	---	---	---	---	---	---	---
EP-074E: Halogenated Aliphatics (QC Lot: 773317)											
Trichloroethene	79-01-6	0.5	mg/kg	<0.5	0.5 mg/kg	109	---	65	134	---	---
Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	0.5 mg/kg	128	---	74	128	---	---
EP-074G: Trihalomethanes (THM) (QC Lot: 773317)											
Chloroform	67-66-3	0.5	mg/kg	<0.5	0.5 mg/kg	95.8	---	59	145	---	---
Bromodichloromethane	75-27-4	0.5	mg/kg	<0.5	0.5 mg/kg	96.1	---	59	142	---	---
EP-075A: Phenols (QC Lot: 773321)											
Phenol	108-95-2	0.1	mg/kg	<0.1	0.25 mg/kg	76.7	---	49	103	---	---
EP-075B: Polyaromatic Hydrocarbons (PAHs) (QC Lot: 773321)											
Naphthalene	91-20-3	0.1	mg/kg	<0.1	0.25 mg/kg	67.5	---	61	101	---	---
Acenaphthylene	208-96-8	0.1	mg/kg	<0.1	0.25 mg/kg	64.1	---	56	104	---	---
Acenaphthene	83-32-9	0.1	mg/kg	<0.1	0.25 mg/kg	72.2	---	63	104	---	---
Fluorene	86-73-7	0.1	mg/kg	<0.1	0.25 mg/kg	72.9	---	65	106	---	---
Phenanthrene	85-01-8	0.1	mg/kg	<0.1	0.25 mg/kg	70.0	---	66	103	---	---
Anthracene	120-12-7	0.1	mg/kg	<0.1	0.25 mg/kg	# 65.9	---	66	98	---	---
Fluoranthene	206-44-0	0.1	mg/kg	<0.1	0.25 mg/kg	# 68.4	---	69	106	---	---
Pyrene	129-00-0	0.1	mg/kg	<0.1	0.25 mg/kg	# 67.6	---	68	106	---	---
Benz(a)anthracene	56-55-3	0.1	mg/kg	<0.1	0.25 mg/kg	66.8	---	57	109	---	---
Chrysene	218-01-9	0.1	mg/kg	<0.1	0.25 mg/kg	67.2	---	66	109	---	---
Benzo(b) & Benzo(k)fluoranthene	205-99-2 207-08-9	0.2	mg/kg	<0.2	0.50 mg/kg	81.4	---	72	104	---	---
Benzo(a)pyrene	50-32-8	0.1	mg/kg	<0.1	0.25 mg/kg	66.7	---	60	104	---	---



Matrix: SOIL		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
						LCS	DCS	Low	High	Value	Control Limit
EP-075B: Polyaromatic Hydrocarbons (PAHs) (QC Lot: 773321) - Continued											
Indeno(1.2.3.cd)pyrene	193-39-5	0.1	mg/kg	<0.1	0.25 mg/kg	84.8	---	63	111	---	---
Dibenz(a,h)anthracene	53-70-3	0.1	mg/kg	<0.1	0.25 mg/kg	85.2	---	64	111	---	---
Benzo(g,h,i)perylene	191-24-2	0.1	mg/kg	<0.1	0.25 mg/kg	81.0	---	68	112	---	---
EP-075G: Chlorinated Hydrocarbons (QC Lot: 773321)											
Hexachlorobenzene (HCB)	118-74-1	0.2	mg/kg	<0.2	0.25 mg/kg	75.4	---	68	109	---	---
EP-066: Polychlorinated Biphenyls (QC Lot: 773320)											
Total Polychlorinated biphenyls	---	0.1	mg/kg	<0.1	0.5 mg/kg	126	---	56	141	---	---

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

Matrix: SOIL				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number		MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 775789)										
HK0816122-001	2108/XRL/D329 (1.5-1.85)	EG020: Cadmium	7440-43-9	5 mg/kg	91.9	---	75	125	---	---
		EG020: Copper	7440-50-8	5 mg/kg	82.2	---	75	125	---	---
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined	---	75	125	---	---
		EG020: Mercury	7439-97-6	0.1 mg/kg	94.6	---	75	125	---	---
		EG020: Nickel	7440-02-0	5 mg/kg	86.7	---	75	125	---	---
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	---	75	125	---	---
EG: Metals and Major Cations (QC Lot: 775790)										
HK0816122-001	2108/XRL/D329 (1.5-1.85)	EG3060: Hexavalent Chromium	18540-29-9	2.5 mg/kg	108	---	75	125	---	---
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 775478)										
HK0816122-002	2108/XRL/D329 (3.0-3.33)	C6 - C8 Fraction	---	3 mg/kg	116	---	50	130	---	---
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 775479)										
HK0816122-002	2108/XRL/D329 (3.0-3.33)	C9 - C16 Fraction	---	31 mg/kg	76.8	---	50	130	---	---
		C17 - C35 Fraction	---	75 mg/kg	84.4	---	50	130	---	---

Surrogate Control Limits

Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP-080S: TPH(Volatile)/BTEX Surrogate			
Dibromofluoromethane	1868-53-7	80	120
Toluene-D8	2037-26-5	81	117



Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP-080S: TPH(Volatile)/BTX Surrogate - Continued			
4-Bromofluorobenzene	460-00-4	74	121
EP-074S: VOC Surrogates			
Dibromofluoromethane	1868-53-7	80	120
Toluene-D8	2037-26-5	81	117
4-Bromofluorobenzene	460-00-4	74	121
EP-075S: Acid Extractable Surrogates			
2-Fluorophenol	367-12-4	25	121
Phenol-d6	13127-88-3	24	113
2,4,6-Tribromophenol	118-79-6	20	122
EP-075T: Base/Neutral Extractable Surrogates			
Nitrobenzene -d5	4165-60-0	23	120
2-Fluorobiphenyl	321-60-8	30	115
4-Terphenyl-d14	1718-51-0	20	137
EP-066S: PCB Surrogate			
Tetrachlorometaxylene	877-09-8	50	130
Dibutylchlorodate	1770-80-5	50	130

MTR CORPORATION
EXPRESS RAIL LINK (XRL)
CONTRACTOR'S SUBMISSION FORM (CSF)



Project Management - XRL Department
 4/F MTR Kam Tin Bldg., 23 Kam Ho Road, NT
 Tel : (852) 2208-3333 Direct Fax : (852) 2208-3283

FROM : GEOTECHNICS & CONCRETE ENGINEERING (H.K.) LTD. 6 KO SHAN ROAD, GROUND FLOOR, HUNG HOM, KOWLOON		TO : CONSTRUCTION MANAGER CONTRACT NEX/2108 MTR CORPORATION HONG KONG		CSF No. : NEX2108/SUB/425 FILE REF : SIGNED : <i>John Fung</i> DATE : 15 October 2008	
DOCUMENT TITLE	* N / R	DOCUMENT NO	SRF / ERF NO	CONTRACTOR'S COMMENTS	
Preliminary environmental lab test results for drillhole no. 2108/XRL/D329	N	GCE/NEX/2108/2008/S425			
REGISTRATION	INTERNAL DISTRIBUTION			EXTERNAL DISTRIBUTION	
Receipt date :					
Registration No :					

*

N = New Submission R = Re-submission

PIMS/PN/11-4/F9.A1

w/encl.

c.c. MTRCL by Fax No. 2208 3283 (Mr. Derek KWOK)

SWL by Fax No. 2428 9922 (Mr. Benjamin SUN / Mr. Sam LAM)

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ALS Technichem (HK) Pty Ltd

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES



CERTIFICATE OF ANALYSIS

Client	: MASS TRANSIT RAILWAY CORPORATION	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 9
Contact	: MR TOM LO	Contact	: Wong Wai Man, Alice	Work Order	: HK0815703
Address	: 6 KO SHAN ROAD, GROUND FLOOR, HUNG HOM, KOWLOON, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: tom@gce.com.hk	E-mail	: Alice.Wong@alsenviro.com		
Telephone	: +852 2365 9123	Telephone	: +852 2610 1044		
Facsimile	: +852 2765 8034	Facsimile	: +852 2610 2021		
Project	: MTR CORPORATION LIMITED CONTRACT NEX_2108 GROUND INVESTIGATION WORKS FOR EXPRESS RAIL LINK	Quote number	: ----	Date Samples Received	: 25-SEP-2008
Order number	: ----			Issue Date	: 14-OCT-2008
C-O-C number	: H004104			No. of samples received	: 1
Site	: ----			No. of samples analysed	: 1

General Comments

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release. When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client. The completion date of analysis is: 14-OCT-2008

Key: LOR = Limit of reporting; CAS Number = Chemistry Abstract Services number

Specific comments for Work Order: HK0815703

Sample(s) were received in an ambient condition.

Soil sample(s) analysed on an as received basis. Result(s) reported on a dry weight basis.

Sample(s) as received, digested by in-house method E-ASTM D3974-81 based on ASTM D3974-81, prior to the determination of metals.

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This document has been electronically signed by those names that appear on this report and are the authorised signatories. Electronic signing has been carried out in compliance with procedures specified in the Electronic Transactions Ordinance of Hong Kong, Chapter 553, Section 6.

Signatories	Position	Authorised results for
Anh Ngoc Huynh	Senior Chemist	Organics
Fung Lim Chee, Richard	General Manager	Inorganics

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A Campbell Brothers Limited Company



Analytical Results

Sub-Matrix: SEDIMENT		Client sample ID		2108/XRL/D329					
				(0.5M-0.95M)					
		Client sampling date / time		25-SEP-2008 13:15					
				HK0815703-001					
Compound	CAS Number	LOR	Unit						
EA/ED: Physical and Aggregate Properties									
EA055: Moisture Content (dried @ 103° C)	----	0.1	%	11.9					
ED/EK: Inorganic Nonmetallic Parameters									
EK025: Free Cyanide	----	1	mg/kg	<1					
EG: Metals and Major Cations									
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2					
EG020: Copper	7440-50-8	1	mg/kg	<1					
EG020: Lead	7439-92-1	1	mg/kg	7					
EG020: Mercury	7439-97-6	0.2	mg/kg	<0.2					
EG020: Nickel	7440-02-0	1	mg/kg	<1					
EG020: Zinc	7440-66-6	1	mg/kg	149					
EG049: Trivalent Chromium	16065-83-1	1	mg/kg	<1					
EG3060: Hexavalent Chromium	18540-29-9	1	mg/kg	<1					
EP-071HK: Total Petroleum Hydrocarbons (TPH)									
C9 - C16 Fraction	----	200	mg/kg	<200					
C17 - C35 Fraction	----	500	mg/kg	<500					
C6 - C8 Fraction	----	5	mg/kg	<5					
EP-074A: Monocyclic Aromatic Hydrocarbons (MAH)									
Benzene	71-43-2	0.5	mg/kg	<0.5					
Toluene	108-88-3	0.5	mg/kg	<0.5					
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5					
meta- & para-Xylene	108-38-3 106-42-3	1.0	mg/kg	<1.0					
Styrene	100-42-5	0.5	mg/kg	<0.5					
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5					
EP-074B: Oxygenated Compounds									
2-Propanone (Acetone)	67-64-1	5	mg/kg	<5					
2-Butanone (MEK)	78-93-3	5	mg/kg	<5					
EP-074E: Halogenated Aliphatics									
Methylene chloride	75-09-2	5	mg/kg	<5					
Trichloroethene	79-01-6	0.5	mg/kg	<0.5					
Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5					
EP-074G: Trihalomethanes (THM)									
Chloroform	67-66-3	0.5	mg/kg	<0.5					
Bromodichloromethane	75-27-4	0.5	mg/kg	<0.5					
EP-074L: Methyl-tert-butyl Ether									
Methyl tert-Butyl Ether (MTBE)	1634-04-4	5.0	mg/kg	<5.0					



Sub-Matrix: SEDIMENT

Client sample ID : 2108/XRL/D329
 (0.5M-0.95M)

Client sampling date / time : 25-SEP-2008 13:15

Compound CAS Number LOR Unit HK0815703-001

EP-075A: Phenols

Compound	CAS Number	LOR	Unit	HK0815703-001
Phenol	108-95-2	0.5	mg/kg	<0.5

EP-075B: Polyaromatic Hydrocarbons (PAHs)

Naphthalene	91-20-3	0.5	mg/kg	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5
Benzo(b) & Benzo(k)fluoranthene	205-99-2 207-08-9	1.0	mg/kg	<1.0
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5

EP-075C: Phthalate Esters

Bis(2-ethylhexyl)phthalate	117-81-7	5.0	mg/kg	<5.0
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EP-075G: Chlorinated Hydrocarbons

Hexachlorobenzene (HCB)	118-74-1	0.2	mg/kg	<0.2
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EP-066: Polychlorinated Biphenyls

Total Polychlorinated biphenyls	----	1.0	mg/kg	<1.0
---------------------------------	------	-----	-------	------

EP-080S: TPH(Volatile)/BTEX Surrogate

Dibromofluoromethane	1868-53-7	0.1	%	82.6
Toluene-D8	2037-26-5	0.1	%	97.1
4-Bromofluorobenzene	460-00-4	0.1	%	103

Surrogate control limits listed at end of this report.

EP-074S: VOC Surrogates

Dibromofluoromethane	1868-53-7	0.1	%	82.6
Toluene-D8	2037-26-5	0.1	%	97.1
4-Bromofluorobenzene	460-00-4	0.1	%	103

Surrogate control limits listed at end of this report.

EP-075S: Acid Extractable Surrogates

2-Fluorophenol	367-12-4	0.1	%	59.8
Phenol-d6	13127-88-3	0.1	%	53.3
2,4,6-Tribromophenol	118-79-6	0.1	%	51.9

Surrogate control limits listed at end of this report.

EP-075T: Base/Neutral Extractable Surrogates

Surrogate control limits listed at end of this report.

Page Number : 4 of 9
Client : MASS TRANSIT RAILWAY CORPORATION
Work Order : HK0815703



Sub-Matrix: SEDIMENT

Client sample ID

2108/XRL/D329
(0.5M-0.95M)

Client sampling date / time

25-SEP-2008 13:15

Compound CAS Number LOR Unit HK0815703-001

EP-075T: Base/Neutral Extractable Surrogates - Continued

Surrogate control limits listed at end of this report.

Nitrobenzene -d5	4165-60-0	0.1	%	61.7
2-Fluorobiphenyl	321-60-8	0.1	%	49.0
4-Terphenyl-d14	1718-51-0	0.1	%	57.6

EP-066S: PCB Surrogate

Surrogate control limits listed at end of this report.

Tetrachlorometaxylene	877-09-8	0.1	%	105
Dibutylchlorodate	1770-80-5	0.1	%	89.9



Laboratory Duplicate (DUP) Report

Matrix: SOIL				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 771654)								
HK0815369-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	---	0.1	%	17.9	17.8	0.9
HK0815698-002	Anonymous	EA055: Moisture Content (dried @ 103°C)	---	0.1	%	18.8	18.2	3.6
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 781255)								
HK0815703-001	2108/XRL/D329 (0.5M-0.95M)	EK025: Free Cyanide	---	1	mg/kg	<1	<1	0.0
EG: Metals and Major Cations (QC Lot: 773206)								
HK0815369-002	Anonymous	EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	<0.05	0.0
		EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Copper	7440-50-8	1	mg/kg	7	6	0.0
		EG020: Lead	7439-92-1	1	mg/kg	13	13	0.0
		EG020: Nickel	7440-02-0	1	mg/kg	11	10	0.0
		EG020: Zinc	7440-66-6	1	mg/kg	155	144	7.9
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 773318)								
HK0815703-001	2108/XRL/D329 (0.5M-0.95M)	C6 - C8 Fraction	---	5	mg/kg	<5	<5	0.0
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 773322)								
HK0815703-001	2108/XRL/D329 (0.5M-0.95M)	C9 - C16 Fraction	---	200	mg/kg	<200	<200	0.0
		C17 - C35 Fraction	----	500	mg/kg	<500	<500	0.0
EP-074A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 773317)								
HK0815703-001	2108/XRL/D329 (0.5M-0.95M)	Benzene	71-43-2	0.5	mg/kg	<0.5	<0.5	0.0
		Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0
		Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0
		Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	0.0
		ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0
		meta- & para-Xylene	108-38-3	1.0	mg/kg	<1.0	<1.0	0.0
		106-42-3						
EP-074B: Oxygenated Compounds (QC Lot: 773317)								
HK0815703-001	2108/XRL/D329 (0.5M-0.95M)	2-Propanone (Acetone)	67-64-1	5	mg/kg	<5	<5	0.0
		2-Butanone (MEK)	78-93-3	5	mg/kg	<5	<5	0.0
EP-074E: Halogenated Aliphatics (QC Lot: 773317)								
HK0815703-001	2108/XRL/D329 (0.5M-0.95M)	Trichloroethene	79-01-6	0.5	mg/kg	<0.5	<0.5	0.0
		Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	<0.5	0.0
		Methylene chloride	75-09-2	5	mg/kg	<5	<5	0.0
EP-074G: Trihalomethanes (THM) (QC Lot: 773317)								



Matrix: SOIL					Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EP-074G: Trihalomethanes (THM) (QC Lot: 773317) - Continued								
HK0815703-001	2108/XRL/D329 (0.5M-0.95M)	Chloroform	67-66-3	0.5	mg/kg	<0.5	<0.5	0.0
		Bromodichloromethane	75-27-4	0.5	mg/kg	<0.5	<0.5	0.0
EP-074L: Methyl-tert-butyl Ether (QC Lot: 773317)								
HK0815703-001	2108/XRL/D329 (0.5M-0.95M)	Methyl tert-Butyl Ether (MTBE)	1634-04-4	5.0	mg/kg	<5.0	<5.0	0.0
EP-075A: Phenols (QC Lot: 773321)								
HK0815703-001	2108/XRL/D329 (0.5M-0.95M)	Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.0
EP-075B: Polyaromatic Hydrocarbons (PAHs) (QC Lot: 773321)								
HK0815703-001	2108/XRL/D329 (0.5M-0.95M)	Napthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0
		Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0
		Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0
		Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0
		Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0
		Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0
		Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0
		Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0
		Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0
		Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0
		Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0
		Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0
		Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0
		Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0
		Benzo(b) & Benzo(k)fluoranthene	205-99-2 207-08-9	1.0	mg/kg	<1.0	<1.0	0.0
EP-075C: Phthalate Esters (QC Lot: 773321)								
HK0815703-001	2108/XRL/D329 (0.5M-0.95M)	Bis(2-ethylhexyl)phthalate	117-81-7	5.0	mg/kg	<5.0	<5.0	0.0
EP-075G: Chlorinated Hydrocarbons (QC Lot: 773321)								
HK0815703-001	2108/XRL/D329 (0.5M-0.95M)	Hexachlorobenzene (HCB)	118-74-1	0.2	mg/kg	<0.2	<0.2	0.0
EP-066: Polychlorinated Biphenyls (QC Lot: 773320)								
HK0815703-001	2108/XRL/D329 (0.5M-0.95M)	Total Polychlorinated biphenyls	—	1.0	mg/kg	<1.0	<1.0	0.0

Method Blank (MB), Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report

Matrix: SOIL	Method Blank (MB) Report	Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report
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Matrix: SOIL		Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
						LCS	DCS	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 781255)											
EK025: Free Cyanide	---	1	mg/kg	<1	---	---	---	---	---	---	---
				---	9.48 mg/kg	101	---	85	115	---	---
EG: Metals and Major Cations (QC Lot: 773206)											
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	92.8	---	85	115	---	---
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	91.0	---	85	115	---	---
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	88.1	---	85	115	---	---
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	97.9	---	85	115	---	---
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	89.9	---	85	115	---	---
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	92.7	---	85	115	---	---
EG: Metals and Major Cations (QC Lot: 773208)											
EG3060: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<1	2.5 mg/kg	93.7	---	85	115	---	---
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 773318)											
C6 - C8 Fraction	---	5	mg/kg	<5	3 mg/kg	102	---	63	135	---	---
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 773322)											
C9 - C16 Fraction	---	200	mg/kg	<200	31 mg/kg	77.9	---	45	122	---	---
C17 - C35 Fraction	---	500	mg/kg	<500	75 mg/kg	75.0	---	50	111	---	---
EP-074A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 773317)											
Benzene	71-43-2	0.5	mg/kg	<0.5	0.5 mg/kg	114	---	57	144	---	---
Toluene	108-88-3	0.5	mg/kg	<0.5	0.5 mg/kg	115	---	66	128	---	---
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	0.5 mg/kg	112	---	76	134	---	---
meta- & para-Xylene	108-38-3 106-42-3	1.0	mg/kg	<1.0	1.0 mg/kg	108	---	69	142	---	---
Styrene	100-42-5	0.5	mg/kg	<0.5	0.5 mg/kg	104	---	69	126	---	---
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	0.5 mg/kg	109	---	72	139	---	---
EP-074B: Oxygenated Compounds (QC Lot: 773317)											
2-Butanone (MEK)	78-93-3	5.0	mg/kg	---	5.0 mg/kg	109	---	16	138	---	---
				<5	---	---	---	---	---	---	---
EP-074E: Halogenated Aliphatics (QC Lot: 773317)											
Trichloroethene	79-01-6	0.5	mg/kg	<0.5	0.5 mg/kg	109	---	65	134	---	---
Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	0.5 mg/kg	128	---	74	128	---	---
EP-074G: Trihalomethanes (THM) (QC Lot: 773317)											
Chloroform	67-66-3	0.5	mg/kg	<0.5	0.5 mg/kg	95.8	---	59	145	---	---
Bromodichloromethane	75-27-4	0.5	mg/kg	<0.5	0.5 mg/kg	96.1	---	59	142	---	---
EP-075A: Phenols (QC Lot: 773321)											
Phenol	108-95-2	0.1	mg/kg	<0.1	0.25 mg/kg	76.7	---	49	103	---	---
EP-075B: Polyaromatic Hydrocarbons (PAHs) (QC Lot: 773321)											
Naphthalene	91-20-3	0.1	mg/kg	<0.1	0.25 mg/kg	67.5	---	61	101	---	---
Acenaphthylene	208-96-8	0.1	mg/kg	<0.1	0.25 mg/kg	64.1	---	56	104	---	---



Matrix: SOIL		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					n	LCS	DCS	Low	High	Value	Control Limit
EP-075B: Polyaromatic Hydrocarbons (PAHs) (QC Lot: 773321) - Continued											
Acenaphthene	83-32-9	0.1	mg/kg	<0.1	0.25 mg/kg	72.2	---	63	104	---	---
Fluorene	86-73-7	0.1	mg/kg	<0.1	0.25 mg/kg	72.9	---	65	106	---	---
Phenanthrene	85-01-8	0.1	mg/kg	<0.1	0.25 mg/kg	70.0	---	66	103	---	---
Anthracene	120-12-7	0.1	mg/kg	<0.1	0.25 mg/kg	# 65.9	---	66	98	---	---
Fluoranthene	206-44-0	0.1	mg/kg	<0.1	0.25 mg/kg	# 68.4	---	69	106	---	---
Pyrene	129-00-0	0.1	mg/kg	<0.1	0.25 mg/kg	# 67.6	---	68	106	---	---
Benz(a)anthracene	56-55-3	0.1	mg/kg	<0.1	0.25 mg/kg	66.8	---	57	109	---	---
Chrysene	218-01-9	0.1	mg/kg	<0.1	0.25 mg/kg	67.2	---	66	109	---	---
Benzo(b) & Benzo(k)fluoranthene	205-99-2 207-08-9	0.2	mg/kg	<0.2	0.50 mg/kg	81.4	---	72	104	---	---
Benzo(a)pyrene	50-32-8	0.1	mg/kg	<0.1	0.25 mg/kg	66.7	---	60	104	---	---
Indeno(1,2,3-cd)pyrene	193-39-5	0.1	mg/kg	<0.1	0.25 mg/kg	84.8	---	63	111	---	---
Dibenz(a,h)anthracene	53-70-3	0.1	mg/kg	<0.1	0.25 mg/kg	85.2	---	64	111	---	---
Benzo(g,h,i)perylene	191-24-2	0.1	mg/kg	<0.1	0.25 mg/kg	81.0	---	68	112	---	---
EP-075G: Chlorinated Hydrocarbons (QC Lot: 773321)											
Hexachlorobenzene (HCB)	118-74-1	0.2	mg/kg	<0.2	0.25 mg/kg	75.4	---	68	109	---	---
EP-066: Polychlorinated Biphenyls (QC Lot: 773320)											
Total Polychlorinated biphenyls	---	0.1	mg/kg	<0.1	0.5 mg/kg	126	---	56	141	---	---

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

Matrix: SOIL				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 773206)										
HK0815369-001	Anonymous	EG020: Cadmium	7440-43-9	5 mg/kg	90.8	---	75	125	---	---
		EG020: Copper	7440-50-8	5 mg/kg	108	---	75	125	---	---
		EG020: Lead	7439-92-1	5 mg/kg	86.2	---	75	125	---	---
		EG020: Mercury	7439-97-6	0.1 mg/kg	87.8	---	75	125	---	---
		EG020: Nickel	7440-02-0	5 mg/kg	82.5	---	75	125	---	---
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	---	75	125	---	---
EG: Metals and Major Cations (QC Lot: 773208)										
HK0815703-001	2108/XRL/D329 (0.5M-0.95M)	EG3060: Hexavalent Chromium	18540-29-9	2.5 mg/kg	108	---	75	125	---	---

Surrogate Control Limits

Sub-Matrix: SEDIMENT

Recovery Limits (%)



Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP-080S: TPH(Volatile)/BTEX Surrogate			
Dibromofluoromethane	1868-53-7	80	120
Toluene-D8	2037-26-5	81	117
4-Bromofluorobenzene	460-00-4	74	121
EP-074S: VOC Surrogates			
Dibromofluoromethane	1868-53-7	80	120
Toluene-D8	2037-26-5	81	117
4-Bromofluorobenzene	460-00-4	74	121
EP-075S: Acid Extractable Surrogates			
2-Fluorophenol	367-12-4	25	121
Phenol-d6	13127-88-3	24	113
2,4,6-Tribromophenol	118-79-6	20	122
EP-075T: Base/Neutral Extractable Surrogates			
Nitrobenzene -d5	4165-60-0	23	120
2-Fluorobiphenyl	321-60-8	30	115
4-Terphenyl-d14	1718-51-0	20	137
EP-066S: PCB Surrogate			
Tetrachlorometaxylene	877-09-8	50	130
Dibutylchlorodate	1770-80-5	50	130

MTR CORPORATION
EXPRESS RAIL LINK (XRL)
CONTRACTOR'S SUBMISSION FORM (CSF)



Project Management - XRL Department
 4/F MTR Kam Tin Bldg., 23 Kam Ho Road, NT
 Tel : (852) 2208-3333 Direct Fax : (852) 2208-3283

FROM : GEOTECHNICS & CONCRETE ENGINEERING (H.K.) LTD. 6 KO SHAN ROAD, GROUND FLOOR, HUNG HOM, KOWLOON		TO : CONSTRUCTION MANAGER CONTRACT NEX/2108 MTR CORPORATION HONG KONG		CSF No. : NEX2108/SUB/648	
				FILE REF : _____	
				SIGNED : <i>P. P. John Fung</i>	
				DATE : 20 November 2008	

DOCUMENT TITLE	* N / R	DOCUMENT NO	SRF / ERF NO	CONTRACTOR'S COMMENTS
Preliminary environmental lab test results for drillhole no. 2108/XRL/EDH27	N	GCE/NEX/2108/2008/S648		

REGISTRATION	INTERNAL DISTRIBUTION			EXTERNAL DISTRIBUTION		
Receipt date : _____						
Registration No : _____						

*

N = New Submission R = Re-submission

PIMS/PN/11-4/F9.A1

w/encl.

c.c. MTRCL by Fax No. 2208 3283 (Mr. Derek KWOK)

DKWOK@mtr.com.hk

SWL by Fax No. 2428 9922 (Mr. Benjamin SUN / Mr. Sam LAM)

sam.lam@scottwilson.com.hk

GCE Mr. S.L. HAU / Mr. Tom LO / Mr. Eric YEUNG

ALS Technichem (HK) Pty Ltd

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES



CERTIFICATE OF ANALYSIS

Client	: MASS TRANSIT RAILWAY CORPORATION	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 4
Contact	: MR TOM LO	Contact	: Wong Wai Man, Alice	Work Order	: HK0820037
Address	: 6 KO SHAN ROAD, GROUND FLOOR, HUNG HOM, KOWLOON, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: tom@gce.com.hk	E-mail	: Alice.Wong@alsenviro.com		
Telephone	: +852 2365 9123	Telephone	: +852 2610 1044		
Facsimile	: +852 2765 8034	Facsimile	: +852 2610 2021		
Project	: GROUND INVESTIGATION FOR EXPRESS RAIL LINK	Quote number	: ----	Date Samples Received	: 13-OCT-2008
Order number	: ----			Issue Date	: 20-NOV-2008
C-O-C number	: H005353			No. of samples received	: 1
Site	: ----			No. of samples analysed	: 1

General Comments

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release. When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client. The completion date of analysis is:

19-NOV-2008

Key: LOR = Limit of reporting; CAS Number = Chemistry Abstract Services number

Specific comments for Work Order: HK0820037

Sample(s) were received in a chilled condition.

Sample(s) analysed and reported on an as received basis.

The metal concentrations reported are those determined on the TCLP leachate. Extraction Fluid #1 pH 4.88 - 4.98.

Water sample(s) were filtered prior to dissolved metal analysis.

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This document has been electronically signed by those names that appear on this report and are the authorised signatories. Electronic signing has been carried out in compliance with procedures specified in the Electronic Transactions Ordinance of Hong Kong, Chapter 553, Section 6.

Signatories

Fung Lim Chee, Richard

Position

General Manager

Authorised results for

Inorganics

ALS Laboratory Group
Trading Name: **ALS Technichem (HK) Pty Ltd**
11/F., Chung Shun Knitting Centre, 1-3 Wing Yip Street, Kwai Chung, N.T., Hong Kong
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A Campbell Brothers Limited Company



Analytical Results

Sub-Matrix: TCLP LEACHATE

Client sample ID

2108/XRL/EDH27

0.50M

Client sampling date / time

13-OCT-2008 14:15

Compound	CAS Number	LOR	Unit	HK0820037-001				
EG: Metals and Major Cations - Filtered								
EG020: Antimony	7440-36-0	1	mg/L	<1				
EG020: Arsenic	7440-38-2	1	mg/L	<1				
EG020: Barium	7440-39-3	1	mg/L	<1				
EG020: Beryllium	7440-41-7	1	mg/L	<1				
EG020: Cadmium	7440-43-9	0.2	mg/L	<0.2				
EG020: Chromium	7440-47-3	1	mg/L	<1				
EG020: Copper	7440-50-8	1	mg/L	<1				
EG020: Lead	7439-92-1	1	mg/L	<1				
EG020: Mercury	7439-97-6	0.2	mg/L	<0.2				
EG020: Nickel	7440-02-0	1	mg/L	<1				
EG020: Selenium	7782-49-2	0.2	mg/L	<0.2				
EG020: Silver	7440-22-4	1	mg/L	<1				
EG020: Thallium	7440-28-0	1	mg/L	<1				
EG020: Tin	7440-31-5	1	mg/L	<1				
EG020: Vanadium	7440-62-2	1	mg/L	<1				
EG020: Zinc	7440-66-6	1	mg/L	<1				

Sample Preparation Method

E-TCLP: Extraction Fluid Number

-

-

1



Laboratory Duplicate (DUP) Report

Matrix: WATER					Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EG: Metals and Major Cations - Filtered (QC Lot: 816733)								
HK0819661-001	Anonymous	EG020: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0
		EG020: Cadmium	7440-43-9	0.0002	mg/L	<0.0002	<0.0002	0.0
		EG020: Antimony	7440-36-0	0.001	mg/L	0.013	0.011	17.3
		EG020: Barium	7440-39-3	0.001	mg/L	0.102	0.085	18.5
		EG020: Beryllium	7440-41-7	0.001	mg/L	0.001	<0.001	0.0
		EG020: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0
		EG020: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.0
		EG020: Nickel	7440-02-0	0.001	mg/L	0.011	0.010	0.0
		EG020: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0
		EG020: Thallium	7440-28-0	0.001	mg/L	<0.001	<0.001	0.0
		EG020: Arsenic	7440-38-2	0.01	mg/L	<0.01	<0.01	0.0
		EG020: Selenium	7782-49-2	0.01	mg/L	0.02	0.01	0.0
		EG020: Tin	7440-31-5	0.01	mg/L	<0.01	<0.01	0.0
		EG020: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0
		EG020: Zinc	7440-66-6	0.01	mg/L	0.23	0.23	0.0
		EG020: Lead	7439-92-1	0.010	mg/L	1.92	1.65	15.5

Method Blank (MB), Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report

Matrix: WATER					Method Blank (MB) Report						
					Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					n	LCS	DCS	Low	High	Value	Control Limit
EG: Metals and Major Cations - Filtered (QC Lot: 816733)											
EG020: Antimony	7440-36-0	0.001	mg/L	<0.001	1 mg/L	85.9	---	85	115	---	---
EG020: Arsenic	7440-38-2	0.01	mg/L	<0.01	1 mg/L	92.7	---	85	115	---	---
EG020: Barium	7440-39-3	0.001	mg/L	<0.001	1 mg/L	111	---	85	115	---	---
EG020: Beryllium	7440-41-7	0.001	mg/L	<0.001	1 mg/L	96.4	---	85	115	---	---
EG020: Cadmium	7440-43-9	0.0002	mg/L	<0.0002	1 mg/L	91.9	---	85	115	---	---
EG020: Chromium	7440-47-3	0.001	mg/L	<0.001	1 mg/L	98.2	---	85	115	---	---
EG020: Copper	7440-50-8	0.001	mg/L	<0.001	1 mg/L	97.5	---	85	115	---	---
EG020: Lead	7439-92-1	0.001	mg/L	<0.01	1 mg/L	89.7	---	85	115	---	---
EG020: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.02 mg/L	90.2	---	85	115	---	---
EG020: Nickel	7440-02-0	0.001	mg/L	<0.001	1 mg/L	95.7	---	85	115	---	---
EG020: Selenium	7782-49-2	0.01	mg/L	<0.01	1 mg/L	91.6	---	85	115	---	---
EG020: Silver	7440-22-4	0.001	mg/L	<0.001	1 mg/L	91.0	---	85	115	---	---
EG020: Thallium	7440-28-0	0.001	mg/L	<0.001	1 mg/L	85.4	---	85	115	---	---
EG020: Tin	7440-31-5	0.01	mg/L	<0.01	1 mg/L	97.0	---	85	115	---	---
EG020: Vanadium	7440-62-2	0.01	mg/L	<0.01	1 mg/L	93.8	---	85	115	---	---
EG020: Zinc	7440-66-6	0.01	mg/L	<0.01	1 mg/L	90.0	---	85	115	---	---



Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

Matrix: WATER

Matrix: WATER				Spike Concentration	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number		Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations - Filtered (QC Lot: 816733)										
HK0819661-001	Anonymous	EG020: Antimony	7440-36-0	1 mg/L	84.2	80.5	75	125	4.5	---
		EG020: Arsenic	7440-38-2	1 mg/L	89.3	90.3	75	125	1.1	---
		EG020: Barium	7440-39-3	1 mg/L	105	99.3	75	125	5.8	---
		EG020: Beryllium	7440-41-7	1 mg/L	86.6	89.2	75	125	2.9	---
		EG020: Cadmium	7440-43-9	1 mg/L	87.0	89.1	75	125	2.4	---
		EG020: Chromium	7440-47-3	1 mg/L	95.8	90.9	75	125	5.2	---
		EG020: Copper	7440-50-8	1 mg/L	90.8	87.3	75	125	3.9	---
		EG020: Lead	7439-92-1	1 mg/L	93.4	87.8	75	125	6.2	---
		EG020: Mercury	7439-97-6	0.02 mg/L	96.1	96.6	75	125	0.5	---
		EG020: Nickel	7440-02-0	1 mg/L	94.9	87.9	75	125	7.6	---
		EG020: Selenium	7782-49-2	1 mg/L	88.8	82.5	75	125	7.4	---
		EG020: Silver	7440-22-4	1 mg/L	78.9	77.0	75	125	2.4	---
		EG020: Thallium	7440-28-0	1 mg/L	80.3	85.8	75	125	6.7	---
		EG020: Tin	7440-31-5	1 mg/L	96.6	95.2	75	125	1.5	---
		EG020: Vanadium	7440-62-2	1 mg/L	94.0	92.8	75	125	1.3	---
		EG020: Zinc	7440-66-6	1 mg/L	87.0	84.4	75	125	3.0	---

MTR CORPORATION
EXPRESS RAIL LINK (XRL)
CONTRACTOR'S SUBMISSION FORM (CSF)



Project Management - XRL Department
 4/F MTR Kam Tin Bldg., 23 Kam Ho Road, NT
 Tel : (852) 2208-3333 Direct Fax : (852) 2208-3283

FROM : GEOTECHNICS & CONCRETE ENGINEERING (H.K.) LTD. 6 KO SHAN ROAD, GROUND FLOOR, HUNG HOM, KOWLOON		TO : CONSTRUCTION MANAGER CONTRACT NEX/2108 MTR CORPORATION HONG KONG		CSF No. : NEX2108/SUB/588	
				FILE REF :	
				SIGNED : <i>P. f. John Fung</i>	
				DATE : 06 November 2008	
DOCUMENT TITLE	* N / R	DOCUMENT NO	SRF / ERF NO	CONTRACTOR'S COMMENTS	
Preliminary environmental lab test results for drillhole no. 2108/XRL/EDH28	N	GCE/NEX/2108/2008/S588			
REGISTRATION	INTERNAL DISTRIBUTION			EXTERNAL DISTRIBUTION	
Receipt date :					
Registration No :					

*

N = New Submission R = Re-submission

PIMS/PN/11-4/F9.A1

w/encl.

c.c. MTRCL by Fax No. 2208 3283 (Mr. Derek KWOK)

DKWOK@mtr.com.hk

SWL by Fax No. 2428 9922 (Mr. Benjamin SUN / Mr. Sam LAM)

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GCE Mr. S.L. HAU / Mr. Tom LO / Mr. Eric YEUNG

ALS Technichem (HK) Pty Ltd

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES



CERTIFICATE OF ANALYSIS

Client	: MASS TRANSIT RAILWAY CORPORATION	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 9
Contact	: MR TOM LO	Contact	: Wong Wai Man, Alice	Work Order	: HK0816621
Address	: 6 KO SHAN ROAD, GROUND FLOOR, HUNG HOM, KOWLOON, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong	Amendment	: 1
E-mail	: tom@gce.com.hk	E-mail	: Alice.Wong@alsenviro.com		
Telephone	: +852 2365 9123	Telephone	: +852 2610 1044		
Facsimile	: +852 2765 8034	Facsimile	: +852 2610 2021		
Project	: GROUND INVESTIGATION FOR EXPRESS RAIL LINK	Quote number	: ----	Date Samples Received	: 03-OCT-2008
Order number	: ----			Issue Date	: 04-NOV-2008
C-O-C number	: H005352			No. of samples received	: 1
Site	: ----			No. of samples analysed	: 1

General Comments

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release. When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client. The completion date of analysis is: 18-OCT-2008

Key: LOR = Limit of reporting; CAS Number = Chemistry Abstract Services number

Specific comments for Work Order: HK0816621

Sample(s) were received in an ambient condition.

Soil sample(s) analysed on an as received basis. Result(s) reported on a dry weight basis.

Sample(s) as received, digested by In-house method E-ASTM D3974-81 based on ASTM D3974-81, prior to the determination of metals.

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This document has been electronically signed by those names that appear on this report and are the authorised signatories. Electronic signing has been carried out in compliance with procedures specified in the Electronic Transactions Ordinance of Hong Kong, Chapter 553, Section 6.

Signatories

Anh Ngoc Huynh
Fung Lim Chee, Richard

Position

Senior Chemist
General Manager

Authorised results for

Organics
Inorganics

ALS Laboratory Group
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A Campbell Brothers Limited Company



Analytical Results

Sub-Matrix: SEDIMENT

Client sample ID

2108/XRL/EDH28

(0.5M)

Client sampling date / time

[03-OCT-2008]

Compound CAS Number LOR Unit HK0816621-001

EA/ED: Physical and Aggregate Properties

EA055: Moisture Content (dried @ 103° C)

0.1

%

8.6

ED/EK: Inorganic Nonmetallic Parameters

EK025: Free Cyanide

1

mg/kg

1

EG: Metals and Major Cations

EG020: Cadmium

7440-43-9

0.2

mg/kg

<0.2

EG020: Copper

7440-50-8

1

mg/kg

12

EG020: Lead

7439-92-1

1

mg/kg

59

EG020: Mercury

7439-97-6

0.2

mg/kg

<0.2

EG020: Nickel

7440-02-0

1

mg/kg

14

EG020: Zinc

7440-66-6

1

mg/kg

124

EG049: Trivalent Chromium

16065-83-1

1

mg/kg

4

EG3060: Hexavalent Chromium

18540-29-9

1

mg/kg

<1

EP-080: BTEX

Benzene

71-43-2

0.2

mg/kg

<0.2

Toluene

108-88-3

0.2

mg/kg

<0.2

Chlorobenzene

108-90-7

0.2

mg/kg

<0.2

Ethylbenzene

100-41-4

0.2

mg/kg

<0.2

meta- & para-Xylene

108-38-3 106-42-3

0.4

mg/kg

<0.4

ortho-Xylene

95-47-6

0.2

mg/kg

<0.2

EP-071HK: Total Petroleum Hydrocarbons (TPH)

C9 - C16 Fraction

200

mg/kg

<200

C17 - C35 Fraction

500

mg/kg

<500

C6 - C8 Fraction

5

mg/kg

<5

EP-074A: Monocyclic Aromatic Hydrocarbons (MAH)

Benzene

71-43-2

0.5

mg/kg

<0.5

Toluene

108-88-3

0.5

mg/kg

<0.5

Ethylbenzene

100-41-4

0.5

mg/kg

<0.5

meta- & para-Xylene

108-38-3 106-42-3

1.0

mg/kg

<1.0

Styrene

100-42-5

0.5

mg/kg

<0.5

ortho-Xylene

95-47-6

0.5

mg/kg

<0.5

EP-074B: Oxygenated Compounds

2-Propanone (Acetone)

67-64-1

5

mg/kg

<5

2-Butanone (MEK)

78-93-3

5

mg/kg

<5

EP-074E: Halogenated Aliphatics

Methylene chloride

75-09-2

5

mg/kg

<5



Sub-Matrix: SEDIMENT

Client sample ID 2108/XRL/EDH28

(0.5M)

Client sampling date / time [03-OCT-2008]

Compound CAS Number LOR Unit HK0816621-001

EP-074E: Halogenated Aliphatics - Continued

Trichloroethene	79-01-6	0.5	mg/kg	<0.5
Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5

EP-074G: Trihalomethanes (THM)

Chloroform	67-66-3	0.5	mg/kg	<0.5
Bromodichloromethane	75-27-4	0.5	mg/kg	<0.5

EP-074L: Methyl-tert-butyl Ether

Methyl tert-Butyl Ether (MTBE)	1634-04-4	5.0	mg/kg	<5.0
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EP-075A: Phenols

Phenol	108-95-2	0.5	mg/kg	<0.5
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EP-075B: Polyaromatic Hydrocarbons (PAHs)

Naphthalene	91-20-3	0.5	mg/kg	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5
Benzo(b) & Benzo(k)fluoranthene	205-99-2 207-08-9	1.0	mg/kg	<1.0
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	<0.5
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5

EP-075C: Phthalate Esters

Bis(2-ethylhexyl)phthalate	117-81-7	5.0	mg/kg	<5.0
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EP-075G: Chlorinated Hydrocarbons

Hexachlorobenzene (HCB)	118-74-1	0.2	mg/kg	<0.2
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EP-086: Polychlorinated Biphenyls

Total Polychlorinated biphenyls	----	0.1	mg/kg	0.2
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EP-080S: TPH(Volatile)/BTEX Surrogate

Dibromofluoromethane	1868-53-7	0.1	%	84.3
Toluene-D8	2037-26-5	0.1	%	97.6
4-Bromofluorobenzene	460-00-4	0.1	%	105

EP-074S: VOC Surrogates

Surrogate control limits listed at end of this report.

Surrogate control limits listed at end of this report.



Sub-Matrix: SEDIMENT

Client sample ID 2108/XRL/EDH28
 (0.5M)

Client sampling date / time [03-OCT-2008]

HK0816621-001

Compound	CAS Number	LOR	Unit	
EP-074S: VOC Surrogates - Continued				
Dibromofluoromethane	1868-53-7	0.1	%	84.3
Toluene-D8	2037-26-5	0.1	%	97.6
4-Bromofluorobenzene	460-00-4	0.1	%	105
EP-075S: Acid Extractable Surrogates				
2-Fluorophenol	367-12-4	0.1	%	79.0
Phenol-d6	13127-88-3	0.1	%	74.2
2,4,6-Tribromophenol	118-79-6	0.1	%	82.8
EP-075T: Base/Neutral Extractable Surrogates				
Nitrobenzene -d5	4165-60-0	0.1	%	75.4
2-Fluorobiphenyl	321-60-8	0.1	%	74.1
4-Terphenyl-d14	1718-51-0	0.1	%	79.2
EP-066S: PCB Surrogate				
Tetrachlorometaxylene	877-09-8	0.1	%	118
Dibutylchlorodate	1770-80-5	0.1	%	117

Surrogate control limits listed at end of this report.

Surrogate control limits listed at end of this report.

Surrogate control limits listed at end of this report.

Surrogate control limits listed at end of this report.



Laboratory Duplicate (DUP) Report

Matrix: SOIL				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 780530)								
HK0816500-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	---	0.1	%	35.1	34.9	0.6
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 781255)								
HK0815703-001	Anonymous	EK025: Free Cyanide	---	1	mg/kg	<1	<1	0.0
EG: Metals and Major Cations (QC Lot: 780003)								
HK0816799-005	Anonymous	EG020: Cadmium	7440-43-9	0.5	mg/kg	1.7	1.7	0.0
		EG020: Copper	7440-50-8	0.5	mg/kg	197	198	0.8
		EG020: Lead	7439-92-1	0.5	mg/kg	30.1	30.8	2.2
		EG020: Mercury	7439-97-6	0.5	mg/kg	0.7	0.7	0.0
		EG020: Nickel	7440-02-0	0.5	mg/kg	12.2	11.0	10.8
		EG020: Zinc	7440-66-6	0.5	mg/kg	585	606	3.4
EP-080: BTEX (QC Lot: 779506)								
HK0816621-001	2108/XRL/EDH28 (0.5M)	Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0
		Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.0
		Chlorobenzene	108-90-7	0.2	mg/kg	<0.2	<0.2	0.0
		Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.0
		ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.0
		meta- & para-Xylene	108-38-3	0.4	mg/kg	<0.4	<0.4	0.0
			106-42-3					
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 779505)								
HK0816621-001	2108/XRL/EDH28 (0.5M)	C9 - C16 Fraction	---	200	mg/kg	<200	<200	0.0
		C17 - C35 Fraction	---	500	mg/kg	<500	<500	0.0
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 779506)								
HK0816621-001	2108/XRL/EDH28 (0.5M)	C6 - C8 Fraction	---	5	mg/kg	<5	<5	0.0
EP-074A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 773317)								
HK0815703-001	Anonymous	Benzene	71-43-2	0.5	mg/kg	<0.5	<0.5	0.0
		Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0
		Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0
		Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	0.0
		ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0
		meta- & para-Xylene	108-38-3	1.0	mg/kg	<1.0	<1.0	0.0
			106-42-3					
EP-074B: Oxygenated Compounds (QC Lot: 773317)								
HK0815703-001	Anonymous	2-Propanone (Acetone)	67-64-1	5	mg/kg	<5	<5	0.0
		2-Butanone (MEK)	78-93-3	5	mg/kg	<5	<5	0.0
EP-074E: Halogenated Aliphatics (QC Lot: 773317)								
HK0815703-001	Anonymous	Trichloroethene	79-01-6	0.5	mg/kg	<0.5	<0.5	0.0
		Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	<0.5	0.0
		Methylene chloride	75-09-2	5	mg/kg	<5	<5	0.0



Matrix: SOIL					Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EP-074G: Trihalomethanes (THM) (QC Lot: 773317)								
HK0815703-001	Anonymous	Chloroform	67-66-3	0.5	mg/kg	<0.5	<0.5	0.0
		Bromodichloromethane	75-27-4	0.5	mg/kg	<0.5	<0.5	0.0
EP-074L: Methyl-tert-butyl Ether (QC Lot: 773317)								
HK0815703-001	Anonymous	Methyl tert-Butyl Ether (MTBE)	1634-04-4	5.0	mg/kg	<5.0	<5.0	0.0
EP-075A: Phenols (QC Lot: 773321)								
HK0815703-001	Anonymous	Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.0
EP-075B: Polyaromatic Hydrocarbons (PAHs) (QC Lot: 773321)								
HK0815703-001	Anonymous	Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0
		Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0
		Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0
		Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0
		Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0
		Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0
		Fluoranthene	208-44-0	0.5	mg/kg	<0.5	<0.5	0.0
		Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0
		Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0
		Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0
		Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0
		Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0
		Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0
		Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0
		Benzo(b) & Benzo(k)fluoranthene	205-99-2	1.0	mg/kg	<1.0	<1.0	0.0
			207-08-9					
EP-075C: Phthalate Esters (QC Lot: 773321)								
HK0815703-001	Anonymous	Bis(2-ethylhexyl)phthalate	117-81-7	5.0	mg/kg	<5.0	<5.0	0.0
EP-075G: Chlorinated Hydrocarbons (QC Lot: 773321)								
HK0815703-001	Anonymous	Hexachlorobenzene (HCB)	118-74-1	0.2	mg/kg	<0.2	<0.2	0.0
EP-066: Polychlorinated Biphenyls (QC Lot: 773320)								
HK0815703-001	Anonymous	Total Polychlorinated biphenyls	---	0.1	mg/kg	<0.1	<0.1	0.0

Method Blank (MB), Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report

Matrix: SOIL					Method Blank (MB) Report							
					Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report							
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)		
						LCS	DCS	Low	High	Value	Control Limit	
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 781255)												
EK025: Free Cyanide	---	1	mg/kg	<1	---	---	---	---	---	---	---	---
				---	9.48 mg/kg	101	---	85	115	---	---	---
EG: Metals and Major Cations (QC Lot: 780003)												
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	89.1	---	85	115	---	---	---



Matrix: SOIL		Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
						LCS	DCS	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 780003) - Continued											
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	94.3	---	85	115	---	---
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	92.4	---	85	115	---	---
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	114	---	85	115	---	---
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	96.0	---	85	115	---	---
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	90.8	---	85	115	---	---
EG: Metals and Major Cations (QC Lot: 783452)											
EG3060: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<1	25 mg/kg	104	---	85	115	---	---
EP-080: BTEX (QC Lot: 779506)											
Benzene	71-43-2	0.2	mg/kg	<0.2	0.2 mg/kg	120	---	50	129	---	---
Toluene	108-88-3	0.2	mg/kg	<0.2	0.2 mg/kg	# 130	---	73	112	---	---
Chlorobenzene	108-90-7	0.2	mg/kg	<0.2	0.2 mg/kg	# 137	---	88	120	---	---
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	0.2 mg/kg	# 126	---	83	125	---	---
meta- & para-Xylene	108-38-3 108-42-3	0.4	mg/kg	<0.4	0.4 mg/kg	122	---	78	143	---	---
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	0.2 mg/kg	121	---	72	140	---	---
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 779505)											
C9 - C16 Fraction	---	200	mg/kg	<200	31 mg/kg	89.6	---	45	122	---	---
C17 - C35 Fraction	---	500	mg/kg	<500	75 mg/kg	103	---	50	111	---	---
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 779506)											
C6 - C8 Fraction	---	5	mg/kg	<5	3 mg/kg	98.0	---	63	135	---	---
EP-074A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 773317)											
Benzene	71-43-2	0.5	mg/kg	<0.5	0.5 mg/kg	114	---	57	144	---	---
Toluene	108-88-3	0.5	mg/kg	<0.5	0.5 mg/kg	115	---	66	128	---	---
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	0.5 mg/kg	112	---	76	134	---	---
meta- & para-Xylene	108-38-3 106-42-3	1.0	mg/kg	<1.0	1.0 mg/kg	108	---	69	142	---	---
Styrene	100-42-5	0.5	mg/kg	<0.5	0.5 mg/kg	104	---	69	126	---	---
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	0.5 mg/kg	109	---	72	139	---	---
EP-074B: Oxygenated Compounds (QC Lot: 773317)											
2-Butanone (MEK)	78-93-3	5.0	mg/kg	---	5.0 mg/kg	109	---	16	138	---	---
				<5	---	---	---	---	---	---	---
EP-074E: Halogenated Aliphatics (QC Lot: 773317)											
Trichloroethene	79-01-6	0.5	mg/kg	<0.5	0.5 mg/kg	109	---	65	134	---	---
Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	0.5 mg/kg	128	---	74	128	---	---
EP-074G: Trihalomethanes (THM) (QC Lot: 773317)											
Chloroform	67-66-3	0.5	mg/kg	<0.5	0.5 mg/kg	95.8	---	59	145	---	---
Bromodichloromethane	75-27-4	0.5	mg/kg	<0.5	0.5 mg/kg	96.1	---	59	142	---	---
EP-075A: Phenols (QC Lot: 773321)											
Phenol	108-95-2	0.1	mg/kg	<0.1	0.25 mg/kg	76.7	---	49	103	---	---



Matrix: SOIL		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
						LCS	DCS	Low	High	Value	Control Limit
EP-075B: Polyaromatic Hydrocarbons (PAHs) (QC Lot: 773321)											
Naphthalene	91-20-3	0.1	mg/kg	<0.1	0.25 mg/kg	67.5	---	61	101	---	---
Acenaphthylene	208-96-8	0.1	mg/kg	<0.1	0.25 mg/kg	64.1	---	56	104	---	---
Acenaphthene	83-32-9	0.1	mg/kg	<0.1	0.25 mg/kg	72.2	---	63	104	---	---
Fluorene	86-73-7	0.1	mg/kg	<0.1	0.25 mg/kg	72.9	---	65	106	---	---
Phenanthrene	85-01-8	0.1	mg/kg	<0.1	0.25 mg/kg	70.0	---	66	103	---	---
Anthracene	120-12-7	0.1	mg/kg	<0.1	0.25 mg/kg	# 65.9	---	66	98	---	---
Fluoranthene	208-44-0	0.1	mg/kg	<0.1	0.25 mg/kg	# 68.4	---	69	106	---	---
Pyrene	129-00-0	0.1	mg/kg	<0.1	0.25 mg/kg	# 67.6	---	68	106	---	---
Benz(a)anthracene	56-55-3	0.1	mg/kg	<0.1	0.25 mg/kg	66.8	---	57	109	---	---
Chrysene	218-01-9	0.1	mg/kg	<0.1	0.25 mg/kg	67.2	---	66	109	---	---
Benzo(b) & Benzo(k)fluoranthene	205-99-2 207-08-9	0.2	mg/kg	<0.2	0.50 mg/kg	81.4	---	72	104	---	---
Benzo(a)pyrene	50-32-8	0.1	mg/kg	<0.1	0.25 mg/kg	66.7	---	60	104	---	---
Indeno(1,2,3-cd)pyrene	193-39-5	0.1	mg/kg	<0.1	0.25 mg/kg	84.8	---	63	111	---	---
Dibenz(a,h)anthracene	53-70-3	0.1	mg/kg	<0.1	0.25 mg/kg	85.2	---	64	111	---	---
Benzo(g,h,i)perylene	191-24-2	0.1	mg/kg	<0.1	0.25 mg/kg	81.0	---	68	112	---	---
EP-075G: Chlorinated Hydrocarbons (QC Lot: 773321)											
Hexachlorobenzene (HCB)	118-74-1	0.2	mg/kg	<0.2	0.25 mg/kg	75.4	---	68	109	---	---
EP-066: Polychlorinated Biphenyls (QC Lot: 773320)											
Total Polychlorinated biphenyls	---	0.1	mg/kg	<0.1	0.5 mg/kg	126	---	56	141	---	---

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

Matrix: SOIL				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 780003)										
HK0816608-008	Anonymous	EG020: Cadmium	7440-43-9	5 mg/kg	93.8	---	75	125	---	---
		EG020: Copper	7440-50-8	5 mg/kg	# Not Determined	---	75	125	---	---
		EG020: Lead	7439-92-1	5 mg/kg	88.5	---	75	125	---	---
		EG020: Mercury	7439-97-6	0.1 mg/kg	87.9	---	75	125	---	---
		EG020: Nickel	7440-02-0	5 mg/kg	82.3	---	75	125	---	---
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	---	75	125	---	---
EG: Metals and Major Cations (QC Lot: 783452)										
HK0816621-001	2108/XRL/EDH28 (0.5M)	EG3060: Hexavalent Chromium	18540-29-9	25 mg/kg	111	---	75	125	---	---



Surrogate Control Limits

Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP-080S: TPH(Volatile)/BTEX Surrogate			
Dibromofluoromethane	1868-53-7	80	120
Toluene-D8	2037-26-5	81	117
4-Bromofluorobenzene	460-00-4	74	121
EP-074S: VOC Surrogates			
Dibromofluoromethane	1868-53-7	80	120
Toluene-D8	2037-26-5	81	117
4-Bromofluorobenzene	460-00-4	74	121
EP-075S: Acid Extractable Surrogates			
2-Fluorophenol	367-12-4	25	121
Phenol-d6	13127-88-3	24	113
2,4,6-Tribromophenol	118-79-6	20	122
EP-075T: Base/Neutral Extractable Surrogates			
Nitrobenzene -d5	4165-60-0	23	120
2-Fluorobiphenyl	321-60-8	30	115
4-Terphenyl-d14	1718-51-0	20	137
EP-066S: PCB Surrogate			
Tetrachlorometaxylene	877-09-8	50	130
Dibutylchlorendate	1770-80-5	50	130

Stage 2 SI



CERTIFICATE OF ANALYSIS

Client	: VIBRO (H.K.) LTD	Laboratory	: ALS Technichem HK Pty Ltd	Page	: 1 of 17
Contact	: MR H M CHAN	Contact	: Chan Kwok Fai, Godfrey	Work Order	: HK1014893
Address	: 4/F., 38 SHEUNG ON ST., CHAI WAN HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong	Amendment	: 2
E-mail	: HM_Chan@vibro.com.hk	E-mail	: Godfrey.Chan@alsenviro.com		
Telephone	: 2335 2554	Telephone	: +852 2610 1044		
Facsimile	: ----	Facsimile	: +852 2610 2021		
Project	: J200942E MTR C8016 - ENVIRONMENTAL TERM CONSULTANCY FOR XRL	Quote number	: HK/582a/2010	Date Samples Received	: 06-JUL-2010
Order number	: ----			Issue Date	: 25-AUG-2010
C-O-C number	: H012456			No. of samples received	: 7
Site	: KCV			No. of samples analysed	: 7

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This document has been electronically signed by those names that appear on this report and are the authorised signatories. Electronic signing has been carried out in compliance with procedures specified in the Electronic Transactions Ordinance of Hong Kong, Chapter 553, Section 6.

Signatories

Anh Ngoc Huynh
Fung Lim Chee, Richard

Position

Senior Chemist
General Manager

Authorised results for

Organics
Inorganics



General Comments

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release. When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client. The completion date of analysis is:

15-JUL-2010

Key: LOR = Limit of reporting; CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

Specific comments for Work Order: **HK1014893**

Particular samples required dilution prior to SVOC analysis due to matrix interference. LOR values have been adjusted accordingly.

Sample(s) were picked up from client by ALS Technichem (HK) staff in a chilled condition.

Water sample(s) analysed and reported on an as received basis.

Soil sample(s) analysed on an as received basis. Result(s) reported on a dry weight basis.

Water sample(s) were filtered prior to dissolved metal analysis.

Soil sample(s) as received, digested by In-house method E-ASTM D3974-81 based on ASTM D3974-81, prior to the determination of metals.



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				H06A 0.2M	H05A 0.15M	H04B 0.2M	H04B 0.2M DUPLICATE	
				06-JUL-2010 11:20	06-JUL-2010 11:30	06-JUL-2010 11:40	[06-JUL-2010]	
Compound	CAS Number	LOR	Unit	HK1014893-001	HK1014893-002	HK1014893-003	HK1014893-004	
EA/ED: Physical and Aggregate Properties								
EA055: Moisture Content (dried @ 103° C)	----	0.1	%	11.0	9.7	6.0	5.5	
ED/EK: Inorganic Nonmetallic Parameters								
EK025: Free Cyanide	----	1	mg/kg	<1	<1	<1	<1	
EG: Metals and Major Cations								
EG020: Cadmium	7440-43-9	0.2	mg/kg	1.5	0.6	0.2	<0.2	
EG020: Copper	7440-50-8	1	mg/kg	139	54	24	24	
EG020: Lead	7439-92-1	1	mg/kg	155	108	60	67	
EG020: Nickel	7440-02-0	1	mg/kg	89	17	20	14	
EG020: Zinc	7440-66-6	1	mg/kg	795	163	109	91	
EG036: Mercury	7439-97-6	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	
EG049: Trivalent Chromium	16065-83-1	1	mg/kg	112	7	5	5	
EG3060: Hexavalent Chromium	18540-29-9	1	mg/kg	<1	<1	<1	<1	
EP-080: BTEX								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
meta- & para-Xylene	108-38-3 106-42-3	1.0	mg/kg	<1.0	<1.0	<1.0	<1.0	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	
EP-071HK: Total Petroleum Hydrocarbons (TPH)								
C6 - C8 Fraction	----	5	mg/kg	<5	<5	<5	<5	
C9 - C16 Fraction	----	200	mg/kg	370	<200	310	310	
C17 - C35 Fraction	----	500	mg/kg	7520	730	1990	1790	
EP-074A: Monocyclic Aromatic Hydrocarbons (MAH)								
Styrene	100-42-5	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	
EP-074B: Oxygenated Compounds								
2-Propanone (Acetone)	67-64-1	50	mg/kg	<50	<50	<50	<50	
2-Butanone (MEK)	78-93-3	5.0	mg/kg	<5.0	<5.0	<5.0	<5.0	
EP-074E: Halogenated Aliphatics								
Methylene chloride	75-09-2	5	mg/kg	<5	<5	<5	<5	
Trichloroethene	79-01-6	0.04	mg/kg	<0.04	<0.04	<0.04	<0.04	
Tetrachloroethene	127-18-4	0.04	mg/kg	<0.04	<0.04	<0.04	<0.04	
EP-074G: Trihalomethanes (THM)								
Chloroform	67-66-3	0.04	mg/kg	<0.04	<0.04	<0.04	<0.04	
Bromodichloromethane	75-27-4	0.04	mg/kg	<0.04	<0.04	<0.04	<0.04	
EP-074L: Methyl-tert-butyl Ether								
Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	



Sub-Matrix: SOIL				Client sample ID	H06A 0.2M	H05A 0.15M	H04B 0.2M	H04B 0.2M DUPLICATE	
Client sampling date / time					06-JUL-2010 11:20	06-JUL-2010 11:30	06-JUL-2010 11:40	[06-JUL-2010]	
Compound	CAS Number	LOR	Unit		HK1014893-001	HK1014893-002	HK1014893-003	HK1014893-004	
EP-075A: Phenols									
Phenol	108-95-2	0.5	mg/kg		<5.0	<0.5	<0.5	<0.5	
EP-075B: Polyaromatic Hydrocarbons (PAHs)									
Naphthalene	91-20-3	0.5	mg/kg		<5.0	<0.5	<0.5	<0.5	
Acenaphthylene	208-96-8	0.5	mg/kg		<5.0	<0.5	<0.5	<0.5	
Acenaphthene	83-32-9	0.5	mg/kg		<5.0	<0.5	<0.5	<0.5	
Fluorene	86-73-7	0.5	mg/kg		<5.0	<0.5	<0.5	<0.5	
Phenanthrene	85-01-8	0.5	mg/kg		<5.0	<0.5	<0.5	<0.5	
Anthracene	120-12-7	0.5	mg/kg		<5.0	<0.5	<0.5	<0.5	
Fluoranthene	206-44-0	0.5	mg/kg		<5.0	<0.5	<0.5	<0.5	
Pyrene	129-00-0	0.5	mg/kg		<5.0	<0.5	<0.5	<0.5	
Benz(a)anthracene	56-55-3	0.5	mg/kg		<5.0	<0.5	<0.5	<0.5	
Chrysene	218-01-9	0.5	mg/kg		<5.0	<0.5	<0.5	<0.5	
Benzo(b) & Benzo(k)fluoranthene	205-99-2 207-08-9	1.0	mg/kg		<10.0	<1.0	<1.0	<1.0	
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<5.0	<0.5	<0.5	<0.5	
Indeno(1,2,3.cd)pyrene	193-39-5	0.5	mg/kg		<5.0	<0.5	<0.5	<0.5	
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg		<5.0	<0.5	<0.5	<0.5	
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg		<5.0	<0.5	<0.5	<0.5	
EP-075C: Phthalate Esters									
Bis(2-ethylhexyl)phthalate	117-81-7	5.0	mg/kg		<50.0	<5.0	<5.0	<5.0	
EP-075G: Chlorinated Hydrocarbons									
Hexachlorobenzene (HCB)	118-74-1	0.2	mg/kg		<2.0	<0.2	<0.2	<0.2	
EP-066: Polychlorinated Biphenyls									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	
EP-080S: TPH(Volatile)/BTEX Surrogate								Surrogate control limits listed at end of this report.	
Dibromofluoromethane	1868-53-7	0.1	%		98.5	98.9	91.0	81.2	
Toluene-D8	2037-26-5	0.1	%		101	99.2	101	99.7	
4-Bromofluorobenzene	460-00-4	0.1	%		98.8	102	102	104	
EP-074S: VOC Surrogates								Surrogate control limits listed at end of this report.	
Dibromofluoromethane	1868-53-7	0.1	%		98.5	98.9	91.0	81.2	
Toluene-D8	2037-26-5	0.1	%		101	99.2	101	99.7	
4-Bromofluorobenzene	460-00-4	0.1	%		98.8	102	102	104	
EP-075S: Acid Extractable Surrogates								Surrogate control limits listed at end of this report.	
2-Fluorophenol	367-12-4	0.1	%		Not Determined	82.7	76.8	26.3	
Phenol-d6	13127-88-3	0.1	%		Not Determined	89.8	83.0	49.7	
2,4,6-Tribromophenol	118-79-6	0.1	%		Not Determined	32.1	24.5	93.1	
EP-075T: Base/Neutral Extractable Surrogates								Surrogate control limits listed at end of this report.	
Nitrobenzene -d5	4165-60-0	0.1	%		Not Determined	99.6	92.5	73.0	



Sub-Matrix: SOIL				Client sample ID	H06A 0.2M	H05A 0.15M	H04B 0.2M	H04B 0.2M DUPLICATE	
Client sampling date / time					06-JUL-2010 11:20	06-JUL-2010 11:30	06-JUL-2010 11:40	[06-JUL-2010]	
Compound	CAS Number	LOR	Unit		HK1014893-001	HK1014893-002	HK1014893-003	HK1014893-004	
EP-075T: Base/Neutral Extractable Surrogates - Continued					Surrogate control limits listed at end of this report.				
2-Fluorobiphenyl	321-60-8	0.1	%		Not Determined	72.8	91.2	48.2	
4-Terphenyl-d14	1718-51-0	0.1	%		Not Determined	95.0	81.9	61.1	
EP-066S: PCB Surrogate					Surrogate control limits listed at end of this report.				
Tetrachlorometaxylene	877-09-8	0.1	%		65.7	78.2	77.3	50.6	
Dibutylchloredate	1770-80-5	0.1	%		52.6	51.1	51.9	52.6	



Sub-Matrix: WATER				Client sample ID	EQUIPMENT BLANK	FIELD BLANK	TRIP BLANK		
Client sampling date / time					[06-JUL-2010]	[06-JUL-2010]	[06-JUL-2010]		
Compound	CAS Number	LOR	Unit		HK1014893-005	HK1014893-006	HK1014893-007		
ED/EK: Inorganic Nonmetallic Parameters									
EK025MD: Free Cyanide	----	0.01	mg/L		0.01	0.01	----		
EG: Metals and Major Cations									
EG049: Trivalent Chromium	16065-83-1	0.02	mg/L		<0.02	<0.02	----		
EG050: Hexavalent Chromium	18540-29-9	0.02	mg/L		<0.02	<0.02	----		
EG: Metals and Major Cations - Filtered									
EG020: Cadmium	7440-43-9	0.2	µg/L		<0.2	<0.2	----		
EG020: Copper	7440-50-8	1	µg/L		<1	<1	----		
EG020: Lead	7439-92-1	1	µg/L		<1	<1	----		
EG020: Nickel	7440-02-0	1	µg/L		<1	<1	----		
EG020: Zinc	7440-66-6	10	µg/L		<10	<10	----		
EG036: Mercury	7439-97-6	0.5	µg/L		<0.5	<0.5	----		
EP-080: BTEX									
Benzene	71-43-2	5	µg/L		<5	<5	<5		
Toluene	108-88-3	5	µg/L		<5	<5	<5		
Ethylbenzene	100-41-4	5	µg/L		<5	<5	<5		
meta- & para-Xylene	108-38-3 106-42-3	10	µg/L		<10	<10	<10		
ortho-Xylene	95-47-6	5	µg/L		<5	<5	<5		
EP-071HK: Total Petroleum Hydrocarbons (TPH)									
C6 - C8 Fraction	----	20	µg/L		<20	<20	<20		
C9 - C16 Fraction	----	500	µg/L		<500	<500	----		
C17 - C35 Fraction	----	500	µg/L		<500	<500	----		
EP-074A: Monocyclic Aromatic Hydrocarbons (MAH)									
Styrene	100-42-5	5	µg/L		<5	<5	----		
EP-074B: Oxygenated Compounds									
2-Propanone (Acetone)	67-64-1	500	µg/L		<500	<500	----		
2-Butanone (MEK)	78-93-3	50	µg/L		<50	<50	----		
EP-074E: Halogenated Aliphatics									
Methylene chloride	75-09-2	50	µg/L		<50	<50	----		
Trichloroethene	79-01-6	5	µg/L		<5	<5	----		
Tetrachloroethene	127-18-4	5	µg/L		<5	<5	----		
EP-074G: Trihalomethanes (THM)									
Chloroform	67-66-3	5	µg/L		<5	<5	----		
Bromodichloromethane	75-27-4	5	µg/L		<5	<5	----		
EP-074L: Methyl-tert-butyl Ether									
Methyl tert-Butyl Ether (MTBE)	1634-04-4	5	µg/L		<5	<5	----		
EP-075A: Phenols									
Phenol	108-95-2	2.0	µg/L		79.5	120	----		
EP-075B: Polyaromatic Hydrocarbons (PAHs)									



Sub-Matrix: WATER				Client sample ID	EQUIPMENT BLANK	FIELD BLANK	TRIP BLANK		
Client sampling date / time					[06-JUL-2010]	[06-JUL-2010]	[06-JUL-2010]		
Compound	CAS Number	LOR	Unit		HK1014893-005	HK1014893-006	HK1014893-007		
EP-075B: Polyaromatic Hydrocarbons (PAHs) - Continued									
Naphthalene	91-20-3	2.0	µg/L		<2.0	<2.0	----		
Acenaphthylene	208-96-8	2.0	µg/L		<2.0	<2.0	----		
Acenaphthene	83-32-9	2.0	µg/L		<2.0	<2.0	----		
Fluorene	86-73-7	2.0	µg/L		<2.0	<2.0	----		
Phenanthrene	85-01-8	2.0	µg/L		<2.0	<2.0	----		
Anthracene	120-12-7	2.0	µg/L		<2.0	<2.0	----		
Fluoranthene	206-44-0	2.0	µg/L		<2.0	<2.0	----		
Pyrene	129-00-0	2.0	µg/L		<2.0	<2.0	----		
Benz(a)anthracene	56-55-3	2.0	µg/L		<2.0	<2.0	----		
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	----		
Benzo(b) & Benzo(k)fluoranthene	205-99-2 207-08-9	1.00	µg/L		<1.00	<1.00	----		
Benzo(a)pyrene	50-32-8	2.00	µg/L		<2.00	<2.00	----		
Indeno(1.2.3.cd)pyrene	193-39-5	2.00	µg/L		<2.00	<2.00	----		
Dibenz(a,h)anthracene	53-70-3	2.0	µg/L		<2.0	<2.0	----		
Benzo(g,h,i)perylene	191-24-2	2.00	µg/L		<2.00	<2.00	----		
EP-075C: Phthalate Esters									
Bis(2-ethylhexyl)phthalate	117-81-7	20.0	µg/L		<20.0	<20.0	----		
EP-075G: Chlorinated Hydrocarbons									
Hexachlorobenzene (HCB)	118-74-1	4.0	µg/L		<4.0	<4.0	----		
EP-066_67: Total Polychlorinated Biphenyls									
Total Polychlorinated biphenyls	----	0.20	µg/L		<0.20	<0.20	----		
EP-080S: TPH(Volatile)/BTEX Surrogate Surrogate control limits listed at end of this report.									
Dibromofluoromethane	1868-53-7	0.1	%		112	114	113		
Toluene-D8	2037-26-5	0.1	%		101	102	104		
4-Bromofluorobenzene	460-00-4	0.1	%		96.7	98.0	95.4		
EP-074S: VOC Surrogates Surrogate control limits listed at end of this report.									
Dibromofluoromethane	1868-53-7	0.1	%		112	114	----		
Toluene-D8	2037-26-5	0.1	%		101	102	----		
4-Bromofluorobenzene	460-00-4	0.1	%		96.7	98.0	----		
EP-075S: Acid Extractable Surrogates Surrogate control limits listed at end of this report.									
2-Fluorophenol	367-12-4	0.1	%		25.9	30.6	----		
Phenol-d6	13127-88-3	0.1	%		25.3	32.8	----		
2,4,6-Tribromophenol	118-79-6	0.1	%		37.2	42.0	----		
EP-075T: Base/Neutral Extractable Surrogates Surrogate control limits listed at end of this report.									
Nitrobenzene -d5	4165-60-0	0.1	%		55.1	78.3	----		
2-Fluorobiphenyl	321-60-8	0.1	%		44.1	63.1	----		
4-Terphenyl-d14	1718-51-0	0.1	%		75.5	77.3	----		



Sub-Matrix: WATER				Client sample ID	EQUIPMENT BLANK	FIELD BLANK	TRIP BLANK		
				Client sampling date / time	[06-JUL-2010]	[06-JUL-2010]	[06-JUL-2010]		
Compound	CAS Number	LOR	Unit		HK1014893-005	HK1014893-006	HK1014893-007		
EP-066S: PCB Surrogate									Surrogate control limits listed at end of this report.
Decachlorobiphenyl	2051-24-3	0.1	%		104	88.5	----		



Laboratory Duplicate (DUP) Report

Matrix: SOIL				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 1410108)								
HK1014874-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	18.9	18.5	2.4
HK1015011-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	0.8	1.4	# 47.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1413192)								
HK1014893-001	H06A 0.2M	EK025: Free Cyanide	----	1	mg/kg	<1	<1	0.0
EG: Metals and Major Cations (QC Lot: 1410167)								
HK1014711-003	Anonymous	EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Copper	7440-50-8	1	mg/kg	5	5	0.0
		EG020: Lead	7439-92-1	1	mg/kg	18	21	16.0
		EG020: Nickel	7440-02-0	1	mg/kg	13	14	9.5
		EG020: Zinc	7440-66-6	1	mg/kg	84	75	11.6
HK1014893-004	H04B 0.2M DUPLICATE	EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Copper	7440-50-8	1	mg/kg	24	23	0.0
		EG020: Lead	7439-92-1	1	mg/kg	67	69	3.1
		EG020: Nickel	7440-02-0	1	mg/kg	14	14	0.0
		EG020: Zinc	7440-66-6	1	mg/kg	91	103	12.3
EG: Metals and Major Cations (QC Lot: 1410170)								
HK1014711-003	Anonymous	EG036: Mercury	7439-97-6	0.02	mg/kg	0.07	0.06	20.0
HK1014893-004	H04B 0.2M DUPLICATE	EG036: Mercury	7439-97-6	0.2	mg/kg	<0.2	<0.2	0.0
EG: Metals and Major Cations (QC Lot: 1410174)								
HK1014711-003	Anonymous	EG3060: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.0
HK1014893-004	H04B 0.2M DUPLICATE	EG3060: Hexavalent Chromium	18540-29-9	1	mg/kg	<1	<1	0.0
EP-080: BTEX (QC Lot: 1403178)								
HK1014321-001	Anonymous	Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0
		Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.0
		Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.0
		ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.0
		meta- & para-Xylene	108-38-3	0.4	mg/kg	<0.4	<0.4	0.0
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 1403178)								
HK1014321-001	Anonymous	C6 - C8 Fraction	----	5	mg/kg	<5	<5	0.0
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 1403180)								
HK1014321-001	Anonymous	C9 - C16 Fraction	----	200	mg/kg	<200	<200	0.0
		C17 - C35 Fraction	----	500	mg/kg	<500	<500	0.0
EP-074A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 1404268)								
HK1014489-001	Anonymous	Styrene	100-42-5	0.04	mg/kg	<0.04	<0.04	0.0
EP-074B: Oxygenated Compounds (QC Lot: 1404268)								
HK1014489-001	Anonymous	2-Butanone (MEK)	78-93-3	0.4	mg/kg	<0.4	<0.4	0.0
		2-Propanone (Acetone)	67-64-1	5	mg/kg	<5	<5	0.0



Matrix: SOIL				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EP-074E: Halogenated Aliphatics (QC Lot: 1404268)								
HK1014489-001	Anonymous	Trichloroethene	79-01-6	0.04	mg/kg	<0.04	<0.04	0.0
		Tetrachloroethene	127-18-4	0.04	mg/kg	<0.04	<0.04	0.0
		Methylene chloride	75-09-2	5	mg/kg	<5	<5	0.0
EP-074G: Trihalomethanes (THM) (QC Lot: 1404268)								
HK1014489-001	Anonymous	Chloroform	67-66-3	0.04	mg/kg	<0.04	<0.04	0.0
		Bromodichloromethane	75-27-4	0.04	mg/kg	<0.04	<0.04	0.0
EP-074L: Methyl-tert-butyl Ether (QC Lot: 1404268)								
HK1014489-001	Anonymous	Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.5	mg/kg	<0.5	<0.5	0.0
EP-075A: Phenols (QC Lot: 1404930)								
HK1014625-001	Anonymous	Phenol	108-95-2	0.1	mg/kg	<0.1	<0.1	0.0
EP-075B: Polyaromatic Hydrocarbons (PAHs) (QC Lot: 1404930)								
HK1014625-001	Anonymous	Naphthalene	91-20-3	0.1	mg/kg	<0.1	<0.1	0.0
		Acenaphthylene	208-96-8	0.1	mg/kg	<0.1	<0.1	0.0
		Acenaphthene	83-32-9	0.1	mg/kg	<0.1	<0.1	0.0
		Fluorene	86-73-7	0.1	mg/kg	<0.1	<0.1	0.0
		Phenanthrene	85-01-8	0.1	mg/kg	<0.1	<0.1	0.0
		Anthracene	120-12-7	0.1	mg/kg	<0.1	<0.1	0.0
		Fluoranthene	206-44-0	0.1	mg/kg	<0.1	<0.1	0.0
		Pyrene	129-00-0	0.1	mg/kg	<0.1	<0.1	0.0
		Benz(a)anthracene	56-55-3	0.1	mg/kg	<0.1	<0.1	0.0
		Chrysene	218-01-9	0.1	mg/kg	<0.1	<0.1	0.0
		Benzo(a)pyrene	50-32-8	0.1	mg/kg	<0.1	<0.1	0.0
		Indeno(1.2.3.cd)pyrene	193-39-5	0.1	mg/kg	<0.1	<0.1	0.0
		Dibenz(a.h)anthracene	53-70-3	0.1	mg/kg	<0.1	<0.1	0.0
		Benzo(g.h.i)perylene	191-24-2	0.1	mg/kg	<0.1	<0.1	0.0
		Benzo(b) & Benzo(k)fluoranthene	205-99-2	0.2	mg/kg	<0.2	<0.2	0.0
EP-075C: Phthalate Esters (QC Lot: 1404930)								
HK1014625-001	Anonymous	Bis(2-ethylhexyl)phthalate	117-81-7	1.0	mg/kg	<1.0	<1.0	0.0
EP-075G: Chlorinated Hydrocarbons (QC Lot: 1404930)								
HK1014625-001	Anonymous	Hexachlorobenzene (HCB)	118-74-1	0.2	mg/kg	<0.2	<0.2	0.0
EP-066: Polychlorinated Biphenyls (QC Lot: 1406342)								
HK1014741-001	Anonymous	Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0
Matrix: WATER				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1414678)								
HK1014893-006	FIELD BLANK	EK025MD: Free Cyanide	----	0.01	mg/L	0.01	0.01	0.0
EG: Metals and Major Cations (QC Lot: 1411941)								
HK1014893-005	EQUIPMENT BLANK	EG050: Hexavalent Chromium	18540-29-9	0.02	mg/L	<0.02	<0.02	0.0



Matrix: WATER				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EG: Metals and Major Cations - Filtered (QC Lot: 1409965)								
HK1014893-006	FIELD BLANK	EG036: Mercury	7439-97-6	0.5	µg/L	<0.5	<0.5	0.0
EG: Metals and Major Cations - Filtered (QC Lot: 1409966)								
HK1014893-006	FIELD BLANK	EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	0.0
		EG020: Copper	7440-50-8	1	µg/L	<1	<1	0.0
		EG020: Lead	7439-92-1	1	µg/L	<1	<1	0.0
		EG020: Nickel	7440-02-0	1	µg/L	<1	<1	0.0
		EG020: Zinc	7440-66-6	10	µg/L	<10	<10	0.0
EP-080: BTEX (QC Lot: 1407117)								
HK1014711-001	Anonymous	Benzene	71-43-2	2	µg/L	<2	<2	0.0
		Toluene	108-88-3	2	µg/L	<2	<2	0.0
		Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0
		ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0
		meta- & para-Xylene	108-38-3	4	µg/L	<4	<4	0.0
		106-42-3						
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 1407117)								
HK1014711-001	Anonymous	C6 - C8 Fraction	----	0.02	mg/L	<0.02	<0.02	0.0
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 1407687)								
HK1014711-001	Anonymous	C9 - C16 Fraction	----	0.5	mg/L	<0.5	<0.5	0.0
		C17 - C35 Fraction	----	0.5	mg/L	<0.5	<0.5	0.0
EP-074A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 1410073)								
HK1015017-001	Anonymous	Styrene	100-42-5	5	µg/L	<5	<5	0.0
EP-074B: Oxygenated Compounds (QC Lot: 1410073)								
HK1015017-001	Anonymous	2-Propanone (Acetone)	67-64-1	50	µg/L	<50	<50	0.0
		2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.0
EP-074E: Halogenated Aliphatics (QC Lot: 1410073)								
HK1015017-001	Anonymous	Methylene chloride	75-09-2	5	µg/L	<5	<5	0.0
		Trichloroethene	79-01-6	5	µg/L	<5	<5	0.0
		Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.0
EP-074G: Trihalomethanes (THM) (QC Lot: 1410073)								
HK1015017-001	Anonymous	Chloroform	67-66-3	5	µg/L	<5	<5	0.0
		Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.0
EP-074L: Methyl-tert-butyl Ether (QC Lot: 1410073)								
HK1015017-001	Anonymous	Methyl tert-Butyl Ether (MTBE)	1634-04-4	5	µg/L	<5	<5	0.0

Method Blank (MB), Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report

Matrix: SOIL				Method Blank (MB) Report		Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
Method: Compound		CAS Number	LOR	Unit	Result	Spike Concentratio	Spike Recovery (%)		Recovery Limits (%)		RPD (%)
							LCS	DCS	Low	High	Value Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1413192)											
EK025: Free Cyanide		----	1.0	mg/kg	<1	0.1983 mg/kg	108	----	85	115	----



Matrix: SOIL		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentratio	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
						LCS	DCS	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1413192) - Continued											
EG: Metals and Major Cations (QC Lot: 1410167)											
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	103	----	85	115	----	----
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	89.9	----	85	115	----	----
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	96.2	----	85	115	----	----
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	104	----	85	115	----	----
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	96.4	----	85	115	----	----
EG: Metals and Major Cations (QC Lot: 1410170)											
EG036: Mercury	7439-97-6	0.02	mg/kg	<0.02	0.1 mg/kg	110	----	85	115	----	----
EG: Metals and Major Cations (QC Lot: 1410174)											
EG3060: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	40 mg/kg	111	----	85	115	----	----
EP-080: BTEX (QC Lot: 1403178)											
Benzene	71-43-2	0.2	mg/kg	<0.2	0.2 mg/kg	96.3	----	75	117	----	----
Toluene	108-88-3	0.2	mg/kg	<0.2	0.2 mg/kg	91.9	----	69	111	----	----
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	0.2 mg/kg	96.5	----	75	112	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.4	mg/kg	<0.4	0.4 mg/kg	95.7	----	80	115	----	----
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	0.2 mg/kg	99.0	----	72	110	----	----
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 1403178)											
C6 - C8 Fraction	----	5	mg/kg	<5	3 mg/kg	110	----	51	147	----	----
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 1403180)											
C9 - C16 Fraction	----	200	mg/kg	<200	31 mg/kg	80.4	----	57	107	----	----
C17 - C35 Fraction	----	500	mg/kg	<500	75 mg/kg	77.3	----	43	106	----	----
EP-074A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 1404268)											
Styrene	100-42-5	0.04	mg/kg	<0.04	0.16 mg/kg	90.0	----	63	97	----	----
EP-074B: Oxygenated Compounds (QC Lot: 1404268)											
2-Propanone (Acetone)	67-64-1	5.0	mg/kg	<5	----	----	----	----	----	----	----
2-Butanone (MEK)	78-93-3	0.4	mg/kg	<0.4	1.6 mg/kg	108	----	56	113	----	----
EP-074E: Halogenated Aliphatics (QC Lot: 1404268)											
Methylene chloride	75-09-2	5.0	mg/kg	<5	----	----	----	----	----	----	----
Trichloroethene	79-01-6	0.04	mg/kg	<0.04	0.16 mg/kg	85.8	----	75	101	----	----
Tetrachloroethene	127-18-4	0.04	mg/kg	<0.04	0.16 mg/kg	94.9	----	64	108	----	----
EP-074G: Trihalomethanes (THM) (QC Lot: 1404268)											
Chloroform	67-66-3	0.04	mg/kg	<0.04	0.16 mg/kg	99.4	----	69	115	----	----
Bromodichloromethane	75-27-4	0.04	mg/kg	<0.04	0.16 mg/kg	98.8	----	73	105	----	----
EP-074L: Methyl-tert-butyl Ether (QC Lot: 1404268)											
Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.5	mg/kg	<0.5	----	----	----	----	----	----	----
EP-075A: Phenols (QC Lot: 1404930)											



Matrix: SOIL		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
Method: Compound	CAS Number				LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)
		LCS	DCS	Low					High	Value	Control Limit
EP-075A: Phenols (QC Lot: 1404930) - Continued											
Phenol	108-95-2	0.1	mg/kg	<0.1	0.25 mg/kg	85.6	----	32	132	----	----
EP-075B: Polyaromatic Hydrocarbons (PAHs) (QC Lot: 1404930)											
Naphthalene	91-20-3	0.1	mg/kg	<0.1	0.25 mg/kg	97.0	----	61	105	----	----
Acenaphthylene	208-96-8	0.1	mg/kg	<0.1	0.25 mg/kg	93.9	----	67	113	----	----
Acenaphthene	83-32-9	0.1	mg/kg	<0.1	0.25 mg/kg	76.4	----	72	102	----	----
Fluorene	86-73-7	0.1	mg/kg	<0.1	0.25 mg/kg	95.6	----	69	105	----	----
Phenanthrene	85-01-8	0.1	mg/kg	<0.1	0.25 mg/kg	82.5	----	62	105	----	----
Anthracene	120-12-7	0.1	mg/kg	<0.1	0.25 mg/kg	94.3	----	60	103	----	----
Fluoranthene	206-44-0	0.1	mg/kg	<0.1	0.25 mg/kg	100	----	65	110	----	----
Pyrene	129-00-0	0.1	mg/kg	<0.1	0.25 mg/kg	95.8	----	65	108	----	----
Benz(a)anthracene	56-55-3	0.1	mg/kg	<0.1	0.25 mg/kg	100	----	54	111	----	----
Chrysene	218-01-9	0.1	mg/kg	<0.1	0.25 mg/kg	96.1	----	57	122	----	----
Benzo(b) & Benzo(k)fluoranthene	205-99-2 207-08-9	0.2	mg/kg	<0.2	0.50 mg/kg	92.1	----	56	93	----	----
Benzo(a)pyrene	50-32-8	0.1	mg/kg	<0.1	0.25 mg/kg	94.2	----	54	101	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.1	mg/kg	<0.1	0.25 mg/kg	80.0	----	37	90	----	----
Dibenz(a,h)anthracene	53-70-3	0.1	mg/kg	<0.1	0.25 mg/kg	82.2	----	38	83	----	----
Benzo(g,h,i)perylene	191-24-2	0.1	mg/kg	<0.1	0.25 mg/kg	83.6	----	39	84	----	----
EP-075G: Chlorinated Hydrocarbons (QC Lot: 1404930)											
Hexachlorobenzene (HCB)	118-74-1	0.2	mg/kg	<0.2	0.25 mg/kg	97.8	----	57	123	----	----
EP-066: Polychlorinated Biphenyls (QC Lot: 1406342)											
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	0.5 mg/kg	67.0	----	65	131	----	----

Matrix: WATER		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report							
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)		
		Method: Compound	CAS Number	LOR		Unit	Result	LCS	DCS	Low	High	Value
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1414678)												
EK025MD: Free Cyanide		----	0.01	mg/L	<0.01	0.1983 mg/L	108	----	85	115	----	----
EG: Metals and Major Cations (QC Lot: 1411941)												
EG050: Hexavalent Chromium		18540-29-9	0.02	mg/L	<0.02	0.5 mg/L	100	----	85	115	----	----
EG: Metals and Major Cations - Filtered (QC Lot: 1409965)												
EG036: Mercury		7439-97-6	0.05	µg/L	<0.5	0.2 µg/L	98.7	----	85	115	----	----
EG: Metals and Major Cations - Filtered (QC Lot: 1409966)												
EG020: Cadmium		7440-43-9	0.2	µg/L	<0.2	100 µg/L	98.0	----	85	115	----	----
EG020: Copper		7440-50-8	1	µg/L	<1	100 µg/L	104	----	85	115	----	----
EG020: Lead		7439-92-1	1	µg/L	<1	100 µg/L	95.8	----	85	115	----	----
EG020: Nickel		7440-02-0	1	µg/L	<1	100 µg/L	102	----	85	115	----	----
EG020: Zinc		7440-66-6	10	µg/L	<10	100 µg/L	101	----	85	115	----	----



Matrix: WATER		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
						LCS	DCS	Low	High	Value	Control Limit
EP-080: BTEX (QC Lot: 1407117)											
Benzene	71-43-2	2	µg/L	----	10 µg/L	81.4	----	70	115	----	----
				<1	----	----	----	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	10 µg/L	96.8	----	67	117	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	88.3	----	76	107	----	----
meta- & para-Xylene	108-38-3 106-42-3	4	µg/L	<4	20 µg/L	101	----	77	112	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	92.1	----	69	109	----	----
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 1407117)											
C6 - C8 Fraction	----	0.5	mg/L	----	0.15 mg/L	97.0	----	68	125	----	----
				<0.02	----	----	----	----	----	----	----
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 1407687)											
C9 - C16 Fraction	----	0.5	mg/L	<0.5	0.25 mg/L	82.5	----	17	170	----	----
C17 - C35 Fraction	----	0.5	mg/L	<0.5	0.5 mg/L	88.0	----	32	143	----	----
EP-074A: Monocyclic Aromatic Hydrocarbons (MAH) (QC Lot: 1410073)											
Styrene	100-42-5	5	µg/L	<5	10 µg/L	85.6	----	73	119	----	----
EP-074B: Oxygenated Compounds (QC Lot: 1410073)											
2-Butanone (MEK)	78-93-3	50	µg/L	<50	100 µg/L	79.7	----	63	126	----	----
EP-074E: Halogenated Aliphatics (QC Lot: 1410073)											
Trichloroethene	79-01-6	5	µg/L	<5	10 µg/L	99.5	----	67	125	----	----
Tetrachloroethene	127-18-4	5	µg/L	<5	10 µg/L	96.9	----	59	126	----	----
EP-074G: Trihalomethanes (THM) (QC Lot: 1410073)											
Chloroform	67-66-3	5	µg/L	<5	10 µg/L	99.0	----	68	123	----	----
Bromodichloromethane	75-27-4	5	µg/L	<5	10 µg/L	99.5	----	77	120	----	----
EP-075A: Phenols (QC Lot: 1404781)											
Phenol	108-95-2	0.5	µg/L	<0.5	5 µg/L	56.1	----	9	91	----	----
EP-075B: Polyaromatic Hydrocarbons (PAHs) (QC Lot: 1404781)											
Naphthalene	91-20-3	0.5	µg/L	<0.5	5 µg/L	73.5	----	39	109	----	----
Acenaphthylene	208-96-8	0.5	µg/L	<0.5	5 µg/L	87.9	----	40	113	----	----
Acenaphthene	83-32-9	0.5	µg/L	<0.5	5 µg/L	88.4	----	37	116	----	----
Fluorene	86-73-7	0.5	µg/L	<0.5	5 µg/L	94.3	----	43	111	----	----
Phenanthrene	85-01-8	0.5	µg/L	<0.5	5 µg/L	85.9	----	50	118	----	----
Anthracene	120-12-7	0.5	µg/L	<0.5	5 µg/L	92.0	----	51	113	----	----
Fluoranthene	206-44-0	0.5	µg/L	<0.5	5 µg/L	91.7	----	66	110	----	----
Pyrene	129-00-0	0.5	µg/L	<0.5	5 µg/L	95.3	----	65	109	----	----
Benz(a)anthracene	56-55-3	0.5	µg/L	<0.5	5 µg/L	86.6	----	65	111	----	----
Chrysene	218-01-9	0.2	µg/L	<0.2	5 µg/L	98.2	----	67	119	----	----
Benzo(b) & Benzo(k)fluoranthene	205-99-2 207-08-9	0.05	µg/L	<0.05	10 µg/L	82.0	----	65	91	----	----
Benzo(a)pyrene	50-32-8	0.05	µg/L	<0.05	5 µg/L	84.2	----	60	95	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.05	µg/L	<0.05	5 µg/L	79.1	----	36	106	----	----



Matrix: WATER		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report							
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)		
Method: Compound	CAS Number	LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit	
EP-075B: Polyaromatic Hydrocarbons (PAHs) (QC Lot: 1404781) - Continued												
Dibenz(a,h)anthracene		53-70-3	0.5	µg/L	<0.5	5 µg/L	79.2	----	50	80	----	----
Benzo(g,h,i)perylene		191-24-2	0.05	µg/L	<0.05	5 µg/L	80.6	----	49	81	----	----
EP-075G: Chlorinated Hydrocarbons (QC Lot: 1404781)												
Hexachlorobenzene (HCB)		118-74-1	0.5	µg/L	<0.5	5 µg/L	87.2	----	41	118	----	----
EP-066_67: Total Polychlorinated Biphenyls (QC Lot: 1409452)												
Total Polychlorinated biphenyls		----	0.01	µg/L	<0.01	0.1 µg/L	99.8	----	82	123	----	----

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

Matrix: SOIL				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number		MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 1410167)										
HK1014651-001	Anonymous	EG020: Cadmium	7440-43-9	5 mg/kg	97.2	----	75	125	----	----
		EG020: Copper	7440-50-8	5 mg/kg	85.2	----	75	125	----	----
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined	----	75	125	----	----
		EG020: Nickel	7440-02-0	5 mg/kg	92.0	----	75	125	----	----
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	----	75	125	----	----
EG: Metals and Major Cations (QC Lot: 1410170)										
HK1014651-001	Anonymous	EG036: Mercury	7439-97-6	0.1 mg/kg	95.0	----	75	125	----	----
EG: Metals and Major Cations (QC Lot: 1410174)										
HK1014711-002	Anonymous	EG3060: Hexavalent Chromium	18540-29-9	40 mg/kg	86.2	----	75	125	----	----
EP-080: BTEX (QC Lot: 1403178)										
HK1014321-003	Anonymous	Benzene	71-43-2	0.2 mg/kg	104	----	50	130	----	----
		Toluene	108-88-3	0.2 mg/kg	108	----	50	130	----	----
		Ethylbenzene	100-41-4	0.2 mg/kg	96.9	----	50	130	----	----
		meta- & para-Xylene	108-38-3	0.4 mg/kg	109	----	50	130	----	----
		106-42-3								
ortho-Xylene	95-47-6	0.2 mg/kg	98.8	----	50	130	----	----		
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 1403178)										
HK1014321-003	Anonymous	C6 - C8 Fraction	----	3 mg/kg	109	----	50	130	----	----
EP-071HK: Total Petroleum Hydrocarbons (TPH) (QC Lot: 1403180)										
HK1014321-003	Anonymous	C9 - C16 Fraction	----	31 mg/kg	71.3	----	50	130	----	----
		C17 - C35 Fraction	----	75 mg/kg	72.4	----	50	130	----	----

Matrix: WATER	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report
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Matrix: WATER				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations - Filtered (QC Lot: 1409965)										
HK1014893-005	EQUIPMENT BLANK	EG036: Mercury	7439-97-6	0.2 µg/L	100	----	75	125	----	----
EG: Metals and Major Cations - Filtered (QC Lot: 1409966)										
HK1014893-005	EQUIPMENT BLANK	EG020: Cadmium	7440-43-9	100 µg/L	94.5	----	75	125	----	----
		EG020: Copper	7440-50-8	100 µg/L	102	----	75	125	----	----
		EG020: Lead	7439-92-1	100 µg/L	97.5	----	75	125	----	----
		EG020: Nickel	7440-02-0	100 µg/L	102	----	75	125	----	----
		EG020: Zinc	7440-66-6	100 µg/L	96.4	----	75	125	----	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP-080S: TPH(Volatile)/BTEX Surrogate			
Dibromofluoromethane	1868-53-7	80	120
Toluene-D8	2037-26-5	81	117
4-Bromofluorobenzene	460-00-4	74	121
EP-074S: VOC Surrogates			
Dibromofluoromethane	1868-53-7	80	120
Toluene-D8	2037-26-5	81	117
4-Bromofluorobenzene	460-00-4	74	121
EP-075S: Acid Extractable Surrogates			
2-Fluorophenol	367-12-4	25	121
Phenol-d6	13127-88-3	24	113
2,4,6-Tribromophenol	118-79-6	20	122
EP-075T: Base/Neutral Extractable Surrogates			
Nitrobenzene -d5	4165-60-0	23	120
2-Fluorobiphenyl	321-60-8	30	115
4-Terphenyl-d14	1718-51-0	20	137
EP-066S: PCB Surrogate			
Tetrachlorometaxylene	877-09-8	50	130
Dibutylchlorendate	1770-80-5	50	130

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP-080S: TPH(Volatile)/BTEX Surrogate			
Dibromofluoromethane	1868-53-7	86	118
Toluene-D8	2037-26-5	88	110
4-Bromofluorobenzene	460-00-4	86	115
EP-074S: VOC Surrogates			



Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP-074S: VOC Surrogates - Continued			
Dibromofluoromethane	1868-53-7	86	118
Toluene-D8	2037-26-5	88	110
4-Bromofluorobenzene	460-00-4	86	115
EP-075S: Acid Extractable Surrogates			
2-Fluorophenol	367-12-4	21	100
Phenol-d6	13127-88-3	20	94
2,4,6-Tribromophenol	118-79-6	20	123
EP-075T: Base/Neutral Extractable Surrogates			
Nitrobenzene -d5	4165-60-0	35	114
2-Fluorobiphenyl	321-60-8	43	116
4-Terphenyl-d14	1718-51-0	33	141
EP-066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	50	130



Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1012180	Page	: 1 of 5
Client	: ALS TECHNICHEM (HK)	Laboratory	: Environmental Division Brisbane
Contact	: MR GODFREY CHAN	Contact	: Greg Vogel
Address	: 11/F CHUNG SHUN KNITTING CENTRE 1-3 WING YIP STREET KWAI CHUNG NT HONG KONG	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: godfrey.chan@alsenviro.com	E-mail	: brisbane.enviro.services@alsglobal.com
Telephone	: +852 852 2610 1044	Telephone	: +61 7 3243 7222
Facsimile	: +852 852 2610 2021	Facsimile	: +61 7 3243 7218
Project	: HK1014893	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: -----	Date Samples Received	: 12-JUL-2010
C-O-C number	: -----	Issue Date	: 19-JUL-2010
Sampler	: -----	No. of samples received	: 4
Site	: -----	No. of samples analysed	: 4
Quote number	: EN/48/10		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits



WORLD RECOGNISED
ACCREDITATION

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Sarah Ashworth	Organic Chemist	Organics
Stephen Hislop	Senior Inorganic Chemist	Inorganics

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Page : 3 of 5
Work Order : EB1012180
Client : ALS TECHNICHEM (HK)
Project : HK1014893

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

- Pesticides: Samples HK1014893-1, HK1014893-2, HK1014893-3 and HK1014893-4 required dilution prior to analysis due to matrix interferences. LOR values have been adjusted accordingly. Surrogate recoveries are not determined.



Page : 4 of 5
Work Order : EB1012180
Client : ALS TECHNICHEM (HK)
Project : HK1014893

Analytical Results

Sub-Matrix: SOIL

Compound	CAS Number		Client sample ID		Client sampling date / time	
	LOR	Unit	HK1014893-1	HK1014893-2	HK1014893-3	HK1014893-4
EA055: Moisture Content	----	%	12.0	9.4	8.0	7.9
^ Moisture Content (dried @ 103°C)	----	%	12.0	9.4	8.0	7.9
EP068A: Organochlorine Pesticides (OC)	----	mg/kg	<0.07	<0.06	<0.07	<0.07
Hexachlorobenzene (HCB)	118-74-1	mg/kg	<0.07	<0.06	<0.07	<0.07
EP068S: Organochlorine Pesticide Surrogate	----	%	Not Determined	Not Determined	Not Determined	Not Determined
Dibromo-DDE	21655-73-2	%	Not Determined	Not Determined	Not Determined	Not Determined
EP068T: Organophosphorus Pesticide Surrogate	----	%	Not Determined	Not Determined	Not Determined	Not Determined
DEF	78-48-8	%	Not Determined	Not Determined	Not Determined	Not Determined



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Work Order : EB1012180
Client : ALS TECHNICHEM (HK)
Project : HK1014893

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	10	138
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	22.8	134.5



Environmental Division

QUALITY CONTROL REPORT

Work Order	: EB1012180	Page	: 1 of 5
Client	: ALS TECHNICHEM (HK)	Laboratory	: Environmental Division Brisbane
Contact	: MR GODFREY CHAN	Contact	: Greg Vogel
Address	: 11/F CHUNG SHUN KNITTING CENTRE 1-3 WING YIP STREET KWAI CHUNG NT HONG KONG	Address	: 32 Shand Street Stafford QLD Australia 4053
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Telephone	: +852 852 2610 1044	Telephone	: +61 7 3243 7222
Facsimile	: +852 852 2610 2021	Facsimile	: +61 7 3243 7218
Project	: HK1014893	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: *****		
C-O-C number	: *****	Date Samples Received	: 12-JUL-2010
Sampler	: *****	Issue Date	: 19-JUL-2010
Order number	: *****	No. of samples received	: 4
Quote number	: EN/48/10	No. of samples analysed	: 4

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits



WORLD RECOGNISED
ACCREDITATION

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Sarah Ashworth	Organic Chemist	Organics
Stephen Hislop	Senior Inorganic Chemist	Inorganics



Page : 2 of 5
Work Order : EB1012180
Client : ALS TECHNICHEM (HK)
Project : HK1014893

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC



Page : 3 of 5
Work Order : EB1012180
Client : ALS TECHNICHEM (HK)
Project : HK1014893

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

Sub-Matrix: SOIL

Sub-Matrix: SOIL									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (QC Lot: 1415321)									
EB1012137-036	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	20.7	21.0	1.2	0% - 20%
EB1012137-043	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	9.5	10.0	5.4	0% - 50%
EP068A: Organochlorine Pesticides (OC) (QC Lot: 1416436)									
EB1012093-001	Anonymous	EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
EB1012206-017	Anonymous	EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit



Page : 4 of 5
Work Order : EB1012180
Client : ALS TECHNICHEM (HK)
Project : HK1014893

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: SOIL

Method Blank (MB) Report			Laboratory Control Spike (LCS) Report			
			Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
Result			Unit		Low	High
CAS Number			LOR			
EP068A: Organochlorine Pesticides (OC) (QCLot: 1416436)			0.05			
EP068: Hexachlorobenzene (HCB)			mg/kg	0.5 mg/kg	75.2	57.7
						107

Page : 5 of 5
Work Order : EB1012180
Client : ALS TECHNICHEM (HK)
Project : HK1014893



Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) Results are required to be reported.**

Additional Sampling



CERTIFICATE OF ANALYSIS

Client	: AECOM ASIA COMPANY LIMITED	Laboratory	: ALS Technichem HK Pty Ltd	Page	: 1 of 3
Contact	: MR KA MING CHAN	Contact	: Chan Kwok Fai, Godfrey	Work Order	: HK1102601
Address	: 11/F, TOWER 2, GRAND CENTRAL PLAZA, 138 SHATIN RURAL COMMITTEE ROAD, SHATIN, N.T., HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong	Amendment	: 1
E-mail	: km.chan@aecom.com	E-mail	: Godfrey.Chan@alsenviro.com		
Telephone	: ----	Telephone	: +852 2610 1044		
Facsimile	: ----	Facsimile	: +852 2610 2021		
Project	: XRL821 - KWAI CHUNG VENTILATION BUILDING (H)	Quote number	: ----	Date Samples Received	: 01-FEB-2011
Order number	: 60162431-2.01			Issue Date	: 03-MAR-2011
C-O-C number	: H010646			No. of samples received	: 5
Site	: ----			No. of samples analysed	: 4

General Comments

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release. When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes. The completion date of analysis is: 02-FEB-2011

Key: LOR = Limit of reporting; CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

Specific comments for Work Order: **HK1102601**

Sample(s) were received in a chilled condition.

Soil sample(s) analysed on an as received basis. Result(s) reported on a dry weight basis.

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This document has been electronically signed by those names that appear on this report and are the authorised signatories. Electronic signing has been carried out in compliance with procedures specified in the Electronic Transactions Ordinance of Hong Kong, Chapter 553, Section 6.

Signatories

Anh Ngoc Huynh
Fung Lim Chee, Richard

Position

Senior Chemist
General Manager

Authorised results for

Organics
Inorganics



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				CS1-01	CS1-02	CS1-03	CS1-04	
				[01-FEB-2011]	[01-FEB-2011]	[01-FEB-2011]	[01-FEB-2011]	
Compound	CAS Number	LOR	Unit	HK1102601-001	HK1102601-002	HK1102601-003	HK1102601-004	
EA/ED: Physical and Aggregate Properties								
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	14.3	16.3	17.2	13.9	
EP-075C: Phthalate Esters								
Bis(2-ethylhexyl)phthalate	117-81-7	5	mg/kg	<5	<5	<5	<5	
EP-075S: Acid Extractable Surrogates								
Surrogate control limits listed at end of this report.								
2-Fluorophenol	367-12-4	0.1	%	96.4	89.1	95.1	89.3	
Phenol-d6	13127-88-3	0.1	%	89.8	85.4	90.9	86.3	
2,4,6-Tribromophenol	118-79-6	0.1	%	82.6	70.7	105	60.5	
EP-075T: Base/Neutral Extractable Surrogates								
Surrogate control limits listed at end of this report.								
Nitrobenzene -d5	4165-60-0	0.1	%	93.6	89.8	94.8	91.7	
2-Fluorobiphenyl	321-60-8	0.1	%	94.1	91.0	95.7	92.8	
4-Terphenyl-d14	1718-51-0	0.1	%	100	81.1	79.9	79.6	



Laboratory Duplicate (DUP) Report

Matrix: SOIL				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 1653263)								
HK1102601-001	CS1-01	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	14.3	13.9	2.6
EP-075C: Phthalate Esters (QC Lot: 1650203)								
HK1102312-001	Anonymous	Bis(2-ethylhexyl)phthalate	117-81-7	5	mg/kg	<5	<5	0.0

Method Blank (MB), Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report

Matrix: SOIL		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EP-075C: Phthalate Esters (QC Lot: 1650203)											
Bis(2-ethylhexyl)phthalate	117-81-7	5.0	mg/kg	<5	0.25 mg/kg	80.0	----	56	120	----	----

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

- No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP-075S: Acid Extractable Surrogates			
2-Fluorophenol	367-12-4	25	121
Phenol-d6	13127-88-3	24	113
2,4,6-Tribromophenol	118-79-6	20	122
EP-075T: Base/Neutral Extractable Surrogates			
Nitrobenzene -d5	4165-60-0	23	120
2-Fluorobiphenyl	321-60-8	30	115
4-Terphenyl-d14	1718-51-0	20	137

APPENDIX D

Reference Geological Log



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D328

SHEET **1** OF **11**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT Contract NEX/2108 Ground Investigation Works for Express Rail Link

METHOD Rotary Cored

CO-ORDINATES

WORKS ORDER NO. GCE/2008/001/SI/R

MACHINE & NO. DR101

E 831811.18

N 824481.61

DATE FROM 21/10/2008 TO 08/11/2008

FLUSHING MEDIUM Water

ORIENTATION 35°/125°

GROUND LEVEL +12.84 mPD

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
21/10/2008	PX	08:00						INSPECTION PIT	+12.84	0.00			Brownish grey spotted dark grey, light grey and white, mottled yellowish brown, light grey and red, fine to coarse SAND with occasional angular to subangular fine gravel sized quartz fragments and some fine to medium gravel sized moderately decomposed granite fragments. (FILL)
			83	27	21	>20				0.50			
			82	0	0			T2101	+12.04	1.39		II	Strong, pink spotted dark greenish grey and white, locally mottled and striped dark greenish grey, slightly decomposed, fine grained GRANITE with intense microfractures and chlorite veins (thickness from <0.5mm up to 1mm). Joints are very closely to closely spaced, locally medium spaced, smooth stepped, extremely narrow, chlorite and kaolin (<0.5mm thick) infilled, locally iron oxide stained.
	PX		100	0	0			T2101		1.95			
	HX		100	37	0			T2101		2.29			
			100	38	14	9.5		T2101		2.77			
	HX		100					T2101		3.48			
		3.05m at 18:00				>20		T2101		4.48		III	From 3.96m to 4.31m : Moderately strong, moderately decomposed.
21/10/2008 23/10/2008		3.06m at 08:00	100	59	40	13.3		T2101		5.86		II	At 5.08m : With a slickensided undulating fracture.
						2.9							
			100	74	62	11.1		T2101		7.29		III	From 6.13m to 6.46m : Moderately strong, moderately decomposed.
						>20						II	
			100	70	49	10.3		T2101		8.54		III	From 7.20m to 7.46m : Moderately strong, moderately decomposed.
						2.6						II	
			100	33	28	10.7		T2101		9.55			
						>20							
			100	42	23	13.3		T2101					

- SMALL DISTURBED SAMPLE
- ▲ LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- ▨ U76 UNDISTURBED SAMPLE
- ▨ U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- STANDPIPE
- STANDARD PENETRATION TEST
- PERMEABILITY TEST
- IMPRESSION PACKER TEST
- IN-SITU VANE SHEAR TEST
- PACKER TEST

LOGGED D.Y. Yip

DATE 10/11/2008

CHECKED James Lu

DATE 11/11/2008

REMARKS

- Packer tests were carried out from the depths of 7.00m to 13.00m, 13.00m to 19.00m, 19.00m to 25.00m, 25.00m to 31.00m, 31.00m to 37.00m, 37.00m to 43.00m, 43.00m to 49.00m, 49.00m to 55.00m, 55.00m to 61.00m, 62.00m to 68.00m, 68.00m to 74.00m, 74.00m to 80.00m, 80.00m to 86.00m, 86.00m to 92.00m and 92.00m to 98.00m.
- Acoustic televiwer survey was carried out from the depths of 3.50m to 95.00m.



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D328

SHEET **2** OF **11**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT Contract NEX/2108 Ground Investigation Works for Express Rail Link

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. GCE/2008/001/SI/R

MACHINE & NO. **DR101**

E 831811.18

DATE FROM **21/10/2008** TO **08/11/2008**

N 824481.61

FLUSHING MEDIUM **Water**

ORIENTATION **35°/125°**

GROUND LEVEL **+12.84 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
10										12.00	+		See sheet 1 of 11 for details.
11			100	34	17	>20 7.0		T2101		10.97	+		
12			100	57	37	>20 8.8		T2101		11.80	+		
13			100	57	50	>20 7.7 8.3		T2101		12.92	+		
14		7.11m at 18:00	100	81	56	>20 14.6		T2101		14.38	+		
15		10.02m at 08:00	100	70	42	>20 13.8		T2101		15.73	+		
16			100	57	36	>20 8.1 14.2		T2101		16.84	+		
17			100	90	70	2.3 13.9		T2101		18.14	+		
18			100	93	64			T2101		19.50	+		
19		10.08m at 18:00											
20		11.00m at 08:00											

- SMALL DISTURBED SAMPLE
- ⬆ LARGE DISTURBED SAMPLE
- ▢ SPT LINER SAMPLE
- ▨ U76 UNDISTURBED SAMPLE
- ▩ U100 UNDISTURBED SAMPLE
- ▧ MAZIER SAMPLE
- ▦ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- ⬆ STANDPIPE
- ⬇ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- ⊥ IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⊥ PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/11/2008**
CHECKED **James Lu**
DATE **11/11/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D328

SHEET **3** OF **11**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

E 831811.18

N 824481.61

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **DR101**

DATE FROM **21/10/2008** TO **08/11/2008**

FLUSHING MEDIUM **Water**

ORIENTATION **35°/125°**

GROUND LEVEL **+12.84 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
20			100	100	14			T2101		20.00	++		
			100	100	14			T2101		20.36	++		
21			100	78	70			T2101		21.07	++		
			100	74	59	4.7		T2101		22.23	++		
22			100	90	80	7.0		T2101		23.56	++		
23			100	61	44	>20		T2101		25.01	++		
24			100	51	31	6.2		T2101		25.88	++		
25		10.90m at 18:00	100	46	38	>20		T2101		27.13	++		
26		11.25m at 08:00	100	54	54	NR		T2101		27.98	++	III	From 27.36m to 27.53m : Chloritized granite.
27			100	90	90	5.4		T2101		28.32	++	V	From 27.91m to 28.32m : Moderately strong, moderately decomposed.
28			100	90	90			T2101		28.64	++	II	No core recovered, assumed to be completely decomposed GRANITE.
29			100	90	90			T2101		29.42	++		Strong, pink spotted dark greenish grey, light grey and white, striped and locally mottled dark greenish grey, slightly decomposed, fine grained altered GRANITE with intense microfractures and chlorite veins (thickness from <0.5mm up to 1mm). Joints are closely to medium spaced, locally very
30			100	90	90			T2101			++		

- SMALL DISTURBED SAMPLE
- ⬆ LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- ▨ U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- ▩ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- ⬆ STANDPIPE
- ⬆ STANDARD PENETRATION TEST
- ⬆ PERMEABILITY TEST
- ⬆ IMPRESSION PACKER TEST
- ⬆ IN-SITU VANE SHEAR TEST
- ⬆ PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/11/2008**
CHECKED **James Lu**
DATE **11/11/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D328

SHEET **4** OF **11**

DRILLHOLE RECORD

CONTRACT NO. **NEX/2108**

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **DR101**

E 831811.18

DATE FROM **21/10/2008** TO **08/11/2008**

N 824481.61

FLUSHING MEDIUM **Water**

ORIENTATION **35°/125°**

GROUND LEVEL **+12.84 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
30										30.88	++		
31			100	88	82			T2101		30.80	++		closely and widely spaced, rough stepped and rough undulating, locally smooth stepped, extremely narrow, locally very narrow, chlorite, white kaolin (<0.5mm thick) and locally pyrite infilled. At 30.30m : With a slickensided undulating fracture infilled with white kaolin (<0.5mm thick) and galena. At 30.50m : With a slickensided undulating fracture.
32			100	69	52			T2101		32.10	++		
33		5.06m at 18:00				>20		T2101			++		From 32.85m to 33.00m : Basalt dyke.
27/10/2008 28/10/2008		11.64m at 08:00	100	55	26	14.1				33.51	++		
34						>20		T2101			++		
						7.1					++		
						>20		T2101			++		
35			100	80	53	9.8				34.81	++		From 35.31m to 35.63m : With a margin of aplite dyke.
36			100	89	86			T2101		36.14	++		
37								T2101			++		
			100	37	13	>20				37.49	++		
38						10.8		T2101			++		
						>20					++		
39		5.88m at 18:00	100	67	51	13.3				38.88	++		
28/10/2008 29/10/2008		11.55m at	100	46	35	>20		T2101		39.72	++		From 39.72m to 39.77m : Moderately strong,
40								T201			++		

- SMALL DISTURBED SAMPLE
- ↑ LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- ▨ U76 UNDISTURBED SAMPLE
- ▨ U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- STANDPIPE
- ↓ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- ⊥ IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⊥ PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/11/2008**
CHECKED **James Lu**
DATE **11/11/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D328

SHEET **5** OF **11**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **DR101**

E 831811.18

DATE FROM **21/10/2008** TO **08/11/2008**

N 824481.61

FLUSHING MEDIUM **Water**

ORIENTATION **35°/125°**

GROUND LEVEL **+12.84 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
40		08:00								40.00			
41			100	80	63	9.5		T2101		40.88	+		moderately decomposed. From 40.16m to 41.68m : Chloritized granite.
42						>20 17.9		T2101			+	III II	From 41.35m to 41.49m : Moderately strong, moderately decomposed.
43			100	55	44	8.5				42.40	+		
44						>20 5.0 >20		T2101			+		
45			100	75	60	5.2				43.74	+		From 44.05m to 44.75m : Chloritized granite.
46						>20		T2101			+		From 44.64m to 44.73m : Moderately strong, moderately decomposed.
47		10.06m at 18:00	100	22	14	17.2				45.18	+		
48		11.89m at 08:00	100	33	13	>20		T2101		45.95	+		
49			100	81	81	4.2				46.79	+		
50						>20 10.2		T2101			+		
			100	79	44					48.15	+		
								T2101			+		
			100	50	43	>20				49.48	+		
								T2101			+		

- SMALL DISTURBED SAMPLE
- ↑ LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- ▨ U76 UNDISTURBED SAMPLE
- ▩ U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- STANDPIPE
- STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- ⊥ IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⊥ PACKER TEST

LOGGED D.Y. Yip
DATE 10/11/2008
CHECKED James Lu
DATE 11/11/2008

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D328

SHEET **6** OF **11**

DRILLHOLE RECORD

CONTRACT NO. **NEX/2108**

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **DR101**

E 831811.18

DATE FROM **21/10/2008** TO **08/11/2008**

N 824481.61

FLUSHING MEDIUM **Water**

ORIENTATION **35°/125°**

GROUND LEVEL **+12.84 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
50						5.6				50.00	+		
						>20		T2101			+		
						18.2					+		
						>20					+		
51			100	72	50	16.1		T2101		50.63	+		
						4.9					+		
						12.9					+		
52		6.00m at 18:00	100	23	12	>20		T2101		52.08	+		
31/10/2008		11.68m at 08:00									+		
			100	95	72	4.7		T2101		53.13	+		
53						>20					+		
						7.2		T2101			+		
54			100	39	39					54.43	+		
						>20		T2101			+		
55			100	5	0					55.70	+		
56								T2101			+		
			100	82	82	5.7				57.03	+	III	
57						>20		T2101			+	II	From 57.03m to 57.37m : Moderately strong, moderately decomposed.
						8.4					+		
58		7.14m at 18:00	100	42	28			T2101		58.41	+	III	From 58.00m to 59.27m : Dark grey, moderately strong, moderately decomposed.
31/10/2008		11.43m at 08:00				>20					+		
								T2101			+	II	From 59.13m to 60.56m : Chloritized granite.
59											+		
			100	42	20	11.1				59.87	+		
60											+		

- SMALL DISTURBED SAMPLE
- ↑ LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- ▨ U76 UNDISTURBED SAMPLE
- ▩ U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▩ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- STANDPIPE
- ⊥ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- II IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⊥ PACKER TEST

LOGGED **D.Y. Yip**

DATE **10/11/2008**

CHECKED **James Lu**

DATE **11/11/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D328

SHEET **7** OF **11**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT Contract NEX/2108 Ground Investigation Works for Express Rail Link

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. GCE/2008/001/S1/R

MACHINE & NO. **DR101**

E 831811.18

DATE FROM **21/10/2008** TO **08/11/2008**

N 824481.61

FLUSHING MEDIUM **Water**

ORIENTATION **35°/125°**

GROUND LEVEL **+12.84 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
60						>20				60.11	++		
						4.7		T2101		60.45	++	III	From 60.11m to 60.45m : With a slickensided undulating fracture.
61			100	53	25	>20				60.47	++		From 60.47m to 60.96m : Moderately strong, moderately decomposed.
						9.4		T2101		61.30	++	II	
62						>20				61.42	++	III	From 61.42m to 64.83m : Moderately strong, moderately decomposed.
			100	85	77	4.6		T2101		62.48	++		
63						>20				62.58	++		From 62.58m to 64.83m : Chloritized granite.
						1.7		T2101		63.36	++		
64			100	65	65					63.98	++		From 63.36m to 63.83m : With a quartz-fluorite vein of maximum thickness 10mm.
						>20		T2101	-24.34	64.83	++	II	
65		6.80m at 18:00				>20				65.28	++		Strong, dark greenish grey striped white, slightly decomposed, BASALT with some calcite veins (thickness from <0.5mm up to 6mm). Joints are very closely to closely spaced, locally medium spaced, smooth stepped and smooth undulating, locally rough undulating, extremely narrow, iron oxide stained, calcite and chlorite infilled.
02/11/2008 03/11/2008		11.94m at 08:00	100	60	60	5.4				66.76	++		
66						>20		T2101		67.88	++		
67			100	35	30					68.00	++		
						>20		T2101	-26.16	68.00	++	II	Strong, pink spotted dark greenish grey and white, locally striped and mottled dark greenish grey, slightly decomposed, fine grained GRANITE with intense microfractures. Joints are closely to medium spaced, locally extremely closely to very closely and widely spaced, rough stepped and rough undulating, locally smooth stepped and smooth undulating, extremely narrow, chlorite, white kaolin (<0.5mm thick) and locally calcite infilled.
68			100	94	94	3.6				69.26	++		From 68.78m to 70.42m : Chloritized granite.
						9.7		T2101			++		
69											++		
70											++		

- SMALL DISTURBED SAMPLE
- ↑ LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- ▨ U78 UNDISTURBED SAMPLE
- ▨ U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- STANDPIPE
- ↓ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- ⊥ IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⊥ PACKER TEST

LOGGED D.Y. Yip
DATE 10/11/2008
CHECKED James Lu
DATE 11/11/2008

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D328

SHEET **8** OF **11**

DRILLHOLE RECORD

CONTRACT NO. **NEX/2108**

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **DR101**

E 831811.18

DATE FROM **21/10/2008** TO **08/11/2008**

N 824481.61

FLUSHING MEDIUM **Water**

ORIENTATION **35°/125°**

GROUND LEVEL **+12.84 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
70										70.83	+		
71			100	100	93	3.8		T2101		70.74	+		From 69.29m to 70.50m : With some quartz-fluorite-calcite vein of thickness from <1mm up to 20mm. From 70.46m to 70.78m : With some quartz-calcite vein of maximum thickness 6mm. From 70.94m to 76.42m : Chloritized granite.
72		7.64m at 18:00	100	61	48			T2101		72.10	+		
73		11.66m at 08:00	100	61	51	>20		T2101		73.56	+		From 73.15m to 73.18m : Weak, highly decomposed.
74			100	61	51	8.3		T2101		74.89	+	III	From 74.00m to 74.05m : With a quartz-fluorite vein. From 74.26m to 74.92m : Moderately strong, moderately decomposed.
75			100	98	96	4.4		T2101		76.30	+	II	From 75.48m to 77.99m : With some quartz veins of thickness from <1mm up to 10mm.
76			100	100	100			T2101		77.74	+	III	From 76.58m to 76.91m : Moderately strong, moderately decomposed.
77			100	92	86	6.0		T2101		79.14	+	II	From 77.52m to 77.99m : Moderately strong, moderately decomposed.
78		7.05m at 18:00	100	83	49	>20		T2101			+		
79		11.06m at 08:00	100	83	49	15.6		T2101			+		
80											+		

- SMALL DISTURBED SAMPLE
- LARGE DISTURBED SAMPLE
- ▨ SPT LINER SAMPLE
- ▩ U78 UNDISTURBED SAMPLE
- ▩ U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▩ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- STANDPIPE
- ↓ STANDARD PENETRATION TEST
- ├ PERMEABILITY TEST
- └ IMPRESSION PACKER TEST
- ∨ IN-SITU VANE SHEAR TEST
- ⊥ PACKER TEST

LOGGED **D.Y. Yip**

DATE **10/11/2008**

CHECKED **James Lu**

DATE **11/11/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D328

SHEET **9** OF **11**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **DR101**

E 831811.18

DATE FROM **21/10/2008** TO **08/11/2008**

N 824481.61

FLUSHING MEDIUM **Water**

ORIENTATION **35°/125°**

GROUND LEVEL **+12.84 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
80						4.5		T2101		80.00	++		From 80.06m to 80.11m : Moderately strong, moderately decomposed.
			100	67	43			T2101		80.56	++		
81						>20		T2101			++		
						16.6					++		
82			100	75	31			T2101		82.06	++		
								T2101			++		
83			100	91	75	4.8		T2101		83.25	++		
								T2101			++		
84						>20					++		
			100	74	48	2.8		T2101		84.63	++		
85						>20					++		From 88.10m to 88.25m : Chloritized granite.
						18.4		T2101			++		
86		7.00m at 18:00				12.7					++		
		11.44m at 08:00	100	83	51			T2101		85.99	++		
								T2101			++		
87			100	74	70			T2101		87.38	++		
						>20		T2101			++		
88			100	81	39	11.7		T2101		88.25	++		
											++		
89								T2101			++		
											++		
90			100	92	58			T2101		88.75	++		

- SMALL DISTURBED SAMPLE
- ◄ LARGE DISTURBED SAMPLE
- ▨ SPT LINER SAMPLE
- ▨ U75 UNDISTURBED SAMPLE
- ▨ U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- STANDPIPE
- ⊥ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- ⊥ IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⊥ PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/11/2008**
CHECKED **James Lu**
DATE **11/11/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D328

SHEET **10** OF **11**

DRILLHOLE RECORD

CONTRACT NO. **NEX/2108**

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **DR101**

E 831811.18

DATE FROM **21/10/2008** TO **08/11/2008**

N 824481.61

FLUSHING MEDIUM **Water**

ORIENTATION **35°/125°**

GROUND LEVEL **+12.84 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
90										90.88			
91			100	100	45			T2101		90.88	+		
92			100	93	83			T2101		91.60	+		
93		9.41m at 18:00 11.84m at 08:00	100	100	99	2.8		T2101		92.71	+		
94			100	97	77	>20 8.7		T2101		93.98	+		
95			100	90	86			T2101		95.34	+		
96			100	90	72	16.4		T2101		96.78	+		
97			100	100	95	5.1		T2101		97.59	+		
98			100	55	35	14.0		T2101		98.89	+		
99			100			>20 8.4		T2101			+		
100		3.74m at											

From 93.34m to 93.71m : With some quartz-chlorite veins of thickness from <1mm up to 6mm.

From 99.61m to 99.91m : Chloritized granite.

- SMALL DISTURBED SAMPLE
- ↑ LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- ▨ U76 UNDISTURBED SAMPLE
- ▩ U100 UNDISTURBED SAMPLE
- ▧ MAZIER SAMPLE
- ▦ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- ◻ STANDPIPE
- ▽ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- ⊥ IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⚙ PACKER TEST

LOGGED D.Y. Yip
DATE 10/11/2008
CHECKED James Lu
DATE 11/11/2008

REMARKS

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT Contract NEX/2108 Ground Investigation Works for Express Rail Link

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. GCE/2008/001/SI/R

MACHINE & NO. DR101

E 831811.18
N 824481.61

DATE FROM 21/10/2008 TO 08/11/2008

FLUSHING MEDIUM **Water**

ORIENTATION 35°/125°

GROUND LEVEL +12.84 mPD

[illegible]

- | | | | |
|---|-------------------------|---|---------------------------|
|  | SMALL DISTURBED SAMPLE |  | WATER SAMPLE |
|  | LARGE DISTURBED SAMPLE |  | PIEZOMETER TIP |
|  | SPT LINER SAMPLE |  | STANDPIPE |
|  | U76 UNDISTURBED SAMPLE |  | STANDARD PENETRATION TEST |
|  | U100 UNDISTURBED SAMPLE |  | PERMEABILITY TEST |
|  | MAZIER SAMPLE |  | IMPRESSION PACKER TEST |
|  | PISTON SAMPLE |  | IN-SITU VANE SHEAR TEST |
| | |  | PACKER TEST |

LOGGED	<u>D.Y. Yip</u>
DATE	<u>10/11/2008</u>
CHECKED	<u>James Lu</u>
DATE	<u>11/11/2008</u>

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D329

SHEET **1** OF **5**

DRILLHOLE RECORD

CONTRACT NO. **NEX/2108**

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **DR128**

E 831793.42

DATE FROM **23/09/2008** TO **09/10/2008**

N 824512.35

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.62 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
25/09/2008	PX	08:00							+12.62	0.00			Extremely weak, reddish yellow spotted dark greenish grey and white, completely decomposed, fine grained GRANITE. (Silty fine to coarse SAND with some fine gravel)
25/09/2008		18:00	0					INSPECTION PIT		0.99		V	
26/09/2008		08:00							+11.12	1.50		V	Extremely weak, greenish grey spotted light grey and white, mottled yellowish brown, completely decomposed, fine grained GRANITE. (Silty fine to coarse SAND with some fine to occasional medium gravel)
	PX 3.00						180 bls			1.85			
	HX						234 bls		+9.62	3.00		V	Extremely weak, yellowish brown spotted dark greenish grey, mottled white, completely decomposed, fine grained GRANITE. (Clayey/silty sandy fine to coarse GRAVEL)
										3.33			
	HX 4.51								+8.11	4.51		III	Moderately strong, pink spotted dark greenish grey, mottled yellowish brown, moderately decomposed, fine grained GRANITE. Joints are very closely to closely spaced, locally medium spaced, rough stepped and rough undulating, extremely narrow, locally very narrow, iron and manganese oxide stained, chlorite and kaolin (thickness from <0.5mm up to 1mm) infilled, dipping at 40° to 50° and 60° to 70°, locally 20° to 30°. From 5.17m to 5.46m : Strong, slightly decomposed silicified granite along a quartz vein of maximum thickness 5mm dipping at 70° to 80°.
26/09/2008		2.50m at 18:00	100	66	66	NI		T2IOI		4.80			
29/09/2008		2.80m at 08:00	100	79	69	7.8		T2IOI		5.32			
			100	71	44			T2IOI		6.09			
			100	60	53	>20		T2IOI		6.77			
			96	96	71	8.2		T2IOI		7.75			
			98	53	32	20.0		T2IOI		8.12			
						2.6			+4.50			II	Strong, pink spotted dark greenish grey, light grey and white, locally mottled dark greenish grey, slightly decomposed, fine grained GRANITE with some microfractures dipping at 10° to 20°, 20° to 30°, 40° to 50°, 60° to 70° and 80° to 90°. Joints are closely to medium spaced, locally extremely closely to very closely and widely spaced, rough stepped and rough undulating, locally smooth planar and smooth stepped, extremely narrow, locally very narrow, chlorite
			100	87	67	12.0		T2IOI		9.20			

- SMALL DISTURBED SAMPLE
- LARGE DISTURBED SAMPLE
- ▨ SPT LINER SAMPLE
- ▩ U76 UNDISTURBED SAMPLE
- ▩ U100 UNDISTURBED SAMPLE
- ▩ MAZIER SAMPLE
- ▩ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- ▲ STANDPIPE
- ▬ STANDARD PENETRATION TEST
- ▬ PERMEABILITY TEST
- ▬ IMPRESSION PACKER TEST
- ▬ IN-SITU VANE SHEAR TEST
- ▬ PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/10/2008**
CHECKED **James Lu**
DATE **11/10/2008**

REMARKS
1. Acoustic televiewer survey was carried out from the depths of 4.20m to 47.44m.
2. Packer tests were carried out from the depths of 8.00m to 14.00m, 14.00m to 20.00m, 20.00m to 26.00m, 26.00m to 32.00m, 32.00m to 38.00m and 38.00m to 47.99m.
3. Standpipe was installed at a depth of 30.00m.



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D329

SHEET **2** OF **5**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT Contract NEX/2108 Ground Investigation Works for Express Rail Link

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **DR128**

E 831793.42

DATE FROM **23/09/2008** TO **09/10/2008**

N 824512.35

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.62 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
10			100	44	18					10.00			
11		2.50m at 18:00	100	80	62	5.3		T2IOI		10.12			white kaolin (thickness from <0.5mm up to 1mm) and locally quartz infilled, dipping at 10° to 20°, 20° to 30°, 40° to 50°, 60° to 70° and 80° to 90°, locally 0° to 10°. From 8.19m to 8.91m : With 80° to 90° joints. From 9.03m to 9.19m : With a coarse gravel sized pocket of pegmatite. From 9.05m to 11.40m : With 80° to 90° joints where incipient from 9.37m to 9.62m, 9.70m to 9.85m and 10.53m to 10.67m.
12		2.50m at 08:00	100	80	62	5.3		T2IOI		11.58			From 11.90m to 12.05m : With a pegmatite vein of maximum thickness 22mm dipping at 70° to 80°. From 12.23m to 15.09m : With 80° to 90° joints where incipient from 12.23m to 12.51m and 13.96m to 14.34m.
13			100	74	71	9.1		T2IOI		12.91			From 13.13m to 13.28m : With pegmatite veins of maximum thickness 30mm dipping at 20° to 30° and 80° to 90°.
14			100	76	49	13.4		T2IOI		14.10			
15			100	63	48	11.1		T2IOI		15.39			From 15.24m to 16.48m : With 80° to 90° joints.
16		2.50m at 18:00	100	89	89	5.1		T2IOI		16.58			From 15.94m to 16.31m : Silicified granite.
17		2.50m at 08:00	100	89	89	5.1		T2IOI		17.84			From 16.46m to 16.67m : Silicified granite.
18			100	72	72	19.3		T2IOI		17.84			From 17.50m to 17.84m : With 80° to 90° joints where incipient from 17.50m to 17.80m.
19			100	80	62	3.2		T2IOI		18.93			From 19.20m to 19.23m : Moderately strong, moderately decomposed.
20			100					T2IOI		19.90			

- SMALL DISTURBED SAMPLE
- ◄ LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- MAZIER SAMPLE
- PISTON SAMPLE
- △ WATER SAMPLE
- PIEZOMETER TIP
- STANDPIPE
- STANDARD PENETRATION TEST
- PERMEABILITY TEST
- IMPRESSION PACKER TEST
- IN-SITU VANE SHEAR TEST
- PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/10/2008**
CHECKED **James Lu**
DATE **11/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D329

SHEET **3** OF **5**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT Contract NEX/2108 Ground Investigation Works for Express Rail Link

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **DR128**

E 831793.42

DATE FROM **23/09/2008** TO **09/10/2008**

N 824512.35

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.62 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
20			100	95	93	5.6		T2101		20.00	+	III	From 20.44m to 20.68m : Moderately strong, moderately decomposed.
21			100	99	97			T2101		21.28	+	II	From 21.19m to 21.38m : Silicified granite.
22			100	100	94			T2101		22.75	+	III	From 22.01m to 22.58m : Moderately strong, moderately decomposed.
23			100	100	94			T2101		22.75	+	II	From 22.01m to 22.58m : Moderately strong, moderately decomposed.
24			100	92	82			T2101		24.20	+		From 24.27m to 25.01m : With an 80° to 90° joint where incipient from 24.46m to 25.01m.
25		2.00m at 18:00	100	98	85			T2101		25.19	+		From 24.78m to 24.99m : Chloritized granite.
26		2.60m at 08:00	100			>20 4.0		T2101			+		
27			100	81	81	>20 5.3		T2101		26.58	+		From 26.49m to 27.16m : With an 80° to 90° joint.
28			100	77	59			T2101		27.92	+		From 27.16m to 27.27m : Silicified granite.
29			100			18.8 >20 5.7		T2101			+	III	From 28.59m to 28.64m : With a pegmatite vein of maximum thickness 35mm dipping at 40° to 50°.
30			100	73	59	>20 5.0		T2101		29.35	+	II	From 28.72m to 28.82m : Moderately strong, moderately decomposed.
								T2101			+	III	From 29.70m to 30.35m : With a slickensided

- SMALL DISTURBED SAMPLE
- LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- PIEZOMETER TIP
- STANDPIPE
- ↓ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- II IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⚡ PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/10/2008**
CHECKED **James Lu**
DATE **11/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D329

SHEET **4** OF **5**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **DR128**

E 831793.42

DATE FROM **23/09/2008** TO **09/10/2008**

N 824512.35

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.62 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
30										30.00			
						>20		T2IOI		30.65		II	undulating fracture dipping at 80° to 90°. From 29.74m to 29.89m : Moderately strong, moderately decomposed. From 30.11m to 30.30m : Fine grained granodiorite. From 30.44m to 30.80m : With an 80° to 90° joint. From 30.75m to 30.88m : Moderately strong, moderately decomposed. At 30.82m : With a slickensided undulating fracture dipping at 73°. From 31.40m to 32.05m : With an 80° to 90° joint where incipient from 31.40m to 31.57m.
31			100	100	100	8.1		T2IOI		31.27		III	
			100	94	74	2.9		T2IOI				II	
32		2.50m at 18:00						T2IOI		32.54			
04/10/2008		2.80m at 08:00	100	92	67			T2IOI					
06/10/2008						4.0		T2IOI					
33						18.2		T2IOI		33.70			From 33.15m to 33.33m : With an 80° to 90° joint where incipient from 33.29m to 33.33m.
34			100	100	100	3.5		T2IOI		34.31			
35						19.5		T2IOI		35.53			From 35.11m to 36.32m : With 80° to 90° joints.
36		2.50m at 18:00						T2IOI		36.99			From 36.75m to 37.49m : With 80° to 90° joints.
37		2.80m at 08:00	100	64	43			T2IOI		37.85			From 37.30m to 37.44m : Autolith of fine grained granodiorite. From 37.36m to 37.48m : Silicified granite. At 37.55m : Coarse grained granite vein of maximum thickness 20mm dipping at 60° to 70°. From 37.64m to 38.02m : Finely feldsparphyric rhyolite dipping at 40° to 50°. From 37.66m to 37.97m : With 80° to 90° joints.
38			100	100	95	7.7		T2IOI		39.32		III	From 39.29m to 39.75m : Moderately strong, moderately decomposed.
39												II	From 39.70m to 39.94m : With an 80° to 90°
40			100	87	87			T2IOI					

- SMALL DISTURBED SAMPLE
- LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- MAZIER SAMPLE
- PISTON SAMPLE
- △ WATER SAMPLE
- PIEZOMETER TIP
- STANDPIPE
- STANDARD PENETRATION TEST
- PERMEABILITY TEST
- IMPRESSION PACKER TEST
- IN-SITU VANE SHEAR TEST
- PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/10/2008**
CHECKED **James Lu**
DATE **11/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/D329

SHEET **5** OF **5**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **DR128**

E 831793.42

N 824512.35

DATE FROM **23/09/2008** TO **09/10/2008**

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.62 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
40			100	97	97					40.00			
			100	97	97			T2101		40.09	+		joint.
41			100	100	92	3.9		T2101		41.21	+		From 40.03m to 40.09m : Silicified granite of maximum thickness 40mm with a quartz vein of maximum thickness 4mm dipping at 50° to 60°.
42			100	100	100			T2101		42.44	+		From 40.50m to 41.18m : With an 80° to 90° joint.
43			100	100	100			T2101			+		
44		2.50m at 18:00	100	95	90	>20		T2101		43.80	+		
45		2.90m at 08:00	100	100	100			T2101		45.26	+		
46			100	48	48	4.7		T2101		46.21	+		From 46.04m to 47.31m : With 80° to 90° joints where incipient from 47.17m to 47.31m.
47			100	92	88			T2101		46.83	+		
48		2.60m at 18:00						T2101		47.99	+		
49													Hole completed at 47.99m.
50													

- SMALL DISTURBED SAMPLE
- LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- MAZIER SAMPLE
- PISTON SAMPLE
- △ WATER SAMPLE
- PIEZOMETER TIP
- STANDPIPE
- ↓ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- ⊥ IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⊥ PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/10/2008**
CHECKED **James Lu**
DATE **11/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/EDH27

SHEET **1** OF **3**

DRILLHOLE RECORD

CONTRACT NO. **NEX/2108**

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **D51**

E 831814.58

DATE FROM **13/10/2008** TO **15/10/2008**

N 824493.63

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.83 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
13/10/2008	PX	08:00							+12.83	0.00			
		0.60m at 18:00	0						+12.73	0.10			CONCRETE surface.
13/10/2008										0.60			
14/10/2008		0.60m at 08:00	90						+12.12	0.71			Greyish brown mottled white, brown and green, silty sandy angular fine to coarse GRAVEL sized concrete and tile fragment. (FILL with intense offensive smell)
	PX 1.23		100					T2IOI		1.23			CONCRETE with plastic sheeting underneath.
	HX		100	26	0	NI		T2IOI	+11.17	1.66			
			100	57	28			T2IOI		2.13			Strong, pink spotted dark greenish grey and white, locally mottled dark grey, slightly decomposed, fine grained GRANITE with intense microfractures dipping at 20° to 30°, 40° to 50°, 60° to 70° and 80° to 90°.
	HX 2.13		100			>20		T2IOI		2.88			Joints are closely to medium spaced, locally very closely and widely spaced, smooth and rough stepped and undulating, locally smooth planar and rough planar, extremely narrow, chlorite and white kaolin (<0.5mm thick) infilled, locally iron oxide stained, dipping at 20° to 30°, 40° to 50° and 60° to 70°, locally 10° to 20° and 80° to 90°.
			100	98	98	4.2		T2IOI		4.33			From 1.66m to 2.13m : Silicified granite with quartz veining of maximum thickness 15mm.
			100	100	82			T2IOI		5.75			
			100			15.9		T2IOI		7.32			
			100	100	85	2.2		T2IOI		8.82			From 5.31m to 5.42m : Moderately strong, moderately decomposed.
			100	95	73	5.0		T2IOI					
			100			>20		T2IOI					
14/10/2008		0.55m at 18:00											
15/10/2008		0.75m at 08:00	100	100	89	8.2		T2IOI					
						>20							
						10.9							

- SMALL DISTURBED SAMPLE
- LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- ▨ U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- STANDPIPE
- ↓ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- ⊥ IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⊥ PACKER TEST

LOGGED **D.Y. Yip**
DATE **16/10/2008**
CHECKED **James Lu**
DATE **17/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/EDH27

SHEET **2** OF **3**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **D51**

E 831814.58

DATE FROM **13/10/2008** TO **15/10/2008**

N 824493.63

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.83 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
10			100	96	71	>20 4.9		T2101		10.21	+		From 10.01m to 10.54m : With 80° to 90° joints.
11			100	100	79	>20 4.4		T2101		11.78	+		
12			100	90	79			T2101		13.28	+		
13			100	90	86	1.9		T2101		14.77	+		From 15.27m to 15.52m : With a fault plane dipping at 80° to 90°.
14			100	96	93			T2101		16.31	+		From 16.71m to 17.56m : With an 80° to 90° joint where incipient from 16.98m to 17.56m.
15			100	100	87			T2101		17.80	+		From 17.73m to 17.83m : With a fault plane dipping vertically.
16			100	100	84			T2101		19.29	+		
17													
18													
19													
20													

- SMALL DISTURBED SAMPLE
- ⬆ LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- ▨ U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- ⬆ PIEZOMETER TIP
- STANDPIPE
- ⬆ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- ⊥ IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⬆ PACKER TEST

LOGGED **D.Y. Yip**
DATE **16/10/2008**
CHECKED **James Lu**
DATE **17/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/EDH27

SHEET **3** OF **3**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **D51**

E 831814.58

DATE FROM **13/10/2008** TO **15/10/2008**

N 824493.63

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.83 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
20										20.00			
21			100	100	100			T2101		20.81	+		
22						1.1		T2101		22.35	+		
23		0.60m at 18:00	100	100	100			T2101		23.85	+		
15/10/2008									-11.02				
24													Hole completed at 23.85m.
25													
26													
27													
28													
29													
30													

- SMALL DISTURBED SAMPLE
- ◄ LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- STANDPIPE
- ↓ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- ⊥ IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⊥ PACKER TEST

LOGGED **D.Y. Yip**
DATE **16/10/2008**
CHECKED **James Lu**
DATE **17/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/EDH28

SHEET **1** OF **5**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT Contract NEX/2108 Ground Investigation Works for Express Rail Link

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. GCE/2008/001/SI/R

MACHINE & NO. **D51**

E 831798.51

DATE FROM **03/10/2008** TO **09/10/2008**

N 824470.53

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.90 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
03/10/2008	PX	08:00							+12.90	0.00			CONCRETE surface.
03/10/2008		18:00	128					1 INSPECTION PIT	+12.80	0.10			Yellowish brown, silty fine to coarse SAND with some angular to subangular fine gravel sized quartz fragments and much fine to coarse gravel sized moderately decomposed and slightly decomposed granite fragments. (FILL)
04/10/2008		0.60m at 08:00	100	0	0	>20		2 T2IOI	+12.20	0.70			Strong, pink spotted dark greenish grey, light grey and locally white, locally mottled dark greenish grey and yellowish brown, slightly decomposed, fine grained GRANITE. Joints are very closely to closely spaced, locally extremely closely and medium spaced, smooth and rough planar, stepped and undulating, extremely narrow, calcite, chlorite and locally white kaolin (<0.5mm thick) infilled, locally iron oxide stained, dipping at 20° to 30°, 40° to 50° and 60° to 70°, locally 70° to 80° and 80° to 90°. From 0.70m to 1.38m : With an 80° to 90° joint.
	PX 1.69		100	56	22			T2IOI		1.12			
	HX 2.12		100	96	80	3.3		T2IOI		1.67			
			100			14.7		T2IOI					
			100			2.7		T2IOI					
			100	89	50	>20		T2IOI		3.04			
			100			9.6		T2IOI					
			100	90	71	>20		T2IOI		4.53			From 4.34m to 4.92m : With 80° to 90° joints where incipient from 4.34m to 4.53m.
			100			9.0		T2IOI					
			100					T2IOI		6.06			From 5.54m to 5.60m : Moderately strong, moderately decomposed.
			100	91	45			T2IOI					
			100			>20		T2IOI		7.54			From 7.54m to 8.33m : With 80° to 90° joints.
			100	47	9	>20		T2IOI					
			100			19.6		T2IOI		8.70			
			100	54	29			T2IOI					
			100			>20		T2IOI		9.50			
			100	99	68	>20		T2IOI					
			100			12.6		T2IOI					

- SMALL DISTURBED SAMPLE
- LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- MAZIER SAMPLE
- PISTON SAMPLE
- WATER SAMPLE
- PIEZOMETER TIP
- STANDPIPE
- STANDARD PENETRATION TEST
- PERMEABILITY TEST
- IMPRESSION PACKER TEST
- IN-SITU VANE SHEAR TEST
- PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/10/2008**
CHECKED **James Lu**
DATE **11/10/2008**

REMARKS
1. Packer tests were carried out from the depths of 4.00m to 10.00m, 10.00m to 16.00m, 16.00m to 22.00m, 22.00m to 28.00m, 28.00m to 34.00m, 34.00m to 40.00m and 40.00m to 48.55m.
2. Acoustic televiewer survey was carried out from the depth of 2.34m to 48.40m.



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/EDH28

SHEET **2** OF **5**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT Contract NEX/2108 Ground Investigation Works for Express Rail Link

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **D51**

E 831798.51

DATE FROM **03/10/2008** TO **09/10/2008**

N 824470.53

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.90 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
10										10.00			
11			100	86	59	>20		T2IOI		11.02			
12		0.80m at 18:00	100	58	41	>20		T2IOI		12.42			
13		0.80m at 08:00	100	74	33	NI		T2IOI	+0.02	12.88		III	
14			100	74	33	15.2		T2IOI	-0.21	13.11		IV	
15			100	86	59	>20		T2IOI		14.53		II	
16			100	100	67	10.0		T2IOI		16.08			
17			100	78	44	>20		T2IOI		17.58			
18			100	95	87	7.3		T2IOI		19.06			
19													
20													

From 12.04m to 12.52m : Chloritized and silicified granite with quartz veins.
At 12.40m : With a quartz-galena vein of maximum thickness 30mm dipping at 30° to 40°.
From 12.52m to 12.88m : Moderately strong, moderately decomposed.
At 12.62m : With a quartz-galena vein of maximum thickness 15mm dipping at 50° to 60°.
Weak to moderately weak, light greenish grey spotted light grey, pink and dark greenish grey, highly decomposed, fractured, fine grained GRANITE.

Strong, pink spotted dark greenish grey, light grey and white, locally mottled dark greenish grey, locally greenish grey, slightly decomposed, fine grained GRANITE.
Joints are very closely to closely spaced, locally extremely closely and widely spaced, smooth and rough planar, stepped and undulating, extremely narrow, calcite and chlorite infilled, locally iron oxide stained, dipping at 20° to 30°, 40° to 50° and 60° to 70°, locally 70° to 80° and 80° to 90°.

From 13.11m to 13.91m : Moderately strong, moderately decomposed.
From 15.21m to 15.42m : With an 80° to 90° joint.

From 17.10m to 17.39m : Chloritized and silicified granite.

- SMALL DISTURBED SAMPLE
- LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- STANDPIPE
- ↓ STANDARD PENETRATION TEST
- └ PERMEABILITY TEST
- II IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⋈ PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/10/2008**
CHECKED **James Lu**
DATE **11/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/EDH28

SHEET **3** OF **5**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT **Contract NEX/2108 Ground Investigation Works for Express Rail Link**

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. **GCE/2008/001/SI/R**

MACHINE & NO. **D51**

E 831798.51

DATE FROM **03/10/2008** TO **09/10/2008**

N 824470.53

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.90 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
20										20.00			
			100	77	70	10.3		T2IOI		20.57	+		From 20.19m to 20.49m : With 80° to 90° joints.
21						5.9		T2IOI			+		
			100	86	58			T2IOI		22.07	+		From 21.28m to 21.95m : Chloritized and silicified granite.
22											+		
23						13.3		T2IOI			+		From 22.87m to 23.36m : With an 80° to 90° joint.
		0.90m at 18:00	100	91	80	>20		T2IOI		23.55	+		
24		0.95m at 08:00				6.5		T2IOI			+		
			100	95	92			T2IOI		24.99	+		From 24.66m to 24.81m : With an 80° to 90° joint.
25											+		
26			100	99	93			T2IOI		26.51	+		
27								T2IOI			+		
28			100	100	88			T2IOI		28.05	+		
29								T2IOI			+		
			100	100	97			T2IOI		29.56	+		
30											+		

- SMALL DISTURBED SAMPLE
- LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- U76 UNDISTURBED SAMPLE
- U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▨ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- STANDPIPE
- ↓ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- ⊥ IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⊥ PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/10/2008**
CHECKED **James Lu**
DATE **11/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/EDH28

SHEET **4** OF **5**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT Contract NEX/2108 Ground Investigation Works for Express Rail Link

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. GCE/2008/001/SI/R

MACHINE & NO. **D51**

E 831798.51

DATE FROM **03/10/2008** TO **09/10/2008**

N 824470.53

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.90 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
30										30.00			
31			100	94	94	>20 5.0		T2101		31.02			
32			100	90	67			T2101		32.58			
33			100	96	80	>20 5.0		T2101		34.05			From 33.84m to 34.03m : With intense microfractures oriented randomly.
34			100	65	53			T2101		35.47			
35			100	81	72	13.6		T2101		36.97			From 36.21m to 37.00m : With 80° to 90° joints where incipient from 36.92m to 37.00m.
36			100	98	59			T2101		38.46			
37		0.90m at 18:00	100					T2101					
38		0.90m at 08:00	100					T2101					
39								T2101					
40								T2101		39.95			

- SMALL DISTURBED SAMPLE
- ↑ LARGE DISTURBED SAMPLE
- SPT LINER SAMPLE
- ▤ U76 UNDISTURBED SAMPLE
- ▥ U100 UNDISTURBED SAMPLE
- ▨ MAZIER SAMPLE
- ▩ PISTON SAMPLE
- △ WATER SAMPLE
- ▲ PIEZOMETER TIP
- STANDPIPE
- ↓ STANDARD PENETRATION TEST
- ⊥ PERMEABILITY TEST
- ⌚ IMPRESSION PACKER TEST
- ∇ IN-SITU VANE SHEAR TEST
- ⚙ PACKER TEST

LOGGED **D.Y. Yip**
DATE **10/10/2008**
CHECKED **James Lu**
DATE **11/10/2008**

REMARKS



GEOTECHNICS & CONCRETE ENGG. (H.K.) LTD.
GROUND INVESTIGATION DEPARTMENT

HOLE NO.
2108/XRL/EDH28

SHEET **5** OF **5**

DRILLHOLE RECORD

CONTRACT NO. NEX/2108

PROJECT Contract NEX/2108 Ground Investigation Works for Express Rail Link

METHOD **Rotary Cored**

CO-ORDINATES

WORKS ORDER NO. GCE/2008/001/SI/R

MACHINE & NO. **D51**

E 831798.51

DATE FROM **03/10/2008** TO **09/10/2008**

N 824470.53

FLUSHING MEDIUM **Water**

ORIENTATION **Vertical**

GROUND LEVEL **+12.90 mPD**

Drilling Progress	Casing size	Water level (m) & Time	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
40			100	81	63			T2101		40.00	+		
41			100	91	65	>20		T2101		41.39	+		
42			100	100	86	16.7		T2101		42.89	+		
43			100	95	83	7.1		T2101		44.41	+		
44			100	85	44	1.4		T2101		45.92	+		
45			100	41	29	>20		T2101		47.36	+		
46			100	41	29	>20		T2101		48.55	+		
47		0.85m at 18:00	100	41	29	>20		T2101		48.55	+		
48			100	41	29	>20		T2101		48.55	+		
49			100	41	29	>20		T2101		48.55	+		
50			100	41	29	>20		T2101		48.55	+		

From 41.52m to 42.00m : With intense quartz veins of thickness from <0.5mm up to 5mm dipping at 60° to 70° and 80° to 90°.
From 41.56m to 41.59m : Chloritized granite.

From 47.06m to 47.88m : Chloritized and silicified granite.
From 47.53m to 48.55m : With 80° to 90° joints where incipient from 47.53m to 47.75m.
From 47.96m to 48.31m : Chloritized and silicified granite.

Hole completed at 48.55m.

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