

## **Appendix 7.7**

Detailed Laboratory Reports of  
the 2012 Marine SI





*CEDD Contract No. GE/2009/16*

*Chemical and Biological Testing (Service Contract)*

*Service Order No. GE/2009/16.41*

*Agreement No. CE43/2010(HY), Central Kowloon Route -  
Design and Construction*

*Sediment Sampling & Testing at Kowloon Bay  
Laboratory Chemical and Biological Testing (Batch 2)*

**Laboratory Chemical Testing Report (Final Report)**

**Prepared for**

**Civil Engineering and Development Department**

**Prepared By**

**ALS Technichem (HK) Pty Ltd**

**May 5, 2012**



***CEDD Contract No. GE/2009/16***

***Chemical and Biological Testing (Service Contract)***

***Service Order No. GE/2009/16.41***

***Agreement No. CE43/2010(HY), Central Kowloon Route - Design and  
Construction***

***Sediment Sampling & Testing at Kowloon Bay  
Laboratory Chemical and Biological Testing (Batch 2)***

**Laboratory Chemical Testing Report (Final Report)**

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Civil Engineering and Development  
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Mr Fung Lim Chee, Richard  
Person Appointed to Act for the Contractor

Date: May 5, 2012



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# Section 1

## Summary Report



**CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT**  
**Sediment Quality Report**  
**Project: AGREEMENT NO CE 43\_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION**  
**Order No.: CONTRACT NO. GE/2009/16.41**  
**Drillhole: VR1**

ALS Lab ID	Sample ID	Sampling Date	Analyte Description										Total Polychlorinated biphenyls µg/kg	Low M.W. PAHs µg/kg	High M.W. PAHs µg/kg	Tributyl Tin ug TBT/L	Classification		
			Unit (in dry Wt basis) Reporting Limits	Silver mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Nickel mg/kg	Lead mg/kg	Zinc mg/kg	Mercury mg/kg							
HK1201772001	VR1 0.9-1.9M	17/01/2012	<0.1	0.1	1	0.2	1	1	1	1	1	1	1	0.05	18	550	1700	0.015	
HK1201772002	VR1 1.9-2.9M	17/01/2012	<0.1	1	12	1.5	80	65	40	75	200	0.5	23	0.5	550	1700	0.15		
HK1201772003	VR1 2.9-3.9M	17/01/2012	<0.1	2	42	4	160	110	40	110	270	1	180	1	3160	9600	0.15		
HK1201772004	VR1 6.0-6.9M	17/01/2012	<0.1	<1	<1	<0.2	4	1	2	6	5	<0.05	<18	<0.05	<550	<1700	<0.015		
HK1201772005	VR1 GRAB	17/01/2012	0.1	2	2	0.5	5	21	7	10	15	0.05	<18	0.05	23500	84400	<0.015	10xLCEL	
HK1201772006	VR1 GRAB (DUPLICATE)	17/01/2012	0.1	2	2	0.4	4	25	6	10	13	<0.05	<18	<0.05	26000	108000	<0.015	10xLCEL	

**Bold: Value that exceed LCEL**

**Bold Italic and Underlined: Value that exceed UCEL**

**Bold and Underlined: Value that exceed 10 x LCEL**

Total PCB:

Total PCBs calculated through summation of the 18 PCB congeners, based on raw data above the limit of detection of 1ug/kg.

For detailed information on the individual congeners please refer to the certificate of analysis for the work order.

Insufficient interstitial water generated for TBT analysis.

IS Denoted:

Category L:

Category M:

Category H:

Category 10xLCEL:

Analytical results less than or equal to Lower Chemical Exceedance Level (LCEL)

Analytical results greater than Lower Chemical Exceedance Level (LCEL), but less than or equal to Upper Chemical Exceedance Level (UCEL)

Analytical results greater than Upper Chemical Exceedance Level (UCEL)

Analytical results greater than 10x Lower Chemical Exceedance Level (10xLCEL)



**CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT**  
**Sediment Quality Report**  
**Project: AGREEMENT NO CE 43\_2010 (HY) CENTRAL KOWLOON ROUTE – DESIGN AND CONSTRUCTION**  
**Order No.: CONTRACT NO. GE/2009/16.41**  
**Drillhole: VR3**

ALS Lab ID	Sample ID	Analyte Description Unit (in dry Wt basis)	Silver	Arsenic	Cadmium	Chromium	Copper	Nickel	Lead	Zinc	Mercury	Total Polychlorinated biphenyls	Low M.W. PAHs	High M.W. PAHs	Tributyl Tin	Classification
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug TBT/L	
		Reporting Limits	0.1	1	0.2	1	1	1	1	1	0.05	18	550	1700	0.015	
		Lower Chemical Exceedance Level (LCEL)	<b>1</b>	<b>12</b>	<b>1.5</b>	<b>80</b>	<b>65</b>	<b>40</b>	<b>75</b>	<b>200</b>	<b>0.5</b>	<b>23</b>	<b>550</b>	<b>1700</b>	<b>0.15</b>	
		Upper Chemical Exceedance Level (UCEL)	<b>2</b>	<b>42</b>	<b>4</b>	<b>160</b>	<b>110</b>	<b>40</b>	<b>110</b>	<b>270</b>	<b>1</b>	<b>180</b>	<b>3160</b>	<b>9600</b>	<b>0.15</b>	
		10 x (LCEL)	<b>10</b>	<b>120</b>	<b>15</b>	<b>800</b>	<b>650</b>	<b>400</b>	<b>750</b>	<b>2000</b>	<b>5</b>	<b>230</b>	<b>5500</b>	<b>17000</b>	<b>1.5</b>	
<b>Sample Description</b>																
		Sampling Date														
HK1201774001	VR3 0.9-1.9M	17/01/2012	<b>9.6</b>	7	<b>1.6</b>	<b>81</b>	<b>618</b>	39	<b>125</b>	<b>549</b>	<b>1.04</b>	<b>169</b>	<b>557000</b>	<b>1890000</b>	<0.015	<b>10xLCEL</b>
HK1201774002	VR3 1.9-2.9M	17/01/2012	<0.1	3	<0.2	17	6	14	11	34	<0.05	<18	<b>570</b>	<b>2000</b>	<0.015	<b>M</b>
HK1201774003	VR3 2.9-3.9M	17/01/2012	<0.1	5	<0.2	24	7	17	21	60	0.06	<18	<550	<1700	<0.015	L
HK1201774004	VR3 6.0-6.9M	17/01/2012	<0.1	3	<0.2	14	2	6	10	20	<0.05	<18	<550	<1700	<0.015	L
HK1201774005	VR3 GRAB	17/01/2012	<b>6.1</b>	6	<b>1.7</b>	75	<b>600</b>	35	<b>120</b>	<b>352</b>	<b>1.05</b>	<b>46</b>	<b>200000</b>	<b>1050000</b>	0.075	<b>10xLCEL</b>

**Bold: Value that exceed LCEL**

**Bold Italic and Underlined: Value that exceed UCEL**

**Bold and Underlined: Value that exceed 10 x LCEL**

Total PCB:

Total PCBs calculated through summation of the 18 PCB congeners, based on raw data above the limit of detection of 1ug/kg.

For detailed information on the individual congeners please refer to the certificate of analysis for the work order.

IS Denoted: Insufficient interstitial water generated for TBT analysis.

Category L: Analytical results less than or equal to Lower Chemical Exceedance Level (LCEL)

Category M: Analytical results greater than Lower Chemical Exceedance Level (LCEL), but less than or equal to Upper Chemical Exceedance Level (UCEL)

Category H: Analytical results greater than Upper Chemical Exceedance Level (UCEL)

Category 10xLCEL: Analytical results greater than 10x Lower Chemical Exceedance Level (10xLCEL)









**CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT**  
**Sediment Quality Report**  
**Project: AGREEMENT NO CE 43\_2010 (HY) CENTRAL KOWLOON ROUTE – DESIGN AND CONSTRUCTION**  
**Order No.: CONTRACT NO. GE/2009/16.41**  
**Drillhole: GB1**

ALS Lab ID	Sample ID	Sample Description	Silver	Arsenic	Cadmium	Chromium	Copper	Nickel	Lead	Zinc	Mercury	Total Polychlorinated biphenyls	Low M.W. PAHs	High M.W. PAHs	Tributyl Tin	Classification
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/kg	µg/kg	µg TBT/L	
		Analyte Description	0.1	1	0.2	1	1	1	1	1	0.05	18	550	1700	0.015	
		Unit (In dry Wt basis)														
		Reporting Limits														
		Lower Chemical Exceedance Level (LCEL)	<u>1</u>	<u>12</u>	<u>1.5</u>	<u>80</u>	<u>65</u>	<u>40</u>	<u>75</u>	<u>200</u>	<u>0.5</u>	<u>23</u>	<u>550</u>	<u>1700</u>	<u>0.15</u>	
		Upper Chemical Exceedance Level (UCEL)	<u>2</u>	<u>42</u>	<u>4</u>	<u>160</u>	<u>110</u>	<u>40</u>	<u>110</u>	<u>270</u>	<u>1</u>	<u>180</u>	<u>3160</u>	<u>9600</u>	<u>0.15</u>	
		10 x (LCEL)	<u>10</u>	<u>120</u>	<u>15</u>	<u>800</u>	<u>650</u>	<u>400</u>	<u>750</u>	<u>2000</u>	<u>5</u>	<u>230</u>	<u>5500</u>	<u>17000</u>	<u>1.5</u>	
		Sample Description														
		Sampling Date														
		GB1														
		HK1201843001	<u>20.0</u>	<u>10</u>	<u>4.9</u>	<u>1190</u>	<u>13400</u>	<u>526</u>	<u>979</u>	<u>1330</u>	<u>12.9</u>	<u>192</u>	<u>351000</u>	<u>690000</u>	<u>&lt;0.015</u>	<u>10xLCEL</u>

**Bold: Value that exceed LCEL**  
**Bold Italic and Underlined: Value that exceed UCEL**  
**Bold and Underlined: Value that exceed 10 x LCEL**

Total PCBs: Total PCBs calculated through summation of the 18 PCB congeners, based on raw data above the limit of detection of 1ug/kg.  
For detailed information on the individual congeners please refer to the certificate of analysis for the work order.  
IS Denoted: Insufficient interstitial water generated for TBT analysis.

Category L: Analytical results less than or equal to Lower Chemical Exceedance Level (LCEL)  
Category M: Analytical results greater than Lower Chemical Exceedance Level (LCEL), but less than or equal to Upper Chemical Exceedance Level (UCEL)  
Category H: Analytical results greater than Upper Chemical Exceedance Level (UCEL)  
Category 10xLCEL: Analytical results greater than 10x Lower Chemical Exceedance Level (10xLCEL)

**CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT**  
**Sediment Quality Report**  
**Project: AGREEMENT NO CE 43\_2010 (HY) CENTRAL KOWLOON ROUTE – DESIGN AND CONSTRUCTION**  
**Order No.: CONTRACT NO. GE/2009/16.41**  
**Drillhole: GB2**

ALS Lab ID	Sample ID	Analyte Description Unit (In dry Wt basis)	Silver	Arsenic	Cadmium	Chromium	Copper	Nickel	Lead	Zinc	Mercury	Total Polychlorinated biphenyls	Low M.W. PAHs	High M.W. PAHs	Tributyl Tin	Classification
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/kg	µg/kg	µg TBT/L		
		Reporting Limits	0.1	1	0.2	1	1	1	1	1	0.05	18	550	1700	0.015	
		Lower Chemical Exceedance Level (LCEL)	<u>1</u>	<u>12</u>	<u>1.5</u>	<u>80</u>	<u>65</u>	<u>40</u>	<u>75</u>	<u>200</u>	<u>0.5</u>	<u>23</u>	<u>550</u>	<u>1700</u>	<u>0.15</u>	
		Upper Chemical Exceedance Level (UCEL)	<u>2</u>	<u>42</u>	<u>4</u>	<u>160</u>	<u>110</u>	<u>40</u>	<u>110</u>	<u>270</u>	<u>1</u>	<u>180</u>	<u>3160</u>	<u>9600</u>	<u>0.15</u>	
		10 x (LCEL)	<u>10</u>	<u>120</u>	<u>15</u>	<u>800</u>	<u>650</u>	<u>400</u>	<u>750</u>	<u>2000</u>	<u>5</u>	<u>230</u>	<u>5500</u>	<u>17000</u>	<u>1.5</u>	
Sample Description																
HK1201847001	GB2	Sampling Date	18/01/2012													
			<u>2.9</u>	4	<u>2.6</u>	64	<u>385</u>	29	<u>89</u>	<u>469</u>	<u>0.77</u>	<u>89</u>	<u>1870000</u>	<u>2500000</u>	0.030	<u>10xLCEL</u>

**Bold:** Value that exceed LCEL  
**Bold Italic and Underlined:** Value that exceed UCEL  
**Bold and Underlined:** Value that exceed 10 x LCEL

Total PCB: Total PCBs calculated through summation of the 18 PCB congeners, based on raw data above the limit of detection of 1ug/kg.  
 For detailed information on the individual congeners please refer to the certificate of analysis for the work order.  
 IS Denoted: Insufficient interstitial water generated for TBT analysis.

Category L: Analytical results less than or equal to Lower Chemical Exceedance Level (LCEL)  
 Category M: Analytical results greater than Lower Chemical Exceedance Level (LCEL), but less than or equal to Upper Chemical Exceedance Level (UCEL)  
 Category H: Analytical results greater than Upper Chemical Exceedance Level (UCEL)  
 Category 10xLCEL: Analytical results greater than 10x Lower Chemical Exceedance Level (10xLCEL)



**CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT**  
**Sediment Quality Report**  
**Project: AGREEMENT NO CE 43\_2010 (HY) CENTRAL KOWLOON ROUTE – DESIGN AND CONSTRUCTION**  
**Order No.: CONTRACT NO. GE/2009/16.41**  
**Drillhole: GB3**

ALS Lab ID	Sample ID	Sample Description	Silver mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Nickel mg/kg	Lead mg/kg	Zinc mg/kg	Mercury mg/kg	Total Polychlorinated biphenyls µg/kg	Low M.W. PAHs µg/kg	High M.W. PAHs µg/kg	Tributyl Tin ug TBT/L	Classification
			0.1	1	0.2	1	1	1	1	1	0.05	18	550	1700	0.015	
		Lower Chemical Exceedance Level (UCEL)	<u>1</u>	<u>12</u>	<u>1.5</u>	<u>80</u>	<u>65</u>	<u>40</u>	<u>75</u>	<u>200</u>	<u>0.5</u>	<u>23</u>	<u>550</u>	<u>1700</u>	<u>0.15</u>	
		Upper Chemical Exceedance Level (UCEL)	<u>2</u>	<u>42</u>	<u>4</u>	<u>160</u>	<u>110</u>	<u>40</u>	<u>110</u>	<u>270</u>	<u>1</u>	<u>180</u>	<u>3160</u>	<u>9600</u>	<u>0.15</u>	
		10 x (LCEL)	<u>10</u>	<u>120</u>	<u>15</u>	<u>800</u>	<u>650</u>	<u>400</u>	<u>750</u>	<u>2000</u>	<u>5</u>	<u>230</u>	<u>5500</u>	<u>17000</u>	<u>1.5</u>	
Sample Description																
HK1201850001	GB3	Sampling Date														
			<u>8.9</u>	9	<u>2.3</u>	<u>124</u>	<u>884</u>	<u>50</u>	<u>138</u>	<u>473</u>	<u>1.58</u>	<u>41</u>	<u>838000</u>	<u>3070000</u>	<0.015	<u>10xLCEL</u>

**Bold and Underlined: Value that exceed UCEL**  
**Bold and Underlined: Value that exceed 10 x LCEL**

Total PCBs: Total PCBs calculated through summation of the 18 PCB congeners, based on raw data above the limit of detection of 1ug/kg.  
 For detailed information on the individual congeners please refer to the certificate of analysis for the work order.

IS Denoted: Insufficient interstitial water generated for TBT analysis.

Category L: Analytical results less than or equal to Lower Chemical Exceedance Level (LCEL)  
 Category M: Analytical results greater than Lower Chemical Exceedance Level (LCEL), but less than or equal to Upper Chemical Exceedance Level (UCEL)  
 Category H: Analytical results greater than Upper Chemical Exceedance Level (UCEL)  
 Category 10xLCEL: Analytical results greater than 10x Lower Chemical Exceedance Level (10xLCEL)

**CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT**  
**Sediment Quality Report**  
**Project: AGREEMENT NO CE 43\_2010 (HY) CENTRAL KOWLOON ROUTE – DESIGN AND CONSTRUCTION**  
**Order No.: CONTRACT NO. GE/2009/16.41**  
**Drillhole: GB4**

ALS Lab ID	Sample ID	Sample Description	Analyte Description													Classification
			Silver mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Nickel mg/kg	Lead mg/kg	Zinc mg/kg	Mercury mg/kg	Total Polychlorinated biphenyls µg/kg	Low M.W. PAHs µg/kg	High M.W. PAHs µg/kg	Tributyl Tin ug TBT/L	
HK1201851001	GB4	18/01/2012	1.0	5	0.6	37	91	18	38	117	0.43	130	1600000	1550000	0.041	10xLCEL
<b>Reporting Limits</b>			0.1	1	0.2	1	1	1	1	1	0.05	18	550	1700	0.015	
<b>Lower Chemical Exceedance Level (LCEL)</b>			<u>1</u>	<u>12</u>	<u>1.5</u>	<u>80</u>	<u>65</u>	<u>40</u>	<u>75</u>	<u>200</u>	<u>0.5</u>	<u>23</u>	<u>550</u>	<u>1700</u>	<u>0.15</u>	
<b>Upper Chemical Exceedance Level (UCEL)</b>			<u>2</u>	<u>42</u>	<u>4</u>	<u>160</u>	<u>110</u>	<u>40</u>	<u>110</u>	<u>270</u>	<u>1</u>	<u>180</u>	<u>3160</u>	<u>9600</u>	<u>0.15</u>	
<b>10 x (LCEL)</b>			<u>10</u>	<u>120</u>	<u>15</u>	<u>800</u>	<u>650</u>	<u>400</u>	<u>750</u>	<u>2000</u>	<u>5</u>	<u>230</u>	<u>5500</u>	<u>17000</u>	<u>1.5</u>	

**Bold:** Value that exceed LCEL  
**Bold and Underlined:** Value that exceed UCEL  
**Bold and Underlined:** Value that exceed 10 x LCEL

Total PCBs: Total PCBs calculated through summation of the 18 PCB congeners, based on raw data above the limit of detection of 1ug/kg.  
 For detailed information on the individual congeners please refer to the certificate of analysis for the work order.  
 IS Denoted: Insufficient interstitial water generated for TBT analysis.

Category L: Analytical results less than or equal to Lower Chemical Exceedance Level (LCEL)  
 Category M: Analytical results greater than Lower Chemical Exceedance Level (LCEL), but less than or equal to Upper Chemical Exceedance Level (UCEL)  
 Category H: Analytical results greater than Upper Chemical Exceedance Level (UCEL)  
 Category 10xLCEL: Analytical results greater than 10x Lower Chemical Exceedance Level (10xLCEL)

**CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT**  
**Sediment Quality Report**  
**Project: AGREEMENT NO CE 43\_2010 (HY) CENTRAL KOWLOON ROUTE – DESIGN AND CONSTRUCTION**  
**Order No.: CONTRACT NO. GE/2009/16.41**  
**Drillhole: GB5**

ALS Lab ID	Sample ID	Sampling Date	Analyte Description													Classification	
			Unit (in dry Wt basis)	Silver mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Nickel mg/kg	Lead mg/kg	Zinc mg/kg	Mercury mg/kg	Total Polychlorinated biphenyls µg/kg	Low M.W. PAHs µg/kg	High M.W. PAHs µg/kg		Tributyl Tin ug TBT/L
			Reporting Limits	0.1	1	0.2	1	1	1	1	1	0.05	18	550	1700	0.015	
			Lower Chemical Exceedance Level (UCEL)	<u>1</u>	<u>12</u>	<u>1.5</u>	<u>80</u>	<u>65</u>	<u>40</u>	<u>75</u>	<u>200</u>	<u>0.5</u>	<u>23</u>	<u>550</u>	<u>1700</u>	<u>0.15</u>	
			Upper Chemical Exceedance Level (UCEL)	<u>2</u>	<u>42</u>	<u>4</u>	<u>160</u>	<u>110</u>	<u>40</u>	<u>110</u>	<u>270</u>	<u>1</u>	<u>180</u>	<u>3160</u>	<u>9600</u>	<u>0.15</u>	
			10 x (UCEL)	<u>10</u>	<u>120</u>	<u>15</u>	<u>800</u>	<u>650</u>	<u>400</u>	<u>750</u>	<u>2000</u>	<u>5</u>	<u>230</u>	<u>5500</u>	<u>17000</u>	<u>1.5</u>	
			Sample Description														
			Sample ID														
HK1201852001	GB5	18/01/2012		<u>5.7</u>	7	1.4	<u>135</u>	<u>360</u>	37	<u>277</u>	<u>654</u>	<u>1.20</u>	<u>238</u>	<u>378000</u>	<u>1230000</u>	0.029	<u>10xUCEL</u>
HK1201852002	GB5 (DUPLICATE)	18/01/2012		<u>4.5</u>	7	1.5	<u>160</u>	<u>422</u>	<u>46</u>	<u>99</u>	<u>390</u>	<u>1.43</u>	<u>279</u>	<u>368000</u>	<u>1200000</u>	0.026	<u>10xUCEL</u>

**Bold:** Value that exceed LCEL

**Bold Italic and Underlined:** Value that exceed UCEL

**Bold and Underlined:** Value that exceed 10 x LCEL

Total PCB:

IS Denoted:

Category L:

Category M:

Category H:

Category 10xLCEL:

Total PCBs calculated through summation of the 18 PCB congeners, based on raw data above the limit of detection of 1ug/kg.

For detailed information on the individual congeners please refer to the certificate of analysis for the work order.

Insufficient interstitial water generated for TBT analysis.

Analytical results less than or equal to Lower Chemical Exceedance Level (LCEL)

Analytical results greater than Lower Chemical Exceedance Level (LCEL), but less than or equal to Upper Chemical Exceedance Level (UCEL)

Analytical results greater than Upper Chemical Exceedance Level (UCEL)

Analytical results greater than 10x Lower Chemical Exceedance Level (10xLCEL)



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**Sediment Quality Report**  
**Project: AGREEMENT NO CE 43\_2010 (HY) CENTRAL KOWLOON ROUTE – DESIGN AND CONSTRUCTION**  
**Order No.: CONTRACT NO. GE/2009/16.41**  
**Drillhole: GB6**

ALS Lab ID	Sample ID	Sample Description	Analyte Description													Classification	
			Silver mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Nickel mg/kg	Lead mg/kg	Zinc mg/kg	Mercury mg/kg	Total Polychlorinated biphenyls µg/kg	Low M.W. PAHs µg/kg	High M.W. PAHs µg/kg	Tributyl Tin ug TBT/L		
			0.1	1	0.2	1	1	1	1	1	1	1	0.05	18	550	1700	0.015
		Reporting Limits															
		Lower Chemical Exceedance Level (UCEL)	<u>1</u>	<u>12</u>	<u>1.5</u>	<u>80</u>	<u>65</u>	<u>40</u>	<u>75</u>	<u>200</u>	<u>0.5</u>	<u>23</u>	<u>550</u>	<u>1700</u>	<u>0.15</u>		
		Upper Chemical Exceedance Level (UCEL)	<u>2</u>	<u>42</u>	<u>4</u>	<u>160</u>	<u>110</u>	<u>40</u>	<u>110</u>	<u>270</u>	<u>1</u>	<u>180</u>	<u>3160</u>	<u>9600</u>	<u>0.15</u>		
		10 x (UCEL)	<u>10</u>	<u>120</u>	<u>15</u>	<u>800</u>	<u>650</u>	<u>400</u>	<u>750</u>	<u>2000</u>	<u>5</u>	<u>230</u>	<u>5500</u>	<u>17000</u>	<u>1.5</u>		
		Sample Description															
		Sampling Date															
HK1201854001	GB6	18/01/2012	<u>5.2</u>	6	1.2	74	<u>604</u>	30	<u>84</u>	<u>275</u>	<u>1.04</u>	<u>100</u>	<u>227000</u>	<u>1210000</u>	<u>&lt;0.015</u>	<u>10xUCEL</u>	

**Bold:** Value that exceed LCEL

**Bold Italic and Underlined:** Value that exceed UCEL

**Bold and Underlined:** Value that exceed 10 x LCEL

Total PCB:

Total PCBs calculated through summation of the 18 PCB congeners, based on raw data above the limit of detection of 1ug/kg.

For detailed information on the individual congeners please refer to the certificate of analysis for the work order.

IS Denoted: Insufficient interstitial water generated for TBT analysis.

Category L: Analytical results less than or equal to Lower Chemical Exceedance Level (LCEL)

Category M: Analytical results greater than Lower Chemical Exceedance Level (LCEL), but less than or equal to Upper Chemical Exceedance Level (UCEL)

Category H: Analytical results greater than Upper Chemical Exceedance Level (UCEL)

Category 10xLCEL: Analytical results greater than 10x Lower Chemical Exceedance Level (10xLCEL)

**CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT**  
**Sediment Quality Report**  
**Project: AGREEMENT NO CE 43\_2010 (HY) CENTRAL KOWLOON ROUTE – DESIGN AND CONSTRUCTION**  
**Order No.: CONTRACT NO. GE/2009/16.41**  
**Drillhole: GB7**

ALS Lab ID	Sample ID	Sample Description	Analyte Description													Classification				
			Silver mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Nickel mg/kg	Lead mg/kg	Zinc mg/kg	Mercury mg/kg	Total Polychlorinated biphenyls µg/kg	Low M.W. PAHs µg/kg	High M.W. PAHs µg/kg	Tributyl Tin ug TBT/L					
		Reporting Limits	0.1	1	0.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		Lower Chemical Exceedance Level (LCEL)	<u>1</u>	<u>12</u>	<u>1.5</u>	<u>80</u>	<u>65</u>	<u>40</u>	<u>75</u>	<u>200</u>	<u>0.5</u>	<u>23</u>	<u>550</u>	<u>1700</u>	<u>0.015</u>					
		Upper Chemical Exceedance Level (UCEL)	<u>2</u>	<u>42</u>	<u>4</u>	<u>160</u>	<u>110</u>	<u>40</u>	<u>110</u>	<u>1</u>	<u>180</u>	<u>3160</u>	<u>9600</u>	<u>0.15</u>						
		10 x (LCEL)	<u>10</u>	<u>120</u>	<u>15</u>	<u>800</u>	<u>650</u>	<u>400</u>	<u>750</u>	<u>2000</u>	<u>5</u>	<u>230</u>	<u>5500</u>	<u>17000</u>	<u>1.5</u>					
		Sample Description																		
		Sampling Date																		
HK1201856001	GB7	18/01/2012	<u>6.1</u>	8	2.0	115	970	48	126	427	1.51	160	185000	1050000	<0.015					10xLCEL

**Bold:** Value that exceed LCEL  
**Bold Italic and Underlined:** Value that exceed UCEL  
**Bold and Underlined:** Value that exceed 10 x LCEL

Total PCBs: Total PCBs calculated through summation of the 18 PCB congeners, based on raw data above the limit of detection of 1ug/kg.  
 For detailed information on the individual congeners please refer to the certificate of analysis for the work order.  
 IS Denoted: Insufficient interstitial water generated for TBT analysis.

Category L: Analytical results less than or equal to Lower Chemical Exceedance Level (LCEL)  
 Category M: Analytical results greater than Lower Chemical Exceedance Level (LCEL), but less than or equal to Upper Chemical Exceedance Level (UCEL)  
 Category H: Analytical results greater than Upper Chemical Exceedance Level (UCEL)  
 Category 10xLCEL: Analytical results greater than 10x Lower Chemical Exceedance Level (10xLCEL)



**CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT**  
**Sediment Quality Report**  
**Project: AGREEMENT NO CE 43\_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION**  
**Order No.: CONTRACT NO. GE/2009/16.41**  
**Drillhole: GB8**

ALS Lab ID	Sample ID	Sampling Date	Analyte Description		Silver mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Nickel mg/kg	Lead mg/kg	Zinc mg/kg	Mercury mg/kg	Total Polychlorinated biphenyls µg/kg	Low M.W. PAHs µg/kg	High M.W. PAHs µg/kg	Tributyl Tin ug TBT/L	Classification
			Unit (in dry Wt basis)	Reporting Limits														
HK1201858001	GB8	18/01/2012	10.8	10	2.3	145	53	164	469	2.06	105	36300	223000	<0.015	10xLCEL			
<b>Value that exceed LCEL</b>																		
<b>Value that exceed UCEL</b>																		
<b>Value that exceed 10 x LCEL</b>																		
<b>Value that exceed 10x LCEL</b>																		

**Sample Description**

Sample ID: GB8

Sampling Date: 18/01/2012

Value that exceed LCEL

Value that exceed UCEL

Value that exceed 10 x LCEL

Value that exceed 10x LCEL

Total PCB: Total PCBs calculated through summation of the 18 PCB congeners, based on raw data above the limit of detection of 1ug/kg. For detailed information on the individual congeners please refer to the certificate of analysis for the work order.

IS Denoted: Insufficient interstitial water generated for TBT analysis.

Category L: Analytical results less than or equal to Lower Chemical Exceedance Level (LCEL)

Category M: Analytical results greater than Lower Chemical Exceedance Level (LCEL), but less than or equal to Upper Chemical Exceedance Level (UCEL)

Category H: Analytical results greater than Upper Chemical Exceedance Level (UCEL)

Category 10xLCEL: Analytical results greater than 10x Lower Chemical Exceedance Level (10xLCEL)

**CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT**  
**Sediment Quality Report**  
**Project: AGREEMENT NO CE 43\_2010 (HY) CENTRAL KOWLOON ROUTE – DESIGN AND CONSTRUCTION**  
**Order No.: CONTRACT NO. GE/2009/16.41**  
**Drillhole: GB9**

ALS Lab ID	Sample ID	Sample Description	Analyte Description		Silver mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Nickel mg/kg	Lead mg/kg	Zinc mg/kg	Mercury mg/kg	Total Polychlorinated biphenyls µg/kg	Low M.W. PAHs µg/kg	High M.W. PAHs µg/kg	Tributyl Tin ug TBT/L	Classification
			Unit (in dry Wt basis)	Reporting Limits														
HK1201859001	GB9	18/01/2012	mg/kg	0.1	1	0.2	1	1	1	1	1	1	0.05	18	550	1700	0.015	
			Lower Chemical Exceedance Level (LCEL)	<u>1</u>	<u>12</u>	<u>1.5</u>	<u>80</u>	<u>65</u>	<u>40</u>	<u>75</u>	<u>200</u>	<u>0.5</u>	<u>23</u>	<u>550</u>	<u>1700</u>	<u>0.15</u>		
			Upper Chemical Exceedance Level (UCEL)	<u>2</u>	<u>42</u>	<u>4</u>	<u>160</u>	<u>110</u>	<u>40</u>	<u>110</u>	<u>270</u>	<u>1</u>	<u>180</u>	<u>3160</u>	<u>9600</u>	<u>0.15</u>		
			10 x (LCEL)	<u>10</u>	<u>120</u>	<u>15</u>	<u>800</u>	<u>650</u>	<u>400</u>	<u>750</u>	<u>2000</u>	<u>5</u>	<u>230</u>	<u>5500</u>	<u>17000</u>	<u>1.5</u>		
			Sampling Date															
				<u>6.1</u>	8	<u>1.8</u>	<u>95</u>	<u>663</u>	38	<u>98</u>	<u>336</u>	<u>1.24</u>	<u>95</u>	<u>330000</u>	<u>1690000</u>	<0.015	<u>10xLCEL</u>	

**Value that exceed LCEL**

**Value that exceed UCEL**

**Value that exceed 10 x LCEL**

**Value that exceed 10 x LCEL**

Total PCB: Total PCBs calculated through summation of the 18 PCB congeners, based on raw data above the limit of detection of 1ug/kg.

For detailed information on the individual congeners please refer to the certificate of analysis for the work order.

IS Denoted: Insufficient interstitial water generated for TBT analysis.

Category L: Analytical results less than or equal to Lower Chemical Exceedance Level (LCEL)

Category M: Analytical results greater than Lower Chemical Exceedance Level (LCEL), but less than or equal to Upper Chemical Exceedance Level (UCEL)

Category H: Analytical results greater than Upper Chemical Exceedance Level (UCEL)

Category 10xLCEL: Analytical results greater than 10x Lower Chemical Exceedance Level (10xLCEL)

**CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT**  
**Sediment Quality Report**  
**Project: AGREEMENT NO CE 43\_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION**  
**Order No.: CONTRACT NO. GE/2009/16.41**  
**Drillhole: GB10**

ALS Lab ID	Sample ID	Sampling Date	Analyte Description													Classification
			Silver mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Nickel mg/kg	Lead mg/kg	Zinc mg/kg	Mercury mg/kg	Total Polychlorinated biphenyls µg/kg	Low M.W. PAHs µg/kg	High M.W. PAHs µg/kg	Tributyl Tin ug TBT/L	
			0.1	1	0.2	1	1	1	0.05	18	550	1700	0.015			
			<b>1</b>	<b>12</b>	<b>1.5</b>	<b>80</b>	<b>65</b>	<b>40</b>	<b>0.5</b>	<b>23</b>	<b>550</b>	<b>1700</b>	<b>0.15</b>			
			<b>2</b>	<b>42</b>	<b>4</b>	<b>160</b>	<b>110</b>	<b>40</b>	<b>1</b>	<b>180</b>	<b>3160</b>	<b>9600</b>	<b>0.15</b>			
			<b>10</b>	<b>120</b>	<b>15</b>	<b>800</b>	<b>650</b>	<b>400</b>	<b>5</b>	<b>230</b>	<b>5500</b>	<b>17000</b>	<b>1.5</b>			
			<b>8.6</b>	<b>9</b>	<b>2.6</b>	<b>150</b>	<b>1530</b>	<b>61</b>	<b>1.85</b>	<b>158</b>	<b>305000</b>	<b>1810000</b>	<b>0.693</b>			

**Sample Description**  
**Sample ID** GB10  
**Sampling Date** 18/01/2012

**Value that exceed LCEL**  
**Value that exceed UCEL**  
**Value that exceed 10 x LCEL**  
**Value that exceed 10 x UCEL**

Total PCBs: Total PCBs calculated through summation of the 18 PCB congeners, based on raw data above the limit of detection of 1ug/kg.  
For detailed information on the individual congeners please refer to the certificate of analysis for the work order.  
IS Denoted: Insufficient interstitial water generated for TBT analysis.

Category L: Analytical results less than or equal to Lower Chemical Exceedance Level (LCEL)  
Category M: Analytical results greater than Lower Chemical Exceedance Level (LCEL), but less than or equal to Upper Chemical Exceedance Level (UCEL)  
Category H: Analytical results greater than Upper Chemical Exceedance Level (UCEL)  
Category 10xLCEL: Analytical results greater than 10x Lower Chemical Exceedance Level (10xLCEL)







## Summary Result for Pore Water Samples

**Date of Issue:** 23/02/2012  
**Client:** Civil Engineering and Development Department  
**Service Order No.:** GE/2009/16.41  
**Project:** Agreement No. CE43/2010(HY), Central Kowloon Route - Design and Construction  
 Sediment Sampling & Testing at Kowloon Bay

ALS Lab ID		HK1202619001	HK1201779001	HK1201779002	HK1201779003	HK1201675002	HK1201675001	HK1201653001	HK1201876001
Client Sample ID	Unit	REFERENCE SAMPLE	VR1	VR1 (DUPLICATE)	VR3	VR2	VR4	VR5	GB1
Sampling Date		21/01/2012	17/01/2012	17/01/2012	17/01/2012	16/01/2012	16/01/2012	14/01/2012	18/01/2012
<b>Inorganic Nonmetallic Parameters</b>									
Ammonia as N	mg/L	3.54	2.1	0.58	<0.01	2.43	24.70	10.60	3.14
Reactive Phosphorus as P	µg/L	480	10	<10	3890	80	1910	1020	50
Total Kjeldahl Nitrogen as N	mg/L	4.9	2.2	0.7	1.4	3.2	26.3	10.8	4
Total Phosphorus as P	mg/L	0.5	<0.1	<0.1	4.2	0.1	2.3	1.1	0.1
Nitrate as N	mg/L	0.02	0.2	0.28	<0.01	<0.01	<0.01	<0.01	<0.01
Nitrite as N	mg/L	0.02	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01
<b>Metals</b>									
Arsenic	µg/L	<10	<10	<10	31	<10	34	<10	<10
Cadmium	µg/L	<0.2	<0.2	1	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium	µg/L	<1	<1	<1	12	7	2	<1	6
Copper	µg/L	<1	3	5	2	<1	<1	2	6
Lead	µg/L	<1	<1	<1	<1	<1	<1	<1	<1
Mercury	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	µg/L	1	2	11	4	<1	5	1	2
Silver	µg/L	<1	<1	<1	<1	<1	<1	<1	<1
Zinc	µg/L	<10	12	47	<10	<10	<10	<10	<10
<b>PCB Single Congeners</b>									
PCB 8	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 18	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 28	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 52	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 44	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 66	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 101	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 77	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 118	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 153	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 105	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 126	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 187	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 128	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 180	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 169	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 170	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 138	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
<b>Organochlorine Pesticides (OC)</b>									
Aldrin	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
alpha-BHC	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
beta-BHC	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
gamma-BHC	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
delta-BHC	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Heptachlor	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Heptachlor epoxide	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan 1	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan sulfate	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDT	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDD	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDE	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
<b>Polycyclic Aromatics Hydrocarbons (PAHs)</b>									
Naphthalene	µg/L	<0.2	<0.2	<0.2	1.6	0.2	2	0.4	0.3
Acenaphthylene	µg/L	<0.2	2.6	1.9	12.8	2.8	24.3	16.8	2.5
Acenaphthene	µg/L	<0.2	48.4	41.2	32.5	3.3	47.7	1	14.7
Fluorene	µg/L	<0.2	1.9	1.6	1.8	1.1	3	0.3	0.6
Phenanthrene	µg/L	<0.2	4.1	3.8	21.4	7	15.9	3.7	2.5
Anthracene	µg/L	<0.2	2.7	2.4	16.3	2.2	16.2	2.2	2.6
Fluoranthene	µg/L	<0.2	16.4	13.6	101	18.1	316	37.2	26.7
Pyrene	µg/L	<0.2	18	15.1	133	21.7	468	96.6	30.2
Benz(a)anthracene	µg/L	<0.2	3	3.2	42.2	6.5	109	33.5	9.5
Chrysene	µg/L	<0.2	2.9	2.7	35.3	4.5	108	32.5	7.6
Benzo(b)fluoranthene	µg/L	<0.2	2.8	3.1	39.3	6.8	92.0	50.5	8.3
Benzo(k)fluoranthene	µg/L	<0.2	0.8	1.1	16.4	2.1	64.4	20.8	3.7
Benzo(a)pyrene	µg/L	<0.2	3	3	43.4	7.4	114	54	9.2
Indeno(1,2,3-cd)pyrene	µg/L	<0.2	1.7	2.4	21.5	3.1	48.2	32.4	3.2
Dibenz(a,h)anthracene	µg/L	<0.2	0.3	0.4	5.1	0.6	11	2	0.7
Benzo(g,h,i)perylene	µg/L	<0.2	1.7	1.8	20.1	2.8	48	31.4	2.6
Low M.W. PAHs	µg/L	<2.2	59.7	51	86.5	16.7	109	24.5	23.2
High M.W. PAHs	µg/L	<6.8	50.6	46.6	457	73.7	1380	391	102
<b>Triorganotins</b>									
Tributyltin	µg TBT/L	<0.015	<0.015	<0.015	0.075	0.189	<0.015	<0.015	<0.015



## Summary Result for Pore Water Samples

**Date of Issue:** 23/02/2012  
**Client:** Civil Engineering and Development Department  
**Service Order No.:** GE/2009/16.41  
**Project:** Agreement No. CE43/2010(HY), Central Kowloon Route - Design and Construction  
 Sediment Sampling & Testing at Kowloon Bay

ALS Lab ID		HK1201876002	HK1201876004	HK1201876005	HK1201876006	HK1201876007	HK1201876008	HK1201876009	HK1201876010
Client Sample ID		GB2	GB3	GB4	GB5	GB5 (DUPLICATE)	GB6	GB7	GB8
Sampling Date	Unit	18/01/2012	18/01/2012	18/01/2012	18/01/2012	18/01/2012	18/01/2012	18/01/2012	18/01/2012
<b>Inorganic Nonmetallic Parameters</b>									
Ammonia as N	mg/L	15.3	8.62	6.82	5.98	15.5	11.7	5.44	13.3
Reactive Phosphorus as P	µg/L	1440	1630	2120	1520	2900	1620	220	1030
Total Kjeldahl Nitrogen as N	mg/L	15.4	10.4	8.9	7.5	16.6	12.2	5.4	14.8
Total Phosphorus as P	mg/L	1.4	1.6	2.1	1.5	2.9	1.6	0.2	2.6
Nitrate as N	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nitrite as N	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
<b>Metals</b>									
Arsenic	µg/L	15	28	15	15	<10	16	<10	16
Cadmium	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium	µg/L	4	2	3	3	3	1	<1	1
Copper	µg/L	<1	1	1	2	2	3	2	5
Lead	µg/L	<1	<1	<1	1	2	<1	<1	<1
Mercury	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	µg/L	2	2	3	4	2	<1	1	1
Silver	µg/L	<1	<1	<1	<1	<1	<1	<1	<1
Zinc	µg/L	<10	<10	<10	<10	<10	<10	<10	<10
<b>PCB Single Congeners</b>									
PCB 8	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 18	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 28	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 52	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 44	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 66	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 101	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 77	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 118	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 153	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 105	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 126	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 187	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 128	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 180	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 169	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 170	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 138	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
<b>Organochlorine Pesticides (OC)</b>									
Aldrin	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
alpha-BHC	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
beta-BHC	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
gamma-BHC	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
delta-BHC	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Heptachlor	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Heptachlor epoxide	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan 1	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan sulfate	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDT	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDD	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDE	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
<b>Polycyclic Aromatics Hydrocarbons (PAHs)</b>									
Naphthalene	µg/L	165	88.7	12400	1.6	1.2	0.6	0.2	<0.2
Acenaphthylene	µg/L	13.8	11.6	585	12.9	12.3	4.1	2.0	0.6
Acenaphthene	µg/L	196	36.9	2260	100	102	8.4	2.4	0.3
Fluorene	µg/L	42.9	6.4	1060	1.8	1.6	0.6	0.2	<0.2
Phenanthrene	µg/L	188	31.6	4650	17.1	18.8	3.8	2.1	0.4
Anthracene	µg/L	48.5	7.8	876	10.6	11.9	2.3	1.2	0.4
Fluoranthene	µg/L	126	43.6	2130	173	169	23	7.0	1.3
Pyrene	µg/L	148	59.3	2640	189	180	35.3	11.6	2.8
Benz(a)anthracene	µg/L	33.5	16.8	703	59.6	60.9	10.4	3.5	0.7
Chrysene	µg/L	29.2	13.9	528	46.1	48.8	8.4	3.1	0.8
Benzo(b)fluoranthene	µg/L	28.4	17.0	552.0	49.4	51.5	10.8	3.6	1.0
Benzo(k)fluoranthene	µg/L	10.8	6.8	185.0	14.2	21.8	4.3	1.4	0.5
Benzo(a)pyrene	µg/L	26	16.6	561	51.9	54.6	11.6	3.3	1
Indeno(1,2,3,cd)pyrene	µg/L	11.9	8	258	16.5	25.6	5.5	1.8	0.5
Dibenz(a,h)anthracene	µg/L	1.7	1.4	49.9	2.1	2.8	0.8	0.4	<0.2
Benzo(g,h,i)perylene	µg/L	10.7	7.5	238	15	24.3	5.2	1.6	0.4
Low M.W. PAHs	µg/L	655	183	21800	144	148	19.7	8.2	<2.2
High M.W. PAHs	µg/L	426	191	7840	616	639	115	37.3	9
<b>Triorganotin</b>									
Tributyltin	µg TBT /L	0.030	<0.015	0.041	0.029	0.026	<0.015	<0.015	<0.015

## Summary Result for Pore Water Samples

**Date of Issue:** 23/02/2012  
**Client:** Civil Engineering and Development Department  
**Service Order No.:** GE/2009/16.41  
**Project:** Agreement No. CE43/2010(HY), Central Kowloon Route - Design and Construction  
 Sediment Sampling & Testing at Kowloon Bay

ALS Lab ID		HK1201876011	HK1201876012	HK1201876003	--	--	--	--	--
Client Sample ID		GB9	GB10	GB11	--	--	--	--	--
Sampling Date	Unit	18/01/2012	18/01/2012	18/01/2012	--	--	--	--	--
<b>Inorganic Nonmetallic Parameters</b>									
Ammonia as N	mg/L	14.5	22.4	16.6					
Reactive Phosphorus as P	µg/L	2510	4760	480					
Total Kjeldahl Nitrogen as N	mg/L	16.4	24.1	17.2					
Total Phosphorus as P	mg/L	2.5	4.8	0.5					
Nitrate as N	mg/L	<0.01	<0.01	<0.01					
Nitrite as N	mg/L	<0.01	<0.01	<0.01					
<b>Metals</b>									
Arsenic	µg/L	25	13	16					
Cadmium	µg/L	<0.2	<0.2	<0.2					
Chromium	µg/L	2	6	3					
Copper	µg/L	<1	4	2					
Lead	µg/L	<1	1	<1					
Mercury	µg/L	<0.1	<0.1	<0.1					
Nickel	µg/L	2	4	2					
Silver	µg/L	<1	<1	<1					
Zinc	µg/L	<10	<10	<10					
<b>PCB Single Congeners</b>									
PCB 8	µg/L	<0.01	<0.01	<0.01					
PCB 18	µg/L	<0.01	<0.01	<0.01					
PCB 28	µg/L	<0.01	<0.01	<0.01					
PCB 52	µg/L	<0.01	<0.01	<0.01					
PCB 44	µg/L	<0.01	<0.01	<0.01					
PCB 66	µg/L	<0.01	<0.01	<0.01					
PCB 101	µg/L	<0.01	<0.01	<0.01					
PCB 77	µg/L	<0.01	<0.01	<0.01					
PCB 118	µg/L	<0.01	<0.01	<0.01					
PCB 153	µg/L	<0.01	<0.01	<0.01					
PCB 105	µg/L	<0.01	<0.01	<0.01					
PCB 126	µg/L	<0.01	<0.01	<0.01					
PCB 187	µg/L	<0.01	<0.01	<0.01					
PCB 128	µg/L	<0.01	<0.01	<0.01					
PCB 180	µg/L	<0.01	<0.01	<0.01					
PCB 169	µg/L	<0.01	<0.01	<0.01					
PCB 170	µg/L	<0.01	<0.01	<0.01					
PCB 138	µg/L	<0.01	<0.01	<0.01					
<b>Organochlorine Pesticides (OC)</b>									
Aldrin	µg/L	<0.10	<0.10	<0.10					
alpha-BHC	µg/L	<0.10	<0.10	<0.10					
beta-BHC	µg/L	<0.10	<0.10	<0.10					
gamma-BHC	µg/L	<0.10	<0.10	<0.10					
delta-BHC	µg/L	<0.10	<0.10	<0.10					
Heptachlor	µg/L	<0.10	<0.10	<0.10					
Heptachlor epoxide	µg/L	<0.10	<0.10	<0.10					
Endosulfan 1	µg/L	<0.10	<0.10	<0.10					
Endosulfan sulfate	µg/L	<0.10	<0.10	<0.10					
4,4'-DDT	µg/L	<0.10	<0.10	<0.10					
4,4'-DDD	µg/L	<0.10	<0.10	<0.10					
4,4'-DDE	µg/L	<0.10	<0.10	<0.10					
<b>Polycyclic Aromatics Hydrocarbons (PAHs)</b>									
Naphthalene	µg/L	0.3	0.6	65.6					
Acenaphthylene	µg/L	1.7	6.9	7.9					
Acenaphthene	µg/L	1	21.7	92.1					
Fluorene	µg/L	<0.2	0.3	17.7					
Phenanthrene	µg/L	1.6	2.6	92.7					
Anthracene	µg/L	1.1	15.1	16.9					
Fluoranthene	µg/L	4.6	180	82.3					
Pyrene	µg/L	13.4	247	107					
Benz(a)anthracene	µg/L	2.6	36.7	23.4					
Chrysene	µg/L	2.3	33.5	17.9					
Benzo(b)fluoranthene	µg/L	3.0	30.5	18.6					
Benzo(k)fluoranthene	µg/L	0.9	12.0	8.3					
Benzo(a)pyrene	µg/L	2.6	31.3	18.2					
Indeno(1,2,3.cd)pyrene	µg/L	1.4	14.2	7.8					
Dibenz(a,h)anthracene	µg/L	0.3	1.8	1.1					
Benzo(g,h,i)perylene	µg/L	1.2	12.8	7.2					
Low M.W. PAHs	µg/L	5.7	47.2	293					
High M.W. PAHs	µg/L	32.3	600	292					
<b>Triorganotins</b>									
Tributyltin	µg TBT /L	<0.015	0.693	<0.015					



















### Summary Result for Elutriate Samples

**Date of Issue:** 23/02/2012  
**Client:** Civil Engineering and Development Department  
**Service Order No.:** GE/2009/16.41  
**Project:** Agreement No. CE43/2010(HY), Central Kowloon Route - Design and Construction  
 Sediment Sampling & Testing at Kowloon Bay

ALS Lab ID		HK1201868013	HK1202618001	HK1202618002	--	--	--	--	--
Client Sample ID		MW04 (ELUTRIATE BLANK)	REFERENCE SAMPLE	REFERENCE SAMPLE	--	--	--	--	--
Sampling Date	Unit	18/01/2012	18/01/2012	18/01/2012	--	--	--	--	--
<b>Inorganic Nonmetallic Parameters</b>									
Ammonia as N	mg/L	0.33	1.3	0.14					
Reactive Phosphorus as P	µg/L	10	110	<10					
Total Kjeldahl Nitrogen as N	mg/L	0.6	1.7	0.3					
Total Phosphorus as P	mg/L	0.1	0.1	<0.1					
Nitrate as N	mg/L	0.25	0.13	0.17					
Nitrite as N	mg/L	0.02	<0.01	0.02					
<b>Metals</b>									
Arsenic	µg/L	<10	<10	<10					
Cadmium	µg/L	<0.2	<0.2	<0.2					
Chromium	µg/L	<1	<1	<1					
Copper	µg/L	<1	<1	<1					
Lead	µg/L	<1	<1	<1					
Mercury	µg/L	<0.1	<0.1	<0.1					
Nickel	µg/L	<1	<1	<1					
Silver	µg/L	<1	<1	<1					
Zinc	µg/L	<10	<10	<10					
<b>PCB Single Congeners</b>									
PCB 8	µg/L	<0.01	<0.01	<0.01					
PCB 18	µg/L	<0.01	<0.01	<0.01					
PCB 28	µg/L	<0.01	<0.01	<0.01					
PCB 52	µg/L	<0.01	<0.01	<0.01					
PCB 44	µg/L	<0.01	<0.01	<0.01					
PCB 66	µg/L	<0.01	<0.01	<0.01					
PCB 101	µg/L	<0.01	<0.01	<0.01					
PCB 77	µg/L	<0.01	<0.01	<0.01					
PCB 118	µg/L	<0.01	<0.01	<0.01					
PCB 153	µg/L	<0.01	<0.01	<0.01					
PCB 105	µg/L	<0.01	<0.01	<0.01					
PCB 126	µg/L	<0.01	<0.01	<0.01					
PCB 187	µg/L	<0.01	<0.01	<0.01					
PCB 128	µg/L	<0.01	<0.01	<0.01					
PCB 180	µg/L	<0.01	<0.01	<0.01					
PCB 169	µg/L	<0.01	<0.01	<0.01					
PCB 170	µg/L	<0.01	<0.01	<0.01					
PCB 138	µg/L	<0.01	<0.01	<0.01					
<b>Organochlorine Pesticides (OC)</b>									
Aldrin	µg/L	<0.10	<0.10	<0.10					
alpha-BHC	µg/L	<0.10	<0.10	<0.10					
beta-BHC	µg/L	<0.10	<0.10	<0.10					
gamma-BHC	µg/L	<0.10	<0.10	<0.10					
delta-BHC	µg/L	<0.10	<0.10	<0.10					
Heptachlor	µg/L	<0.10	<0.10	<0.10					
Heptachlor epoxide	µg/L	<0.10	<0.10	<0.10					
Endosulfan 1	µg/L	<0.10	<0.10	<0.10					
Endosulfan sulfate	µg/L	<0.10	<0.10	<0.10					
4,4'-DDT	µg/L	<0.10	<0.10	<0.10					
4,4'-DDD	µg/L	<0.10	<0.10	<0.10					
4,4'-DDE	µg/L	<0.10	<0.10	<0.10					
<b>Polycyclic Aromatics Hydrocarbons (PAHs)</b>									
Naphthalene	µg/L	0.2	<0.2	<0.2					
Acenaphthylene	µg/L	<0.2	<0.2	<0.2					
Acenaphthene	µg/L	<0.2	<0.2	<0.2					
Fluorene	µg/L	<0.2	<0.2	<0.2					
Phenanthrene	µg/L	<0.2	<0.2	<0.2					
Anthracene	µg/L	<0.2	<0.2	<0.2					
Fluoranthene	µg/L	<0.2	<0.2	<0.2					
Pyrene	µg/L	<0.2	<0.2	<0.2					
Benz(a)anthracene	µg/L	<0.2	<0.2	<0.2					
Chrysene	µg/L	<0.2	<0.2	<0.2					
Benzo(b)fluoranthene	µg/L	<0.2	<0.2	<0.2					
Benzo(k)fluoranthene	µg/L	<0.2	<0.2	<0.2					
Benzo(a)pyrene	µg/L	<0.2	<0.2	<0.2					
Indeno(1,2,3,cd)pyrene	µg/L	<0.2	<0.2	<0.2					
Dibenz(a,h)anthracene	µg/L	<0.2	<0.2	<0.2					
Benzo(g,h,i)perylene	µg/L	<0.2	<0.2	<0.2					
Low M.W. PAHs	µg/L	<2.2	<2.2	<2.2					
High M.W. PAHs	µg/L	<6.8	<6.8	<6.8					
<b>Triorganotins</b>									
Tributyltin	µg TBT/L	<0.015	<0.015	<0.015					



## Section 2

# Certificate of Analysis



# ALS Technichem (HK) Pty Ltd

## ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES



### CERTIFICATE OF ANALYSIS

Client	: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Laboratory	: ALS Technichem HK Pty Ltd	Page	: 1 of 13
Contact	: IR POPHIL LAM	Contact	: Chan Kwok Fai, Godfrey	Work Order	: HK1201772
Address	: GEOTECHNICAL PROJECTS DIVISION, GEOTECHNICAL ENGINEERING OFFICE, 23/F., KWUN TONG VIEW, 410 KWUN TONG ROAD, KOWLOON, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: Pophilkiam@cedd.gov.hk	E-mail	: Godfrey.Chan@alsglobal.com		
Telephone	: +852 2716 8609	Telephone	: +852 2610 1044		
Facsimile	: ----	Facsimile	: +852 2610 2021		
Project	: AGREEMENT NO CE 43_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION	Quote number	: ----	Date Samples Received	: 17-JAN-2012
Order number	: GE/2009/16.41			Issue Date	: 15-FEB-2012
C-O-C number	: H014510			No. of samples received	: 6
Site	: VR1			No. of samples analysed	: 6

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Hong Kong Accreditation Service (HKAS) has accredited this laboratory (ALS Technichem (HK) Pty Ltd) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation.

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  
Tai Yuk Lun, Stephen  
Wong Wing, Kenneth

#### Position

Senior Chemist - Organics  
Senior Chemist - Organics  
Assistant Supervisor - Metals

#### Authorised results for

Organics  
Organics  
Inorganics

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ALS Technichem (HK) Pty Ltd

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A Campbell Brothers Limited Company





Page Number : 2 of 13  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201772

### 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: 30-JAN-2012

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: **HK1201772**

The PCB cleanup method on sample(s) VR1 0.9-1.9M (HK1201772-001), is not accredited. Due to matrix interference on sample(s), VR1 0.9-1.9M (HK1201772-001), a non-accredited clean-up method was applied on those samples. The PCB analysis, including QA/QC requirements, in this certificate of analysis was performed as per the corresponding HOKLAS accredited method for sediment matrix.

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay. Sample(s) were received in a chilled condition.

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

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

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.



**Analytical Results**  
 Sub-Matrix: SEDIMENT

Compound	CAS Number	LOR	Unit	Client sample ID				
				VR1 0.9-1.9M 17-JAN-2012 14:00 HK1201772-001	VR1 1.9-2.9M 17-JAN-2012 14:00 HK1201772-002	VR1 2.9-3.9M 17-JAN-2012 14:00 HK1201772-003	VR1 6.0-6.9M 17-JAN-2012 14:20 HK1201772-004	VR1 GRAB 17-JAN-2012 15:00 HK1201772-005
EA/ED: Physical and Aggregate Properties				44.4	24.7	18.0	20.9	18.0
EA055: Moisture Content (dried @ 103° C)								
EG: Metals and Major Cations								
EG020: Arsenic	7440-38-2	1	mg/kg	9	4	2	<1	2
EG020: Cadmium	7440-43-9	0.2	mg/kg	3.4	<0.2	<0.2	<0.2	0.5
EG020: Chromium	7440-47-3	1	mg/kg	56	23	9	4	5
EG020: Copper	7440-50-8	1	mg/kg	130	6	2	1	21
EG020: Lead	7439-92-1	1	mg/kg	161	16	6	6	10
EG020: Mercury	7439-97-6	0.05	mg/kg	1.42	<0.05	<0.05	<0.05	0.05
EG020: Nickel	7440-02-0	1	mg/kg	21	16	6	2	7
EG020: Silver	7440-22-4	0.1	mg/kg	2.6	<0.1	<0.1	<0.1	0.1
EG020: Zinc	7440-66-6	1	mg/kg	423	54	20	5	15
EP-065: PCB Single Congeners								
PCB 8	34883-43-7	3	µg/kg	<3	<3	<3	<3	<3
PCB 18	37680-65-2	3	µg/kg	<3	<3	<3	<3	<3
PCB 28	7012-37-5	3	µg/kg	<3	<3	<3	<3	<3
PCB 44	41464-39-5	3	µg/kg	<3	<3	<3	<3	<3
PCB 52	35693-99-3	3	µg/kg	<3	<3	<3	<3	<3
PCB 66	32598-10-0	3	µg/kg	<3	<3	<3	<3	<3
PCB 77	32598-13-3	3	µg/kg	<3	<3	<3	<3	<3
PCB 101	37680-73-2	3	µg/kg	<3	<3	<3	<3	<3
PCB 105	32598-14-4	3	µg/kg	<3	<3	<3	<3	<3
PCB 118	31508-00-6	3	µg/kg	<3	<3	<3	<3	<3
PCB 126	57465-28-8	3	µg/kg	<3	<3	<3	<3	<3
PCB 128	38380-07-3	3	µg/kg	<3	<3	<3	<3	<3
PCB 138	35065-28-2	3	µg/kg	<3	<3	<3	<3	<3
PCB 153	35065-27-1	3	µg/kg	<3	<3	<3	<3	<3
PCB 169	32774-16-6	3	µg/kg	<3	<3	<3	<3	<3
PCB 170	35065-30-6	3	µg/kg	<3	<3	<3	<3	<3
PCB 180	35065-29-3	3	µg/kg	<3	<3	<3	<3	<3
PCB 187	52663-68-0	3	µg/kg	<3	<3	<3	<3	<3
Total Polychlorinated biphenyls	----	18	µg/kg	<18	<18	<18	<18	<18
EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)								
Naphthalene	91-20-3	50	µg/kg	80	<50	<50	<50	318
Acenaphthylene	208-96-8	50	µg/kg	105	<50	<50	<50	2880
Acenaphthene	83-32-9	50	µg/kg	57	<50	<50	<50	5210
Fluorene	86-73-7	50	µg/kg	<50	<50	<50	<50	610
Phenanthrene	85-01-8	50	µg/kg	233	<50	<50	<50	9540
Anthracene	120-12-7	50	µg/kg	102	<50	<50	<50	4990
Fluoranthene	206-44-0	150	µg/kg	497	<150	<150	<150	16800
Pyrene	129-00-0	150	µg/kg	683	<150	<150	<150	19500





Compound	CAS Number	LOR	Client sample ID				
			VR1 0.9-1.9M 17-JAN-2012 14:00 HK1201772-001	VR1 1.9-2.9M 17-JAN-2012 14:00 HK1201772-002	VR1 2.9-3.9M 17-JAN-2012 14:00 HK1201772-003	VR1 6.0-6.9M 17-JAN-2012 14:20 HK1201772-004	VR1 GRAB 17-JAN-2012 15:00 HK1201772-005
<b>Sub-Matrix: SEDIMENT</b>							
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued</b>							
Benz(a)anthracene	56-55-3	150	317	<150	<150	<150	7840
Chrysene	218-019	150	253	<150	<150	<150	7690
Benzo(b)fluoranthene	205-99-2	150	549	<150	<150	<150	8490
Benzo(k)fluoranthene	207-08-9	150	229	<150	<150	<150	2960
Benzo(a)pyrene	50-32-8	150	390	<150	<150	<150	9110
Indeno(1.2.3.cd)pyrene	193-39-5	150	206	<150	<150	<150	5370
Dibenz(a,h)anthracene	53-70-3	150	<150	<150	<150	<150	1150
Benzo(g,h,i)perylene	191-24-2	150	252	<150	<150	<150	5530
Low M.W. PAHs	----	550	577	<550	<550	<550	23500
High M.W. PAHs	----	1700	3380	<1700	<1700	<1700	84400
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>							
2-Fluorobiphenyl	32160-8	0.1	97.8	75.7	71.6	93.3	63.1
4-Terphenyl-d14	1718-510	0.1	96.1	104	95.4	112	52.3
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>							
Decachlorobiphenyl	2051-24-3	0.1	62.8	74.4	64.8	64.8	65.2

Surrogate control limits listed at end of this report.

Surrogate control limits listed at end of this report.



Compound	Client sample ID			VR1
	CAS Number	LOR	Unit	
<b>EA/ED: Physical and Aggregate Properties</b>				
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	21.8
<b>EG: Metals and Major Cations</b>				
EG020: Arsenic	7440-38-2	1	mg/kg	2
EG020: Cadmium	7440-43-9	0.2	mg/kg	0.4
EG020: Chromium	7440-47-3	1	mg/kg	4
EG020: Copper	7440-50-8	1	mg/kg	25
EG020: Lead	7439-92-1	1	mg/kg	10
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05
EG020: Nickel	7440-02-0	1	mg/kg	6
EG020: Silver	7440-22-4	0.1	mg/kg	0.1
EG020: Zinc	7440-66-6	1	mg/kg	13
<b>EP-065: PCB Single Congeners</b>				
PCB 8	34883-43-7	3	µg/kg	<3
PCB 18	37680-66-2	3	µg/kg	<3
PCB 28	7012-37-5	3	µg/kg	<3
PCB 44	41464-39-5	3	µg/kg	<3
PCB 52	35693-99-3	3	µg/kg	<3
PCB 66	32598-10-0	3	µg/kg	<3
PCB 77	32598-13-3	3	µg/kg	<3
PCB 101	37680-73-2	3	µg/kg	<3
PCB 105	32598-14-4	3	µg/kg	<3
PCB 118	31508-00-6	3	µg/kg	<3
PCB 126	57465-28-8	3	µg/kg	<3
PCB 128	38380-07-3	3	µg/kg	<3
PCB 138	35065-28-2	3	µg/kg	<3
PCB 153	35065-27-1	3	µg/kg	<3
PCB 169	32774-16-6	3	µg/kg	<3
PCB 170	35065-30-6	3	µg/kg	<3
PCB 180	35065-29-3	3	µg/kg	<3
PCB 187	52863-68-0	3	µg/kg	<3
Total Polychlorinated biphenyls	----	18	µg/kg	<18
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)</b>				
Naphthalene	91-20-3	50	µg/kg	419
Acenaphthylene	208-96-8	50	µg/kg	3570
Acenaphthene	83-32-9	50	µg/kg	6280
Fluorene	86-73-7	50	µg/kg	662
Phenanthrene	85-018	50	µg/kg	8900
Anthracene	120-12-7	50	µg/kg	6160
Fluoranthene	206-44-0	150	µg/kg	21100
Pyrene	129-00-0	150	µg/kg	24400
Benz(a)anthracene	56-55-3	150	µg/kg	9950





Compound	CAS Number	LOR	Client sample ID	
			Client sampling date / time	VR1
<b>Sub-Matrix: SEDIMENT</b>				
<b>GRAB (DUPLICATE)</b>				
17-JAN-2012 15:40				
HK1201772-006				
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued</b>				
Chrysene	218-019	150	µg/kg	10100
Benzo(b)fluoranthene	205-99-2	150	µg/kg	10800
Benzo(k)fluoranthene	207-08-9	150	µg/kg	3880
Benzo(a)pyrene	50-32-8	150	µg/kg	11700
Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	7100
Dibenz(a,h)anthracene	53-70-3	150	µg/kg	1430
Benzo(g,h,i)perylene	191-24-2	150	µg/kg	7390
Low M.W. PAHs	----	550	µg/kg	26000
High M.W. PAHs	----	1700	µg/kg	108000
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>				
2-Fluorobiphenyl	32160-8	0.1	%	89.4
4-Terphenyl-d14	1718-510	0.1	%	60.5
<b>EP-066S: PCB Congeners and Organochlorine Pesticides Surrogate</b>				
Decachlorobiphenyl	2051-24-3	0.1	%	61.9
Surrogate control limits listed at end of this report.				
Surrogate control limits listed at end of this report.				



Sub-Matrix: INTERSTITIAL WATER

Compound	CAS Number	LOR	Client sample ID		Client sampling date / time	Unit	µg TBT / L
			VR1	VR1			
EP-390: Triorganotins Tributyltin	56573-85-4	0.015	0.9-1.9M	VR1	17-JAN-2012 14:00	HK1201772-001	<0.015
			1.9-2.9M	VR1	17-JAN-2012 14:00	HK1201772-002	<0.015
			2.9-3.9M	VR1	17-JAN-2012 14:00	HK1201772-003	<0.015
			6.0-6.9M	VR1	17-JAN-2012 14:20	HK1201772-004	<0.015
			GRAB	VR1	17-JAN-2012 15:00	HK1201772-005	<0.015



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Sub-Matrix: INTERSTITIAL WATER

Compound	CAS Number	LOR	Client sampling date / time		Unit	Client sample ID
			Client sampling date / time	Unit		
EP-390: Triorganotins	56573-85-4	0.015	17-JAN-2012	15:40	µg TBT /L	VR1 GRAB (DUPLICATE)
Tributyltin						HK1201772-006 <0.015





**Laboratory Duplicate (DUP) Report**

Matrix: SOIL		Method: Compound		Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>EA/ED: Physical and Aggregate Properties (QC Lot: 2135027)</b>							
HK1201772-001	VR1 0.9-1.9M	----	0.1	%	44.4	46.7	5.0
HK1201774-005	Anonymous	----	0.1	%	40.7	43.3	6.2
<b>EG: Metals and Major Cations (QC Lot: 2135151)</b>							
HK1201772-002	VR1 1.9-2.9M	7439-97-6	0.05	mg/kg	<0.05	<0.05	0.0
		EG020: Mercury					
		7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0
		EG020: Silver					
		7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Cadmium					
		7440-38-2	1	mg/kg	4	4	0.0
		EG020: Arsenic					
		7440-47-3	1	mg/kg	23	22	5.7
		EG020: Chromium					
		7440-50-8	1	mg/kg	6	5	0.0
		EG020: Copper					
		7439-92-1	1	mg/kg	16	14	6.8
		EG020: Lead					
		7440-02-0	1	mg/kg	16	15	6.5
		EG020: Nickel					
		7440-66-6	1	mg/kg	54	51	5.3
		EG020: Zinc					
		7439-97-6	0.05	mg/kg	1.05	1.10	4.4
		EG020: Mercury					
		7440-22-4	0.1	mg/kg	6.1	6.5	7.0
		EG020: Silver					
		7440-43-9	0.2	mg/kg	1.7	1.8	0.0
		EG020: Cadmium					
		7440-38-2	1	mg/kg	6	6	0.0
		EG020: Arsenic					
		7440-47-3	1	mg/kg	75	82	8.9
		EG020: Chromium					
		7440-50-8	1	mg/kg	600	654	8.6
		EG020: Copper					
		7439-92-1	1	mg/kg	120	124	3.3
		EG020: Lead					
		7440-02-0	1	mg/kg	35	34	0.0
		EG020: Nickel					
		7440-66-6	1	mg/kg	352	354	0.6
		EG020: Zinc					
<b>EP-065: PCB Single Congeners (QC Lot: 2133664)</b>							
HK1201753-001	Anonymous	----	18	µg/kg	63	68	6.7
		Total Polychlorinated biphenyls					
		PCB 8	3	µg/kg	<3	<3	0.0
		PCB 18	3	µg/kg	<3	<3	0.0
		PCB 28	3	µg/kg	<3	<3	0.0
		PCB 44	3	µg/kg	<3	<3	0.0
		PCB 52	3	µg/kg	<3	<3	0.0
		PCB 66	3	µg/kg	<3	<3	0.0
		PCB 77	3	µg/kg	<3	<3	0.0
		PCB 101	3	µg/kg	4	4	0.0
		PCB 105	3	µg/kg	<3	<3	0.0
		PCB 118	3	µg/kg	<3	<3	0.0
		PCB 126	3	µg/kg	<3	<3	0.0
		PCB 128	3	µg/kg	<3	<3	0.0
		PCB 138	3	µg/kg	10	10	0.0
		PCB 153	3	µg/kg	17	17	0.0
		PCB 169	3	µg/kg	<3	<3	0.0
		PCB 170	3	µg/kg	9	10	0.0
		PCB 180	3	µg/kg	17	18	6.8
		PCB 187	3	µg/kg	7	8	16.3
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133502)</b>							





Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
							Original Result	Duplicate Result	
<b>Matrix: SOIL</b>									
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133502) - Continued</b>									
HK1201753-001		Anonymous	Fluoranthene	206-44-0	150	µg/kg	<150	<150	0.0
			Pyrene	129-00-0	150	µg/kg	<150	<150	0.0
			Benz(a)anthracene	56-55-3	150	µg/kg	<150	<150	0.0
			Chrysene	218-01-9	150	µg/kg	<150	<150	0.0
			Benzo(b)fluoranthene	205-99-2	150	µg/kg	<150	<150	0.0
			Benzo(k)fluoranthene	207-08-9	150	µg/kg	<150	<150	0.0
			Benzo(a)pyrene	50-32-8	150	µg/kg	<150	<150	0.0
			Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	<150	<150	0.0
			Dibenzo(a,h)anthracene	53-70-3	150	µg/kg	<150	<150	0.0
			Benzo(g,h,i)perylene	191-24-2	150	µg/kg	<150	<150	0.0
			High M.W. PAHs	----	1700	µg/kg	<1700	<1700	0.0
			Naphthalene	91-20-3	50	µg/kg	<50	<50	0.0
			Acenaphthylene	208-96-8	50	µg/kg	<50	<50	0.0
			Acenaphthene	83-32-9	50	µg/kg	<50	<50	0.0
			Fluorene	86-73-7	50	µg/kg	<50	<50	0.0
			Phenanthrene	85-01-8	50	µg/kg	<50	58	14.0
			Anthracene	120-12-7	50	µg/kg	<50	<50	0.0
			Low M.W. PAHs	----	550	µg/kg	<550	<550	0.0

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
							Original Result	Duplicate Result	
<b>Matrix: WATER</b>									
<b>EP-390: Triorganotin (QC Lot: 2144340)</b>									
HK1201645-005		Anonymous	Tributyltin	56573-85-4	6	ngSn/L	<6	<6	0.0
<b>EP-390: Triorganotin (QC Lot: 2145652)</b>									
HK1201645-001		Anonymous	Tributyltin	56573-85-4	6	ngSn/L	<6	<6	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 (%)	DCS	Recovery Limits (%)	Value	Control Limit
								Low	High	
<b>EG: Metals and Major Cations (QC Lot: 2135151)</b>										
EG020: Arsenic	7440-38-2	1	mg/kg	<1	5 mg/kg	92.5	---	77	109	---
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	95.8	---	86	110	---
EG020: Chromium	7440-47-3	1	mg/kg	<1	5 mg/kg	91.8	---	88	120	---
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	91.3	---	85	109	---
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	93.0	---	84	106	---
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	100	---	80	112	---
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	92.6	---	87	111	---
EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	5 mg/kg	88.4	---	83	105	---
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	98.2	---	82	126	---
<b>EP-065: PCB Single Congeners (QC Lot: 2133664)</b>										
PCB 8	34883-43-7	3	µg/kg	<3	5 µg/kg	81.6	---	22	121	---
PCB 18	37680-65-2	3	µg/kg	<3	5 µg/kg	73.1	---	23	124	---
PCB 28	7012-37-5	3	µg/kg	<3	5 µg/kg	64.0	---	26	124	---





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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	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>EP-065: PCB Single Congeners (QC Lot: 2133664) - Continued</b>														
PCB 44	41464-39-5	3	µg/kg	<3	5 µg/kg	62.2			16	132				
PCB 52	35693-99-3	3	µg/kg	<3	5 µg/kg	60.7			18	133				
PCB 66	32598-10-0	3	µg/kg	<3	5 µg/kg	71.4			5	130				
PCB 77	32598-13-3	3	µg/kg	<3	5 µg/kg	80.4			16	137				
PCB 101	37680-73-2	3	µg/kg	<3	5 µg/kg	87.6			26	143				
PCB 105	32598-14-4	3	µg/kg	<3	5 µg/kg	84.9			19	132				
PCB 118	31508-00-6	3	µg/kg	<3	5 µg/kg	83.6			17	137				
PCB 126	57465-28-8	3	µg/kg	<3	5 µg/kg	89.4			29	107				
PCB 128	38380-07-3	3	µg/kg	<3	5 µg/kg	87.1			28	126				
PCB 138	35065-28-2	3	µg/kg	<3	5 µg/kg	85.1			21	136				
PCB 153	35065-27-1	3	µg/kg	<3	5 µg/kg	85.2			25	135				
PCB 169	32774-16-6	3	µg/kg	<3	5 µg/kg	87.6			17	129				
PCB 170	35065-30-6	3	µg/kg	<3	5 µg/kg	87.6			18	129				
PCB 180	35065-29-3	3	µg/kg	<3	5 µg/kg	89.0			21	124				
PCB 187	52663-68-0	3	µg/kg	<3	5 µg/kg	85.6			30	124				
Total Polychlorinated biphenyls														
QC Lot: 2133502														
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)</b>														
Naphthalene	91-20-3	25	µg/kg	<50	25 µg/kg	103			43	140				
Acenaphthylene	208-96-8	25	µg/kg	<50	25 µg/kg	80.8			7	159				
Acenaphthene	83-32-9	25	µg/kg	<50	25 µg/kg	101			44	139				
Fluorene	86-73-7	25	µg/kg	<50	25 µg/kg	110			36	147				
Phenanthrene	85-01-8	50	µg/kg	<50	25 µg/kg	116			53	126				
Anthracene	120-12-7	25	µg/kg	<50	25 µg/kg	79.2			12	159				
Fluoranthene	206-44-0	50	µg/kg	<50	25 µg/kg	112			40	144				
Pyrene	129-00-0	50	µg/kg	<50	25 µg/kg	116			38	148				
Benz(a)anthracene	56-55-3	25	µg/kg	<50	25 µg/kg	95.9			38	150				
Chrysene	218-01-9	25	µg/kg	<50	25 µg/kg	103			50	144				
Benzo(b)fluoranthene	205-99-2	50	µg/kg	<50	25 µg/kg	102			59	123				
Benzo(k)fluoranthene	207-08-9	50	µg/kg	<50	25 µg/kg	115			58	125				
Benzo(a)pyrene	50-32-8	50	µg/kg	<50	25 µg/kg	75.9			30	136				
Indeno(1,2,3-cd)pyrene	193-39-5	25	µg/kg	<50	25 µg/kg	112			54	127				





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 (%)	DCS	Recovery Limits (%)	Value	Control Limit
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133502) - Continued</b>										
Indeno(1,2,3-cd)pyrene	193-39-5	50	µg/kg	<50						
Dibenz(a,h)anthracene	53-70-3	50	µg/kg	<50						
Benzo(g,h,i)perylene	191-24-2	25	µg/kg	<50	25 µg/kg	115		60	122	
Low M.W. PAHs		550	µg/kg	<550	25 µg/kg	121		64	132	
High M.W. PAHs		1700	µg/kg	<1700						

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 (%)	DCS	Recovery Limits (%)	Value	Control Limit
<b>EP-390: Triorganotin (QC Lot: 2144340)</b>										
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	101		81	117	
<b>EP-390: Triorganotin (QC Lot: 2145652)</b>										
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	101		81	117	

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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)	MSD	Recovery Limits (%)	RPD (%)		
<b>EG: Metals and Major Cations (QC Lot: 2135151)</b>										
HK1201772-001	VR1 0.9-1.9M									
		EG020: Arsenic	7440-38-2	5 mg/kg	78.5		75	125		
		EG020: Cadmium	7440-43-9	5 mg/kg	95.3		75	125		
		EG020: Chromium	7440-47-3	5 mg/kg	# Not Determined		75	125		
		EG020: Copper	7440-50-8	5 mg/kg	# Not Determined		75	125		
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined		75	125		
		EG020: Mercury	7439-97-6	0.1 mg/kg	# Not Determined		75	125		
		EG020: Nickel	7440-02-0	5 mg/kg	81.0		75	125		
		EG020: Silver	7440-22-4	5 mg/kg	84.6		75	125		
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined		75	125		

**Surrogate Control Limits**

Sub-Matrix: SEDIMENT	Recovery Limits (%)	
Compound	Low	High
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates		
2-Fluorobiphenyl	50	130



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Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201772

Compound	CAS Number	Recovery Limits (%)	
		Low	High
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates - Continued			
4-Terphenyl-d14	1718-51-0	50	130
EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate			
Decachlorobiphenyl	2051-24-3	50	130



# ALS Technichem (HK) Pty Ltd

**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES



## CERTIFICATE OF ANALYSIS

Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Contact : IR POPHIL LAM  
Address : GEOTECHNICAL PROJECTS DIVISION, GEOTECHNICAL ENGINEERING OFFICE, 23/F., KWUN TONG VIEW, 410 KWUN TONG ROAD, KOWLOON, HONG KONG  
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Project : AGREEMENT NO CE 43\_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION  
Order number : GE/2009/16.41  
C-O-C number : H014504  
Site : VR2

Laboratory : ALS Technichem HK Pty Ltd  
Contact : Chan Kwok Fai, Godfrey  
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Quote number : ----

Page : 1 of 10  
Work Order : HK1201664

Date Samples Received : 16-JAN-2012  
Issue Date : 13-FEB-2012  
No. of samples received : 4  
No. of samples analysed : 4

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Hong Kong Accreditation Service (HKAS) has accredited this laboratory (ALS Technichem (HK) Pty Ltd) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation.

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  
Tai Yuk Lun, Stephen  
Wong Wing, Kenneth

### Position

Senior Chemist - Organics  
Senior Chemist - Organics  
Assistant Supervisor - Metals

### Authorised results for

Organics  
Organics  
Inorganics

ALS Laboratory Group  
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A Campbell Brothers Limited Company



Page Number : 2 of 10  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201664

### 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: 30-JAN-2012

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: **HK1201664**

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

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

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.





**Analytical Results**

Sub-Matrix: SEDIMENT

Compound	CAS Number	LOR	Unit	Client sample ID			
				VR2 0.9-1.9M 16-JAN-2012 14:35 HK1201664-001	VR2 1.9-2.9M 16-JAN-2012 14:35 HK1201664-002	VR2 2.9-3.9M 16-JAN-2012 14:35 HK1201664-003	VR2 GRAB 16-JAN-2012 15:45 HK1201664-004
EA/ED: Physical and Aggregate Properties							
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	18.7	20.6	19.5	19.2
EG: Metals and Major Cations							
EG020: Arsenic	7440-38-2	1	mg/kg	1	2	1	<1
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2
EG020: Chromium	7440-47-3	1	mg/kg	9	17	8	5
EG020: Copper	7440-50-8	1	mg/kg	2	4	2	44
EG020: Lead	7439-92-1	1	mg/kg	6	10	7	6
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05
EG020: Nickel	7440-02-0	1	mg/kg	6	12	4	3
EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	0.2
EG020: Zinc	7440-66-6	1	mg/kg	19	36	14	18
EP-065: PCB Single Congeners							
PCB 8	34883-43-7	3	µg/kg	<3	<3	<3	<3
PCB 18	37680-65-2	3	µg/kg	<3	<3	<3	<3
PCB 28	7012-37-5	3	µg/kg	<3	<3	<3	<3
PCB 44	41464-38-5	3	µg/kg	<3	<3	<3	<3
PCB 52	35693-98-3	3	µg/kg	<3	<3	<3	<3
PCB 66	32598-10-0	3	µg/kg	<3	<3	<3	<3
PCB 77	32598-13-3	3	µg/kg	<3	<3	<3	<3
PCB 101	37680-73-2	3	µg/kg	<3	<3	<3	<3
PCB 105	32598-14-4	3	µg/kg	<3	<3	<3	<3
PCB 118	31508-00-6	3	µg/kg	<3	<3	<3	<3
PCB 126	57465-28-8	3	µg/kg	<3	<3	<3	<3
PCB 128	38380-07-3	3	µg/kg	<3	<3	<3	<3
PCB 138	35065-28-2	3	µg/kg	<3	<3	<3	<3
PCB 153	35065-27-1	3	µg/kg	<3	<3	<3	<3
PCB 169	32774-16-6	3	µg/kg	<3	<3	<3	<3
PCB 170	35065-30-6	3	µg/kg	<3	<3	<3	<3
PCB 180	35065-29-3	3	µg/kg	<3	<3	<3	<3
PCB 187	52663-68-0	3	µg/kg	<3	<3	<3	<3
Total Polychlorinated biphenyls	----	18	µg/kg	<18	<18	<18	<18
EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)							
Naphthalene	9120-3	50	µg/kg	<50	<50	<50	641
Acenaphthylene	208-96-8	50	µg/kg	<50	<50	<50	1710
Acenaphthene	83-32-9	50	µg/kg	<50	<50	<50	2280
Fluorene	86-73-7	50	µg/kg	<50	<50	<50	685
Phenanthrene	85-01-8	50	µg/kg	<50	<50	<50	8870
Anthracene	120-12-7	50	µg/kg	<50	<50	<50	3170
Fluoranthene	206-44-0	150	µg/kg	<150	<150	<150	12000
Pyrene	129-00-0	150	µg/kg	<150	<150	<150	14300



Compound	Client sample ID			
	CAS Number	LOR	Unit	Client sampling date / time
	VR2 0.9-1.9M 16-JAN-2012 14:35 HK1201664-001	VR2 1.9-2.9M 16-JAN-2012 14:35 HK1201664-002	VR2 2.9-3.9M 16-JAN-2012 14:35 HK1201664-003	VR2 GRAB 16-JAN-2012 15:45 HK1201664-004
<b>Sub-Matrix: SEDIMENT</b>				
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued</b>				
Benz(a)anthracene	56-55-3	150	µg/kg	<150
Chrysene	218-019	150	µg/kg	<150
Benzo(b)fluoranthene	205-99-2	150	µg/kg	<150
Benzo(k)fluoranthene	207-08-9	150	µg/kg	<150
Benzo(a)pyrene	50-32-8	150	µg/kg	<150
Indeno(1.2.3.cd)pyrene	193-39-5	150	µg/kg	<150
Dibenz(a,h)anthracene	53-70-3	150	µg/kg	<150
Benzo(g,h,i)perylene	19124-2	150	µg/kg	<150
Low M.W. PAHs	----	550	µg/kg	<550
High M.W. PAHs	----	1700	µg/kg	<1700
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>				
2-Fluorobiphenyl	32160-8	0.1	%	76.0
4-Terphenyl-d14	1718-510	0.1	%	95.4
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>				
Decachlorobiphenyl	205124-3	0.1	%	51.4
Surrogate control limits listed at end of this report.				
				5380
				5110
				5700
				1470
				6140
				3090
				641
				2810
				17400
				56700
Surrogate control limits listed at end of this report.				
				99.0
				81.0
Surrogate control limits listed at end of this report.				
				54.8
				52.6
				77.2
				99.2
				58.3





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 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201664

Sub-Matrix: INTERSTITIAL WATER

Compound	CAS Number	LOR	Client sampling date / time	Client sample ID			
				Unit	VR2	VR2	VR2
EP-390: Triorganotins Tributyltin	56573-85-4	0.015	µg TBT / L	0.9-1.9M	1.9-2.9M	2.9-3.9M	VR2 GRAB
				16-JAN-2012 14:35	16-JAN-2012 14:35	16-JAN-2012 14:35	16-JAN-2012 15:45
				HK1201664-001	HK1201664-002	HK1201664-003	HK1201664-004
				<0.015	<0.015	<0.015	0.189



**Laboratory Duplicate (DUP) Report**

Matrix: SOIL		Method: Compound		Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>EA/ED: Physical and Aggregate Properties (QC Lot: 2130757)</b>							
HK1201661-005	Anonymous	----	0.1	%	51.2	52.3	2.1
<b>EG: Metals and Major Cations (QC Lot: 2132903)</b>							
HK1201607-002	Anonymous	7439-97-6	0.05	mg/kg	<0.05	<0.05	0.0
		EG020: Mercury					
		7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0
		EG020: Silver					
		7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Cadmium					
		7440-38-2	1	mg/kg	<1	1	0.0
		EG020: Arsenic					
		7440-47-3	1	mg/kg	6	6	0.0
		EG020: Chromium					
		7440-50-8	1	mg/kg	2	2	0.0
		EG020: Copper					
		7439-92-1	1	mg/kg	24	27	11.5
		EG020: Lead					
		7440-02-0	1	mg/kg	1	2	0.0
		EG020: Nickel					
		7440-66-6	1	mg/kg	17	20	15.6
		EG020: Zinc					
		7439-97-6	0.05	mg/kg	<0.05	<0.05	0.0
		EG020: Mercury					
		7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0
		EG020: Silver					
		7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Cadmium					
		7440-38-2	1	mg/kg	2	2	0.0
		EG020: Arsenic					
		7440-47-3	1	mg/kg	17	16	0.0
		EG020: Chromium					
		7440-50-8	1	mg/kg	4	4	0.0
		EG020: Copper					
		7439-92-1	1	mg/kg	10	11	10.8
		EG020: Lead					
		7440-02-0	1	mg/kg	12	12	0.0
		EG020: Nickel					
		7440-66-6	1	mg/kg	36	37	0.0
		EG020: Zinc					
<b>EP-065: PCB Single Congeners (QC Lot: 2133663)</b>							
HK1201645-001	Anonymous	----	18	µg/kg	1400	1410	0.8
		Total Polychlorinated biphenyls					
		PCB 8	3	µg/kg	5	5	0.0
		PCB 18	3	µg/kg	12	13	13.4
		PCB 28	3	µg/kg	27	30	8.7
		PCB 44	3	µg/kg	14	15	9.6
		PCB 52	3	µg/kg	25	27	10.0
		PCB 66	3	µg/kg	12	14	15.9
		PCB 77	3	µg/kg	<3	<3	0.0
		PCB 101	3	µg/kg	89	98	9.8
		PCB 105	3	µg/kg	13	14	7.8
		PCB 118	3	µg/kg	56	61	8.3
		PCB 126	3	µg/kg	<3	<3	0.0
		PCB 128	3	µg/kg	31	33	5.1
		PCB 138	3	µg/kg	288	296	2.5
		PCB 153	3	µg/kg	404	387	4.2
		PCB 169	3	µg/kg	<3	<3	0.0
		PCB 170	3	µg/kg	126	122	3.0
		PCB 180	3	µg/kg	228	221	3.3
		PCB 187	3	µg/kg	64	69	6.3
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133498)</b>							
HK1201645-001	Anonymous	206-44-0	150	µg/kg	53000	66200	22.1
		Fluoranthene					





Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>Matrix: SOIL</b>									
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133498) - Continued</b>									
HK1201645-001	Anonymous		Pyrene	129-00-0	150	µg/kg	67000	83700	22.1
			Benz(a)anthracene	56-55-3	150	µg/kg	30000	35200	15.9
			Chrysene	218-01-9	150	µg/kg	30600	38500	23.0
			Benzo(b)fluoranthene	205-99-2	150	µg/kg	25000	30600	20.1
			Benzo(k)fluoranthene	207-08-9	150	µg/kg	15300	18100	16.9
			Benzo(a)pyrene	50-32-8	150	µg/kg	35000	34800	0.8
			Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	15900	19300	19.2
			Dibenz(a,h)anthracene	53-70-3	150	µg/kg	1690	1710	1.2
			Benzo(g,h,i)perylene	191-24-2	150	µg/kg	15600	19300	21.3
			High M.W. PAHs	----	1700	µg/kg	289000	347000	18.3
			Naphthalene	91-20-3	50	µg/kg	878	982	11.2
			Acenaphthylene	208-96-8	50	µg/kg	11900	12100	1.7
			Acenaphthene	83-32-9	50	µg/kg	12200	15300	22.9
			Fluorene	86-73-7	50	µg/kg	4450	4640	4.1
			Phenanthrene	85-01-8	50	µg/kg	73100	86300	16.6
			Anthracene	120-12-7	50	µg/kg	17100	20500	17.8
			Low M.W. PAHs	----	550	µg/kg	120000	140000	15.6

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>Matrix: WATER</b>									
<b>EP-390: Triorganotin (QC Lot: 2144340)</b>									
HK1201645-005	Anonymous		Tributyltin	56573-85-4	6	ngSn/L	<6	<6	0.0
<b>EP-390: Triorganotin (QC Lot: 2145652)</b>									
HK1201645-001	Anonymous		Tributyltin	56573-85-4	6	ngSn/L	<6	<6	0.0

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

<b>Matrix: SOIL</b>												
<b>Method Blank (MB) Report</b>												
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Value	Control Limit	RPD (%)
<b>EG: Metals and Major Cations (QC Lot: 2132903)</b>												
EG020: Arsenic	7440-38-2	1	mg/kg	<1	5 mg/kg	87.5	77	88	77	109	----	----
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	102	86	88	86	110	----	----
EG020: Chromium	7440-47-3	1	mg/kg	<1	5 mg/kg	99.9	88	85	88	120	----	----
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	92.8	85	84	85	109	----	----
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	93.9	84	80	84	106	----	----
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	84.6	80	87	80	112	----	----
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	92.7	87	83	87	111	----	----
EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	5 mg/kg	95.1	83	82	83	105	----	----
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	100	82	82	82	126	----	----
<b>EP-065: PCB Single Congeners (QC Lot: 2133663)</b>												
PCB 8	34883-43-7	3	µg/kg	<3	5 µg/kg	71.4	22	23	22	121	----	----
PCB 18	37680-65-2	3	µg/kg	<3	5 µg/kg	61.8	23	26	23	124	----	----
PCB 28	7012-37-5	3	µg/kg	<3	5 µg/kg	59.4	26	16	26	124	----	----
PCB 44	41464-39-5	3	µg/kg	<3	5 µg/kg	62.6	16	132	16	132	----	----





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	LCS	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>EP-065: PCB Single Congeners (QC Lot: 2133663) - Continued</b>													
PCB 52	35693-99-3	3	µg/kg	<3	5 µg/kg	81.3	-----	-----	18	133	-----	-----	-----
PCB 66	32598-10-0	3	µg/kg	<3	5 µg/kg	72.6	-----	-----	5	130	-----	-----	-----
PCB 77	32598-13-3	3	µg/kg	<3	5 µg/kg	77.5	-----	-----	16	137	-----	-----	-----
PCB 101	37680-73-2	3	µg/kg	<3	5 µg/kg	81.6	-----	-----	26	143	-----	-----	-----
PCB 105	32598-14-4	3	µg/kg	<3	5 µg/kg	83.5	-----	-----	19	132	-----	-----	-----
PCB 118	31508-00-6	3	µg/kg	<3	5 µg/kg	80.5	-----	-----	17	137	-----	-----	-----
PCB 126	57465-28-8	3	µg/kg	<3	5 µg/kg	83.3	-----	-----	29	107	-----	-----	-----
PCB 128	38380-07-3	3	µg/kg	<3	5 µg/kg	82.6	-----	-----	28	126	-----	-----	-----
PCB 138	35065-28-2	3	µg/kg	<3	5 µg/kg	82.0	-----	-----	21	136	-----	-----	-----
PCB 153	35065-27-1	3	µg/kg	<3	5 µg/kg	81.9	-----	-----	25	135	-----	-----	-----
PCB 169	32774-16-6	3	µg/kg	<3	5 µg/kg	85.2	-----	-----	17	129	-----	-----	-----
PCB 170	35065-30-6	3	µg/kg	<3	5 µg/kg	84.5	-----	-----	18	129	-----	-----	-----
PCB 180	35065-29-3	3	µg/kg	<3	5 µg/kg	84.0	-----	-----	21	124	-----	-----	-----
PCB 187	52663-68-0	3	µg/kg	<3	5 µg/kg	82.5	-----	-----	30	124	-----	-----	-----
Total Polychlorinated biphenyls													
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133498)</b>													
Naphthalene	91-20-3	25	µg/kg	-----	250 µg/kg	90.7	-----	-----	43	140	-----	-----	-----
Acenaphthylene	208-96-8	25	µg/kg	<50	250 µg/kg	83.2	-----	-----	7	159	-----	-----	-----
Acenaphthene	83-32-9	50	µg/kg	<50	250 µg/kg	89.8	-----	-----	44	139	-----	-----	-----
Fluorene	86-73-7	50	µg/kg	<50	250 µg/kg	97.2	-----	-----	36	147	-----	-----	-----
Phenanthrene	85-01-8	25	µg/kg	-----	250 µg/kg	95.9	-----	-----	53	126	-----	-----	-----
Anthracene	120-12-7	50	µg/kg	<50	250 µg/kg	84.5	-----	-----	12	159	-----	-----	-----
Fluoranthene	206-44-0	25	µg/kg	<50	250 µg/kg	96.6	-----	-----	40	144	-----	-----	-----
Pyrene	129-00-0	25	µg/kg	<50	250 µg/kg	95.2	-----	-----	38	148	-----	-----	-----
Benz(a)anthracene	56-55-3	50	µg/kg	<50	250 µg/kg	80.0	-----	-----	38	150	-----	-----	-----
Chrysene	218-01-9	25	µg/kg	<50	250 µg/kg	104	-----	-----	50	144	-----	-----	-----
Benzo(b)fluoranthene	205-99-2	50	µg/kg	<50	250 µg/kg	97.8	-----	-----	59	123	-----	-----	-----
Benzo(k)fluoranthene	207-08-9	25	µg/kg	-----	250 µg/kg	103	-----	-----	58	125	-----	-----	-----
Benzo(a)pyrene	50-32-8	50	µg/kg	<50	250 µg/kg	88.4	-----	-----	30	136	-----	-----	-----
Indeno(1,2,3-cd)pyrene	193-39-5	25	µg/kg	<50	250 µg/kg	95.0	-----	-----	54	127	-----	-----	-----





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 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201664

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 (%)	RPD (%)
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133498) - Continued</b>							
Dibenzo(a,h)anthracene	53-70-3	25	µg/kg	<50	250 µg/kg	96.3	122
Benzo(g,h,i)perylene	191-24-2	50	µg/kg	<50	250 µg/kg	101	132
Low M.W. PAHs	---	550	µg/kg	<550	---	---	---
High M.W. PAHs	---	1700	µg/kg	<1700	---	---	---

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 (%)	RPD (%)
<b>EP-390: Triorganotins (QC Lot: 2144340)</b>							
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	101	117
<b>EP-390: Triorganotins (QC Lot: 2145652)</b>							
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	101	117

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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report			RPD (%)
					MS	MSD	Recovery Limits (%)	
<b>EG: Metals and Major Cations (QC Lot: 2132903)</b>								
HK1201609-002 Anonymous		EG020: Arsenic	7440-38-2	5 mg/kg	89.9	---	75	125
		EG020: Cadmium	7440-43-9	5 mg/kg	104	---	75	125
		EG020: Chromium	7440-47-3	5 mg/kg	# Not Determined	---	75	125
		EG020: Copper	7440-50-8	5 mg/kg	# Not Determined	---	75	125
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined	---	75	125
		EG020: Mercury	7439-97-6	0.1 mg/kg	81.3	---	75	125
		EG020: Nickel	7440-02-0	5 mg/kg	85.0	---	75	125
		EG020: Silver	7440-22-4	5 mg/kg	85.6	---	75	125
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	---	75	125

**Surrogate Control Limits**

Sub-Matrix: SEDIMENT	Compound	CAS Number	Recovery Limits (%)	
			Low	High
	EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates			
	2-Fluorobiphenyl	321-60-8	50	130
	4-Terphenyl-d14	1718-51-0	50	130

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Work Order : HK1201664



Sub-Matrix: <b>SEDIMENT</b>	CAS Number	Recovery Limits (%)	
		Low	High
<b>Compound</b> EP-0655: PCB Congeners and Organochlorine Pesticides Surrogate			
Decachlorobiphenyl	2051-24-3	50	130



# ALS Technichem (HK) Pty Ltd

## ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES



### CERTIFICATE OF ANALYSIS

Client	: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Laboratory	: ALS Technichem HK Pty Ltd	Page	: 1 of 10
Contact	: IR POPHIL LAM	Contact	: Chan Kwok Fai, Godfrey	Work Order	: HK1201774
Address	: GEOTECHNICAL PROJECTS DIVISION, GEOTECHNICAL ENGINEERING OFFICE, 23/F., KWUN TONG VIEW, 410 KWUN TONG ROAD, KOWLOON, HONG KONG	Address	: 1/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: Pophilkiam@cedd.gov.hk	E-mail	: Godfrey.Chan@alsglobal.com		
Telephone	: +852 2716 8609	Telephone	: +852 2610 1044		
Facsimile	: ----	Facsimile	: +852 2610 2021		
Project	: AGREEMENT NO CE 43_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION	Quote number	: ----	Date Samples Received	: 17-JAN-2012
Order number	: GE/2009/16.41			Issue Date	: 14-FEB-2012
C-O-C number	: H014507			No. of samples received	: 5
Site	: VR3			No. of samples analysed	: 5

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Hong Kong Accreditation Service (HKAS) has accredited this laboratory (ALS Technichem (HK) Pty Ltd) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation.

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  
Tai Yuk Lun, Stephen  
Wong Wing, Kenneth

#### Position

Senior Chemist - Organics  
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Assistant Supervisor - Metals

#### Authorised results for

Organics  
Organics  
Inorganics

ALS Laboratory Group  
ALS Technichem (HK) Pty Ltd

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Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201774

### 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: 30-JAN-2012

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: **HK1201774**

The PCB cleanup method on sample(s), VR3 0.9-1.9M (HK1201774-001) and VR3 GRAB (HK1201774-005), is not accredited. Due to matrix interference on sample(s), VR3 0.9-1.9M (HK1201774-001) and VR3 GRAB (HK1201774-005), a non-accredited clean-up method was applied on those samples. The PCB analysis, including QA/QC requirements, in this certificate of analysis was performed as per the corresponding HOKLAS accredited method for sediment matrix.

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.  
Sample(s) were received in a chilled condition.

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

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

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.





**Analytical Results**  
 Sub-Matrix: SEDIMENT

Compound	CAS Number	LOR	Unit	Client sample ID								
				Client sampling date / time	VR3	VR3	VR3	VR3	VR3			
EA/ED: Physical and Aggregate Properties												
EA055: Moisture Content (dried @ 103° C)	----	0.1	%	38.1	20.6	31.0	15.5	40.7				
EG: Metals and Major Cations												
EG020: Arsenic	7440-38-2	1	mg/kg	7	3	5	3	6				
EG020: Cadmium	7440-43-9	0.2	mg/kg	1.6	<0.2	<0.2	<0.2	1.7				
EG020: Chromium	7440-47-3	1	mg/kg	81	17	24	14	75				
EG020: Copper	7440-50-8	1	mg/kg	618	6	7	2	600				
EG020: Lead	7439-92-1	1	mg/kg	125	11	21	10	120				
EG020: Mercury	7439-97-6	0.05	mg/kg	1.04	<0.05	0.06	<0.05	1.05				
EG020: Nickel	7440-02-0	1	mg/kg	39	14	17	6	35				
EG020: Silver	7440-22-4	0.1	mg/kg	9.6	<0.1	<0.1	<0.1	6.1				
EG020: Zinc	7440-66-6	1	mg/kg	549	34	60	20	352				
EP-065: PCB Single Congeners												
PCB 8	34883-43-7	3	µg/kg	<3	<3	<3	<3	<3				
PCB 18	37680-65-2	3	µg/kg	7	<3	<3	<3	<3				
PCB 28	7012-37-5	3	µg/kg	17	<3	<3	<3	4				
PCB 44	41464-39-5	3	µg/kg	10	<3	<3	<3	<3				
PCB 52	35693-99-3	3	µg/kg	15	<3	<3	<3	4				
PCB 66	32598-10-0	3	µg/kg	8	<3	<3	<3	<3				
PCB 77	32598-13-3	3	µg/kg	<3	<3	<3	<3	<3				
PCB 101	37680-73-2	3	µg/kg	17	<3	<3	<3	5				
PCB 105	32598-14-4	3	µg/kg	<3	<3	<3	<3	<3				
PCB 118	31508-00-6	3	µg/kg	9	<3	<3	<3	<3				
PCB 126	57465-28-8	3	µg/kg	<3	<3	<3	<3	<3				
PCB 128	38380-07-3	3	µg/kg	<3	<3	<3	<3	<3				
PCB 138	35065-28-2	3	µg/kg	22	<3	<3	<3	<3				
PCB 153	35065-27-1	3	µg/kg	28	<3	<3	<3	9				
PCB 169	32774-16-6	3	µg/kg	<3	<3	<3	<3	<3				
PCB 170	35065-30-6	3	µg/kg	8	<3	<3	<3	<3				
PCB 180	35065-29-3	3	µg/kg	15	<3	<3	<3	4				
PCB 187	52663-68-0	3	µg/kg	6	<3	<3	<3	<3				
Total Polychlorinated biphenyls	----	18	µg/kg	169	<18	<18	<18	46				
EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)												
Naphthalene	91-20-3	50	µg/kg	23500	<50	<50	<50	12400				
Acenaphthylene	208-96-8	50	µg/kg	55300	79	<50	<50	31400				
Acenaphthene	83-32-9	50	µg/kg	99300	105	<50	<50	44200				
Fluorene	86-73-7	50	µg/kg	25000	<50	<50	<50	6150				
Phenanthrene	85-018	50	µg/kg	250000	266	<50	<50	70600				
Anthracene	120-12-7	50	µg/kg	104000	121	<50	<50	35600				
Fluoranthene	206-44-0	150	µg/kg	335000	517	<150	<150	165000				
Pyrene	129-00-0	150	µg/kg	365000	629	<150	<150	198000				





Sub-Matrix: SEDIMENT

Compound	CAS Number	LOR	Unit	Client sample ID				
				VR3 0.9-1.9M 17-JAN-2012 09:07 HK1201774-001	VR3 1.9-2.9M 17-JAN-2012 09:07 HK1201774-002	VR3 2.9-3.9M 17-JAN-2012 09:07 HK1201774-003	VR3 6.0-6.9M 17-JAN-2012 09:33 HK1201774-004	VR3 GRAB 17-JAN-2012 10:02 HK1201774-005
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued</b>								
Benz(a)anthracene	56-55-3	150	µg/kg	195000	185	<150	<150	94700
Chrysene	218-019	150	µg/kg	197000	192	<150	<150	96100
Benzo(b)fluoranthene	205-99-2	150	µg/kg	221000	229	<150	<150	100000
Benzo(k)fluoranthene	207-08-9	150	µg/kg	80000	<150	<150	<150	35800
Benzo(a)pyrene	50-32-8	150	µg/kg	234000	248	<150	<150	116000
Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	119000	<150	<150	<150	51700
Dibenz(a,h)anthracene	53-70-3	150	µg/kg	29600	<150	<150	<150	142000
Benzo(g,h,i)perylene	19124-2	150	µg/kg	113000	<150	<150	<150	51200
Low M.W. PAHs	----	550	µg/kg	557000	570	<550	<550	200000
High M.W. PAHs	----	1700	µg/kg	1890000	2000	<1700	<1700	1050000
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>								
2-Fluorobiphenyl	32160-8	0.1	%	97.7	96.4	83.1	78.3	94.3
4-Terphenyl-d14	1718-510	0.1	%	56.7	111	114	109	52.2
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>								
Decachlorobiphenyl	205124-3	0.1	%	57.6	84.9	83.6	57.5	56.3

Surrogate control limits listed at end of this report.

Surrogate control limits listed at end of this report.







**Laboratory Duplicate (DUP) Report**

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
							Original Result	Duplicate Result	
<b>EA/ED: Physical and Aggregate Properties (QC Lot: 2135027)</b>									
HK1201772-001	Anonymous		EA055: Moisture Content (dried @ 103°C)	----	0.1	%	44.4	46.7	5.0
HK1201774-005	VR3 GRAB		EA055: Moisture Content (dried @ 103°C)	----	0.1	%	40.7	43.3	6.2
<b>EG: Metals and Major Cations (QC Lot: 2135151)</b>									
HK1201772-002	Anonymous		EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	<0.05	0.0
			EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0
			EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
			EG020: Arsenic	7440-38-2	1	mg/kg	4	4	0.0
			EG020: Chromium	7440-47-3	1	mg/kg	23	22	5.7
			EG020: Copper	7440-50-8	1	mg/kg	6	5	0.0
			EG020: Lead	7439-92-1	1	mg/kg	16	14	6.8
			EG020: Nickel	7440-02-0	1	mg/kg	16	15	6.5
			EG020: Zinc	7440-66-6	1	mg/kg	54	51	5.3
HK1201774-005	VR3 GRAB		EG020: Mercury	7439-97-6	0.05	mg/kg	1.05	1.10	4.4
			EG020: Silver	7440-22-4	0.1	mg/kg	6.1	6.5	7.0
			EG020: Cadmium	7440-43-9	0.2	mg/kg	1.7	1.8	0.0
			EG020: Arsenic	7440-38-2	1	mg/kg	6	6	0.0
			EG020: Chromium	7440-47-3	1	mg/kg	75	82	8.9
			EG020: Copper	7440-50-8	1	mg/kg	600	654	8.6
			EG020: Lead	7439-92-1	1	mg/kg	120	124	3.3
			EG020: Nickel	7440-02-0	1	mg/kg	35	34	0.0
			EG020: Zinc	7440-66-6	1	mg/kg	352	354	0.6
<b>EP-065: PCB Single Congeners (QC Lot: 2133664)</b>									
HK1201753-001	Anonymous		Total Polychlorinated biphenyls	----	18	µg/kg	63	68	6.7
			PCB 8	34883-43-7	3	µg/kg	<3	<3	0.0
			PCB 18	37680-65-2	3	µg/kg	<3	<3	0.0
			PCB 28	7012-37-5	3	µg/kg	<3	<3	0.0
			PCB 44	41464-39-5	3	µg/kg	<3	<3	0.0
			PCB 52	35693-99-3	3	µg/kg	<3	<3	0.0
			PCB 66	32598-10-0	3	µg/kg	<3	<3	0.0
			PCB 77	32598-13-3	3	µg/kg	<3	<3	0.0
			PCB 101	37680-73-2	3	µg/kg	4	4	0.0
			PCB 105	32598-14-4	3	µg/kg	<3	<3	0.0
			PCB 118	31508-00-6	3	µg/kg	<3	<3	0.0
			PCB 126	57465-28-8	3	µg/kg	<3	<3	0.0
			PCB 128	38380-07-3	3	µg/kg	<3	<3	0.0
			PCB 138	35065-28-2	3	µg/kg	10	10	0.0
			PCB 153	35065-27-1	3	µg/kg	17	17	0.0
			PCB 169	32774-16-6	3	µg/kg	<3	<3	0.0
			PCB 170	35065-30-6	3	µg/kg	9	10	0.0
			PCB 180	35065-29-3	3	µg/kg	17	18	6.8
			PCB 187	52663-68-0	3	µg/kg	7	8	16.3
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133502)</b>									





Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
							Original Result	Duplicate Result	
<b>Matrix: SOIL</b>									
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133502) - Continued</b>									
HK1201753-001	Anonymous		Fluoranthene	206-44-0	150	µg/kg	<150	<150	0.0
			Pyrene	129-00-0	150	µg/kg	<150	<150	0.0
			Benz(a)anthracene	56-55-3	150	µg/kg	<150	<150	0.0
			Chrysene	218-01-9	150	µg/kg	<150	<150	0.0
			Benzo(b)fluoranthene	205-99-2	150	µg/kg	<150	<150	0.0
			Benzo(k)fluoranthene	207-08-9	150	µg/kg	<150	<150	0.0
			Benzo(a)pyrene	50-32-8	150	µg/kg	<150	<150	0.0
			Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	<150	<150	0.0
			Dibenz(a,h)anthracene	53-70-3	150	µg/kg	<150	<150	0.0
			Benzo(g,h,i)perylene	191-24-2	150	µg/kg	<150	<150	0.0
			High M.W. PAHs	----	1700	µg/kg	<1700	<1700	0.0
			Naphthalene	91-20-3	50	µg/kg	<50	<50	0.0
			Acenaphthylene	208-96-8	50	µg/kg	<50	<50	0.0
			Acenaphthene	83-32-9	50	µg/kg	<50	<50	0.0
			Fluorene	86-73-7	50	µg/kg	<50	<50	0.0
			Phenanthrene	85-01-8	50	µg/kg	<50	58	14.0
			Anthracene	120-12-7	50	µg/kg	<50	<50	0.0
			Low M.W. PAHs	----	550	µg/kg	<550	<550	0.0

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
							Original Result	Duplicate Result	
<b>Matrix: WATER</b>									
<b>EP-390: Triorganotins (QC Lot: 2144340)</b>									
HK1201645-005	Anonymous		Tributyltin	56573-85-4	6	ngSn/L	<6	<6	0.0
<b>EP-390: Triorganotins (QC Lot: 2145652)</b>									
HK1201645-001	Anonymous		Tributyltin	56573-85-4	6	ngSn/L	<6	<6	0.0

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

Method: Compound	Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report				RPD (%)	
	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	DCS	Recovery Limits (%)		Value
<b>EG: Metals and Major Cations (QC Lot: 2135151)</b>										
EG020: Arsenic	7440-38-2	1	mg/kg	<1	5 mg/kg	92.5	-----	77	109	-----
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	95.8	-----	86	110	-----
EG020: Chromium	7440-47-3	1	mg/kg	<1	5 mg/kg	91.8	-----	88	120	-----
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	91.3	-----	85	109	-----
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	93.0	-----	84	106	-----
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	100	-----	80	112	-----
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	92.6	-----	87	111	-----
EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	5 mg/kg	88.4	-----	83	105	-----
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	98.2	-----	82	126	-----
<b>EP-065: PCB Single Congeners (QC Lot: 2133664)</b>										
PCB 8	34883-43-7	3	µg/kg	<3	5 µg/kg	81.6	-----	22	121	-----
PCB 18	37680-65-2	3	µg/kg	<3	5 µg/kg	73.1	-----	23	124	-----
PCB 28	7012-37-5	3	µg/kg	<3	5 µg/kg	64.0	-----	26	124	-----





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 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201774

Method: Compound

Method Blank (MB) Report

Matrix: SOIL

Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report

Method: Compound	CAS Number	LOR	Unit	Result	Spike Recovery (%)			Recovery Limits (%)			RPD (%)
					LCS	DCS	Low	High	Value	Control Limit	
<b>EP-065: PCB Single Congeners (QC Lot: 2133664) - Continued</b>											
PCB 44	41464-39-5	3	µg/kg	<3	62.2	-----	16	132	-----	-----	
PCB 52	35693-99-3	3	µg/kg	<3	60.7	-----	18	133	-----	-----	
PCB 66	32598-10-0	3	µg/kg	<3	71.4	-----	5	130	-----	-----	
PCB 77	32598-13-3	3	µg/kg	<3	80.4	-----	16	137	-----	-----	
PCB 101	37680-73-2	3	µg/kg	<3	87.6	-----	26	143	-----	-----	
PCB 105	32598-14-4	3	µg/kg	<3	84.9	-----	19	132	-----	-----	
PCB 118	31508-00-6	3	µg/kg	<3	83.6	-----	17	137	-----	-----	
PCB 126	57465-28-8	3	µg/kg	<3	89.4	-----	29	107	-----	-----	
PCB 128	38380-07-3	3	µg/kg	<3	87.1	-----	28	126	-----	-----	
PCB 138	35065-28-2	3	µg/kg	<3	85.1	-----	21	136	-----	-----	
PCB 153	35065-27-1	3	µg/kg	<3	85.2	-----	25	135	-----	-----	
PCB 169	32774-16-6	3	µg/kg	<3	87.6	-----	17	129	-----	-----	
PCB 170	35065-30-6	3	µg/kg	<3	87.6	-----	18	129	-----	-----	
PCB 180	35065-29-3	3	µg/kg	<3	89.0	-----	21	124	-----	-----	
PCB 187	52663-68-0	3	µg/kg	<3	85.6	-----	30	124	-----	-----	
Total Polychlorinated biphenyls											
-----											
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133502)</b>											
Naphthalene	91-20-3	25	µg/kg	<50	103	-----	43	140	-----	-----	
Acenaphthylene	208-96-8	25	µg/kg	<50	80.8	-----	7	159	-----	-----	
Acenaphthene	83-32-9	25	µg/kg	<50	101	-----	44	139	-----	-----	
Fluorene	86-73-7	25	µg/kg	<50	110	-----	36	147	-----	-----	
Phenanthrene	85-01-8	50	µg/kg	<50	116	-----	53	126	-----	-----	
Anthracene	120-12-7	25	µg/kg	<50	79.2	-----	12	159	-----	-----	
Fluoranthene	206-44-0	50	µg/kg	<50	112	-----	40	144	-----	-----	
Pyrene	129-00-0	50	µg/kg	<50	116	-----	38	148	-----	-----	
Benzo(a)anthracene	56-55-3	25	µg/kg	<50	95.9	-----	38	150	-----	-----	
Chrysene	218-01-9	25	µg/kg	<50	103	-----	50	144	-----	-----	
Benzo(b)fluoranthene	205-99-2	50	µg/kg	<50	102	-----	59	123	-----	-----	
Benzo(k)fluoranthene	207-08-9	50	µg/kg	<50	115	-----	58	125	-----	-----	
Benzo(a)pyrene	50-32-8	50	µg/kg	<50	75.9	-----	30	136	-----	-----	
Indeno(1,2,3-cd)pyrene	193-39-5	25	µg/kg	<50	112	-----	54	127	-----	-----	





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 (%)	DCS	Recovery Limits (%)	Value	Control Limit
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133502) - Continued</b>										
Indeno(1,2,3-cd)pyrene	193-39-5	50	µg/kg	<50						
Dibenz(a,h)anthracene	53-70-3	50	µg/kg	<50						
Benzo(g,h,i)perylene	191-24-2	25	µg/kg	<50	25 µg/kg	115		60	122	
Low M.W. PAHs		550	µg/kg	<550	25 µg/kg	121		64	132	
High M.W. PAHs		1700	µg/kg	<1700						

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 (%)	DCS	Recovery Limits (%)	Value	Control Limit
<b>EP-390: Triorganotin (QC Lot: 2144340)</b>										
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	101		81	117	
<b>EP-390: Triorganotin (QC Lot: 2145652)</b>										
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	101		81	117	

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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	MS	MSD	Recovery Limits (%)	RPD (%)		
<b>EG: Metals and Major Cations (QC Lot: 2135151)</b>										
HK1201772-001	Anonymous									
		EG020: Arsenic	7440-38-2	5 mg/kg	78.5		75	125		
		EG020: Cadmium	7440-43-9	5 mg/kg	95.3		75	125		
		EG020: Chromium	7440-47-3	5 mg/kg	# Not Determined		75	125		
		EG020: Copper	7440-50-8	5 mg/kg	# Not Determined		75	125		
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined		75	125		
		EG020: Mercury	7439-97-6	0.1 mg/kg	# Not Determined		75	125		
		EG020: Nickel	7440-02-0	5 mg/kg	81.0		75	125		
		EG020: Silver	7440-22-4	5 mg/kg	84.6		75	125		
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined		75	125		

**Surrogate Control Limits**

Sub-Matrix: SEDIMENT	Recovery Limits (%)	
Compound	Low	High
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates		
2-Fluorobiphenyl	50	130



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Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201774

Compound	CAS Number	Recovery Limits (%)	
		Low	High
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates - Continued			
4-Terphenyl-d14	1718-51-0	50	130
EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate			
Decachlorobiphenyl	2051-24-3	50	130



# ALS Technichem (HK) Pty Ltd

## ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES



### CERTIFICATE OF ANALYSIS

Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
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Project : AGREEMENT NO CE 43\_2010 (HY) CENTRAL  
KOWLOON ROUTE - DESIGN AND  
CONSTRUCTION  
Order number : GE/2009/16.41  
C-O-C number : H014504  
Site : VR4

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Quote number : ----

Page : 1 of 10

Work Order : HK1201661

Date Samples Received : 16-JAN-2012

Issue Date : 14-FEB-2012

No. of samples received : 5

No. of samples analysed : 5

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Hong Kong Accreditation Service (HKAS) has accredited this laboratory (ALS Technichem (HK) Pty Ltd) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation.

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  
Lin Wai Yu, Iris  
Tai Yuk Lun, Stephen  
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#### Position

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Senior Chemist - Inorganics  
Senior Chemist - Organics  
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#### Authorised results for

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Organics  
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Page Number : 2 of 10  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201661

### 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: 30-JAN-2012

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: **HK1201661**

The PCB cleanup method on sample(s), VR4 0.9-1.9M (HK1201661-001), VR4 1.9-2.9M (HK1201661-002), VR4 3.0-4.0M (HK1201661-003) and VR4 GRAB (HK1201661-005), is not accredited. Due to matrix interference on sample(s), VR4 0.9-1.9M (HK1201661-001), VR4 1.9-2.9M (HK1201661-002), VR4 3.0-4.0M (HK1201661-003) and VR4 GRAB (HK1201661-005), a non-accredited clean-up method was applied on those samples. The PCB analysis, including QA/QC requirements, in this certificate of analysis was performed as per the corresponding HOKLAS accredited method for sediment matrix.

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

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

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.





**CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT**

**Analytical Results**

Sub-Matrix: SEDIMENT

Compound	CAS Number	LOR	Client sample ID		Unit	%	VR4					VR4
			Client sampling date / time	Client sample ID			1.9-2.9M	3.0-4.0M	6.0-6.9M	GRAB		
<b>EA/ED: Physical and Aggregate Properties</b>												
EA055: Moisture Content (dried @ 103° C)	----	0.1				39.1	46.4	52.2	23.5	51.2		
<b>EG: Metals and Major Cations</b>												
EG020: Arsenic	7440-38-2	1			ng/kg	8	7	8	3	10		
EG020: Cadmium	7440-43-9	0.2			ng/kg	2.2	23.7	2.5	<0.2	2.3		
EG020: Chromium	7440-47-3	1			ng/kg	361	458	514	19	99		
EG020: Copper	7440-50-8	1			ng/kg	4990	605	8120	4	817		
EG020: Lead	7439-92-1	1			ng/kg	548	238	784	12	134		
EG020: Mercury	7439-97-6	0.05			ng/kg	5.14	2.24	8.78	<0.05	1.45		
EG020: Nickel	7440-02-0	1			ng/kg	204	205	296	12	47		
EG020: Silver	7440-22-4	0.1			ng/kg	14.0	7.4	20.0	<0.1	7.2		
EG020: Zinc	7440-66-6	1			ng/kg	1280	1350	1600	38	470		
<b>EP-065: PCB Single Congeners</b>												
PCB 8	34883-43-7	3			µg/kg	4	<3	11	<3	<3		
PCB 18	37680-65-2	3			µg/kg	10	4	22	<3	<3		
PCB 28	7012-37-5	3			µg/kg	24	11	50	<3	6		
PCB 44	41464-39-5	3			µg/kg	13	7	26	<3	3		
PCB 52	35693-99-3	3			µg/kg	22	15	48	<3	6		
PCB 66	32598-10-0	3			µg/kg	18	7	26	<3	3		
PCB 77	32598-13-3	3			µg/kg	<3	<3	3	<3	<3		
PCB 101	37680-73-2	3			µg/kg	22	10	137	<3	16		
PCB 105	32598-14-4	3			µg/kg	4	<3	26	<3	4		
PCB 118	31508-00-6	3			µg/kg	12	7	81	<3	11		
PCB 126	57465-28-8	3			µg/kg	<3	<3	<3	<3	<3		
PCB 128	38380-07-3	3			µg/kg	4	<3	30	<3	3		
PCB 138	35065-28-2	3			µg/kg	30	10	238	<3	22		
PCB 153	35065-27-1	3			µg/kg	46	15	286	<3	31		
PCB 169	32774-16-6	3			µg/kg	<3	<3	<3	<3	<3		
PCB 170	35065-30-6	3			µg/kg	16	5	101	<3	8		
PCB 180	35065-29-3	3			µg/kg	30	11	187	<3	15		
PCB 187	52663-68-0	3			µg/kg	10	6	69	<3	7		
Total Polychlorinated biphenyls	----	18			µg/kg	266	116	1340	<18	137		
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)</b>												
Naphthalene	91-20-3	50			µg/kg	6150	1840	2350	<50	6060		
Acenaphthylene	208-96-8	50			µg/kg	18100	7430	7730	<50	18200		
Acenaphthene	83-32-9	50			µg/kg	92900	31700	18100	<50	22600		
Fluorene	86-73-7	50			µg/kg	35600	24400	11000	<50	3380		
Phenanthrene	85-01-8	50			µg/kg	355000	129000	93300	<50	38900		
Anthracene	120-12-7	50			µg/kg	104000	40500	28800	<50	25000		
Fluoranthene	206-44-0	150			µg/kg	291000	79800	79800	<150	171000		
Pyrene	129-00-0	150			µg/kg	324000	85200	97900	<150	217000		





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 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201661

Compound	CAS Number	LOR	Unit	Client sample ID				
				VR4 0.9-1.9M 16-JAN-2012 10:10 HK1201661-001	VR4 1.9-2.9M 16-JAN-2012 10:10 HK1201661-002	VR4 3.0-4.0M 16-JAN-2012 11:20 HK1201661-003	VR4 6.0-6.9M 16-JAN-2012 11:20 HK1201661-004	VR4 GRAB 16-JAN-2012 11:55 HK1201661-005
<b>Sub-Matrix: SEDIMENT</b>								
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued</b>								
Benz(a)anthracene	56-55-3	150	µg/kg	113000	37700	40800	<150	83400
Chrysene	218-019	150	µg/kg	114000	34900	42000	<150	79800
Benzo(b)fluoranthene	205-99-2	150	µg/kg	114000	31700	43100	<150	91200
Benzo(k)fluoranthene	207-08-9	150	µg/kg	25800	10800	14800	<150	21100
Benzo(a)pyrene	50-32-8	150	µg/kg	123000	29600	45200	<150	98000
Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	60100	13700	22700	<150	46200
Dibenz(a,h)anthracene	53-70-3	150	µg/kg	4060	1610	4950	<150	9510
Benzo(g,h,i)perylene	19124-2	150	µg/kg	52700	11600	21400	<150	43000
Low M.W. PAHs	----	550	µg/kg	612000	235000	161000	<550	114000
High M.W. PAHs	----	1700	µg/kg	1220000	337000	413000	<1700	860000
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>								
2-Fluorobiphenyl	32160-8	0.1	%	75.6	99.2	57.2	81.5	100
4-Terphenyl-d14	17718-510	0.1	%	59.8	51.9	60.5	97.5	57.3
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>								
Decachlorobiphenyl	205124-3	0.1	%	60.2	61.5	76.2	68.4	68.7





Sub-Matrix: INTERSTITIAL WATER

Compound	CAS Number	LOR	Client sample ID		VR4	VR4	VR4	VR4	VR4	VR4		
			Client sampling date / time	Unit								
EP-390: Triorganotins Tributyltin	56573-85-4	0.015	0.9-1.9M	16-JAN-2012 10:10	HK1201661-001	<0.015	1.9-2.9M	16-JAN-2012 10:10	HK1201661-002	<0.015		
			3.0-4.0M	16-JAN-2012 11:20	HK1201661-003	<0.015	6.0-6.9M	16-JAN-2012 11:20	HK1201661-004	<0.015		
			GRAB	16-JAN-2012 11:55	HK1201661-005	<0.015						



**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 (%)
<b>EA/ED: Physical and Aggregate Properties (QC Lot: 2130756)</b>								
HK1201600-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	65.1	64.8	0.5
HK1201607-003	Anonymous	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	20.2	20.6	2.3
<b>EA/ED: Physical and Aggregate Properties (QC Lot: 2130757)</b>								
HK1201661-005	VR4 GRAB	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	51.2	52.3	2.1
<b>EG: Metals and Major Cations (QC Lot: 2132903)</b>								
HK1201607-002	Anonymous	EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	<0.05	0.0
		EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0
		EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Arsenic	7440-38-2	1	mg/kg	<1	1	0.0
		EG020: Chromium	7440-47-3	1	mg/kg	6	6	0.0
		EG020: Copper	7440-50-8	1	mg/kg	2	2	0.0
		EG020: Lead	7439-92-1	1	mg/kg	24	27	11.5
		EG020: Nickel	7440-02-0	1	mg/kg	1	2	0.0
		EG020: Zinc	7440-66-6	1	mg/kg	17	20	15.6
HK1201664-002	Anonymous	EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	<0.05	0.0
		EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0
		EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Arsenic	7440-38-2	1	mg/kg	2	2	0.0
		EG020: Chromium	7440-47-3	1	mg/kg	17	16	0.0
		EG020: Copper	7440-50-8	1	mg/kg	4	4	0.0
		EG020: Lead	7439-92-1	1	mg/kg	10	11	10.8
		EG020: Nickel	7440-02-0	1	mg/kg	12	12	0.0
		EG020: Zinc	7440-66-6	1	mg/kg	36	37	0.0
<b>EP-065: PCB Single Congeners (QC Lot: 2133663)</b>								
HK1201645-001	Anonymous	Total Polychlorinated biphenyls	----	18	µg/kg	1400	1410	0.8
		PCB 8	34883-43-7	3	µg/kg	5	5	0.0
		PCB 18	37680-65-2	3	µg/kg	12	13	13.4
		PCB 28	7012-37-5	3	µg/kg	27	30	8.7
		PCB 44	41464-39-5	3	µg/kg	14	15	9.6
		PCB 52	35693-99-3	3	µg/kg	25	27	10.0
		PCB 66	32598-10-0	3	µg/kg	12	14	15.9
		PCB 77	32598-13-3	3	µg/kg	<3	<3	0.0
		PCB 101	37680-73-2	3	µg/kg	89	98	9.8
		PCB 105	32598-14-4	3	µg/kg	13	14	7.8
		PCB 118	31508-00-6	3	µg/kg	56	61	8.3
		PCB 126	57465-28-8	3	µg/kg	<3	<3	0.0
		PCB 128	38380-07-3	3	µg/kg	31	33	5.1
		PCB 138	35065-28-2	3	µg/kg	288	296	2.5
		PCB 153	35065-27-1	3	µg/kg	404	387	4.2
		PCB 169	32774-16-6	3	µg/kg	<3	<3	0.0
		PCB 170	35065-30-6	3	µg/kg	126	122	3.0
		PCB 180	35065-29-3	3	µg/kg	228	221	3.3





Matrix: SOIL		Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>EP-065: PCB Single Congeners (QC Lot: 2133663) - Continued</b>								
HK1201645-001	Anonymous	PCB 187	52663-68-0	3	µg/kg	64	69	6.3
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133498)</b>								
HK1201645-001	Anonymous	Fluoranthene	206-44-0	150	µg/kg	53000	66200	22.1
		Pyrene	129-00-0	150	µg/kg	67000	83700	22.1
		Benz(a)anthracene	56-55-3	150	µg/kg	30000	35200	15.9
		Chrysene	218-01-9	150	µg/kg	30600	38500	23.0
		Benzo(b)fluoranthene	205-99-2	150	µg/kg	25000	30600	20.1
		Benzo(k)fluoranthene	207-08-9	150	µg/kg	15300	18100	16.9
		Benzo(a)pyrene	50-32-8	150	µg/kg	35000	34800	0.8
		Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	15900	19300	19.2
		Dibenz(a,h)anthracene	53-70-3	150	µg/kg	1690	1710	1.2
		Benzo(g,h,i)perylene	191-24-2	150	µg/kg	15600	19300	21.3
		High M.W. PAHs	----	1700	µg/kg	289000	347000	18.3
		Naphthalene	91-20-3	50	µg/kg	878	982	11.2
		Acenaphthylene	208-96-8	50	µg/kg	11900	12100	1.7
		Acenaphthene	83-32-9	50	µg/kg	12200	15300	22.9
		Fluorene	86-73-7	50	µg/kg	4450	4640	4.1
		Phenanthrene	85-01-8	50	µg/kg	73100	86300	16.6
		Anthracene	120-12-7	50	µg/kg	17100	20500	17.8
		Low M.W. PAHs	----	550	µg/kg	120000	140000	15.6

Matrix: WATER		Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>EP-390: Triorganotin (QC Lot: 2144340)</b>								
HK1201645-005	Anonymous	Tributyltin	56573-85-4	6	ngSn/L	<6	<6	0.0
<b>EP-390: Triorganotin (QC Lot: 2145652)</b>								
HK1201645-001	Anonymous	Tributyltin	56573-85-4	6	ngSn/L	<6	<6	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 (%)	DCS	Recovery Limits (%)	Value	Control Limit
<b>EG: Metals and Major Cations (QC Lot: 2132903)</b>										
EG020: Arsenic	7440-38-2	1	mg/kg	<1	5 mg/kg	87.5	-----	77	109	-----
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	102	-----	86	110	-----
EG020: Chromium	7440-47-3	1	mg/kg	<1	5 mg/kg	99.9	-----	88	120	-----
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	92.8	-----	85	109	-----
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	93.9	-----	84	106	-----
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	84.6	-----	80	112	-----
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	92.7	-----	87	111	-----
EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	5 mg/kg	95.1	-----	83	105	-----
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	100	-----	82	126	-----





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	LCS	DCS	Recovery Low	Recovery High	Value	RPD (%)	Control Limit
<b>EP-065: PCB Single Congeners (QC Lot: 2133663) - Continued</b>												
PCB 8	34883-43-7	3	µg/kg	<3	5 µg/kg	71.4	-----	22	121	-----	-----	-----
PCB 18	37680-65-2	3	µg/kg	<3	5 µg/kg	61.8	-----	23	124	-----	-----	-----
PCB 28	7012-37-5	3	µg/kg	<3	5 µg/kg	59.4	-----	26	124	-----	-----	-----
PCB 44	41464-39-5	3	µg/kg	<3	5 µg/kg	62.6	-----	16	132	-----	-----	-----
PCB 52	35693-99-3	3	µg/kg	<3	5 µg/kg	81.3	-----	18	133	-----	-----	-----
PCB 66	32598-10-0	3	µg/kg	<3	5 µg/kg	72.6	-----	5	130	-----	-----	-----
PCB 77	32598-13-3	3	µg/kg	<3	5 µg/kg	77.5	-----	16	137	-----	-----	-----
PCB 101	37680-73-2	3	µg/kg	<3	5 µg/kg	81.6	-----	26	143	-----	-----	-----
PCB 105	32598-14-4	3	µg/kg	<3	5 µg/kg	83.5	-----	19	132	-----	-----	-----
PCB 118	31508-00-6	3	µg/kg	<3	5 µg/kg	80.5	-----	17	137	-----	-----	-----
PCB 126	57465-28-8	3	µg/kg	<3	5 µg/kg	83.3	-----	29	107	-----	-----	-----
PCB 128	38380-07-3	3	µg/kg	<3	5 µg/kg	82.6	-----	28	126	-----	-----	-----
PCB 138	35065-28-2	3	µg/kg	<3	5 µg/kg	82.0	-----	21	136	-----	-----	-----
PCB 153	35065-27-1	3	µg/kg	<3	5 µg/kg	81.9	-----	25	135	-----	-----	-----
PCB 169	32774-16-6	3	µg/kg	<3	5 µg/kg	85.2	-----	17	129	-----	-----	-----
PCB 170	35065-30-6	3	µg/kg	<3	5 µg/kg	84.5	-----	18	129	-----	-----	-----
PCB 180	35065-29-3	3	µg/kg	<3	5 µg/kg	84.0	-----	21	124	-----	-----	-----
PCB 187	52663-68-0	3	µg/kg	<3	5 µg/kg	82.5	-----	30	124	-----	-----	-----
Total Polychlorinated biphenyls	-----	18	µg/kg	<18	-----	-----	-----	-----	-----	-----	-----	-----
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133498)</b>												
Naphthalene	91-20-3	25	µg/kg	<50	250 µg/kg	90.7	-----	43	140	-----	-----	-----
Acenaphthylene	208-96-8	25	µg/kg	<50	250 µg/kg	83.2	-----	7	159	-----	-----	-----
Acenaphthene	83-32-9	50	µg/kg	<50	250 µg/kg	89.8	-----	44	139	-----	-----	-----
Fluorene	86-73-7	50	µg/kg	<50	250 µg/kg	97.2	-----	36	147	-----	-----	-----
Phenanthrene	85-01-8	25	µg/kg	<50	250 µg/kg	95.9	-----	53	126	-----	-----	-----
Anthracene	120-12-7	50	µg/kg	<50	250 µg/kg	84.5	-----	12	159	-----	-----	-----
Fluoranthene	206-44-0	25	µg/kg	<50	250 µg/kg	96.6	-----	40	144	-----	-----	-----
Pyrene	129-00-0	25	µg/kg	<50	250 µg/kg	95.2	-----	38	148	-----	-----	-----
Benz(a)anthracene	56-55-3	50	µg/kg	<50	250 µg/kg	80.0	-----	38	150	-----	-----	-----
Chrysene	218-01-9	25	µg/kg	<50	250 µg/kg	104	-----	50	144	-----	-----	-----
Benzo(b)fluoranthene	205-99-2	50	µg/kg	<50	250 µg/kg	97.8	-----	59	123	-----	-----	-----
Benzo(k)fluoranthene	207-08-9	25	µg/kg	<50	250 µg/kg	103	-----	58	125	-----	-----	-----





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 (%)	Value	Control Limit
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133498) - Continued</b>									
Benzo(a)pyrene	50-32-8	50	µg/kg	<50	250 µg/kg	88.4	30	136	-----
Indeno(1.2.3.cd)pyrene	193-39-5	25	µg/kg	<50	250 µg/kg	95.0	54	127	-----
Dibenz(a,h)anthracene	53-70-3	25	µg/kg	<50	250 µg/kg	96.3	60	122	-----
Benzo(g,h,i)perylene	191-24-2	50	µg/kg	<50	250 µg/kg	101	64	132	-----
Low M.W. PAHs	-----	550	µg/kg	<550	-----	-----	-----	-----	-----
High M.W. PAHs	-----	1700	µg/kg	<1700	-----	-----	-----	-----	-----
<b>Matrix: WATER</b>									
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 (%)	Value	Control Limit
EP-390: Triorganotins (QC Lot: 2144340)									
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	101	81	117	-----
EP-390: Triorganotins (QC Lot: 2145652)									
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	101	81	117	-----

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

Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
Method: Compound	CAS Number	MS	MSD	Recovery Limits (%)	Value	Control Limit			
<b>Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report</b>									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)	MSD	Recovery Limits (%)	Value	Control Limit
<b>EG: Metals and Major Cations (QC Lot: 2132903)</b>									
HK1201609-002	Anonymous								
EG020: Arsenic	7440-38-2	5 mg/kg	89.9	75	125	-----			
EG020: Cadmium	7440-43-9	5 mg/kg	104	75	125	-----			
EG020: Chromium	7440-47-3	5 mg/kg	# Not Determined	75	125	-----			
EG020: Copper	7440-50-8	5 mg/kg	# Not Determined	75	125	-----			
EG020: Lead	7439-92-1	5 mg/kg	# Not Determined	75	125	-----			
EG020: Mercury	7439-97-6	0.1 mg/kg	81.3	75	125	-----			
EG020: Nickel	7440-02-0	5 mg/kg	85.0	75	125	-----			
EG020: Silver	7440-22-4	5 mg/kg	85.6	75	125	-----			
EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	75	125	-----			

**Surrogate Control Limits**

Sub-Matrix: SEDIMENT	CAS Number	Recovery Limits (%)
Compound	Low	High



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Sub-Matrix: <b>SEDIMENT</b>	Compound	CAS Number	Recovery Limits (%)	
			Low	High
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>				
	2-Fluorobiphenyl	321-60-8	50	130
	4-Terphenyl-d14	1718-51-0	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>				
	Decachlorobiphenyl	2051-24-3	50	130



### CERTIFICATE OF ANALYSIS

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KOWLOON ROUTE - DESIGN AND  
CONSTRUCTION  
Order number : GE/2009/16.41  
C-O-C number : H014501  
Site : VR5

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Page : 1 of 10  
Work Order : HK1201645

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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.

Authorised results for

Position	Authorised results for
Senior Chemist - Organics	Organics
Senior Chemist - Organics	Organics
Assistant Supervisor - Metals	Inorganics

Signatories

Anh Ngoc Huynh  
Tai Yuk Lun, Stephen  
Wong Wing, Kenneth





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### 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: 30-JAN-2012

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: **HK1201645**

The PCB cleanup method on sample(s), VR5 0.9-1.9M (HK1201645-001), VR5 1.9-2.9M (HK1201645-002) and VR5 GRAB (HK1201645-005), is not accredited. Due to matrix interference on sample(s), VR5 0.9-1.9M (HK1201645-001), VR5 1.9-2.9M (HK1201645-002) and VR5 GRAB (HK1201645-005), a non-accredited clean-up method was applied on those samples. The PCB analysis, including QA/QC requirements, in this certificate of analysis was performed as per the corresponding HOKLAS accredited method for sediment matrix.

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

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

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.





**Analytical Results**  
 Sub-Matrix: SEDIMENT

Compound	CAS Number	LOR	Unit	Client sample ID		VR5 0.9-1.9M 14-JAN-2012 10:27 HK1201645-001	VR5 1.9-2.9M 14-JAN-2012 10:27 HK1201645-002	VR5 2.9-3.9M 14-JAN-2012 10:27 HK1201645-003	VR5 6.0-7.0M 14-JAN-2012 11:20 HK1201645-004	VR5 GRAB 14-JAN-2012 11:55 HK1201645-005
				Client sampling date / time	Unit					
<b>EA/ED: Physical and Aggregate Properties</b>										
EA055: Moisture Content (dried @ 103°C)	----	0.1	%			56.1	54.7	32.8	27.4	56.3
<b>EG: Metals and Major Cations</b>										
EG020: Arsenic	7440-38-2	1	mg/kg			9	11	7	3	11
EG020: Cadmium	7440-43-9	0.2	mg/kg			4.0	9.3	<0.2	<0.2	2.4
EG020: Chromium	7440-47-3	1	mg/kg			539	346	23	24	143
EG020: Copper	7440-50-8	1	mg/kg			4700	573	46	46	1240
EG020: Lead	7439-92-1	1	mg/kg			392	254	81	16	195
EG020: Mercury	7439-97-6	0.05	mg/kg			5.24	4.73	0.88	<0.05	5.11
EG020: Nickel	7440-02-0	1	mg/kg			204	170	16	15	56
EG020: Silver	7440-22-4	0.1	mg/kg			14.7	6.8	0.3	<0.1	11.4
EG020: Zinc	7440-66-6	1	mg/kg			1230	1060	98	43	514
<b>EP-065: PCB Single Congeners</b>										
PCB 8	34883-43-7	3	µg/kg			5	11	<3	<3	<3
PCB 18	37680-65-2	3	µg/kg			12	16	<3	<3	<3
PCB 28	7012-37-5	3	µg/kg			27	40	<3	<3	4
PCB 44	41464-39-5	3	µg/kg			14	23	<3	<3	<3
PCB 52	35693-99-3	3	µg/kg			25	48	<3	<3	5
PCB 66	32598-10-0	3	µg/kg			12	22	<3	<3	3
PCB 77	32598-13-3	3	µg/kg			<3	3	<3	<3	<3
PCB 101	37680-73-2	3	µg/kg			89	26	<3	<3	5
PCB 105	32598-14-4	3	µg/kg			13	66	<3	<3	<3
PCB 118	31508-00-6	3	µg/kg			56	<3	<3	<3	4
PCB 126	57465-28-8	3	µg/kg			<3	<3	<3	<3	<3
PCB 128	38380-07-3	3	µg/kg			31	17	<3	<3	<3
PCB 138	35065-28-2	3	µg/kg			288	91	<3	<3	8
PCB 153	35065-27-1	3	µg/kg			404	80	<3	<3	9
PCB 169	32774-16-6	3	µg/kg			<3	<3	<3	<3	<3
PCB 170	35065-30-6	3	µg/kg			126	24	<3	<3	3
PCB 180	35065-29-3	3	µg/kg			228	44	<3	<3	6
PCB 187	52663-68-0	3	µg/kg			64	22	<3	<3	<3
Total Polychlorinated biphenyls	----	18	µg/kg			1400	622	<18	<18	55
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)</b>										
Naphthalene	9120-3	50	µg/kg			878	908	<50	<50	10200
Acenaphthylene	208-96-8	50	µg/kg			11900	17300	<50	<50	21800
Acenaphthene	83-32-9	50	µg/kg			12200	21100	<50	<50	14400
Fluorene	86-73-7	50	µg/kg			4450	26400	<50	<50	3050
Phenanthrene	85-01-8	50	µg/kg			73100	116000	56	112	38900
Anthracene	120-12-7	50	µg/kg			17100	34500	<50	58	11500
Fluoranthene	206-44-0	150	µg/kg			53000	96000	<150	195	73500
Pyrene	129-00-0	150	µg/kg			67000	105000	<150	252	119000





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Compound	CAS Number	LOR	Unit	Client sample ID				
				VR5 0.9-1.9M 14-JAN-2012 10:27 HK1201645-001	VR5 1.9-2.9M 14-JAN-2012 10:27 HK1201645-002	VR5 2.9-3.9M 14-JAN-2012 10:27 HK1201645-003	VR5 6.0-7.0M 14-JAN-2012 11:20 HK1201645-004	VR5 GRAB 14-JAN-2012 11:55 HK1201645-005
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued</b>								
Benz(a)anthracene	56-55-3	150	µg/kg	30000	54600	<150	<150	43500
Chrysene	218-019	150	µg/kg	30600	56000	<150	<150	48900
Benzo(b)fluoranthene	205-99-2	150	µg/kg	25000	44400	<150	<150	48000
Benzo(k)fluoranthene	207-08-9	150	µg/kg	15300	27300	<150	<150	29400
Benzo(a)pyrene	50-32-8	150	µg/kg	35000	52000	<150	<150	49300
Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	15900	25000	<150	<150	33100
Dibenz(a,h)anthracene	53-70-3	150	µg/kg	1690	2020	<150	<150	5820
Benzo(g,h,i)perylene	191-24-2	150	µg/kg	15600	23800	<150	<150	34200
Low M.W. PAHs	----	550	µg/kg	120000	217000	<550	<550	100000
High M.W. PAHs	----	1700	µg/kg	289000	486000	<1700	<1700	485000
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>								
2-Fluorobiphenyl	321-60-8	0.1	%	86.6	104	87.4	72.6	83.6
4-Terphenyl-d14	1718-510	0.1	%	84.1	98.2	106	102	57.1
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>								
Decachlorobiphenyl	2051-24-3	0.1	%	78.4	87.0	64.0	63.0	52.8





Sub-Matrix: INTERSTITIAL WATER

Compound	CAS Number	Client sample ID		VR5	VR5	VR5	VR5	VR5	VR5
		Client sampling date / time	Unit						
EP-390: Triorganotins Tributyltin	56573-85-4	LOR		0.9-1.9M	1.9-2.9M	2.9-3.9M	6.0-7.0M	VR5 GRAB	VR5 GRAB
				14-JAN-2012 10:27	14-JAN-2012 10:27	14-JAN-2012 10:27	14-JAN-2012 11:20	14-JAN-2012 11:55	14-JAN-2012 11:55
				HK1201645-001	HK1201645-002	HK1201645-003	HK1201645-004	HK1201645-005	HK1201645-005
				<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
				µg TBT/L					



**Laboratory Duplicate (DUP) Report**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
						Original Result	Duplicate Result	
<b>EA/ED: Physical and Aggregate Properties (QC Lot: 2130756)</b>								
HK1201600-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	65.1	64.8	0.5
HK1201607-003	Anonymous	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	20.2	20.6	2.3
<b>EG: Metals and Major Cations (QC Lot: 2131215)</b>								
HK1201582-003	Anonymous	EG020: Mercury	7439-97-6	0.05	mg/kg	33.3	28.4	15.9
		EG020: Silver	7440-22-4	0.1	mg/kg	22.5	24.2	7.3
		EG020: Cadmium	7440-43-9	0.2	mg/kg	16.0	17.3	7.4
		EG020: Arsenic	7440-38-2	1	mg/kg	106	104	1.2
		EG020: Chromium	7440-47-3	1	mg/kg	569	580	1.9
		EG020: Copper	7440-50-8	1	mg/kg	1950	1970	1.1
		EG020: Lead	7439-92-1	1	mg/kg	646	672	4.0
		EG020: Nickel	7440-02-0	1	mg/kg	185	198	6.4
		EG020: Zinc	7440-66-6	1	mg/kg	4890	5150	5.3
HK1201601-001	Anonymous	EG020: Mercury	7439-97-6	0.05	mg/kg	0.40	0.34	15.2
		EG020: Silver	7440-22-4	0.1	mg/kg	2.3	2.2	5.2
		EG020: Cadmium	7440-43-9	0.2	mg/kg	0.4	0.3	0.0
		EG020: Arsenic	7440-38-2	1	mg/kg	9	10	0.0
		EG020: Chromium	7440-47-3	1	mg/kg	52	52	0.0
		EG020: Copper	7440-50-8	1	mg/kg	154	156	1.4
		EG020: Lead	7439-92-1	1	mg/kg	56	51	9.1
		EG020: Nickel	7440-02-0	1	mg/kg	27	26	0.0
		EG020: Zinc	7440-66-6	1	mg/kg	178	172	3.4
<b>EP-065: PCB Single Congeners (QC Lot: 2133663)</b>								
HK1201645-001	VR5 0.9-1.9M	Total Polychlorinated biphenyls	----	18	µg/kg	1400	1410	0.8
		PCB 8	34883-43-7	3	µg/kg	5	5	0.0
		PCB 18	37680-65-2	3	µg/kg	12	13	13.4
		PCB 28	7012-37-5	3	µg/kg	27	30	8.7
		PCB 44	41464-39-5	3	µg/kg	14	15	9.6
		PCB 52	35693-99-3	3	µg/kg	25	27	10.0
		PCB 66	32598-10-0	3	µg/kg	12	14	15.9
		PCB 77	32598-13-3	3	µg/kg	<3	<3	0.0
		PCB 101	37680-73-2	3	µg/kg	89	98	9.8
		PCB 105	32598-14-4	3	µg/kg	13	14	7.8
		PCB 118	31508-00-6	3	µg/kg	56	61	8.3
		PCB 126	57465-28-8	3	µg/kg	<3	<3	0.0
		PCB 128	38380-07-3	3	µg/kg	31	33	5.1
		PCB 138	35065-28-2	3	µg/kg	288	296	2.5
		PCB 153	35065-27-1	3	µg/kg	404	387	4.2
		PCB 169	32774-16-6	3	µg/kg	<3	<3	0.0
		PCB 170	35065-30-6	3	µg/kg	126	122	3.0
		PCB 180	35065-29-3	3	µg/kg	228	221	3.3
		PCB 187	52663-68-0	3	µg/kg	64	69	6.3
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133498)</b>								





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Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
							Original Result	Duplicate Result	
<b>Matrix: SOIL</b>									
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133498) - Continued</b>									
HK1201645-001		VR5 0.9-1.9M	Fluoranthene	206-44-0	150	µg/kg	53000	66200	22.1
			Pyrene	129-00-0	150	µg/kg	67000	83700	22.1
			Benzo(a)anthracene	56-55-3	150	µg/kg	30000	35200	15.9
			Chrysene	218-01-9	150	µg/kg	30600	38500	23.0
			Benzo(b)fluoranthene	205-99-2	150	µg/kg	25000	30600	20.1
			Benzo(k)fluoranthene	207-08-9	150	µg/kg	15300	18100	16.9
			Benzo(a)pyrene	50-32-8	150	µg/kg	35000	34800	0.8
			Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	15900	19300	19.2
			Dibenz(a,h)anthracene	53-70-3	150	µg/kg	1690	1710	1.2
			Benzo(g,h,i)perylene	191-24-2	150	µg/kg	15600	19300	21.3
			High M.W. PAHs	-----	1700	µg/kg	289000	347000	18.3
			Naphthalene	91-20-3	50	µg/kg	878	982	11.2
			Acenaphthylene	208-96-8	50	µg/kg	11900	12100	1.7
			Acenaphthene	83-32-9	50	µg/kg	12200	15300	22.9
			Fluorene	86-73-7	50	µg/kg	4450	4640	4.1
			Phenanthrene	85-01-8	50	µg/kg	73100	86300	16.6
			Anthracene	120-12-7	50	µg/kg	17100	20500	17.8
			Low M.W. PAHs	-----	550	µg/kg	120000	140000	15.6

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
							Original Result	Duplicate Result	
<b>Matrix: WATER</b>									
<b>EP-390: Triorganotins (QC Lot: 2144340)</b>									
HK1201645-005		VR5 GRAB	Tributyltin	56573-85-4	6	ngSn/L	<6	<6	0.0
<b>EP-390: Triorganotins (QC Lot: 2145652)</b>									
HK1201645-001		VR5 0.9-1.9M	Tributyltin	56573-85-4	6	ngSn/L	<6	<6	0.0

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

Matrix: SOIL									
Method Blank (MB) Report									
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	DCS	Recovery Limits (%)	Control Limit
						Low	High	Value	
<b>EG: Metals and Major Cations (QC Lot: 2131215)</b>									
EG020: Arsenic	7440-38-2	1	mg/kg	<1	5 mg/kg	87.2	109	77	109
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	94.9	110	86	110
EG020: Chromium	7440-47-3	1	mg/kg	<1	5 mg/kg	110	120	88	120
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	93.0	109	85	109
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	95.4	106	84	106
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	92.8	112	80	112
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	89.3	111	87	111
EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	5 mg/kg	96.3	105	83	105
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	100	126	82	126
<b>EP-065: PCB Single Congeners (QC Lot: 2133663)</b>									
PCB 8	34883-43-7	3	µg/kg	<3	5 µg/kg	71.4	121	22	121
PCB 18	37680-65-2	3	µg/kg	<3	5 µg/kg	61.8	124	23	124
PCB 28	7012-37-5	3	µg/kg	<3	5 µg/kg	59.4	124	26	124





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	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>EP-065: PCB Single Congeners (QC Lot: 2133663) - Continued</b>														
PCB 44	41464-39-5	3	µg/kg	<3	5 µg/kg	62.6	-----	-----	16	132	-----	-----	-----	-----
PCB 52	35693-99-3	3	µg/kg	<3	5 µg/kg	81.3	-----	-----	18	133	-----	-----	-----	-----
PCB 66	32598-10-0	3	µg/kg	<3	5 µg/kg	72.6	-----	-----	5	130	-----	-----	-----	-----
PCB 77	32598-13-3	3	µg/kg	<3	5 µg/kg	77.5	-----	-----	16	137	-----	-----	-----	-----
PCB 101	37680-73-2	3	µg/kg	<3	5 µg/kg	81.6	-----	-----	26	143	-----	-----	-----	-----
PCB 105	32598-14-4	3	µg/kg	<3	5 µg/kg	83.5	-----	-----	19	132	-----	-----	-----	-----
PCB 118	31508-00-6	3	µg/kg	<3	5 µg/kg	80.5	-----	-----	17	137	-----	-----	-----	-----
PCB 126	57465-28-8	3	µg/kg	<3	5 µg/kg	83.3	-----	-----	29	107	-----	-----	-----	-----
PCB 128	38380-07-3	3	µg/kg	<3	5 µg/kg	82.6	-----	-----	28	126	-----	-----	-----	-----
PCB 138	35065-28-2	3	µg/kg	<3	5 µg/kg	82.0	-----	-----	21	136	-----	-----	-----	-----
PCB 153	35065-27-1	3	µg/kg	<3	5 µg/kg	81.9	-----	-----	25	135	-----	-----	-----	-----
PCB 169	32774-16-6	3	µg/kg	<3	5 µg/kg	85.2	-----	-----	17	129	-----	-----	-----	-----
PCB 170	35065-30-6	3	µg/kg	<3	5 µg/kg	84.5	-----	-----	18	129	-----	-----	-----	-----
PCB 180	35065-29-3	3	µg/kg	<3	5 µg/kg	84.0	-----	-----	21	124	-----	-----	-----	-----
PCB 187	52663-68-0	3	µg/kg	<3	5 µg/kg	82.5	-----	-----	30	124	-----	-----	-----	-----
Total Polychlorinated biphenyls ----- 18 -----														
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133498)</b>														
Naphthalene	91-20-3	25	µg/kg	<50	250 µg/kg	90.7	-----	-----	43	140	-----	-----	-----	-----
Acenaphthylene	208-96-8	25	µg/kg	<50	250 µg/kg	83.2	-----	-----	7	159	-----	-----	-----	-----
Acenaphthene	83-32-9	50	µg/kg	<50	250 µg/kg	89.8	-----	-----	44	139	-----	-----	-----	-----
Fluorene	86-73-7	50	µg/kg	<50	250 µg/kg	97.2	-----	-----	36	147	-----	-----	-----	-----
Phenanthrene	85-01-8	25	µg/kg	<50	250 µg/kg	95.9	-----	-----	53	126	-----	-----	-----	-----
Anthracene	120-12-7	50	µg/kg	<50	250 µg/kg	84.5	-----	-----	12	159	-----	-----	-----	-----
Fluoranthene	206-44-0	25	µg/kg	<50	250 µg/kg	96.6	-----	-----	40	144	-----	-----	-----	-----
Pyrene	129-00-0	25	µg/kg	<50	250 µg/kg	95.2	-----	-----	38	148	-----	-----	-----	-----
Benz(a)anthracene	56-55-3	50	µg/kg	<50	250 µg/kg	80.0	-----	-----	38	150	-----	-----	-----	-----
Chrysene	218-01-9	25	µg/kg	<50	250 µg/kg	104	-----	-----	50	144	-----	-----	-----	-----
Benzo(b)fluoranthene	205-99-2	50	µg/kg	<50	250 µg/kg	97.8	-----	-----	59	123	-----	-----	-----	-----
Benzo(k)fluoranthene	207-08-9	25	µg/kg	<50	250 µg/kg	103	-----	-----	58	125	-----	-----	-----	-----
Benzo(a)pyrene	50-32-8	50	µg/kg	<50	250 µg/kg	88.4	-----	-----	30	136	-----	-----	-----	-----
Indeno(1.2.3.cd)pyrene	193-39-5	25	µg/kg	<50	250 µg/kg	95.0	-----	-----	54	127	-----	-----	-----	-----





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 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201645

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 (%)	Value	Control Limit
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133498) - Continued</b>									
Indeno(1,2,3-cd)pyrene	193-39-5	50	µg/kg	<50	250 µg/kg	96.3	60	122	-----
Dibenz(a,h)anthracene	53-70-3	25	µg/kg	<50	-----	-----	-----	-----	-----
Benzo(g,h,i)perylene	191-24-2	50	µg/kg	<50	250 µg/kg	101	64	132	-----
Low M.W. PAHs	-----	550	µg/kg	<550	-----	-----	-----	-----	-----
High M.W. PAHs	-----	1700	µg/kg	<1700	-----	-----	-----	-----	-----

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 (%)	Value	Control Limit
<b>EP-390: Triorganotins (QC Lot: 2144340)</b>									
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	101	81	117	-----
<b>EP-390: Triorganotins (QC Lot: 2145652)</b>									
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	101	81	117	-----

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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report			RPD (%)	
					MS	MSD	Recovery Limits (%)		
<b>EG: Metals and Major Cations (QC Lot: 2131215)</b>									
HK1201582-001	Anonymous								
		EG020: Arsenic	7440-38-2	5 mg/kg	87.6	-----	75	125	-----
		EG020: Cadmium	7440-43-9	5 mg/kg	100	-----	75	125	-----
		EG020: Chromium	7440-47-3	5 mg/kg	84.8	-----	75	125	-----
		EG020: Copper	7440-50-8	5 mg/kg	# Not Determined	-----	75	125	-----
		EG020: Lead	7439-92-1	5 mg/kg	82.3	-----	75	125	-----
		EG020: Mercury	7439-97-6	0.1 mg/kg	96.4	-----	75	125	-----
		EG020: Nickel	7440-02-0	5 mg/kg	91.2	-----	75	125	-----
		EG020: Silver	7440-22-4	5 mg/kg	91.6	-----	75	125	-----
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	-----	75	125	-----

**Surrogate Control Limits**

Sub-Matrix: SEDIMENT	Recovery Limits (%)		
Compound	CAS Number	Low	High
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			



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Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201645

Compound	CAS Number	Recovery Limits (%)	
		Low	High
EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate - Continued			
Decachlorobiphenyl	2051-24-3	50	130



### CERTIFICATE OF ANALYSIS

Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
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KOWLOON ROUTE - DESIGN AND  
CONSTRUCTION  
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Quote number : ----

Page : 1 of 9

Work Order : HK1201843

Date Samples Received : 18-JAN-2012

Issue Date : 15-FEB-2012

No. of samples received : 1

No. of samples analysed : 1

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Hong Kong Accreditation Service (HKAS) has accredited this laboratory (ALS Technichem (HK) Pty Ltd) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation.

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	Organics
Tai Yuk Lun, Stephen	Senior Chemist - Organics	Organics
Wong Wing, Kenneth	Assistant Supervisor - Metals	Inorganics



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Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201843

### 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: 31-JAN-2012

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: **HK1201843**

The PCB cleanup method on sample(s), GB1 (HK1201843-001), is not accredited. Due to matrix interference on sample(s), GB1 (HK1201843-001), a non-accredited clean-up method was applied on those samples. The PCB analysis, including QA/QC requirements, in this certificate of analysis was performed as per the corresponding HOKLAS accredited method for sediment matrix.

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.  
Sample(s) were received in a chilled condition.

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

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

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.





**Analytical Results**

Sub-Matrix: SEDIMENT

Compound	CAS Number	LOR	Client sampling date / time		GB1
			LOR	Unit	
<b>EA055: Physical and Aggregate Properties</b>					
EA055: Moisture Content (dried @ 103° C)	----	0.1	%		53.4
<b>EG: Metals and Major Cations</b>					
EG020: Arsenic	7440-38-2	1	mg/kg		10
EG020: Cadmium	7440-43-9	0.2	mg/kg		4.9
EG020: Chromium	7440-47-3	1	mg/kg		1190
EG020: Copper	7440-50-8	1	mg/kg		13400
EG020: Lead	7439-92-1	1	mg/kg		979
EG020: Mercury	7439-97-6	0.05	mg/kg		12.9
EG020: Nickel	7440-02-0	1	mg/kg		526
EG020: Silver	7440-22-4	0.1	mg/kg		20.0
EG020: Zinc	7440-66-6	1	mg/kg		1330
<b>EP-065: PCB Single Congeners</b>					
PCB 8	34883-43-7	3	µg/kg		4
PCB 18	37680-65-2	3	µg/kg		10
PCB 28	7012-37-5	3	µg/kg		22
PCB 44	41464-39-5	3	µg/kg		10
PCB 52	35693-99-3	3	µg/kg		13
PCB 66	32598-10-0	3	µg/kg		7
PCB 77	32598-13-3	3	µg/kg		<3
PCB 101	37680-73-2	3	µg/kg		18
PCB 105	32598-14-4	3	µg/kg		4
PCB 118	31508-00-6	3	µg/kg		12
PCB 126	57465-28-8	3	µg/kg		<3
PCB 128	38380-07-3	3	µg/kg		4
PCB 138	35065-28-2	3	µg/kg		22
PCB 153	35065-27-1	3	µg/kg		30
PCB 169	32774-16-6	3	µg/kg		<3
PCB 170	35065-30-6	3	µg/kg		9
PCB 180	35065-29-3	3	µg/kg		18
PCB 187	52663-68-0	3	µg/kg		7
Total Polychlorinated biphenyls	----	18	µg/kg		192
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)</b>					
Naphthalene	91-20-3	50	µg/kg		4920
Acenaphthylene	208-96-8	50	µg/kg		17500
Acenaphthene	83-32-9	50	µg/kg		71100
Fluorene	86-73-7	50	µg/kg		24500
Phenanthrene	85-01-8	50	µg/kg		181000
Anthracene	120-12-7	50	µg/kg		51800
Fluoranthene	206-44-0	150	µg/kg		138000
Pyrene	129-00-0	150	µg/kg		169000
Benz(a)anthracene	56-55-3	150	µg/kg		61900



Compound	Client sample ID		Unit	LOR	CAS Number	Client sampling date / time	GB1
	LOR	Unit					
<b>Sub-Matrix: SEDIMENT</b>							
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued</b>							
Chrysene	150	µg/kg	150	218-019	18-JAN-2012 09:10	67000	
Benzo(b)fluoranthene	150	µg/kg	150	205-99-2	18-JAN-2012 09:10	66000	
Benzo(k)fluoranthene	150	µg/kg	150	207-08-9	18-JAN-2012 09:10	25900	
Benzo(a)pyrene	150	µg/kg	150	50-32-8	18-JAN-2012 09:10	73500	
Indeno(1,2,3-cd)pyrene	150	µg/kg	150	193-39-5	18-JAN-2012 09:10	39500	
Dibenz(a,h)anthracene	150	µg/kg	150	53-70-3	18-JAN-2012 09:10	9250	
Benzo(g,h,i)perylene	150	µg/kg	150	191-24-2	18-JAN-2012 09:10	39200	
Low M.W. PAHs	550	µg/kg	550	-----	18-JAN-2012 09:10	351000	
High M.W. PAHs	1700	µg/kg	1700	-----	18-JAN-2012 09:10	690000	
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>							
2-Fluorobiphenyl	0.1	%	0.1	32160-8	18-JAN-2012 09:10	80.6	Surrogate control limits listed at end of this report.
4-Terphenyl-d14	0.1	%	0.1	1718-51-0	18-JAN-2012 09:10	56.5	Surrogate control limits listed at end of this report.
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>							
Decachlorobiphenyl	0.1	%	0.1	205124-3	18-JAN-2012 09:10	100	Surrogate control limits listed at end of this report.







**Laboratory Duplicate (DUP) Report**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
						Original Result	Duplicate Result	
<b>EA/ED: Physical and Aggregate Properties (QC Lot: 2135027)</b>								
HK1201772-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	-----	0.1	%	44.4	46.7	5.0
HK1201774-005	Anonymous	EA055: Moisture Content (dried @ 103°C)	-----	0.1	%	40.7	43.3	6.2
<b>EG: Metals and Major Cations (QC Lot: 2135151)</b>								
Matrix: SOIL								
HK1201772-002	Anonymous	EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	<0.05	0.0
		EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0
		EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Arsenic	7440-38-2	1	mg/kg	4	4	0.0
		EG020: Chromium	7440-47-3	1	mg/kg	23	22	5.7
		EG020: Copper	7440-50-8	1	mg/kg	6	5	0.0
		EG020: Lead	7439-92-1	1	mg/kg	16	14	6.8
		EG020: Nickel	7440-02-0	1	mg/kg	16	15	6.5
		EG020: Zinc	7440-66-6	1	mg/kg	54	51	5.3
HK1201774-005	Anonymous	EG020: Mercury	7439-97-6	0.05	mg/kg	1.05	1.10	4.4
		EG020: Silver	7440-22-4	0.1	mg/kg	6.1	6.5	7.0
		EG020: Cadmium	7440-43-9	0.2	mg/kg	1.7	1.8	0.0
		EG020: Arsenic	7440-38-2	1	mg/kg	6	6	0.0
		EG020: Chromium	7440-47-3	1	mg/kg	75	82	8.9
		EG020: Copper	7440-50-8	1	mg/kg	600	654	8.6
		EG020: Lead	7439-92-1	1	mg/kg	120	124	3.3
		EG020: Nickel	7440-02-0	1	mg/kg	35	34	0.0
		EG020: Zinc	7440-66-6	1	mg/kg	352	354	0.6
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>								
HK1201791-001	Anonymous	Total Polychlorinated biphenyls	-----	18	µg/kg	<18	<18	0.0
		PCB 8	34883-43-7	3	µg/kg	<3	<3	0.0
		PCB 18	37680-65-2	3	µg/kg	<3	<3	0.0
		PCB 28	7012-37-5	3	µg/kg	<3	<3	0.0
		PCB 44	41464-39-5	3	µg/kg	<3	<3	0.0
		PCB 52	35693-99-3	3	µg/kg	<3	<3	0.0
		PCB 66	32598-10-0	3	µg/kg	<3	<3	0.0
		PCB 77	32598-13-3	3	µg/kg	<3	<3	0.0
		PCB 101	37680-73-2	3	µg/kg	<3	<3	0.0
		PCB 105	32598-14-4	3	µg/kg	<3	<3	0.0
		PCB 118	31508-00-6	3	µg/kg	<3	<3	0.0
		PCB 126	57465-28-8	3	µg/kg	<3	<3	0.0
		PCB 128	38380-07-3	3	µg/kg	<3	<3	0.0
		PCB 138	35065-28-2	3	µg/kg	<3	<3	0.0
		PCB 153	35065-27-1	3	µg/kg	<3	<3	0.0
		PCB 169	32774-16-6	3	µg/kg	<3	<3	0.0
		PCB 170	35065-30-6	3	µg/kg	<3	<3	0.0
		PCB 180	35065-29-3	3	µg/kg	<3	<3	0.0
		PCB 187	52663-68-0	3	µg/kg	<3	<3	0.0
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>								





Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
Matrix: SOIL									
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>									
HK1201791-001	Anonymous		Fluoranthene	206-44-0	150	µg/kg	<150	<150	0.0
			Pyrene	129-00-0	150	µg/kg	<150	<150	0.0
			Benzo(a)anthracene	56-55-3	150	µg/kg	<150	<150	0.0
			Chrysene	218-01-9	150	µg/kg	<150	<150	0.0
			Benzo(b)fluoranthene	205-99-2	150	µg/kg	<150	<150	0.0
			Benzo(k)fluoranthene	207-08-9	150	µg/kg	<150	<150	0.0
			Benzo(a)pyrene	50-32-8	150	µg/kg	<150	<150	0.0
			Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	<150	<150	0.0
			Dibenz(a,h)anthracene	53-70-3	150	µg/kg	<150	<150	0.0
			Benzo(g,h,i)perylene	191-24-2	150	µg/kg	<150	<150	0.0
			High M.W. PAHs	----	1700	µg/kg	<1700	<1700	0.0
			Naphthalene	91-20-3	50	µg/kg	<50	<50	0.0
			Acenaphthylene	208-96-8	50	µg/kg	<50	<50	0.0
			Acenaphthene	83-32-9	50	µg/kg	<50	<50	0.0
			Fluorene	86-73-7	50	µg/kg	<50	<50	0.0
			Phenanthrene	85-01-8	50	µg/kg	<50	<50	0.0
			Anthracene	120-12-7	50	µg/kg	<50	<50	0.0
			Low M.W. PAHs	----	550	µg/kg	<550	<550	0.0

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
Matrix: WATER									
<b>EP-390: Triorganotins (QC Lot: 2148235)</b>									
HK1201860-001	Anonymous		Tributyltin	56573-85-4	6	ngSn/L	284	287	0.8

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

Method: Compound	CAS Number	LOR	Unit	Result	Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report				RPD (%)
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	Value	
Matrix: SOIL									
<b>EG: Metals and Major Cations (QC Lot: 21335151)</b>									
EG020: Arsenic	7440-38-2	1	mg/kg	<1	5 mg/kg	92.5	77	109	-----
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	95.8	86	110	-----
EG020: Chromium	7440-47-3	1	mg/kg	<1	5 mg/kg	91.8	88	120	-----
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	91.3	85	109	-----
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	93.0	84	106	-----
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	100	80	112	-----
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	92.6	87	111	-----
EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	5 mg/kg	88.4	83	105	-----
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	98.2	82	126	-----
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>									
PCB 8	34883-43-7	3	µg/kg	<3	5 µg/kg	55.4	22	121	-----
PCB 18	37680-65-2	3	µg/kg	<3	5 µg/kg	55.2	23	124	-----
PCB 28	7012-37-5	3	µg/kg	<3	5 µg/kg	63.3	26	124	-----
PCB 44	41464-39-5	3	µg/kg	<3	5 µg/kg	62.5	16	132	-----
PCB 52	35693-99-3	3	µg/kg	<3	5 µg/kg	64.4	18	133	-----





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	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>EP-065: PCB Single Congeners (QC Lot: 2133666) - Continued</b>														
PCB 66	32598-10-0	3	µg/kg	<3	5 µg/kg	64.4	-----	-----	5	130	-----	-----	-----	-----
PCB 77	32598-13-3	3	µg/kg	<3	5 µg/kg	58.1	-----	-----	16	137	-----	-----	-----	-----
PCB 101	37680-73-2	3	µg/kg	<3	5 µg/kg	59.7	-----	-----	26	143	-----	-----	-----	-----
PCB 105	32598-14-4	3	µg/kg	<3	5 µg/kg	60.1	-----	-----	19	132	-----	-----	-----	-----
PCB 118	31508-00-6	3	µg/kg	<3	5 µg/kg	59.8	-----	-----	17	137	-----	-----	-----	-----
PCB 126	57465-28-8	3	µg/kg	<3	5 µg/kg	62.7	-----	-----	29	107	-----	-----	-----	-----
PCB 128	38380-07-3	3	µg/kg	<3	5 µg/kg	60.7	-----	-----	28	126	-----	-----	-----	-----
PCB 138	35065-28-2	3	µg/kg	<3	5 µg/kg	60.4	-----	-----	21	136	-----	-----	-----	-----
PCB 153	35065-27-1	3	µg/kg	<3	5 µg/kg	61.2	-----	-----	25	135	-----	-----	-----	-----
PCB 169	32774-16-6	3	µg/kg	<3	5 µg/kg	65.0	-----	-----	17	129	-----	-----	-----	-----
PCB 170	35065-30-6	3	µg/kg	<3	5 µg/kg	64.6	-----	-----	18	129	-----	-----	-----	-----
PCB 180	35065-29-3	3	µg/kg	<3	5 µg/kg	64.1	-----	-----	21	124	-----	-----	-----	-----
PCB 187	52663-68-0	3	µg/kg	<3	5 µg/kg	61.4	-----	-----	30	124	-----	-----	-----	-----
Total Polychlorinated biphenyls	-----	18	µg/kg	<18	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>														
Naphthalene	91-20-3	25	µg/kg	<50	25 µg/kg	86.8	-----	-----	43	140	-----	-----	-----	-----
Acenaphthylene	208-96-8	50	µg/kg	<50	25 µg/kg	97.6	-----	-----	7	159	-----	-----	-----	-----
Acenaphthene	83-32-9	25	µg/kg	<50	25 µg/kg	90.3	-----	-----	44	139	-----	-----	-----	-----
Fluorene	86-73-7	25	µg/kg	<50	25 µg/kg	94.4	-----	-----	36	147	-----	-----	-----	-----
Phenanthrene	85-01-8	25	µg/kg	<50	25 µg/kg	94.3	-----	-----	53	126	-----	-----	-----	-----
Anthracene	120-12-7	25	µg/kg	<50	25 µg/kg	95.2	-----	-----	12	159	-----	-----	-----	-----
Fluoranthene	206-44-0	50	µg/kg	<50	25 µg/kg	95.0	-----	-----	40	144	-----	-----	-----	-----
Pyrene	129-00-0	25	µg/kg	<50	25 µg/kg	96.2	-----	-----	38	148	-----	-----	-----	-----
Benz(a)anthracene	56-55-3	25	µg/kg	<50	25 µg/kg	102	-----	-----	38	150	-----	-----	-----	-----
Chrysene	218-01-9	50	µg/kg	<50	25 µg/kg	105	-----	-----	50	144	-----	-----	-----	-----
Benzo(b)fluoranthene	205-99-2	25	µg/kg	<50	25 µg/kg	102	-----	-----	59	123	-----	-----	-----	-----
Benzo(k)fluoranthene	207-08-9	25	µg/kg	<50	25 µg/kg	104	-----	-----	58	125	-----	-----	-----	-----
Benzo(a)pyrene	50-32-8	25	µg/kg	<50	25 µg/kg	106	-----	-----	30	136	-----	-----	-----	-----
Indeno(1,2,3-cd)pyrene	193-39-5	25	µg/kg	<50	25 µg/kg	66.9	-----	-----	54	127	-----	-----	-----	-----
Dibenz(a,h)anthracene	53-70-3	25	µg/kg	<50	25 µg/kg	99.2	-----	-----	60	122	-----	-----	-----	-----





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 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201843

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 (%)	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>													
Dibenz(a,h)anthracene	53-70-3	50	µg/kg	<50	-----	-----	-----	-----	-----	-----	-----	-----	-----
Benzo(g,h,i)perylene	191-24-2	50	µg/kg	<50	25 µg/kg	102	-----	64 132	-----	-----	-----	-----	-----
Low M.W. PAHs	-----	550	µg/kg	<550	-----	-----	-----	-----	-----	-----	-----	-----	-----
High M.W. PAHs	-----	1700	µg/kg	<1700	-----	-----	-----	-----	-----	-----	-----	-----	-----

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 (%)	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>EP-390: Triorganotin (QC Lot: 2148235)</b>													
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	98.0	-----	81 117	-----	-----	-----	-----	-----

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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report									
				Spike Concentration	Spike Recovery (%)	MSD	Recovery Limits (%)	RPD (%)	Control Limit				
<b>EG: Metals and Major Cations (QC Lot: 2135151)</b>													
HK1201772-001	Anonymous	EG020: Arsenic	7440-38-2	5 mg/kg	78.5	-----	75 125	-----	-----	-----	-----	-----	-----
		EG020: Cadmium	7440-43-9	5 mg/kg	95.3	-----	75 125	-----	-----	-----	-----	-----	-----
		EG020: Chromium	7440-47-3	5 mg/kg	# Not Determined	-----	75 125	-----	-----	-----	-----	-----	-----
		EG020: Copper	7440-50-8	5 mg/kg	# Not Determined	-----	75 125	-----	-----	-----	-----	-----	-----
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined	-----	75 125	-----	-----	-----	-----	-----	-----
		EG020: Mercury	7439-97-6	0.1 mg/kg	# Not Determined	-----	75 125	-----	-----	-----	-----	-----	-----
		EG020: Nickel	7440-02-0	5 mg/kg	81.0	-----	75 125	-----	-----	-----	-----	-----	-----
		EG020: Silver	7440-22-4	5 mg/kg	84.6	-----	75 125	-----	-----	-----	-----	-----	-----
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	-----	75 125	-----	-----	-----	-----	-----	-----

**Surrogate Control Limits**

Sub-Matrix: SEDIMENT	CAS Number	Recovery Limits (%)	Low	High
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>				
2-Fluorobiphenyl	321-60-8	50	50	130
4-Terphenyl-d14	1718-51-0	50	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>				
Decachlorobiphenyl	2051-24-3	50	50	130

### CERTIFICATE OF ANALYSIS

Client	: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Laboratory	: ALS Technichem HK Pty Ltd	Page	: 1 of 9
Contact	: IR POPHIL LAM	Contact	: Chan Kwok Fai, Godfrey	Work Order	: HK1201847
Address	: GEOTECHNICAL PROJECTS DIVISION, GEOTECHNICAL ENGINEERING OFFICE, 23/F., KWUN TONG VIEW, 410 KWUN TONG ROAD, KOWLOON, HONG KONG	Address	: 1/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
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Telephone	: +852 2716 8609	Telephone	: +852 2610 1044		
Facsimile	: ----	Facsimile	: +852 2610 2021		
Project	: AGREEMENT NO CE 43_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION	Quote number	: ----	Date Samples Received	: 18-JAN-2012
Order number	: GE/2009/16.41			Issue Date	: 15-FEB-2012
C-O-C number	: H014516			No. of samples received	: 1
Site	: GB2			No. of samples analysed	: 1

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 Hong Kong Accreditation Service (HKAS) has accredited this laboratory (ALS Technichem (HK) Pty Ltd) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation.

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  
 Tai Yuk Lun, Stephen  
 Wong Wing, Kenneth

Senior Chemist - Organics  
 Senior Chemist - Organics  
 Assistant Supervisor - Metals  
 Organics  
 Organics  
 Inorganics





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Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201847

### 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: 31-JAN-2012

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: **HK1201847**

The PCB cleanup method on sample(s), GB2 (HK1201847-001), is not accredited. Due to matrix interference on sample(s), GB2 (HK1201847-001), a non-accredited clean-up method was applied on those samples. The PCB analysis, including QA/QC requirements, in this certificate of analysis was performed as per the corresponding HOKLAS accredited method for sediment matrix.

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.  
Sample(s) were received in a chilled condition.

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

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

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.



**Analytical Results**

Compound	CAS Number	LOR	Client sampling date / time		Unit	Client sample ID
<b>EA/ED: Physical and Aggregate Properties</b>						
EA055: Moisture Content (dried @ 103°C)	----	0.1	%		46.7	GB2 18-JAN-2012 09:44 HK1201847-001
<b>EG: Metals and Major Cations</b>						
EG020: Arsenic	7440-38-2	1	mg/kg		4	
EG020: Cadmium	7440-43-9	0.2	mg/kg		2.6	
EG020: Chromium	7440-47-3	1	mg/kg		64	
EG020: Copper	7440-50-8	1	mg/kg		385	
EG020: Lead	7439-92-1	1	mg/kg		89	
EG020: Mercury	7439-97-6	0.05	mg/kg		0.77	
EG020: Nickel	7440-02-0	1	mg/kg		29	
EG020: Silver	7440-22-4	0.1	mg/kg		2.9	
EG020: Zinc	7440-66-6	1	mg/kg		469	
<b>EP-065: PCB Single Congeners</b>						
PCB 8	34883-43-7	3	µg/kg		<3	
PCB 18	37680-65-2	3	µg/kg		<3	
PCB 28	7012-37-5	3	µg/kg		6	
PCB 44	41464-39-5	3	µg/kg		<3	
PCB 52	35683-99-3	3	µg/kg		5	
PCB 66	32598-10-0	3	µg/kg		3	
PCB 77	32598-13-3	3	µg/kg		<3	
PCB 101	37680-73-2	3	µg/kg		10	
PCB 105	32598-14-4	3	µg/kg		<3	
PCB 118	31508-00-6	3	µg/kg		6	
PCB 126	57465-28-8	3	µg/kg		<3	
PCB 128	38380-07-3	3	µg/kg		<3	
PCB 138	35065-28-2	3	µg/kg		12	
PCB 153	35065-27-1	3	µg/kg		16	
PCB 169	32774-16-6	3	µg/kg		<3	
PCB 170	35065-30-6	3	µg/kg		5	
PCB 180	35065-29-3	3	µg/kg		10	
PCB 187	52663-68-0	3	µg/kg		6	
Total Polychlorinated biphenyls	----	18	µg/kg		89	
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)</b>						
Naphthalene	91-20-3	50	µg/kg		35800	
Acenaphthylene	208-96-8	50	µg/kg		63000	
Acenaphthene	83-32-9	50	µg/kg		360000	
Fluorene	86-73-7	50	µg/kg		133000	
Phenanthrene	85-01-8	50	µg/kg		993000	
Anthracene	120-12-7	50	µg/kg		286000	
Fluoranthene	206-44-0	150	µg/kg		643000	
Pyrene	129-00-0	150	µg/kg		745000	
Benz(a)anthracene	56-55-3	150	µg/kg		228000	





Sub-Matrix: SEDIMENT		Client sample ID		GB2
		Client sampling date / time	18-JAN-2012 09:44	
		LOR	HK1201847-001	
Compound	CAS Number	LOR	Unit	
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued</b>				
Chrysene	218-019	150	µg/kg	210000
Benzo(b)fluoranthene	205-99-2	150	µg/kg	191000
Benzo(k)fluoranthene	207-08-9	150	µg/kg	78500
Benzo(a)pyrene	50-32-8	150	µg/kg	198000
Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	96500
Dibenz(a,h)anthracene	53-70-3	150	µg/kg	21600
Benzo(g,h,i)perylene	191-24-2	150	µg/kg	89700
Low M.W. PAHs	----	550	µg/kg	1870000
High M.W. PAHs	----	1700	µg/kg	2500000
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>				
2-Fluorobiphenyl	32160-8	0.1	%	105
4-Terphenyl-d14	1718-510	0.1	%	111
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>				
Decachlorobiphenyl	2051-24-3	0.1	%	54.0
Surrogate control limits listed at end of this report.				
Surrogate control limits listed at end of this report.				



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 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201847

Sub-Matrix: INTERSTITIAL WATER		Client sample ID	Client sampling date / time	Client sampling date / time	Client sampling date / time
Compound	CAS Number	LOR	Unit	Unit	Unit
EP-390: Triorganotins	56673-85-4	0.015	µg TBT /L	0.030	
Tributyltin					





**Laboratory Duplicate (DUP) Report**

Matrix: SOIL		Method: Compound		Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>EA/ED: Physical and Aggregate Properties (QC Lot: 2135028)</b>							
HK1201847-001	GB2	-----	0.1	%	46.7	51.4	9.6
HK1201860-001	Anonymous	-----	0.1	%	53.8	54.8	1.7
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>							
HK1201848-001	Anonymous	7439-97-6	0.05	mg/kg	1.26	1.27	1.0
		7440-22-4	0.1	mg/kg	6.5	6.4	1.7
		7440-43-9	0.2	mg/kg	1.8	1.9	7.6
		7440-38-2	1	mg/kg	8	8	0.0
		7440-47-3	1	mg/kg	93	96	3.1
		7440-50-8	1	mg/kg	706	702	0.5
		7439-92-1	1	mg/kg	121	123	1.4
		7440-02-0	1	mg/kg	39	45	14.3
		7440-66-6	1	mg/kg	437	442	1.0
HK1202238-002	Anonymous	7439-97-6	0.05	mg/kg	<0.05	<0.05	0.0
		7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
		7440-38-2	1	mg/kg	3	3	0.0
		7440-47-3	1	mg/kg	3	3	0.0
		7440-50-8	1	mg/kg	6	5	0.0
		7439-92-1	1	mg/kg	105	91	14.0
		7440-02-0	1	mg/kg	2	2	0.0
		7440-66-6	1	mg/kg	57	50	13.2
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>							
HK1201791-001	Anonymous	-----	18	µg/kg	<18	<18	0.0
		34883-43-7	3	µg/kg	<3	<3	0.0
		37680-65-2	3	µg/kg	<3	<3	0.0
		7012-37-5	3	µg/kg	<3	<3	0.0
		41464-39-5	3	µg/kg	<3	<3	0.0
		35693-99-3	3	µg/kg	<3	<3	0.0
		32598-10-0	3	µg/kg	<3	<3	0.0
		32598-13-3	3	µg/kg	<3	<3	0.0
		37680-73-2	3	µg/kg	<3	<3	0.0
		32598-14-4	3	µg/kg	<3	<3	0.0
		31508-00-6	3	µg/kg	<3	<3	0.0
		57465-28-8	3	µg/kg	<3	<3	0.0
		38380-07-3	3	µg/kg	<3	<3	0.0
		35065-28-2	3	µg/kg	<3	<3	0.0
		35065-27-1	3	µg/kg	<3	<3	0.0
		32774-16-6	3	µg/kg	<3	<3	0.0
		35065-30-6	3	µg/kg	<3	<3	0.0
		35065-29-3	3	µg/kg	<3	<3	0.0
		52663-68-0	3	µg/kg	<3	<3	0.0
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>							
HK1201791-001	Anonymous	206-44-0	150	µg/kg	<150	<150	0.0
		Fluoranthene					





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 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201847

Matrix: SOIL		Laboratory Duplicate (DUP) Report		Laboratory Duplicate (DUP) Report		RPD (%)
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	RPD (%)
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>						
HK1201791-001	Anonymous	Pyrene	129-00-0	150	µg/kg	0.0
		Benz(a)anthracene	56-55-3	150	µg/kg	0.0
		Chrysene	218-01-9	150	µg/kg	0.0
		Benzo(b)fluoranthene	205-99-2	150	µg/kg	0.0
		Benzo(k)fluoranthene	207-08-9	150	µg/kg	0.0
		Benzo(a)pyrene	50-32-8	150	µg/kg	0.0
		Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	0.0
		Dibenz(a,h)anthracene	53-70-3	150	µg/kg	0.0
		Benzo(g,h,i)perylene	191-24-2	150	µg/kg	0.0
		High M.W. PAHs	-----	1700	µg/kg	0.0
		Naphthalene	91-20-3	50	µg/kg	0.0
		Acenaphthylene	208-96-8	50	µg/kg	0.0
		Acenaphthene	83-32-9	50	µg/kg	0.0
		Fluorene	86-73-7	50	µg/kg	0.0
		Phenanthrene	85-01-8	50	µg/kg	0.0
		Anthracene	120-12-7	50	µg/kg	0.0
		Low M.W. PAHs	-----	550	µg/kg	0.0

Matrix: WATER		Laboratory Duplicate (DUP) Report		Laboratory Duplicate (DUP) Report		RPD (%)
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	RPD (%)
EP-390: Triorganotins (QC Lot: 2148235)						
HK1201860-001	Anonymous	Tributyltin	56573-85-4	6	ngSn/L	0.8

**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		Recovery Limits (%)		Control Limit			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	DCS	Low	High	Value	Control Limit
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>											
EG020: Arsenic	7440-38-2	1	mg/kg	<1	5 mg/kg	94.3	-----	77	109	-----	-----
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	103	-----	86	110	-----	-----
EG020: Chromium	7440-47-3	1	mg/kg	<1	5 mg/kg	105	-----	88	120	-----	-----
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	94.8	-----	85	109	-----	-----
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	94.5	-----	84	106	-----	-----
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	85.8	-----	80	112	-----	-----
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	98.4	-----	87	111	-----	-----
EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	5 mg/kg	87.9	-----	83	105	-----	-----
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	100	-----	82	126	-----	-----
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>											
PCB 8	34883-43-7	3	µg/kg	<3	5 µg/kg	55.4	-----	22	121	-----	-----
PCB 18	37680-65-2	3	µg/kg	<3	5 µg/kg	55.2	-----	23	124	-----	-----
PCB 28	7012-37-5	3	µg/kg	<3	5 µg/kg	63.3	-----	26	124	-----	-----
PCB 44	41464-39-5	3	µg/kg	<3	5 µg/kg	62.5	-----	16	132	-----	-----
PCB 52	35693-99-3	3	µg/kg	<3	5 µg/kg	64.4	-----	18	133	-----	-----
PCB 66	32598-10-0	3	µg/kg	<3	5 µg/kg	64.4	-----	5	130	-----	-----





Method Blank (MB) Report		Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report									
Matrix	SOIL	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	DCS	Recovery Limits (%)	Value	RPD (%)
Method: Compound							Low	High			Control Limit
<b>EP-065: PCB Single Congeners (QC Lot: 2133666) - Continued</b>											
PCB 77		32598-13-3	3	µg/kg	<3	5 µg/kg	58.1		16	137	
PCB 101		37680-73-2	3	µg/kg	<3	5 µg/kg	59.7		26	143	
PCB 105		32598-14-4	3	µg/kg	<3	5 µg/kg	60.1		19	132	
PCB 118		31508-00-6	3	µg/kg	<3	5 µg/kg	59.8		17	137	
PCB 126		57465-28-8	3	µg/kg	<3	5 µg/kg	62.7		29	107	
PCB 128		38380-07-3	3	µg/kg	<3	5 µg/kg	60.7		28	126	
PCB 138		35065-28-2	3	µg/kg	<3	5 µg/kg	60.4		21	136	
PCB 153		35065-27-1	3	µg/kg	<3	5 µg/kg	61.2		25	135	
PCB 169		32774-16-6	3	µg/kg	<3	5 µg/kg	65.0		17	129	
PCB 170		35065-30-6	3	µg/kg	<3	5 µg/kg	64.6		18	129	
PCB 180		35065-29-3	3	µg/kg	<3	5 µg/kg	64.1		21	124	
PCB 187		52663-68-0	3	µg/kg	<3	5 µg/kg	61.4		30	124	
Total Polychlorinated biphenyls											
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>											
Naphthalene		91-20-3	25	µg/kg	<50	25 µg/kg	86.8		43	140	
Acenaphthylene		208-96-8	50	µg/kg	<50	25 µg/kg	97.6		7	159	
Acenaphthene		83-32-9	25	µg/kg	<50	25 µg/kg	90.3		44	139	
Fluorene		86-73-7	25	µg/kg	<50	25 µg/kg	94.4		36	147	
Phenanthrene		85-01-8	25	µg/kg	<50	25 µg/kg	94.3		53	126	
Anthracene		120-12-7	25	µg/kg	<50	25 µg/kg	95.2		12	159	
Fluoranthene		206-44-0	50	µg/kg	<50	25 µg/kg	95.0		40	144	
Pyrene		129-00-0	25	µg/kg	<50	25 µg/kg	96.2		38	148	
Benz(a)anthracene		56-55-3	25	µg/kg	<50	25 µg/kg	102		38	150	
Chrysene		218-01-9	50	µg/kg	<50	25 µg/kg	105		50	144	
Benzo(b)fluoranthene		205-99-2	25	µg/kg	<50	25 µg/kg	102		59	123	
Benzo(k)fluoranthene		207-08-9	25	µg/kg	<50	25 µg/kg	104		58	125	
Benzo(a)pyrene		50-32-8	25	µg/kg	<50	25 µg/kg	106		30	136	
Indeno(1,2,3-cd)pyrene		193-39-5	25	µg/kg	<50	25 µg/kg	66.9		54	127	
Dibenz(a,h)anthracene		53-70-3	25	µg/kg	<50	25 µg/kg	99.2		60	122	





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 (%)	Control Limit
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>							
Benzo(g,h,i)perylene	191-24-2	50	µg/kg	<50	25 µg/kg	102	132
Low M.W. PAHs	---	550	µg/kg	<550	---	64	---
High M.W. PAHs	---	1700	µg/kg	<1700	---	---	---
Matrix: WATER							
Method Blank (MB) Report				Laboratory Control Spike Duplicate (DCS) Report			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	Control Limit
EP-390: Triorganotins (QC Lot: 2148235)	56573-85-4	5	ngSn/L	<5	5 ngSn/L	98.0	117
Tributyltin						81	---

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

Method: Compound				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)	MSD	Control Limit
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>							
HK1202238-001 Anonymous		EG020: Arsenic	7440-38-2	5 mg/kg	102	---	125
		EG020: Cadmium	7440-43-9	5 mg/kg	102	---	125
		EG020: Chromium	7440-47-3	5 mg/kg	106	---	125
		EG020: Copper	7440-50-8	5 mg/kg	94.7	---	125
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined	---	125
		EG020: Mercury	7439-97-6	0.1 mg/kg	88.6	---	125
		EG020: Nickel	7440-02-0	5 mg/kg	112	---	125
		EG020: Silver	7440-22-4	5 mg/kg	82.9	---	125
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	---	125

**Surrogate Control Limits**

Sub-Matrix: SEDIMENT	CAS Number	Recovery Limits (%)
Compound	Low	High
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>		
2-Fluorobiphenyl	321-60-8	50
4-Terphenyl-d14	1718-51-0	50
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>		
Decachlorobiphenyl	2051-24-3	50



### CERTIFICATE OF ANALYSIS

Client	: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Laboratory	: ALS Technichem HK Pty Ltd	Page	: 1 of 9
Contact	: IR POPHIL LAM	Contact	: Chan Kwok Fai, Godfrey	Work Order	: HK1201850
Address	: GEOTECHNICAL PROJECTS DIVISION, GEOTECHNICAL ENGINEERING OFFICE, 23/F., KWUN TONG VIEW, 410 KWUN TONG ROAD, KOWLOON, HONG KONG	Address	: 1/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: Pophilkiam@cedd.gov.hk	E-mail	: Godfrey.Chan@alsglobal.com		
Telephone	: +852 2716 8609	Telephone	: +852 2610 1044		
Facsimile	: ----	Facsimile	: +852 2610 2021		
Project	: AGREEMENT NO CE 43_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION	Quote number	: ----	Date Samples Received	: 18-JAN-2012
Order number	: GEI/2009/16.41			Issue Date	: 15-FEB-2012
C-O-C number	: H014516			No. of samples received	: 1
Site	: GB3			No. of samples analysed	: 1

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Hong Kong Accreditation Service (HKAS) has accredited this laboratory (ALS Technichem (HK) Pty Ltd) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation.

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  
Tai Yuk Lun, Stephen  
Wong Wing, Kenneth

Position

Senior Chemist - Organics  
Senior Chemist - Organics  
Assistant Supervisor - Metals  
Organics  
Organics  
Inorganics

Authorised results for



Page Number : 2 of 9  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201850

### 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: 31-JAN-2012

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: **HK1201850**

The PCB cleanup method on sample(s), GB3 (HK1201850-001), is not accredited. Due to matrix interference on sample(s), GB3 (HK1201850-001), a non-accredited clean-up method was applied on those samples. The PCB analysis, including QA/QC requirements, in this certificate of analysis was performed as per the corresponding HOKLAS accredited method for sediment matrix.

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

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

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.





**Analytical Results**

Sub-Matrix: SEDIMENT

Compound	Client sample ID		LOR	Unit	CAS Number	LOR	Unit	Client sampling date / time	GB3
<b>EA/ED: Physical and Aggregate Properties</b>									
EA055: Moisture Content (dried @ 103°C)	----	0.1	%					18-JAN-2012 10:40	59.8
<b>EG: Metals and Major Cations</b>									
EG020: Arsenic	7440-38-2	1	mg/kg						9
EG020: Cadmium	7440-43-9	0.2	mg/kg						2.3
EG020: Chromium	7440-47-3	1	mg/kg						124
EG020: Copper	7440-50-8	1	mg/kg						884
EG020: Lead	7439-92-1	1	mg/kg						138
EG020: Mercury	7439-97-6	0.05	mg/kg						1.58
EG020: Nickel	7440-02-0	1	mg/kg						50
EG020: Silver	7440-22-4	0.1	mg/kg						8.9
EG020: Zinc	7440-66-6	1	mg/kg						473
<b>EP-065: PCB Single Congeners</b>									
PCB 8	34883-43-7	3	µg/kg						<3
PCB 18	37680-65-2	3	µg/kg						<3
PCB 28	7012-37-5	3	µg/kg						<3
PCB 44	41464-39-5	3	µg/kg						<3
PCB 52	35693-99-3	3	µg/kg						<3
PCB 66	32598-10-0	3	µg/kg						<3
PCB 77	32598-13-3	3	µg/kg						<3
PCB 101	37680-73-2	3	µg/kg						6
PCB 105	32598-14-4	3	µg/kg						<3
PCB 118	31508-00-6	3	µg/kg						4
PCB 126	57465-28-8	3	µg/kg						<3
PCB 128	38380-07-3	3	µg/kg						<3
PCB 138	35065-28-2	3	µg/kg						8
PCB 153	35065-27-1	3	µg/kg						9
PCB 169	32774-16-6	3	µg/kg						<3
PCB 170	35065-30-6	3	µg/kg						<3
PCB 180	35065-29-3	3	µg/kg						5
PCB 187	52663-68-0	3	µg/kg						<3
Total Polychlorinated biphenyls	----	18	µg/kg						41
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)</b>									
Naphthalene	91-20-3	50	µg/kg						28000
Acenaphthylene	208-96-8	50	µg/kg						77300
Acenaphthene	83-32-9	50	µg/kg						179000
Fluorene	86-73-7	50	µg/kg						26600
Phenanthrene	85-01-8	50	µg/kg						372000
Anthracene	120-12-7	50	µg/kg						155000
Fluoranthene	206-44-0	150	µg/kg						669000
Pyrene	129-00-0	150	µg/kg						844000
Benz(a)anthracene	56-55-3	150	µg/kg						290000



Page Number : 4 of 9  
 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201850

Sub-Matrix: SEDIMENT		Client sample ID	Client sampling date / time	GB3
Compound	CAS Number	LOR	Unit	HK1201850-001
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued</b>				
Chrysene	218-019	150	µg/kg	252000
Benzo(b)fluoranthene	205-99-2	150	µg/kg	273000
Benzo(k)fluoranthene	207-08-9	150	µg/kg	116000
Benzo(a)pyrene	50-32-8	150	µg/kg	295000
Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	156000
Dibenz(a,h)anthracene	53-70-3	150	µg/kg	30600
Benzo(g,h,i)perylene	191-24-2	150	µg/kg	147000
Low M.W. PAHs	----	550	µg/kg	838000
High M.W. PAHs	----	1700	µg/kg	3070000
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>				
2-Fluorobiphenyl	32160-8	0.1	%	98.4
4-Terphenyl-d14	1718-510	0.1	%	72.7
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>				
Decachlorobiphenyl	2051-24-3	0.1	%	57.2

Surrogate control limits listed at end of this report.

Surrogate control limits listed at end of this report.





Page Number : 5 of 9  
 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201850

Sub-Matrix: INTERSTITIAL WATER		Client sample ID	Client sampling date / time	Client sample ID
Compound	CAS Number	LOR	Unit	Unit
EP-390: Triorganotins				GB3
Tributyltin	56573-85-4	0.015	µg TBT / L	18-JAN-2012 10:40 HK1201850-001
				<0.015



Page Number : 6 of 9  
 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201850

**Laboratory Duplicate (DUP) Report**

Matrix: SOIL		Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	Method: Compound	LOR	Unit	RPD (%)
<b>EA/ED: Physical and Aggregate Properties (QC Lot: 2135028)</b>					
HK1201847-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	0.1	%	51.4
HK1201860-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	0.1	%	54.8
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>					
HK1201848-001	Anonymous	EG020: Mercury	0.05	mg/kg	1.27
		EG020: Silver	0.1	mg/kg	6.4
		EG020: Cadmium	0.2	mg/kg	1.9
		EG020: Arsenic	1	mg/kg	8
		EG020: Chromium	1	mg/kg	96
		EG020: Copper	1	mg/kg	702
		EG020: Lead	1	mg/kg	123
		EG020: Nickel	1	mg/kg	45
		EG020: Zinc	1	mg/kg	442
HK1202238-002	Anonymous	EG020: Mercury	0.05	mg/kg	<0.05
		EG020: Cadmium	0.2	mg/kg	<0.2
		EG020: Arsenic	1	mg/kg	3
		EG020: Chromium	1	mg/kg	3
		EG020: Copper	1	mg/kg	5
		EG020: Lead	1	mg/kg	91
		EG020: Nickel	1	mg/kg	2
		EG020: Zinc	1	mg/kg	57
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>					
HK1201791-001	Anonymous	Total Polychlorinated biphenyls	18	µg/kg	<18
		PCB 8	3	µg/kg	<3
		PCB 18	3	µg/kg	<3
		PCB 28	3	µg/kg	<3
		PCB 44	3	µg/kg	<3
		PCB 52	3	µg/kg	<3
		PCB 66	3	µg/kg	<3
		PCB 77	3	µg/kg	<3
		PCB 101	3	µg/kg	<3
		PCB 105	3	µg/kg	<3
		PCB 118	3	µg/kg	<3
		PCB 126	3	µg/kg	<3
		PCB 128	3	µg/kg	<3
		PCB 138	3	µg/kg	<3
		PCB 153	3	µg/kg	<3
		PCB 169	3	µg/kg	<3
		PCB 170	3	µg/kg	<3
		PCB 180	3	µg/kg	<3
		PCB 187	3	µg/kg	<3
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>					
HK1201791-001	Anonymous	Fluoranthene	150	µg/kg	<150
					0.0









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	LCS	DCS	Recovery Low (%)	Recovery High (%)	Value	RPD (%)	Control Limit
<b>EP-065: PCB Single Congeners (QC Lot: 2133666) - Continued</b>												
PCB 77	32598-13-3	3	µg/kg	<3	5 µg/kg	58.1	-----	16	137	-----	-----	-----
PCB 101	37680-73-2	3	µg/kg	<3	5 µg/kg	59.7	-----	26	143	-----	-----	-----
PCB 105	32598-14-4	3	µg/kg	<3	5 µg/kg	60.1	-----	19	132	-----	-----	-----
PCB 118	31508-00-6	3	µg/kg	<3	5 µg/kg	59.8	-----	17	137	-----	-----	-----
PCB 126	57465-28-8	3	µg/kg	<3	5 µg/kg	62.7	-----	29	107	-----	-----	-----
PCB 128	38380-07-3	3	µg/kg	<3	5 µg/kg	60.7	-----	28	126	-----	-----	-----
PCB 138	35065-28-2	3	µg/kg	<3	5 µg/kg	60.4	-----	21	136	-----	-----	-----
PCB 153	35065-27-1	3	µg/kg	<3	5 µg/kg	61.2	-----	25	135	-----	-----	-----
PCB 169	32774-16-6	3	µg/kg	<3	5 µg/kg	65.0	-----	17	129	-----	-----	-----
PCB 170	35065-30-6	3	µg/kg	<3	5 µg/kg	64.6	-----	18	129	-----	-----	-----
PCB 180	35065-29-3	3	µg/kg	<3	5 µg/kg	64.1	-----	21	124	-----	-----	-----
PCB 187	52663-68-0	3	µg/kg	<3	5 µg/kg	61.4	-----	30	124	-----	-----	-----
Total Polychlorinated biphenyls -----												
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>												
Naphthalene	91-20-3	25	µg/kg	<50	25 µg/kg	86.8	-----	43	140	-----	-----	-----
Acenaphthylene	208-96-8	50	µg/kg	<50	25 µg/kg	97.6	-----	7	159	-----	-----	-----
Acenaphthene	83-32-9	25	µg/kg	<50	25 µg/kg	90.3	-----	44	139	-----	-----	-----
Fluorene	86-73-7	25	µg/kg	<50	25 µg/kg	94.4	-----	36	147	-----	-----	-----
Phenanthrene	85-01-8	25	µg/kg	<50	25 µg/kg	94.3	-----	53	126	-----	-----	-----
Anthracene	120-12-7	25	µg/kg	<50	25 µg/kg	95.2	-----	12	159	-----	-----	-----
Fluoranthene	206-44-0	50	µg/kg	<50	25 µg/kg	-----	-----	-----	-----	-----	-----	-----
Pyrene	129-00-0	25	µg/kg	<50	25 µg/kg	96.2	-----	38	148	-----	-----	-----
Benz(a)anthracene	56-55-3	25	µg/kg	<50	25 µg/kg	102	-----	38	150	-----	-----	-----
Chrysene	218-01-9	50	µg/kg	<50	25 µg/kg	-----	-----	-----	-----	-----	-----	-----
Benzo(b)fluoranthene	205-99-2	25	µg/kg	<50	25 µg/kg	105	-----	50	144	-----	-----	-----
Benzo(k)fluoranthene	207-08-9	25	µg/kg	<50	25 µg/kg	102	-----	59	123	-----	-----	-----
Benzo(a)pyrene	50-32-8	25	µg/kg	<50	25 µg/kg	106	-----	30	136	-----	-----	-----
Indeno(1,2,3-cd)pyrene	193-39-5	25	µg/kg	<50	25 µg/kg	66.9	-----	54	127	-----	-----	-----
Dibenz(a,h)anthracene	53-70-3	25	µg/kg	<50	25 µg/kg	99.2	-----	60	122	-----	-----	-----





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 (%)	Value	Control Limit
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>									
Benzo(g,h,i)perylene	191-24-2	50	µg/kg	<50	25 µg/kg	102	64	132	
Low M.W. PAHs		550	µg/kg	<550					
High M.W. PAHs		1700	µg/kg	<1700					
Matrix: WATER									
<b>Method Blank (MB) Report</b>									
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	Value	Control Limit
EP-390: Triorganotins (QC Lot: 2148235)	56573-85-4	5	ngSn/L	<5	5 ngSn/L	98.0	81	117	
Tributyltin									

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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
				Spike Concentration	Recovery Limits (%)				
				MS	MSD	Low	High	Value	Control Limit
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>									
Sub-Matrix: SEDIMENT									
HK1202238-001	Anonymous	EG020: Arsenic	7440-38-2	5 mg/kg	102	75	125		
		EG020: Cadmium	7440-43-9	5 mg/kg	102	75	125		
		EG020: Chromium	7440-47-3	5 mg/kg	106	75	125		
		EG020: Copper	7440-50-8	5 mg/kg	94.7	75	125		
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined	75	125		
		EG020: Mercury	7439-97-6	0.1 mg/kg	88.6	75	125		
		EG020: Nickel	7440-02-0	5 mg/kg	112	75	125		
		EG020: Silver	7440-22-4	5 mg/kg	82.9	75	125		
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	75	125		

**Surrogate Control Limits**

Compound	CAS Number	Recovery Limits (%)	
		Low	High
<b>EP-076S: Polycyclic Aromatic Hydrocarbons (PAHs) Surrogates</b>			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			
Decachlorobiphenyl	2051-24-3	50	130

### CERTIFICATE OF ANALYSIS

Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
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Project : AGREEMENT NO CE 43\_2010 (HY) CENTRAL  
KOWLOON ROUTE - DESIGN AND  
CONSTRUCTION  
Order number : GE/2009/16.41  
C-O-C number : H014516  
Site : GB4

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Quote number : ----

Page : 1 of 9

Work Order : HK1201851

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Hong Kong Accreditation Service (HKAS) has accredited this laboratory (ALS Technichem (HK) Pty Ltd) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation.

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	Organics
Tai Yuk Lun, Stephen	Senior Chemist - Organics	Organics
Wong Wing, Kenneth	Assistant Supervisor - Metals	Inorganics





Page Number : 2 of 9  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201851

### 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: 31-JAN-2012

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: **HK1201851**

The PCB cleanup method on sample(s), GB4 (HK1201851-001), is not accredited. Due to matrix interference on sample(s), GB4 (HK1201851-001), a non-accredited clean-up method was applied on those samples. The PCB analysis, including QA/QC requirements, in this certificate of analysis was performed as per the corresponding HOKLAS accredited method for sediment matrix.

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay. Sample(s) were received in a chilled condition.

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

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

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.



**Analytical Results**

Compound	CAS Number	LOR	Client sample ID	
			Client sampling date / time	Unit
<b>EA055: Physical and Aggregate Properties</b>				
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	36.6
<b>EG: Metals and Major Cations</b>				
EG020: Arsenic	7440-38-2	1	mg/kg	5
EG020: Cadmium	7440-43-9	0.2	mg/kg	0.6
EG020: Chromium	7440-47-3	1	mg/kg	37
EG020: Copper	7440-50-8	1	mg/kg	91
EG020: Lead	7439-92-1	1	mg/kg	38
EG020: Mercury	7439-97-6	0.05	mg/kg	0.43
EG020: Nickel	7440-02-0	1	mg/kg	18
EG020: Silver	7440-22-4	0.1	mg/kg	1.0
EG020: Zinc	7440-66-6	1	mg/kg	117
<b>EP-065: PCB Single Congeners</b>				
PCB 8	34883-43-7	3	µg/kg	<3
PCB 18	37680-65-2	3	µg/kg	<3
PCB 28	7012-37-5	3	µg/kg	5
PCB 44	41464-39-5	3	µg/kg	<3
PCB 52	35693-99-3	3	µg/kg	6
PCB 66	32598-10-0	3	µg/kg	<3
PCB 77	32598-13-3	3	µg/kg	<3
PCB 101	37680-73-2	3	µg/kg	21
PCB 105	32598-14-4	3	µg/kg	4
PCB 118	31508-00-6	3	µg/kg	11
PCB 126	57465-28-8	3	µg/kg	<3
PCB 128	38380-07-3	3	µg/kg	<3
PCB 138	35065-28-2	3	µg/kg	21
PCB 153	35065-27-1	3	µg/kg	27
PCB 169	32774-16-6	3	µg/kg	<3
PCB 170	35065-30-6	3	µg/kg	7
PCB 180	35065-29-3	3	µg/kg	14
PCB 187	52863-68-0	3	µg/kg	6
Total Polychlorinated biphenyls	----	18	µg/kg	130
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)</b>				
Naphthalene	9120-3	50	µg/kg	288000
Acenaphthylene	208-96-8	50	µg/kg	36400
Acenaphthene	83-32-9	50	µg/kg	312000
Fluorene	86-73-7	50	µg/kg	121000
Phenanthrene	85-01-8	50	µg/kg	680000
Anthracene	120-12-7	50	µg/kg	167000
Fluoranthene	206-44-0	150	µg/kg	378000
Pyrene	129-00-0	150	µg/kg	453000
Benz(a)anthracene	56-55-3	150	µg/kg	136000





Page Number : 4 of 9  
 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201851

Compound	CAS Number	LOR	Client sample ID		GB4
			Client sampling date / time	Unit	
Sub-Matrix: SEDIMENT					
			18-JAN-2012 11:05		
			HK1201851-001		
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued</b>					
Chrysene	218-019	150		µg/kg	139000
Benzo(b)fluoranthene	205-99-2	150		µg/kg	126000
Benzo(k)fluoranthene	207-08-9	150		µg/kg	46300
Benzo(a)pyrene	50-32-8	150		µg/kg	131000
Indeno(1,2,3-cd)pyrene	193-39-5	150		µg/kg	65600
Dibenz(a,h)anthracene	53-70-3	150		µg/kg	16600
Benzo(g,h,i)perylene	191-24-2	150		µg/kg	60700
Low M.W. PAHs	----	550		µg/kg	1600000
High M.W. PAHs	----	1700		µg/kg	1550000
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>					
2-Fluorobiphenyl	32160-8	0.1		%	114
4-Terphenyl-d14	1718-51-0	0.1		%	70.8
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>					
Decachlorobiphenyl	205124-3	0.1		%	56.4
Surrogate control limits listed at end of this report.					
Surrogate control limits listed at end of this report.					







**Laboratory Duplicate (DUP) Report**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)	
						Original Result	Duplicate Result		
<b>EA/ED: Physical and Aggregate Properties (QC Lot: 2135028)</b>									
HK1201847-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	----	0.1	%		46.7	51.4	9.6
HK1201860-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	----	0.1	%		53.8	54.8	1.7
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>									
HK1201848-001	Anonymous	EG020: Mercury	7439-97-6	0.05	mg/kg		1.26	1.27	1.0
		EG020: Silver	7440-22-4	0.1	mg/kg		6.5	6.4	1.7
		EG020: Cadmium	7440-43-9	0.2	mg/kg		1.8	1.9	7.6
		EG020: Arsenic	7440-38-2	1	mg/kg		8	8	0.0
		EG020: Chromium	7440-47-3	1	mg/kg		93	96	3.1
		EG020: Copper	7440-50-8	1	mg/kg		706	702	0.5
		EG020: Lead	7439-92-1	1	mg/kg		121	123	1.4
		EG020: Nickel	7440-02-0	1	mg/kg		39	45	14.3
		EG020: Zinc	7440-66-6	1	mg/kg		437	442	1.0
HK1202238-002	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: Arsenic	7440-38-2	1	mg/kg		3	3	0.0
		EG020: Chromium	7440-47-3	1	mg/kg		3	3	0.0
		EG020: Copper	7440-50-8	1	mg/kg		6	5	0.0
		EG020: Lead	7439-92-1	1	mg/kg		105	91	14.0
		EG020: Nickel	7440-02-0	1	mg/kg		2	2	0.0
		EG020: Zinc	7440-66-6	1	mg/kg		57	50	13.2
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>									
HK1201791-001	Anonymous	Total Polychlorinated biphenyls	----	18	µg/kg		<18	<18	0.0
		PCB 8	34883-43-7	3	µg/kg		<3	<3	0.0
		PCB 18	37680-65-2	3	µg/kg		<3	<3	0.0
		PCB 28	7012-37-5	3	µg/kg		<3	<3	0.0
		PCB 44	41464-39-5	3	µg/kg		<3	<3	0.0
		PCB 52	35693-99-3	3	µg/kg		<3	<3	0.0
		PCB 66	32598-10-0	3	µg/kg		<3	<3	0.0
		PCB 77	32598-13-3	3	µg/kg		<3	<3	0.0
		PCB 101	37680-73-2	3	µg/kg		<3	<3	0.0
		PCB 105	32598-14-4	3	µg/kg		<3	<3	0.0
		PCB 118	31508-00-6	3	µg/kg		<3	<3	0.0
		PCB 126	57465-28-8	3	µg/kg		<3	<3	0.0
		PCB 128	38380-07-3	3	µg/kg		<3	<3	0.0
		PCB 138	35065-28-2	3	µg/kg		<3	<3	0.0
		PCB 153	35065-27-1	3	µg/kg		<3	<3	0.0
		PCB 169	32774-16-6	3	µg/kg		<3	<3	0.0
		PCB 170	35065-30-6	3	µg/kg		<3	<3	0.0
		PCB 180	35065-29-3	3	µg/kg		<3	<3	0.0
		PCB 187	52663-68-0	3	µg/kg		<3	<3	0.0
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>									
HK1201791-001	Anonymous	Fluoranthene	206-44-0	150	µg/kg		<150	<150	0.0





Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>Matrix: SOIL</b>									
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>									
HK1201791-001	Anonymous		Pyrene	129-00-0	150	µg/kg	<150	<150	0.0
			Benzo(a)anthracene	56-55-3	150	µg/kg	<150	<150	0.0
			Chrysene	218-01-9	150	µg/kg	<150	<150	0.0
			Benzo(b)fluoranthene	205-99-2	150	µg/kg	<150	<150	0.0
			Benzo(k)fluoranthene	207-08-9	150	µg/kg	<150	<150	0.0
			Benzo(a)pyrene	50-32-8	150	µg/kg	<150	<150	0.0
			Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	<150	<150	0.0
			Dibenz(a,h)anthracene	53-70-3	150	µg/kg	<150	<150	0.0
			Benzo(g,h,i)perylene	191-24-2	150	µg/kg	<150	<150	0.0
			High M.W. PAHs	----	1700	µg/kg	<1700	<1700	0.0
			Naphthalene	91-20-3	50	µg/kg	<50	<50	0.0
			Acenaphthylene	208-96-8	50	µg/kg	<50	<50	0.0
			Acenaphthene	83-32-9	50	µg/kg	<50	<50	0.0
			Fluorene	86-73-7	50	µg/kg	<50	<50	0.0
			Phenanthrene	85-01-8	50	µg/kg	<50	<50	0.0
			Anthracene	120-12-7	50	µg/kg	<50	<50	0.0
			Low M.W. PAHs	----	550	µg/kg	<550	<550	0.0

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>Matrix: WATER</b>									
<b>EP-390: Triorganotin (QC Lot: 2148235)</b>									
HK1201860-001	Anonymous		Tributyltin	56573-85-4	6	ngSn/L	284	287	0.8

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

<b>Matrix: SOIL</b>									
<b>Method Blank (MB) Report</b>									
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	DCS	Recovery Limits (%)	Control Limit
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>									
EG020: Arsenic	7440-38-2	1	mg/kg	<1	5 mg/kg	94.3	-----	77	109
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	103	-----	86	110
EG020: Chromium	7440-47-3	1	mg/kg	<1	5 mg/kg	105	-----	88	120
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	94.8	-----	85	109
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	94.5	-----	84	106
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	85.8	-----	80	112
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	98.4	-----	87	111
EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	5 mg/kg	87.9	-----	83	105
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	100	-----	82	126
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>									
PCB 8	34883-43-7	3	µg/kg	<3	5 µg/kg	55.4	-----	22	121
PCB 18	37680-65-2	3	µg/kg	<3	5 µg/kg	55.2	-----	23	124
PCB 28	7012-37-5	3	µg/kg	<3	5 µg/kg	63.3	-----	26	124
PCB 44	41464-39-5	3	µg/kg	<3	5 µg/kg	62.5	-----	16	132
PCB 52	35693-99-3	3	µg/kg	<3	5 µg/kg	64.4	-----	18	133
PCB 66	32598-10-0	3	µg/kg	<3	5 µg/kg	64.4	-----	5	130





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	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	Control Limit
<b>EP-065: PCB Single Congeners (QC Lot: 2133666) - Continued</b>													
PCB 77	32598-13-3	3	µg/kg	<3	5 µg/kg	58.1	-----	-----	-----	16	137	-----	-----
PCB 101	37680-73-2	3	µg/kg	<3	5 µg/kg	59.7	-----	-----	-----	26	143	-----	-----
PCB 105	32598-14-4	3	µg/kg	<3	5 µg/kg	60.1	-----	-----	-----	19	132	-----	-----
PCB 118	31508-00-6	3	µg/kg	<3	5 µg/kg	59.8	-----	-----	-----	17	137	-----	-----
PCB 126	57465-28-8	3	µg/kg	<3	5 µg/kg	62.7	-----	-----	-----	29	107	-----	-----
PCB 128	38380-07-3	3	µg/kg	<3	5 µg/kg	60.7	-----	-----	-----	28	126	-----	-----
PCB 138	35065-29-2	3	µg/kg	<3	5 µg/kg	60.4	-----	-----	-----	21	136	-----	-----
PCB 153	35065-27-1	3	µg/kg	<3	5 µg/kg	61.2	-----	-----	-----	25	135	-----	-----
PCB 169	32774-16-6	3	µg/kg	<3	5 µg/kg	65.0	-----	-----	-----	17	129	-----	-----
PCB 170	35065-30-6	3	µg/kg	<3	5 µg/kg	64.6	-----	-----	-----	18	129	-----	-----
PCB 180	35065-29-3	3	µg/kg	<3	5 µg/kg	64.1	-----	-----	-----	21	124	-----	-----
PCB 187	52663-68-0	3	µg/kg	<3	5 µg/kg	61.4	-----	-----	-----	30	124	-----	-----
Total Polychlorinated biphenyls	-----	18	µg/kg	<18	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>													
Naphthalene	91-20-3	25	µg/kg	<50	25 µg/kg	86.8	-----	-----	-----	43	140	-----	-----
Acenaphthylene	208-96-8	50	µg/kg	<50	25 µg/kg	97.6	-----	-----	-----	7	159	-----	-----
Acenaphthene	83-32-9	25	µg/kg	<50	25 µg/kg	90.3	-----	-----	-----	44	139	-----	-----
Fluorene	86-73-7	25	µg/kg	<50	25 µg/kg	94.4	-----	-----	-----	36	147	-----	-----
Phenanthrene	85-01-8	25	µg/kg	<50	25 µg/kg	94.3	-----	-----	-----	53	126	-----	-----
Anthracene	120-12-7	25	µg/kg	<50	25 µg/kg	95.2	-----	-----	-----	12	159	-----	-----
Fluoranthene	206-44-0	50	µg/kg	<50	25 µg/kg	95.0	-----	-----	-----	40	144	-----	-----
Pyrene	129-00-0	25	µg/kg	<50	25 µg/kg	96.2	-----	-----	-----	38	148	-----	-----
Benz(a)anthracene	56-55-3	25	µg/kg	<50	25 µg/kg	102	-----	-----	-----	38	150	-----	-----
Chrysene	218-01-9	50	µg/kg	<50	25 µg/kg	105	-----	-----	-----	50	144	-----	-----
Benzo(b)fluoranthene	205-99-2	25	µg/kg	<50	25 µg/kg	102	-----	-----	-----	59	123	-----	-----
Benzo(k)fluoranthene	207-08-9	25	µg/kg	<50	25 µg/kg	104	-----	-----	-----	58	125	-----	-----
Benzo(a)pyrene	50-32-8	25	µg/kg	<50	25 µg/kg	106	-----	-----	-----	30	136	-----	-----
Indeno(1,2,3-cd)pyrene	193-39-5	25	µg/kg	<50	25 µg/kg	66.9	-----	-----	-----	54	127	-----	-----
Dibenz(a,h)anthracene	53-70-3	25	µg/kg	<50	25 µg/kg	99.2	-----	-----	-----	60	122	-----	-----





Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report									
Matrix: SOIL	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>Method: Compound</b>													
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>													
Benzo(g,h,i)perylene	191-24-2	50	µg/kg	<50	-----	-----	-----	-----	-----	-----	-----	-----	-----
Low M.W. PAHs	-----	550	µg/kg	<550	-----	-----	-----	-----	64	132	-----	-----	-----
High M.W. PAHs	-----	1700	µg/kg	<1700	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>Matrix: WATER</b>													
<b>Method: Compound</b>													
<b>EP-390: Triorganotin (QC Lot: 2148235)</b>													
Tributyltin	56573-85-4	5	ngSn/L	<5	-----	-----	-----	-----	81	117	-----	-----	-----

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

Method: Compound				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report								
Matrix: SOIL	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)	MSD	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>												
HK1202238-001	Anonymous	EG020: Arsenic	7440-38-2	5 mg/kg	102	-----	-----	75	125	-----	-----	-----
		EG020: Cadmium	7440-43-9	5 mg/kg	102	-----	-----	75	125	-----	-----	-----
		EG020: Chromium	7440-47-3	5 mg/kg	106	-----	-----	75	125	-----	-----	-----
		EG020: Copper	7440-50-8	5 mg/kg	94.7	-----	-----	75	125	-----	-----	-----
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined	-----	-----	75	125	-----	-----	-----
		EG020: Mercury	7439-97-6	0.1 mg/kg	88.6	-----	-----	75	125	-----	-----	-----
		EG020: Nickel	7440-02-0	5 mg/kg	112	-----	-----	75	125	-----	-----	-----
		EG020: Silver	7440-22-4	5 mg/kg	82.9	-----	-----	75	125	-----	-----	-----
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	-----	-----	75	125	-----	-----	-----

**Surrogate Control Limits**

Sub-Matrix: SEDIMENT	Compound	CAS Number	Recovery Limits (%)	Low	High
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>					
	2-Fluorobiphenyl	321-60-8	50	50	130
	4-Terphenyl-d14	1718-51-0	50	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>					
	Decachlorobiphenyl	2051-24-3	50	50	130



### CERTIFICATE OF ANALYSIS

Client	: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Laboratory	: ALS Technichem HK Pty Ltd	Page	: 1 of 9
Contact	: IR POPHIL LAM	Contact	: Chan Kwok Fai, Godfrey	Work Order	: HK1201852
Address	: GEOTECHNICAL PROJECTS DIVISION, GEOTECHNICAL ENGINEERING OFFICE, 23/F., KWUN TONG VIEW, 410 KWUN TONG ROAD, KOWLOON, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: Pophilkiam@cedd.gov.hk	E-mail	: Godfrey.Chan@alsglobal.com		
Telephone	: +852 2716 8609	Telephone	: +852 2610 1044		
Facsimile	: ----	Facsimile	: +852 2610 2021		
Project	: AGREEMENT NO CE 43_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION	Quote number	: ----	Date Samples Received	: 18-JAN-2012
Order number	: GE/2009/16.41			Issue Date	: 15-FEB-2012
C-O-C number	: H014516			No. of samples received	: 2
Site	: GB5			No. of samples analysed	: 2

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 Hong Kong Accreditation Service (HKAS) has accredited this laboratory (ALS Technichem (HK) Pty Ltd) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation.

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	Organics
 Tai Yuk Lun, Stephen	Senior Chemist - Organics	Organics
 Wong Wing, Kenneth	Assistant Supervisor - Metals	Inorganics



Page Number : 2 of 9  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201852

#### 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: 31-JAN-2012

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: **HK1201852**

The PCB cleanup method on sample(s), GB5 (HK1201852-001) and GB5 DUPLICATE (HK1201852-002), is not accredited. Due to matrix interference on sample(s), GB5 (HK1201852-001) and GB5 DUPLICATE (HK1201852-002), a non-accredited clean-up method was applied on those samples. The PCB analysis, including QA/QC requirements, in this certificate of analysis was performed as per the corresponding HOKLAS accredited method for sediment matrix.

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

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

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.





**Analytical Results**

Sub-Matrix: SEDIMENT

Compound	CAS Number	LOR	Client sample ID	
			Client sampling date / time	Unit
<b>EA/ED: Physical and Aggregate Properties</b>				
EA055: Moisture Content (dried @ 103°C)	----	0.1	47.3	48.2
<b>EG: Metals and Major Cations</b>				
EG020: Arsenic	7440-38-2	1	7	7
EG020: Cadmium	7440-43-9	0.2	1.4	1.5
EG020: Chromium	7440-47-3	1	135	160
EG020: Copper	7440-50-8	1	360	422
EG020: Lead	7439-92-1	1	277	99
EG020: Mercury	7439-97-6	0.05	1.20	1.43
EG020: Nickel	7440-02-0	1	37	46
EG020: Silver	7440-22-4	0.1	5.7	4.5
EG020: Zinc	7440-66-6	1	654	390
<b>EP-065: PCB Single Congeners</b>				
PCB 8	34883-43-7	3	<3	<3
PCB 18	37680-65-2	3	<3	4
PCB 28	7012-37-5	3	7	7
PCB 44	41464-39-5	3	4	6
PCB 52	35693-99-3	3	9	13
PCB 66	32598-10-0	3	5	5
PCB 77	32598-13-3	3	<3	<3
PCB 101	37680-73-2	3	29	42
PCB 105	32598-14-4	3	7	9
PCB 118	31508-00-6	3	20	27
PCB 126	57465-28-8	3	<3	<3
PCB 128	38380-07-3	3	6	7
PCB 138	35065-28-2	3	43	44
PCB 153	35065-27-1	3	46	53
PCB 169	32774-16-6	3	<3	<3
PCB 170	35065-30-6	3	16	16
PCB 180	35065-29-3	3	30	30
PCB 187	52663-68-0	3	13	14
Total Polychlorinated biphenyls	----	18	238	279
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)</b>				
Naphthalene	9120-3	50	8520	7550
Acenaphthylene	208-96-8	50	23100	22400
Acenaphthene	83-32-9	50	104000	102000
Fluorene	86-73-7	50	13600	11800
Phenanthrene	85-01-8	50	158000	155000
Anthracene	120-12-7	50	70300	69800
Fluoranthene	206-44-0	150	287000	271000
Pyrene	129-00-0	150	350000	323000
Benz(a)anthracene	56-55-3	150	118000	115000



Page Number : 4 of 9  
 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201852

Compound	Client sample ID		GB5 (DUPLICATE)
	Client sampling date / time	Client sampling date / time	
CAS Number	LOR	Unit	GB5
<b>Sub-Matrix: SEDIMENT</b>			
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued</b>			
Chrysene	218-019	150	113000
Benzo(b)fluoranthene	205-99-2	150	107000
Benzo(k)fluoranthene	207-08-9	150	41600
Benzo(a)pyrene	50-32-8	150	111000
Indeno(1.2.3.cd)pyrene	193-39-5	150	54600
Dibenz(a,h)anthracene	53-70-3	150	12700
Benzo(g,h,i)perylene	191-24-2	150	48200
Low M.W. PAHs	----	550	378000
High M.W. PAHs	----	1700	1230000
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>			
2-Fluorobiphenyl	321-60-8	0.1	113
4-Terphenyl-d14	1718-510	0.1	53.8
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			
Decachlorobiphenyl	2051-24-3	0.1	50.7
			50.1
Surrogate control limits listed at end of this report.			
Surrogate control limits listed at end of this report.			





Page Number : 5 of 9  
 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201852

Sub-Matrix: INTERSTITIAL WATER		Client sample ID	
Compound	CAS Number	Client sampling date / time	Unit
EP-390: Triorganotins Tributyltin	56573-85-4	18-JAN-2012 11:25	GB5 (DUPLICATE)
		18-JAN-2012 11:30	GB5
		HK1201852-001	0.029
		HK1201852-002	0.026



**Laboratory Duplicate (DUP) Report**

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
							Original Result	Duplicate Result	
<b>EA/ED: Physical and Aggregate Properties (QC Lot: 2135028)</b>									
HK1201847-001	Anonymous		EA055: Moisture Content (dried @ 103°C)	----	0.1	%	46.7	51.4	9.6
HK1201860-001	Anonymous		EA055: Moisture Content (dried @ 103°C)	----	0.1	%	53.8	54.8	1.7
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>									
HK1201848-001	Anonymous		EG020: Mercury	7439-97-6	0.05	mg/kg	1.26	1.27	1.0
			EG020: Silver	7440-22-4	0.1	mg/kg	6.5	6.4	1.7
			EG020: Cadmium	7440-43-9	0.2	mg/kg	1.8	1.9	7.6
			EG020: Arsenic	7440-38-2	1	mg/kg	8	8	0.0
			EG020: Chromium	7440-47-3	1	mg/kg	93	96	3.1
			EG020: Copper	7440-50-8	1	mg/kg	706	702	0.5
			EG020: Lead	7439-92-1	1	mg/kg	121	123	1.4
			EG020: Nickel	7440-02-0	1	mg/kg	39	45	14.3
			EG020: Zinc	7440-66-6	1	mg/kg	437	442	1.0
HK1202238-002	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: Arsenic	7440-38-2	1	mg/kg	3	3	0.0
			EG020: Chromium	7440-47-3	1	mg/kg	3	3	0.0
			EG020: Copper	7440-50-8	1	mg/kg	6	5	0.0
			EG020: Lead	7439-92-1	1	mg/kg	105	91	14.0
			EG020: Nickel	7440-02-0	1	mg/kg	2	2	0.0
			EG020: Zinc	7440-66-6	1	mg/kg	57	50	13.2
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>									
HK1201791-001	Anonymous		Total Polychlorinated biphenyls	----	18	µg/kg	<18	<18	0.0
			PCB 8	34883-43-7	3	µg/kg	<3	<3	0.0
			PCB 18	37680-65-2	3	µg/kg	<3	<3	0.0
			PCB 28	7012-37-5	3	µg/kg	<3	<3	0.0
			PCB 44	41464-39-5	3	µg/kg	<3	<3	0.0
			PCB 52	35693-99-3	3	µg/kg	<3	<3	0.0
			PCB 66	32598-10-0	3	µg/kg	<3	<3	0.0
			PCB 77	32598-13-3	3	µg/kg	<3	<3	0.0
			PCB 101	37680-73-2	3	µg/kg	<3	<3	0.0
			PCB 105	32598-14-4	3	µg/kg	<3	<3	0.0
			PCB 118	31508-00-6	3	µg/kg	<3	<3	0.0
			PCB 126	57465-28-8	3	µg/kg	<3	<3	0.0
			PCB 128	38380-07-3	3	µg/kg	<3	<3	0.0
			PCB 138	35065-28-2	3	µg/kg	<3	<3	0.0
			PCB 153	35065-27-1	3	µg/kg	<3	<3	0.0
			PCB 169	32774-16-6	3	µg/kg	<3	<3	0.0
			PCB 170	35065-30-6	3	µg/kg	<3	<3	0.0
			PCB 180	35065-29-3	3	µg/kg	<3	<3	0.0
			PCB 187	52663-68-0	3	µg/kg	<3	<3	0.0
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>									
HK1201791-001	Anonymous		Fluoranthene	206-44-0	150	µg/kg	<150	<150	0.0





Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>Matrix: SOIL</b>									
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>									
HK1201791-001	Anonymous		Pyrene	129-00-0	150	µg/kg	<150	<150	0.0
			Benz(a)anthracene	56-55-3	150	µg/kg	<150	<150	0.0
			Chrysene	218-01-9	150	µg/kg	<150	<150	0.0
			Benzo(b)fluoranthene	205-99-2	150	µg/kg	<150	<150	0.0
			Benzo(k)fluoranthene	207-08-9	150	µg/kg	<150	<150	0.0
			Benzo(a)pyrene	50-32-8	150	µg/kg	<150	<150	0.0
			Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	<150	<150	0.0
			Dibenzo(a,h)anthracene	53-70-3	150	µg/kg	<150	<150	0.0
			Benzo(g,h,i)perylene	191-24-2	150	µg/kg	<150	<150	0.0
			High M.W. PAHs	-----	1700	µg/kg	<1700	<1700	0.0
			Naphthalene	91-20-3	50	µg/kg	<50	<50	0.0
			Acenaphthylene	208-96-8	50	µg/kg	<50	<50	0.0
			Acenaphthene	83-32-9	50	µg/kg	<50	<50	0.0
			Fluorene	86-73-7	50	µg/kg	<50	<50	0.0
			Phenanthrene	85-01-8	50	µg/kg	<50	<50	0.0
			Anthracene	120-12-7	50	µg/kg	<50	<50	0.0
			Low M.W. PAHs	-----	550	µg/kg	<550	<550	0.0

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>Matrix: WATER</b>									
<b>EP-390: Triorganotins (QC Lot: 2148235)</b>									
HK1201860-001	Anonymous		Tributyltin	56573-85-4	6	ngSn/L	284	287	0.8

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

<b>Matrix: SOIL</b>									
<b>Method: Compound</b>									
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>									
CAS Number	LOR	Unit	Result	Spike Concentration	LCS	DCS	Recovery Limits (%)	Value	Control Limit
					Low	High			
7440-38-2	1	mg/kg	<1	5 mg/kg	77	109	-----	-----	-----
7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	86	110	-----	-----	-----
7440-47-3	1	mg/kg	<1	5 mg/kg	88	120	-----	-----	-----
7440-50-8	1	mg/kg	<1	5 mg/kg	85	109	-----	-----	-----
7439-92-1	1	mg/kg	<1	5 mg/kg	84	106	-----	-----	-----
7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	80	112	-----	-----	-----
7440-02-0	1	mg/kg	<1	5 mg/kg	87	111	-----	-----	-----
7440-22-4	0.1	mg/kg	<0.1	5 mg/kg	83	105	-----	-----	-----
7440-66-6	1	mg/kg	<1	5 mg/kg	82	126	-----	-----	-----
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>									
34883-43-7	3	µg/kg	<3	5 µg/kg	22	121	-----	-----	-----
37680-65-2	3	µg/kg	<3	5 µg/kg	23	124	-----	-----	-----
7012-37-5	3	µg/kg	<3	5 µg/kg	26	124	-----	-----	-----
41464-39-5	3	µg/kg	<3	5 µg/kg	16	132	-----	-----	-----
35693-99-3	3	µg/kg	<3	5 µg/kg	18	133	-----	-----	-----
32598-10-0	3	µg/kg	<3	5 µg/kg	5	130	-----	-----	-----





Method Blank (MB) Report		Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report													
Matrix	SOIL	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>Method: Compound</b>															
<b>EP-065: PCB Single Congeners (QC Lot: 2133666) - Continued</b>															
PCB 77		32598-13-3	3	µg/kg	<3	5 µg/kg	58.1			16	137				
PCB 101		37680-73-2	3	µg/kg	<3	5 µg/kg	59.7			26	143				
PCB 105		32598-14-4	3	µg/kg	<3	5 µg/kg	60.1			19	132				
PCB 118		31508-00-6	3	µg/kg	<3	5 µg/kg	59.8			17	137				
PCB 126		57465-28-8	3	µg/kg	<3	5 µg/kg	62.7			29	107				
PCB 128		38380-07-3	3	µg/kg	<3	5 µg/kg	60.7			28	126				
PCB 138		35065-28-2	3	µg/kg	<3	5 µg/kg	60.4			21	136				
PCB 153		35065-27-1	3	µg/kg	<3	5 µg/kg	61.2			25	135				
PCB 169		32774-16-6	3	µg/kg	<3	5 µg/kg	65.0			17	129				
PCB 170		35065-30-6	3	µg/kg	<3	5 µg/kg	64.6			18	129				
PCB 180		35065-29-3	3	µg/kg	<3	5 µg/kg	64.1			21	124				
PCB 187		52663-68-0	3	µg/kg	<3	5 µg/kg	61.4			30	124				
Total Polychlorinated biphenyls															
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>															
Naphthalene		91-20-3	25	µg/kg	<50	25 µg/kg	86.8			43	140				
Acenaphthylene		208-96-8	50	µg/kg	<50	25 µg/kg	97.6			7	159				
Acenaphthene		83-32-9	25	µg/kg	<50	25 µg/kg	90.3			44	139				
Fluorene		86-73-7	25	µg/kg	<50	25 µg/kg	94.4			36	147				
Phenanthrene		85-01-8	25	µg/kg	<50	25 µg/kg	94.3			53	126				
Anthracene		120-12-7	25	µg/kg	<50	25 µg/kg	95.2			12	159				
Fluoranthene		206-44-0	50	µg/kg	<50	25 µg/kg	95.0			40	144				
Pyrene		129-00-0	25	µg/kg	<50	25 µg/kg	96.2			38	148				
Benz(a)anthracene		56-55-3	25	µg/kg	<50	25 µg/kg	102			38	150				
Chrysene		218-01-9	50	µg/kg	<50	25 µg/kg	105			50	144				
Benzo(b)fluoranthene		205-99-2	25	µg/kg	<50	25 µg/kg	102			59	123				
Benzo(k)fluoranthene		207-08-9	25	µg/kg	<50	25 µg/kg	104			58	125				
Benzo(a)pyrene		50-32-8	25	µg/kg	<50	25 µg/kg	106			30	136				
Indeno(1,2,3-cd)pyrene		193-39-5	25	µg/kg	<50	25 µg/kg	66.9			54	127				
Dibenz(a,h)anthracene		53-70-3	25	µg/kg	<50	25 µg/kg	99.2			60	122				





Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report										
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>														
Benzo(g,h,i)perylene	191-24-2	50	µg/kg	<50										
Low M.W. PAHs		550	µg/kg	<550	25 µg/kg	102				64	132			
High M.W. PAHs		1700	µg/kg	<1700										
Matrix: WATER														
Method Blank (MB) Report														
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	98.0				81	117			

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

Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report										
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report</b>														
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	MS	MSD	Spike Recovery (%)	MSD	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>														
HK1202238-001	Anonymous													
		EG020: Arsenic	7440-38-2	5 mg/kg	102					75	125			
		EG020: Cadmium	7440-43-9	5 mg/kg	102					75	125			
		EG020: Chromium	7440-47-3	5 mg/kg	106					75	125			
		EG020: Copper	7440-50-8	5 mg/kg	94.7					75	125			
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined					75	125			
		EG020: Mercury	7439-97-6	0.1 mg/kg	88.6					75	125			
		EG020: Nickel	7440-02-0	5 mg/kg	112					75	125			
		EG020: Silver	7440-22-4	5 mg/kg	82.9					75	125			
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined					75	125			

**Surrogate Control Limits**

Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			
Decachlorobiphenyl	2051-24-3	50	130

# ALS Technichem (HK) Pty Ltd

## ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES



### CERTIFICATE OF ANALYSIS

Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
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Project : AGREEMENT NO CE 43\_2010 (HY) CENTRAL  
KOWLOON ROUTE - DESIGN AND  
CONSTRUCTION  
Order number : GE/2009/16.41  
C-O-C number : H014516  
Site : GB6

Laboratory : ALS Technichem HK Pty Ltd  
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Quote number : ----

Page : 1 of 9

Work Order : HK1201854

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Hong Kong Accreditation Service (HKAS) has accredited this laboratory (ALS Technichem (HK) Pty Ltd) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation.

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  
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#### Position

Senior Chemist - Organics  
Senior Chemist - Organics  
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Organics  
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Inorganics

#### Authorised results for





Page Number : 2 of 9  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201854

### 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: 31-JAN-2012

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: **HK1201854**

The PCB cleanup method on sample(s), GB6 (HK1201854-001), is not accredited. Due to matrix interference on sample(s), GB6 (HK1201854-001), a non-accredited clean-up method was applied on those samples. The PCB analysis, including QA/QC requirements, in this certificate of analysis was performed as per the corresponding HOKLAS accredited method for sediment matrix.

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

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

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.



**Analytical Results**

Sub-Matrix: SEDIMENT

Compound	CAS Number	Client sampling date / time		Unit	GB6
		LOR	Unit		
<b>EAI/ED: Physical and Aggregate Properties</b>					
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	40.9	
<b>EG: Metals and Major Cations</b>					
EG020: Arsenic	7440-38-2	1	mg/kg	6	
EG020: Cadmium	7440-43-9	0.2	mg/kg	1.2	
EG020: Chromium	7440-47-3	1	mg/kg	74	
EG020: Copper	7440-50-8	1	mg/kg	604	
EG020: Lead	7439-92-1	1	mg/kg	84	
EG020: Mercury	7439-97-6	0.05	mg/kg	1.04	
EG020: Nickel	7440-02-0	1	mg/kg	30	
EG020: Silver	7440-22-4	0.1	mg/kg	5.2	
EG020: Zinc	7440-66-6	1	mg/kg	275	
<b>EP-065: PCB Single Congeners</b>					
PCB 8	34883-43-7	3	µg/kg	<3	
PCB 18	37680-65-2	3	µg/kg	<3	
PCB 28	7012-37-5	3	µg/kg	5	
PCB 44	41464-39-5	3	µg/kg	<3	
PCB 52	35693-99-3	3	µg/kg	6	
PCB 66	32598-10-0	3	µg/kg	<3	
PCB 77	32598-13-3	3	µg/kg	<3	
PCB 101	37680-73-2	3	µg/kg	13	
PCB 105	32598-14-4	3	µg/kg	<3	
PCB 118	31508-00-6	3	µg/kg	8	
PCB 126	57465-28-8	3	µg/kg	<3	
PCB 128	38380-07-3	3	µg/kg	<3	
PCB 138	35065-28-2	3	µg/kg	14	
PCB 153	35065-27-1	3	µg/kg	19	
PCB 169	32774-16-6	3	µg/kg	<3	
PCB 170	35065-30-6	3	µg/kg	6	
PCB 180	35065-29-3	3	µg/kg	11	
PCB 187	52663-68-0	3	µg/kg	5	
Total Polychlorinated biphenyls	----	18	µg/kg	100	
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)</b>					
Naphthalene	9120-3	50	µg/kg	7500	
Acenaphthylene	208-96-8	50	µg/kg	30200	
Acenaphthene	83-32-9	50	µg/kg	39700	
Fluorene	86-73-7	50	µg/kg	7570	
Phenanthrene	85-01-8	50	µg/kg	94600	
Anthracene	120-12-7	50	µg/kg	47800	
Fluoranthene	206-44-0	150	µg/kg	216000	
Pyrene	129-00-0	150	µg/kg	311000	
Benz(a)anthracene	56-55-3	150	µg/kg	115000	





Compound	Client sample ID		LOR	Unit	GB6
	CAS Number	Client sampling date / time			
<b>Sub-Matrix: SEDIMENT</b>					
18-JAN-2012 13:10					
HK1201854-001					
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued</b>					
Chrysene	218-019	150	µg/kg	114000	
Benzo(b)fluoranthene	205-99-2	150	µg/kg	124000	
Benzo(k)fluoranthene	207-08-9	150	µg/kg	49600	
Benzo(a)pyrene	50-32-8	150	µg/kg	135000	
Indeno(1.2.3.cd)pyrene	193-39-5	150	µg/kg	69200	
Dibenz(a,h)anthracene	53-70-3	150	µg/kg	11000	
Benzo(g,h,i)perylene	191-24-2	150	µg/kg	67000	
Low M.W. PAHs	----	550	µg/kg	227000	
High M.W. PAHs	----	1700	µg/kg	1210000	
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>					
2-Fluorobiphenyl	32160-8	0.1	%	107	Surrogate control limits listed at end of this report.
4-Terphenyl-d14	1718-510	0.1	%	52.8	
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>					
Decachlorobiphenyl	2051-24-3	0.1	%	51.0	Surrogate control limits listed at end of this report.







**Laboratory Duplicate (DUP) Report**

Matrix: SOIL		Method: Compound		Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>E/ED: Physical and Aggregate Properties (QC Lot: 2135028)</b>							
HK1201847-001	Anonymous	----	0.1	%	46.7	51.4	9.6
HK1201860-001	Anonymous	----	0.1	%	53.8	54.8	1.7
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>							
HK1201848-001	Anonymous	7439-97-6	0.05	mg/kg	1.26	1.27	1.0
		EG020: Mercury					
		EG020: Silver	0.1	mg/kg	6.5	6.4	1.7
		EG020: Cadmium	0.2	mg/kg	1.8	1.9	7.6
		EG020: Arsenic	1	mg/kg	8	8	0.0
		EG020: Chromium	1	mg/kg	93	96	3.1
		EG020: Copper	1	mg/kg	706	702	0.5
		EG020: Lead	1	mg/kg	121	123	1.4
		EG020: Nickel	1	mg/kg	39	45	14.3
		EG020: Zinc	1	mg/kg	437	442	1.0
HK1202238-002	Anonymous	7439-97-6	0.05	mg/kg	<0.05	<0.05	0.0
		EG020: Mercury					
		EG020: Cadmium	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Arsenic	1	mg/kg	3	3	0.0
		EG020: Chromium	1	mg/kg	3	3	0.0
		EG020: Copper	1	mg/kg	6	5	0.0
		EG020: Lead	1	mg/kg	105	91	14.0
		EG020: Nickel	1	mg/kg	2	2	0.0
		EG020: Zinc	1	mg/kg	57	50	13.2
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>							
HK1201791-001	Anonymous	----	18	µg/kg	<18	<18	0.0
		Total Polychlorinated biphenyls					
		PCB 8	3	µg/kg	<3	<3	0.0
		PCB 18	3	µg/kg	<3	<3	0.0
		PCB 28	3	µg/kg	<3	<3	0.0
		PCB 44	3	µg/kg	<3	<3	0.0
		PCB 52	3	µg/kg	<3	<3	0.0
		PCB 66	3	µg/kg	<3	<3	0.0
		PCB 77	3	µg/kg	<3	<3	0.0
		PCB 101	3	µg/kg	<3	<3	0.0
		PCB 105	3	µg/kg	<3	<3	0.0
		PCB 118	3	µg/kg	<3	<3	0.0
		PCB 126	3	µg/kg	<3	<3	0.0
		PCB 128	3	µg/kg	<3	<3	0.0
		PCB 138	3	µg/kg	<3	<3	0.0
		PCB 153	3	µg/kg	<3	<3	0.0
		PCB 169	3	µg/kg	<3	<3	0.0
		PCB 170	3	µg/kg	<3	<3	0.0
		PCB 180	3	µg/kg	<3	<3	0.0
		PCB 187	3	µg/kg	<3	<3	0.0
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>							
HK1201791-001	Anonymous	206-44-0	150	µg/kg	<150	<150	0.0
		Fluoranthene					





Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>Matrix: SOIL</b>									
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>									
HK1201791-001	Anonymous		Pyrene	129-00-0	150	µg/kg	<150	<150	0.0
			Benz(a)anthracene	56-55-3	150	µg/kg	<150	<150	0.0
			Chrysene	218-01-9	150	µg/kg	<150	<150	0.0
			Benzo(b)fluoranthene	205-99-2	150	µg/kg	<150	<150	0.0
			Benzo(k)fluoranthene	207-08-9	150	µg/kg	<150	<150	0.0
			Benzo(a)pyrene	50-32-8	150	µg/kg	<150	<150	0.0
			Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	<150	<150	0.0
			Dibenzo(a,h)anthracene	53-70-3	150	µg/kg	<150	<150	0.0
			Benzo(g,h,i)perylene	191-24-2	150	µg/kg	<150	<150	0.0
			High M.W. PAHs	----	1700	µg/kg	<1700	<1700	0.0
			Naphthalene	91-20-3	50	µg/kg	<50	<50	0.0
			Acenaphthylene	208-96-8	50	µg/kg	<50	<50	0.0
			Acenaphthene	83-32-9	50	µg/kg	<50	<50	0.0
			Fluorene	86-73-7	50	µg/kg	<50	<50	0.0
			Phenanthrene	85-01-8	50	µg/kg	<50	<50	0.0
			Anthracene	120-12-7	50	µg/kg	<50	<50	0.0
			Low M.W. PAHs	----	550	µg/kg	<550	<550	0.0

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>Matrix: WATER</b>									
<b>EP-390: Triorganotins (QC Lot: 2148235)</b>									
HK1201860-001	Anonymous		Tributyltin	56573-85-4	6	ngSn/L	284	287	0.8

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

<b>Matrix: SOIL</b>									
<b>Method Blank (MB) Report</b>									
CAS Number	LOR	Unit	Result	Spike Concentration	LCS	DCS	Recovery Limits (%)	Value	Control Limit
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>									
EG020: Arsenic	7440-38-2	1	mg/kg	5 mg/kg	94.3	---	77	109	---
EG020: Cadmium	7440-43-9	0.2	mg/kg	5 mg/kg	103	---	86	110	---
EG020: Chromium	7440-47-3	1	mg/kg	5 mg/kg	105	---	88	120	---
EG020: Copper	7440-50-8	1	mg/kg	5 mg/kg	94.8	---	85	109	---
EG020: Lead	7439-92-1	1	mg/kg	5 mg/kg	94.5	---	84	106	---
EG020: Mercury	7439-97-6	0.05	mg/kg	0.1 mg/kg	85.8	---	80	112	---
EG020: Nickel	7440-02-0	1	mg/kg	5 mg/kg	98.4	---	87	111	---
EG020: Silver	7440-22-4	0.1	mg/kg	5 mg/kg	87.9	---	83	105	---
EG020: Zinc	7440-66-6	1	mg/kg	5 mg/kg	100	---	82	126	---
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>									
PCB 8	34883-43-7	3	µg/kg	5 µg/kg	55.4	---	22	121	---
PCB 18	37680-65-2	3	µg/kg	5 µg/kg	55.2	---	23	124	---
PCB 28	7012-37-5	3	µg/kg	5 µg/kg	63.3	---	26	124	---
PCB 44	41484-39-5	3	µg/kg	5 µg/kg	62.5	---	16	132	---
PCB 52	35693-99-3	3	µg/kg	5 µg/kg	64.4	---	18	133	---
PCB 66	32598-10-0	3	µg/kg	5 µg/kg	64.4	---	5	130	---





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	LCS	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>EP-065: PCB Single Congeners (QC Lot: 2133666) - Continued</b>													
PCB 77	32598-13-3	3	µg/kg	<3	5 µg/kg	58.1	-----	-----	16	137	-----	-----	-----
PCB 101	37680-73-2	3	µg/kg	<3	5 µg/kg	59.7	-----	-----	26	143	-----	-----	-----
PCB 105	32598-14-4	3	µg/kg	<3	5 µg/kg	60.1	-----	-----	19	132	-----	-----	-----
PCB 118	31508-00-6	3	µg/kg	<3	5 µg/kg	59.8	-----	-----	17	137	-----	-----	-----
PCB 126	57465-28-8	3	µg/kg	<3	5 µg/kg	62.7	-----	-----	29	107	-----	-----	-----
PCB 128	38380-07-3	3	µg/kg	<3	5 µg/kg	60.7	-----	-----	28	126	-----	-----	-----
PCB 138	35065-28-2	3	µg/kg	<3	5 µg/kg	60.4	-----	-----	21	136	-----	-----	-----
PCB 153	35065-27-1	3	µg/kg	<3	5 µg/kg	61.2	-----	-----	25	135	-----	-----	-----
PCB 169	32774-16-6	3	µg/kg	<3	5 µg/kg	65.0	-----	-----	17	129	-----	-----	-----
PCB 170	35065-30-6	3	µg/kg	<3	5 µg/kg	64.6	-----	-----	18	129	-----	-----	-----
PCB 180	35065-29-3	3	µg/kg	<3	5 µg/kg	64.1	-----	-----	21	124	-----	-----	-----
PCB 187	52663-68-0	3	µg/kg	<3	5 µg/kg	61.4	-----	-----	30	124	-----	-----	-----
Total Polychlorinated biphenyls		-----	µg/kg	<18	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>													
Naphthalene	91-20-3	25	µg/kg	<50	25 µg/kg	86.8	-----	-----	43	140	-----	-----	-----
Acenaphthylene	208-96-8	50	µg/kg	<50	25 µg/kg	97.6	-----	-----	7	159	-----	-----	-----
Acenaphthene	83-32-9	25	µg/kg	<50	25 µg/kg	90.3	-----	-----	44	139	-----	-----	-----
Fluorene	86-73-7	25	µg/kg	<50	25 µg/kg	94.4	-----	-----	36	147	-----	-----	-----
Phenanthrene	85-01-8	25	µg/kg	<50	25 µg/kg	94.3	-----	-----	53	126	-----	-----	-----
Anthracene	120-12-7	25	µg/kg	<50	25 µg/kg	95.2	-----	-----	12	159	-----	-----	-----
Fluoranthene	206-44-0	50	µg/kg	<50	25 µg/kg	95.0	-----	-----	40	144	-----	-----	-----
Pyrene	129-00-0	25	µg/kg	<50	25 µg/kg	96.2	-----	-----	38	148	-----	-----	-----
Benz(a)anthracene	56-55-3	25	µg/kg	<50	25 µg/kg	102	-----	-----	38	150	-----	-----	-----
Chrysene	218-01-9	50	µg/kg	<50	25 µg/kg	105	-----	-----	50	144	-----	-----	-----
Benzo(b)fluoranthene	205-99-2	25	µg/kg	<50	25 µg/kg	102	-----	-----	59	123	-----	-----	-----
Benzo(k)fluoranthene	207-08-9	25	µg/kg	<50	25 µg/kg	104	-----	-----	58	125	-----	-----	-----
Benzo(a)pyrene	50-32-8	25	µg/kg	<50	25 µg/kg	106	-----	-----	30	136	-----	-----	-----
Indeno(1.2.3.cd)pyrene	193-39-5	25	µg/kg	<50	25 µg/kg	66.9	-----	-----	54	127	-----	-----	-----
Dibenz(a,h)anthracene	53-70-3	25	µg/kg	<50	25 µg/kg	99.2	-----	-----	60	122	-----	-----	-----





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 (%)	Value	Control Limit
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>									
Benzo(g,h,i)perylene	191-24-2	50	µg/kg	<50					
Low M.W. PAHs		550	µg/kg	<550	25 µg/kg	102	64	132	
High M.W. PAHs		1700	µg/kg	<1700					
Matrix: WATER									
<b>EP-390: Triorganotins (QC Lot: 2148235)</b>									
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	98.0	81	117	

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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report			RPD (%)	
					MS	MSD	Recovery Limits (%)		
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>									
HK1202238-001	Anonymous								
		EG020: Arsenic	7440-38-2	5 mg/kg	102		75	125	
		EG020: Cadmium	7440-43-9	5 mg/kg	102		75	125	
		EG020: Chromium	7440-47-3	5 mg/kg	106		75	125	
		EG020: Copper	7440-50-8	5 mg/kg	94.7		75	125	
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined		75	125	
		EG020: Mercury	7439-97-6	0.1 mg/kg	88.6		75	125	
		EG020: Nickel	7440-02-0	5 mg/kg	112		75	125	
		EG020: Silver	7440-22-4	5 mg/kg	82.9		75	125	
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined		75	125	

**Surrogate Control Limits**

Sub-Matrix: SEDIMENT	Compound	CAS Number	Recovery Limits (%)	
			Low	High
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>				
	2-Fluorobiphenyl	321-60-8	50	130
	4-Terphenyl-d14	1718-51-0	50	130
<b>EP-066S: PCB Congeners and Organochlorine Pesticides Surrogate</b>				
	Decachlorobiphenyl	2051-24-3	50	130



### CERTIFICATE OF ANALYSIS

Client	: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Laboratory	: ALS Technichem HK Pty Ltd	Page	: 1 of 9
Contact	: IR POPHIL LAM	Contact	: Chan Kwok Fai, Godfrey	Work Order	: HK1201856
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Project	: AGREEMENT NO CE 43_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION	Quote number	: ----	Date Samples Received	: 18-JAN-2012
Order number	: GE/2009/16.41			Issue Date	: 15-FEB-2012
C-O-C number	: H014516			No. of samples received	: 1
Site	: GB7			No. of samples analysed	: 1

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Signatories

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Position

Senior Chemist - Organics  
Senior Chemist - Organics  
Assistant Supervisor - Metals

Authorised results for

Organics  
Organics  
Inorganics



Page Number : 2 of 9  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201856

### 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: 31-JAN-2012

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: **HK1201856**

The PCB cleanup method on sample(s), GB7 (HK1201856-001), is not accredited. Due to matrix interference on sample(s), GB7 (HK1201856-001), a non-accredited clean-up method was applied on those samples. The PCB analysis, including QA/QC requirements, in this certificate of analysis was performed as per the corresponding HOKLAS accredited method for sediment matrix.

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.  
Sample(s) were received in a chilled condition.

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

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

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.





**Analytical Results**

Sub-Matrix: SEDIMENT

Compound	CAS Number	LOR	Client sample ID		GB7
			Client sampling date / time	Unit	
<b>EA/ED: Physical and Aggregate Properties</b>					
EA055: Moisture Content (dried @ 103°C)	----	0.1	%		52.0
<b>EG: Metals and Major Cations</b>					
EG020: Arsenic	7440-38-2	1	mg/kg		8
EG020: Cadmium	7440-43-9	0.2	mg/kg		2.0
EG020: Chromium	7440-47-3	1	mg/kg		115
EG020: Copper	7440-50-8	1	mg/kg		970
EG020: Lead	7439-92-1	1	mg/kg		126
EG020: Mercury	7439-97-6	0.05	mg/kg		1.51
EG020: Nickel	7440-02-0	1	mg/kg		48
EG020: Silver	7440-22-4	0.1	mg/kg		6.1
EG020: Zinc	7440-66-6	1	mg/kg		427
<b>EP-065: PCB Single Congeners</b>					
PCB 8	34883-43-7	3	µg/kg		<3
PCB 18	37680-65-2	3	µg/kg		<3
PCB 28	7012-37-5	3	µg/kg		7
PCB 44	41464-39-5	3	µg/kg		4
PCB 52	35693-99-3	3	µg/kg		9
PCB 66	32598-10-0	3	µg/kg		4
PCB 77	32598-13-3	3	µg/kg		<3
PCB 101	37680-73-2	3	µg/kg		20
PCB 105	32598-14-4	3	µg/kg		5
PCB 118	31508-00-6	3	µg/kg		14
PCB 126	57465-28-8	3	µg/kg		<3
PCB 128	38380-07-3	3	µg/kg		4
PCB 138	35065-28-2	3	µg/kg		23
PCB 153	35065-27-1	3	µg/kg		32
PCB 169	32774-16-6	3	µg/kg		<3
PCB 170	35065-30-6	3	µg/kg		9
PCB 180	35065-29-3	3	µg/kg		17
PCB 187	52663-68-0	3	µg/kg		8
Total Polychlorinated biphenyls	----	18	µg/kg		160
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)</b>					
Naphthalene	91-20-3	50	µg/kg		9940
Acenaphthylene	208-96-8	50	µg/kg		27300
Acenaphthene	83-32-9	50	µg/kg		30700
Fluorene	86-73-7	50	µg/kg		6420
Phenanthrene	85-01-8	50	µg/kg		71100
Anthracene	120-12-7	50	µg/kg		39600
Fluoranthene	206-44-0	150	µg/kg		187000
Pyrene	129-00-0	150	µg/kg		266000
Benz(a)anthracene	56-55-3	150	µg/kg		92200



Compound	Client sample ID		LOR	Unit	GB7
	CAS Number	Client sampling date / time			
Sub-Matrix: SEDIMENT					
EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued					
Chrysene	218-019	18-JAN-2012 13:35	150	µg/kg	97600
Benzo(b)fluoranthene	205-99-2	HK1201856-001	150	µg/kg	113000
Benzo(k)fluoranthene	207-08-9		150	µg/kg	43600
Benzo(a)pyrene	50-32-8		150	µg/kg	122000
Indeno(1.2.3.cd)pyrene	193-39-5		150	µg/kg	60800
Dibenz(a,h)anthracene	53-70-3		150	µg/kg	11200
Benzo(g,h,i)perylene	191-24-2		150	µg/kg	55400
Low M.W. PAHs	----		550	µg/kg	185000
High M.W. PAHs	----		1700	µg/kg	1050000
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates					
2-Fluorobiphenyl	32160-8		0.1	%	114
4-Terphenyl-d14	1718-510		0.1	%	55.2
EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate					
Decachlorobiphenyl	205124-3		0.1	%	55.5

Surrogate control limits listed at end of this report.

Surrogate control limits listed at end of this report.







**Laboratory Duplicate (DUP) Report**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
						Original Result	Duplicate Result	
<b>EA/ED: Physical and Aggregate Properties (QC Lot: 2135028)</b>								
HK1201847-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	-----	0.1	%	46.7	51.4	9.6
HK1201860-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	-----	0.1	%	53.8	54.8	1.7
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>								
HK1201848-001	Anonymous	EG020: Mercury	7439-97-6	0.05	mg/kg	1.26	1.27	1.0
		EG020: Silver	7440-22-4	0.1	mg/kg	6.5	6.4	1.7
		EG020: Cadmium	7440-43-9	0.2	mg/kg	1.8	1.9	7.6
		EG020: Arsenic	7440-38-2	1	mg/kg	8	8	0.0
		EG020: Chromium	7440-47-3	1	mg/kg	93	96	3.1
		EG020: Copper	7440-50-8	1	mg/kg	706	702	0.5
		EG020: Lead	7439-92-1	1	mg/kg	121	123	1.4
		EG020: Nickel	7440-02-0	1	mg/kg	39	45	14.3
		EG020: Zinc	7440-66-6	1	mg/kg	437	442	1.0
HK1202238-002	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: Arsenic	7440-38-2	1	mg/kg	3	3	0.0
		EG020: Chromium	7440-47-3	1	mg/kg	3	3	0.0
		EG020: Copper	7440-50-8	1	mg/kg	6	5	0.0
		EG020: Lead	7439-92-1	1	mg/kg	105	91	14.0
		EG020: Nickel	7440-02-0	1	mg/kg	2	2	0.0
		EG020: Zinc	7440-66-6	1	mg/kg	57	50	13.2
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>								
HK1201791-001	Anonymous	Total Polychlorinated biphenyls	-----	18	µg/kg	<18	<18	0.0
		PCB 8	34883-43-7	3	µg/kg	<3	<3	0.0
		PCB 18	37680-65-2	3	µg/kg	<3	<3	0.0
		PCB 28	7012-37-5	3	µg/kg	<3	<3	0.0
		PCB 44	41464-39-5	3	µg/kg	<3	<3	0.0
		PCB 52	35693-99-3	3	µg/kg	<3	<3	0.0
		PCB 66	32598-10-0	3	µg/kg	<3	<3	0.0
		PCB 77	32598-13-3	3	µg/kg	<3	<3	0.0
		PCB 101	37680-73-2	3	µg/kg	<3	<3	0.0
		PCB 105	32598-14-4	3	µg/kg	<3	<3	0.0
		PCB 118	31508-00-6	3	µg/kg	<3	<3	0.0
		PCB 126	57465-28-8	3	µg/kg	<3	<3	0.0
		PCB 128	38380-07-3	3	µg/kg	<3	<3	0.0
		PCB 138	35065-28-2	3	µg/kg	<3	<3	0.0
		PCB 153	35065-27-1	3	µg/kg	<3	<3	0.0
		PCB 169	32774-16-6	3	µg/kg	<3	<3	0.0
		PCB 170	35065-30-6	3	µg/kg	<3	<3	0.0
		PCB 180	35065-29-3	3	µg/kg	<3	<3	0.0
		PCB 187	52663-68-0	3	µg/kg	<3	<3	0.0
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>								
HK1201791-001	Anonymous	Fluoranthene	206-44-0	150	µg/kg	<150	<150	0.0





Page Number : 7 of 9  
 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201856

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
						Original Result	Duplicate Result	
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>								
HK1201791-001	Anonymous	Pyrene	129-00-0	150	µg/kg	<150	<150	0.0
		Benz(a)anthracene	56-55-3	150	µg/kg	<150	<150	0.0
		Chrysene	218-01-9	150	µg/kg	<150	<150	0.0
		Benzo(b)fluoranthene	205-99-2	150	µg/kg	<150	<150	0.0
		Benzo(k)fluoranthene	207-08-9	150	µg/kg	<150	<150	0.0
		Benzo(a)pyrene	50-32-8	150	µg/kg	<150	<150	0.0
		Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	<150	<150	0.0
		Dibenz(a,h)anthracene	53-70-3	150	µg/kg	<150	<150	0.0
		Benzo(g,h,i)perylene	191-24-2	150	µg/kg	<150	<150	0.0
		High M.W. PAHs	----	1700	µg/kg	<1700	<1700	0.0
		Naphthalene	91-20-3	50	µg/kg	<50	<50	0.0
		Acenaphthylene	208-96-8	50	µg/kg	<50	<50	0.0
		Acenaphthene	83-32-9	50	µg/kg	<50	<50	0.0
		Fluorene	86-73-7	50	µg/kg	<50	<50	0.0
		Phenanthrene	85-01-8	50	µg/kg	<50	<50	0.0
		Anthracene	120-12-7	50	µg/kg	<50	<50	0.0
		Low M.W. PAHs	----	550	µg/kg	<550	<550	0.0

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
						Original Result	Duplicate Result	
<b>Matrix: WATER</b>								
EP-390: Triorganotins (QC Lot: 2148235)	Anonymous	Tributyltin	56573-85-4	6	ngSn/L	284	287	0.8

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

Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)			Recovery Limits (%)	Value	Control Limit
						LCS	DCS	DCS			
<b>Matrix: SOIL</b>											
<b>Method Blank (MB) Report</b>											
EG: Metals and Major Cations (QC Lot: 2142348)											
EG020: Arsenic	7440-38-2	1	mg/kg	<1	5 mg/kg	94.3	77	109	77-109	-----	-----
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	103	86	110	86-110	-----	-----
EG020: Chromium	7440-47-3	1	mg/kg	<1	5 mg/kg	105	88	120	88-120	-----	-----
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	94.8	85	109	85-109	-----	-----
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	94.5	84	106	84-106	-----	-----
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	85.8	80	112	80-112	-----	-----
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	98.4	87	111	87-111	-----	-----
EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	5 mg/kg	87.9	83	105	83-105	-----	-----
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	100	82	126	82-126	-----	-----
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>											
PCB 8	34883-43-7	3	µg/kg	<3	5 µg/kg	55.4	22	121	22-121	-----	-----
PCB 18	37680-65-2	3	µg/kg	<3	5 µg/kg	55.2	23	124	23-124	-----	-----
PCB 28	7012-37-5	3	µg/kg	<3	5 µg/kg	63.3	26	124	26-124	-----	-----
PCB 44	41464-39-5	3	µg/kg	<3	5 µg/kg	62.5	16	132	16-132	-----	-----
PCB 52	35693-99-3	3	µg/kg	<3	5 µg/kg	64.4	18	133	18-133	-----	-----
PCB 66	32598-10-0	3	µg/kg	<3	5 µg/kg	64.4	5	130	5-130	-----	-----





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	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>EP-065: PCB Single Congeners (QC Lot: 2133666) - Continued</b>														
PCB 77	32598-13-3	3	µg/kg	<3	5 µg/kg	58.1			16	137				
PCB 101	37680-73-2	3	µg/kg	<3	5 µg/kg	59.7			26	143				
PCB 105	32598-14-4	3	µg/kg	<3	5 µg/kg	60.1			19	132				
PCB 118	31508-00-6	3	µg/kg	<3	5 µg/kg	59.8			17	137				
PCB 126	57465-28-8	3	µg/kg	<3	5 µg/kg	62.7			29	107				
PCB 128	38380-07-3	3	µg/kg	<3	5 µg/kg	60.7			28	126				
PCB 138	35065-28-2	3	µg/kg	<3	5 µg/kg	60.4			21	136				
PCB 153	35065-27-1	3	µg/kg	<3	5 µg/kg	61.2			25	135				
PCB 169	32774-16-6	3	µg/kg	<3	5 µg/kg	65.0			17	129				
PCB 170	35065-30-6	3	µg/kg	<3	5 µg/kg	64.6			18	129				
PCB 180	35065-29-3	3	µg/kg	<3	5 µg/kg	64.1			21	124				
PCB 187	52663-68-0	3	µg/kg	<3	5 µg/kg	61.4			30	124				
Total Polychlorinated biphenyls														
18														
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>														
Naphthalene	91-20-3	25	µg/kg	<50	25 µg/kg	86.8			43	140				
Acenaphthylene	208-96-8	50	µg/kg	<50	25 µg/kg	97.6			7	159				
Acenaphthene	83-32-9	25	µg/kg	<50	25 µg/kg	90.3			44	139				
Fluorene	86-73-7	25	µg/kg	<50	25 µg/kg	94.4			36	147				
Phenanthrene	85-01-8	25	µg/kg	<50	25 µg/kg	94.3			53	126				
Anthracene	120-12-7	25	µg/kg	<50	25 µg/kg	95.2			12	159				
Fluoranthene	206-44-0	50	µg/kg	<50	25 µg/kg	95.0			40	144				
Pyrene	129-00-0	25	µg/kg	<50	25 µg/kg	96.2			38	148				
Benz(a)anthracene	56-55-3	25	µg/kg	<50	25 µg/kg	102			38	150				
Chrysene	218-01-9	50	µg/kg	<50	25 µg/kg	105			50	144				
Benzo(b)fluoranthene	205-99-2	25	µg/kg	<50	25 µg/kg	102			59	123				
Benzo(k)fluoranthene	207-08-9	25	µg/kg	<50	25 µg/kg	104			58	125				
Benzo(a)pyrene	50-32-8	25	µg/kg	<50	25 µg/kg	106			30	136				
Indeno(1,2,3-cd)pyrene	193-39-5	25	µg/kg	<50	25 µg/kg	66.9			54	127				
Dibenz(a,h)anthracene	53-70-3	25	µg/kg	<50	25 µg/kg	99.2			60	122				





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 (%)	Value	Control Limit
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>									
Benzo(g,h,i)perylene	191-24-2	50	µg/kg	<50	25 µg/kg	102	64	132	
Low M.W. PAHs		550	µg/kg	<550					
High M.W. PAHs		1700	µg/kg	<1700					
Matrix: WATER									
<b>Method Blank (MB) Report</b>									
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	Value	Control Limit
EP-390: Triorganotins (QC Lot: 2148235)	56573-85-4	5	ngSn/L	<5	5 ngSn/L	98.0	81	117	
Tributyltin									

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

Method: Compound				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)	MSD	Recovery Limits (%)	Value	Control Limit
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>									
HK1202238-001 Anonymous		EG020: Arsenic	7440-38-2	5 mg/kg	102		75	125	
		EG020: Cadmium	7440-43-9	5 mg/kg	102		75	125	
		EG020: Chromium	7440-47-3	5 mg/kg	106		75	125	
		EG020: Copper	7440-50-8	5 mg/kg	94.7		75	125	
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined		75	125	
		EG020: Mercury	7439-97-6	0.1 mg/kg	88.6		75	125	
		EG020: Nickel	7440-02-0	5 mg/kg	112		75	125	
		EG020: Silver	7440-22-4	5 mg/kg	82.9		75	125	
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined		75	125	

**Surrogate Control Limits**

Sub-Matrix: SEDIMENT	Compound	CAS Number	Recovery Limits (%)
			Low High
	EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates		
	2-Fluorobiphenyl	321-60-8	50 130
	4-Terphenyl-d14	1718-51-0	50 130
	EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate		
	Decachlorobiphenyl	2051-24-3	50 130

### CERTIFICATE OF ANALYSIS

Client	: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Laboratory	: ALS Technichem HK Pty Ltd	Page	: 1 of 9
Contact	: IR POPHIL LAM	Contact	: Chan Kwok Fai, Godfrey	Work Order	: HK1201858
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Project	: AGREEMENT NO CE 43_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION	Quote number	: ----	Date Samples Received	: 18-JAN-2012
Order number	: GE/2009/16.41			Issue Date	: 15-FEB-2012
C-O-C number	: H014516			No. of samples received	: 1
Site	: GB8			No. of samples analysed	: 1

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Hong Kong Accreditation Service (HKAS) has accredited this laboratory (ALS Technichem (HK) Pty Ltd) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation.

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	Organics
Tai Yuk Lun, Stephen	Senior Chemist - Organics	Organics
Wong Wing, Kenneth	Assistant Supervisor - Metals	Inorganics





Page Number : 2 of 9  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201858

### 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: 31-JAN-2012

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: **HK1201858**

The PCB cleanup method on sample(s), GB8 (HK1201858-001), is not accredited. Due to matrix interference on sample(s), GB8 (HK1201858-001), a non-accredited clean-up method was applied on those samples. The PCB analysis, including QA/QC requirements, in this certificate of analysis was performed as per the corresponding HOKLAS accredited method for sediment matrix.

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay. Sample(s) were received in a chilled condition.

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

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

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.



**Analytical Results**

Sub-Matrix: SEDIMENT

Compound	CAS Number	LOR	Client sample ID		Unit
			Client sampling date / time	GB8	
<b>E/ED: Physical and Aggregate Properties</b>					
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	18-JAN-2012 14:05	HK1201858-001
<b>EG: Metals and Major Cations</b>					
EG020: Arsenic	7440-38-2	1	mg/kg	10	
EG020: Cadmium	7440-43-9	0.2	mg/kg	2.3	
EG020: Chromium	7440-47-3	1	mg/kg	145	
EG020: Copper	7440-50-8	1	mg/kg	1450	
EG020: Lead	7439-92-1	1	mg/kg	164	
EG020: Mercury	7439-97-6	0.05	mg/kg	2.06	
EG020: Nickel	7440-02-0	1	mg/kg	53	
EG020: Silver	7440-22-4	0.1	mg/kg	10.8	
EG020: Zinc	7440-66-6	1	mg/kg	469	
<b>EP-065: PCB Single Congeners</b>					
PCB 8	34883-43-7	3	µg/kg	<3	
PCB 18	37680-65-2	3	µg/kg	<3	
PCB 28	7012-37-5	3	µg/kg	3	
PCB 44	41464-39-5	3	µg/kg	<3	
PCB 52	35693-98-3	3	µg/kg	4	
PCB 66	32598-10-0	3	µg/kg	<3	
PCB 77	32598-13-3	3	µg/kg	<3	
PCB 101	37680-73-2	3	µg/kg	12	
PCB 105	32598-14-4	3	µg/kg	<3	
PCB 118	31508-00-6	3	µg/kg	9	
PCB 126	57465-28-8	3	µg/kg	<3	
PCB 128	38380-07-3	3	µg/kg	<3	
PCB 138	35065-28-2	3	µg/kg	17	
PCB 153	35065-27-1	3	µg/kg	23	
PCB 169	32774-16-6	3	µg/kg	<3	
PCB 170	35065-30-6	3	µg/kg	7	
PCB 180	35065-29-3	3	µg/kg	14	
PCB 187	52663-68-0	3	µg/kg	6	
Total Polychlorinated biphenyls	----	18	µg/kg	105	
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)</b>					
Naphthalene	91-20-3	50	µg/kg	3860	
Acenaphthylene	208-96-8	50	µg/kg	9020	
Acenaphthene	83-32-9	50	µg/kg	3640	
Fluorene	86-73-7	50	µg/kg	1980	
Phenanthrene	85-01-8	50	µg/kg	10400	
Anthracene	120-12-7	50	µg/kg	7400	
Fluoranthene	206-44-0	150	µg/kg	30500	
Pyrene	129-00-0	150	µg/kg	50400	
Benz(a)anthracene	56-55-3	150	µg/kg	17200	





Compound	Client sample ID		Unit	LOR	CAS Number	Client sampling date / time	GB8
	LOR	Unit					
Sub-Matrix: SEDIMENT							
18-JAN-2012 14:05							
HK1201858-001							
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued</b>							
Chrysene	218-019	150	µg/kg				19500
Benzo(b)fluoranthene	205-99-2	150	µg/kg				27100
Benzo(k)fluoranthene	207-08-9	150	µg/kg				9380
Benzo(a)pyrene	50-32-8	150	µg/kg				32000
Indeno(1.2.3.cd)pyrene	193-39-5	150	µg/kg				17000
Dibenz(a,h)anthracene	53-70-3	150	µg/kg				3320
Benzo(g,h,i)perylene	191-24-2	150	µg/kg				16800
Low M.W. PAHs	----	550	µg/kg				36300
High M.W. PAHs	----	1700	µg/kg				223000
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>							
2-Fluorobiphenyl	32160-8	0.1	%				96.0
4-Terphenyl-d14	1718-510	0.1	%				54.3
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>							
Decachlorobiphenyl	205124-3	0.1	%				73.4
Surrogate control limits listed at end of this report.							
Surrogate control limits listed at end of this report.							



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Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201858

Sub-Matrix: INTERSTITIAL WATER		Client sample ID	Client sampling date / time	Client sample ID
Compound	CAS Number	LOR	Unit	Client sample ID
EP-390: Triorganotins	56573-85-4	0.015	µg TBT /L	GB8
Tributyltin				18-JAN-2012 14:05
				HK1201858-001





**Laboratory Duplicate (DUP) Report**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)	
						Original Result	Duplicate Result		
<b>EA/ED: Physical and Aggregate Properties (QC Lot: 2135028)</b>									
HK1201847-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	----	0.1	%		46.7	51.4	9.6
HK1201860-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	----	0.1	%		53.8	54.8	1.7
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>									
HK1201848-001	Anonymous	EG020: Mercury	7439-97-6	0.05	mg/kg		1.26	1.27	1.0
		EG020: Silver	7440-22-4	0.1	mg/kg		6.5	6.4	1.7
		EG020: Cadmium	7440-43-9	0.2	mg/kg		1.8	1.9	7.6
		EG020: Arsenic	7440-38-2	1	mg/kg		8	8	0.0
		EG020: Chromium	7440-47-3	1	mg/kg		93	96	3.1
		EG020: Copper	7440-50-8	1	mg/kg		706	702	0.5
		EG020: Lead	7439-92-1	1	mg/kg		121	123	1.4
		EG020: Nickel	7440-02-0	1	mg/kg		39	45	14.3
		EG020: Zinc	7440-66-6	1	mg/kg		437	442	1.0
HK1202238-002	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: Arsenic	7440-38-2	1	mg/kg		3	3	0.0
		EG020: Chromium	7440-47-3	1	mg/kg		3	3	0.0
		EG020: Copper	7440-50-8	1	mg/kg		6	5	0.0
		EG020: Lead	7439-92-1	1	mg/kg		105	91	14.0
		EG020: Nickel	7440-02-0	1	mg/kg		2	2	0.0
		EG020: Zinc	7440-66-6	1	mg/kg		57	50	13.2
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>									
HK1201791-001	Anonymous	Total Polychlorinated biphenyls	----	18	µg/kg		<18	<18	0.0
		PCB 8	34883-43-7	3	µg/kg		<3	<3	0.0
		PCB 18	37680-65-2	3	µg/kg		<3	<3	0.0
		PCB 28	7012-37-5	3	µg/kg		<3	<3	0.0
		PCB 44	41464-39-5	3	µg/kg		<3	<3	0.0
		PCB 52	35693-99-3	3	µg/kg		<3	<3	0.0
		PCB 66	32598-10-0	3	µg/kg		<3	<3	0.0
		PCB 77	32598-13-3	3	µg/kg		<3	<3	0.0
		PCB 101	37680-73-2	3	µg/kg		<3	<3	0.0
		PCB 105	32598-14-4	3	µg/kg		<3	<3	0.0
		PCB 118	31508-00-6	3	µg/kg		<3	<3	0.0
		PCB 126	57465-28-8	3	µg/kg		<3	<3	0.0
		PCB 128	38380-07-3	3	µg/kg		<3	<3	0.0
		PCB 138	35065-28-2	3	µg/kg		<3	<3	0.0
		PCB 153	35065-27-1	3	µg/kg		<3	<3	0.0
		PCB 169	32774-16-6	3	µg/kg		<3	<3	0.0
		PCB 170	35065-30-6	3	µg/kg		<3	<3	0.0
		PCB 180	35065-29-3	3	µg/kg		<3	<3	0.0
		PCB 187	52663-68-0	3	µg/kg		<3	<3	0.0
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>									
HK1201791-001	Anonymous	Fluoranthene	206-44-0	150	µg/kg		<150	<150	0.0





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 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201858

Matrix: SOIL		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Client sample ID	Method: Compound	Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>									
HK1201791-001	Anonymous	Pyrene	129-00-0	150	µg/kg	<150	<150	<150	0.0
		Benz(a)anthracene	56-55-3	150	µg/kg	<150	<150	<150	0.0
		Chrysene	218-01-9	150	µg/kg	<150	<150	<150	0.0
		Benzo(b)fluoranthene	205-99-2	150	µg/kg	<150	<150	<150	0.0
		Benzo(k)fluoranthene	207-08-9	150	µg/kg	<150	<150	<150	0.0
		Benzo(a)pyrene	50-32-8	150	µg/kg	<150	<150	<150	0.0
		Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	<150	<150	<150	0.0
		Dibenz(a,h)anthracene	53-70-3	150	µg/kg	<150	<150	<150	0.0
		Benzo(g,h,i)perylene	191-24-2	150	µg/kg	<150	<150	<150	0.0
		High M.W. PAHs	-----	1700	µg/kg	<1700	<1700	<1700	0.0
		Naphthalene	91-20-3	50	µg/kg	<50	<50	<50	0.0
		Acenaphthylene	208-96-8	50	µg/kg	<50	<50	<50	0.0
		Acenaphthene	83-32-9	50	µg/kg	<50	<50	<50	0.0
		Fluorene	86-73-7	50	µg/kg	<50	<50	<50	0.0
		Phenanthrene	85-01-8	50	µg/kg	<50	<50	<50	0.0
		Anthracene	120-12-7	50	µg/kg	<50	<50	<50	0.0
		Low M.W. PAHs	-----	550	µg/kg	<550	<550	<550	0.0

Matrix: WATER		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Client sample ID	Method: Compound	Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
HK1201860-001	Anonymous	Tributyltin	56573-85-4	6	ngSn/L	284	284	287	0.8

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

Matrix: SOIL										
Method Blank (MB) Report										
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Control Limit
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>										
EG020: Arsenic	7440-38-2	1	mg/kg	<1	5 mg/kg	94.3	77	109	77-109	-----
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	103	86	110	86-110	-----
EG020: Chromium	7440-47-3	1	mg/kg	<1	5 mg/kg	105	88	120	88-120	-----
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	94.8	85	109	85-109	-----
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	94.5	84	106	84-106	-----
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	85.8	80	112	80-112	-----
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	98.4	87	111	87-111	-----
EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	5 mg/kg	87.9	83	105	83-105	-----
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	100	82	126	82-126	-----
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>										
PCB 8	34883-43-7	3	µg/kg	<3	5 µg/kg	55.4	22	121	22-121	-----
PCB 18	37680-65-2	3	µg/kg	<3	5 µg/kg	55.2	23	124	23-124	-----
PCB 28	7012-37-5	3	µg/kg	<3	5 µg/kg	63.3	26	124	26-124	-----
PCB 44	41464-39-5	3	µg/kg	<3	5 µg/kg	62.5	16	132	16-132	-----
PCB 52	35693-99-3	3	µg/kg	<3	5 µg/kg	64.4	18	133	18-133	-----
PCB 66	32598-10-0	3	µg/kg	<3	5 µg/kg	64.4	5	130	5-130	-----





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	LCS	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>EP-065: PCB Single Congeners (QC Lot: 2133666) - Continued</b>													
PCB 77	32598-13-3	3	µg/kg	<3	5 µg/kg	58.1	-----	-----	16	137	-----	-----	-----
PCB 101	37680-73-2	3	µg/kg	<3	5 µg/kg	59.7	-----	-----	26	143	-----	-----	-----
PCB 105	32598-14-4	3	µg/kg	<3	5 µg/kg	60.1	-----	-----	19	132	-----	-----	-----
PCB 118	31508-00-6	3	µg/kg	<3	5 µg/kg	59.8	-----	-----	17	137	-----	-----	-----
PCB 126	57465-28-8	3	µg/kg	<3	5 µg/kg	62.7	-----	-----	29	107	-----	-----	-----
PCB 128	38380-07-3	3	µg/kg	<3	5 µg/kg	60.7	-----	-----	28	126	-----	-----	-----
PCB 138	35065-28-2	3	µg/kg	<3	5 µg/kg	60.4	-----	-----	21	136	-----	-----	-----
PCB 153	35065-27-1	3	µg/kg	<3	5 µg/kg	61.2	-----	-----	25	135	-----	-----	-----
PCB 169	32774-16-6	3	µg/kg	<3	5 µg/kg	65.0	-----	-----	17	129	-----	-----	-----
PCB 170	35065-30-6	3	µg/kg	<3	5 µg/kg	64.6	-----	-----	18	129	-----	-----	-----
PCB 180	35065-29-3	3	µg/kg	<3	5 µg/kg	64.1	-----	-----	21	124	-----	-----	-----
PCB 187	52663-68-0	3	µg/kg	<3	5 µg/kg	61.4	-----	-----	30	124	-----	-----	-----
Total Polychlorinated biphenyls	-----	18	µg/kg	<18	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>													
Naphthalene	91-20-3	25	µg/kg	-----	25 µg/kg	86.8	-----	-----	43	140	-----	-----	-----
Acenaphthylene	208-96-8	50	µg/kg	<50	-----	-----	-----	-----	-----	-----	-----	-----	-----
Acenaphthene	83-32-9	25	µg/kg	<50	25 µg/kg	97.6	-----	-----	7	159	-----	-----	-----
Fluorene	86-73-7	25	µg/kg	<50	25 µg/kg	90.3	-----	-----	44	139	-----	-----	-----
Phenanthrene	85-01-8	25	µg/kg	<50	25 µg/kg	94.4	-----	-----	36	147	-----	-----	-----
Anthracene	120-12-7	25	µg/kg	<50	25 µg/kg	94.3	-----	-----	53	126	-----	-----	-----
Fluoranthene	206-44-0	50	µg/kg	<50	25 µg/kg	95.2	-----	-----	12	159	-----	-----	-----
Pyrene	129-00-0	25	µg/kg	<50	25 µg/kg	-----	-----	-----	-----	-----	-----	-----	-----
Benz(a)anthracene	56-55-3	25	µg/kg	<50	25 µg/kg	95.0	-----	-----	40	144	-----	-----	-----
Chrysene	218-01-9	50	µg/kg	<50	25 µg/kg	96.2	-----	-----	38	148	-----	-----	-----
Benzo(b)fluoranthene	205-99-2	25	µg/kg	<50	25 µg/kg	102	-----	-----	38	150	-----	-----	-----
Benzo(k)fluoranthene	207-08-9	25	µg/kg	<50	25 µg/kg	-----	-----	-----	-----	-----	-----	-----	-----
Benzo(a)pyrene	50-32-8	25	µg/kg	<50	25 µg/kg	105	-----	-----	50	144	-----	-----	-----
Indeno(1,2,3-cd)pyrene	193-39-5	25	µg/kg	<50	25 µg/kg	102	-----	-----	59	123	-----	-----	-----
Dibenz(a,h)anthracene	53-70-3	25	µg/kg	<50	25 µg/kg	104	-----	-----	58	125	-----	-----	-----
					25 µg/kg	106	-----	-----	30	136	-----	-----	-----
					25 µg/kg	66.9	-----	-----	54	127	-----	-----	-----
					25 µg/kg	99.2	-----	-----	60	122	-----	-----	-----





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 (%)	DCS	Low	High	Value	RPD (%)	Control Limit
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>													
Benzo(g,h,i)perylene	191-24-2	50	µg/kg	<50	25 µg/kg	102	64	132	64	132			
Low M.W. PAHs	-----	550	µg/kg	<550									
High M.W. PAHs	-----	1700	µg/kg	<1700									
<b>Matrix: WATER</b>													
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 (%)	DCS	Low	High	Value	RPD (%)	Control Limit
EP-390: Triorganotins (QC Lot: 2148235)	56573-85-4	5	ngSn/L	<5	5 ngSn/L	98.0	81	117	81	117			
Tributyltin													

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

Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report			
				Spike Concentration	Spike Recovery (%)	MSD	RPD (%)
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>							
HK1202238-001	Anonymous						
		EG020: Arsenic	7440-38-2	5 mg/kg	102	75	125
		EG020: Cadmium	7440-43-9	5 mg/kg	102	75	125
		EG020: Chromium	7440-47-3	5 mg/kg	106	75	125
		EG020: Copper	7440-50-8	5 mg/kg	94.7	75	125
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined	75	125
		EG020: Mercury	7439-97-6	0.1 mg/kg	88.6	75	125
		EG020: Nickel	7440-02-0	5 mg/kg	112	75	125
		EG020: Silver	7440-22-4	5 mg/kg	82.9	75	125
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	75	125

**Surrogate Control Limits**

Sub-Matrix: SEDIMENT	CAS Number	Recovery Limits (%)
Compound	Low	High
<b>EP-076S: Polycyclic Aromatic Hydrocarbons (PAHs) Surrogates</b>		
2-Fluorobiphenyl	321-60-8	50
4-Terphenyl-d14	1718-51-0	50
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>		
Decachlorobiphenyl	2051-24-3	50



### CERTIFICATE OF ANALYSIS

Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
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Project : AGREEMENT NO CE 43\_2010 (HY) CENTRAL  
KOWLOON ROUTE - DESIGN AND  
CONSTRUCTION  
Order number : GE/2009/16.41  
C-O-C number : H014516  
Site : GB9

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Quote number : ----  
Page : 1 of 9  
Work Order : HK1201859

Date Samples Received : 18-JAN-2012  
Issue Date : 15-FEB-2012  
No. of samples received : 1  
No. of samples analysed : 1

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Hong Kong Accreditation Service (HKAS) has accredited this laboratory (ALS Technichem (HK) Pty Ltd) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation.

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	Organics
Tai Yuk Lun, Stephen	Senior Chemist - Organics	Organics
Wong Wing, Kenneth	Assistant Supervisor - Metals	Inorganics



Page Number : 2 of 9  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201859

### 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: 31-JAN-2012

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: **HK1201859**

The PCB cleanup method on sample(s), GB9 (HK1201859-001), is not accredited. Due to matrix interference on sample(s), GB9 (HK1201859-001), a non-accredited clean-up method was applied on those samples. The PCB analysis, including QA/QC requirements, in this certificate of analysis was performed as per the corresponding HOKLAS accredited method for sediment matrix.

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

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

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.





**Analytical Results**

Sub-Matrix: SEDIMENT

Compound	CAS Number	LOR	Client sample ID	
			Client sampling date / time	Unit
<b>GB9</b>				
18-JAN-2012 14:25				
<b>HK1201859-001</b>				
<b>E/ED: Physical and Aggregate Properties</b>				
E/ED: Moisture Content (dried @ 103°C)	----	0.1	%	51.1
<b>EG: Metals and Major Cations</b>				
EG020: Arsenic	7440-38-2	1	mg/kg	8
EG020: Cadmium	7440-43-9	0.2	mg/kg	1.8
EG020: Chromium	7440-47-3	1	mg/kg	95
EG020: Copper	7440-50-8	1	mg/kg	663
EG020: Lead	7439-92-1	1	mg/kg	98
EG020: Mercury	7439-97-6	0.05	mg/kg	1.24
EG020: Nickel	7440-02-0	1	mg/kg	38
EG020: Silver	7440-22-4	0.1	mg/kg	6.1
EG020: Zinc	7440-66-6	1	mg/kg	336
<b>EP-065: PCB Single Congeners</b>				
PCB 8	34883-43-7	3	µg/kg	<3
PCB 18	37680-65-2	3	µg/kg	<3
PCB 28	7012-37-5	3	µg/kg	4
PCB 44	41464-39-5	3	µg/kg	<3
PCB 52	35693-99-3	3	µg/kg	5
PCB 66	32598-10-0	3	µg/kg	<3
PCB 77	32598-13-3	3	µg/kg	<3
PCB 101	37680-73-2	3	µg/kg	12
PCB 105	32598-14-4	3	µg/kg	<3
PCB 118	31508-00-6	3	µg/kg	8
PCB 126	57465-28-8	3	µg/kg	<3
PCB 128	38380-07-3	3	µg/kg	<3
PCB 138	35065-28-2	3	µg/kg	16
PCB 153	35065-27-1	3	µg/kg	18
PCB 169	32774-16-6	3	µg/kg	<3
PCB 170	35065-30-6	3	µg/kg	6
PCB 180	35065-29-3	3	µg/kg	11
PCB 187	52663-68-0	3	µg/kg	5
Total Polychlorinated biphenyls	----	18	µg/kg	95
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)</b>				
Naphthalene	91-20-3	50	µg/kg	11500
Acenaphthylene	208-96-8	50	µg/kg	44000
Acenaphthene	83-32-9	50	µg/kg	51400
Fluorene	86-73-7	50	µg/kg	9260
Phenanthrene	85-01-8	50	µg/kg	142000
Anthracene	120-12-7	50	µg/kg	72000
Fluoranthene	206-44-0	150	µg/kg	306000
Pyrene	129-00-0	150	µg/kg	422000
Benz(a)anthracene	56-55-3	150	µg/kg	161000



Sub-Matrix: SEDIMENT		Client sample ID	
Compound	CAS Number	Client sampling date / time	Unit
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued</b>			
Chrysene	218-019	150	µg/kg
Benzo(b)fluoranthene	205-99-2	150	µg/kg
Benzo(k)fluoranthene	207-08-9	150	µg/kg
Benzo(a)pyrene	50-32-8	150	µg/kg
Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg
Dibenz(a,h)anthracene	53-70-3	150	µg/kg
Benzo(g,h,i)perylene	191-24-2	150	µg/kg
Low M.W. PAHs	----	550	µg/kg
High M.W. PAHs	----	1700	µg/kg
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>			
2-Fluorobiphenyl	32160-8	0.1	%
4-Terphenyl-d14	1718-51-0	0.1	%
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			
Decachlorobiphenyl	2051-24-3	0.1	%
		<b>GB9</b>	
		18-JAN-2012 14:25	
		<b>HK1201859-001</b>	
		<b>156000</b>	
		<b>168000</b>	
		<b>80300</b>	
		<b>192000</b>	
		<b>97200</b>	
		<b>16000</b>	
		<b>91500</b>	
		<b>330000</b>	
		<b>1690000</b>	
		Surrogate control limits listed at end of this report.	
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			
		<b>103</b>	
		<b>59.4</b>	
		Surrogate control limits listed at end of this report.	
		<b>72.5</b>	





Page Number : 5 of 9  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201859

Sub-Matrix: INTERSTITIAL WATER

Compound	CAS Number	LOR	Client sample ID		Unit
			Client sampling date / time		
EP-390: Triorganotins	56573-85-4	0.015	GB9	18-JAN-2012 14:25	HK1201859-001
Tributyltin		0.015			<0.015



**Laboratory Duplicate (DUP) Report**

Matrix: SOIL		Method: Compound		Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>EA/ED: Physical and Aggregate Properties (QC Lot: 2135028)</b>							
HK1201847-001	Anonymous	-----	0.1	%	46.7	51.4	9.6
HK1201860-001	Anonymous	-----	0.1	%	53.8	54.8	1.7
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>							
HK1201848-001	Anonymous	7439-97-6	0.05	mg/kg	1.26	1.27	1.0
		EG020: Mercury					
		7440-22-4	0.1	mg/kg	6.5	6.4	1.7
		EG020: Silver					
		7440-43-9	0.2	mg/kg	1.8	1.9	7.6
		EG020: Cadmium					
		7440-38-2	1	mg/kg	8	8	0.0
		EG020: Arsenic					
		7440-47-3	1	mg/kg	93	96	3.1
		EG020: Chromium					
		7440-50-8	1	mg/kg	706	702	0.5
		EG020: Copper					
		7439-92-1	1	mg/kg	121	123	1.4
		EG020: Lead					
		7440-02-0	1	mg/kg	39	45	14.3
		EG020: Nickel					
		7440-66-6	1	mg/kg	437	442	1.0
		EG020: Zinc					
		7439-97-6	0.05	mg/kg	<0.05	<0.05	0.0
		EG020: Mercury					
		7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Cadmium					
		7440-38-2	1	mg/kg	3	3	0.0
		EG020: Arsenic					
		7440-47-3	1	mg/kg	3	3	0.0
		EG020: Chromium					
		7440-50-8	1	mg/kg	6	5	0.0
		EG020: Copper					
		7439-92-1	1	mg/kg	105	91	14.0
		EG020: Lead					
		7440-02-0	1	mg/kg	2	2	0.0
		EG020: Nickel					
		7440-66-6	1	mg/kg	57	50	13.2
		EG020: Zinc					
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>							
HK1201791-001	Anonymous	-----	18	µg/kg	<18	<18	0.0
		Total Polychlorinated biphenyls					
		PCB 8	3	µg/kg	<3	<3	0.0
		PCB 18	3	µg/kg	<3	<3	0.0
		PCB 28	3	µg/kg	<3	<3	0.0
		PCB 44	3	µg/kg	<3	<3	0.0
		PCB 52	3	µg/kg	<3	<3	0.0
		PCB 66	3	µg/kg	<3	<3	0.0
		PCB 77	3	µg/kg	<3	<3	0.0
		PCB 101	3	µg/kg	<3	<3	0.0
		PCB 105	3	µg/kg	<3	<3	0.0
		PCB 118	3	µg/kg	<3	<3	0.0
		PCB 126	3	µg/kg	<3	<3	0.0
		PCB 128	3	µg/kg	<3	<3	0.0
		PCB 138	3	µg/kg	<3	<3	0.0
		PCB 153	3	µg/kg	<3	<3	0.0
		PCB 169	3	µg/kg	<3	<3	0.0
		PCB 170	3	µg/kg	<3	<3	0.0
		PCB 180	3	µg/kg	<3	<3	0.0
		PCB 187	3	µg/kg	<3	<3	0.0
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>							
HK1201791-001	Anonymous	206-44-0	150	µg/kg	<150	<150	0.0
		Fluoranthene					





Matrix: SOIL		Method: Compound		Laboratory Duplicate (DUP) Report	
Laboratory sample ID	Client sample ID	CAS Number	LOR	Unit	RPD (%)
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>					
HK1201791-001	Anonymous	129-00-0	150	µg/kg	0.0
		56-55-3	150	µg/kg	0.0
		218-01-9	150	µg/kg	0.0
		205-99-2	150	µg/kg	0.0
		207-08-9	150	µg/kg	0.0
		50-32-8	150	µg/kg	0.0
		193-39-5	150	µg/kg	0.0
		53-70-3	150	µg/kg	0.0
		191-24-2	150	µg/kg	0.0
		-----	1700	µg/kg	0.0
		91-20-3	50	µg/kg	0.0
		208-96-8	50	µg/kg	0.0
		83-32-9	50	µg/kg	0.0
		86-73-7	50	µg/kg	0.0
		85-01-8	50	µg/kg	0.0
		120-12-7	50	µg/kg	0.0
		-----	550	µg/kg	0.0

Matrix: WATER		Method: Compound		Laboratory Duplicate (DUP) Report	
Laboratory sample ID	Client sample ID	CAS Number	LOR	Unit	RPD (%)
EP-390: Triorganotins (QC Lot: 2148235)	Anonymous	56573-85-4	6	ngSn/L	0.8

**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	RPD (%)
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>					
EG020: Arsenic	7440-38-2	1	mg/kg	<1	-----
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	-----
EG020: Chromium	7440-47-3	1	mg/kg	<1	-----
EG020: Copper	7440-50-8	1	mg/kg	<1	-----
EG020: Lead	7439-92-1	1	mg/kg	<1	-----
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	-----
EG020: Nickel	7440-02-0	1	mg/kg	<1	-----
EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	-----
EG020: Zinc	7440-66-6	1	mg/kg	<1	-----
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>					
PCB 8	34883-43-7	3	µg/kg	<3	-----
PCB 18	37680-65-2	3	µg/kg	<3	-----
PCB 28	7012-37-5	3	µg/kg	<3	-----
PCB 44	41464-39-5	3	µg/kg	<3	-----
PCB 52	35693-99-3	3	µg/kg	<3	-----
PCB 66	32598-10-0	3	µg/kg	<3	-----





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	LCS	DCS	Recovery Limits (%)	RPD (%)		
								Low	High	Value	Control Limit
<b>EP-065: PCB Single Congeners (QC Lot: 2133666) - Continued</b>											
PCB 77	32598-13-3	3	µg/kg	<3	5 µg/kg	58.1		16	137		
PCB 101	37680-73-2	3	µg/kg	<3	5 µg/kg	59.7		26	143		
PCB 105	32598-14-4	3	µg/kg	<3	5 µg/kg	60.1		19	132		
PCB 118	31508-00-6	3	µg/kg	<3	5 µg/kg	59.8		17	137		
PCB 126	57465-28-8	3	µg/kg	<3	5 µg/kg	62.7		29	107		
PCB 128	38380-07-3	3	µg/kg	<3	5 µg/kg	60.7		28	126		
PCB 138	35065-28-2	3	µg/kg	<3	5 µg/kg	60.4		21	136		
PCB 153	35065-27-1	3	µg/kg	<3	5 µg/kg	61.2		25	135		
PCB 169	32774-16-6	3	µg/kg	<3	5 µg/kg	65.0		17	129		
PCB 170	35065-30-6	3	µg/kg	<3	5 µg/kg	64.6		18	129		
PCB 180	35065-29-3	3	µg/kg	<3	5 µg/kg	64.1		21	124		
PCB 187	52663-68-0	3	µg/kg	<3	5 µg/kg	61.4		30	124		
Total Polychlorinated biphenyls		18	µg/kg	<18							
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>											
Naphthalene	91-20-3	25	µg/kg	<50	25 µg/kg	86.8		43	140		
Acenaphthylene	208-96-8	50	µg/kg	<50	25 µg/kg	97.6		7	159		
Acenaphthene	83-32-9	25	µg/kg	<50	25 µg/kg	90.3		44	139		
Fluorene	86-73-7	25	µg/kg	<50	25 µg/kg	94.4		36	147		
Phenanthrene	85-01-8	25	µg/kg	<50	25 µg/kg	94.3		53	126		
Anthracene	120-12-7	25	µg/kg	<50	25 µg/kg	95.2		12	159		
Fluoranthene	206-44-0	50	µg/kg	<50	25 µg/kg	95.0		40	144		
Pyrene	129-00-0	25	µg/kg	<50	25 µg/kg	96.2		38	148		
Benz(a)anthracene	56-55-3	25	µg/kg	<50	25 µg/kg	102		38	150		
Chrysene	218-01-9	50	µg/kg	<50	25 µg/kg	105		50	144		
Benzo(b)fluoranthene	205-99-2	25	µg/kg	<50	25 µg/kg	102		59	123		
Benzo(k)fluoranthene	207-08-9	25	µg/kg	<50	25 µg/kg	104		58	125		
Benzo(a)pyrene	50-32-8	25	µg/kg	<50	25 µg/kg	106		30	136		
Indeno(1,2,3-cd)pyrene	193-39-5	25	µg/kg	<50	25 µg/kg	66.9		54	127		
Dibenz(a,h)anthracene	53-70-3	25	µg/kg	<50	25 µg/kg	99.2		60	122		





Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	DCS	Recovery Limits (%)	Value	RPD (%)
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>										
Benzo(g,h,i)perylene	191-24-2	50	µg/kg	<50	25 µg/kg	102	-----	64	132	-----
Low M.W. PAHs	-----	550	µg/kg	<550	-----	-----	-----	-----	-----	-----
High M.W. PAHs	-----	1700	µg/kg	<1700	-----	-----	-----	-----	-----	-----
<b>Matrix: WATER</b>										
Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	DCS	Recovery Limits (%)	Value	RPD (%)
EP-390: Triorganotins (QC Lot: 2148235)	56573-85-4	5	ngSn/L	<5	5 ngSn/L	98.0	-----	81	117	-----
Tributyltin										

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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	MS	MSD	Recovery Limits (%)	RPD (%)		
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>										
HK1202238-001 Anonymous										
		EG020: Arsenic	7440-38-2	5 mg/kg	102	-----	75	125	-----	-----
		EG020: Cadmium	7440-43-9	5 mg/kg	102	-----	75	125	-----	-----
		EG020: Chromium	7440-47-3	5 mg/kg	106	-----	75	125	-----	-----
		EG020: Copper	7440-50-8	5 mg/kg	94.7	-----	75	125	-----	-----
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined	-----	75	125	-----	-----
		EG020: Mercury	7439-97-6	0.1 mg/kg	88.6	-----	75	125	-----	-----
		EG020: Nickel	7440-02-0	5 mg/kg	112	-----	75	125	-----	-----
		EG020: Silver	7440-22-4	5 mg/kg	82.9	-----	75	125	-----	-----
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	-----	75	125	-----	-----

**Surrogate Control Limits**

Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			
Decachlorobiphenyl	2051-24-3	50	130

### CERTIFICATE OF ANALYSIS

Client	: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Laboratory	: ALS Technichem HK Pty Ltd	Page	: 1 of 9
Contact	: IR POPHIL LAM	Contact	: Chan Kwok Fai, Godfrey	Work Order	: HK1201860
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Project	: AGREEMENT NO CE 43_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION	Quote number	: ----	Date Samples Received	: 18-JAN-2012
Order number	: GE/2009/16.41			Issue Date	: 15-FEB-2012
C-O-C number	: H014516			No. of samples received	: 1
Site	: GB10			No. of samples analysed	: 1

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Hong Kong Accreditation Service (HKAS) has accredited this laboratory (ALS Technichem (HK) Pty Ltd) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation.

#### Signatories

Anh Ngoc Huynh  
Tai Yuk Lun, Stephen  
Wong Wing, Kenneth



#### Position

Senior Chemist - Organics  
Senior Chemist - Organics  
Assistant Supervisor - Metals

#### Authorised results for

Organics  
Organics  
Inorganics

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.





Page Number : 2 of 9  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201860

### 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: 31-JAN-2012

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: **HK1201860**

The PCB cleanup method on sample(s), GB10 (HK1201860-001), is not accredited. Due to matrix interference on sample(s), GB10 (HK1201860-001), a non-accredited clean-up method was applied on those samples. The PCB analysis, including QA/QC requirements, in this certificate of analysis was performed as per the corresponding HOKLAS accredited method for sediment matrix.

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

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

Analysis of Tributyltin in interstitial water was cancelled due to insufficient volume of interstitial water.

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.



**Analytical Results**

Sub-Matrix: SEDIMENT

Compound	CAS Number	LOR	Unit	Client sample ID
EA/ED: Physical and Aggregate Properties				
EA055: Moisture Content (dried @ 103° C)	----	0.1	%	53.8
EG: Metals and Major Cations				
EG020: Arsenic	7440-38-2	1	mg/kg	9
EG020: Cadmium	7440-43-9	0.2	mg/kg	2.6
EG020: Chromium	7440-47-3	1	mg/kg	150
EG020: Copper	7440-50-8	1	mg/kg	1530
EG020: Lead	7439-92-1	1	mg/kg	183
EG020: Mercury	7439-97-6	0.05	mg/kg	1.85
EG020: Nickel	7440-02-0	1	mg/kg	61
EG020: Silver	7440-22-4	0.1	mg/kg	8.6
EG020: Zinc	7440-66-6	1	mg/kg	472
EP-065: PCB Single Congeners				
PCB 8	34883-43-7	3	µg/kg	<3
PCB 18	37680-65-2	3	µg/kg	<3
PCB 28	7012-37-5	3	µg/kg	8
PCB 44	41464-39-5	3	µg/kg	4
PCB 52	35693-99-3	3	µg/kg	8
PCB 66	32598-10-0	3	µg/kg	5
PCB 77	32598-13-3	3	µg/kg	<3
PCB 101	37680-73-2	3	µg/kg	19
PCB 105	32598-14-4	3	µg/kg	4
PCB 118	31508-00-6	3	µg/kg	13
PCB 126	57465-28-8	3	µg/kg	<3
PCB 128	38380-07-3	3	µg/kg	4
PCB 138	35065-28-2	3	µg/kg	25
PCB 153	35065-27-1	3	µg/kg	31
PCB 169	32774-16-6	3	µg/kg	<3
PCB 170	35065-30-6	3	µg/kg	9
PCB 180	35065-29-3	3	µg/kg	18
PCB 187	52663-68-0	3	µg/kg	7
Total Polychlorinated biphenyls	----	18	µg/kg	158
EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)				
Naphthalene	9120-3	50	µg/kg	13600
Acenaphthylene	208-96-8	50	µg/kg	42000
Acenaphthene	83-32-9	50	µg/kg	47200
Fluorene	86-73-7	50	µg/kg	7890
Phenanthrene	85-01-8	50	µg/kg	126000
Anthracene	120-12-7	50	µg/kg	68300
Fluoranthene	206-44-0	150	µg/kg	326000
Pyrene	129-00-0	150	µg/kg	465000
Benz(a)anthracene	56-55-3	150	µg/kg	168000





Sub-Matrix: SEDIMENT		Client sample ID	Client sampling date / time	GB10
Compound	CAS Number	LOR	Unit	HK1201860-001
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued</b>				
Chrysene	218-019	150	µg/kg	177000
Benzo(b)fluoranthene	205-99-2	150	µg/kg	178000
Benzo(k)fluoranthene	207-08-9	150	µg/kg	86600
Benzo(a)pyrene	50-32-8	150	µg/kg	204000
Indeno(1.2.3-cd)pyrene	193-39-5	150	µg/kg	95900
Dibenz(a,h)anthracene	53-70-3	150	µg/kg	15700
Benzo(g,h,i)perylene	19124-2	150	µg/kg	89500
Low M.W. PAHs	----	550	µg/kg	305000
High M.W. PAHs	----	1700	µg/kg	1810000
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>				
2-Fluorobiphenyl	32160-8	0.1	%	120
4-Terphenyl-d14	1718-51-0	0.1	%	83.6
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>				
Decachlorobiphenyl	205124-3	0.1	%	51.5

Surrogate control limits listed at end of this report.

Surrogate control limits listed at end of this report.



Page Number : 5 of 9  
 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201860

Sub-Matrix: INTERSTITIAL WATER

Compound	CAS Number	LOR	Client sample ID	
			Client sampling date / time	Unit
EP-390: Triorganotins	56573-85-4	0.015	GB10	18-JAN-2012 14:45
Tributyltin			HK1201860-001	
				0.693





**Laboratory Duplicate (DUP) Report**

Matrix: SOIL		Method: Compound		Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>EA/ED: Physical and Aggregate Properties (QC Lot: 2135028)</b>							
HK1201847-001	Anonymous	----	0.1	%	46.7	51.4	9.6
HK1201860-001	GB10	----	0.1	%	53.8	54.8	1.7
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>							
HK1201848-001	Anonymous	7439-97-6	0.05	mg/kg	1.26	1.27	1.0
		EG020: Mercury					
		7440-22-4	0.1	mg/kg	6.5	6.4	1.7
		EG020: Silver					
		7440-43-9	0.2	mg/kg	1.8	1.9	7.6
		EG020: Cadmium					
		7440-38-2	1	mg/kg	8	8	0.0
		EG020: Arsenic					
		7440-47-3	1	mg/kg	93	96	3.1
		EG020: Chromium					
		7440-50-8	1	mg/kg	706	702	0.5
		EG020: Copper					
		7439-92-1	1	mg/kg	121	123	1.4
		EG020: Lead					
		7440-02-0	1	mg/kg	39	45	14.3
		EG020: Nickel					
		7440-66-6	1	mg/kg	437	442	1.0
		EG020: Zinc					
HK1202238-002	Anonymous	7439-97-6	0.05	mg/kg	<0.05	<0.05	0.0
		EG020: Mercury					
		7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Cadmium					
		7440-38-2	1	mg/kg	3	3	0.0
		EG020: Arsenic					
		7440-47-3	1	mg/kg	3	3	0.0
		EG020: Chromium					
		7440-50-8	1	mg/kg	6	5	0.0
		EG020: Copper					
		7439-92-1	1	mg/kg	105	91	14.0
		EG020: Lead					
		7440-02-0	1	mg/kg	2	2	0.0
		EG020: Nickel					
		7440-66-6	1	mg/kg	57	50	13.2
		EG020: Zinc					
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>							
HK1201791-001	Anonymous	----	18	µg/kg	<18	<18	0.0
		Total Polychlorinated biphenyls					
		PCB 8	3	µg/kg	<3	<3	0.0
		PCB 18	3	µg/kg	<3	<3	0.0
		PCB 28	3	µg/kg	<3	<3	0.0
		PCB 44	3	µg/kg	<3	<3	0.0
		PCB 52	3	µg/kg	<3	<3	0.0
		PCB 66	3	µg/kg	<3	<3	0.0
		PCB 77	3	µg/kg	<3	<3	0.0
		PCB 101	3	µg/kg	<3	<3	0.0
		PCB 105	3	µg/kg	<3	<3	0.0
		PCB 118	3	µg/kg	<3	<3	0.0
		PCB 126	3	µg/kg	<3	<3	0.0
		PCB 128	3	µg/kg	<3	<3	0.0
		PCB 138	3	µg/kg	<3	<3	0.0
		PCB 153	3	µg/kg	<3	<3	0.0
		PCB 169	3	µg/kg	<3	<3	0.0
		PCB 170	3	µg/kg	<3	<3	0.0
		PCB 180	3	µg/kg	<3	<3	0.0
		PCB 187	3	µg/kg	<3	<3	0.0
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>							
HK1201791-001	Anonymous	206-44-0	150	µg/kg	<150	<150	0.0
		Fluoranthene					





Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>Matrix: SOIL</b>									
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>									
HK1201791-001		Anonymous	Pyrene	129-00-0	150	µg/kg	<150	<150	0.0
			Benzo(a)anthracene	56-55-3	150	µg/kg	<150	<150	0.0
			Chrysene	218-01-9	150	µg/kg	<150	<150	0.0
			Benzo(b)fluoranthene	205-99-2	150	µg/kg	<150	<150	0.0
			Benzo(k)fluoranthene	207-08-9	150	µg/kg	<150	<150	0.0
			Benzo(a)pyrene	50-32-8	150	µg/kg	<150	<150	0.0
			Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	<150	<150	0.0
			Dibenzo(a,h)anthracene	53-70-3	150	µg/kg	<150	<150	0.0
			Benzo(g,h,i)perylene	191-24-2	150	µg/kg	<150	<150	0.0
			High M.W. PAHs	-----	1700	µg/kg	<1700	<1700	0.0
			Naphthalene	91-20-3	50	µg/kg	<50	<50	0.0
			Acenaphthylene	208-96-8	50	µg/kg	<50	<50	0.0
			Acenaphthene	83-32-9	50	µg/kg	<50	<50	0.0
			Fluorene	86-73-7	50	µg/kg	<50	<50	0.0
			Phenanthrene	85-01-8	50	µg/kg	<50	<50	0.0
			Anthracene	120-12-7	50	µg/kg	<50	<50	0.0
			Low M.W. PAHs	-----	550	µg/kg	<550	<550	0.0
<b>Matrix: WATER</b>									
<b>EP-390: Triorganotin (QC Lot: 2148235)</b>									
HK1201860-001		GB10	Tributyltin	56573-85-4	6	ngSn/L	284	287	0.8

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>Matrix: SOIL</b>									
<b>Method Blank (MB), Laboratory Control Spike Duplicate (LCS) and Laboratory Control Spike Duplicate (DCS) Report</b>									
<b>Method Blank (MB) Report</b>									
CAS Number		LOR	Unit	Result					
7440-38-2		1	mg/kg	<1					
7440-43-9		0.2	mg/kg	<0.2					
7440-47-3		1	mg/kg	<1					
7440-50-8		1	mg/kg	<1					
7439-92-1		1	mg/kg	<1					
7439-97-6		0.05	mg/kg	<0.05					
7440-02-0		1	mg/kg	<1					
7440-22-4		0.1	mg/kg	<0.1					
7440-66-6		1	mg/kg	<1					

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Result <th colspan="4">Laboratory Control Spike Duplicate (DCS) Report</th>	Laboratory Control Spike Duplicate (DCS) Report					
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>													
CAS Number		LOR	Unit	Result	Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	Control Limit
7440-38-2		1	mg/kg	<1	5 mg/kg	94.3	77	109	77	109	-----	-----	-----
7440-43-9		0.2	mg/kg	<0.2	5 mg/kg	103	86	110	86	110	-----	-----	-----
7440-47-3		1	mg/kg	<1	5 mg/kg	105	88	120	88	120	-----	-----	-----
7440-50-8		1	mg/kg	<1	5 mg/kg	94.8	85	109	85	109	-----	-----	-----
7439-92-1		1	mg/kg	<1	5 mg/kg	94.5	84	106	84	106	-----	-----	-----
7439-97-6		0.05	mg/kg	<0.05	0.1 mg/kg	85.8	80	112	80	112	-----	-----	-----
7440-02-0		1	mg/kg	<1	5 mg/kg	98.4	87	111	87	111	-----	-----	-----
7440-22-4		0.1	mg/kg	<0.1	5 mg/kg	87.9	83	105	83	105	-----	-----	-----
7440-66-6		1	mg/kg	<1	5 mg/kg	100	82	126	82	126	-----	-----	-----

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Result <th colspan="4">Laboratory Control Spike Duplicate (DCS) Report</th>	Laboratory Control Spike Duplicate (DCS) Report					
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>													
CAS Number		LOR	Unit	Result	Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	Control Limit
34883-43-7		3	µg/kg	<3	5 µg/kg	55.4	22	121	22	121	-----	-----	-----
37680-65-2		3	µg/kg	<3	5 µg/kg	55.2	23	124	23	124	-----	-----	-----
7012-37-5		3	µg/kg	<3	5 µg/kg	63.3	26	124	26	124	-----	-----	-----
41464-39-5		3	µg/kg	<3	5 µg/kg	62.5	16	132	16	132	-----	-----	-----
35693-99-3		3	µg/kg	<3	5 µg/kg	64.4	18	133	18	133	-----	-----	-----
32598-10-0		3	µg/kg	<3	5 µg/kg	64.4	5	130	5	130	-----	-----	-----





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	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	Control Limit
<b>EP-065: PCB Single Congeners (QC Lot: 2133666) - Continued</b>													
PCB 77	32598-13-3	3	µg/kg	<3	5 µg/kg	58.1			16	137			
PCB 101	37680-73-2	3	µg/kg	<3	5 µg/kg	59.7			26	143			
PCB 105	32598-14-4	3	µg/kg	<3	5 µg/kg	60.1			19	132			
PCB 118	31508-00-6	3	µg/kg	<3	5 µg/kg	59.8			17	137			
PCB 126	57465-28-8	3	µg/kg	<3	5 µg/kg	62.7			29	107			
PCB 128	38380-07-3	3	µg/kg	<3	5 µg/kg	60.7			28	126			
PCB 138	35065-28-2	3	µg/kg	<3	5 µg/kg	60.4			21	136			
PCB 153	35065-27-1	3	µg/kg	<3	5 µg/kg	61.2			25	135			
PCB 169	32774-16-6	3	µg/kg	<3	5 µg/kg	65.0			17	129			
PCB 170	35065-30-6	3	µg/kg	<3	5 µg/kg	64.6			18	129			
PCB 180	35065-29-3	3	µg/kg	<3	5 µg/kg	64.1			21	124			
PCB 187	52663-68-0	3	µg/kg	<3	5 µg/kg	61.4			30	124			
Total Polychlorinated biphenyls		18	µg/kg	<18									
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>													
Naphthalene	91-20-3	25	µg/kg	<50	25 µg/kg	86.8			43	140			
Acenaphthylene	208-96-8	50	µg/kg	<50	25 µg/kg	97.6			7	159			
Acenaphthene	83-32-9	25	µg/kg	<50	25 µg/kg	90.3			44	139			
Fluorene	86-73-7	25	µg/kg	<50	25 µg/kg	94.4			36	147			
Phenanthrene	85-01-8	25	µg/kg	<50	25 µg/kg	94.3			53	126			
Anthracene	120-12-7	25	µg/kg	<50	25 µg/kg	95.2			12	159			
Fluoranthene	206-44-0	50	µg/kg	<50	25 µg/kg	95.0			40	144			
Pyrene	129-00-0	25	µg/kg	<50	25 µg/kg	96.2			38	148			
Benz(a)anthracene	56-55-3	25	µg/kg	<50	25 µg/kg	102			38	150			
Chrysene	218-01-9	50	µg/kg	<50	25 µg/kg	105			50	144			
Benzo(b)fluoranthene	205-99-2	25	µg/kg	<50	25 µg/kg	102			59	123			
Benzo(k)fluoranthene	207-08-9	25	µg/kg	<50	25 µg/kg	104			58	125			
Benzo(a)pyrene	50-32-8	25	µg/kg	<50	25 µg/kg	106			30	136			
Indeno(1,2,3-cd)pyrene	193-39-5	25	µg/kg	<50	25 µg/kg	66.9			54	127			
Dibenz(a,h)anthracene	53-70-3	25	µg/kg	<50	25 µg/kg	99.2			60	122			





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 (%)	Control Limit
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>							
Benzo(g,h,i)perylene	191-24-2	50	µg/kg	<50	25 µg/kg	102	132
Low M.W. PAHs	---	550	µg/kg	<550	---	64	---
High M.W. PAHs	---	1700	µg/kg	<1700	---	---	---
Matrix: WATER							
<b>EP-390: Triorganotins (QC Lot: 2148235)</b>							
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Recovery Limits (%)	
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	81	117
Matrix: SOIL							

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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report			
				Spike Concentration	Spike Recovery (%)	MSD	RPD (%)
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>							
HK1202238-001	Anonymous						
		EG020: Arsenic	7440-38-2	5 mg/kg	102	75	125
		EG020: Cadmium	7440-43-9	5 mg/kg	102	75	125
		EG020: Chromium	7440-47-3	5 mg/kg	106	75	125
		EG020: Copper	7440-50-8	5 mg/kg	94.7	75	125
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined	75	125
		EG020: Mercury	7439-97-6	0.1 mg/kg	88.6	75	125
		EG020: Nickel	7440-02-0	5 mg/kg	112	75	125
		EG020: Silver	7440-22-4	5 mg/kg	82.9	75	125
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	75	125

**Surrogate Control Limits**

Sub-Matrix: SEDIMENT	CAS Number	Low	High
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			
Decachlorobiphenyl	2051-24-3	50	130



# ALS Technichem (HK) Pty Ltd

**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES



## CERTIFICATE OF ANALYSIS

Client	: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Laboratory	: ALS Technichem HK Pty Ltd	Page	: 1 of 9
Contact	: IR POPHIL LAM	Contact	: Chan Kwok Fai, Godfrey	Work Order	: HK1201848
Address	: GEOTECHNICAL PROJECTS DIVISION, GEOTECHNICAL ENGINEERING OFFICE, 23/F., KWUN TONG VIEW, 410 KWUN TONG ROAD, KOWLOON, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
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Telephone	: +852 2716 8609	Telephone	: +852 2610 1044		
Facsimile	: ----	Facsimile	: +852 2610 2021		
Project	: AGREEMENT NO CE 43_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION	Quote number	: ----	Date Samples Received	: 18-JAN-2012
Order number	: GE/2009/16.41			Issue Date	: 15-FEB-2012
C-O-C number	: H014516			No. of samples received	: 1
Site	: GB11			No. of samples analysed	: 1

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Hong Kong Accreditation Service (HKAS) has accredited this laboratory (ALS Technichem (HK) Pty Ltd) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation.

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	Organics
Chan Siu Ming, Vico	Manager - Inorganics	Inorganics
Tai Yuk Lun, Stephen	Senior Chemist - Organics	Organics
Wong Wing, Kenneth	Assistant Supervisor - Metals	Inorganics



Page Number : 2 of 9  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201848

### 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:

31-JAN-2012

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: **HK1201848**

The PCB cleanup method on sample(s), GB11 (HK1201848-001), is not accredited. Due to matrix interference on sample(s), GB11 (HK1201848-001), a non-accredited clean-up method was applied on those samples. The PCB analysis, including QA/QC requirements, in this certificate of analysis was performed as per the corresponding HOKLAS accredited method for sediment matrix.

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.  
Sample(s) were received in a chilled condition.

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

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

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.





**Analytical Results**

Sub-Matrix: SEDIMENT

Compound	CAS Number		LOR		Client sampling date / time		Client sample ID
				Unit			
<b>EIA/ED: Physical and Aggregate Properties</b>							
EA055: Moisture Content (dried @ 103° C)	-----	0.1	%		18-JAN-2012 10:10	GB11	
						HK1201848-001	
<b>EG: Metals and Major Cations</b>							
EG020: Arsenic	7440-38-2	1	mg/kg			8	
EG020: Cadmium	7440-43-9	0.2	mg/kg			1.8	
EG020: Chromium	7440-47-3	1	mg/kg			93	
EG020: Copper	7440-50-8	1	mg/kg			706	
EG020: Lead	7439-92-1	1	mg/kg			121	
EG020: Mercury	7439-97-6	0.05	mg/kg			1.26	
EG020: Nickel	7440-02-0	1	mg/kg			39	
EG020: Silver	7440-22-4	0.1	mg/kg			6.5	
EG020: Zinc	7440-66-6	1	mg/kg			437	
<b>EP-065: PCB Single Congeners</b>							
PCB 8	34883-43-7	3	µg/kg			<3	
PCB 18	37680-65-2	3	µg/kg			<3	
PCB 28	7012-37-5	3	µg/kg			6	
PCB 44	41464-39-5	3	µg/kg			4	
PCB 52	35693-99-3	3	µg/kg			8	
PCB 66	32598-10-0	3	µg/kg			3	
PCB 77	32598-13-3	3	µg/kg			<3	
PCB 101	37680-73-2	3	µg/kg			16	
PCB 105	32598-14-4	3	µg/kg			3	
PCB 118	31508-00-6	3	µg/kg			10	
PCB 126	57465-28-8	3	µg/kg			<3	
PCB 128	38380-07-3	3	µg/kg			<3	
PCB 138	35065-28-2	3	µg/kg			19	
PCB 153	35065-27-1	3	µg/kg			25	
PCB 169	32774-16-6	3	µg/kg			<3	
PCB 170	35065-30-6	3	µg/kg			7	
PCB 180	35065-29-3	3	µg/kg			15	
PCB 187	52663-68-0	3	µg/kg			7	
Total Polychlorinated biphenyls	-----	18	µg/kg			128	
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)</b>							
Naphthalene	91-20-3	50	µg/kg			172000	
Acenaphthylene	208-96-8	50	µg/kg			39200	
Acenaphthene	83-32-9	50	µg/kg			226000	
Fluorene	86-73-7	50	µg/kg			69900	
Phenanthrene	85-018	50	µg/kg			478000	
Anthracene	120-12-7	50	µg/kg			138000	
Fluoranthene	206-44-0	150	µg/kg			477000	
Pyrene	129-00-0	150	µg/kg			580000	
Benz(a)anthracene	56-55-3	150	µg/kg			172000	



Compound	Client sample ID		Unit	LOR	CAS Number	Client sampling date / time	GB11 18-JAN-2012 10:10 HK1201848-001
	Sub-Matrix: SEDIMENT						
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued</b>							
Chrysene		150	µg/kg	218-019			162000
Benzo(b)fluoranthene		150	µg/kg	205-99-2			153000
Benzo(k)fluoranthene		150	µg/kg	207-08-9			57200
Benzo(a)pyrene		150	µg/kg	50-32-8			162000
Indeno(1.2.3.cd)pyrene		150	µg/kg	193-39-5			74900
Dibenz(a,h)anthracene		150	µg/kg	53-70-3			16400
Benzo(g,h,i)perylene		150	µg/kg	194-24-2			68400
Low M.W. PAHs		550	µg/kg	----			1120000
High M.W. PAHs		1700	µg/kg	----			1920000
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>							
2-Fluorobiphenyl		0.1	%	32460-8			114
4-Terphenyl-d14		0.1	%	1718-510			59.6
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>							
Decachlorobiphenyl		0.1	%	2051-24-3			57.9
Surrogate control limits listed at end of this report.							
Surrogate control limits listed at end of this report.							





Page Number : 5 of 9  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201848

Compound	CAS Number	Client sample ID		Unit	µg TBT /L
		LOR	Client sampling date / time		
EP-390: Triorganotins	56573-86-4	0.015	GB11 18-JAN-2012 10:10	HK1201848-001	<0.015
Tributyltin					



**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 (%)
<b>EA/ED: Physical and Aggregate Properties (QC Lot: 2135028)</b>								
HK1201847-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	46.7	51.4	9.6
HK1201860-001	Anonymous	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	53.8	54.8	1.7
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>								
HK1201848-001	GB11	EG020: Mercury	7439-97-6	0.05	mg/kg	1.26	1.27	1.0
		EG020: Silver	7440-22-4	0.1	mg/kg	6.5	6.4	1.7
		EG020: Cadmium	7440-43-9	0.2	mg/kg	1.8	1.9	7.6
		EG020: Arsenic	7440-38-2	1	mg/kg	8	8	0.0
		EG020: Chromium	7440-47-3	1	mg/kg	93	96	3.1
		EG020: Copper	7440-50-8	1	mg/kg	706	702	0.5
		EG020: Lead	7439-92-1	1	mg/kg	121	123	1.4
		EG020: Nickel	7440-02-0	1	mg/kg	39	45	14.3
		EG020: Zinc	7440-66-6	1	mg/kg	437	442	1.0
HK1202238-002	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: Arsenic	7440-38-2	1	mg/kg	3	3	0.0
		EG020: Chromium	7440-47-3	1	mg/kg	3	3	0.0
		EG020: Copper	7440-50-8	1	mg/kg	6	5	0.0
		EG020: Lead	7439-92-1	1	mg/kg	105	91	14.0
		EG020: Nickel	7440-02-0	1	mg/kg	2	2	0.0
		EG020: Zinc	7440-66-6	1	mg/kg	57	50	13.2
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>								
HK1201791-001	Anonymous	Total Polychlorinated biphenyls	----	18	µg/kg	<18	<18	0.0
		PCB 8	34883-47-7	3	µg/kg	<3	<3	0.0
		PCB 18	37680-65-2	3	µg/kg	<3	<3	0.0
		PCB 28	7012-37-5	3	µg/kg	<3	<3	0.0
		PCB 44	41464-39-5	3	µg/kg	<3	<3	0.0
		PCB 52	35693-99-3	3	µg/kg	<3	<3	0.0
		PCB 66	32598-10-0	3	µg/kg	<3	<3	0.0
		PCB 77	32598-13-3	3	µg/kg	<3	<3	0.0
		PCB 101	37680-73-2	3	µg/kg	<3	<3	0.0
		PCB 105	32598-14-4	3	µg/kg	<3	<3	0.0
		PCB 118	31508-00-6	3	µg/kg	<3	<3	0.0
		PCB 126	57465-28-8	3	µg/kg	<3	<3	0.0
		PCB 128	38380-07-3	3	µg/kg	<3	<3	0.0
		PCB 138	35065-28-2	3	µg/kg	<3	<3	0.0
		PCB 153	35065-27-1	3	µg/kg	<3	<3	0.0
		PCB 169	32774-16-6	3	µg/kg	<3	<3	0.0
		PCB 170	35065-30-6	3	µg/kg	<3	<3	0.0
		PCB 180	35065-29-3	3	µg/kg	<3	<3	0.0
		PCB 187	52663-68-0	3	µg/kg	<3	<3	0.0
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>								
HK1201791-001	Anonymous	Fluoranthene	206-44-0	150	µg/kg	<150	<150	0.0





Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
						Original Result	Duplicate Result	
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>								
HK1201791-001	Anonymous	Pyrene	129-00-0	150	µg/kg	<150	<150	0.0
		Benz(a)anthracene	56-55-3	150	µg/kg	<150	<150	0.0
		Chrysene	218-01-9	150	µg/kg	<150	<150	0.0
		Benzo(b)fluoranthene	205-99-2	150	µg/kg	<150	<150	0.0
		Benzo(k)fluoranthene	207-08-9	150	µg/kg	<150	<150	0.0
		Benzo(a)pyrene	50-32-8	150	µg/kg	<150	<150	0.0
		Indeno(1,2,3-cd)pyrene	193-39-5	150	µg/kg	<150	<150	0.0
		Dibenz(a,h)anthracene	53-70-3	150	µg/kg	<150	<150	0.0
		Benzo(g,h,i)perylene	191-24-2	150	µg/kg	<150	<150	0.0
		High M.W. PAHs	-----	1700	µg/kg	<1700	<1700	0.0
		Naphthalene	91-20-3	50	µg/kg	<50	<50	0.0
		Acenaphthylene	208-96-8	50	µg/kg	<50	<50	0.0
		Acenaphthene	83-32-9	50	µg/kg	<50	<50	0.0
		Fluorene	86-73-7	50	µg/kg	<50	<50	0.0
		Phenanthrene	85-01-8	50	µg/kg	<50	<50	0.0
		Anthracene	120-12-7	50	µg/kg	<50	<50	0.0
		Low M.W. PAHs	-----	550	µg/kg	<550	<550	0.0

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
						Original Result	Duplicate Result	
<b>EP-390: Triorganotins (QC Lot: 2148235)</b>								
HK1201860-001	Anonymous	Tributyltin	56573-85-4	6	ngSn/L	284	287	0.8

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

Method: Compound	CAS Number	LOR	Unit	Result	Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
					Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Value
<b>Method Blank (MB) Report</b>										
EG020: Arsenic	7440-38-2	1	mg/kg	<1	5 mg/kg	94.3	77	109	-----	-----
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	103	86	110	-----	-----
EG020: Chromium	7440-47-3	1	mg/kg	<1	5 mg/kg	105	88	120	-----	-----
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	94.8	85	109	-----	-----
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	94.5	84	106	-----	-----
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	85.8	80	112	-----	-----
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	98.4	87	111	-----	-----
EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	5 mg/kg	87.9	83	105	-----	-----
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	100	82	126	-----	-----
<b>EP-065: PCB Single Congeners (QC Lot: 2133666)</b>										
PCB 8	34883-43-7	3	µg/kg	<3	5 µg/kg	55.4	22	121	-----	-----
PCB 18	37680-65-2	3	µg/kg	<3	5 µg/kg	55.2	23	124	-----	-----
PCB 28	7012-37-5	3	µg/kg	<3	5 µg/kg	63.3	26	124	-----	-----
PCB 44	41464-39-5	3	µg/kg	<3	5 µg/kg	62.5	16	132	-----	-----
PCB 52	35693-99-3	3	µg/kg	<3	5 µg/kg	64.4	18	133	-----	-----
PCB 66	32598-10-0	3	µg/kg	<3	5 µg/kg	64.4	5	130	-----	-----





Method Blank (MB) Report		Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report								
Matrix	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	DCS	Recovery Limits (%)	Value	RPD (%)
Method: Compound								Low	High	Control Limit
<b>EP-065: PCB Single Congeners (QC Lot: 2133666) - Continued</b>										
PCB 77	32598-13-3	3	µg/kg	<3	5 µg/kg	58.1		16	137	
PCB 101	37680-73-2	3	µg/kg	<3	5 µg/kg	59.7		26	143	
PCB 105	32598-14-4	3	µg/kg	<3	5 µg/kg	60.1		19	132	
PCB 118	31508-00-6	3	µg/kg	<3	5 µg/kg	59.8		17	137	
PCB 126	57465-28-8	3	µg/kg	<3	5 µg/kg	62.7		29	107	
PCB 128	38380-07-3	3	µg/kg	<3	5 µg/kg	60.7		28	126	
PCB 138	35065-28-2	3	µg/kg	<3	5 µg/kg	60.4		21	136	
PCB 153	35065-27-1	3	µg/kg	<3	5 µg/kg	61.2		25	135	
PCB 169	32774-16-6	3	µg/kg	<3	5 µg/kg	65.0		17	129	
PCB 170	35065-30-6	3	µg/kg	<3	5 µg/kg	64.6		18	129	
PCB 180	35065-29-3	3	µg/kg	<3	5 µg/kg	64.1		21	124	
PCB 187	52663-68-0	3	µg/kg	<3	5 µg/kg	61.4		30	124	
Total Polychlorinated biphenyls		18	µg/kg	<18						
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500)</b>										
Naphthalene	91-20-3	25	µg/kg	<50	25 µg/kg	86.8		43	140	
Acenaphthylene	208-96-8	50	µg/kg	<50	25 µg/kg	97.6		7	159	
Acenaphthene	83-32-9	25	µg/kg	<50	25 µg/kg	90.3		44	139	
Fluorene	86-73-7	25	µg/kg	<50	25 µg/kg	94.4		36	147	
Phenanthrene	85-01-8	25	µg/kg	<50	25 µg/kg	94.3		53	126	
Anthracene	120-12-7	25	µg/kg	<50	25 µg/kg	95.2		12	159	
Fluoranthene	206-44-0	50	µg/kg	<50	25 µg/kg	95.0		40	144	
Pyrene	129-00-0	25	µg/kg	<50	25 µg/kg	96.2		38	148	
Benz(a)anthracene	56-55-3	25	µg/kg	<50	25 µg/kg	102		38	150	
Chrysene	218-01-9	50	µg/kg	<50	25 µg/kg	105		50	144	
Benzo(b)fluoranthene	205-99-2	25	µg/kg	<50	25 µg/kg	102		59	123	
Benzo(k)fluoranthene	207-08-9	25	µg/kg	<50	25 µg/kg	104		58	125	
Benzo(a)pyrene	50-32-8	25	µg/kg	<50	25 µg/kg	106		30	136	
Indeno(1,2,3-cd)pyrene	193-39-5	25	µg/kg	<50	25 µg/kg	66.9		54	127	
Dibenz(a,h)anthracene	53-70-3	25	µg/kg	<50	25 µg/kg	99.2		60	122	





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 (%)	Value	Control Limit
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133500) - Continued</b>									
Benzo(g,h,i)perylene	191-24-2	50	µg/kg	<50	25 µg/kg	102	64	132	
Low M.W. PAHs	-----	550	µg/kg	<550	-----	-----	-----	-----	-----
High M.W. PAHs	-----	1700	µg/kg	<1700	-----	-----	-----	-----	-----
Matrix: WATER									
Method Blank (MB) Report									
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	Value	Control Limit
EP-390: Triorganotins (QC Lot: 2148235)	56573-85-4	5	ngSn/L	<5	5 ngSn/L	98.0	81	117	-----
Tributyltin									

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

Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report				
				Spike Concentration	Spike Recovery (%)	MSD	RPD (%)	
<b>EG: Metals and Major Cations (QC Lot: 2142348)</b>								
HK1202238-001/Anonymous		EG020: Arsenic	7440-38-2	5 mg/kg	102	75	125	-----
		EG020: Cadmium	7440-43-9	5 mg/kg	102	75	125	-----
		EG020: Chromium	7440-47-3	5 mg/kg	106	75	125	-----
		EG020: Copper	7440-50-8	5 mg/kg	94.7	75	125	-----
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined	75	125	-----
		EG020: Mercury	7439-97-6	0.1 mg/kg	88.6	75	125	-----
		EG020: Nickel	7440-02-0	5 mg/kg	112	75	125	-----
		EG020: Silver	7440-22-4	5 mg/kg	82.9	75	125	-----
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	75	125	-----

**Surrogate Control Limits**

Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP-076S: Polycyclic Aromatic Hydrocarbons (PAHs) Surrogates</b>			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			
Decachlorobiphenyl	2051-24-3	50	130

### CERTIFICATE OF ANALYSIS

Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
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Project : AGREEMENT NO CE 43\_2010 (HY) CENTRAL  
KOWLOON ROUTE - DESIGN AND  
CONSTRUCTION  
Order number : GE/2009/16.41  
C-O-C number : H014519  
Site : ----

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Quote number : ----

Page : 1 of 9  
Work Order : HK1202616

Date Samples Received : 21-JAN-2012  
Issue Date : 16-FEB-2012  
No. of samples received : 1  
No. of samples analysed : 1

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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	Organics
Tai Yuk Lun, Stephen	Senior Chemist - Organics	Organics
Wong Wing, Kenneth	Assistant Supervisor - Metals	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 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: 31-JAN-2012

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: **HK1202616**

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

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

Total PCBs results (Method: EP065) are not HOKLAS accredited. The values are calculated from summation of the 18 PCB congeners, based on Limit of Detection (LOD) of 1 µg/kg.



**Analytical Results**

Sub-Matrix: SEDIMENT

Compound	CAS Number	Client sample ID		Unit	REFERENCE SAMPLE
		LOR	Client sampling date / time		
<b>EA/ED: Physical and Aggregate Properties</b>					
EA055: Moisture Content (dried @ 103° C)	----	0.1	%	46.7	
<b>EG: Metals and Major Cations</b>					
EG020: Arsenic	7440-38-2	1	mg/kg	7	
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	
EG020: Chromium	7440-47-3	1	mg/kg	36	
EG020: Copper	7440-50-8	1	mg/kg	16	
EG020: Lead	7439-92-1	1	mg/kg	31	
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	
EG020: Nickel	7440-02-0	1	mg/kg	24	
EG020: Silver	7440-22-4	0.1	mg/kg	0.1	
EG020: Zinc	7440-66-6	1	mg/kg	96	
<b>EP-065: PCB Single Congeners</b>					
PCB 8	34863-43-7	3	µg/kg	<3	
PCB 18	37680-65-2	3	µg/kg	<3	
PCB 28	7012-37-5	3	µg/kg	<3	
PCB 44	41464-39-5	3	µg/kg	<3	
PCB 52	35693-99-3	3	µg/kg	<3	
PCB 66	32598-10-0	3	µg/kg	<3	
PCB 77	32596-13-3	3	µg/kg	<3	
PCB 101	37680-73-2	3	µg/kg	<3	
PCB 105	32596-14-4	3	µg/kg	<3	
PCB 118	31508-00-6	3	µg/kg	<3	
PCB 126	57465-28-8	3	µg/kg	<3	
PCB 128	38380-07-3	3	µg/kg	<3	
PCB 138	35065-28-2	3	µg/kg	<3	
PCB 153	35065-27-1	3	µg/kg	<3	
PCB 169	32774-16-6	3	µg/kg	<3	
PCB 170	35065-30-6	3	µg/kg	<3	
PCB 180	35065-29-3	3	µg/kg	<3	
PCB 187	52663-68-0	3	µg/kg	<3	
Total Polychlorinated biphenyls	----	18	µg/kg	<18	
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs)</b>					
Naphthalene	9120-3	50	µg/kg	<50	
Acenaphthylene	208-96-8	50	µg/kg	<50	
Acenaphthene	83-32-9	50	µg/kg	<50	
Fluorene	86-73-7	50	µg/kg	<50	
Phenanthrene	85-01-8	50	µg/kg	<50	
Anthracene	120-12-7	50	µg/kg	<50	
Fluoranthene	206-44-0	150	µg/kg	<150	
Pyrene	129-00-0	150	µg/kg	<150	
Benz(a)anthracene	56-55-3	150	µg/kg	<150	





Sub-Matrix: SEDIMENT

Compound	Client sample ID		Unit	REFERENCE SAMPLE
	CAS Number	LOR		
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) - Continued</b>				
Chrysene	218-019	150	µg/kg	<150
Benzo(b)fluoranthene	205-99-2	150	µg/kg	<150
Benzo(k)fluoranthene	207-08-9	150	µg/kg	<150
Benzo(a)pyrene	50-32-8	150	µg/kg	<150
Indeno(1.2.3.cd)pyrene	183-39-5	150	µg/kg	<150
Dibenz(a,h)anthracene	53-70-3	150	µg/kg	<150
Benzo(g,h,i)perylene	19124-2	150	µg/kg	<150
Low M.W. PAHs	----	550	µg/kg	<550
High M.W. PAHs	----	1700	µg/kg	<1700
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>				
2-Fluorobiphenyl	32160-8	0.1	%	80.6
4-Terphenyl-d14	1718-510	0.1	%	70.4
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>				
Decachlorobiphenyl	205124-3	0.1	%	77.0
Surrogate control limits listed at end of this report.				
Surrogate control limits listed at end of this report.				



Page Number : 5 of 9  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1202616

Sub-Matrix: INTERSTITIAL WATER		Client sample ID	REFERENCE SAMPLE
Compound	CAS Number	Client sampling date / time	
EP-390: Triorganotins		21-JAN-2012 11:30	
Tributyltin	56573-85-4	LOR	Unit
		0.015	HK1202616-001
		µg TBT /L	<0.015





**Laboratory Duplicate (DUP) Report**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
						Original Result	Duplicate Result	
<b>EAIED: Physical and Aggregate Properties (QC Lot: 2148048)</b>								
HK1202616-001	REFERENCE SAMPLE	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	46.7	46.5	0.4
<b>EG: Metals and Major Cations (QC Lot: 2146541)</b>								
HK1202355-001	Anonymous	EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	<0.05	0.0
		EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0
		EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Arsenic	7440-38-2	1	mg/kg	1	1	0.0
		EG020: Chromium	7440-47-3	1	mg/kg	2	2	0.0
		EG020: Copper	7440-50-8	1	mg/kg	4	4	0.0
		EG020: Lead	7439-92-1	1	mg/kg	56	50	13.1
		EG020: Nickel	7440-02-0	1	mg/kg	<1	<1	0.0
		EG020: Zinc	7440-66-6	1	mg/kg	47	44	5.6
HK1202362-002	Anonymous	EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	<0.05	0.0
		EG020: Silver	7440-22-4	0.1	mg/kg	0.1	<0.1	0.0
		EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	<0.2	0.0
		EG020: Arsenic	7440-38-2	1	mg/kg	2	2	0.0
		EG020: Chromium	7440-47-3	1	mg/kg	4	3	0.0
		EG020: Copper	7440-50-8	1	mg/kg	10	9	0.0
		EG020: Lead	7439-92-1	1	mg/kg	238	242	2.0
		EG020: Nickel	7440-02-0	1	mg/kg	2	2	0.0
		EG020: Zinc	7440-66-6	1	mg/kg	36	38	4.1
<b>EP-065: PCB Single Congeners (QC Lot: 2149855)</b>								
HK1202616-001	REFERENCE SAMPLE	Total Polychlorinated biphenyls	----	18	µg/kg	<18	<18	0.0
		PCB 8	34883-43-7	3	µg/kg	<3	<3	0.0
		PCB 18	37680-65-2	3	µg/kg	<3	<3	0.0
		PCB 28	7012-37-5	3	µg/kg	<3	<3	0.0
		PCB 44	41464-39-5	3	µg/kg	<3	<3	0.0
		PCB 52	35693-99-3	3	µg/kg	<3	<3	0.0
		PCB 66	32598-10-0	3	µg/kg	<3	<3	0.0
		PCB 77	32598-13-3	3	µg/kg	<3	<3	0.0
		PCB 101	37680-73-2	3	µg/kg	<3	<3	0.0
		PCB 105	32598-14-4	3	µg/kg	<3	<3	0.0
		PCB 118	31508-00-6	3	µg/kg	<3	<3	0.0
		PCB 126	57465-28-8	3	µg/kg	<3	<3	0.0
		PCB 128	38380-07-3	3	µg/kg	<3	<3	0.0
		PCB 138	35065-28-2	3	µg/kg	<3	<3	0.0
		PCB 153	35065-27-1	3	µg/kg	<3	<3	0.0
		PCB 169	32774-16-6	3	µg/kg	<3	<3	0.0
		PCB 170	35065-30-6	3	µg/kg	<3	<3	0.0
		PCB 180	35065-29-3	3	µg/kg	<3	<3	0.0
		PCB 187	52663-68-0	3	µg/kg	<3	<3	0.0
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2144707)</b>								
HK1202594-001	Anonymous	High M.W. PAHs	----	1700	µg/kg	<1700	<1700	0.0





Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
						Original Result	Duplicate Result	
<b>Matrix: SOIL</b>								
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2144707) - Continued</b>								
HK1202594-001		Naphthalene	91-20-3	500	µg/kg	<500	<500	0.0
	Anonymous	Acenaphthylene	209-96-8	500	µg/kg	<500	<500	0.0
		Acenaphthene	83-32-9	500	µg/kg	<500	<500	0.0
		Fluorene	86-73-7	500	µg/kg	<500	<500	0.0
		Phenanthrene	85-01-8	500	µg/kg	<500	<500	0.0
		Anthracene	120-12-7	500	µg/kg	<500	<500	0.0
		Fluoranthene	206-44-0	500	µg/kg	<500	<500	0.0
		Pyrene	129-00-0	500	µg/kg	<500	<500	0.0
		Benz(a)anthracene	56-55-3	500	µg/kg	<500	<500	0.0
		Chrysene	218-01-9	500	µg/kg	<500	<500	0.0
		Benzo(b)fluoranthene	205-99-2	500	µg/kg	<500	<500	0.0
		Benzo(k)fluoranthene	207-08-9	500	µg/kg	<500	<500	0.0
		Benzo(a)pyrene	50-32-8	500	µg/kg	<500	<500	0.0
		Indeno(1,2,3-cd)pyrene	193-39-5	500	µg/kg	<500	<500	0.0
		Dibenz(a,h)anthracene	53-70-3	500	µg/kg	<500	<500	0.0
		Benzo(g,h,i)perylene	191-24-2	500	µg/kg	<500	<500	0.0
		Low M.W. PAHs	----	550	µg/kg	<550	<550	0.0

<b>Matrix: WATER</b>								
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EP-390: Triorganotins (QC Lot: 2162163)								
HK1202616-001	REFERENCE SAMPLE	Tributyltin	56573-85-4	6	ngSn/L	<6	<6	0.0

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

Method: Compound	CAS Number	LOR	Unit	Result	Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
					Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Value
<b>Method Blank (MB) Report</b>										
EG: Metals and Major Cations (QC Lot: 2146541)										
EG020: Arsenic	7440-38-2	1	mg/kg	<1	5 mg/kg	90.2	77	109	-----	-----
EG020: Cadmium	7440-43-9	0.2	mg/kg	<0.2	5 mg/kg	88.5	86	110	-----	-----
EG020: Chromium	7440-47-3	1	mg/kg	<1	5 mg/kg	95.2	88	120	-----	-----
EG020: Copper	7440-50-8	1	mg/kg	<1	5 mg/kg	93.2	85	109	-----	-----
EG020: Lead	7439-92-1	1	mg/kg	<1	5 mg/kg	92.2	84	106	-----	-----
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.1 mg/kg	101	80	112	-----	-----
EG020: Nickel	7440-02-0	1	mg/kg	<1	5 mg/kg	91.2	87	111	-----	-----
EG020: Silver	7440-22-4	0.1	mg/kg	<0.1	5 mg/kg	89.5	83	105	-----	-----
EG020: Zinc	7440-66-6	1	mg/kg	<1	5 mg/kg	93.6	82	126	-----	-----
<b>EP-065: PCB Single Congeners (QC Lot: 2149855)</b>										
PCB 8	34883-43-7	3	µg/kg	<3	5 µg/kg	90.3	22	121	-----	-----
PCB 18	37680-65-2	3	µg/kg	<3	5 µg/kg	76.6	23	124	-----	-----
PCB 28	7012-37-5	3	µg/kg	<3	5 µg/kg	79.0	26	124	-----	-----
PCB 44	41464-39-5	3	µg/kg	<3	5 µg/kg	73.1	16	132	-----	-----
PCB 52	35693-99-3	3	µg/kg	<3	5 µg/kg	74.4	18	133	-----	-----
PCB 66	32598-10-0	3	µg/kg	<3	5 µg/kg	66.5	5	130	-----	-----





Method: Compound		Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report								
		CAS Number	LOR	Unit	Result	Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)
<b>EP-065: PCB Single Congeners (QC Lot: 2149855) - Continued</b>														
PCB 77	32598-13-3	3	µg/kg	<3	5 µg/kg	83.5	-----	-----	-----	16	137	-----	-----	-----
PCB 101	37680-73-2	3	µg/kg	<3	5 µg/kg	88.2	-----	-----	-----	26	143	-----	-----	-----
PCB 105	32598-14-4	3	µg/kg	<3	5 µg/kg	84.6	-----	-----	-----	19	132	-----	-----	-----
PCB 118	31508-00-6	3	µg/kg	<3	5 µg/kg	84.3	-----	-----	-----	17	137	-----	-----	-----
PCB 126	57465-28-8	3	µg/kg	<3	5 µg/kg	85.4	-----	-----	-----	29	107	-----	-----	-----
PCB 128	38380-07-3	3	µg/kg	<3	5 µg/kg	84.5	-----	-----	-----	28	126	-----	-----	-----
PCB 138	35065-28-2	3	µg/kg	<3	5 µg/kg	83.7	-----	-----	-----	21	136	-----	-----	-----
PCB 153	35065-27-1	3	µg/kg	<3	5 µg/kg	85.2	-----	-----	-----	25	135	-----	-----	-----
PCB 169	32774-16-6	3	µg/kg	<3	5 µg/kg	83.2	-----	-----	-----	17	129	-----	-----	-----
PCB 170	35065-30-6	3	µg/kg	<3	5 µg/kg	84.6	-----	-----	-----	18	129	-----	-----	-----
PCB 180	35065-29-3	3	µg/kg	<3	5 µg/kg	85.9	-----	-----	-----	21	124	-----	-----	-----
PCB 187	52663-68-0	3	µg/kg	<3	5 µg/kg	84.5	-----	-----	-----	30	124	-----	-----	-----
Total Polychlorinated biphenyls	-----	18	µg/kg	<18	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2144707)</b>														
Naphthalene	91-20-3	50	µg/kg	<50	25 µg/kg	94.1	-----	-----	-----	43	140	-----	-----	-----
Acenaphthylene	208-96-8	25	µg/kg	-----	25 µg/kg	73.6	-----	-----	-----	7	159	-----	-----	-----
Acenaphthene	83-32-9	25	µg/kg	<50	25 µg/kg	102	-----	-----	-----	44	139	-----	-----	-----
Fluorene	86-73-7	25	µg/kg	<50	25 µg/kg	102	-----	-----	-----	36	147	-----	-----	-----
Phenanthrene	85-01-8	50	µg/kg	<50	25 µg/kg	110	-----	-----	-----	53	126	-----	-----	-----
Anthracene	120-12-7	50	µg/kg	<50	25 µg/kg	97.9	-----	-----	-----	12	159	-----	-----	-----
Fluoranthene	206-44-0	50	µg/kg	<50	25 µg/kg	105	-----	-----	-----	40	144	-----	-----	-----
Pyrene	129-00-0	50	µg/kg	<50	25 µg/kg	104	-----	-----	-----	38	148	-----	-----	-----
Benz(a)anthracene	56-55-3	25	µg/kg	<50	25 µg/kg	108	-----	-----	-----	38	150	-----	-----	-----
Chrysene	218-01-9	50	µg/kg	<50	25 µg/kg	119	-----	-----	-----	50	144	-----	-----	-----
Benzo(b)fluoranthene	205-99-2	25	µg/kg	-----	25 µg/kg	103	-----	-----	-----	59	123	-----	-----	-----
Benzo(k)fluoranthene	207-08-9	25	µg/kg	<50	25 µg/kg	109	-----	-----	-----	58	125	-----	-----	-----
Benzo(a)pyrene	50-32-8	25	µg/kg	<50	25 µg/kg	97.2	-----	-----	-----	30	136	-----	-----	-----
Indeno(1,2,3-cd)pyrene	193-39-5	50	µg/kg	<50	25 µg/kg	99.6	-----	-----	-----	54	127	-----	-----	-----
Dibenz(a,h)anthracene	53-70-3	50	µg/kg	<50	25 µg/kg	106	-----	-----	-----	60	122	-----	-----	-----





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 (%)	Value	Control Limit
<b>EP-076A: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2144707) - Continued</b>									
Benzo(g,h,i)perylene	191-24-2	25	µg/kg	<50	25 µg/kg	112	64	132	
Low M.W. PAHs		550	µg/kg	<550					
High M.W. PAHs		1700	µg/kg	<1700					
<b>Matrix: WATER</b>									
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 (%)	Value	Control Limit
EP-390: Triorganotins (QC Lot: 2162163)	56573-85-4	5	ngSn/L	<5	5 ngSn/L	99.6	81	117	
Tributyltin									

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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	RPD (%)		
<b>EG: Metals and Major Cations (QC Lot: 2146541)</b>									
HK1202059-001	Anonymous								
		EG020: Arsenic	7440-38-2	5 mg/kg	90.9	75	125		
		EG020: Cadmium	7440-43-9	5 mg/kg	100	75	125		
		EG020: Chromium	7440-47-3	5 mg/kg	93.1	75	125		
		EG020: Copper	7440-50-8	5 mg/kg	90.0	75	125		
		EG020: Lead	7439-92-1	5 mg/kg	80.3	75	125		
		EG020: Mercury	7439-97-6	0.1 mg/kg	90.6	75	125		
		EG020: Nickel	7440-02-0	5 mg/kg	84.9	75	125		
		EG020: Silver	7440-22-4	5 mg/kg	89.6	75	125		
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	75	125		

**Surrogate Control Limits**

Compound	CAS Number	Recovery Limits (%)	
		Low	High
<b>Sub-Matrix: SEDIMENT</b>			
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			
Decachlorobiphenyl	2051-24-3	50	130



# ALS Technichem (HK) Pty Ltd

**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES



## CERTIFICATE OF ANALYSIS

Client	: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Laboratory	: ALS Technichem HK Pty Ltd	Page	: 1 of 9
Contact	: IR POPHIL LAM	Contact	: Chan Kwok Fai, Godfrey	Work Order	: HK1202619
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Facsimile	: ----	Facsimile	: +852 2610 2021		
Project	: AGREEMENT NO CE 43_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION	Quote number	: ----	Date Samples Received	: 21-JAN-2012
Order number	: GE/2009/16.41	Issue Date	: 15-FEB-2012	No. of samples received	: 1
C-O-C number	: H014519	No. of samples analysed	: 1		
Site	: ----				

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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

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Authorised results for

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Page Number : 2 of 9  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1202619

### 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: 08-FEB-2012

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: **HK1202619**

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

Sample(s) were filtered prior to dissolved metal analysis.





**Analytical Results**

Sub-Matrix: INTERSTITIAL WATER

Compound	CAS Number	Client sample ID		REFERENCE SAMPLE
		LOR	Unit	
<b>ED/EK: Inorganic Nonmetallic Parameters</b>				
EK055K: Ammonia as N	7664-417	0.01	mg/L	3.54
EK057A: Nitrite as N	----	0.01	mg/L	0.02
EK058A: Nitrate as N	14797-55-8	0.01	mg/L	0.02
EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	4.9
EK067A: Total Phosphorus as P	----	0.1	mg/L	0.5
EK071K: Reactive Phosphorus as P	----	10	µg/L	480
<b>EG: Metals and Major Cations - Filtered</b>				
EG020: Arsenic	7440-38-2	10	µg/L	<10
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2
EG020: Chromium	7440-47-3	1	µg/L	<1
EG020: Copper	7440-50-8	1	µg/L	<1
EG020: Lead	7439-92-1	1	µg/L	<1
EG020: Mercury	7439-97-6	0.1	µg/L	<0.1
EG020: Nickel	7440-02-0	1	µg/L	1
EG020: Silver	7440-22-4	1	µg/L	<1
EG020: Zinc	7440-66-6	10	µg/L	<10
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs)</b>				
Naphthalene	91-20-3	0.2	µg/L	<0.2
Acenaphthylene	208-96-8	0.2	µg/L	<0.2
Acenaphthene	83-32-9	0.2	µg/L	<0.2
Fluorene	86-73-7	0.2	µg/L	<0.2
Phenanthrene	85-01-8	0.2	µg/L	<0.2
Anthracene	120-12-7	0.2	µg/L	<0.2
Fluoranthene	206-44-0	0.2	µg/L	<0.2
Pyrene	129-00-0	0.2	µg/L	<0.2
Benz(a)anthracene	56-55-3	0.2	µg/L	<0.2
Chrysene	218-01-9	0.2	µg/L	<0.2
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	<0.2
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	<0.2
Benzo(a)pyrene	50-32-8	0.2	µg/L	<0.2
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	<0.2
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2
Low M.W. PAHs	----	2.2	µg/L	<2.2
High M.W. PAHs	----	6.8	µg/L	<6.8
<b>EP-065A: PCB Single Congeners</b>				
PCB 8	34883-43-7	0.01	µg/L	<0.01
PCB 18	37680-65-2	0.01	µg/L	<0.01
PCB 28	7012-37-5	0.01	µg/L	<0.01
PCB 44	41464-39-5	0.01	µg/L	<0.01
PCB 52	35693-99-3	0.01	µg/L	<0.01
PCB 66	32598-10-0	0.01	µg/L	<0.01





Sub-Matrix: INTERSTITIAL WATER		Client sample ID		REFERENCE SAMPLE
Compound	CAS Number	LOR	Unit	Client sampling date / time
<b>EP-065A: PCB Single Congeners - Continued</b>				
PCB 77	32598-13-3	0.01	µg/L	<0.01
PCB 101	37680-73-2	0.01	µg/L	<0.01
PCB 105	32598-14-4	0.01	µg/L	<0.01
PCB 118	31508-00-6	0.01	µg/L	<0.01
PCB 126	57465-28-8	0.01	µg/L	<0.01
PCB 128	38380-07-3	0.01	µg/L	<0.01
PCB 138	35065-28-2	0.01	µg/L	<0.01
PCB 153	35065-27-1	0.01	µg/L	<0.01
PCB 169	32774-16-6	0.01	µg/L	<0.01
PCB 170	35065-30-6	0.01	µg/L	<0.01
PCB 180	35065-29-3	0.01	µg/L	<0.01
PCB 187	52663-68-0	0.01	µg/L	<0.01
Total Polychlorinated biphenyls	----	0.18	µg/L	<0.18
<b>EP-067A: Organochlorine Pesticides (OC)</b>				
Aldrin	309-00-2	0.10	µg/L	<0.10
alpha-BHC	319-84-6	0.10	µg/L	<0.10
beta-BHC	319-85-7	0.10	µg/L	<0.10
gamma-BHC	58-89-9	0.10	µg/L	<0.10
delta-BHC	319-86-8	0.10	µg/L	<0.10
Heptachlor	76-44-8	0.10	µg/L	<0.10
Heptachlor epoxide	1024-57-3	0.10	µg/L	<0.10
Endosulfan 1	959-98-8	0.10	µg/L	<0.10
Endosulfan sulfate	1031-07-8	0.10	µg/L	<0.10
4,4'-DDT	50-29-3	0.10	µg/L	<0.10
4,4'-DDD	72-54-8	0.10	µg/L	<0.10
4,4'-DDE	72-55-9	0.10	µg/L	<0.10
<b>EP-390: Triorganotins</b>				
Tributyltin	56573-85-4	0.015	µg TBT /L	<0.015
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>				
2-Fluorobiphenyl	32160-8	0.1	%	51.2
4-Terphenyl-d14	1718-51-0	0.1	%	86.6
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>				
Decachlorobiphenyl	205124-3	0.1	%	83.0
<b>EP-067S: Pesticide Surrogate</b>				
Dibutylchlorendate	1770-80-5	0.1	%	112

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: WATER		Method: Compound		Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2151420)</b>							
HK1202550-001	Anonymous	----	0.1	mg/L	11.0	11.4	3.6
HK1202670-001	Anonymous	----	0.1	mg/L	21.3	22.3	4.6
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2151421)</b>							
HK1202550-001	Anonymous	----	0.1	mg/L	1.8	1.9	0.0
HK1202646-004	Anonymous	----	0.1	mg/L	0.4	0.4	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2155253)</b>							
HK1202803-001	Anonymous	7664-41-7	0.01	mg/L	0.15	0.14	6.9
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2155761)</b>							
HK1203032-001	Anonymous	----	0.01	mg/L	<0.01	<0.01	0.0
HK1203045-001	Anonymous	----	0.01	mg/L	0.21	0.21	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2155778)</b>							
HK1203085-001	Anonymous	----	0.01	mg/L	0.09	0.09	0.0
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2160149)</b>							
HK1202618-002	Anonymous						
		7439-97-6	0.1	µg/L	<0.1	<0.1	0.0
		7440-43-9	0.2	µg/L	<0.2	<0.2	0.0
		7440-47-3	1	µg/L	<1	<1	0.0
		7440-50-8	1	µg/L	<1	<1	0.0
		7439-92-1	1	µg/L	<1	<1	0.0
		7440-02-0	1	µg/L	<1	<1	0.0
		7440-22-4	1	µg/L	<1	<1	0.0
		7440-38-2	10	µg/L	<10	<10	0.0
		7440-66-6	10	µg/L	<10	<10	0.0
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2149864)</b>							
HK1202618-002	Anonymous						
		91-20-3	0.2	µg/L	<0.2	<0.2	0.0
		208-96-8	0.2	µg/L	<0.2	<0.2	0.0
		83-32-9	0.2	µg/L	<0.2	<0.2	0.0
		86-73-7	0.2	µg/L	<0.2	<0.2	0.0
		85-01-8	0.2	µg/L	<0.2	<0.2	0.0
		120-12-7	0.2	µg/L	<0.2	<0.2	0.0
		206-44-0	0.2	µg/L	<0.2	<0.2	0.0
		129-00-0	0.2	µg/L	<0.2	<0.2	0.0
		56-55-3	0.2	µg/L	<0.2	<0.2	0.0
		218-01-9	0.2	µg/L	<0.2	<0.2	0.0
		205-99-2	0.2	µg/L	<0.2	<0.2	0.0
		207-08-9	0.2	µg/L	<0.2	<0.2	0.0
		50-32-8	0.2	µg/L	<0.2	<0.2	0.0
		193-39-5	0.2	µg/L	<0.2	<0.2	0.0
		53-70-3	0.2	µg/L	<0.2	<0.2	0.0
		191-24-2	0.2	µg/L	<0.2	<0.2	0.0
		----	2.2	µg/L	<2.2	<2.2	0.0
		----	6.8	µg/L	<6.8	<6.8	0.0





Matrix: WATER		Method: Compound		Laboratory Duplicate (DUP) Report				RPD (%)
Laboratory sample ID	Client sample ID	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	
<b>EP-065A: PCB Single Congeners (QC Lot: 2149865)</b>								
HK1202618-002	Anonymous	34883-43-7	0.01	µg/L	<0.01	<0.01	0.0	
		37680-65-2	0.01	µg/L	<0.01	<0.01	0.0	
		7012-37-5	0.01	µg/L	<0.01	<0.01	0.0	
		41464-39-5	0.01	µg/L	<0.01	<0.01	0.0	
		35693-99-3	0.01	µg/L	<0.01	<0.01	0.0	
		32598-10-0	0.01	µg/L	<0.01	<0.01	0.0	
		32598-13-3	0.01	µg/L	<0.01	<0.01	0.0	
		37680-73-2	0.01	µg/L	<0.01	<0.01	0.0	
		32598-14-4	0.01	µg/L	<0.01	<0.01	0.0	
		31508-00-6	0.01	µg/L	<0.01	<0.01	0.0	
		57465-28-8	0.01	µg/L	<0.01	<0.01	0.0	
		38380-07-3	0.01	µg/L	<0.01	<0.01	0.0	
		35065-28-2	0.01	µg/L	<0.01	<0.01	0.0	
		35065-27-1	0.01	µg/L	<0.01	<0.01	0.0	
		32774-16-6	0.01	µg/L	<0.01	<0.01	0.0	
		35065-30-6	0.01	µg/L	<0.01	<0.01	0.0	
		35065-29-3	0.01	µg/L	<0.01	<0.01	0.0	
		52663-68-0	0.01	µg/L	<0.01	<0.01	0.0	
		----	0.18	µg/L	<0.18	<0.18	0.0	
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2149867)</b>								
HK1202618-002	Anonymous	309-00-2	0.10	µg/L	<0.10	<0.10	0.0	
		alpha-BHC	0.10	µg/L	<0.10	<0.10	0.0	
		beta-BHC	0.10	µg/L	<0.10	<0.10	0.0	
		gamma-BHC	0.10	µg/L	<0.10	<0.10	0.0	
		delta-BHC	0.10	µg/L	<0.10	<0.10	0.0	
		Heptachlor	0.10	µg/L	<0.10	<0.10	0.0	
		Heptachlor epoxide	0.10	µg/L	<0.10	<0.10	0.0	
		Endosulfan 1	0.10	µg/L	<0.10	<0.10	0.0	
		Endosulfan sulfate	0.10	µg/L	<0.10	<0.10	0.0	
		4,4'-DDT	0.10	µg/L	<0.10	<0.10	0.0	
		4,4'-DDD	0.10	µg/L	<0.10	<0.10	0.0	
		4,4'-DDE	0.10	µg/L	<0.10	<0.10	0.0	
<b>EP-390: Triorganotins (QC Lot: 2153956)</b>								
HK1202618-001	Anonymous	56573-85-4	6	ngSn/L	<6	<6	0.0	

Matrix: WATER		Method Blank (MB) Report				Laboratory Control Spike Duplicate (DCS) Report				Laboratory Control Spike Duplicate (DCS) Report			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	Control Limit
<b>Method Blank (MB), Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report</b>													
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2151420)	----	0.1	mg/L	<0.1	0.5 mg/L	104	----	----	85	115	----	----	----
EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	0.5 mg/L	96.2	----	----	85	115	----	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2151421)	----	0.1	mg/L	<0.1	0.5 mg/L	96.2	----	----	85	115	----	----	----
EK067A: Total Phosphorus as P	----	0.1	mg/L	<0.1	0.5 mg/L	96.2	----	----	85	115	----	----	----





Method: Compound		Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report								
		CAS Number	LOR	Unit	Result	Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2155253)</b>														
EK055K: Ammonia as N	7664-41-7	0.01	mg/L	<0.01		0.5 mg/L	108	-----	-----	85	115	-----	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2155761)</b>														
EK057A: Nitrite as N	---	0.01	mg/L	<0.01		0.4 mg/L	115	-----	-----	85	115	-----	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2155778)</b>														
EK071K: Reactive Phosphorus as P	---	0.01	mg/L	<0.01		0.5 mg/L	98.7	-----	-----	85	115	-----	-----	-----
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2160149)</b>														
EG020: Arsenic	7440-38-2	10	µg/L	<10		10 µg/L	98.2	-----	-----	78	114	-----	-----	-----
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2		10 µg/L	96.5	-----	-----	80	112	-----	-----	-----
EG020: Chromium	7440-47-3	1	µg/L	<1		10 µg/L	97.4	-----	-----	80	114	-----	-----	-----
EG020: Copper	7440-50-8	1	µg/L	<1		10 µg/L	98.8	-----	-----	79	113	-----	-----	-----
EG020: Lead	7439-92-1	1	µg/L	<1		10 µg/L	96.3	-----	-----	81	109	-----	-----	-----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.1		0.2 µg/L	110	-----	-----	81	113	-----	-----	-----
EG020: Nickel	7440-02-0	1	µg/L	<1		10 µg/L	98.3	-----	-----	78	112	-----	-----	-----
EG020: Silver	7440-22-4	1	µg/L	<1		10 µg/L	92.8	-----	-----	79	111	-----	-----	-----
EG020: Zinc	7440-66-6	10	µg/L	<10		10 µg/L	92.4	-----	-----	73	121	-----	-----	-----
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2149864)</b>														
Naphthalene	91-20-3	0.2	µg/L	<0.2		0.5 µg/L	72.0	-----	-----	44	114	-----	-----	-----
Acenaphthylene	208-96-8	0.2	µg/L	<0.2		0.5 µg/L	68.7	-----	-----	40	109	-----	-----	-----
Acenaphthene	83-32-9	0.2	µg/L	<0.2		0.5 µg/L	70.6	-----	-----	44	108	-----	-----	-----
Fluorene	86-73-7	0.2	µg/L	<0.2		0.5 µg/L	71.3	-----	-----	43	113	-----	-----	-----
Phenanthrene	85-01-8	0.2	µg/L	<0.2		0.5 µg/L	75.7	-----	-----	45	115	-----	-----	-----
Anthracene	120-12-7	0.2	µg/L	<0.2		0.5 µg/L	73.2	-----	-----	45	112	-----	-----	-----
Fluoranthene	206-44-0	0.2	µg/L	<0.2		0.5 µg/L	78.5	-----	-----	56	121	-----	-----	-----
Pyrene	129-00-0	0.2	µg/L	<0.2		0.5 µg/L	79.3	-----	-----	57	122	-----	-----	-----
Benz(a)anthracene	56-55-3	0.2	µg/L	<0.2		0.5 µg/L	91.5	-----	-----	61	118	-----	-----	-----
Chrysene	218-01-9	0.2	µg/L	<0.2		0.5 µg/L	99.2	-----	-----	65	126	-----	-----	-----
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	<0.2		0.5 µg/L	87.9	-----	-----	49	138	-----	-----	-----
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	<0.2		0.5 µg/L	93.7	-----	-----	69	123	-----	-----	-----
Benzo(a)pyrene	50-32-8	0.2	µg/L	<0.2		0.5 µg/L	91.0	-----	-----	51	134	-----	-----	-----
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2		0.5 µg/L	75.6	-----	-----	54	129	-----	-----	-----
Dibenzo(a,h)anthracene	53-70-3	0.2	µg/L	<0.2		0.5 µg/L	87.7	-----	-----	51	138	-----	-----	-----
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2		0.5 µg/L	91.4	-----	-----	59	135	-----	-----	-----
Low M.W. PAHs	-----	1.2	µg/L	<1.2		-----	-----	-----	-----	-----	-----	-----	-----	-----
High M.W. PAHs	-----	2.0	µg/L	<2.0		-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>EP-065A: PCB Single Congeners (QC Lot: 2149865)</b>														
PCB 8	34883-43-7	0.01	µg/L	<0.01		0.1 µg/L	82.4	-----	-----	50	130	-----	-----	-----
PCB 18	37680-65-2	0.01	µg/L	<0.01		0.1 µg/L	66.2	-----	-----	50	130	-----	-----	-----
PCB 28	7012-37-5	0.01	µg/L	<0.01		0.1 µg/L	56.0	-----	-----	50	130	-----	-----	-----
PCB 44	41464-39-5	0.01	µg/L	<0.01		0.1 µg/L	53.0	-----	-----	50	130	-----	-----	-----
PCB 52	35693-99-3	0.01	µg/L	<0.01		0.1 µg/L	95.9	-----	-----	50	130	-----	-----	-----
PCB 66	32598-10-0	0.01	µg/L	<0.01		0.1 µg/L	53.5	-----	-----	50	130	-----	-----	-----
PCB 77	32598-13-3	0.01	µg/L	<0.01		0.1 µg/L	79.3	-----	-----	50	130	-----	-----	-----





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	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Value	RPD (%)	Control Limit
<b>EP-065A: PCB Single Congeners (QC Lot: 2149865) - Continued</b>												
PCB 101	37680-73-2	0.01	µg/L	<0.01	0.1 µg/L	81.5	-----	-----	50	130	-----	-----
PCB 105	32598-14-4	0.01	µg/L	<0.01	0.1 µg/L	79.9	-----	-----	50	130	-----	-----
PCB 118	31508-00-6	0.01	µg/L	<0.01	0.1 µg/L	78.8	-----	-----	50	130	-----	-----
PCB 126	57465-28-8	0.01	µg/L	<0.01	0.1 µg/L	78.8	-----	-----	50	130	-----	-----
PCB 128	38380-07-3	0.01	µg/L	<0.01	0.1 µg/L	78.2	-----	-----	50	130	-----	-----
PCB 138	35065-28-2	0.01	µg/L	<0.01	0.1 µg/L	78.4	-----	-----	50	130	-----	-----
PCB 153	35065-27-1	0.01	µg/L	<0.01	0.1 µg/L	79.5	-----	-----	50	130	-----	-----
PCB 169	32774-16-6	0.01	µg/L	<0.01	0.1 µg/L	77.5	-----	-----	50	130	-----	-----
PCB 170	35065-30-6	0.01	µg/L	<0.01	0.1 µg/L	79.2	-----	-----	50	130	-----	-----
PCB 180	35065-29-3	0.01	µg/L	<0.01	0.1 µg/L	79.8	-----	-----	50	130	-----	-----
PCB 187	52663-68-0	0.01	µg/L	<0.01	0.1 µg/L	79.6	-----	-----	50	130	-----	-----
Total Polychlorinated biphenyls												
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2149867)</b>												
Aldrin	309-00-2	0.02	µg/L	<0.02	0.1 µg/L	70.2	-----	-----	50	130	-----	-----
alpha-BHC	319-84-6	0.02	µg/L	<0.02	0.1 µg/L	100	-----	-----	50	130	-----	-----
beta-BHC	319-85-7	0.02	µg/L	<0.02	0.1 µg/L	92.4	-----	-----	50	130	-----	-----
gamma-BHC	58-89-9	0.02	µg/L	<0.02	0.1 µg/L	81.0	-----	-----	50	130	-----	-----
delta-BHC	319-86-8	0.02	µg/L	<0.02	0.1 µg/L	56.6	-----	-----	50	130	-----	-----
Heptachlor	76-44-8	0.02	µg/L	<0.02	0.1 µg/L	106	-----	-----	50	130	-----	-----
Heptachlor epoxide	1024-57-3	0.02	µg/L	<0.02	0.1 µg/L	64.3	-----	-----	50	130	-----	-----
Endosulfan 1	959-98-8	0.02	µg/L	<0.02	0.1 µg/L	66.4	-----	-----	50	130	-----	-----
Endosulfan sulfate	1031-07-8	0.02	µg/L	<0.02	0.1 µg/L	67.7	-----	-----	50	130	-----	-----
4,4'-DDT	50-29-3	0.02	µg/L	<0.02	0.1 µg/L	71.9	-----	-----	50	130	-----	-----
4,4'-DDD	72-54-8	0.02	µg/L	<0.02	0.1 µg/L	74.8	-----	-----	50	130	-----	-----
4,4'-DDE	72-55-9	0.02	µg/L	<0.02	0.1 µg/L	63.3	-----	-----	50	130	-----	-----
<b>EP-390: Triorganotins (QC Lot: 2153956)</b>												
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	94.3	-----	-----	81	117	-----	-----





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

Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	MS	MSD	Recovery Limits (%)	RPD (%)		
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2151420)</b>										
HK1202550-001	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	5 mg/L	92.0	----	75	125	----	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2151421)</b>										
HK1202550-001	Anonymous	EK067A: Total Phosphorus as P	----	5 mg/L	100	----	75	125	----	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2155253)</b>										
HK1202803-001	Anonymous	EK055K: Ammonia as N	7664-41-7	0.5 mg/L	94.4	----	75	125	----	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2155761)</b>										
HK1203032-001	Anonymous	EK057A: Nitrite as N	----	0.5 mg/L	119	----	75	125	----	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2155778)</b>										
HK1203085-001	Anonymous	EK071K: Reactive Phosphorus as P	----	0.5 mg/L	102	----	75	125	----	----
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2160149)</b>										
HK1202618-001	Anonymous	EG020: Arsenic	7440-38-2	10 µg/L	112	----	75	125	----	----
		EG020: Cadmium	7440-43-9	10 µg/L	96.7	----	75	125	----	----
		EG020: Chromium	7440-47-3	10 µg/L	99.6	----	75	125	----	----
		EG020: Copper	7440-50-8	10 µg/L	96.9	----	75	125	----	----
		EG020: Lead	7439-92-1	10 µg/L	99.2	----	75	125	----	----
		EG020: Mercury	EG020: 02-0	0.2 µg/L	100	----	75	125	----	----
		EG020: Nickel	7440-02-0	10 µg/L	90.9	----	75	125	----	----
		EG020: Silver	7440-22-4	10 µg/L	93.5	----	75	125	----	----
		EG020: Zinc	7440-66-6	10 µg/L	105	----	75	125	----	----

**Surrogate Control Limits**

Compound	CAS Number	Recovery Limits (%)	
		Low	High
<b>Sub-Matrix: INTERSTITIAL WATER</b>			
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			
Decachlorobiphenyl	2051-24-3	50	130
<b>EP-067S: Pesticide Surrogate</b>			
Dibutylchloroendate	1770-80-5	50	130



### CERTIFICATE OF ANALYSIS

Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
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Project : AGREEMENT NO CE 43\_2010 (HY) CENTRAL  
KOWLOON ROUTE - DESIGN AND  
CONSTRUCTION  
Order number : GE/2009/16.41  
C-O-C number : H014509,H014512  
Site : VR1 AND VR3

Laboratory : ALS Technichem HK Pty Ltd  
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Quote number : ----

Page : 1 of 8  
Work Order : HK1201779

Date Samples Received : 17-JAN-2012  
Issue Date : 15-FEB-2012  
No. of samples received : 3  
No. of samples analysed : 3

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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

PP

Position

Senior Chemist  
General Manager

Authorised results for

Organics  
Inorganics





Page Number : 2 of 8  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201779

#### 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: 30-JAN-2012

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: **HK1201779**

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

Sample(s) were filtered prior to dissolved metal analysis.



**Analytical Results**

Sub-Matrix: INTERSTITIAL WATER

Compound	CAS Number	LOR	Client sample ID		VR1 GRAB	VR1 GRAB (DUPLICATE)	VR3 GRAB
			Client sampling date / time	Unit			
<b>ED/EK: Inorganic Nonmetallic Parameters</b>							
EK055K: Ammonia as N	7664-417	0.01	mg/L		2.10	0.58	<0.01
EK057A: Nitrite as N	----	0.01	mg/L		0.02	0.02	<0.01
EK058A: Nitrate as N	14797-55-8	0.01	mg/L		0.20	0.28	<0.01
EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L		2.2	0.7	1.4
EK067A: Total Phosphorus as P	----	0.1	mg/L		<0.1	<0.1	4.2
EK071K: Reactive Phosphorus as P	----	10	µg/L		10	<10	3890
<b>EG: Metals and Major Cations - Filtered</b>							
EG020: Arsenic	7440-38-2	10	µg/L		<10	<10	31
EG020: Cadmium	7440-43-9	0.2	µg/L		<0.2	1.0	<0.2
EG020: Chromium	7440-47-3	1	µg/L		<1	<1	12
EG020: Copper	7440-50-8	1	µg/L		3	5	2
EG020: Lead	7439-92-1	1	µg/L		<1	<1	<1
EG020: Mercury	7439-97-6	0.1	µg/L		<0.1	<0.1	<0.1
EG020: Nickel	7440-02-0	1	µg/L		2	11	4
EG020: Silver	7440-22-4	1	µg/L		<1	<1	<1
EG020: Zinc	7440-66-6	10	µg/L		12	47	<10
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs)</b>							
Naphthalene	9120-3	0.2	µg/L		<0.2	<0.2	1.6
Acenaphthylene	208-96-8	0.2	µg/L		2.6	1.9	12.8
Acenaphthene	83-32-9	0.2	µg/L		48.4	41.2	32.5
Fluorene	86-73-7	0.2	µg/L		1.9	1.6	1.8
Phenanthrene	85-01-8	0.2	µg/L		4.1	3.8	21.4
Anthracene	120-12-7	0.2	µg/L		2.7	2.4	16.3
Fluoranthene	206-44-0	0.2	µg/L		16.4	13.6	101
Pyrene	129-00-0	0.2	µg/L		18.0	15.1	133
Benz(a)anthracene	56-55-3	0.2	µg/L		3.0	3.2	42.2
Chrysene	218-019	0.2	µg/L		2.9	2.7	35.3
Benzo(b)fluoranthene	205-98-2	0.2	µg/L		2.8	3.1	39.3
Benzo(k)fluoranthene	207-08-9	0.2	µg/L		0.8	1.1	16.4
Benzo(a)pyrene	50-32-8	0.2	µg/L		3.0	3.0	43.4
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L		1.7	2.4	21.5
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L		0.3	0.4	5.1
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L		1.7	1.8	20.1
Low M.W. PAHs	----	2.2	µg/L		59.7	51.0	86.5
High M.W. PAHs	----	6.8	µg/L		50.6	46.6	457
<b>EP-065A: PCB Single Congeners</b>							
PCB 8	34883-43-7	0.01	µg/L		<0.01	<0.01	<0.01
PCB 18	37680-65-2	0.01	µg/L		<0.01	<0.01	<0.01
PCB 28	7012-37-5	0.01	µg/L		<0.01	<0.01	<0.01
PCB 44	41464-39-5	0.01	µg/L		<0.01	<0.01	<0.01
PCB 52	35693-99-3	0.01	µg/L		<0.01	<0.01	<0.01





Compound	CAS Number	LOR	Client sample ID		VR1 GRAB	VR1 GRAB (DUPLICATE)	VR3 GRAB
			Client sampling date / time	Unit			
Sub-Matrix: INTERSTITIAL WATER							
EP-065A: PCB Single Congeners - Continued							
PCB 66	32598-10-0	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 77	32598-13-3	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 101	37680-73-2	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 105	32598-14-4	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 118	31508-00-6	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 126	57465-28-8	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 128	38380-07-3	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 138	35065-28-2	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 153	35065-27-1	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 169	32774-16-6	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 170	35065-30-6	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 180	35065-29-3	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 187	52663-68-0	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Polychlorinated biphenyls	----	0.18	<0.18	<0.18	<0.18	<0.18	<0.18
EP-067A: Organochlorine Pesticides (OC)							
Aldrin	309-00-2	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
alpha-BHC	319-84-6	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
beta-BHC	319-85-7	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
gamma-BHC	58-89-9	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
delta-BHC	319-86-8	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Heptachlor	76-44-8	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Heptachlor epoxide	1024-57-3	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan 1	959-98-8	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan sulfate	103+07-8	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDT	50-29-3	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDD	72-54-8	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDE	72-55-9	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
EP-390: Triorganotins							
Tributyltin	56573-85-4	0.015	<0.015	<0.015	<0.015	<0.015	0.075
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates							
2-Fluorobiphenyl	321-60-8	0.1	82.0	82.0	62.3	55.6	Surrogate control limits listed at end of this report.
4-Terphenyl-d14	1718-510	0.1	93.8	93.8	107	75.2	
EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate							
Decachlorobiphenyl	2051-24-3	0.1	82.3	82.3	81.3	87.3	Surrogate control limits listed at end of this report.
EP-067S: Pesticide Surrogate							
Dibutylchlorendate	1770-80-5	0.1	110	110	74.0	94.7	Surrogate control limits listed at end of this report.





**Laboratory Duplicate (DUP) Report**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
						Original Result	Duplicate Result	
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142444)</b>								
HK1201775-012	Anonymous	EK057A: Nitrite as N	----	0.01	mg/L	0.02	0.02	0.0
HK1201779-002	VR1 GRAB (DUPLICATE)	EK057A: Nitrite as N	----	0.01	mg/L	0.02	0.02	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143530)</b>								
HK1202098-001	Anonymous	EK071K: Reactive Phosphorus as P	----	0.01	mg/L	0.99	0.96	3.1
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143540)</b>								
HK1201775-010	Anonymous	EK055K: Ammonia as N	7664-41-7	0.01	mg/L	0.92	0.90	2.2
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144325)</b>								
HK1201775-012	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.7	0.7	0.0
HK1201779-001	VR1 GRAB	EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.2	2.3	4.4
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144326)</b>								
HK1201775-002	Anonymous	EK067A: Total Phosphorus as P	----	0.1	mg/L	0.3	0.2	0.0
HK1201775-012	Anonymous	EK067A: Total Phosphorus as P	----	0.1	mg/L	<0.1	<0.1	0.0
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2146164)</b>								
HK1201779-002	VR1 GRAB (DUPLICATE)	EG020: Mercury	7439-97-6	0.1	µg/L	<0.1	<0.1	0.0
		EG020: Cadmium	7440-43-9	0.2	µg/L	1.0	1.0	0.0
		EG020: Chromium	7440-47-3	1	µg/L	<1	<1	0.0
		EG020: Copper	7440-50-8	1	µg/L	5	5	0.0
		EG020: Lead	7439-92-1	1	µg/L	<1	<1	0.0
		EG020: Nickel	7440-02-0	1	µg/L	11	12	0.0
		EG020: Silver	7440-22-4	1	µg/L	<1	<1	0.0
		EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	0.0
		EG020: Zinc	7440-66-6	10	µg/L	47	50	5.6
<b>EP-390: Triorganotins (QC Lot: 2143968)</b>								
HK1201775-001	Anonymous	Tributyltin	56573-85-4	6	ngSn/L	<6	<6	0.0

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

Method: Compound	CAS Number	LOR	Unit	Result	Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report				RPD (%)
					Spike Concentration	Spike Recovery (%)	DCS	Recovery Limits (%)	
				Result	LCS	Low	High	Value	Control Limit
<b>Method Blank (MB) Report</b>									
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142444)	----	0.01	mg/L	<0.01	109	85	115	----	----
EK057A: Nitrite as N	----	0.01	mg/L	<0.01	109	85	115	----	----
<b>Laboratory Control Spike Duplicate (DCS) Report</b>									
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143530)	----	0.01	mg/L	<0.01	97.3	85	115	----	----
EK071K: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	97.3	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143540)	7664-41-7	0.01	mg/L	<0.01	92.5	85	115	----	----
EK055K: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	92.5	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144325)	----	0.1	mg/L	<0.1	103	85	115	----	----
EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	103	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144326)	----	0.1	mg/L	<0.1	98.9	85	115	----	----
EK067A: Total Phosphorus as P	----	0.1	mg/L	<0.1	98.9	85	115	----	----
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2146164)</b>									





Method: Compound	Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Value	Control Limit
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2146164) - Continued</b>											
EG020: Arsenic	7440-38-2	10	µg/L	<10	10 µg/L	97.7	-----	-----	78	114	-----
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	10 µg/L	97.2	-----	-----	80	112	-----
EG020: Chromium	7440-47-3	1	µg/L	<1	10 µg/L	102	-----	-----	80	114	-----
EG020: Copper	7440-50-8	1	µg/L	<1	10 µg/L	96.5	-----	-----	79	113	-----
EG020: Lead	7439-92-1	1	µg/L	<1	10 µg/L	96.7	-----	-----	81	109	-----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.1	0.2 µg/L	100	-----	-----	81	113	-----
EG020: Nickel	7440-02-0	1	µg/L	<1	10 µg/L	96.5	-----	-----	78	112	-----
EG020: Silver	7440-22-4	1	µg/L	<1	10 µg/L	96.2	-----	-----	79	111	-----
EG020: Zinc	7440-66-6	10	µg/L	<10	10 µg/L	95.8	-----	-----	73	121	-----
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2142667)</b>											
Naphthalene	91-20-3	0.2	µg/L	<0.2	0.5 µg/L	88.8	-----	-----	44	114	-----
Acenaphthylene	208-96-8	0.2	µg/L	<0.2	0.5 µg/L	54.8	-----	-----	40	109	-----
Acenaphthene	83-32-9	0.2	µg/L	<0.2	0.5 µg/L	69.5	-----	-----	44	108	-----
Fluorene	86-73-7	0.2	µg/L	<0.2	0.5 µg/L	92.6	-----	-----	43	113	-----
Phenanthrene	85-01-8	0.2	µg/L	<0.2	0.5 µg/L	79.8	-----	-----	45	115	-----
Anthracene	120-12-7	0.2	µg/L	<0.2	0.5 µg/L	69.1	-----	-----	45	112	-----
Fluoranthene	206-44-0	0.2	µg/L	<0.2	0.5 µg/L	93.7	-----	-----	56	121	-----
Pyrene	129-00-0	0.2	µg/L	<0.2	0.5 µg/L	80.3	-----	-----	57	122	-----
Benz(a)anthracene	56-55-3	0.2	µg/L	<0.2	0.5 µg/L	78.8	-----	-----	61	118	-----
Chrysene	218-01-9	0.2	µg/L	<0.2	0.5 µg/L	89.5	-----	-----	65	126	-----
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	<0.2	0.5 µg/L	108	-----	-----	49	138	-----
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	<0.2	0.5 µg/L	93.0	-----	-----	69	123	-----
Benzo(a)pyrene	50-32-8	0.2	µg/L	<0.2	0.5 µg/L	102	-----	-----	51	134	-----
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2	0.5 µg/L	119	-----	-----	54	129	-----
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	0.5 µg/L	109	-----	-----	51	138	-----
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2	0.5 µg/L	106	-----	-----	59	135	-----
Low M.W. PAHs	-----	1.2	µg/L	<1.2	-----	-----	-----	-----	-----	-----	-----
High M.W. PAHs	-----	2.0	µg/L	<2.0	-----	-----	-----	-----	-----	-----	-----
<b>EP-065A: PCB Single Congeners (QC Lot: 2142668)</b>											
PCB 8	34883-43-7	0.01	µg/L	<0.01	0.1 µg/L	82.3	-----	-----	50	130	-----
PCB 18	37680-65-2	0.01	µg/L	<0.01	0.1 µg/L	73.8	-----	-----	50	130	-----
PCB 28	7012-37-5	0.01	µg/L	<0.01	0.1 µg/L	64.0	-----	-----	50	130	-----
PCB 44	41464-39-5	0.01	µg/L	<0.01	0.1 µg/L	59.8	-----	-----	50	130	-----
PCB 52	35693-99-3	0.01	µg/L	<0.01	0.1 µg/L	60.4	-----	-----	50	130	-----
PCB 66	32598-10-0	0.01	µg/L	<0.01	0.1 µg/L	72.9	-----	-----	50	130	-----
PCB 77	32598-13-3	0.01	µg/L	<0.01	0.1 µg/L	79.8	-----	-----	50	130	-----
PCB 101	37680-73-2	0.01	µg/L	<0.01	0.1 µg/L	86.1	-----	-----	50	130	-----
PCB 105	32598-14-4	0.01	µg/L	<0.01	0.1 µg/L	84.4	-----	-----	50	130	-----
PCB 118	31508-00-6	0.01	µg/L	<0.01	0.1 µg/L	82.7	-----	-----	50	130	-----
PCB 126	57465-28-8	0.01	µg/L	<0.01	0.1 µg/L	86.7	-----	-----	50	130	-----
PCB 128	38380-07-3	0.01	µg/L	<0.01	0.1 µg/L	85.1	-----	-----	50	130	-----
PCB 138	35065-28-2	0.01	µg/L	<0.01	0.1 µg/L	83.1	-----	-----	50	130	-----
PCB 153	35065-27-1	0.01	µg/L	<0.01	0.1 µg/L	83.6	-----	-----	50	130	-----





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	LCS	DCS	Recovery Low (%)	Recovery High (%)	Value	Control Limit
<b>EP-065A: PCB Single Congeners (QC Lot: 2142668) - Continued</b>											
PCB169	32774-16-6	0.01	µg/L	<0.01	0.1 µg/L	86.2	-----	50	130	-----	-----
PCB170	35065-30-6	0.01	µg/L	<0.01	0.1 µg/L	86.1	-----	50	130	-----	-----
PCB180	35065-29-3	0.01	µg/L	<0.01	0.1 µg/L	86.1	-----	50	130	-----	-----
PCB187	52663-68-0	0.01	µg/L	<0.01	0.1 µg/L	84.2	-----	50	130	-----	-----
Total Polychlorinated biphenyls	-----	0.18	µg/L	<0.18	-----	-----	-----	-----	-----	-----	-----
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2142669)</b>											
Aldrin	309-00-2	0.02	µg/L	<0.02	0.1 µg/L	103	-----	50	130	-----	-----
alpha-BHC	319-84-6	0.02	µg/L	<0.02	0.1 µg/L	83.6	-----	50	130	-----	-----
beta-BHC	319-85-7	0.02	µg/L	<0.02	0.1 µg/L	102	-----	50	130	-----	-----
gamma-BHC	58-89-9	0.02	µg/L	<0.02	0.1 µg/L	73.1	-----	50	130	-----	-----
delta-BHC	319-86-8	0.02	µg/L	<0.02	0.1 µg/L	116	-----	50	130	-----	-----
Heptachlor	76-44-8	0.02	µg/L	<0.02	0.1 µg/L	89.2	-----	50	130	-----	-----
Heptachlor epoxide	1024-57-3	0.02	µg/L	<0.02	0.1 µg/L	113	-----	50	130	-----	-----
Endosulfan 1	959-98-8	0.02	µg/L	<0.02	0.1 µg/L	101	-----	50	130	-----	-----
Endosulfan sulfate	1031-07-8	0.02	µg/L	<0.02	0.1 µg/L	109	-----	50	130	-----	-----
4,4'-DDT	50-29-3	0.02	µg/L	<0.02	0.1 µg/L	107	-----	50	130	-----	-----
4,4'-DDD	72-54-8	0.02	µg/L	<0.02	0.1 µg/L	105	-----	50	130	-----	-----
4,4'-DDE	72-55-9	0.02	µg/L	<0.02	0.1 µg/L	101	-----	50	130	-----	-----
<b>EP-390: Triorganotins (QC Lot: 2143968)</b>											
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	109	-----	81	117	-----	-----





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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	MS	MSD	Recovery Limits (%)	RPD (%)		
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142444)</b>										
HK1201775-012	Anonymous	EK057A: Nitrite as N	----	0.5 mg/L	113	----	75	125	----	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143530)</b>										
HK1202098-001	Anonymous	EK071K: Reactive Phosphorus as P	----	5 mg/L	104	----	75	125	----	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143540)</b>										
HK1201868-001	Anonymous	EK055K: Ammonia as N	7664-41-7	0.5 mg/L	122	----	75	125	----	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144325)</b>										
HK1201775-012	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	0.5 mg/L	100	----	75	125	----	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144326)</b>										
HK1201775-004	Anonymous	EK067A: Total Phosphorus as P	----	0.5 mg/L	106	----	75	125	----	----
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2146164)</b>										
HK1201779-001	VR1 GRAB	EG020: Arsenic	7440-38-2	10 µg/L	85.6	----	75	125	----	----
		EG020: Cadmium	7440-43-9	10 µg/L	95.9	----	75	125	----	----
		EG020: Chromium	7440-47-3	10 µg/L	93.6	----	75	125	----	----
		EG020: Copper	7440-50-8	10 µg/L	90.5	----	75	125	----	----
		EG020: Lead	7439-92-1	10 µg/L	91.4	----	75	125	----	----
		EG020: Mercury	7439-97-6	0.2 µg/L	88.5	----	75	125	----	----
		EG020: Nickel	7440-02-0	10 µg/L	91.6	----	75	125	----	----
		EG020: Silver	7440-22-4	10 µg/L	95.6	----	75	125	----	----
		EG020: Zinc	7440-66-6	10 µg/L	87.0	----	75	125	----	----

**Surrogate Control Limits**

Compound	CAS Number	Recovery Limits (%)	
		Low	High
<b>Sub-Matrix: INTERSTITIAL WATER</b>			
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			
Decachlorobiphenyl	2051-24-3	50	130
<b>EP-067S: Pesticide Surrogate</b>			
Dibutylchloroendate	1770-80-5	50	130



### CERTIFICATE OF ANALYSIS

Client	: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Laboratory	: ALS Technichem HK Pty Ltd	Page	: 1 of 9
Contact	: IR POPHIL LAM	Contact	: Chan Kwok Fai, Godfrey	Work Order	: HK1201675
Address	: GEOTECHNICAL PROJECTS DIVISION, GEOTECHNICAL ENGINEERING OFFICE, 23/F., KWUN TONG VIEW, 410 KWUN TONG ROAD, KOWLOON, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: Pophilkiam@cedd.gov.hk	E-mail	: Godfrey.Chan@alsglobal.com		
Telephone	: +852 2716 8609	Telephone	: +852 2610 1044		
Facsimile	: ----	Facsimile	: +852 2610 2021		
Project	: AGREEMENT NO CE 43_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION	Quote number	: ----	Date Samples Received	: 16-JAN-2012
Order number	: GE/2009/16.41			Issue Date	: 16-FEB-2012
C-O-C number	: H014506			No. of samples received	: 2
Site	: VR4 AND VR2			No. of samples analysed	: 2

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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

PP Anh Ngoc Huynh  
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Position

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Page Number : 2 of 9  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201675

### 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: 27-JAN-2012

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: **HK1201675**

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

Sample(s) were filtered prior to dissolved metal analysis.



**Analytical Results**

Sub-Matrix: INTERSTITIAL WATER

Compound	CAS Number	LOR	Client sampling date / time		Client sample ID
			Unit	Unit	
<b>EDIEK: Inorganic Nonmetallic Parameters</b>					
EK055K: Ammonia as N	7664-417	0.01	mg/L	24.7	VR2 GRAB
EK057A: Nitrite as N	----	0.01	mg/L	<0.01	16-JAN-2012 15:45
EK058A: Nitrate as N	14797-55-8	0.01	mg/L	<0.01	HK1201675-002
EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	26.3	
EK067A: Total Phosphorus as P	----	0.1	mg/L	2.3	
EK071K: Reactive Phosphorus as P	----	10	µg/L	1910	
<b>EG: Metals and Major Cations - Filtered</b>					
EG020: Arsenic	7440-38-2	10	µg/L	34	<10
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2
EG020: Chromium	7440-47-3	1	µg/L	2	7
EG020: Copper	7440-50-8	1	µg/L	<1	<1
EG020: Lead	7439-92-1	1	µg/L	<1	<1
EG020: Mercury	7439-97-6	0.1	µg/L	<0.1	<0.1
EG020: Nickel	7440-02-0	1	µg/L	5	<1
EG020: Silver	7440-22-4	1	µg/L	<1	<1
EG020: Zinc	7440-66-6	10	µg/L	<10	<10
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs)</b>					
Naphthalene	91-20-3	0.2	µg/L	2.0	0.2
Acenaphthylene	208-96-8	0.2	µg/L	24.3	2.8
Acenaphthene	83-32-9	0.2	µg/L	47.7	3.3
Fluorene	86-73-7	0.2	µg/L	3.0	1.1
Phenanthrene	85-018	0.2	µg/L	15.9	7.0
Anthracene	120-127	0.2	µg/L	16.2	2.2
Fluoranthene	206-44-0	0.2	µg/L	316	18.1
Pyrene	129-00-0	0.2	µg/L	468	21.7
Benz(a)anthracene	56-55-3	0.2	µg/L	109	6.5
Chrysene	218-019	0.2	µg/L	108	4.5
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	92.0	6.8
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	64.4	2.1
Benzo(a)pyrene	50-32-8	0.2	µg/L	114	7.4
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	48.2	3.1
Dibenzo(a,h)anthracene	53-70-3	0.2	µg/L	11.0	0.6
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	48.0	2.8
Low M.W. PAHs	----	2.2	µg/L	109	16.7
High M.W. PAHs	----	6.8	µg/L	1380	73.7
<b>EP-065A: PCB Single Congeners</b>					
PCB 8	34883-43-7	0.01	µg/L	<0.01	<0.01
PCB 18	37680-65-2	0.01	µg/L	<0.01	<0.01
PCB 28	7012-37-5	0.01	µg/L	<0.01	<0.01
PCB 44	41464-39-5	0.01	µg/L	<0.01	<0.01
PCB 52	35693-99-3	0.01	µg/L	<0.01	<0.01





Compound	CAS Number	LOR	Client sample ID		VR2 GRAB
			Client sampling date / time	Unit	
Sub-Matrix: INTERSTITIAL WATER					
EP-065A: PCB Single Congeners - Continued					
PCB 66	32598-10-0	0.01	<0.01	16-JAN-2012 11:55	<0.01
PCB 77	32598-13-3	0.01	<0.01	16-JAN-2012 15:45	<0.01
PCB 101	37680-73-2	0.01	<0.01	HK1201675-001	<0.01
PCB 105	32598-14-4	0.01	<0.01		<0.01
PCB 118	31508-00-6	0.01	<0.01		<0.01
PCB 126	57465-28-8	0.01	<0.01		<0.01
PCB 128	38380-07-3	0.01	<0.01		<0.01
PCB 138	35065-28-2	0.01	<0.01		<0.01
PCB 153	35065-27-1	0.01	<0.01		<0.01
PCB 169	32774-16-6	0.01	<0.01		<0.01
PCB 170	35065-30-6	0.01	<0.01		<0.01
PCB 180	35065-29-3	0.01	<0.01		<0.01
PCB 187	52663-68-0	0.01	<0.01		<0.01
Total Polychlorinated biphenyls	----	0.18	<0.18		<0.18
EP-067A: Organochlorine Pesticides (OC)					
Aldrin	309-00-2	0.10	<0.10		<0.10
alpha-BHC	319-84-6	0.10	<0.10		<0.10
beta-BHC	319-85-7	0.10	<0.10		<0.10
gamma-BHC	58-89-9	0.10	<0.10		<0.10
delta-BHC	319-86-8	0.10	<0.10		<0.10
Heptachlor	76-44-8	0.10	<0.10		<0.10
Heptachlor epoxide	1024-57-3	0.10	<0.10		<0.10
Endosulfan 1	959-98-8	0.10	<0.10		<0.10
Endosulfan sulfate	103107-8	0.10	<0.10		<0.10
4,4'-DDT	50-29-3	0.10	<0.10		<0.10
4,4'-DDD	72-54-8	0.10	<0.10		<0.10
4,4'-DDE	72-55-9	0.10	<0.10		<0.10
EP-390: Triorganotins					
Tributyltin	56573-85-4	0.015	<0.015		0.189
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates					
2-Fluorobiphenyl	32160-8	0.1	66.5		59.7
4-Terphenyl-d14	1718-510	0.1	53.7		92.8
EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate					
Decachlorobiphenyl	2051-24-3	0.1	91.2		51.7
EP-067S: Pesticide Surrogate					
Dibutylchloroendate	1770-80-5	0.1	110		126

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: WATER		Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133256)</b>								
HK1201670-001	Anonymous	EK055K: Ammonia as N	7664-41-7	0.01	mg/L	34.6	37.8	8.7
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133259)</b>								
HK1201670-001	Anonymous	EK071K: Reactive Phosphorus as P	----	0.01	mg/L	0.01	0.01	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133354)</b>								
HK1201510-052	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.0
HK1201623-001	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	25.9	28.4	9.2
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133355)</b>								
HK1201670-010	Anonymous	EK067A: Total Phosphorus as P	----	0.1	mg/L	<0.1	<0.1	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142439)</b>								
HK1201670-002	Anonymous	EK057A: Nitrite as N	----	0.01	mg/L	0.03	0.03	0.0
HK1201687-004	Anonymous	EK057A: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2134967)</b>								
HK1201512-004	Anonymous	EG020: Mercury	7439-97-6	0.1	µg/L	0.1	<0.1	0.0
		EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	0.0
		EG020: Chromium	7440-47-3	1	µg/L	<1	<1	0.0
		EG020: Copper	7440-50-8	1	µg/L	4	4	0.0
		EG020: Lead	7439-92-1	1	µg/L	<1	<1	0.0
		EG020: Nickel	7440-02-0	1	µg/L	4	4	0.0
		EG020: Silver	7440-22-4	1	µg/L	<1	<1	0.0
		EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	0.0
		EG020: Zinc	7440-66-6	10	µg/L	201	197	2.2
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2133670)</b>								
HK1201648-006	Anonymous	Naphthalene	91-20-3	0.2	µg/L	<0.2	<0.2	0.0
		Acenaphthylene	208-96-8	0.2	µg/L	<0.2	<0.2	0.0
		Acenaphthene	83-32-9	0.2	µg/L	<0.2	<0.2	0.0
		Fluorene	86-73-7	0.2	µg/L	<0.2	<0.2	0.0
		Phenanthrene	85-01-8	0.2	µg/L	<0.2	<0.2	0.0
		Anthracene	120-12-7	0.2	µg/L	<0.2	<0.2	0.0
		Fluoranthene	206-44-0	0.2	µg/L	<0.2	<0.2	0.0
		Pyrene	129-00-0	0.2	µg/L	<0.2	<0.2	0.0
		Benz(a)anthracene	56-55-3	0.2	µg/L	<0.2	<0.2	0.0
		Chrysene	218-01-9	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(b)fluoranthene	205-99-2	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(k)fluoranthene	207-08-9	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(a)pyrene	50-32-8	0.2	µg/L	<0.2	<0.2	0.0
		Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2	<0.2	0.0
		Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2	<0.2	0.0
		Low M.W. PAHs	----	2.2	µg/L	<2.2	<2.2	0.0
		High M.W. PAHs	----	6.8	µg/L	<6.8	<6.8	0.0
<b>EP-065A: PCB Single Congeners (QC Lot: 2133671)</b>								





Matrix: WATER		Laboratory Duplicate (DUP) Report									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)			
<b>EP-065A: PCB Single Congeners (QC Lot: 2133671) - Continued</b>											
HK1201648-006	Anonymous	PCB 8	34883-43-7	0.01	µg/L	<0.01	<0.01	0.0			
		PCB 18	37680-65-2	0.01	µg/L	<0.01	<0.01	0.0			
		PCB 28	7012-37-5	0.01	µg/L	<0.01	<0.01	0.0			
		PCB 44	41464-39-5	0.01	µg/L	<0.01	<0.01	0.0			
		PCB 52	35693-99-3	0.01	µg/L	<0.01	<0.01	0.0			
		PCB 66	32598-10-0	0.01	µg/L	<0.01	<0.01	0.0			
		PCB 77	32598-13-3	0.01	µg/L	<0.01	<0.01	0.0			
		PCB 101	37680-73-2	0.01	µg/L	<0.01	<0.01	0.0			
		PCB 105	32598-14-4	0.01	µg/L	<0.01	<0.01	0.0			
		PCB 118	31508-00-6	0.01	µg/L	<0.01	<0.01	0.0			
		PCB 126	57465-28-8	0.01	µg/L	<0.01	<0.01	0.0			
		PCB 128	38380-07-3	0.01	µg/L	<0.01	<0.01	0.0			
		PCB 138	35065-28-2	0.01	µg/L	<0.01	<0.01	0.0			
		PCB 153	35065-27-1	0.01	µg/L	<0.01	<0.01	0.0			
		PCB 169	32774-16-6	0.01	µg/L	<0.01	<0.01	0.0			
		PCB 170	35065-30-6	0.01	µg/L	<0.01	<0.01	0.0			
		PCB 180	35065-29-3	0.01	µg/L	<0.01	<0.01	0.0			
		PCB 187	52663-68-0	0.01	µg/L	<0.01	<0.01	0.0			
		Total Polychlorinated biphenyls	----	0.18	µg/L	<0.18	<0.18	0.0			
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2133672)</b>											
HK1201648-006	Anonymous	Aldrin	309-00-2	0.10	µg/L	<0.10	<0.10	0.0			
		alpha-BHC	319-84-6	0.10	µg/L	<0.10	<0.10	0.0			
		beta-BHC	319-85-7	0.10	µg/L	<0.10	<0.10	0.0			
		gamma-BHC	58-89-9	0.10	µg/L	<0.10	<0.10	0.0			
		delta-BHC	319-86-8	0.10	µg/L	<0.10	<0.10	0.0			
		Heptachlor	76-44-8	0.10	µg/L	<0.10	<0.10	0.0			
		Heptachlor epoxide	1024-57-3	0.10	µg/L	<0.10	<0.10	0.0			
		Endosulfan 1	959-98-8	0.10	µg/L	<0.10	<0.10	0.0			
		Endosulfan sulfate	1031-07-8	0.10	µg/L	<0.10	<0.10	0.0			
		4,4'-DDT	50-29-3	0.10	µg/L	<0.10	<0.10	0.0			
		4,4'-DDD	72-54-8	0.10	µg/L	<0.10	<0.10	0.0			
		4,4'-DDE	72-55-9	0.10	µg/L	<0.10	<0.10	0.0			
<b>EP-390: Triorganotins (QC Lot: 2143967)</b>											
HK1201670-002	Anonymous	Tributyltin	56573-85-4	6	ngSn/L	<6	<6	0.0			

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

Matrix: WATER		Method Blank (MB) Report					Laboratory Control Spike Duplicate (DCS) Report				
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	DCS	Recovery Limits (%)	Value	Control Limit	
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133256)</b>											
EK055K: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	95.3	----	85	115	----	
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133259)</b>											
EK071K: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	101	----	85	115	----	





Method: Compound		Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report							
CAS Number	LOR	Unit	Result	Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133354)</b>													
ED061A: Total Kjeldahl Nitrogen as N	0.1	mg/L	<0.1	0.5 mg/L	101	-----	-----	85	85	115	-----	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133355)</b>													
ED067A: Total Phosphorus as P	0.1	mg/L	<0.1	0.5 mg/L	98.4	-----	-----	85	85	115	-----	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142439)</b>													
EK057A: Nitrite as N	0.01	mg/L	<0.01	0.4 mg/L	99.8	-----	-----	85	85	115	-----	-----	-----
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2134967)</b>													
EG020: Arsenic	7440-38-2	10	<10	100 µg/L	91.8	-----	-----	78	78	114	-----	-----	-----
EG020: Cadmium	7440-43-9	0.2	<0.2	100 µg/L	98.2	-----	-----	80	80	112	-----	-----	-----
EG020: Chromium	7440-47-3	1	<1	100 µg/L	98.7	-----	-----	80	80	114	-----	-----	-----
EG020: Copper	7440-50-8	1	<1	100 µg/L	94.6	-----	-----	79	79	113	-----	-----	-----
EG020: Lead	7439-92-1	1	<1	100 µg/L	99.0	-----	-----	81	81	109	-----	-----	-----
EG020: Mercury	7439-97-6	0.5	<0.5	2 µg/L	95.0	-----	-----	81	81	113	-----	-----	-----
EG020: Nickel	7440-02-0	1	<1	100 µg/L	100	-----	-----	78	78	112	-----	-----	-----
EG020: Silver	7440-22-4	1	<1	100 µg/L	87.3	-----	-----	79	79	111	-----	-----	-----
EG020: Zinc	7440-66-6	10	<10	100 µg/L	91.5	-----	-----	73	73	121	-----	-----	-----
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2133670)</b>													
Naphthalene	91-20-3	0.2	<0.2	0.5 µg/L	101	-----	-----	44	44	114	-----	-----	-----
Acenaphthylene	208-96-8	0.2	<0.2	0.5 µg/L	89.5	-----	-----	40	40	109	-----	-----	-----
Acenaphthene	83-32-9	0.2	<0.2	0.5 µg/L	92.2	-----	-----	44	44	108	-----	-----	-----
Fluorene	86-73-7	0.2	<0.2	0.5 µg/L	98.7	-----	-----	43	43	113	-----	-----	-----
Phenanthrene	85-01-8	0.2	<0.2	0.5 µg/L	93.3	-----	-----	45	45	115	-----	-----	-----
Anthracene	120-12-7	0.2	<0.2	0.5 µg/L	86.2	-----	-----	45	45	112	-----	-----	-----
Fluoranthene	206-44-0	0.2	<0.2	0.5 µg/L	101	-----	-----	56	56	121	-----	-----	-----
Pyrene	129-00-0	0.2	<0.2	0.5 µg/L	94.5	-----	-----	57	57	122	-----	-----	-----
Benz(a)anthracene	56-55-3	0.2	<0.2	0.5 µg/L	93.8	-----	-----	61	61	118	-----	-----	-----
Chrysene	218-01-9	0.2	<0.2	0.5 µg/L	108	-----	-----	65	65	126	-----	-----	-----
Benzo(b)fluoranthene	205-99-2	0.2	<0.2	0.5 µg/L	102	-----	-----	49	49	138	-----	-----	-----
Benzo(k)fluoranthene	207-08-9	0.2	<0.2	0.5 µg/L	86.8	-----	-----	69	69	123	-----	-----	-----
Benzo(a)pyrene	50-32-8	0.2	<0.2	0.5 µg/L	105	-----	-----	51	51	134	-----	-----	-----
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	<0.2	0.5 µg/L	102	-----	-----	54	54	129	-----	-----	-----
Dibenz(a,h)anthracene	53-70-3	0.2	<0.2	0.5 µg/L	103	-----	-----	51	51	138	-----	-----	-----
Benzo(g,h,i)perylene	191-24-2	0.2	<0.2	0.5 µg/L	108	-----	-----	59	59	135	-----	-----	-----
Low M.W. PAHs	-----	1.2	<1.2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
High M.W. PAHs	-----	2.0	<2.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>EP-065A: PCB Single Congeners (QC Lot: 2133671)</b>													
PCB 8	34883-43-7	0.01	<0.01	0.1 µg/L	68.3	-----	-----	50	50	130	-----	-----	-----
PCB 18	37680-65-2	0.01	<0.01	0.1 µg/L	55.2	-----	-----	50	50	130	-----	-----	-----
PCB 28	7012-37-5	0.01	<0.01	0.1 µg/L	85.8	-----	-----	50	50	130	-----	-----	-----
PCB 44	41464-39-5	0.01	<0.01	0.1 µg/L	89.7	-----	-----	50	50	130	-----	-----	-----
PCB 52	35693-99-3	0.01	<0.01	0.1 µg/L	84.6	-----	-----	50	50	130	-----	-----	-----
PCB 66	32598-10-0	0.01	<0.01	0.1 µg/L	112	-----	-----	50	50	130	-----	-----	-----
PCB 77	32598-13-3	0.01	<0.01	0.1 µg/L	79.0	-----	-----	50	50	130	-----	-----	-----





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 Recovery (%)				Control Limit
					LCS	DCS	Low	High	
<b>EP-065A: PCB Single Congeners (QC Lot: 2133671) - Continued</b>									
PCB 101	37680-73-2	0.01	µg/L	<0.01	54.7	-----	50	130	-----
PCB 105	32598-14-4	0.01	µg/L	<0.01	80.4	-----	50	130	-----
PCB 118	31508-00-6	0.01	µg/L	<0.01	78.3	-----	50	130	-----
PCB 126	57465-28-8	0.01	µg/L	<0.01	81.3	-----	50	130	-----
PCB 128	38380-07-3	0.01	µg/L	<0.01	77.4	-----	50	130	-----
PCB 138	35065-28-2	0.01	µg/L	<0.01	73.3	-----	50	130	-----
PCB 153	35065-27-1	0.01	µg/L	<0.01	74.4	-----	50	130	-----
PCB 169	32774-16-6	0.01	µg/L	<0.01	81.4	-----	50	130	-----
PCB 170	35065-30-6	0.01	µg/L	<0.01	75.6	-----	50	130	-----
PCB 180	35065-29-3	0.01	µg/L	<0.01	75.6	-----	50	130	-----
PCB 187	52663-68-0	0.01	µg/L	<0.01	68.5	-----	50	130	-----
Total Polychlorinated biphenyls	-----	0.18	µg/L	<0.18	-----	-----	-----	-----	-----
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2133672)</b>									
Aldrin	309-00-2	0.02	µg/L	<0.02	52.0	-----	50	130	-----
alpha-BHC	319-84-6	0.02	µg/L	<0.02	52.6	-----	50	130	-----
beta-BHC	319-85-7	0.02	µg/L	<0.02	64.6	-----	50	130	-----
gamma-BHC	58-89-9	0.02	µg/L	<0.02	54.7	-----	50	130	-----
delta-BHC	319-86-8	0.02	µg/L	<0.02	78.3	-----	50	130	-----
Heptachlor	76-44-8	0.02	µg/L	<0.02	55.0	-----	50	130	-----
Heptachlor epoxide	1024-57-3	0.02	µg/L	<0.02	75.7	-----	50	130	-----
Endosulfan 1	959-98-8	0.02	µg/L	<0.02	82.2	-----	50	130	-----
Endosulfan sulfate	1031-07-8	0.02	µg/L	<0.02	104	-----	50	130	-----
4,4'-DDT	50-29-3	0.02	µg/L	<0.02	99.7	-----	50	130	-----
4,4'-DDD	72-54-8	0.02	µg/L	<0.02	95.3	-----	50	130	-----
4,4'-DDE	72-55-9	0.02	µg/L	<0.02	82.7	-----	50	130	-----
<b>EP-390: Triorganotins (QC Lot: 2143967)</b>									
Tributyltin	56573-85-4	5	ngSn/L	<5	110	-----	81	117	-----





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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
				Spike Concentration	MS	MSD	Recovery Limits (%)	RPD (%)	
				MS	MSD	Low	High	Value	Control Limit
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133256)</b>									
HK1201670-001	Anonymous	EK055K: Ammonia as N	7664-41-7	5 mg/L	# Not Determined	75	125	---	---
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133259)</b>									
HK1201670-001	Anonymous	EK071K: Reactive Phosphorus as P	---	0.5 mg/L	119	75	125	---	---
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133354)</b>									
HK1201510-008	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	---	50 mg/L	87.4	75	125	---	---
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133355)</b>									
HK1201670-010	Anonymous	EK067A: Total Phosphorus as P	---	0.5 mg/L	104	75	125	---	---
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142439)</b>									
HK1201670-002	Anonymous	EK057A: Nitrite as N	---	0.5 mg/L	118	75	125	---	---
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2134967)</b>									
HK1201436-005	Anonymous	EG020: Arsenic	7440-38-2	100 µg/L	99.3	75	125	---	---
		EG020: Cadmium	7440-43-9	100 µg/L	103	75	125	---	---
		EG020: Chromium	7440-47-3	100 µg/L	106	75	125	---	---
		EG020: Copper	7440-50-8	100 µg/L	100	75	125	---	---
		EG020: Lead	7439-92-1	100 µg/L	102	75	125	---	---
		EG020: Mercury	7439-97-6	2 µg/L	83.2	75	125	---	---
		EG020: Nickel	7440-02-0	100 µg/L	106	75	125	---	---
		EG020: Silver	7440-22-4	100 µg/L	84.6	75	125	---	---
		EG020: Zinc	7440-66-6	100 µg/L	98.0	75	125	---	---

**Surrogate Control Limits**

Sub-Matrix: INTERSTITIAL WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			
Decachlorobiphenyl	2051-24-3	50	130
<b>EP-067S: Pesticide Surrogate</b>			
Dibutylchloroendate	1770-80-5	50	130





### CERTIFICATE OF ANALYSIS

Client	: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Laboratory	: ALS Technichem HK Pty Ltd	Page	: 1 of 9
Contact	: IR POPHIL LAM	Contact	: Chan Kwok Fai, Godfrey	Work Order	: HK1201653
Address	: GEOTECHNICAL PROJECTS DIVISION, GEOTECHNICAL ENGINEERING OFFICE, 23/F., KWUN TONG VIEW, 410 KWUN TONG ROAD, KOWLOON, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: Pophilkiam@cedd.gov.hk	E-mail	: Godfrey.Chan@alsglobal.com		
Telephone	: +852 2716 8609	Telephone	: +852 2610 1044		
Facsimile	: ----	Facsimile	: +852 2610 2021		
Project	: AGREEMENT NO CE 43_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION	Quote number	: ----	Date Samples Received	: 14-JAN-2012
Order number	: GE/2009/16.41			Issue Date	: 03-FEB-2012
C-O-C number	: H014503			No. of samples received	: 1
Site	: VR5			No. of samples analysed	: 1

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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



Page Number : 2 of 9  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201653

#### **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: 27-JAN-2012

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: **HK1201653**

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

Sample(s) were filtered prior to dissolved metal analysis.





**Analytical Results**

Sub-Matrix: INTERSTITIAL WATER

Compound	CAS Number	LOR	Client sample ID	
			Client sampling date / time	Unit
<b>ED/EK: Inorganic Nonmetallic Parameters</b>				
EK055K: Ammonia as N	7664-417	0.01	mg/L	10.6
EK057A: Nitrite as N	----	0.01	mg/L	<0.01
EK058A: Nitrate as N	14797-55-8	0.01	mg/L	<0.01
EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	10.8
EK067A: Total Phosphorus as P	----	0.1	mg/L	1.1
EK071K: Reactive Phosphorus as P	----	10	µg/L	1020
<b>EG: Metals and Major Cations - Filtered</b>				
EG020: Arsenic	7440-38-2	10	µg/L	<10
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2
EG020: Chromium	7440-47-3	1	µg/L	<1
EG020: Copper	7440-50-8	1	µg/L	2
EG020: Lead	7439-92-1	1	µg/L	<1
EG020: Mercury	7439-97-6	0.1	µg/L	<0.1
EG020: Nickel	7440-02-0	1	µg/L	1
EG020: Silver	7440-22-4	1	µg/L	<1
EG020: Zinc	7440-66-6	10	µg/L	<10
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs)</b>				
Naphthalene	9120-3	0.2	µg/L	0.4
Acenaphthylene	208-96-8	0.2	µg/L	16.8
Acenaphthene	83-32-9	0.2	µg/L	1.0
Fluorene	86-73-7	0.2	µg/L	0.3
Phenanthrene	85-018	0.2	µg/L	3.7
Anthracene	120-12-7	0.2	µg/L	2.2
Fluoranthene	206-44-0	0.2	µg/L	37.2
Pyrene	129-00-0	0.2	µg/L	96.6
Benz(a)anthracene	56-55-3	0.2	µg/L	33.5
Chrysene	218-019	0.2	µg/L	32.5
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	50.5
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	20.8
Benzo(a)pyrene	50-32-8	0.2	µg/L	54.0
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	32.4
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	2.0
Benzo(g,h,i)perylene	19124-2	0.2	µg/L	31.4
Low M.W. PAHs	----	2.2	µg/L	24.5
High M.W. PAHs	----	6.8	µg/L	391
<b>EP-065A: PCB Single Congeners</b>				
PCB 8	34883-43-7	0.01	µg/L	<0.01
PCB 18	37680-65-2	0.01	µg/L	<0.01
PCB 28	7012-37-5	0.01	µg/L	<0.01
PCB 44	41464-39-5	0.01	µg/L	<0.01
PCB 52	35693-99-3	0.01	µg/L	<0.01





Sub-Matrix: INTERSTITIAL WATER		Client sample ID		VR5
Compound	CAS Number	LOR	Unit	GRAB
		Client sampling date / time		14-JAN-2012 11:55
				HK1201653-001
<b>EP-065A: PCB Single Congeners - Continued</b>				
PCB 66	32598-10-0	0.01	µg/L	<0.01
PCB 77	32598-13-3	0.01	µg/L	<0.01
PCB 101	37680-73-2	0.01	µg/L	<0.01
PCB 105	32598-14-4	0.01	µg/L	<0.01
PCB 118	31508-00-6	0.01	µg/L	<0.01
PCB 126	57465-28-8	0.01	µg/L	<0.01
PCB 128	38380-07-3	0.01	µg/L	<0.01
PCB 138	35065-28-2	0.01	µg/L	<0.01
PCB 153	35065-27-1	0.01	µg/L	<0.01
PCB 169	32774-16-6	0.01	µg/L	<0.01
PCB 170	35065-30-6	0.01	µg/L	<0.01
PCB 180	35065-29-3	0.01	µg/L	<0.01
PCB 187	52663-68-0	0.01	µg/L	<0.01
Total Polychlorinated biphenyls	----	0.18	µg/L	<0.18
<b>EP-067A: Organochlorine Pesticides (OC)</b>				
Aldrin	309-00-2	0.10	µg/L	<0.10
alpha-BHC	319-84-6	0.10	µg/L	<0.10
beta-BHC	319-85-7	0.10	µg/L	<0.10
gamma-BHC	58-89-9	0.10	µg/L	<0.10
delta-BHC	319-86-8	0.10	µg/L	<0.10
Heptachlor	76-44-8	0.10	µg/L	<0.10
Heptachlor epoxide	1024-57-3	0.10	µg/L	<0.10
Endosulfan 1	959-98-8	0.10	µg/L	<0.10
Endosulfan sulfate	1031-07-8	0.10	µg/L	<0.10
4,4'-DDT	50-29-3	0.10	µg/L	<0.10
4,4'-DDD	72-54-8	0.10	µg/L	<0.10
4,4'-DDE	72-55-9	0.10	µg/L	<0.10
<b>EP-390: Triorganotins</b>				
Tributyltin	56573-85-4	0.015	µg TBT /L	<0.015
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>				
2-Fluorobiphenyl	32160-8	0.1	%	54.3
4-Terphenyl-d14	1718-51-0	0.1	%	73.8
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>				
Decachlorobiphenyl	205124-3	0.1	%	51.8
<b>EP-067S: Pesticide Surrogate</b>				
Dibutylchlorendate	1770-80-5	0.1	%	108

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**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
						Original Result	Duplicate Result	
<b>Matrix: WATER</b>								
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133256)</b>								
HK1201670-001	Anonymous	EK055K: Ammonia as N	7664-41-7	0.01	mg/L	34.6	37.8	8.7
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133259)</b>								
HK1201670-001	Anonymous	EK071K: Reactive Phosphorus as P	----	0.01	mg/L	0.01	0.01	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133353)</b>								
HK1201510-052	Anonymous	EK067A: Total Phosphorus as P	----	0.1	mg/L	0.2	0.2	0.0
HK1201648-004	Anonymous	EK067A: Total Phosphorus as P	----	0.1	mg/L	0.2	0.2	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133354)</b>								
HK1201510-052	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.0
HK1201623-001	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	25.9	28.4	9.2
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142437)</b>								
HK1201643-001	Anonymous	EK057A: Nitrite as N	----	0.01	mg/L	0.07	0.07	0.0
HK1201680-004	Anonymous	EK057A: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2134967)</b>								
HK1201512-004	Anonymous	EG020: Mercury	7439-97-6	0.1	µg/L	0.1	<0.1	0.0
		EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	0.0
		EG020: Chromium	7440-47-3	1	µg/L	<1	<1	0.0
		EG020: Copper	7440-50-8	1	µg/L	4	4	0.0
		EG020: Lead	7439-92-1	1	µg/L	<1	<1	0.0
		EG020: Nickel	7440-02-0	1	µg/L	4	4	0.0
		EG020: Silver	7440-22-4	1	µg/L	<1	<1	0.0
		EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	0.0
		EG020: Zinc	7440-66-6	10	µg/L	201	197	2.2
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2133670)</b>								
HK1201648-006	Anonymous	Naphthalene	91-20-3	0.2	µg/L	<0.2	<0.2	0.0
		Acenaphthylene	208-96-8	0.2	µg/L	<0.2	<0.2	0.0
		Acenaphthene	83-32-9	0.2	µg/L	<0.2	<0.2	0.0
		Fluorene	86-73-7	0.2	µg/L	<0.2	<0.2	0.0
		Phenanthrene	85-01-8	0.2	µg/L	<0.2	<0.2	0.0
		Anthracene	120-12-7	0.2	µg/L	<0.2	<0.2	0.0
		Fluoranthene	206-44-0	0.2	µg/L	<0.2	<0.2	0.0
		Pyrene	129-00-0	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(a)anthracene	56-55-3	0.2	µg/L	<0.2	<0.2	0.0
		Chrysene	218-01-9	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(b)fluoranthene	205-99-2	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(k)fluoranthene	207-08-9	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(a)pyrene	50-32-8	0.2	µg/L	<0.2	<0.2	0.0
		Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2	<0.2	0.0
		Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2	<0.2	0.0
		Low M.W. PAHs	----	2.2	µg/L	<2.2	<2.2	0.0
		High M.W. PAHs	----	6.8	µg/L	<6.8	<6.8	0.0





Page Number : 6 of 9  
 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201653

Matrix: WATER		Laboratory Duplicate (DUP) Report		RPD (%)				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>EP-065A: PCB Single Congeners (QC Lot: 2133671)</b>								
HK1201648-006	Anonymous	PCB 8	34883-43-7	0.01	µg/L	<0.01	<0.01	0.0
		PCB 18	37680-65-2	0.01	µg/L	<0.01	<0.01	0.0
		PCB 28	7012-37-5	0.01	µg/L	<0.01	<0.01	0.0
		PCB 44	41464-39-5	0.01	µg/L	<0.01	<0.01	0.0
		PCB 52	35693-99-3	0.01	µg/L	<0.01	<0.01	0.0
		PCB 66	32598-10-0	0.01	µg/L	<0.01	<0.01	0.0
		PCB 77	32598-13-3	0.01	µg/L	<0.01	<0.01	0.0
		PCB 101	37680-73-2	0.01	µg/L	<0.01	<0.01	0.0
		PCB 105	32598-14-4	0.01	µg/L	<0.01	<0.01	0.0
		PCB 118	31508-00-6	0.01	µg/L	<0.01	<0.01	0.0
		PCB 126	57465-28-8	0.01	µg/L	<0.01	<0.01	0.0
		PCB 128	38380-07-3	0.01	µg/L	<0.01	<0.01	0.0
		PCB 138	35065-28-2	0.01	µg/L	<0.01	<0.01	0.0
		PCB 153	35065-27-1	0.01	µg/L	<0.01	<0.01	0.0
		PCB 169	32774-16-6	0.01	µg/L	<0.01	<0.01	0.0
		PCB 170	35065-30-6	0.01	µg/L	<0.01	<0.01	0.0
		PCB 180	35065-29-3	0.01	µg/L	<0.01	<0.01	0.0
		PCB 187	52663-68-0	0.01	µg/L	<0.01	<0.01	0.0
		Total Polychlorinated biphenyls	----	0.18	µg/L	<0.18	<0.18	0.0
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2133672)</b>								
HK1201648-006	Anonymous	Aldrin	309-00-2	0.10	µg/L	<0.10	<0.10	0.0
		alpha-BHC	319-84-6	0.10	µg/L	<0.10	<0.10	0.0
		beta-BHC	319-85-7	0.10	µg/L	<0.10	<0.10	0.0
		gamma-BHC	58-89-9	0.10	µg/L	<0.10	<0.10	0.0
		delta-BHC	319-86-8	0.10	µg/L	<0.10	<0.10	0.0
		Heptachlor	76-44-8	0.10	µg/L	<0.10	<0.10	0.0
		Heptachlor epoxide	1024-57-3	0.10	µg/L	<0.10	<0.10	0.0
		Endosulfan 1	959-98-8	0.10	µg/L	<0.10	<0.10	0.0
		Endosulfan sulfate	1031-07-8	0.10	µg/L	<0.10	<0.10	0.0
		4,4'-DDT	50-29-3	0.10	µg/L	<0.10	<0.10	0.0
		4,4'-DDD	72-54-8	0.10	µg/L	<0.10	<0.10	0.0
		4,4'-DDE	72-55-9	0.10	µg/L	<0.10	<0.10	0.0
<b>EP-390: Triorganotins (QC Lot: 2143967)</b>								
HK1201670-002	Anonymous	Tributyltin	56573-85-4	6	ngSn/L	<6	<6	0.0

**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	LCS	DCS	Recovery Limits (%)	Value	Control Limit
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133256)</b>										
EK055K: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	95.3	----	85	115	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133259)</b>										
EK071K: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/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	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133353)</b>														
EK067A: Total Phosphorus as P	---	0.1	mg/L	<0.1	0.5 mg/L	95.2	---	---	85	85	115	---	---	---
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133354)</b>														
EK061A: Total Kjeldahl Nitrogen as N	---	0.1	mg/L	<0.1	0.5 mg/L	101	---	---	85	85	115	---	---	---
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142437)</b>														
EK057A: Nitrite as N	---	0.01	mg/L	<0.01	0.4 mg/L	97.2	---	---	85	85	115	---	---	---
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2134967)</b>														
EG020: Arsenic	7440-38-2	10	µg/L	<10	100 µg/L	91.8	---	---	78	78	114	---	---	---
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	100 µg/L	98.2	---	---	80	80	112	---	---	---
EG020: Chromium	7440-47-3	1	µg/L	<1	100 µg/L	98.7	---	---	80	80	114	---	---	---
EG020: Copper	7440-50-8	1	µg/L	<1	100 µg/L	94.6	---	---	79	79	113	---	---	---
EG020: Lead	7439-92-1	1	µg/L	<1	100 µg/L	99.0	---	---	81	81	109	---	---	---
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	2 µg/L	95.0	---	---	81	81	113	---	---	---
EG020: Nickel	7440-02-0	1	µg/L	<1	100 µg/L	100	---	---	78	78	112	---	---	---
EG020: Silver	7440-22-4	1	µg/L	<1	100 µg/L	87.3	---	---	79	79	111	---	---	---
EG020: Zinc	7440-66-6	10	µg/L	<10	100 µg/L	91.5	---	---	73	73	121	---	---	---
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2133670)</b>														
Naphthalene	91-20-3	0.2	µg/L	<0.2	0.5 µg/L	101	---	---	44	44	114	---	---	---
Acenaphthylene	208-96-8	0.2	µg/L	<0.2	0.5 µg/L	89.5	---	---	40	40	109	---	---	---
Acenaphthene	83-32-9	0.2	µg/L	<0.2	0.5 µg/L	92.2	---	---	44	44	108	---	---	---
Fluorene	86-73-7	0.2	µg/L	<0.2	0.5 µg/L	98.7	---	---	43	43	113	---	---	---
Phenanthrene	85-01-8	0.2	µg/L	<0.2	0.5 µg/L	93.3	---	---	45	45	115	---	---	---
Anthracene	120-12-7	0.2	µg/L	<0.2	0.5 µg/L	86.2	---	---	45	45	112	---	---	---
Fluoranthene	206-44-0	0.2	µg/L	<0.2	0.5 µg/L	101	---	---	56	56	121	---	---	---
Pyrene	129-00-0	0.2	µg/L	<0.2	0.5 µg/L	94.5	---	---	57	57	122	---	---	---
Benz(a)anthracene	56-55-3	0.2	µg/L	<0.2	0.5 µg/L	93.8	---	---	61	61	118	---	---	---
Chrysene	218-01-9	0.2	µg/L	<0.2	0.5 µg/L	108	---	---	65	65	126	---	---	---
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	<0.2	0.5 µg/L	102	---	---	49	49	138	---	---	---
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	<0.2	0.5 µg/L	86.8	---	---	69	69	123	---	---	---
Benzo(a)pyrene	50-32-8	0.2	µg/L	<0.2	0.5 µg/L	105	---	---	51	51	134	---	---	---
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2	0.5 µg/L	102	---	---	54	54	129	---	---	---
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	0.5 µg/L	103	---	---	51	51	138	---	---	---
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2	0.5 µg/L	108	---	---	59	59	135	---	---	---
Low M.W. PAHs	---	1.2	µg/L	<1.2	---	---	---	---	---	---	---	---	---	---
High M.W. PAHs	---	2.0	µg/L	<2.0	---	---	---	---	---	---	---	---	---	---
<b>EP-065A: PCB Single Congeners (QC Lot: 2133671)</b>														
PCB 8	34883-43-7	0.01	µg/L	<0.01	0.1 µg/L	68.3	---	---	50	50	130	---	---	---
PCB 18	37680-65-2	0.01	µg/L	<0.01	0.1 µg/L	55.2	---	---	50	50	130	---	---	---
PCB 28	7012-37-5	0.01	µg/L	<0.01	0.1 µg/L	85.8	---	---	50	50	130	---	---	---
PCB 44	41464-39-5	0.01	µg/L	<0.01	0.1 µg/L	89.7	---	---	50	50	130	---	---	---
PCB 52	35693-99-3	0.01	µg/L	<0.01	0.1 µg/L	84.6	---	---	50	50	130	---	---	---
PCB 66	32598-10-0	0.01	µg/L	<0.01	0.1 µg/L	112	---	---	50	50	130	---	---	---
PCB 77	32598-13-3	0.01	µg/L	<0.01	0.1 µg/L	79.0	---	---	50	50	130	---	---	---





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	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Value	RPD (%)	Control Limit
<b>EP-065A: PCB Single Congeners (QC Lot: 2133671) - Continued</b>												
PCB 101	37680-73-2	0.01	µg/L	<0.01	0.1 µg/L	54.7	-----	-----	50	130	-----	-----
PCB 105	32598-14-4	0.01	µg/L	<0.01	0.1 µg/L	80.4	-----	-----	50	130	-----	-----
PCB 118	31508-00-6	0.01	µg/L	<0.01	0.1 µg/L	78.3	-----	-----	50	130	-----	-----
PCB 126	57465-28-8	0.01	µg/L	<0.01	0.1 µg/L	81.3	-----	-----	50	130	-----	-----
PCB 128	38380-07-3	0.01	µg/L	<0.01	0.1 µg/L	77.4	-----	-----	50	130	-----	-----
PCB 138	35065-28-2	0.01	µg/L	<0.01	0.1 µg/L	73.3	-----	-----	50	130	-----	-----
PCB 153	35065-27-1	0.01	µg/L	<0.01	0.1 µg/L	74.4	-----	-----	50	130	-----	-----
PCB 169	32774-16-6	0.01	µg/L	<0.01	0.1 µg/L	81.4	-----	-----	50	130	-----	-----
PCB 170	35065-30-6	0.01	µg/L	<0.01	0.1 µg/L	75.6	-----	-----	50	130	-----	-----
PCB 180	35065-29-3	0.01	µg/L	<0.01	0.1 µg/L	75.6	-----	-----	50	130	-----	-----
PCB 187	52663-68-0	0.01	µg/L	<0.01	0.1 µg/L	68.5	-----	-----	50	130	-----	-----
Total Polychlorinated biphenyls	-----	0.18	µg/L	<0.18	-----	-----	-----	-----	-----	-----	-----	-----
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2133672)</b>												
Aldrin	309-00-2	0.02	µg/L	<0.02	0.1 µg/L	52.0	-----	-----	50	130	-----	-----
alpha-BHC	319-84-6	0.02	µg/L	<0.02	0.1 µg/L	52.6	-----	-----	50	130	-----	-----
beta-BHC	319-85-7	0.02	µg/L	<0.02	0.1 µg/L	64.6	-----	-----	50	130	-----	-----
gamma-BHC	58-89-9	0.02	µg/L	<0.02	0.1 µg/L	54.7	-----	-----	50	130	-----	-----
delta-BHC	319-86-8	0.02	µg/L	<0.02	0.1 µg/L	78.3	-----	-----	50	130	-----	-----
Heptachlor	76-44-8	0.02	µg/L	<0.02	0.1 µg/L	55.0	-----	-----	50	130	-----	-----
Heptachlor epoxide	1024-57-3	0.02	µg/L	<0.02	0.1 µg/L	75.7	-----	-----	50	130	-----	-----
Endosulfan 1	959-98-8	0.02	µg/L	<0.02	0.1 µg/L	82.2	-----	-----	50	130	-----	-----
Endosulfan sulfate	1031-07-8	0.02	µg/L	<0.02	0.1 µg/L	104	-----	-----	50	130	-----	-----
4,4'-DDT	50-29-3	0.02	µg/L	<0.02	0.1 µg/L	99.7	-----	-----	50	130	-----	-----
4,4'-DDD	72-54-8	0.02	µg/L	<0.02	0.1 µg/L	95.3	-----	-----	50	130	-----	-----
4,4'-DDE	72-55-9	0.02	µg/L	<0.02	0.1 µg/L	82.7	-----	-----	50	130	-----	-----
<b>EP-390: Triorganotins (QC Lot: 2143967)</b>												
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	110	-----	-----	81	117	-----	-----





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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report															
				Spike Concentration	MS	MSD	Recovery Limits (%)	RPD (%)											
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133256)																			
HK1201670-001	Anonymous	EK055K: Ammonia as N	7664-41-7	5 mg/L	# Not Determined	---	75	125	---	---									
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133259)																			
HK1201670-001	Anonymous	EK071K: Reactive Phosphorus as P	---	0.5 mg/L	119	---	75	125	---	---									
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133353)																			
HK1201648-006	Anonymous	EK067A: Total Phosphorus as P	---	0.5 mg/L	92.7	---	75	125	---	---									
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133354)																			
HK1201510-008	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	---	50 mg/L	87.4	---	75	125	---	---									
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142437)																			
HK1201643-001	Anonymous	EK057A: Nitrite as N	---	0.5 mg/L	119	---	75	125	---	---									
EG: Metals and Major Cations - Filtered (QC Lot: 2134967)																			
HK1201436-005	Anonymous	EG020: Arsenic	7440-38-2	100 µg/L	99.3	---	75	125	---	---									
		EG020: Cadmium	7440-43-9	100 µg/L	103	---	75	125	---	---									
		EG020: Chromium	7440-47-3	100 µg/L	106	---	75	125	---	---									
		EG020: Copper	7440-50-8	100 µg/L	100	---	75	125	---	---									
		EG020: Lead	7439-92-1	100 µg/L	102	---	75	125	---	---									
		EG020: Mercury	7439-97-6	2 µg/L	83.2	---	75	125	---	---									
		EG020: Nickel	7440-02-0	100 µg/L	106	---	75	125	---	---									
		EG020: Silver	7440-22-4	100 µg/L	84.6	---	75	125	---	---									
		EG020: Zinc	7440-66-6	100 µg/L	98.0	---	75	125	---	---									

**Surrogate Control Limits**

Compound	CAS Number	Recovery Limits (%)	
		Low	High
Sub-Matrix: INTERSTITIAL WATER			
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate			
Decachlorobiphenyl	2051-24-3	50	130
EP-067S: Pesticide Surrogate			
Dibutylchloroendate	1770-80-5	50	130

# ALS Technichem (HK) Pty Ltd

**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES



## CERTIFICATE OF ANALYSIS

Client	: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Laboratory	: ALS Technichem HK Pty Ltd	Page	: 1 of 12
Contact	: IR POPHIL LAM	Contact	: Chan Kwok Fai, Godfrey	Work Order	: HK1201876
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Project	: AGREEMENT NO CE 43_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION	Quote number	: ----	Date Samples Received	: 18-JAN-2012
Order number	: GE/2009/16.41	Issue Date	: 16-FEB-2012		
C-O-C number	: H014518	No. of samples received	: 12		
Site	: GB1 TO GB11	No. of samples analysed	: 12		

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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

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Authorised results for

Organics  
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Page Number : 2 of 12  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201876

### 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:

30-JAN-2012

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: **HK1201876**

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

Sample(s) were filtered prior to dissolved metal analysis.



**Analytical Results**

Sub-Matrix: INTERSTITIAL WATER

Compound	CAS Number	LOR	Client sampling date / time		GB1	GB2	GB11	GB3	GB4
			18-JAN-2012 09:10	18-JAN-2012 09:44					
			Unit	Unit	HK1201876-001	HK1201876-002	HK1201876-003	HK1201876-004	HK1201876-005
<b>ED/EK: Inorganic Nonmetallic Parameters</b>									
EK055K: Ammonia as N	7664-417	0.01	mg/L		3.14	15.3	16.6	8.62	6.82
EK057A: Nitrite as N	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058A: Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L		4.0	15.4	17.2	10.4	8.9
EK067A: Total Phosphorus as P	----	0.1	mg/L		0.1	1.4	0.5	1.6	2.1
EK071K: Reactive Phosphorus as P	----	10	µg/L		50	1440	480	1630	2120
<b>EG: Metals and Major Cations - Filtered</b>									
EG020: Arsenic	7440-38-2	10	µg/L		<10	15	16	28	15
EG020: Cadmium	7440-43-9	0.2	µg/L		<0.2	<0.2	<0.2	<0.2	<0.2
EG020: Chromium	7440-47-3	1	µg/L		6	4	3	2	3
EG020: Copper	7440-50-8	1	µg/L		<1	<1	2	1	1
EG020: Lead	7439-92-1	1	µg/L		<1	<1	<1	<1	<1
EG020: Mercury	7439-97-6	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
EG020: Nickel	7440-02-0	1	µg/L		2	2	2	2	3
EG020: Silver	7440-22-4	1	µg/L		<1	<1	<1	<1	<1
EG020: Zinc	7440-66-6	10	µg/L		<10	<10	<10	<10	<10
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs)</b>									
Naphthalene	91-20-3	0.2	µg/L		0.3	165	65.6	88.7	12400
Acenaphthylene	208-96-8	0.2	µg/L		2.5	13.8	7.9	11.6	585
Acenaphthene	83-32-9	0.2	µg/L		14.7	196	92.1	36.9	2260
Fluorene	86-73-7	0.2	µg/L		0.6	42.9	17.7	6.4	1060
Phenanthrene	85-01-8	0.2	µg/L		2.5	188	92.7	31.6	4650
Anthracene	120-12-7	0.2	µg/L		2.6	48.5	16.9	7.8	876
Fluoranthene	206-44-0	0.2	µg/L		26.7	126	82.3	43.6	2130
Pyrene	129-00-0	0.2	µg/L		30.2	148	107	59.3	2640
Benz(a)anthracene	56-55-3	0.2	µg/L		9.5	33.5	23.4	16.8	703
Chrysene	218-01-9	0.2	µg/L		7.6	29.2	17.9	13.9	528
Benzo(b)fluoranthene	205-99-2	0.2	µg/L		8.3	28.4	18.6	17.0	552
Benzo(k)fluoranthene	207-08-9	0.2	µg/L		3.7	10.8	8.3	6.8	185
Benzo(a)pyrene	50-32-8	0.2	µg/L		9.2	26.0	18.2	16.6	561
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L		3.2	11.9	7.8	8.0	258
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L		0.7	1.7	1.1	1.4	49.9
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L		2.6	10.7	7.2	7.5	238
Low M.W. PAHs	----	2.2	µg/L		23.2	655	293	183	21800
High M.W. PAHs	----	6.8	µg/L		102	426	292	191	7840
<b>EP-065A: PCB Single Congeners</b>									
PCB 8	34883-43-7	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
PCB 18	37680-65-2	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
PCB 28	7012-37-5	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
PCB 44	41464-39-5	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
PCB 52	35693-99-3	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
PCB 66	32598-10-0	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01





Sub-Matrix: INTERSTITIAL WATER		Client sample ID			
Compound	CAS Number	LOR	Unit	Client sampling date / time	Client sample ID
<b>EP-065A: PCB Single Congeners - Continued</b>					
PCB 77	32598-13-3	0.01	µg/L	18-JAN-2012 09:10	GB1 HK1201876-001
PCB 101	37680-73-2	0.01	µg/L	18-JAN-2012 09:44	GB2 HK1201876-002
PCB 105	32598-14-4	0.01	µg/L	18-JAN-2012 10:10	GB11 HK1201876-003
PCB 118	31508-00-6	0.01	µg/L	18-JAN-2012 10:40	GB3 HK1201876-004
PCB 126	57465-28-8	0.01	µg/L		GB4 18-JAN-2012 11:05
PCB 128	38380-07-3	0.01	µg/L		HK1201876-005
PCB 138	35065-28-2	0.01	µg/L		
PCB 153	35065-27-1	0.01	µg/L		
PCB 169	32774-16-6	0.01	µg/L		
PCB 170	35065-30-6	0.01	µg/L		
PCB 180	35065-29-3	0.01	µg/L		
PCB 187	52663-68-0	0.01	µg/L		
Total Polychlorinated biphenyls	----	0.18	µg/L		
<b>EP-067A: Organochlorine Pesticides (OC)</b>					
Aldrin	309-00-2	0.10	µg/L	<0.10	<0.10
alpha-BHC	319-84-6	0.10	µg/L	<0.10	<0.10
beta-BHC	319-85-7	0.10	µg/L	<0.10	<0.10
gamma-BHC	58-89-9	0.10	µg/L	<0.10	<0.10
delta-BHC	319-86-8	0.10	µg/L	<0.10	<0.10
Heptachlor	76-44-8	0.10	µg/L	<0.10	<0.10
Heptachlor epoxide	1024-57-3	0.10	µg/L	<0.10	<0.10
Endosulfan 1	959-98-8	0.10	µg/L	<0.10	<0.10
Endosulfan sulfate	1031-07-8	0.10	µg/L	<0.10	<0.10
4,4'-DDT	50-29-3	0.10	µg/L	<0.10	<0.10
4,4'-DDD	72-54-8	0.10	µg/L	<0.10	<0.10
4,4'-DDE	72-55-9	0.10	µg/L	<0.10	<0.10
<b>EP-390: Triorganotins</b>					
Tributyltin	56573-85-4	0.015	µg TBT/L	<0.015	<0.015
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>					
2-Fluorobiphenyl	321-60-8	0.1	%	53.5	51.0
4-Terphenyl-d14	1718-510	0.1	%	52.9	56.0
<b>EP-066S: PCB Congeners and Organochlorine Pesticides Surrogate</b>					
Decachlorobiphenyl	2051-24-3	0.1	%	70.2	64.0
<b>EP-067S: Pesticide Surrogate</b>					
Dibutylchlorendate	1770-80-5	0.1	%	107	110
				0.030	0.041
				Surrogate control limits listed at end of this report.	
				59.0	110
				55.0	50.5
				Surrogate control limits listed at end of this report.	
				76.6	62.1
				Surrogate control limits listed at end of this report.	
				78.8	126





Sub-Matrix: INTERSTITIAL WATER		Client sample ID		GB5	GB5 (DUPLICATE)	GB6	GB7	GB8
Compound	CAS Number	LOR	Unit	18-JAN-2012 11:25 HK1201876-006	18-JAN-2012 11:30 HK1201876-007	18-JAN-2012 13:10 HK1201876-008	18-JAN-2012 13:35 HK1201876-009	18-JAN-2012 14:05 HK1201876-010
<b>ED/EK: Inorganic Nonmetallic Parameters</b>								
EK055K: Ammonia as N	7664-41-7	0.01	mg/L	5.98	15.5	11.7	5.44	13.3
EK057A: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058A: Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	7.5	16.6	12.2	5.4	14.8
EK067A: Total Phosphorus as P	----	0.1	mg/L	1.5	2.9	1.6	0.2	2.6
EK071K: Reactive Phosphorus as P	----	10	µg/L	1520	2900	1620	220	1030
<b>EG: Metals and Major Cations - Filtered</b>								
EG020: Arsenic	7440-38-2	10	µg/L	15	<10	16	<10	16
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
EG020: Chromium	7440-47-3	1	µg/L	3	3	1	<1	1
EG020: Copper	7440-50-8	1	µg/L	2	2	3	2	5
EG020: Lead	7439-92-1	1	µg/L	1	2	<1	<1	<1
EG020: Mercury	7439-97-6	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EG020: Nickel	7440-02-0	1	µg/L	4	2	<1	1	1
EG020: Silver	7440-22-4	1	µg/L	<1	<1	<1	<1	<1
EG020: Zinc	7440-66-6	10	µg/L	<10	<10	<10	<10	<10
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs)</b>								
Naphthalene	91-20-3	0.2	µg/L	1.6	1.2	0.6	0.2	<0.2
Acenaphthylene	208-96-8	0.2	µg/L	12.9	12.3	4.1	2.0	0.6
Acenaphthene	83-32-9	0.2	µg/L	100	102	8.4	2.4	0.3
Fluorene	86-73-7	0.2	µg/L	1.8	1.6	0.6	0.2	<0.2
Phenanthrene	85-018	0.2	µg/L	17.1	18.8	3.8	2.1	0.4
Anthracene	120-12-7	0.2	µg/L	10.6	11.9	2.3	1.2	0.4
Fluoranthene	206-44-0	0.2	µg/L	173	169	23.0	7.0	1.3
Pyrene	129-00-0	0.2	µg/L	189	180	35.3	11.6	2.8
Benz(a)anthracene	56-55-3	0.2	µg/L	59.6	60.9	10.4	3.5	0.7
Chrysene	218-019	0.2	µg/L	46.1	48.8	8.4	3.1	0.8
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	49.4	51.5	10.8	3.6	1.0
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	14.2	21.8	4.3	1.4	0.5
Benzo(a)pyrene	50-32-8	0.2	µg/L	51.9	54.6	11.6	3.3	1.0
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	16.5	25.6	5.5	1.8	0.5
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	2.1	2.8	0.8	0.4	<0.2
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	15.0	24.3	5.2	1.6	0.4
Low M.W. PAHs	----	2.2	µg/L	144	148	19.7	8.2	<2.2
High M.W. PAHs	----	6.8	µg/L	616	639	115	37.3	9.0
<b>EP-065A: PCB Single Congeners</b>								
PCB 8	34883-43-7	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 18	37680-65-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 28	7012-37-5	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 44	41464-39-5	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 52	35693-99-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 66	32598-10-0	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 77	32598-13-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01





Sub-Matrix: INTERSTITIAL WATER		Client sample ID						
Compound	CAS Number	LOR	Client sampling date / time	GB5	GB5 (DUPLICATE)	GB6	GB7	GB8
				18-JAN-2012 11:25 HK1201876-006	18-JAN-2012 11:30 HK1201876-007	18-JAN-2012 13:10 HK1201876-008	18-JAN-2012 13:35 HK1201876-009	18-JAN-2012 14:05 HK1201876-010
<b>EP-065A: PCB Single Congeners - Continued</b>								
PCB 101	37680-73-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 105	32598-14-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 118	31508-00-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 126	57465-28-8	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 128	38380-07-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 138	35065-28-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 153	35065-27-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 169	32774-16-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 170	35065-30-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 180	35065-29-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 187	52863-68-0	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Total Polychlorinated biphenyls	----	0.18	µg/L	<0.18	<0.18	<0.18	<0.18	<0.18
<b>EP-067A: Organochlorine Pesticides (OC)</b>								
Aldrin	309-00-2	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
alpha-BHC	319-84-6	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
beta-BHC	319-85-7	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
gamma-BHC	58-89-9	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
delta-BHC	319-86-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Heptachlor	76-44-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Heptachlor epoxide	1024-57-3	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan 1	959-98-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan sulfate	1031-07-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDT	50-29-3	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDD	72-54-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDE	72-55-9	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
<b>EP-390: Triorganotins</b>								
Tributyltin	56573-85-4	0.015	µg TBT/L	0.029	0.026	<0.015	<0.015	<0.015
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>								
2-Fluorobiphenyl	32160-8	0.1	%	64.7	55.1	51.8	63.8	55.3
4-Terphenyl-d14	1718-51-0	0.1	%	54.8	65.2	56.6	54.7	103
<b>EP-066S: PCB Congeners and Organochlorine Pesticides Surrogate</b>								
Decachlorobiphenyl	205124-3	0.1	%	79.4	66.6	76.9	73.2	83.7
<b>EP-067S: Pesticide Surrogate</b>								
Dibutylchlorendate	1770-80-5	0.1	%	97.4	92.3	85.4	97.8	97.7





Sub-Matrix: INTERSTITIAL WATER		Client sample ID		GB9	GB10
Compound	CAS Number	LOR	Unit	18-JAN-2012 14:25 HK1201876-011	18-JAN-2012 14:45 HK1201876-012
<b>ED/EK: Inorganic Nonmetallic Parameters</b>					
EK055K: Ammonia as N	7664-417	0.01	mg/L	14.5	22.4
EK057A: Nitrite as N	----	0.01	mg/L	<0.01	<0.01
EK058A: Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01
EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	16.4	24.1
EK067A: Total Phosphorus as P	----	0.1	mg/L	2.5	4.8
EK071K: Reactive Phosphorus as P	----	10	µg/L	2510	4760
<b>EG: Metals and Major Cations - Filtered</b>					
EG020: Arsenic	7440-38-2	10	µg/L	25	13
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2
EG020: Chromium	7440-47-3	1	µg/L	2	6
EG020: Copper	7440-50-8	1	µg/L	<1	4
EG020: Lead	7439-92-1	1	µg/L	<1	1
EG020: Mercury	7439-97-6	0.1	µg/L	<0.1	<0.1
EG020: Nickel	7440-02-0	1	µg/L	2	4
EG020: Silver	7440-22-4	1	µg/L	<1	<1
EG020: Zinc	7440-66-6	10	µg/L	<10	<10
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs)</b>					
Naphthalene	91-20-3	0.2	µg/L	0.3	0.6
Acenaphthylene	208-96-8	0.2	µg/L	1.7	6.9
Acenaphthene	83-32-9	0.2	µg/L	1.0	21.7
Fluorene	86-73-7	0.2	µg/L	<0.2	0.3
Phenanthrene	85-018	0.2	µg/L	1.6	2.6
Anthracene	120-12-7	0.2	µg/L	1.1	15.1
Fluoranthene	206-44-0	0.2	µg/L	4.6	180
Pyrene	129-00-0	0.2	µg/L	13.4	247
Benz(a)anthracene	56-55-3	0.2	µg/L	2.6	36.7
Chrysene	218-019	0.2	µg/L	2.3	33.5
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	3.0	30.5
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	0.9	12.0
Benzo(a)pyrene	50-32-8	0.2	µg/L	2.6	31.3
Indeno(1,2,3-cd)pyrene	183-39-5	0.2	µg/L	1.4	14.2
Dibenzo(a,h)anthracene	53-70-3	0.2	µg/L	0.3	1.8
Benzo(g,h,i)perylene	181-24-2	0.2	µg/L	1.2	12.8
Low M.W. PAHs	----	2.2	µg/L	5.7	47.2
High M.W. PAHs	----	6.8	µg/L	32.3	600
<b>EP-065A: PCB Single Congeners</b>					
PCB 8	34883-43-7	0.01	µg/L	<0.01	<0.01
PCB 18	37680-65-2	0.01	µg/L	<0.01	<0.01
PCB 28	7012-37-5	0.01	µg/L	<0.01	<0.01
PCB 44	41464-39-5	0.01	µg/L	<0.01	<0.01
PCB 52	35693-99-3	0.01	µg/L	<0.01	<0.01
PCB 66	32598-10-0	0.01	µg/L	<0.01	<0.01
PCB 77	32598-13-3	0.01	µg/L	<0.01	<0.01





Sub-Matrix: INTERSTITIAL WATER		Client sample ID		GB9	GB10
Compound	CAS Number	LOR	Unit	18-JAN-2012 14:25 HK1201876-011	18-JAN-2012 14:45 HK1201876-012
<b>EP-065A: PCB Single Congeners - Continued</b>					
PCB 101	37680-73-2	0.01	µg/L	<0.01	<0.01
PCB 105	32598-14-4	0.01	µg/L	<0.01	<0.01
PCB 118	31508-00-6	0.01	µg/L	<0.01	<0.01
PCB 126	57465-28-8	0.01	µg/L	<0.01	<0.01
PCB 128	38380-07-3	0.01	µg/L	<0.01	<0.01
PCB 138	35065-28-2	0.01	µg/L	<0.01	<0.01
PCB 153	35065-27-1	0.01	µg/L	<0.01	<0.01
PCB 169	32774-16-6	0.01	µg/L	<0.01	<0.01
PCB 170	35065-30-6	0.01	µg/L	<0.01	<0.01
PCB 180	35065-29-3	0.01	µg/L	<0.01	<0.01
PCB 187	52663-68-0	0.01	µg/L	<0.01	<0.01
Total Polychlorinated biphenyls	----	0.18	µg/L	<0.18	<0.18
<b>EP-067A: Organochlorine Pesticides (OC)</b>					
Aldrin	309-00-2	0.10	µg/L	<0.10	<0.10
alpha-BHC	319-84-6	0.10	µg/L	<0.10	<0.10
beta-BHC	319-85-7	0.10	µg/L	<0.10	<0.10
gamma-BHC	58-89-9	0.10	µg/L	<0.10	<0.10
delta-BHC	319-86-8	0.10	µg/L	<0.10	<0.10
Heptachlor	76-44-8	0.10	µg/L	<0.10	<0.10
Heptachlor epoxide	1024-57-3	0.10	µg/L	<0.10	<0.10
Endosulfan 1	959-98-8	0.10	µg/L	<0.10	<0.10
Endosulfan sulfate	1031-07-8	0.10	µg/L	<0.10	<0.10
4,4'-DDT	50-29-3	0.10	µg/L	<0.10	<0.10
4,4'-DDD	72-54-8	0.10	µg/L	<0.10	<0.10
4,4'-DDE	72-55-9	0.10	µg/L	<0.10	<0.10
<b>EP-390: Triorganotins</b>					
Tributyltin	56573-85-4	0.015	µg TBT / L	<0.015	0.693
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>					
2-Fluorobiphenyl	32160-8	0.1	%	64.1	53.4
4-Terphenyl-d14	1718-510	0.1	%	84.2	55.1
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>					
Decachlorobiphenyl	205124-3	0.1	%	84.8	90.6
<b>EP-067S: Pesticide Surrogate</b>					
Dibutylchloroendate	1770-80-5	0.1	%	119	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.





**Laboratory Duplicate (DUP) Report**

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142444)</b>									
HK1201775-012	Anonymous		EK057A: Nitrite as N	----	0.01	mg/L	0.02	0.02	0.0
HK1201779-002	Anonymous		EK057A: Nitrite as N	----	0.01	mg/L	0.02	0.02	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142446)</b>									
HK1202039-004	Anonymous		EK057A: Nitrite as N	----	0.01	mg/L	0.15	0.14	6.9
HK1201775-005	Anonymous		EK057A: Nitrite as N	----	0.01	mg/L	0.02	0.02	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143530)</b>									
HK1202098-001	Anonymous		EK071K: Reactive Phosphorus as P	----	0.01	mg/L	0.99	0.96	3.1
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143542)</b>									
HK1201775-012	Anonymous		EK055K: Ammonia as N	7664-41-7	0.01	mg/L	0.33	0.37	11.4
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143543)</b>									
HK1202290-002	Anonymous		EK055K: Ammonia as N	7664-41-7	0.01	mg/L	0.23	0.24	4.2
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144328)</b>									
HK1201876-008	GB6		EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	12.2	12.2	0.0
HK1201876-010	GB8		EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	14.8	14.6	1.4
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144329)</b>									
HK1201779-001	Anonymous		EK067A: Total Phosphorus as P	----	0.1	mg/L	<0.1	<0.1	0.0
HK1201868-007	Anonymous		EK067A: Total Phosphorus as P	----	0.1	mg/L	<0.1	<0.1	0.0
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2146164)</b>									
HK1201779-002	Anonymous		EG020: Mercury	7439-97-6	0.1	µg/L	<0.1	<0.1	0.0
			EG020: Cadmium	7440-43-9	0.2	µg/L	1.0	1.0	0.0
			EG020: Chromium	7440-47-3	1	µg/L	<1	<1	0.0
			EG020: Copper	7440-50-8	1	µg/L	5	5	0.0
			EG020: Lead	7439-92-1	1	µg/L	<1	<1	0.0
			EG020: Nickel	7440-02-0	1	µg/L	11	12	0.0
			EG020: Silver	7440-22-4	1	µg/L	<1	<1	0.0
			EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	0.0
			EG020: Zinc	7440-66-6	10	µg/L	47	50	5.6
<b>EP-390: Triorganotin (QC Lot: 2143969)</b>									
HK1201876-012	GB10		Tributyltin	56573-85-4	6	ngSn/L	284	287	0.8

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

Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report								
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	High	Value	Control Limit
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142444)</b>												
EK057A: Nitrite as N	----	0.01	mg/L	<0.01	0.4 mg/L	109	-----	-----	85	115	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142446)</b>												
EK057A: Nitrite as N	----	0.01	mg/L	<0.01	0.4 mg/L	98.2	-----	-----	85	115	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143530)</b>												
EK071K: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	97.3	-----	-----	85	115	-----	-----





Method: Compound	Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		Value	Control Limit
						LCS	DCS	Low	High		
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143542)</b>											
EK055K: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	102	-----	85	115	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143543)</b>											
EK055K: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	108	-----	85	115	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144328)</b>											
EK061A: Total Kjeldahl Nitrogen as N	-----	0.1	mg/L	<0.1	0.5 mg/L	88.3	-----	85	115	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144329)</b>											
EK067A: Total Phosphorus as P	-----	0.1	mg/L	<0.1	0.5 mg/L	99.4	-----	85	115	-----	-----
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2146164)</b>											
EG020: Arsenic	7440-38-2	10	µg/L	<10	10 µg/L	97.7	-----	78	114	-----	-----
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	10 µg/L	97.2	-----	80	112	-----	-----
EG020: Chromium	7440-47-3	1	µg/L	<1	10 µg/L	102	-----	80	114	-----	-----
EG020: Copper	7440-50-8	1	µg/L	<1	10 µg/L	96.5	-----	79	113	-----	-----
EG020: Lead	7439-92-1	1	µg/L	<1	10 µg/L	96.7	-----	81	109	-----	-----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.1	0.2 µg/L	100	-----	81	113	-----	-----
EG020: Nickel	7440-02-0	1	µg/L	<1	10 µg/L	96.5	-----	78	112	-----	-----
EG020: Silver	7440-22-4	1	µg/L	<1	10 µg/L	96.2	-----	79	111	-----	-----
EG020: Zinc	7440-66-6	10	µg/L	<10	10 µg/L	95.8	-----	73	121	-----	-----
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2142667)</b>											
Naphthalene	91-20-3	0.2	µg/L	<0.2	0.5 µg/L	88.8	-----	44	114	-----	-----
Acenaphthylene	208-96-8	0.2	µg/L	<0.2	0.5 µg/L	54.8	-----	40	109	-----	-----
Acenaphthene	83-32-9	0.2	µg/L	<0.2	0.5 µg/L	69.5	-----	44	108	-----	-----
Fluorene	86-73-7	0.2	µg/L	<0.2	0.5 µg/L	92.6	-----	43	113	-----	-----
Phenanthrene	85-01-8	0.2	µg/L	<0.2	0.5 µg/L	79.8	-----	45	115	-----	-----
Anthracene	120-12-7	0.2	µg/L	<0.2	0.5 µg/L	69.1	-----	45	112	-----	-----
Fluoranthene	206-44-0	0.2	µg/L	<0.2	0.5 µg/L	93.7	-----	56	121	-----	-----
Pyrene	129-00-0	0.2	µg/L	<0.2	0.5 µg/L	80.3	-----	57	122	-----	-----
Benz(a)anthracene	56-55-3	0.2	µg/L	<0.2	0.5 µg/L	78.8	-----	61	118	-----	-----
Chrysene	218-01-9	0.2	µg/L	<0.2	0.5 µg/L	89.5	-----	65	126	-----	-----
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	<0.2	0.5 µg/L	108	-----	49	138	-----	-----
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	<0.2	0.5 µg/L	93.0	-----	69	123	-----	-----
Benzo(a)pyrene	50-32-8	0.2	µg/L	<0.2	0.5 µg/L	102	-----	51	134	-----	-----
Indeno(1.2.3.cd)pyrene	193-39-5	0.2	µg/L	<0.2	0.5 µg/L	119	-----	54	129	-----	-----
Dibenzo(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	0.5 µg/L	109	-----	51	138	-----	-----
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2	0.5 µg/L	106	-----	59	135	-----	-----
Low M.W. PAHs	-----	1.2	µg/L	<1.2	-----	-----	-----	-----	-----	-----	-----
High M.W. PAHs	-----	2.0	µg/L	<2.0	-----	-----	-----	-----	-----	-----	-----
<b>EP-065A: PCB Single Congeners (QC Lot: 2142668)</b>											
PCB 8	34883-43-7	0.01	µg/L	<0.01	0.1 µg/L	82.3	-----	50	130	-----	-----
PCB 18	37680-65-2	0.01	µg/L	<0.01	0.1 µg/L	73.8	-----	50	130	-----	-----
PCB 28	7012-37-5	0.01	µg/L	<0.01	0.1 µg/L	64.0	-----	50	130	-----	-----
PCB 44	41464-39-5	0.01	µg/L	<0.01	0.1 µg/L	59.8	-----	50	130	-----	-----
PCB 52	35693-99-3	0.01	µg/L	<0.01	0.1 µg/L	60.4	-----	50	130	-----	-----





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	LCS	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>EP-065A: PCB Single Congeners (QC Lot: 2142668) - Continued</b>													
PCB 66	32598-10-0	0.01	µg/L	<0.01	0.1 µg/L	72.9	-----	50	50	130	-----	-----	-----
PCB 77	32598-13-3	0.01	µg/L	<0.01	0.1 µg/L	79.8	-----	50	50	130	-----	-----	-----
PCB 101	37680-73-2	0.01	µg/L	<0.01	0.1 µg/L	86.1	-----	50	50	130	-----	-----	-----
PCB 105	32598-14-4	0.01	µg/L	<0.01	0.1 µg/L	84.4	-----	50	50	130	-----	-----	-----
PCB 118	31508-00-6	0.01	µg/L	<0.01	0.1 µg/L	82.7	-----	50	50	130	-----	-----	-----
PCB 126	57465-28-8	0.01	µg/L	<0.01	0.1 µg/L	86.7	-----	50	50	130	-----	-----	-----
PCB 128	38380-07-3	0.01	µg/L	<0.01	0.1 µg/L	85.1	-----	50	50	130	-----	-----	-----
PCB 138	35065-28-2	0.01	µg/L	<0.01	0.1 µg/L	83.1	-----	50	50	130	-----	-----	-----
PCB 153	35065-27-1	0.01	µg/L	<0.01	0.1 µg/L	83.6	-----	50	50	130	-----	-----	-----
PCB 169	32774-16-6	0.01	µg/L	<0.01	0.1 µg/L	86.2	-----	50	50	130	-----	-----	-----
PCB 170	35065-30-6	0.01	µg/L	<0.01	0.1 µg/L	86.1	-----	50	50	130	-----	-----	-----
PCB 180	35065-29-3	0.01	µg/L	<0.01	0.1 µg/L	86.1	-----	50	50	130	-----	-----	-----
PCB 187	52663-68-0	0.01	µg/L	<0.01	0.1 µg/L	84.2	-----	50	50	130	-----	-----	-----
Total Polychlorinated biphenyls	-----	0.18	µg/L	<0.18	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2142669)</b>													
Aldrin	309-00-2	0.02	µg/L	<0.02	0.1 µg/L	103	-----	50	50	130	-----	-----	-----
alpha-BHC	319-84-6	0.02	µg/L	<0.02	0.1 µg/L	83.6	-----	50	50	130	-----	-----	-----
beta-BHC	319-85-7	0.02	µg/L	<0.02	0.1 µg/L	102	-----	50	50	130	-----	-----	-----
gamma-BHC	58-89-9	0.02	µg/L	<0.02	0.1 µg/L	73.1	-----	50	50	130	-----	-----	-----
delta-BHC	319-86-8	0.02	µg/L	<0.02	0.1 µg/L	116	-----	50	50	130	-----	-----	-----
Heptachlor	76-44-8	0.02	µg/L	<0.02	0.1 µg/L	89.2	-----	50	50	130	-----	-----	-----
Heptachlor epoxide	1024-57-3	0.02	µg/L	<0.02	0.1 µg/L	113	-----	50	50	130	-----	-----	-----
Endosulfan 1	959-98-8	0.02	µg/L	<0.02	0.1 µg/L	101	-----	50	50	130	-----	-----	-----
Endosulfan sulfate	1031-07-8	0.02	µg/L	<0.02	0.1 µg/L	109	-----	50	50	130	-----	-----	-----
4,4'-DDT	50-29-3	0.02	µg/L	<0.02	0.1 µg/L	107	-----	50	50	130	-----	-----	-----
4,4'-DDD	72-54-8	0.02	µg/L	<0.02	0.1 µg/L	105	-----	50	50	130	-----	-----	-----
4,4'-DDE	72-55-9	0.02	µg/L	<0.02	0.1 µg/L	101	-----	50	50	130	-----	-----	-----
<b>EP-390: Triorganotins (QC Lot: 2143969)</b>													
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	98.0	-----	81	81	117	-----	-----	-----





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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
				Spike Concentration	MS	MSD	Recovery Limits (%)	RPD (%)	
				MS	MSD	Low	High	Value	Control Limit
<b>Matrix: WATER</b>									
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142444)</b>									
HK1201775-012	Anonymous	EK057A: Nitrite as N	----	0.5 mg/L	113	75	125	----	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142446)</b>									
HK1202039-004	Anonymous	EK057A: Nitrite as N	----	0.5 mg/L	107	75	125	----	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143530)</b>									
HK1202098-001	Anonymous	EK071K: Reactive Phosphorus as P	----	5 mg/L	104	75	125	----	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143542)</b>									
HK1202405-001	Anonymous	EK055K: Ammonia as N	7664-41-7	0.5 mg/L	122	75	125	----	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143543)</b>									
HK1202229-001	Anonymous	EK055K: Ammonia as N	7664-41-7	0.5 mg/L	119	75	125	----	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144328)</b>									
HK1201876-008	GB6	EK061A: Total Kjeldahl Nitrogen as N	----	5 mg/L	106	75	125	----	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144329)</b>									
HK1201775-012	Anonymous	EK067A: Total Phosphorus as P	----	0.5 mg/L	102	75	125	----	----
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2146164)</b>									
HK1201779-001	Anonymous	EG020: Arsenic	7440-38-2	10 µg/L	85.6	75	125	----	----
		EG020: Cadmium	7440-43-9	10 µg/L	95.9	75	125	----	----
		EG020: Chromium	7440-47-3	10 µg/L	93.6	75	125	----	----
		EG020: Copper	7440-50-8	10 µg/L	90.5	75	125	----	----
		EG020: Lead	7439-92-1	10 µg/L	91.4	75	125	----	----
		EG020: Mercury	7439-97-6	0.2 µg/L	88.5	75	125	----	----
		EG020: Nickel	7440-02-0	10 µg/L	91.6	75	125	----	----
		EG020: Silver	7440-22-4	10 µg/L	95.6	75	125	----	----
		EG020: Zinc	7440-66-6	10 µg/L	87.0	75	125	----	----

**Surrogate Control Limits**

Compound	CAS Number	Recovery Limits (%)	
		Low	High
<b>Sub-Matrix: INTERSTITIAL WATER</b>			
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			
Decachlorobiphenyl	2051-24-3	50	130
<b>EP-067S: Pesticide Surrogate</b>			
Dibutylchloroendate	1770-80-5	50	130





### CERTIFICATE OF ANALYSIS

Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Contact : IR POPHIL LAM  
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Project : AGREEMENT NO CE 43\_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION  
Order number : GE/2009/16.41  
C.O-C number : H014502  
Site : VR5

Laboratory : ALS Technichem HK Pty Ltd  
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Quote number : ----

Page : 1 of 11  
Work Order : HK1201648

Date Samples Received : 14-JAN-2012  
Issue Date : 07-FEB-2012  
No. of samples received : 7  
No. of samples analysed : 6

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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





Page Number : 2 of 11  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201648

### 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: 30-JAN-2012

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: **HK1201648**

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

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



**Analytical Results**

Sub-Matrix: ELUTRIATE

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	VR5 0.9-1.9M 14-JAN-2012 10:27 HK1201648-001	VR5 1.9-2.9M 14-JAN-2012 10:27 HK1201648-002	VR5 2.9-3.9M 14-JAN-2012 10:27 HK1201648-003	VR5 6.0-7.0M 14-JAN-2012 11:20 HK1201648-004	VR5 GRAB 14-JAN-2012 11:55 HK1201648-005
<b>ED/EK: Inorganic Nonmetallic Parameters</b>								
EK055K: Ammonia as N	7664-417	0.01	mg/L	88.9	76.3	8.08	6.20	4.02
EK057A: Nitrite as N	---	0.01	mg/L	0.02	0.04	0.03	0.02	0.02
EK058A: Nitrate as N	14797-55-8	0.01	mg/L	0.27	0.24	0.28	0.28	0.10
EK061A: Total Kjeldahl Nitrogen as N	---	0.1	mg/L	95.8	90.7	8.2	6.2	5.2
EK067A: Total Phosphorus as P	---	0.1	mg/L	0.2	0.2	0.2	0.2	<0.1
EK071K: Reactive Phosphorus as P	---	10	µg/L	90	30	170	190	20
<b>EG: Metals and Major Cations - Filtered</b>								
EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	<10	<10	<10
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
EG020: Chromium	7440-47-3	1	µg/L	2	2	<1	<1	<1
EG020: Copper	7440-50-8	1	µg/L	22	2	<1	<1	4
EG020: Lead	7439-92-1	1	µg/L	2	<1	<1	<1	<1
EG020: Mercury	7439-97-6	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EG020: Nickel	7440-02-0	1	µg/L	47	25	<1	<1	1
EG020: Silver	7440-22-4	1	µg/L	<1	<1	<1	<1	<1
EG020: Zinc	7440-66-6	10	µg/L	17	20	<10	<10	<10
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs)</b>								
Naphthalene	9120-3	0.2	µg/L	<0.2	0.3	<0.2	<0.2	<0.2
Acenaphthylene	208-96-8	0.2	µg/L	0.5	3.0	<0.2	<0.2	<0.2
Acenaphthene	83-32-9	0.2	µg/L	1.9	41.7	0.2	<0.2	<0.2
Fluorene	86-73-7	0.2	µg/L	1.2	25.7	<0.2	<0.2	<0.2
Phenanthrene	85-01-8	0.2	µg/L	7.4	80.1	0.4	<0.2	<0.2
Anthracene	120-12-7	0.2	µg/L	2.1	32.5	<0.2	<0.2	<0.2
Fluoranthene	206-44-0	0.2	µg/L	5.2	70.0	<0.2	<0.2	0.3
Pyrene	129-00-0	0.2	µg/L	6.7	79.7	<0.2	<0.2	4.2
Benz(a)anthracene	56-55-3	0.2	µg/L	2.8	31.2	<0.2	<0.2	0.2
Chrysene	218-01-9	0.2	µg/L	1.8	36.0	<0.2	<0.2	0.2
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	2.5	37.0	<0.2	<0.2	0.7
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	0.6	15.8	<0.2	<0.2	0.3
Benzo(a)pyrene	50-32-8	0.2	µg/L	1.8	40.0	<0.2	<0.2	0.7
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	0.8	27.5	<0.2	<0.2	0.3
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	0.2	2.1	<0.2	<0.2	<0.2
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	1.0	27.0	<0.2	<0.2	0.3
Low M.W. PAHs	---	2.2	µg/L	13.0	183	<2.2	<2.2	<2.2
High M.W. PAHs	---	6.8	µg/L	23.4	366	<6.8	<6.8	7.3
<b>EP-065A: PCB Single Congeners</b>								
PCB 8	34883-43-7	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 18	37680-65-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 28	7012-37-5	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 44	41464-39-5	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01





Sub-Matrix: ELUTRIATE		Client sample ID		VR5	VR5	VR5	VR5	VR5	VR5	VR5
Compound	CAS Number	LOR	Unit	0.9-1.9M	1.9-2.9M	2.9-3.9M	6.0-7.0M	14-JAN-2012 10:27	14-JAN-2012 10:27	14-JAN-2012 11:55
				HK1201648-001	HK1201648-002	HK1201648-003	HK1201648-004	HK1201648-005	HK1201648-006	HK1201648-007
<b>EP-065A: PCB Single Congeners - Continued</b>										
PCB 52	35693-99-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 66	32598-10-0	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 77	32598-13-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 101	37680-73-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 105	32598-14-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 118	31508-00-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 126	57465-28-8	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 128	38380-07-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 138	35065-28-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 153	35065-27-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 169	32774-16-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 170	35065-30-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 180	35065-29-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 187	52663-68-0	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Polychlorinated biphenyls	----	0.18	µg/L	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
<b>EP-067A: Organochlorine Pesticides (OC)</b>										
Aldrin	309-00-2	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
alpha-BHC	319-84-6	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
beta-BHC	319-85-7	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
gamma-BHC	58-89-9	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
delta-BHC	319-86-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Heptachlor	76-44-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Heptachlor epoxide	1024-57-3	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan 1	959-98-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan sulfate	103107-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDT	50-29-3	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDD	72-54-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDE	72-55-9	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
<b>EP-390: Triorganotins</b>										
Tributyltin	56573-85-4	0.015	µg TBT/L	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>										
2-Fluorobiphenyl	32160-8	0.1	%	84.8	67.9	55.4	57.9	51.4	51.4	51.4
4-Terphenyl-d14	1718-51-0	0.1	%	87.4	79.5	114	109	124	124	124
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>										
Decachlorobiphenyl	205124-3	0.1	%	50.8	50.4	78.3	78.3	54.5	54.5	54.5
<b>EP-067S: Pesticide Surrogate</b>										
Dibutylchlorodene	1770-80-5	0.1	%	115	113	125	63.2	82.4	82.4	82.4





Sub-Matrix: ELUTRIATE		Client sample ID		MW01(ELUTRIATE BLANK)	
Compound	CAS Number	LOR	Unit	Client sampling date / time	HK1201648-006
<b>ED/EK: Inorganic Nonmetallic Parameters</b>					
EK055K: Ammonia as N	7664-417	0.01	mg/L		0.30
EK057A: Nitrite as N	---	0.01	mg/L		0.02
EK058A: Nitrate as N	14797-55-8	0.01	mg/L		0.30
EK061A: Total Kjeldahl Nitrogen as N	---	0.1	mg/L		0.6
EK067A: Total Phosphorus as P	---	0.1	mg/L		<0.1
EK071K: Reactive Phosphorus as P	---	10	µg/L		40
<b>EG: Metals and Major Cations - Filtered</b>					
EG020: Arsenic	7440-38-2	10	µg/L		<10
EG020: Cadmium	7440-43-9	0.2	µg/L		<0.2
EG020: Chromium	7440-47-3	1	µg/L		<1
EG020: Copper	7440-50-8	1	µg/L		<1
EG020: Lead	7439-92-1	1	µg/L		<1
EG020: Mercury	7439-97-6	0.1	µg/L		<0.1
EG020: Nickel	7440-02-0	1	µg/L		<1
EG020: Silver	7440-22-4	1	µg/L		<1
EG020: Zinc	7440-66-6	10	µg/L		<10
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs)</b>					
Naphthalene	9120-3	0.2	µg/L		<0.2
Acenaphthylene	208-96-8	0.2	µg/L		<0.2
Acenaphthene	83-32-9	0.2	µg/L		<0.2
Fluorene	86-73-7	0.2	µg/L		<0.2
Phenanthrene	85-01-8	0.2	µg/L		<0.2
Anthracene	120-12-7	0.2	µg/L		<0.2
Fluoranthene	206-44-0	0.2	µg/L		<0.2
Pyrene	129-00-0	0.2	µg/L		<0.2
Benz(a)anthracene	56-55-3	0.2	µg/L		<0.2
Chrysene	218-01-9	0.2	µg/L		<0.2
Benzo(b)fluoranthene	205-99-2	0.2	µg/L		<0.2
Benzo(k)fluoranthene	207-08-9	0.2	µg/L		<0.2
Benzo(a)pyrene	50-32-8	0.2	µg/L		<0.2
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L		<0.2
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L		<0.2
Benzo(g,h,i)perylene	19124-2	0.2	µg/L		<0.2
Low M.W. PAHs	---	2.2	µg/L		<2.2
High M.W. PAHs	---	6.8	µg/L		<6.8
<b>EP-065A: PCB Single Congeners</b>					
PCB 8	34883-43-7	0.01	µg/L		<0.01
PCB 18	37680-65-2	0.01	µg/L		<0.01
PCB 28	7012-37-5	0.01	µg/L		<0.01
PCB 44	41464-39-5	0.01	µg/L		<0.01
PCB 52	35693-99-3	0.01	µg/L		<0.01
PCB 66	32598-10-0	0.01	µg/L		<0.01





Sub-Matrix: ELUTRIATE		Client sample ID		MW01(ELUTRIATE BLANK)	
Compound	CAS Number	LOR	Unit	Client sampling date / time	HK1201648-006
<b>EP-065A: PCB Single Congeners - Continued</b>					
PCB 77	32598-13-3	0.01	µg/L		<0.01
PCB 101	37680-73-2	0.01	µg/L		<0.01
PCB 105	32598-14-4	0.01	µg/L		<0.01
PCB 118	31508-00-6	0.01	µg/L		<0.01
PCB 126	57465-28-8	0.01	µg/L		<0.01
PCB 128	38380-07-3	0.01	µg/L		<0.01
PCB 138	35065-28-2	0.01	µg/L		<0.01
PCB 153	35065-27-1	0.01	µg/L		<0.01
PCB 169	32774-16-6	0.01	µg/L		<0.01
PCB 170	35065-30-6	0.01	µg/L		<0.01
PCB 180	35065-29-3	0.01	µg/L		<0.01
PCB 187	52663-68-0	0.01	µg/L		<0.01
Total Polychlorinated biphenyls	----	0.18	µg/L		<0.18
<b>EP-067A: Organochlorine Pesticides (OC)</b>					
Aldrin	309-00-2	0.10	µg/L		<0.10
alpha-BHC	319-84-6	0.10	µg/L		<0.10
beta-BHC	319-85-7	0.10	µg/L		<0.10
gamma-BHC	58-89-9	0.10	µg/L		<0.10
delta-BHC	319-86-8	0.10	µg/L		<0.10
Heptachlor	76-44-8	0.10	µg/L		<0.10
Heptachlor epoxide	1024-57-3	0.10	µg/L		<0.10
Endosulfan 1	959-98-8	0.10	µg/L		<0.10
Endosulfan sulfate	1031-07-8	0.10	µg/L		<0.10
4,4'-DDD	50-29-3	0.10	µg/L		<0.10
4,4'-DDD	72-54-8	0.10	µg/L		<0.10
4,4'-DDE	72-55-9	0.10	µg/L		<0.10
<b>EP-390: Triorganotins</b>					
Tributyltin	56573-85-4	0.015	µg TBT / L		<0.015
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>					
2-Fluorobiphenyl	32160-8	0.1	%		51.4
4-Terphenyl-d14	1718-510	0.1	%		105
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>					
Decachlorobiphenyl	2051-24-3	0.1	%		58.4
<b>EP-067S: Pesticide Surrogate</b>					
Dibutylchloroendate	1770-80-5	0.1	%		101

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: WATER		Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133256)</b>								
HK1201670-001	Anonymous	EK055K: Ammonia as N	7664-41-7	0.01	mg/L	34.6	37.8	8.7
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133259)</b>								
HK1201670-001	Anonymous	EK071K: Reactive Phosphorus as P	----	0.01	mg/L	0.01	0.01	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133352)</b>								
HK1201510-008	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	46.0	46.5	1.1
HK1201510-029	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133353)</b>								
HK1201510-052	Anonymous	EK067A: Total Phosphorus as P	----	0.1	mg/L	0.2	0.2	0.0
HK1201648-004	VR5 6.0-7.0M	EK067A: Total Phosphorus as P	----	0.1	mg/L	0.2	0.2	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133354)</b>								
HK1201510-052	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.0
HK1201623-001	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	25.9	28.4	9.2
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142437)</b>								
HK1201643-001	Anonymous	EK057A: Nitrite as N	----	0.01	mg/L	0.07	0.07	0.0
HK1201680-004	Anonymous	EK057A: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2142261)</b>								
HK1201648-006	MW01 (ELUTRIATE BLANK)	EG020: Mercury	7439-97-6	0.1	µg/L	<0.1	<0.1	0.0
		EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	0.0
		EG020: Chromium	7440-47-3	1	µg/L	<1	<1	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: Silver	7440-22-4	1	µg/L	<1	<1	0.0
		EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	0.0
		EG020: Zinc	7440-66-6	10	µg/L	<10	<10	0.0
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2133670)</b>								
HK1201648-006	MW01 (ELUTRIATE BLANK)	Naphthalene	91-20-3	0.2	µg/L	<0.2	<0.2	0.0
		Acenaphthylene	208-96-8	0.2	µg/L	<0.2	<0.2	0.0
		Acenaphthene	83-32-9	0.2	µg/L	<0.2	<0.2	0.0
		Fluorene	86-73-7	0.2	µg/L	<0.2	<0.2	0.0
		Phenanthrene	85-01-8	0.2	µg/L	<0.2	<0.2	0.0
		Anthracene	120-12-7	0.2	µg/L	<0.2	<0.2	0.0
		Fluoranthene	206-44-0	0.2	µg/L	<0.2	<0.2	0.0
		Pyrene	129-00-0	0.2	µg/L	<0.2	<0.2	0.0
		Benz(a)anthracene	56-55-3	0.2	µg/L	<0.2	<0.2	0.0
		Chrysene	218-01-9	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(b)fluoranthene	205-99-2	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(k)fluoranthene	207-08-9	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(a)pyrene	50-32-8	0.2	µg/L	<0.2	<0.2	0.0
		Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2	<0.2	0.0





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 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201648

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
						Original Result	Duplicate Result	
<b>Matrix: WATER</b>								
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2133670) - Continued</b>								
HK1201648-006	MW01 (ELUTRIATE BLANK)	Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2	<0.2	0.0
		Low M.W. PAHs	----	2.2	µg/L	<2.2	<2.2	0.0
		High M.W. PAHs	----	6.8	µg/L	<6.8	<6.8	0.0
<b>EP-065A: PCB Single Congeners (QC Lot: 2133671)</b>								
HK1201648-006	MW01 (ELUTRIATE BLANK)	PCB 8	34883-43-7	0.01	µg/L	<0.01	<0.01	0.0
		PCB 18	37680-65-2	0.01	µg/L	<0.01	<0.01	0.0
		PCB 28	7012-37-5	0.01	µg/L	<0.01	<0.01	0.0
		PCB 44	41464-39-5	0.01	µg/L	<0.01	<0.01	0.0
		PCB 52	35693-99-3	0.01	µg/L	<0.01	<0.01	0.0
		PCB 66	32598-10-0	0.01	µg/L	<0.01	<0.01	0.0
		PCB 77	32598-13-3	0.01	µg/L	<0.01	<0.01	0.0
		PCB 101	37680-73-2	0.01	µg/L	<0.01	<0.01	0.0
		PCB 105	32598-14-4	0.01	µg/L	<0.01	<0.01	0.0
		PCB 118	31508-00-6	0.01	µg/L	<0.01	<0.01	0.0
		PCB 126	57465-28-8	0.01	µg/L	<0.01	<0.01	0.0
		PCB 128	38380-07-3	0.01	µg/L	<0.01	<0.01	0.0
		PCB 138	35065-28-2	0.01	µg/L	<0.01	<0.01	0.0
		PCB 153	35065-27-1	0.01	µg/L	<0.01	<0.01	0.0
		PCB 169	32774-16-6	0.01	µg/L	<0.01	<0.01	0.0
		PCB 170	35065-30-6	0.01	µg/L	<0.01	<0.01	0.0
		PCB 180	35065-29-3	0.01	µg/L	<0.01	<0.01	0.0
		PCB 187	52663-68-0	0.01	µg/L	<0.01	<0.01	0.0
		Total Polychlorinated biphenyls	----	0.18	µg/L	<0.18	<0.18	0.0
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2133672)</b>								
HK1201648-006	MW01 (ELUTRIATE BLANK)	Aldrin	309-00-2	0.10	µg/L	<0.10	<0.10	0.0
		alpha-BHC	319-84-6	0.10	µg/L	<0.10	<0.10	0.0
		beta-BHC	319-85-7	0.10	µg/L	<0.10	<0.10	0.0
		gamma-BHC	58-89-9	0.10	µg/L	<0.10	<0.10	0.0
		delta-BHC	319-86-8	0.10	µg/L	<0.10	<0.10	0.0
		Heptachlor	76-44-8	0.10	µg/L	<0.10	<0.10	0.0
		Heptachlor epoxide	1024-57-3	0.10	µg/L	<0.10	<0.10	0.0
		Endosulfan 1	959-98-8	0.10	µg/L	<0.10	<0.10	0.0
		Endosulfan sulfate	1031-07-8	0.10	µg/L	<0.10	<0.10	0.0
		4,4'-DDT	50-29-3	0.10	µg/L	<0.10	<0.10	0.0
		4,4'-DDD	72-54-8	0.10	µg/L	<0.10	<0.10	0.0
		4,4'-DDE	72-55-9	0.10	µg/L	<0.10	<0.10	0.0
<b>EP-390: Triorganotins (QC Lot: 2143967)</b>								
HK1201670-002	Anonymous	Tributyltin	56573-85-4	6	ngSn/L	<6	<6	0.0

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





Method: Compound	Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
	CAS Number	LOR	Unit	Result	Spike Concentration		Spike Recovery (%)		Recovery Limits (%)		RPD (%)
					LCS	DCS	Low	High	Value	Control Limit	
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133256)</b>											
EK055K: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	95.3	-----	85	115	-----	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133259)</b>											
EK071K: Reactive Phosphorus as P	-----	0.01	mg/L	<0.01	101	-----	85	115	-----	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133352)</b>											
EK061A: Total Kjeldahl Nitrogen as N	-----	0.1	mg/L	<0.1	96.3	-----	85	115	-----	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133353)</b>											
EK067A: Total Phosphorus as P	-----	0.1	mg/L	<0.1	95.2	-----	85	115	-----	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133354)</b>											
EK061A: Total Kjeldahl Nitrogen as N	-----	0.1	mg/L	<0.1	101	-----	85	115	-----	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142437)</b>											
EK057A: Nitrite as N	-----	0.01	mg/L	<0.01	97.2	-----	85	115	-----	-----	-----
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2142261)</b>											
EG020: Arsenic	7440-38-2	10	µg/L	<10	100	-----	78	114	-----	-----	-----
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	87.7	-----	80	112	-----	-----	-----
EG020: Chromium	7440-47-3	1	µg/L	<1	97.8	-----	80	114	-----	-----	-----
EG020: Copper	7440-50-8	1	µg/L	<1	87.9	-----	79	113	-----	-----	-----
EG020: Lead	7439-92-1	1	µg/L	<1	90.6	-----	81	109	-----	-----	-----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.1	102	-----	81	113	-----	-----	-----
EG020: Nickel	7440-02-0	1	µg/L	<1	99.6	-----	78	112	-----	-----	-----
EG020: Silver	7440-22-4	1	µg/L	<1	92.6	-----	79	111	-----	-----	-----
EG020: Zinc	7440-66-6	10	µg/L	<10	92.9	-----	73	121	-----	-----	-----
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2133670)</b>											
Naphthalene	91-20-3	0.2	µg/L	<0.2	101	-----	44	114	-----	-----	-----
Acenaphthylene	208-96-8	0.2	µg/L	<0.2	89.5	-----	40	109	-----	-----	-----
Acenaphthene	83-32-9	0.2	µg/L	<0.2	92.2	-----	44	108	-----	-----	-----
Fluorene	86-73-7	0.2	µg/L	<0.2	98.7	-----	43	113	-----	-----	-----
Phenanthrene	85-01-8	0.2	µg/L	<0.2	93.3	-----	45	115	-----	-----	-----
Anthracene	120-12-7	0.2	µg/L	<0.2	86.2	-----	45	112	-----	-----	-----
Fluoranthene	206-44-0	0.2	µg/L	<0.2	101	-----	56	121	-----	-----	-----
Pyrene	129-00-0	0.2	µg/L	<0.2	94.5	-----	57	122	-----	-----	-----
Benz(a)anthracene	56-55-3	0.2	µg/L	<0.2	93.8	-----	61	118	-----	-----	-----
Chrysene	218-01-9	0.2	µg/L	<0.2	108	-----	65	126	-----	-----	-----
Benz(b)fluoranthene	205-99-2	0.2	µg/L	<0.2	102	-----	49	138	-----	-----	-----
Benz(k)fluoranthene	207-08-9	0.2	µg/L	<0.2	86.8	-----	69	123	-----	-----	-----
Benz(a)pyrene	50-32-8	0.2	µg/L	<0.2	105	-----	51	134	-----	-----	-----
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2	102	-----	54	129	-----	-----	-----
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	103	-----	51	138	-----	-----	-----
Benz(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2	108	-----	59	135	-----	-----	-----
Low M.W. PAHs	-----	1.2	µg/L	<1.2	-----	-----	-----	-----	-----	-----	-----
High M.W. PAHs	-----	2.0	µg/L	<2.0	-----	-----	-----	-----	-----	-----	-----
<b>EP-065A: PCB Single Congeners (QC Lot: 2133671)</b>											





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	LCS	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>EP-065A: PCB Single Congeners (QC Lot: 2133671) - Continued</b>													
PCB 8	34883-43-7	0.01	µg/L	<0.01	0.1 µg/L	68.3	-----	50	50	130	-----	-----	-----
PCB 18	37680-65-2	0.01	µg/L	<0.01	0.1 µg/L	55.2	-----	50	50	130	-----	-----	-----
PCB 28	7012-37-5	0.01	µg/L	<0.01	0.1 µg/L	85.8	-----	50	50	130	-----	-----	-----
PCB 44	41464-39-5	0.01	µg/L	<0.01	0.1 µg/L	89.7	-----	50	50	130	-----	-----	-----
PCB 52	35693-99-3	0.01	µg/L	<0.01	0.1 µg/L	84.6	-----	50	50	130	-----	-----	-----
PCB 66	32598-10-0	0.01	µg/L	<0.01	0.1 µg/L	112	-----	50	50	130	-----	-----	-----
PCB 77	32598-13-3	0.01	µg/L	<0.01	0.1 µg/L	79.0	-----	50	50	130	-----	-----	-----
PCB 101	37680-73-2	0.01	µg/L	<0.01	0.1 µg/L	54.7	-----	50	50	130	-----	-----	-----
PCB 105	32598-14-4	0.01	µg/L	<0.01	0.1 µg/L	80.4	-----	50	50	130	-----	-----	-----
PCB 118	31508-00-6	0.01	µg/L	<0.01	0.1 µg/L	78.3	-----	50	50	130	-----	-----	-----
PCB 126	57465-28-8	0.01	µg/L	<0.01	0.1 µg/L	81.3	-----	50	50	130	-----	-----	-----
PCB 128	38380-07-3	0.01	µg/L	<0.01	0.1 µg/L	77.4	-----	50	50	130	-----	-----	-----
PCB 138	35065-28-2	0.01	µg/L	<0.01	0.1 µg/L	73.3	-----	50	50	130	-----	-----	-----
PCB 153	35065-27-1	0.01	µg/L	<0.01	0.1 µg/L	74.4	-----	50	50	130	-----	-----	-----
PCB 169	32774-16-6	0.01	µg/L	<0.01	0.1 µg/L	81.4	-----	50	50	130	-----	-----	-----
PCB 170	35065-30-6	0.01	µg/L	<0.01	0.1 µg/L	75.6	-----	50	50	130	-----	-----	-----
PCB 180	35065-29-3	0.01	µg/L	<0.01	0.1 µg/L	75.6	-----	50	50	130	-----	-----	-----
PCB 187	52663-68-0	0.01	µg/L	<0.01	0.1 µg/L	68.5	-----	50	50	130	-----	-----	-----
Total Polychlorinated biphenyls	----	0.18	µg/L	<0.18	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2133672)</b>													
Aldrin	309-00-2	0.02	µg/L	<0.02	0.1 µg/L	52.0	-----	50	50	130	-----	-----	-----
alpha-BHC	319-84-6	0.02	µg/L	<0.02	0.1 µg/L	52.6	-----	50	50	130	-----	-----	-----
beta-BHC	319-85-7	0.02	µg/L	<0.02	0.1 µg/L	64.6	-----	50	50	130	-----	-----	-----
gamma-BHC	58-89-9	0.02	µg/L	<0.02	0.1 µg/L	54.7	-----	50	50	130	-----	-----	-----
delta-BHC	319-86-8	0.02	µg/L	<0.02	0.1 µg/L	78.3	-----	50	50	130	-----	-----	-----
Heptachlor	76-44-8	0.02	µg/L	<0.02	0.1 µg/L	55.0	-----	50	50	130	-----	-----	-----
Heptachlor epoxide	1024-57-3	0.02	µg/L	<0.02	0.1 µg/L	75.7	-----	50	50	130	-----	-----	-----
Endosulfan 1	959-98-8	0.02	µg/L	<0.02	0.1 µg/L	82.2	-----	50	50	130	-----	-----	-----
Endosulfan sulfate	1031-07-8	0.02	µg/L	<0.02	0.1 µg/L	104	-----	50	50	130	-----	-----	-----
4,4'-DDT	50-29-3	0.02	µg/L	<0.02	0.1 µg/L	99.7	-----	50	50	130	-----	-----	-----
4,4'-DDD	72-54-8	0.02	µg/L	<0.02	0.1 µg/L	95.3	-----	50	50	130	-----	-----	-----
4,4'-DDE	72-55-9	0.02	µg/L	<0.02	0.1 µg/L	82.7	-----	50	50	130	-----	-----	-----
<b>EP-390: Triorganotin (QC Lot: 2143967)</b>													
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	110	-----	81	81	117	-----	-----	-----





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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
				Spike Concentration	MS	MSD	Recovery Limits (%)	RPD (%)	
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133256)</b>									
HK1201670-001	Anonymous	EK055K: Ammonia as N	7664-41-7	5 mg/L	# Not Determined	---	75	125	---
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133259)</b>									
HK1201670-001	Anonymous	EK071K: Reactive Phosphorus as P	---	0.5 mg/L	119	---	75	125	---
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133352)</b>									
HK1201485-001	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	---	5 mg/L	91.6	---	75	125	---
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133353)</b>									
HK1201648-006	MW01 (ELUTRIATE BLANK)	EK067A: Total Phosphorus as P	---	0.5 mg/L	92.7	---	75	125	---
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133354)</b>									
HK1201510-008	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	---	50 mg/L	87.4	---	75	125	---
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142437)</b>									
HK1201643-001	Anonymous	EK057A: Nitrite as N	---	0.5 mg/L	119	---	75	125	---
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2142261)</b>									
HK1201648-001	VR5 0.9-1.9M	EG020: Arsenic	7440-38-2	10 µg/L	83.4	---	75	125	---
		EG020: Cadmium	7440-43-9	10 µg/L	86.6	---	75	125	---
		EG020: Chromium	7440-47-3	10 µg/L	91.3	---	75	125	---
		EG020: Copper	7440-50-8	10 µg/L	84.6	---	75	125	---
		EG020: Lead	7439-92-1	10 µg/L	93.8	---	75	125	---
		EG020: Mercury	7439-97-6	0.2 µg/L	107	---	75	125	---
		EG020: Nickel	7440-02-0	10 µg/L	# Not Determined	---	75	125	---
		EG020: Silver	7440-22-4	10 µg/L	92.4	---	75	125	---
		EG020: Zinc	7440-66-6	10 µg/L	79.9	---	75	125	---

**Surrogate Control Limits**

Compound	CAS Number	Recovery Limits (%)	
		Low	High
<b>Sub-Matrix: ELUTRIATE</b>			
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			
Decachlorobiphenyl	2051-24-3	50	130
<b>EP-067S: Pesticide Surrogate</b>			
Dibutylchlorendate	1770-80-5	50	130





### CERTIFICATE OF ANALYSIS

Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Contact : IR POPHIL LAM  
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Project : AGREEMENT NO CE 43\_2010 (HY) CENTRAL  
KOWLOON ROUTE - DESIGN AND  
CONSTRUCTION  
Order number : GE/2009/16.41  
C-O-C number : H014505  
Site : VR4 AND VR2

Laboratory : ALS Technichem HK Pty Ltd

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Quote number : ----

Page : 1 of 11

Work Order : HK1201670

Date Samples Received : 16-JAN-2012

Issue Date : 16-FEB-2012

No. of samples received : 11

No. of samples analysed : 10

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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



Page Number : 2 of 11  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201670

### 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: 30-JAN-2012

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: **HK1201670**

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

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





**Analytical Results**

Sub-Matrix: ELUTRIATE

Compound	CAS Number	LOR	Unit	Client sample ID				
				VR4 0.9-1.9M 16-JAN-2012 10:10 HK1201670-001	VR4 1.9-2.9M 16-JAN-2012 10:10 HK1201670-002	VR4 3.0-4.0M 16-JAN-2012 11:20 HK1201670-003	VR4 6.0-6.9M 16-JAN-2012 11:20 HK1201670-004	VR4 GRAB 16-JAN-2012 11:55 HK1201670-005
<b>ED/EK: Inorganic Nonmetallic Parameters</b>								
EK055K: Ammonia as N	7664-417	0.01	mg/L	34.6	57.9	95.8	5.50	8.10
EK057A: Nitrite as N	----	0.01	mg/L	0.03	0.03	0.03	0.02	0.02
EK058A: Nitrate as N	14797-558	0.01	mg/L	0.30	0.30	0.27	0.30	0.11
EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	48.5	65.9	98.5	6.4	8.4
EK067A: Total Phosphorus as P	----	0.1	mg/L	<0.1	<0.1	<0.1	0.2	<0.1
EK071K: Reactive Phosphorus as P	----	10	µg/L	10	20	10	200	20
<b>EG: Metals and Major Cations - Filtered</b>								
EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	<10	<10	<10
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
EG020: Chromium	7440-47-3	1	µg/L	<1	<1	2	<1	<1
EG020: Copper	7440-50-8	1	µg/L	5	10	3	<1	4
EG020: Lead	7439-92-1	1	µg/L	<1	<1	<1	<1	<1
EG020: Mercury	7439-97-6	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EG020: Nickel	7440-02-0	1	µg/L	51	93	23	<1	2
EG020: Silver	7440-22-4	1	µg/L	<1	<1	<1	<1	<1
EG020: Zinc	7440-66-6	10	µg/L	11	<10	12	42	13
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs)</b>								
Naphthalene	91-20-3	0.2	µg/L	<0.2	0.2	0.3	<0.2	0.3
Acenaphthylene	208-96-8	0.2	µg/L	1.8	0.9	1.5	<0.2	0.4
Acenaphthene	83-32-9	0.2	µg/L	77.6	9.5	34.3	0.3	7.3
Fluorene	86-73-7	0.2	µg/L	33.5	3.9	14.4	<0.2	<0.2
Phenanthrene	85-018	0.2	µg/L	155	17.3	52.3	0.2	0.2
Anthracene	120-12-7	0.2	µg/L	27.2	3.6	12.6	<0.2	0.2
Fluoranthene	206-44-0	0.2	µg/L	40.4	5.2	16.3	<0.2	5.2
Pyrene	129-00-0	0.2	µg/L	45.4	5.8	18.8	<0.2	7.0
Benz(a)anthracene	56-55-3	0.2	µg/L	8.4	1.2	3.1	<0.2	0.9
Chrysene	218-019	0.2	µg/L	7.9	1.3	3.3	<0.2	0.8
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	5.0	1.2	2.7	<0.2	0.7
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	1.3	0.4	1.2	<0.2	0.3
Benzo(a)pyrene	50-32-8	0.2	µg/L	4.7	1.2	3.0	<0.2	0.8
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	2.3	0.7	1.8	<0.2	0.3
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	0.5	<0.2	0.3	<0.2	<0.2
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	2.2	0.7	1.7	<0.2	0.3
Low M.W. PAHs	----	2.2	µg/L	295	35.4	115	<2.2	8.5
High M.W. PAHs	----	6.8	µg/L	118	17.6	52.3	<6.8	16.4
<b>EP-065A: PCB Single Congeners</b>								
PCB 8	34883-43-7	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 18	37680-65-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 28	7012-37-5	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 44	41464-39-5	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01





Sub-Matrix: ELUTRIATE

Compound	CAS Number	LOR	Client sampling date / time		Client sample ID				
			Unit	VR4 0.9-1.9M 16-JAN-2012 10:10 HK1201670-001	VR4 1.9-2.9M 16-JAN-2012 10:10 HK1201670-002	VR4 3.0-4.0M 16-JAN-2012 11:20 HK1201670-003	VR4 6.0-6.9M 16-JAN-2012 11:20 HK1201670-004	VR4 GRAB 16-JAN-2012 11:55 HK1201670-005	
<b>EP-065A: PCB Single Congeners - Continued</b>									
PCB 52	35693-99-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 66	32598-10-0	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 77	32598-13-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 101	37680-73-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 105	32598-14-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 118	31508-00-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 126	57465-28-8	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 128	38380-07-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 138	35065-28-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 153	35065-27-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 169	32774-16-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 170	35065-30-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 180	35065-29-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 187	52663-68-0	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Polychlorinated biphenyls	----	0.18	µg/L	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
<b>EP-067A: Organochlorine Pesticides (OC)</b>									
Aldrin	309-00-2	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
alpha-BHC	319-84-6	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
beta-BHC	319-85-7	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
gamma-BHC	58-89-9	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
delta-BHC	319-86-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Heptachlor	76-44-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Heptachlor epoxide	1024-57-3	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan 1	959-98-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan sulfate	1031-07-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDT	50-29-3	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDD	72-54-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDE	72-55-9	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
<b>EP-390: Triorganofins</b>									
Tributyltin	56573-85-4	0.015	µg TBT / L	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>									
2-Fluorobiphenyl	321-60-8	0.1	%	67.6	73.8	84.6	81.6	121	Surrogate control limits listed at end of this report.
4-Terphenyl-d14	1718-51-0	0.1	%	52.6	93.6	92.0	97.9	99.6	Surrogate control limits listed at end of this report.
<b>EP-066S: PCB Congeners and Organochlorine Pesticides Surrogate</b>									
Decachlorobiphenyl	2051-24-3	0.1	%	50.2	53.1	50.2	56.2	51.1	Surrogate control limits listed at end of this report.
<b>EP-067S: Pesticide Surrogate</b>									
Dibutylchloroendate	1770-80-5	0.1	%	67.6	102	81.3	97.5	80.4	Surrogate control limits listed at end of this report.





Compound	CAS Number	LOR	Unit	Client sample ID					VR2 GRAB	MW02 (ELUTRIATE BLANK)
				VR2 0.9-1.9M	VR2 1.9-2.9M	VR2 2.9-3.9M	VR2 GRAB	MW02 (ELUTRIATE BLANK)		
Sub-Matrix: ELUTRIATE										
ED/EK: Inorganic Nonmetallic Parameters										
EK055K: Ammonia as N	7664-417	0.01	mg/L	1.38	0.90	4.52	0.55	0.33		
EK057A: Nitrite as N	----	0.01	mg/L	0.02	0.02	0.02	0.03	0.02		
EK058A: Nitrate as N	14797-55-8	0.01	mg/L	0.31	0.30	0.31	0.26	0.32		
EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.9	1.4	4.5	1.0	0.6		
EK067A: Total Phosphorus as P	----	0.1	mg/L	0.1	0.1	0.2	<0.1	<0.1		
EK071K: Reactive Phosphorus as P	----	10	µg/L	110	110	170	10	50		
EG: Metals and Major Cations - Filtered										
EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	<10	<10	<10		
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2		
EG020: Chromium	7440-47-3	1	µg/L	<1	<1	<1	<1	<1		
EG020: Copper	7440-50-8	1	µg/L	<1	<1	<1	<1	<1		
EG020: Lead	7439-92-1	1	µg/L	<1	<1	<1	<1	<1		
EG020: Mercury	7439-97-6	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1		
EG020: Nickel	7440-02-0	1	µg/L	<1	<1	<1	1	<1		
EG020: Silver	7440-22-4	1	µg/L	<1	<1	<1	<1	<1		
EG020: Zinc	7440-66-6	10	µg/L	13	<10	<10	<10	<10		
EP-076: Polycyclic Aromatics Hydrocarbons (PAHs)										
Naphthalene	91-20-3	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2		
Acenaphthylene	208-96-8	0.2	µg/L	<0.2	<0.2	<0.2	0.3	<0.2		
Acenaphthene	83-32-9	0.2	µg/L	<0.2	0.3	<0.2	2.6	<0.2		
Fluorene	86-73-7	0.2	µg/L	<0.2	<0.2	<0.2	0.4	<0.2		
Phenanthrene	85-01-8	0.2	µg/L	<0.2	0.2	<0.2	0.4	<0.2		
Anthracene	120-12-7	0.2	µg/L	<0.2	<0.2	<0.2	0.2	<0.2		
Fluoranthene	206-44-0	0.2	µg/L	<0.2	<0.2	<0.2	1.4	<0.2		
Pyrene	129-00-0	0.2	µg/L	<0.2	<0.2	<0.2	1.1	0.2		
Benz(a)anthracene	56-55-3	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2		
Chrysene	218-019	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	0.2		
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2		
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2		
Benzo(a)pyrene	50-32-8	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2		
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2		
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2		
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2		
Low M.W. PAHs	----	2.2	µg/L	<2.2	<2.2	<2.2	3.9	<2.2		
High M.W. PAHs	----	6.8	µg/L	<6.8	<6.8	<6.8	<6.8	<6.8		
EP-065A: PCB Single Congeners										
PCB 8	34883-43-7	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01		
PCB 18	37680-65-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01		
PCB 28	7012-37-5	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01		
PCB 44	41464-39-5	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01		
PCB 52	35693-99-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01		
PCB 66	32598-10-0	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01		





CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Sub-Matrix: ELUTRIATE

Client sample ID

0.9-1.9M  
 16-JAN-2012 14:35  
 HK1201670-006

VR2  
 1.9-2.9M  
 16-JAN-2012 14:35  
 HK1201670-007

VR2  
 2.9-3.9M  
 16-JAN-2012 14:35  
 HK1201670-008

VR2  
 GRAB  
 16-JAN-2012 15:45  
 HK1201670-009

MW02 (ELUTRIATE  
 BLANK)  
 16-JAN-2012 15:30  
 HK1201670-010

Compound	CAS Number	LOR	Unit	Client sampling date / time				
				VR2 0.9-1.9M 16-JAN-2012 14:35 HK1201670-006	VR2 1.9-2.9M 16-JAN-2012 14:35 HK1201670-007	VR2 2.9-3.9M 16-JAN-2012 14:35 HK1201670-008	VR2 GRAB 16-JAN-2012 15:45 HK1201670-009	MW02 (ELUTRIATE BLANK) 16-JAN-2012 15:30 HK1201670-010
<b>EP-065A: PCB Single Congeners - Continued</b>								
PCB 77	32598-13-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 101	37680-73-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 105	32598-14-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 118	31508-00-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 126	57465-28-8	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 128	38380-07-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 138	35065-28-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 153	35065-27-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 169	32774-16-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 170	35065-30-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 180	35065-29-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 187	52663-68-0	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Total Polychlorinated biphenyls	----	0.18	µg/L	<0.18	<0.18	<0.18	<0.18	<0.18
<b>EP-067A: Organochlorine Pesticides (OC)</b>								
Aldrin	309-00-2	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
alpha-BHC	319-84-6	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
beta-BHC	319-85-7	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
gamma-BHC	88-89-9	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
delta-BHC	319-86-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Heptachlor	76-44-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Heptachlor epoxide	1024-57-3	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan 1	959-98-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan sulfate	103107-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDT	50-29-3	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDD	72-54-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDE	72-55-9	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10
<b>EP-390: Triorganotins</b>								
Tributyltin	56573-85-4	0.015	µg TBT / L	<0.015	<0.015	<0.015	<0.015	<0.015
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>								
2-Fluorobiphenyl	32160-8	0.1	%	65.9	71.3	74.5	82.8	72.6
4-Terphenyl-d14	1718-510	0.1	%	85.9	90.6	97.9	102	75.3
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>								
Decachlorobiphenyl	205124-3	0.1	%	68.1	76.4	89.0	83.1	79.5
<b>EP-067S: Pesticide Surrogate</b>								
Dibutylchloroendate	1770-80-5	0.1	%	107	125	104	102	122





**Laboratory Duplicate (DUP) Report**

Matrix: WATER		Method: Compound		Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133256)</b>							
HK1201670-001	VR4 0.9-1.9M	7664-41-7	0.01	mg/L	34.6	37.8	8.7
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133259)</b>							
HK1201670-001	VR4 0.9-1.9M	----	0.01	mg/L	0.01	0.01	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133353)</b>							
HK1201510-052	Anonymous	----	0.1	mg/L	0.2	0.2	0.0
HK1201648-004	Anonymous	----	0.1	mg/L	0.2	0.2	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133354)</b>							
HK1201510-052	Anonymous	----	0.1	mg/L	<0.1	<0.1	0.0
HK1201623-001	Anonymous	----	0.1	mg/L	25.9	28.4	9.2
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133355)</b>							
HK1201670-010	MW02 (ELUTRIATE BLANK)	----	0.1	mg/L	<0.1	<0.1	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142437)</b>							
HK1201643-001	Anonymous	----	0.01	mg/L	0.07	0.07	0.0
HK1201680-004	Anonymous	----	0.01	mg/L	<0.01	<0.01	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142439)</b>							
HK1201670-002	VR4 1.9-2.9M	----	0.01	mg/L	0.03	0.03	0.0
HK1201687-004	Anonymous	----	0.01	mg/L	<0.01	<0.01	0.0
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2142261)</b>							
HK1201648-006	Anonymous	7439-97-6	0.1	µg/L	<0.1	<0.1	0.0
		7440-43-9	0.2	µg/L	<0.2	<0.2	0.0
		7440-47-3	1	µg/L	<1	<1	0.0
		7440-50-8	1	µg/L	<1	<1	0.0
		7439-92-1	1	µg/L	<1	<1	0.0
		7440-02-0	1	µg/L	<1	<1	0.0
		7440-22-4	1	µg/L	<1	<1	0.0
		7440-38-2	10	µg/L	<10	<10	0.0
		7440-66-6	10	µg/L	<10	<10	0.0
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2133670)</b>							
HK1201648-006	Anonymous	91-20-3	0.2	µg/L	<0.2	<0.2	0.0
		208-96-8	0.2	µg/L	<0.2	<0.2	0.0
		83-32-9	0.2	µg/L	<0.2	<0.2	0.0
		86-73-7	0.2	µg/L	<0.2	<0.2	0.0
		85-01-8	0.2	µg/L	<0.2	<0.2	0.0
		120-12-7	0.2	µg/L	<0.2	<0.2	0.0
		206-44-0	0.2	µg/L	<0.2	<0.2	0.0
		129-00-0	0.2	µg/L	<0.2	<0.2	0.0
		56-55-3	0.2	µg/L	<0.2	<0.2	0.0
		218-01-9	0.2	µg/L	<0.2	<0.2	0.0
		205-99-2	0.2	µg/L	<0.2	<0.2	0.0
		207-08-9	0.2	µg/L	<0.2	<0.2	0.0





Matrix: WATER		Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2133670) - Continued</b>											
HK1201648-006	Anonymous		Benzo(a)pyrene	50-32-8	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	0.0
			Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	0.0
			Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	0.0
			Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	0.0
			Low M.W. PAHs	----	2.2	µg/L	<2.2	<2.2	<2.2	<2.2	0.0
			High M.W. PAHs	----	6.8	µg/L	<6.8	<6.8	<6.8	<6.8	0.0
<b>EP-065A: PCB Single Congeners (QC Lot: 2133671)</b>											
HK1201648-006	Anonymous		PCB 8	34883-43-7	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.0
			PCB 18	37680-65-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.0
			PCB 28	7012-37-5	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.0
			PCB 44	41464-39-5	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.0
			PCB 52	35693-99-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.0
			PCB 66	32598-10-0	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.0
			PCB 77	32598-13-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.0
			PCB 101	37680-73-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.0
			PCB 105	32598-14-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.0
			PCB 118	31508-00-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.0
			PCB 126	57465-28-8	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.0
			PCB 128	38380-07-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.0
			PCB 138	35065-28-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.0
			PCB 153	35065-27-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.0
			PCB 169	32774-16-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.0
			PCB 170	35065-30-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.0
			PCB 180	35065-29-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.0
			PCB 187	52663-68-0	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.0
			Total Polychlorinated biphenyls	----	0.18	µg/L	<0.18	<0.18	<0.18	<0.18	0.0
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2133672)</b>											
HK1201648-006	Anonymous		Aldrin	309-00-2	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	0.0
			alpha-BHC	319-84-6	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	0.0
			beta-BHC	319-85-7	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	0.0
			gamma-BHC	58-89-9	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	0.0
			delta-BHC	319-86-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	0.0
			Heptachlor	76-44-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	0.0
			Heptachlor epoxide	1024-57-3	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	0.0
			Endosulfan 1	959-98-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	0.0
			Endosulfan sulfate	1031-07-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	0.0
			4,4'-DDT	50-29-3	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	0.0
			4,4'-DDD	72-54-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	0.0
			4,4'-DDE	72-55-9	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	0.0
<b>EP-390: Triorganotins (QC Lot: 2143967)</b>											
HK1201670-002	VR4 1.9-2.9M		Tributyltin	56573-85-4	6	ngSn/L	<6	<6	<6	<6	0.0

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

Method Blank (MB) Report

Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report

Matrix: WATER





Method: Compound	Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report									
	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133256)</b>														
EK05K: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	95.3	-----	-----	85	115	-----	-----	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133259)</b>														
EK071K: Reactive Phosphorus as P	---	0.01	mg/L	<0.01	0.5 mg/L	101	-----	-----	85	115	-----	-----	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133353)</b>														
EK07A: Total Phosphorus as P	---	0.1	mg/L	<0.1	0.5 mg/L	95.2	-----	-----	85	115	-----	-----	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133354)</b>														
EK061A: Total Kjeldahl Nitrogen as N	---	0.1	mg/L	<0.1	0.5 mg/L	101	-----	-----	85	115	-----	-----	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133355)</b>														
EK067A: Total Phosphorus as P	---	0.1	mg/L	<0.1	0.5 mg/L	98.4	-----	-----	85	115	-----	-----	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142437)</b>														
EK057A: Nitrite as N	---	0.01	mg/L	<0.01	0.4 mg/L	97.2	-----	-----	85	115	-----	-----	-----	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142439)</b>														
EK057A: Nitrite as N	---	0.01	mg/L	<0.01	0.4 mg/L	99.8	-----	-----	85	115	-----	-----	-----	-----
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2142261)</b>														
EG020: Arsenic	7440-38-2	10	µg/L	<10	10 µg/L	100	-----	-----	78	114	-----	-----	-----	-----
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	10 µg/L	87.7	-----	-----	80	112	-----	-----	-----	-----
EG020: Chromium	7440-47-3	1	µg/L	<1	10 µg/L	97.8	-----	-----	80	114	-----	-----	-----	-----
EG020: Copper	7440-50-8	1	µg/L	<1	10 µg/L	87.9	-----	-----	79	113	-----	-----	-----	-----
EG020: Lead	7439-92-1	1	µg/L	<1	10 µg/L	90.6	-----	-----	81	109	-----	-----	-----	-----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.1	0.2 µg/L	102	-----	-----	81	113	-----	-----	-----	-----
EG020: Nickel	7440-02-0	1	µg/L	<1	10 µg/L	99.6	-----	-----	78	112	-----	-----	-----	-----
EG020: Silver	7440-22-4	1	µg/L	<1	10 µg/L	92.6	-----	-----	79	111	-----	-----	-----	-----
EG020: Zinc	7440-66-6	10	µg/L	<10	10 µg/L	92.9	-----	-----	73	121	-----	-----	-----	-----
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2133670)</b>														
Naphthalene	91-20-3	0.2	µg/L	<0.2	0.5 µg/L	101	-----	-----	44	114	-----	-----	-----	-----
Acenaphthylene	208-96-8	0.2	µg/L	<0.2	0.5 µg/L	89.5	-----	-----	40	109	-----	-----	-----	-----
Acenaphthene	83-32-9	0.2	µg/L	<0.2	0.5 µg/L	92.2	-----	-----	44	108	-----	-----	-----	-----
Fluorene	86-73-7	0.2	µg/L	<0.2	0.5 µg/L	98.7	-----	-----	43	113	-----	-----	-----	-----
Phenanthrene	85-01-8	0.2	µg/L	<0.2	0.5 µg/L	93.3	-----	-----	45	115	-----	-----	-----	-----
Anthracene	120-12-7	0.2	µg/L	<0.2	0.5 µg/L	86.2	-----	-----	45	112	-----	-----	-----	-----
Fluoranthene	206-44-0	0.2	µg/L	<0.2	0.5 µg/L	101	-----	-----	56	121	-----	-----	-----	-----
Pyrene	129-00-0	0.2	µg/L	<0.2	0.5 µg/L	94.5	-----	-----	57	122	-----	-----	-----	-----
Benz(a)anthracene	56-55-3	0.2	µg/L	<0.2	0.5 µg/L	93.8	-----	-----	61	118	-----	-----	-----	-----
Chrysene	218-01-9	0.2	µg/L	<0.2	0.5 µg/L	108	-----	-----	65	126	-----	-----	-----	-----
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	<0.2	0.5 µg/L	102	-----	-----	49	138	-----	-----	-----	-----
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	<0.2	0.5 µg/L	86.8	-----	-----	69	123	-----	-----	-----	-----
Benzo(a)pyrene	50-32-8	0.2	µg/L	<0.2	0.5 µg/L	105	-----	-----	51	134	-----	-----	-----	-----
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2	0.5 µg/L	102	-----	-----	54	129	-----	-----	-----	-----
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	0.5 µg/L	103	-----	-----	51	138	-----	-----	-----	-----
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2	0.5 µg/L	108	-----	-----	59	135	-----	-----	-----	-----
Low M.W. PAHs	-----	1.2	µg/L	<1.2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----





Matrix: WATER	Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report									
	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2133670) - Continued</b>														
High M.W. PAHs														
<b>EP-065A: PCB Single Congeners (QC Lot: 2133671)</b>														
PCB 8	34883-43-7	0.01	µg/L	<0.01	0.1 µg/L	68.3	-----	-----	-----	50	130	-----	-----	-----
PCB 18	37680-65-2	0.01	µg/L	<0.01	0.1 µg/L	55.2	-----	-----	-----	50	130	-----	-----	-----
PCB 28	7012-37-5	0.01	µg/L	<0.01	0.1 µg/L	85.8	-----	-----	-----	50	130	-----	-----	-----
PCB 44	41464-39-5	0.01	µg/L	<0.01	0.1 µg/L	89.7	-----	-----	-----	50	130	-----	-----	-----
PCB 52	35693-99-3	0.01	µg/L	<0.01	0.1 µg/L	84.6	-----	-----	-----	50	130	-----	-----	-----
PCB 66	32598-10-0	0.01	µg/L	<0.01	0.1 µg/L	112	-----	-----	-----	50	130	-----	-----	-----
PCB 77	32598-13-3	0.01	µg/L	<0.01	0.1 µg/L	79.0	-----	-----	-----	50	130	-----	-----	-----
PCB 101	37680-73-2	0.01	µg/L	<0.01	0.1 µg/L	54.7	-----	-----	-----	50	130	-----	-----	-----
PCB 105	32598-14-4	0.01	µg/L	<0.01	0.1 µg/L	80.4	-----	-----	-----	50	130	-----	-----	-----
PCB 118	31508-00-6	0.01	µg/L	<0.01	0.1 µg/L	78.3	-----	-----	-----	50	130	-----	-----	-----
PCB 126	57465-28-8	0.01	µg/L	<0.01	0.1 µg/L	81.3	-----	-----	-----	50	130	-----	-----	-----
PCB 128	38380-07-3	0.01	µg/L	<0.01	0.1 µg/L	77.4	-----	-----	-----	50	130	-----	-----	-----
PCB 138	35065-28-2	0.01	µg/L	<0.01	0.1 µg/L	73.3	-----	-----	-----	50	130	-----	-----	-----
PCB 153	35065-27-1	0.01	µg/L	<0.01	0.1 µg/L	74.4	-----	-----	-----	50	130	-----	-----	-----
PCB 169	32774-16-6	0.01	µg/L	<0.01	0.1 µg/L	81.4	-----	-----	-----	50	130	-----	-----	-----
PCB 170	35065-30-6	0.01	µg/L	<0.01	0.1 µg/L	75.6	-----	-----	-----	50	130	-----	-----	-----
PCB 180	35065-29-3	0.01	µg/L	<0.01	0.1 µg/L	75.6	-----	-----	-----	50	130	-----	-----	-----
PCB 187	52663-68-0	0.01	µg/L	<0.01	0.1 µg/L	68.5	-----	-----	-----	50	130	-----	-----	-----
Total Polychlorinated biphenyls														
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2133672)</b>														
Aldrin	309-00-2	0.02	µg/L	<0.02	0.1 µg/L	52.0	-----	-----	-----	50	130	-----	-----	-----
alpha-BHC	319-84-6	0.02	µg/L	<0.02	0.1 µg/L	52.6	-----	-----	-----	50	130	-----	-----	-----
beta-BHC	319-85-7	0.02	µg/L	<0.02	0.1 µg/L	64.6	-----	-----	-----	50	130	-----	-----	-----
gamma-BHC	58-89-9	0.02	µg/L	<0.02	0.1 µg/L	54.7	-----	-----	-----	50	130	-----	-----	-----
delta-BHC	319-86-8	0.02	µg/L	<0.02	0.1 µg/L	78.3	-----	-----	-----	50	130	-----	-----	-----
Heptachlor	76-44-8	0.02	µg/L	<0.02	0.1 µg/L	55.0	-----	-----	-----	50	130	-----	-----	-----
Heptachlor epoxide	1024-57-3	0.02	µg/L	<0.02	0.1 µg/L	75.7	-----	-----	-----	50	130	-----	-----	-----
Endosulfan 1	959-98-8	0.02	µg/L	<0.02	0.1 µg/L	82.2	-----	-----	-----	50	130	-----	-----	-----
Endosulfan sulfate	1031-07-8	0.02	µg/L	<0.02	0.1 µg/L	104	-----	-----	-----	50	130	-----	-----	-----
4,4'-DDT	50-29-3	0.02	µg/L	<0.02	0.1 µg/L	99.7	-----	-----	-----	50	130	-----	-----	-----
4,4'-DDD	72-54-8	0.02	µg/L	<0.02	0.1 µg/L	95.3	-----	-----	-----	50	130	-----	-----	-----
4,4'-DDE	72-55-9	0.02	µg/L	<0.02	0.1 µg/L	82.7	-----	-----	-----	50	130	-----	-----	-----
<b>EP-390: Triorganotin (QC Lot: 2143967)</b>														
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	110	-----	-----	-----	81	117	-----	-----	-----





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

Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report				
				Spike Concentration	MS	MSD	Recovery Limits (%)	RPD (%)
				Value	High	Low	Control Limit	
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133256)</b>								
HK1201670-001	VR4 0.9-1.9M	EK055K: Ammonia as N	7664-41-7	5 mg/L	# Not Determined	75	125	
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133259)</b>								
HK1201670-001	VR4 0.9-1.9M	EK071K: Reactive Phosphorus as P	---	0.5 mg/L	119	75	125	
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133353)</b>								
HK1201648-006	Anonymous	EK067A: Total Phosphorus as P	---	0.5 mg/L	92.7	75	125	
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133354)</b>								
HK1201510-008	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	---	50 mg/L	87.4	75	125	
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2133355)</b>								
HK1201670-010	MW02 (ELUTRIATE BLANK)	EK067A: Total Phosphorus as P	---	0.5 mg/L	104	75	125	
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142437)</b>								
HK1201643-001	Anonymous	EK057A: Nitrite as N	---	0.5 mg/L	119	75	125	
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142439)</b>								
HK1201670-002	VR4 1.9-2.9M	EK057A: Nitrite as N	---	0.5 mg/L	118	75	125	
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2142261)</b>								
HK1201648-001	Anonymous	EG020: Arsenic	7440-38-2	10 µg/L	83.4	75	125	
		EG020: Cadmium	7440-43-9	10 µg/L	86.6	75	125	
		EG020: Chromium	7440-47-3	10 µg/L	91.3	75	125	
		EG020: Copper	7440-50-8	10 µg/L	84.6	75	125	
		EG020: Lead	7439-92-1	10 µg/L	93.8	75	125	
		EG020: Mercury	7439-97-6	0.2 µg/L	107	75	125	
		EG020: Nickel	7440-02-0	10 µg/L	# Not Determined	75	125	
		EG020: Silver	7440-22-4	10 µg/L	92.4	75	125	
		EG020: Zinc	7440-66-6	10 µg/L	79.9	75	125	

**Surrogate Control Limits**

Sub-Matrix: ELUTRIATE		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			
Decachlorobiphenyl	2051-24-3	50	130
<b>EP-067S: Pesticide Surrogate</b>			
Dibutylchloroendate	1770-80-5	50	130





### CERTIFICATE OF ANALYSIS

Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Contact : IR POPHIL LAM  
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Project : AGREEMENT NO CE 43\_2010 (HY) CENTRAL  
KOWLOON ROUTE - DESIGN AND  
CONSTRUCTION  
Order number : GE/2009/16.41  
C-O-C number : H014508,H014511  
Site : VR1 AND VR3

Laboratory : ALS Technichem HK Pty Ltd  
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Facsimile : +852 2610 2021  
Quote number : ----

Page : 1 of 15  
Work Order : HK1201775

Date Samples Received : 17-JAN-2012  
Issue Date : 15-FEB-2012  
No. of samples received : 13  
No. of samples analysed : 12

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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





Page Number : 2 of 15  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201775

### 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: 30-JAN-2012

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: **HK1201775**

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

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



**Analytical Results**

Sub-Matrix: ELUTRIATE

Client sample ID

Client sampling date / time

Unit

LOR

CAS Number

VR1  
0.9-1.9M  
17-JAN-2012 14:00  
HK1201775-001

VR1  
1.9-2.9M  
17-JAN-2012 14:00  
HK1201775-002

VR1  
2.9-3.9M  
17-JAN-2012 14:00  
HK1201775-003

VR1  
6.0-6.9M  
17-JAN-2012 14:20  
HK1201775-004

VR1  
GRAB  
17-JAN-2012 15:00  
HK1201775-005

Compound

**ED/EK: Inorganic Nonmetallic Parameters**

EK055K: Ammonia as N	7664-417	0.01	ng/L	19.6	5.75	1.64	0.71	0.77
EK057A: Nitrite as N	----	0.01	mg/L	0.05	0.02	0.02	0.03	0.02
EK058A: Nitrate as N	14797-55-8	0.01	mg/L	0.27	0.31	0.32	0.30	0.26
EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	22.6	7.6	3.0	2.2	0.8
EK067A: Total Phosphorus as P	----	0.1	mg/L	<0.1	0.3	0.1	<0.1	<0.1
EK071K: Reactive Phosphorus as P	----	10	µg/L	10	260	130	70	<10

**EG: Metals and Major Cations - Filtered**

EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	<10	<10	<10
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
EG020: Chromium	7440-47-3	1	µg/L	<1	<1	<1	<1	<1
EG020: Copper	7440-50-8	1	µg/L	<1	<1	<1	<1	<1
EG020: Lead	7439-92-1	1	µg/L	1	1	<1	<1	<1
EG020: Mercury	7439-97-6	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EG020: Nickel	7440-02-0	1	µg/L	<1	<1	<1	<1	2
EG020: Silver	7440-22-4	1	µg/L	<1	<1	<1	<1	<1
EG020: Zinc	7440-66-6	10	µg/L	<10	<10	<10	<10	<10

**EP-076: Polycyclic Aromatics Hydrocarbons (PAHs)**

Naphthalene	91-20-3	0.2	µg/L	0.2	<0.2	<0.2	<0.2	0.3
Acenaphthylene	208-96-8	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	1.0
Acenaphthene	83-32-9	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	96.0
Fluorene	86-73-7	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	2.6
Phenanthrene	85-01-8	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	25.3
Anthracene	120-12-7	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	8.2
Fluoranthene	206-44-0	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	19.1
Pyrene	129-00-0	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	19.9
Benz(a)anthracene	56-55-3	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	1.3
Chrysene	218-01-9	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	1.0
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	0.9
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	0.3
Benzo(a)pyrene	50-32-8	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	1.0
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	0.4
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	0.3
Low M.W. PAHs	----	2.2	µg/L	<2.2	<2.2	<2.2	<2.2	133
High M.W. PAHs	----	6.8	µg/L	<6.8	<6.8	<6.8	<6.8	44.2

**EP-065A: PCB Single Congeners**

PCB 8	34883-43-7	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 18	37680-65-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 28	7012-37-5	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 44	41464-39-5	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01





Sub-Matrix: ELUTRIATE

Compound	CAS Number	LOR	Unit	Client sample ID					VR1 GRAB
				VR1 0.9-1.9M 17-JAN-2012 14:00 HK1201775-001	VR1 1.9-2.9M 17-JAN-2012 14:00 HK1201775-002	VR1 2.9-3.9M 17-JAN-2012 14:00 HK1201775-003	VR1 6.0-6.9M 17-JAN-2012 14:20 HK1201775-004	VR1 17-JAN-2012 15:00 HK1201775-005	
<b>EP-065A: PCB Single Congeners - Continued</b>									
PCB 52	35693-99-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 66	32598-10-0	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 77	32598-13-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 101	37680-73-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 105	32598-14-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 118	31508-00-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 126	57465-28-8	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 128	38380-07-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 138	35065-28-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 153	35065-27-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 169	32774-16-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 170	35065-30-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 180	35065-29-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 187	52663-68-0	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Total Polychlorinated biphenyls	----	0.18	µg/L	<0.18	<0.18	<0.18	<0.18	<0.18	
<b>EP-067A: Organochlorine Pesticides (OC)</b>									
Aldrin	309-00-2	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
alpha-BHC	319-84-6	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
beta-BHC	319-85-7	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
gamma-BHC	58-89-9	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
delta-BHC	319-86-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
Heptachlor	76-44-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
Heptachlor epoxide	1024-57-3	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
Endosulfan 1	959-98-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
Endosulfan sulfate	103107-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
4,4'-DDT	50-29-3	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
4,4'-DDD	72-54-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
4,4'-DDE	72-55-9	0.10	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
<b>EP-390: Triorganotin</b>									
Tributyltin	56573-85-4	0.015	µg TBT / L	<0.015	<0.015	<0.015	<0.015	<0.015	
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>									
2-Fluorobiphenyl	32160-8	0.1	%	67.4	52.3	59.2	68.7	88.8	
4-Terphenyl-d14	1718-51-0	0.1	%	115	85.1	88.4	93.9	80.6	
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>									
Decachlorobiphenyl	205124-3	0.1	%	79.4	85.5	84.0	90.6	60.4	
<b>EP-067S: Pesticide Surrogate</b>									
Dibutylchloroendate	1770-80-5	0.1	%	120	106	105	122	103	





Compound	CAS Number	LOR	Unit	Client sample ID		VR1 GRAB (DUPLICATE) 17-JAN-2012 15:40 HK1201775-006	VR3 0.9-1.9M 17-JAN-2012 09:07 HK1201775-007	VR3 1.9-2.9M 17-JAN-2012 09:07 HK1201775-008	VR3 2.9-3.9M 17-JAN-2012 09:07 HK1201775-009	VR3 6.0-6.9M 17-JAN-2012 09:33 HK1201775-010
				Client sampling date / time	Client sampling date / time					
<b>Sub-Matrix: ELUTRIATE</b>										
<b>ED/EK: Inorganic Nonmetallic Parameters</b>										
EK055K: Ammonia as N	7664-417	0.01	mg/L	0.86	<10	<10	30.6	6.20	4.65	0.92
EK057A: Nitrite as N	---	0.01	mg/L	0.02	<0.2	<0.2	0.02	0.02	0.02	0.02
EK058A: Nitrate as N	14797-55-8	0.01	mg/L	0.31	<1	<1	0.27	0.31	0.33	0.34
EK061A: Total Kjeldahl Nitrogen as N	---	0.1	mg/L	0.9	<1	<1	35.2	8.7	5.0	1.0
EK067A: Total Phosphorus as P	---	0.1	mg/L	<0.1	<10	<10	<0.1	0.1	0.3	<0.1
EK071K: Reactive Phosphorus as P	---	10	µg/L	<10	<10	<10	10	90	290	30
<b>EG: Metals and Major Cations - Filtered</b>										
EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	<10	<10	<10	<10	<10
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
EG020: Chromium	7440-47-3	1	µg/L	<1	<1	<1	<1	<1	<1	<1
EG020: Copper	7440-50-8	1	µg/L	1	<1	<1	<1	<1	<1	1
EG020: Lead	7439-92-1	1	µg/L	<1	<1	<1	<1	<1	2	<1
EG020: Mercury	7439-97-6	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
EG020: Nickel	7440-02-0	1	µg/L	5	<1	<1	14	<1	<1	2
EG020: Silver	7440-22-4	1	µg/L	<1	<1	<1	<1	<1	<1	<1
EG020: Zinc	7440-66-6	10	µg/L	<10	<10	<10	20	<10	<10	<10
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs)</b>										
Naphthalene	91-20-3	0.2	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Acenaphthylene	208-96-8	0.2	µg/L	0.9	<0.2	<0.2	1.6	<0.2	<0.2	<0.2
Acenaphthene	83-32-9	0.2	µg/L	85.3	<0.2	<0.2	46.2	<0.2	<0.2	0.3
Fluorene	86-73-7	0.2	µg/L	2.3	<0.2	<0.2	9.1	<0.2	<0.2	<0.2
Phenanthrene	85-01-8	0.2	µg/L	20.9	<0.2	<0.2	30.8	<0.2	<0.2	<0.2
Anthracene	120-12-7	0.2	µg/L	6.8	<0.2	<0.2	6.5	<0.2	<0.2	<0.2
Fluoranthene	206-44-0	0.2	µg/L	15.7	<0.2	<0.2	8.8	<0.2	<0.2	<0.2
Pyrene	129-00-0	0.2	µg/L	16.2	<0.2	<0.2	8.8	<0.2	<0.2	<0.2
Benz(a)anthracene	56-55-3	0.2	µg/L	1.2	<0.2	<0.2	1.2	<0.2	<0.2	<0.2
Chrysene	218-019	0.2	µg/L	1.0	<0.2	<0.2	1.0	<0.2	<0.2	<0.2
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	0.9	<0.2	<0.2	0.8	<0.2	<0.2	<0.2
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	0.4	<0.2	<0.2	0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	50-32-8	0.2	µg/L	1.0	<0.2	<0.2	0.8	<0.2	<0.2	<0.2
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	0.4	<0.2	<0.2	0.5	<0.2	<0.2	<0.2
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	0.4	<0.2	<0.2	0.3	<0.2	<0.2	<0.2
Low M.W. PAHs	---	2.2	µg/L	116	<0.2	<0.2	94.2	<2.2	<2.2	<2.2
High M.W. PAHs	---	6.8	µg/L	37.1	<0.2	<0.2	22.4	<6.8	<6.8	<6.8
<b>EP-065A: PCB Single Congeners</b>										
PCB 8	34883-43-7	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 18	37680-65-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 28	7012-37-5	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 44	41464-39-5	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 52	35693-99-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 66	32598-10-0	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01





Sub-Matrix: ELUTRIATE

Compound	Client sample ID		VR1 GRAB (DUPLICATE) 17-JAN-2012 15:40 HK1201775-006	VR3 0.9-1.9M 17-JAN-2012 09:07 HK1201775-007	VR3 1.9-2.9M 17-JAN-2012 09:07 HK1201775-008	VR3 2.9-3.9M 17-JAN-2012 09:07 HK1201775-009	VR3 6.0-6.9M 17-JAN-2012 09:33 HK1201775-010
	CAS Number	LOR					
<b>EP-065A: PCB Single Congeners - Continued</b>							
PCB 77	32598-13-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01
PCB 101	37680-73-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01
PCB 105	32598-14-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01
PCB 118	31508-00-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01
PCB 126	57465-28-8	0.01	µg/L	<0.01	<0.01	<0.01	<0.01
PCB 128	38380-07-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01
PCB 138	35065-28-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01
PCB 153	35065-27-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01
PCB 169	32774-16-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01
PCB 170	35065-30-6	0.01	µg/L	<0.01	<0.01	<0.01	<0.01
PCB 180	35065-29-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01
PCB 187	52663-68-0	0.01	µg/L	<0.01	<0.01	<0.01	<0.01
Total Polychlorinated biphenyls	****	0.18	µg/L	<0.18	<0.18	<0.18	<0.18
<b>EP-067A: Organochlorine Pesticides (OC)</b>							
Aldrin	309-00-2	0.10	µg/L	<0.10	<0.10	<0.10	<0.10
alpha-BHC	319-84-6	0.10	µg/L	<0.10	<0.10	<0.10	<0.10
beta-BHC	319-85-7	0.10	µg/L	<0.10	<0.10	<0.10	<0.10
gamma-BHC	56-89-9	0.10	µg/L	<0.10	<0.10	<0.10	<0.10
delta-BHC	319-86-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10
Heptachlor	76-44-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10
Heptachlor epoxide	1024-57-3	0.10	µg/L	<0.10	<0.10	<0.10	<0.10
Endosulfan 1	959-98-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10
Endosulfan sulfate	103107-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10
4,4'-DDT	50-29-3	0.10	µg/L	<0.10	<0.10	<0.10	<0.10
4,4'-DDD	72-54-8	0.10	µg/L	<0.10	<0.10	<0.10	<0.10
4,4'-DDE	72-55-9	0.10	µg/L	<0.10	<0.10	<0.10	<0.10
<b>EP-390: Triorganotin</b>							
Tributyltin	56573-85-4	0.015	µg TBT/L	<0.015	<0.015	<0.015	<0.015
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>							
2-Fluorobiphenyl	32160-8	0.1	%	50.1	92.1	89.5	88.8
4-Terphenyl-d14	1718-510	0.1	%	85.6	111	109	108
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>							
Decachlorobiphenyl	205124-3	0.1	%	72.8	74.7	85.8	86.3
<b>EP-067S: Pesticide Surrogate</b>							
Dibutylchloroendate	1770-80-5	0.1	%	93.4	105	128	127





Compound	Client sample ID		LOR	Unit	Client sampling date / time	VR3 GRAB 17-JAN-2012 10:02 HK1201775-011	MW03 (ELUTRIATE BLANK) 17-JAN-2012 09:45 HK1201775-012
	CAS Number	Client sample ID					
<b>Sub-Matrix: ELUTRIATE</b>							
<b>ED/EK: Inorganic Nonmetallic Parameters</b>							
EK055K: Ammonia as N	7664-417	0.01	mg/L			11.7	0.33
EK057A: Nitrite as N	----	0.01	mg/L			0.02	0.02
EK058A: Nitrate as N	14797-55-8	0.01	mg/L			0.13	0.34
EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L			11.8	0.7
EK067A: Total Phosphorus as P	----	0.1	mg/L			<0.1	<0.1
EK071K: Reactive Phosphorus as P	----	10	µg/L			30	40
<b>EG: Metals and Major Cations - Filtered</b>							
EG020: Arsenic	7440-38-2	10	µg/L			<10	<10
EG020: Cadmium	7440-43-9	0.2	µg/L			<0.2	<0.2
EG020: Chromium	7440-47-3	1	µg/L			1	<1
EG020: Copper	7440-50-8	1	µg/L			2	<1
EG020: Lead	7439-92-1	1	µg/L			<1	<1
EG020: Mercury	7439-97-6	0.1	µg/L			<0.1	<0.1
EG020: Nickel	7440-02-0	1	µg/L			1	<1
EG020: Silver	7440-22-4	1	µg/L			<1	<1
EG020: Zinc	7440-66-6	10	µg/L			<10	<10
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs)</b>							
Naphthalene	91-20-3	0.2	µg/L			<0.2	<0.2
Acenaphthylene	208-96-8	0.2	µg/L			0.7	<0.2
Acenaphthene	83-32-9	0.2	µg/L			17.8	<0.2
Fluorene	86-73-7	0.2	µg/L			0.6	<0.2
Phenanthrene	85-018	0.2	µg/L			2.8	<0.2
Anthracene	120-12-7	0.2	µg/L			1.4	<0.2
Fluoranthene	208-44-0	0.2	µg/L			5.8	<0.2
Pyrene	129-00-0	0.2	µg/L			6.7	<0.2
Benz(a)anthracene	56-55-3	0.2	µg/L			0.8	<0.2
Chrysene	218-019	0.2	µg/L			0.6	<0.2
Benzo(b)fluoranthene	205-99-2	0.2	µg/L			0.5	<0.2
Benzo(k)fluoranthene	207-08-9	0.2	µg/L			0.2	<0.2
Benzo(a)pyrene	50-32-8	0.2	µg/L			0.6	<0.2
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L			0.4	<0.2
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L			<0.2	<0.2
Benzo(g,h,i)perylene	19124-2	0.2	µg/L			0.2	<0.2
Low M.W. PAHs	----	2.2	µg/L			23.3	<2.2
High M.W. PAHs	----	6.8	µg/L			15.9	<6.8
<b>EP-065A: PCB Single Congeners</b>							
PCB 8	34883-43-7	0.01	µg/L			<0.01	<0.01
PCB 18	37680-65-2	0.01	µg/L			<0.01	<0.01
PCB 28	7012-37-5	0.01	µg/L			<0.01	<0.01
PCB 44	41464-39-5	0.01	µg/L			<0.01	<0.01
PCB 52	35693-99-3	0.01	µg/L			<0.01	<0.01
PCB 66	32598-10-0	0.01	µg/L			<0.01	<0.01





Compound	Client sample ID			Unit	LOR	Client sampling date / time	VR3 GRAB 17-JAN-2012 10:02 HK1201775-011	MW03 (ELUTRIATE BLANK) 17-JAN-2012 09:45 HK1201775-012
	CAS Number	LOR	Unit					
<b>Sub-Matrix: ELUTRIATE</b>								
<b>EP-065A: PCB Single Congeners - Continued</b>								
PCB 77	32598-13-3	0.01	µg/L				<0.01	<0.01
PCB 101	37680-73-2	0.01	µg/L				<0.01	<0.01
PCB 105	32598-14-4	0.01	µg/L				<0.01	<0.01
PCB 118	31508-00-6	0.01	µg/L				<0.01	<0.01
PCB 126	57465-28-8	0.01	µg/L				<0.01	<0.01
PCB 128	38380-07-3	0.01	µg/L				<0.01	<0.01
PCB 138	35065-28-2	0.01	µg/L				<0.01	<0.01
PCB 153	35065-27-1	0.01	µg/L				<0.01	<0.01
PCB 169	32774-16-6	0.01	µg/L				<0.01	<0.01
PCB 170	35065-30-6	0.01	µg/L				<0.01	<0.01
PCB 180	35065-29-3	0.01	µg/L				<0.01	<0.01
PCB 187	52663-68-0	0.01	µg/L				<0.01	<0.01
Total Polychlorinated biphenyls	----	0.18	µg/L				<0.18	<0.18
<b>EP-067A: Organochlorine Pesticides (OC)</b>								
Aldrin	309-00-2	0.10	µg/L				<0.10	<0.10
alpha-BHC	319-84-6	0.10	µg/L				<0.10	<0.10
beta-BHC	319-85-7	0.10	µg/L				<0.10	<0.10
gamma-BHC	58-89-9	0.10	µg/L				<0.10	<0.10
delta-BHC	319-86-8	0.10	µg/L				<0.10	<0.10
Heptachlor	76-44-8	0.10	µg/L				<0.10	<0.10
Heptachlor epoxide	1024-57-3	0.10	µg/L				<0.10	<0.10
Endosulfan 1	959-98-8	0.10	µg/L				<0.10	<0.10
Endosulfan sulfate	1031-07-8	0.10	µg/L				<0.10	<0.10
4,4'-DDT	50-29-3	0.10	µg/L				<0.10	<0.10
4,4'-DDD	72-54-8	0.10	µg/L				<0.10	<0.10
4,4'-DDE	72-55-9	0.10	µg/L				<0.10	<0.10
<b>EP-390: Triorganotin</b>								
Tributyltin	56573-85-4	0.015	µg TBT /L				<0.015	<0.015
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>								
2-Fluorobiphenyl	32160-8	0.1	%				61.1	51.9
4-Terphenyl-d14	1718-510	0.1	%				112	106
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>								
Decachlorobiphenyl	205124-3	0.1	%				69.8	73.4
<b>EP-067S: Pesticide Surrogate</b>								
Dibutylchloroendate	1770-80-5	0.1	%				126	122





**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 (%)
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142318)</b>								
HK1201775-010	VR3 6.0-6.9M	EK071K: Reactive Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142441)</b>								
HK1201690-004	Anonymous	EK057A: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0
HK1201775-011	VR3 GRAB	EK057A: Nitrite as N	----	0.01	mg/L	0.02	0.02	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142444)</b>								
HK1201775-012	MW03 (ELUTRIATE BLANK)	EK057A: Nitrite as N	----	0.01	mg/L	0.02	0.02	0.0
HK1201779-002	Anonymous	EK057A: Nitrite as N	----	0.01	mg/L	0.02	0.02	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143540)</b>								
HK1201775-010	VR3 6.0-6.9M	EK055K: Ammonia as N	7664-41-7	0.01	mg/L	0.92	0.90	2.2
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144325)</b>								
HK1201775-012	MW03 (ELUTRIATE BLANK)	EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.7	0.7	0.0
HK1201779-001	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.2	2.3	4.4
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144326)</b>								
HK1201775-002	VR1 1.9-2.9M	EK067A: Total Phosphorus as P	----	0.1	mg/L	0.3	0.2	0.0
HK1201775-012	MW03 (ELUTRIATE BLANK)	EK067A: Total Phosphorus as P	----	0.1	mg/L	<0.1	<0.1	0.0
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2142261)</b>								
HK1201648-006	Anonymous	EG020: Mercury	7439-97-6	0.1	µg/L	<0.1	<0.1	0.0
		EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	0.0
		EG020: Chromium	7440-47-3	1	µg/L	<1	<1	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: Silver	7440-22-4	1	µg/L	<1	<1	0.0
		EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	0.0
		EG020: Zinc	7440-66-6	10	µg/L	<10	<10	0.0
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2142263)</b>								
HK1201775-012	MW03 (ELUTRIATE BLANK)	EG020: Mercury	7439-97-6	0.1	µg/L	<0.1	<0.1	0.0
		EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	0.0
		EG020: Chromium	7440-47-3	1	µg/L	<1	<1	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: Silver	7440-22-4	1	µg/L	<1	<1	0.0
		EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	0.0
		EG020: Zinc	7440-66-6	10	µg/L	<10	<10	0.0
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2133674)</b>								
HK1201775-012	MW03 (ELUTRIATE BLANK)	Naphthalene	91-20-3	0.2	µg/L	<0.2	<0.2	0.0





Page Number : 10 of 15  
 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1201775

Laboratory sample ID	Client sample ID	Method : Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
						Original Result	Duplicate Result	
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2133674) - Continued</b>								
HK1201775-012	MW03 (ELUTRIATE BLANK)	Acenaphthylene	208-96-8	0.2	µg/L	<0.2	<0.2	0.0
		Acenaphthene	83-32-9	0.2	µg/L	<0.2	<0.2	0.0
		Fluorene	86-73-7	0.2	µg/L	<0.2	<0.2	0.0
		Phenanthrene	85-01-8	0.2	µg/L	<0.2	<0.2	0.0
		Anthracene	120-12-7	0.2	µg/L	<0.2	<0.2	0.0
		Fluoranthene	206-44-0	0.2	µg/L	<0.2	<0.2	0.0
		Pyrene	129-00-0	0.2	µg/L	<0.2	<0.2	0.0
		Benz(a)anthracene	56-55-3	0.2	µg/L	<0.2	<0.2	0.0
		Chrysene	218-01-9	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(b)fluoranthene	205-99-2	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(k)fluoranthene	207-08-9	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(a)pyrene	50-32-8	0.2	µg/L	<0.2	<0.2	0.0
		Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2	<0.2	0.0
		Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2	<0.2	0.0
		Low M.W. PAHs	----	2.2	µg/L	<2.2	<2.2	0.0
		High M.W. PAHs	----	6.8	µg/L	<6.8	<6.8	0.0
<b>EP-065A: PCB Single Congeners (QC Lot: 2133675)</b>								
HK1201775-012	MW03 (ELUTRIATE BLANK)	PCB 8	34883-43-7	0.01	µg/L	<0.01	<0.01	0.0
		PCB 18	37680-65-2	0.01	µg/L	<0.01	<0.01	0.0
		PCB 28	7012-37-5	0.01	µg/L	<0.01	<0.01	0.0
		PCB 44	41464-39-5	0.01	µg/L	<0.01	<0.01	0.0
		PCB 52	35693-99-3	0.01	µg/L	<0.01	<0.01	0.0
		PCB 66	32598-10-0	0.01	µg/L	<0.01	<0.01	0.0
		PCB 77	32598-13-3	0.01	µg/L	<0.01	<0.01	0.0
		PCB 101	37680-73-2	0.01	µg/L	<0.01	<0.01	0.0
		PCB 105	32598-14-4	0.01	µg/L	<0.01	<0.01	0.0
		PCB 118	31508-00-6	0.01	µg/L	<0.01	<0.01	0.0
		PCB 126	57465-28-8	0.01	µg/L	<0.01	<0.01	0.0
		PCB 128	38380-07-3	0.01	µg/L	<0.01	<0.01	0.0
		PCB 138	35065-28-2	0.01	µg/L	<0.01	<0.01	0.0
		PCB 153	35065-27-1	0.01	µg/L	<0.01	<0.01	0.0
		PCB 169	32774-16-6	0.01	µg/L	<0.01	<0.01	0.0
		PCB 170	35065-30-6	0.01	µg/L	<0.01	<0.01	0.0
		PCB 180	35065-29-3	0.01	µg/L	<0.01	<0.01	0.0
		PCB 187	52663-68-0	0.01	µg/L	<0.01	<0.01	0.0
		Total Polychlorinated biphenyls	----	0.18	µg/L	<0.18	<0.18	0.0
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2133676)</b>								
HK1201775-012	MW03 (ELUTRIATE BLANK)	Aldrin	309-00-2	0.10	µg/L	<0.10	<0.10	0.0
		alpha-BHC	319-84-6	0.10	µg/L	<0.10	<0.10	0.0
		beta-BHC	319-85-7	0.10	µg/L	<0.10	<0.10	0.0





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Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			RPD (%)
						Original Result	Duplicate Result	Value	
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2133676) - Continued</b>									
HK1201775-012	MW03 (ELUTRIATE BLANK)	gamma-BHC	58-89-9	0.10	µg/L	<0.10	<0.10	<0.10	0.0
		delta-BHC	319-86-8	0.10	µg/L	<0.10	<0.10	<0.10	0.0
		Heptachlor	76-44-8	0.10	µg/L	<0.10	<0.10	<0.10	0.0
		Heptachlor epoxide	1024-57-3	0.10	µg/L	<0.10	<0.10	<0.10	0.0
		Endosulfan 1	959-98-8	0.10	µg/L	<0.10	<0.10	<0.10	0.0
		Endosulfan sulfate	1031-07-8	0.10	µg/L	<0.10	<0.10	<0.10	0.0
		4,4'-DDT	50-29-3	0.10	µg/L	<0.10	<0.10	<0.10	0.0
		4,4'-DDD	72-54-8	0.10	µg/L	<0.10	<0.10	<0.10	0.0
		4,4'-DDE	72-55-9	0.10	µg/L	<0.10	<0.10	<0.10	0.0
<b>EP-390: Triorganotins (QC Lot: 2143967)</b>									
HK1201670-002	Anonymous	Tributyltin	56573-85-4	6	ngSn/L	<6	<6	<6	0.0
<b>EP-390: Triorganotins (QC Lot: 2143968)</b>									
HK1201775-001	VR1 0.9-1.9M	Tributyltin	56573-85-4	6	ngSn/L	<6	<6	<6	0.0

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

Method: Compound	CAS Number	LOR	Unit	Result	Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report				
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	Value	RPD (%)
<b>Method Blank (MB) Report</b>									
ED/IEK: Inorganic Nonmetallic Parameters (QC Lot: 2142318)	---	0.01	mg/L	<0.01	0.5 mg/L	85	115	115	----
EK071K: Reactive Phosphorus as P	---	0.01	mg/L	<0.01	0.5 mg/L	85	115	115	----
ED/IEK: Inorganic Nonmetallic Parameters (QC Lot: 2142441)	---	0.01	mg/L	<0.01	0.4 mg/L	85	115	115	----
EK057A: Nitrite as N	---	0.01	mg/L	<0.01	0.4 mg/L	85	115	115	----
ED/IEK: Inorganic Nonmetallic Parameters (QC Lot: 2142444)	---	0.01	mg/L	<0.01	0.4 mg/L	85	115	115	----
EK057A: Nitrite as N	---	0.01	mg/L	<0.01	0.4 mg/L	85	115	115	----
ED/IEK: Inorganic Nonmetallic Parameters (QC Lot: 2143540)	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	85	115	115	----
EK055K: Ammonia as N	---	0.1	mg/L	<0.1	0.5 mg/L	85	115	115	----
ED/IEK: Inorganic Nonmetallic Parameters (QC Lot: 2144325)	---	0.1	mg/L	<0.1	0.5 mg/L	85	115	115	----
EK061A: Total Kjeldahl Nitrogen as N	---	0.1	mg/L	<0.1	0.5 mg/L	85	115	115	----
ED/IEK: Inorganic Nonmetallic Parameters (QC Lot: 2144326)	---	0.1	mg/L	<0.1	0.5 mg/L	85	115	115	----
EK067A: Total Phosphorus as P	---	0.1	mg/L	<0.1	0.5 mg/L	85	115	115	----
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2142261)</b>									
EG020: Arsenic	7440-38-2	10	µg/L	<10	10 µg/L	78	114	114	----
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	10 µg/L	80	112	112	----
EG020: Chromium	7440-47-3	1	µg/L	<1	10 µg/L	80	114	114	----
EG020: Copper	7440-50-8	1	µg/L	<1	10 µg/L	79	113	113	----
EG020: Lead	7439-92-1	1	µg/L	<1	10 µg/L	81	109	109	----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.1	0.2 µg/L	81	113	113	----
EG020: Nickel	7440-02-0	1	µg/L	<1	10 µg/L	78	112	112	----
EG020: Silver	7440-22-4	1	µg/L	<1	10 µg/L	79	111	111	----
EG020: Zinc	7440-66-6	10	µg/L	<10	10 µg/L	73	121	121	----
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2142263)</b>									





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	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2142263) - Continued</b>														
EG020: Arsenic	7440-38-2	10	µg/L	<10	10 µg/L	108	-----	-----	78	78	114	-----	-----	-----
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	10 µg/L	91.8	-----	-----	80	80	112	-----	-----	-----
EG020: Chromium	7440-47-3	1	µg/L	<1	10 µg/L	94.2	-----	-----	80	80	114	-----	-----	-----
EG020: Copper	7440-50-8	1	µg/L	<1	10 µg/L	109	-----	-----	79	79	113	-----	-----	-----
EG020: Lead	7439-92-1	1	µg/L	<1	10 µg/L	93.1	-----	-----	81	81	109	-----	-----	-----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.1	0.2 µg/L	96.0	-----	-----	81	81	113	-----	-----	-----
EG020: Nickel	7440-02-0	1	µg/L	<1	10 µg/L	96.4	-----	-----	78	78	112	-----	-----	-----
EG020: Silver	7440-22-4	1	µg/L	<1	10 µg/L	92.4	-----	-----	79	79	111	-----	-----	-----
EG020: Zinc	7440-66-6	10	µg/L	<10	10 µg/L	95.5	-----	-----	73	73	121	-----	-----	-----
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2133674)</b>														
Naphthalene	91-20-3	0.2	µg/L	<0.2	0.5 µg/L	62.2	-----	-----	44	44	114	-----	-----	-----
Acenaphthylene	208-96-8	0.2	µg/L	<0.2	0.5 µg/L	55.6	-----	-----	40	40	109	-----	-----	-----
Acenaphthene	83-32-9	0.2	µg/L	<0.2	0.5 µg/L	72.3	-----	-----	44	44	108	-----	-----	-----
Fluorene	86-73-7	0.2	µg/L	<0.2	0.5 µg/L	73.6	-----	-----	43	43	113	-----	-----	-----
Phenanthrene	85-01-8	0.2	µg/L	<0.2	0.5 µg/L	71.0	-----	-----	45	45	115	-----	-----	-----
Anthracene	120-12-7	0.2	µg/L	<0.2	0.5 µg/L	55.0	-----	-----	45	45	112	-----	-----	-----
Fluoranthene	206-44-0	0.2	µg/L	<0.2	0.5 µg/L	81.6	-----	-----	56	56	121	-----	-----	-----
Pyrene	129-00-0	0.2	µg/L	<0.2	0.5 µg/L	67.0	-----	-----	57	57	122	-----	-----	-----
Benz(a)anthracene	56-55-3	0.2	µg/L	<0.2	0.5 µg/L	61.4	-----	-----	61	61	118	-----	-----	-----
Chrysene	218-01-9	0.2	µg/L	<0.2	0.5 µg/L	81.4	-----	-----	65	65	126	-----	-----	-----
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	<0.2	0.5 µg/L	100	-----	-----	49	49	138	-----	-----	-----
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	<0.2	0.5 µg/L	109	-----	-----	69	69	123	-----	-----	-----
Benzo(a)pyrene	50-32-8	0.2	µg/L	<0.2	0.5 µg/L	65.8	-----	-----	51	51	134	-----	-----	-----
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2	0.5 µg/L	97.6	-----	-----	54	54	129	-----	-----	-----
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	0.5 µg/L	94.1	-----	-----	51	51	138	-----	-----	-----
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2	0.5 µg/L	99.0	-----	-----	59	59	135	-----	-----	-----
Low M.W. PAHs	-----	1.2	µg/L	<1.2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
High M.W. PAHs	-----	2.0	µg/L	<2.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>EP-065A: PCB Single Congeners (QC Lot: 2133675)</b>														
PCB 8	34883-43-7	0.01	µg/L	<0.01	0.1 µg/L	59.9	-----	-----	50	50	130	-----	-----	-----
PCB 18	37680-65-2	0.01	µg/L	<0.01	0.1 µg/L	75.2	-----	-----	50	50	130	-----	-----	-----
PCB 28	7012-37-5	0.01	µg/L	<0.01	0.1 µg/L	63.7	-----	-----	50	50	130	-----	-----	-----
PCB 44	41464-39-5	0.01	µg/L	<0.01	0.1 µg/L	56.4	-----	-----	50	50	130	-----	-----	-----
PCB 52	35693-99-3	0.01	µg/L	<0.01	0.1 µg/L	75.0	-----	-----	50	50	130	-----	-----	-----
PCB 66	32598-10-0	0.01	µg/L	<0.01	0.1 µg/L	55.7	-----	-----	50	50	130	-----	-----	-----
PCB 77	32598-13-3	0.01	µg/L	<0.01	0.1 µg/L	73.2	-----	-----	50	50	130	-----	-----	-----
PCB 101	37680-73-2	0.01	µg/L	<0.01	0.1 µg/L	77.1	-----	-----	50	50	130	-----	-----	-----
PCB 105	32598-14-4	0.01	µg/L	<0.01	0.1 µg/L	80.5	-----	-----	50	50	130	-----	-----	-----
PCB 118	31508-00-6	0.01	µg/L	<0.01	0.1 µg/L	78.4	-----	-----	50	50	130	-----	-----	-----
PCB 126	57465-28-8	0.01	µg/L	<0.01	0.1 µg/L	82.9	-----	-----	50	50	130	-----	-----	-----
PCB 128	38380-07-3	0.01	µg/L	<0.01	0.1 µg/L	81.2	-----	-----	50	50	130	-----	-----	-----
PCB 138	35065-28-2	0.01	µg/L	<0.01	0.1 µg/L	78.8	-----	-----	50	50	130	-----	-----	-----
PCB 153	35065-27-1	0.01	µg/L	<0.01	0.1 µg/L	78.8	-----	-----	50	50	130	-----	-----	-----





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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	LCS	DCS	Recovery Limits (%)	Low	High	Value	RPD (%)	Control Limit
<b>EP-065A: PCB Single Congeners (QC Lot: 2133675) - Continued</b>													
PCB 169	32774-16-6	0.01	µg/L	<0.01	0.1 µg/L	83.5	-----	50	50	130	-----	-----	-----
PCB 170	35065-30-6	0.01	µg/L	<0.01	0.1 µg/L	84.0	-----	50	50	130	-----	-----	-----
PCB 180	35065-29-3	0.01	µg/L	<0.01	0.1 µg/L	82.9	-----	50	50	130	-----	-----	-----
PCB 187	52863-68-0	0.01	µg/L	<0.01	0.1 µg/L	79.0	-----	50	50	130	-----	-----	-----
Total Polychlorinated biphenyls	-----	0.18	µg/L	<0.18	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2133676)</b>													
Aldrin	309-00-2	0.02	µg/L	<0.02	0.1 µg/L	94.7	-----	50	50	130	-----	-----	-----
alpha-BHC	319-84-6	0.02	µg/L	<0.02	0.1 µg/L	117	-----	50	50	130	-----	-----	-----
beta-BHC	319-85-7	0.02	µg/L	<0.02	0.1 µg/L	88.3	-----	50	50	130	-----	-----	-----
gamma-BHC	58-89-9	0.02	µg/L	<0.02	0.1 µg/L	116	-----	50	50	130	-----	-----	-----
delta-BHC	319-86-8	0.02	µg/L	<0.02	0.1 µg/L	106	-----	50	50	130	-----	-----	-----
Heptachlor	76-44-8	0.02	µg/L	<0.02	0.1 µg/L	98.3	-----	50	50	130	-----	-----	-----
Heptachlor epoxide	1024-57-3	0.02	µg/L	<0.02	0.1 µg/L	105	-----	50	50	130	-----	-----	-----
Endosulfan 1	959-98-8	0.02	µg/L	<0.02	0.1 µg/L	110	-----	50	50	130	-----	-----	-----
Endosulfan sulfate	1031-07-8	0.02	µg/L	<0.02	0.1 µg/L	91.9	-----	50	50	130	-----	-----	-----
4,4'-DDT	50-29-3	0.02	µg/L	<0.02	0.1 µg/L	90.9	-----	50	50	130	-----	-----	-----
4,4'-DDD	72-54-8	0.02	µg/L	<0.02	0.1 µg/L	93.1	-----	50	50	130	-----	-----	-----
4,4'-DDE	72-55-9	0.02	µg/L	<0.02	0.1 µg/L	95.4	-----	50	50	130	-----	-----	-----
<b>EP-390: Triorganotins (QC Lot: 2143967)</b>													
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	110	-----	81	81	117	-----	-----	-----
<b>EP-390: Triorganotins (QC Lot: 2143968)</b>													
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	109	-----	81	81	117	-----	-----	-----





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

Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
				Spike Concentration	MS	MSD	Recovery Limits (%)	RPD (%)	
				MS	MSD	Low	High	Value	Control Limit
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142318)</b>									
HK1201775-010 VR3 6.0-6.9M		EK071K: Reactive Phosphorus as P		122		75	125		
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142441)</b>									
HK1201690-004 Anonymous		EK057A: Nitrite as N		122		75	125		
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142444)</b>									
HK1201775-012 MW03 (ELUTRIATE BLANK)		EK057A: Nitrite as N		113		75	125		
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143540)</b>									
HK1201868-001 Anonymous	7664-41-7	EK055K: Ammonia as N		122		75	125		
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144325)</b>									
HK1201775-012 MW03 (ELUTRIATE BLANK)		EK061A: Total Kjeldahl Nitrogen as N		100		75	125		
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144326)</b>									
HK1201775-004 VR1 6.0-6.9M		EK067A: Total Phosphorus as P		106		75	125		
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2142261)</b>									
HK1201648-001 Anonymous	7440-38-2	EG020: Arsenic		83.4		75	125		
	7440-43-9	EG020: Cadmium		86.6		75	125		
	7440-47-3	EG020: Chromium		91.3		75	125		
	7440-50-8	EG020: Copper		84.6		75	125		
	7439-92-1	EG020: Lead		93.8		75	125		
	7439-97-6	EG020: Mercury		107		75	125		
	7440-02-0	EG020: Nickel		# Not Determined		75	125		
	7440-22-4	EG020: Silver		92.4		75	125		
	7440-66-6	EG020: Zinc		79.9		75	125		
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2142263)</b>									
HK1201775-005 VR1 GRAB	7440-38-2	EG020: Arsenic		85.8		75	125		
	7440-43-9	EG020: Cadmium		88.0		75	125		
	7440-47-3	EG020: Chromium		91.4		75	125		
	7440-50-8	EG020: Copper		90.6		75	125		
	7439-92-1	EG020: Lead		90.8		75	125		
	7439-97-6	EG020: Mercury		116		75	125		
	7440-02-0	EG020: Nickel		84.3		75	125		
	7440-22-4	EG020: Silver		93.4		75	125		
	7440-66-6	EG020: Zinc		89.8		75	125		

**Surrogate Control Limits**

Compound	Sub-Matrix: ELUTRIATE	CAS Number	Recovery Limits (%)	
			Low	High
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates				



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Compound	CAS Number	Recovery Limits (%)	
		Low	High
<b>Sub-Matrix: ELUTRIATE</b>			
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates - Continued</b>			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			
Decachlorobiphenyl	2051-24-3	50	130
<b>EP-067S: Pesticide Surrogate</b>			
Dibutylchloroendate	1770-80-5	50	130





### CERTIFICATE OF ANALYSIS

Client	: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Laboratory	: ALS Technichem HK Pty Ltd	Page	: 1 of 14
Contact	: IR POPHIL LAM	Contact	: Chan Kwok Fai, Godfrey	Work Order	: HK1201868
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Telephone	: +852 2716 8609	Telephone	: +852 2610 1044	Date Samples Received	: 18-JAN-2012
Facsimile	: ----	Facsimile	: +852 2610 2021	Issue Date	: 16-FEB-2012
Project	: AGREEMENT NO CE 43_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION	Quote number	: ----	No. of samples received	: 14
Order number	: GE/2009/16.41			No. of samples analysed	: 13
C-O-C number	: H014515,H014517				
Site	: GB1 TO GB11				

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Signatories

Anh Ngoc Huynh  
Fung Lim Chee, Richard

Position  
Senior Chemist  
General Manager

Organics  
Inorganics

Authorised results for



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Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1201868

#### 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:

30-JAN-2012

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: **HK1201868**

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

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



**Analytical Results**

Sub-Matrix: ELUTRIATE

Compound	CAS Number	LOR	Client sample ID		GB1	GB2	GB11	GB3	GB4
			Client sampling date / time	Unit					
<b>ED/EK: Inorganic Nonmetallic Parameters</b>									
EK055K: Ammonia as N	7664-417	0.01	mg/L	18-JAN-2012 09:10	1.32	5.25	6.20	3.12	2.13
EK057A: Nitrite as N	----	0.01	mg/L	HK1201868-001	0.02	0.02	0.02	0.02	0.02
EK058A: Nitrate as N	14797-55-8	0.01	mg/L	18-JAN-2012 09:44	0.13	0.11	0.05	0.11	0.24
EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	HK1201868-002	1.9	5.6	6.8	3.6	3.0
EK067A: Total Phosphorus as P	----	0.1	mg/L	18-JAN-2012 10:10	<0.1	<0.1	<0.1	<0.1	<0.1
EK071K: Reactive Phosphorus as P	----	10	µg/L	HK1201868-003	<10	<10	<10	20	20
<b>EG: Metals and Major Cations - Filtered</b>									
EG020: Arsenic	7440-38-2	10	µg/L	18-JAN-2012 09:44	<10	<10	<10	<10	<10
EG020: Cadmium	7440-43-9	0.2	µg/L	HK1201868-002	0.3	<0.2	<0.2	<0.2	<0.2
EG020: Chromium	7440-47-3	1	µg/L	18-JAN-2012 10:10	<1	<1	<1	<1	<1
EG020: Copper	7440-50-8	1	µg/L	HK1201868-003	4	<1	2	1	<1
EG020: Lead	7439-92-1	1	µg/L	18-JAN-2012 09:44	<1	<1	<1	<1	<1
EG020: Mercury	7439-97-6	0.1	µg/L	HK1201868-002	<0.1	<0.1	<0.1	<0.1	<0.1
EG020: Nickel	7440-02-0	1	µg/L	18-JAN-2012 10:10	3	2	1	<1	4
EG020: Silver	7440-22-4	1	µg/L	HK1201868-003	<1	<1	<1	<1	<1
EG020: Zinc	7440-66-6	10	µg/L	18-JAN-2012 09:44	13	<10	<10	<10	11
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs)</b>									
Naphthalene	91-20-3	0.2	µg/L	18-JAN-2012 09:44	<0.2	0.4	113	190	9420
Acenaphthylene	208-96-8	0.2	µg/L	HK1201868-002	<0.2	10.8	8.2	27.0	184
Acenaphthene	83-32-9	0.2	µg/L	18-JAN-2012 10:10	16.9	96.6	108	73.7	388
Fluorene	86-73-7	0.2	µg/L	HK1201868-003	1.2	28.2	17.6	17.4	176
Phenanthrene	85-018	0.2	µg/L	18-JAN-2012 09:44	3.8	57.0	36.0	39.0	497
Anthracene	120-12-7	0.2	µg/L	HK1201868-002	1.2	16.3	8.4	7.2	165
Fluoranthene	206-44-0	0.2	µg/L	18-JAN-2012 10:10	7.9	14.1	14.3	9.6	199
Pyrene	129-00-0	0.2	µg/L	HK1201868-003	8.6	14.0	16.3	13.4	241
Benz(a)anthracene	56-55-3	0.2	µg/L	18-JAN-2012 09:44	1.0	2.9	2.1	1.2	59.9
Chrysene	218-019	0.2	µg/L	HK1201868-002	1.3	2.8	1.8	1.0	84.3
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	18-JAN-2012 10:10	1.4	2.0	1.4	0.8	54.1
Benzo(a)pyrene	207-08-9	0.2	µg/L	HK1201868-003	0.6	1.0	0.6	0.3	25.2
Indeno(1,2,3-cd)pyrene	50-32-8	0.2	µg/L	18-JAN-2012 09:44	1.3	2.1	1.5	0.8	61.1
Dibenz(a,h)anthracene	193-39-5	0.2	µg/L	HK1201868-002	0.6	0.8	0.5	0.3	29.8
Benzo(g,h,i)perylene	53-70-3	0.2	µg/L	18-JAN-2012 10:10	<0.2	<0.2	<0.2	<0.2	8.9
Low M.W. PAHs	19124-2	0.2	µg/L	HK1201868-003	0.6	0.6	0.4	0.2	28.6
High M.W. PAHs	----	2.2	µg/L	18-JAN-2012 09:44	23.2	209	291	354	10800
EP-065A: PCB Single Congeners	----	6.8	µg/L	HK1201868-002	23.5	40.2	39.0	27.6	792
PCB 8	34883-43-7	0.01	µg/L	18-JAN-2012 09:44	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 18	37880-65-2	0.01	µg/L	HK1201868-003	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 28	7012-37-5	0.01	µg/L	18-JAN-2012 10:10	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 44	41464-39-5	0.01	µg/L	HK1201868-002	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 52	35693-99-3	0.01	µg/L	18-JAN-2012 09:44	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 66	32598-10-0	0.01	µg/L	HK1201868-003	<0.01	<0.01	<0.01	<0.01	<0.01





Sub-Matrix: ELUTRIATE		Client sample ID				GB1	GB2	GB11	GB3	GB4
Compound	CAS Number	LOR	Unit	Client sampling date / time	18-JAN-2012 09:10 HK1201868-001	18-JAN-2012 09:44 HK1201868-002	18-JAN-2012 10:10 HK1201868-003	18-JAN-2012 10:40 HK1201868-004	18-JAN-2012 11:05 HK1201868-005	
<b>EP-065A: PCB Single Congeners - Continued</b>										
PCB 77	32598-13-3	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 101	37680-73-2	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 105	32598-14-4	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 118	31508-00-6	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 126	57465-28-8	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 128	38380-07-3	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 138	35065-28-2	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 153	35065-27-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 169	32774-16-6	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 170	35065-30-6	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 180	35065-29-3	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01	
PCB 187	52663-68-0	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01	
Total Polychlorinated biphenyls	----	0.18	µg/L		<0.18	<0.18	<0.18	<0.18	<0.18	
<b>EP-067A: Organochlorine Pesticides (OC)</b>										
Aldrin	309-00-2	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	
alpha-BHC	319-84-6	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	
beta-BHC	319-85-7	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	
gamma-BHC	58-89-9	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	
delta-BHC	319-86-8	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	
Heptachlor	76-44-8	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	
Heptachlor epoxide	1024-57-3	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	
Endosulfan 1	959-98-8	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	
Endosulfan sulfate	1031-07-8	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	
4,4'-DDT	50-29-3	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	
4,4'-DDD	72-54-8	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	
4,4'-DDE	72-55-9	0.10	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	
<b>EP-390: Triorganotins</b>										
Tributyltin	56573-85-4	0.015	µg TBT/L		<0.015	<0.015	<0.015	<0.015	<0.015	
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>										
2-Fluorobiphenyl	32160-8	0.1	%		51.7	106	77.0	108	56.0	
4-Terphenyl-d14	1718-510	0.1	%		106	53.4	66.6	69.5	104	
<b>EP-066S: PCB Congeners and Organochlorine Pesticides Surrogate</b>										
Decachlorobiphenyl	205124-3	0.1	%		61.1	71.0	89.7	75.5	62.8	
<b>EP-067S: Pesticide Surrogate</b>										
Dibutylchloroendate	1770-80-5	0.1	%		94.7	95.0	79.7	114	126	





## Sub-Matrix: ELUTRIATE

Compound	CAS Number	LOR	Unit	Client sampling date / time				GB8
				GB5	GB6	GB7	GB8	
Client sample ID				18-JAN-2012 11:25	18-JAN-2012 13:10	18-JAN-2012 13:35	18-JAN-2012 14:05	
Client sampling date / time				HK1201868-006	HK1201868-007	HK1201868-009	HK1201868-010	
<b>ED/EX: Inorganic Nonmetallic Parameters</b>								
EK055K: Ammonia as N	7664-417	0.01	mg/L	5.25	2.76	7.65	5.52	
EK057A: Nitrite as N	---	0.01	mg/L	<0.01	0.03	0.02	0.02	
EK058A: Nitrate as N	14797-558	0.01	mg/L	0.01	0.22	0.10	0.07	
EK061A: Total Kjeldahl Nitrogen as N	---	0.1	mg/L	5.6	3.2	7.6	5.8	
EK067A: Total Phosphorus as P	---	0.1	mg/L	0.1	<0.1	<0.1	<0.1	
EK071K: Reactive Phosphorus as P	---	10	µg/L	130	40	40	10	
<b>EG: Metals and Major Cations - Filtered</b>								
EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	<10	<10	
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	
EG020: Chromium	7440-47-3	1	µg/L	<1	<1	<1	<1	
EG020: Copper	7440-50-8	1	µg/L	2	2	2	2	
EG020: Lead	7439-92-1	1	µg/L	<1	<1	<1	<1	
EG020: Mercury	7439-97-6	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	
EG020: Nickel	7440-02-0	1	µg/L	3	1	<1	1	
EG020: Silver	7440-22-4	1	µg/L	<1	<1	<1	<1	
EG020: Zinc	7440-66-6	10	µg/L	17	<10	<10	<10	
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs)</b>								
Naphthalene	9120-3	0.2	µg/L	1.6	2.2	1.3	0.6	
Acenaphthylene	208-96-8	0.2	µg/L	3.1	4.0	0.9	1.3	
Acenaphthene	83-32-9	0.2	µg/L	97.4	212	7.8	0.4	
Fluorene	86-73-7	0.2	µg/L	2.5	7.2	<0.2	<0.2	
Phenanthrene	85-01-8	0.2	µg/L	8.6	28.3	0.4	0.9	
Anthracene	120-12-7	0.2	µg/L	2.9	6.5	0.3	0.7	
Fluoranthene	206-44-0	0.2	µg/L	15.8	16.1	4.6	0.7	
Pyrene	129-00-0	0.2	µg/L	18.5	17.8	8.2	8.1	
Benz(a)anthracene	56-55-3	0.2	µg/L	2.7	2.0	0.2	2.0	
Chrysene	218-019	0.2	µg/L	2.7	1.6	0.5	2.3	
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	2.1	1.2	0.5	3.5	
Benzo(k)fluoranthene	207-06-9	0.2	µg/L	1.0	0.5	0.2	1.5	
Benzo(a)pyrene	50-32-8	0.2	µg/L	2.0	1.2	0.5	3.1	
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	0.9	0.4	<0.2	1.8	
Dibenzo(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	<0.2	<0.2	0.4	
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	0.7	0.3	<0.2	0.6	
Low M.W. PAHs	----	2.2	µg/L	116	260	10.7	3.9	
High M.W. PAHs	----	6.8	µg/L	46.5	41.2	15.4	25.0	
<b>EP-065A: PCB Single Congeners</b>								
PCB 8	34883-43-7	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	
PCB 18	37680-65-2	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	
PCB 28	7012-37-5	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	
PCB 44	41464-39-5	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	
PCB 52	35693-99-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	
PCB 66	32598-10-0	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	
PCB 77	32598-13-3	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	





Sub-Matrix: ELUTRIATE		Client sample ID				GB8	
Compound	CAS Number	LOR	Unit	Client sampling date / time	GB5 (DUPLICATE)	GB7	GB8
					18-JAN-2012 11:25 HK1201868-006	18-JAN-2012 13:35 HK1201868-009	18-JAN-2012 14:05 HK1201868-010
<b>EP-065A: PCB Single Congeners - Continued</b>							
PCB 101	37880-73-2	0.01	µg/L		<0.01	<0.01	<0.01
PCB 105	32598-14-4	0.01	µg/L		<0.01	<0.01	<0.01
PCB 118	31508-00-6	0.01	µg/L		<0.01	<0.01	<0.01
PCB 126	57465-28-8	0.01	µg/L		<0.01	<0.01	<0.01
PCB 128	38380-07-3	0.01	µg/L		<0.01	<0.01	<0.01
PCB 138	35065-28-2	0.01	µg/L		<0.01	<0.01	<0.01
PCB 153	35065-27-1	0.01	µg/L		<0.01	<0.01	<0.01
PCB 169	32774-16-6	0.01	µg/L		<0.01	<0.01	<0.01
PCB 170	35065-30-6	0.01	µg/L		<0.01	<0.01	<0.01
PCB 180	35065-29-3	0.01	µg/L		<0.01	<0.01	<0.01
PCB 187	52663-68-0	0.01	µg/L		<0.01	<0.01	<0.01
Total Polychlorinated biphenyls	----	0.18	µg/L		<0.18	<0.18	<0.18
<b>EP-067A: Organochlorine Pesticides (OC)</b>							
Aldrin	309-00-2	0.10	µg/L		<0.10	<0.10	<0.10
alpha-BHC	319-84-6	0.10	µg/L		<0.10	<0.10	<0.10
beta-BHC	319-85-7	0.10	µg/L		<0.10	<0.10	<0.10
gamma-BHC	58-89-9	0.10	µg/L		<0.10	<0.10	<0.10
delta-BHC	319-86-8	0.10	µg/L		<0.10	<0.10	<0.10
Heptachlor	76-44-8	0.10	µg/L		<0.10	<0.10	<0.10
Heptachlor epoxide	1024-57-3	0.10	µg/L		<0.10	<0.10	<0.10
Endosulfan 1	959-98-8	0.10	µg/L		<0.10	<0.10	<0.10
Endosulfan sulfate	1031-07-8	0.10	µg/L		<0.10	<0.10	<0.10
4,4'-DDT	50-29-3	0.10	µg/L		<0.10	<0.10	<0.10
4,4'-DDD	72-54-8	0.10	µg/L		<0.10	<0.10	<0.10
4,4'-DDE	72-55-9	0.10	µg/L		<0.10	<0.10	<0.10
<b>EP-390: Triorganofins</b>							
Tributyltin	56573-85-4	0.015	µg TBT / L		<0.015	<0.015	<0.015
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>							
2-Fluorobiphenyl	32160-8	0.1	%		101	63.3	53.9
4-Terphenyl-d14	1718-51-0	0.1	%		85.1	79.6	68.1
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>							
Decachlorobiphenyl	205124-3	0.1	%		67.6	66.6	64.7
<b>EP-067S: Pesticide Surrogate</b>							
Dibutylchlorendate	1770-80-5	0.1	%		73.9	79.7	76.5





Sub-Matrix: ELUTRIATE		Client sample ID		GB9	GB10	MW04 (ELUTRIATE BLANK)
Compound	CAS Number	LOR	Unit	18-JAN-2012 14:25 HK1201868-011	18-JAN-2012 14:45 HK1201868-012	18-JAN-2012 14:30 HK1201868-013
<b>ED/EK: Inorganic Nonmetallic Parameters</b>						
EK055K: Ammonia as N	7664-417	0.01	mg/L	7.79	7.57	0.33
EK057A: Nitrite as N	---	0.01	mg/L	0.02	0.03	0.02
EK058A: Nitrate as N	14797-558	0.01	mg/L	0.08	0.02	0.25
EK061A: Total Kjeldahl Nitrogen as N	---	0.1	mg/L	8.6	8.1	0.6
EK067A: Total Phosphorus as P	---	0.1	mg/L	0.1	<0.1	0.1
EK071K: Reactive Phosphorus as P	---	10	µg/L	100	90	10
<b>EG: Metals and Major Cations - Filtered</b>						
EG020: Arsenic	7440-382	10	µg/L	<10	<10	<10
EG020: Cadmium	7440-439	0.2	µg/L	<0.2	<0.2	<0.2
EG020: Chromium	7440-47-3	1	µg/L	<1	<1	<1
EG020: Copper	7440-50-8	1	µg/L	2	3	<1
EG020: Lead	7439-92-1	1	µg/L	<1	1	<1
EG020: Mercury	7439-97-6	0.1	µg/L	<0.1	<0.1	<0.1
EG020: Nickel	7440-02-0	1	µg/L	<1	8	<1
EG020: Silver	7440-22-4	1	µg/L	<1	<1	<1
EG020: Zinc	7440-66-6	10	µg/L	<10	34	<10
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs)</b>						
Naphthalene	91-20-3	0.2	µg/L	0.3	0.3	0.2
Acenaphthylene	208-96-8	0.2	µg/L	<0.2	0.9	<0.2
Acenaphthene	83-32-9	0.2	µg/L	0.4	32.8	<0.2
Fluorene	86-73-7	0.2	µg/L	<0.2	<0.2	<0.2
Phenanthrene	85-01-8	0.2	µg/L	<0.2	0.5	<0.2
Anthracene	120-12-7	0.2	µg/L	<0.2	4.1	<0.2
Fluoranthene	206-44-0	0.2	µg/L	0.7	13.1	<0.2
Pyrene	129-00-0	0.2	µg/L	4.8	15.3	<0.2
Benz(a)anthracene	56-55-3	0.2	µg/L	0.3	2.8	<0.2
Chrysene	218-01-9	0.2	µg/L	0.2	3.2	<0.2
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	0.4	2.2	<0.2
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	<0.2	0.7	<0.2
Benzo(a)pyrene	50-32-8	0.2	µg/L	0.4	2.1	<0.2
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2	0.9	<0.2
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	<0.2	<0.2
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2	0.7	<0.2
Low M.W. PAHs	---	2.2	µg/L	<2.2	38.6	<2.2
High M.W. PAHs	---	6.8	µg/L	<6.8	41.1	<6.8
<b>EP-065A: PCB Single Congeners</b>						
PCB 8	34883-43-7	0.01	µg/L	<0.01	<0.01	<0.01
PCB 18	37680-65-2	0.01	µg/L	<0.01	<0.01	<0.01
PCB 28	7012-37-5	0.01	µg/L	<0.01	<0.01	<0.01
PCB 44	41464-39-5	0.01	µg/L	<0.01	<0.01	<0.01
PCB 52	35693-99-3	0.01	µg/L	<0.01	<0.01	<0.01
PCB 66	32598-10-0	0.01	µg/L	<0.01	<0.01	<0.01









**Laboratory Duplicate (DUP) Report**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
						Original Result	Duplicate Result	
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142318)</b>								
HK1201775-010	Anonymous	EK071K: Reactive Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142319)</b>								
HK1202039-001	Anonymous	EK071K: Reactive Phosphorus as P	----	0.01	mg/L	0.38	0.37	2.7
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142444)</b>								
HK1201775-012	Anonymous	EK057A: Nitrite as N	----	0.01	mg/L	0.02	0.02	0.0
HK1201779-002	Anonymous	EK057A: Nitrite as N	----	0.01	mg/L	0.02	0.02	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143542)</b>								
HK1201775-012	Anonymous	EK055K: Ammonia as N	7664-41-7	0.01	mg/L	0.33	0.37	11.4
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144325)</b>								
HK1201775-012	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.7	0.7	0.0
HK1201779-001	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.2	2.3	4.4
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144326)</b>								
HK1201775-002	Anonymous	EK067A: Total Phosphorus as P	----	0.1	mg/L	0.3	0.2	0.0
HK1201775-012	Anonymous	EK067A: Total Phosphorus as P	----	0.1	mg/L	<0.1	<0.1	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144328)</b>								
HK1201876-008	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	12.2	12.2	0.0
HK1201876-010	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	14.8	14.6	1.4
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144329)</b>								
HK1201779-001	Anonymous	EK067A: Total Phosphorus as P	----	0.1	mg/L	<0.1	<0.1	0.0
HK1201868-007	GB5 (DUPLICATE)	EK067A: Total Phosphorus as P	----	0.1	mg/L	<0.1	<0.1	0.0
<b>EG: Metals and Major Cations - Filtered (QC Lot: 214227f)</b>								
HK1201868-013	MW04 (ELUTRIATE BLANK)	EG020: Mercury	7439-97-6	0.1	µg/L	<0.1	<0.1	0.0
		EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	0.0
		EG020: Chromium	7440-47-3	1	µg/L	<1	<1	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: Silver	7440-22-4	1	µg/L	<1	<1	0.0
		EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	0.0
		EG020: Zinc	7440-66-6	10	µg/L	<10	<10	0.0
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2133677)</b>								
HK1201868-013	MW04 (ELUTRIATE BLANK)	Naphthalene	91-20-3	0.2	µg/L	0.2	<0.2	0.0
		Acenaphthylene	208-96-8	0.2	µg/L	<0.2	<0.2	0.0
		Acenaphthene	83-32-9	0.2	µg/L	<0.2	<0.2	0.0
		Fluorene	86-73-7	0.2	µg/L	<0.2	<0.2	0.0
		Phenanthrene	85-01-8	0.2	µg/L	<0.2	<0.2	0.0
		Anthracene	120-12-7	0.2	µg/L	<0.2	<0.2	0.0
		Fluoranthene	206-44-0	0.2	µg/L	<0.2	<0.2	0.0
		Pyrene	129-00-0	0.2	µg/L	<0.2	<0.2	0.0





Laboratory sample ID	Client sample ID	Method: Compound	Laboratory Duplicate (DUP) Report				
			LOR	Unit	Original Result	Duplicate Result	
<b>Matrix: WATER</b>							
<b>EP-076: Polycyclic Aromatic Hydrocarbons (PAHs) (QC Lot: 2133677) - Continued</b>							
HK1201868-013	MW04 (ELUTRIATE BLANK)	Benz(a)anthracene	0.2	µg/L	<0.2	<0.2	0.0
		Chrysene	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(b)fluoranthene	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(k)fluoranthene	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(a)pyrene	0.2	µg/L	<0.2	<0.2	0.0
		Indeno(1.2.3-cd)pyrene	0.2	µg/L	<0.2	<0.2	0.0
		Dibenz(a,h)anthracene	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(g,h,i)perylene	0.2	µg/L	<0.2	<0.2	0.0
		Low M.W. PAHs	2.2	µg/L	<2.2	<2.2	0.0
		High M.W. PAHs	6.8	µg/L	<6.8	<6.8	0.0
<b>EP-065A: PCB Single Congeners (QC Lot: 2133678)</b>							
HK1201868-013	MW04 (ELUTRIATE BLANK)	PCB 8	0.01	µg/L	<0.01	<0.01	0.0
		PCB 18	0.01	µg/L	<0.01	<0.01	0.0
		PCB 28	0.01	µg/L	<0.01	<0.01	0.0
		PCB 44	0.01	µg/L	<0.01	<0.01	0.0
		PCB 52	0.01	µg/L	<0.01	<0.01	0.0
		PCB 66	0.01	µg/L	<0.01	<0.01	0.0
		PCB 77	0.01	µg/L	<0.01	<0.01	0.0
		PCB 101	0.01	µg/L	<0.01	<0.01	0.0
		PCB 105	0.01	µg/L	<0.01	<0.01	0.0
		PCB 118	0.01	µg/L	<0.01	<0.01	0.0
		PCB 126	0.01	µg/L	<0.01	<0.01	0.0
		PCB 128	0.01	µg/L	<0.01	<0.01	0.0
		PCB 138	0.01	µg/L	<0.01	<0.01	0.0
		PCB 153	0.01	µg/L	<0.01	<0.01	0.0
		PCB 169	0.01	µg/L	<0.01	<0.01	0.0
		PCB 170	0.01	µg/L	<0.01	<0.01	0.0
		PCB 180	0.01	µg/L	<0.01	<0.01	0.0
		PCB 187	0.01	µg/L	<0.01	<0.01	0.0
		Total Polychlorinated biphenyls	0.18	µg/L	<0.18	<0.18	0.0
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2133679)</b>							
HK1201868-013	MW04 (ELUTRIATE BLANK)	Aldrin	0.10	µg/L	<0.10	<0.10	0.0
		alpha-BHC	0.10	µg/L	<0.10	<0.10	0.0
		beta-BHC	0.10	µg/L	<0.10	<0.10	0.0
		gamma-BHC	0.10	µg/L	<0.10	<0.10	0.0
		delta-BHC	0.10	µg/L	<0.10	<0.10	0.0
		Heptachlor	0.10	µg/L	<0.10	<0.10	0.0
		Heptachlor epoxide	0.10	µg/L	<0.10	<0.10	0.0
		Endosulfan 1	0.10	µg/L	<0.10	<0.10	0.0
		Endosulfan sulfate	0.10	µg/L	<0.10	<0.10	0.0
		4,4'-DDT	0.10	µg/L	<0.10	<0.10	0.0





Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			RPD (%)
						Original Result	Duplicate Result	Value	
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2133679) - Continued</b>									
HK1201868-013	MW04 (ELUTRIATE BLANK)	4.4'-DDD	72-54-8	0.10	µg/L	<0.10	<0.10	<0.10	0.0
		4.4'-DDE	72-55-9	0.10	µg/L	<0.10	<0.10	<0.10	0.0
<b>EP-390: Triorganotins (QC Lot: 2143968)</b>									
HK1201775-001	Anonymous	Tributyltin	56573-85-4	6	ngSn/L	<6	<6	<6	0.0
<b>EP-390: Triorganotins (QC Lot: 2143969)</b>									
HK1201876-012	Anonymous	Tributyltin	56573-85-4	6	ngSn/L	284	287	287	0.8

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

Method: Compound	CAS Number	LOR	Unit	Result	Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					RPD (%)	
					Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)		Value
<b>Method Blank (MB) Report</b>											
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142318)											
EK071K: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	98.3	85	115	115	-----	-----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142319)											
EK071K: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	97.3	85	115	115	-----	-----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142444)											
EK057A: Nitrite as N	----	0.01	mg/L	<0.01	0.4 mg/L	109	85	115	115	-----	-----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143542)											
EK055K: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	102	85	115	115	-----	-----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144325)											
EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	0.5 mg/L	103	85	115	115	-----	-----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144326)											
EK067A: Total Phosphorus as P	----	0.1	mg/L	<0.1	0.5 mg/L	98.9	85	115	115	-----	-----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144328)											
EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	0.5 mg/L	88.3	85	115	115	-----	-----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144329)											
EK067A: Total Phosphorus as P	----	0.1	mg/L	<0.1	0.5 mg/L	99.4	85	115	115	-----	-----
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2142271)</b>											
EG020: Arsenic	7440-38-2	10	µg/L	<10	10 µg/L	104	78	114	114	-----	-----
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	10 µg/L	89.2	80	112	112	-----	-----
EG020: Chromium	7440-47-3	1	µg/L	<1	10 µg/L	90.7	80	114	114	-----	-----
EG020: Copper	7440-50-8	1	µg/L	<1	10 µg/L	90.3	79	113	113	-----	-----
EG020: Lead	7439-92-1	1	µg/L	<1	10 µg/L	88.0	81	109	109	-----	-----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.1	0.2 µg/L	101	81	113	113	-----	-----
EG020: Nickel	7440-02-0	1	µg/L	<1	10 µg/L	95.3	78	112	112	-----	-----
EG020: Silver	7440-22-4	1	µg/L	<1	10 µg/L	92.4	79	111	111	-----	-----
EG020: Zinc	7440-66-6	10	µg/L	<10	10 µg/L	91.2	73	121	121	-----	-----
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2133677)</b>											
Naphthalene	91-20-3	0.2	µg/L	<0.2	0.5 µg/L	87.1	44	114	114	-----	-----
Acenaphthylene	208-96-8	0.2	µg/L	<0.2	0.5 µg/L	71.0	40	109	109	-----	-----





Method: Compound		Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
		CAS Number	LOR	Unit	Result	Spike Concentration	LCS	DCS	Recovery Limits (%)	Value	Control Limit
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2133677) - Continued</b>											
Acenaphthene	83-32-9	0.2	µg/L	<0.2	0.5 µg/L	90.3	-----	44	108	-----	-----
Fluorene	86-73-7	0.2	µg/L	<0.2	0.5 µg/L	110	-----	43	113	-----	-----
Phenanthrene	85-01-8	0.2	µg/L	<0.2	0.5 µg/L	108	-----	45	115	-----	-----
Anthracene	120-12-7	0.2	µg/L	<0.2	0.5 µg/L	66.0	-----	45	112	-----	-----
Fluoranthene	206-44-0	0.2	µg/L	<0.2	0.5 µg/L	111	-----	56	121	-----	-----
Pyrene	129-00-0	0.2	µg/L	<0.2	0.5 µg/L	90.0	-----	57	122	-----	-----
Benz(a)anthracene	56-55-3	0.2	µg/L	<0.2	0.5 µg/L	70.7	-----	61	118	-----	-----
Chrysene	218-01-9	0.2	µg/L	<0.2	0.5 µg/L	89.4	-----	65	126	-----	-----
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	<0.2	0.5 µg/L	107	-----	49	138	-----	-----
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	<0.2	0.5 µg/L	119	-----	69	123	-----	-----
Benzo(a)pyrene	50-32-8	0.2	µg/L	<0.2	0.5 µg/L	81.6	-----	51	134	-----	-----
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2	0.5 µg/L	112	-----	54	129	-----	-----
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	0.5 µg/L	103	-----	51	138	-----	-----
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2	0.5 µg/L	106	-----	59	135	-----	-----
Low M.W. PAHs	-----	1.2	µg/L	<1.2	-----	-----	-----	-----	-----	-----	-----
High M.W. PAHs	-----	2.0	µg/L	<2.0	-----	-----	-----	-----	-----	-----	-----
<b>EP-055A: PCB Single Congeners (QC Lot: 2133678)</b>											
PCB 8	34883-43-7	0.01	µg/L	<0.01	0.1 µg/L	97.0	-----	50	130	-----	-----
PCB 18	37680-65-2	0.01	µg/L	<0.01	0.1 µg/L	85.1	-----	50	130	-----	-----
PCB 28	7012-37-5	0.01	µg/L	<0.01	0.1 µg/L	72.3	-----	50	130	-----	-----
PCB 44	41464-39-5	0.01	µg/L	<0.01	0.1 µg/L	63.5	-----	50	130	-----	-----
PCB 52	35693-99-3	0.01	µg/L	<0.01	0.1 µg/L	66.3	-----	50	130	-----	-----
PCB 66	32598-10-0	0.01	µg/L	<0.01	0.1 µg/L	65.9	-----	50	130	-----	-----
PCB 77	32598-13-3	0.01	µg/L	<0.01	0.1 µg/L	81.0	-----	50	130	-----	-----
PCB 101	37680-73-2	0.01	µg/L	<0.01	0.1 µg/L	87.1	-----	50	130	-----	-----
PCB 105	32598-14-4	0.01	µg/L	<0.01	0.1 µg/L	83.7	-----	50	130	-----	-----
PCB 118	31508-00-6	0.01	µg/L	<0.01	0.1 µg/L	83.5	-----	50	130	-----	-----
PCB 126	57465-28-8	0.01	µg/L	<0.01	0.1 µg/L	85.5	-----	50	130	-----	-----
PCB 128	38380-07-3	0.01	µg/L	<0.01	0.1 µg/L	84.8	-----	50	130	-----	-----
PCB 138	35065-28-2	0.01	µg/L	<0.01	0.1 µg/L	83.6	-----	50	130	-----	-----
PCB 153	35065-27-1	0.01	µg/L	<0.01	0.1 µg/L	83.8	-----	50	130	-----	-----
PCB 169	32774-16-6	0.01	µg/L	<0.01	0.1 µg/L	84.5	-----	50	130	-----	-----
PCB 170	35065-30-6	0.01	µg/L	<0.01	0.1 µg/L	85.1	-----	50	130	-----	-----
PCB 180	35065-29-3	0.01	µg/L	<0.01	0.1 µg/L	85.0	-----	50	130	-----	-----
PCB 187	52663-68-0	0.01	µg/L	<0.01	0.1 µg/L	83.9	-----	50	130	-----	-----
Total Polychlorinated biphenyls	-----	0.18	µg/L	<0.18	-----	-----	-----	-----	-----	-----	-----
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2133679)</b>											
Aldrin	309-00-2	0.02	µg/L	<0.02	0.1 µg/L	99.0	-----	50	130	-----	-----
alpha-BHC	319-84-6	0.02	µg/L	<0.02	0.1 µg/L	79.3	-----	50	130	-----	-----
beta-BHC	319-85-7	0.02	µg/L	<0.02	0.1 µg/L	66.6	-----	50	130	-----	-----
gamma-BHC	58-89-9	0.02	µg/L	<0.02	0.1 µg/L	67.6	-----	50	130	-----	-----
delta-BHC	319-86-8	0.02	µg/L	<0.02	0.1 µg/L	69.4	-----	50	130	-----	-----
Heptachlor	76-44-8	0.02	µg/L	<0.02	0.1 µg/L	61.8	-----	50	130	-----	-----





Method: Compound	Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
	CAS Number	LOR	Unit	Result	Spike Concentration		Recovery Limits (%)		Value	RPD (%)	Control Limit
					LCS	DCS	Low	High			
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2133679) - Continued</b>											
Heptachlor epoxide	1024-57-3	0.02	µg/L	<0.02	0.1 µg/L	110	-----	50	130	-----	-----
Endosulfan 1	959-98-8	0.02	µg/L	<0.02	0.1 µg/L	94.0	-----	50	130	-----	-----
Endosulfan sulfate	1031-07-8	0.02	µg/L	<0.02	0.1 µg/L	74.7	-----	50	130	-----	-----
4,4'-DDT	50-29-3	0.02	µg/L	<0.02	0.1 µg/L	58.6	-----	50	130	-----	-----
4,4'-DDD	72-54-8	0.02	µg/L	<0.02	0.1 µg/L	101	-----	50	130	-----	-----
4,4'-DDE	72-55-9	0.02	µg/L	<0.02	0.1 µg/L	88.8	-----	50	130	-----	-----
<b>EP-390: Triorganotins (QC Lot: 2143968)</b>											
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	109	-----	81	117	-----	-----
<b>EP-390: Triorganotins (QC Lot: 2143969)</b>											
Tributyltin	56573-85-4	5	ngSn/L	<5	5 ngSn/L	98.0	-----	81	117	-----	-----

Matrix: WATER





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

Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
				Spike Concentration	MS	MSD	Recovery Limits (%)	RPD (%)	
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142318)</b>									
HK1201775-010	Anonymous	EK071K: Reactive Phosphorus as P	----	0.5 mg/L	122	----	75	125	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142319)</b>									
HK1201775-011	Anonymous	EK071K: Reactive Phosphorus as P	----	0.5 mg/L	114	----	75	125	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2142444)</b>									
HK1201775-012	Anonymous	EK057A: Nitrite as N	----	0.5 mg/L	113	----	75	125	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2143542)</b>									
HK1202405-001	Anonymous	EK055K: Ammonia as N	7664-41-7	0.5 mg/L	122	----	75	125	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144325)</b>									
HK1201775-012	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	0.5 mg/L	100	----	75	125	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144326)</b>									
HK1201775-004	Anonymous	EK067A: Total Phosphorus as P	----	0.5 mg/L	106	----	75	125	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144328)</b>									
HK1201876-008	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	5 mg/L	106	----	75	125	----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2144329)</b>									
HK1201775-012	Anonymous	EK067A: Total Phosphorus as P	----	0.5 mg/L	102	----	75	125	----
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2142271)</b>									
HK1201868-001	GB1	EG020: Arsenic	7440-38-2	10 µg/L	92.1	----	75	125	----
		EG020: Cadmium	7440-43-9	10 µg/L	93.6	----	75	125	----
		EG020: Chromium	7440-47-3	10 µg/L	92.4	----	75	125	----
		EG020: Copper	7440-50-8	10 µg/L	93.0	----	75	125	----
		EG020: Lead	7439-92-1	10 µg/L	90.8	----	75	125	----
		EG020: Mercury	7439-97-6	0.2 µg/L	91.0	----	75	125	----
		EG020: Nickel	7440-02-0	10 µg/L	89.2	----	75	125	----
		EG020: Silver	7440-22-4	10 µg/L	95.6	----	75	125	----
		EG020: Zinc	7440-66-6	10 µg/L	90.9	----	75	125	----

**Surrogate Control Limits**

Compound	CAS Number	Recovery Limits (%)	
		Low	High
<b>Sub-Matrix: ELUTRIATE</b>			
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			
Decachlorobiphenyl	2051-24-3	50	130
<b>EP-067S: Pesticide Surrogate</b>			
Dibutylchlorendate	1770-80-5	50	130



# ALS Technichem (HK) Pty Ltd

**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES



## CERTIFICATE OF ANALYSIS

Client	: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT : IR POPHIL LAM	Laboratory	: ALS Technichem HK Pty Ltd	Page	: 1 of 9
Contact	: GEOTECHNICAL PROJECTS DIVISION, GEOTECHNICAL ENGINEERING OFFICE, 23/F., KWUN TONG VIEW, 410 KWUN TONG ROAD, KOWLOON, HONG KONG	Contact	: Chan Kwok Fai, Godfrey	Work Order	: HK1202618
Address		Address	: 1/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: Pophilkiam@cedd.gov.hk	E-mail	: Godfrey.Chan@alsglobal.com		
Telephone	: +852 2716 8609	Telephone	: +852 2610 1044	Date Samples Received	: 21-JAN-2012
Facsimile	: ----	Facsimile	: +852 2610 2021	Issue Date	: 15-FEB-2012
Project	: AGREEMENT NO CE 43_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION	Quote number	: ----	No. of samples received	: 3
Order number	: GE/2009/16.41			No. of samples analysed	: 2
C-O-C number	: H014519				
Site	: ----				

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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.

**Signature**  
Anh Ngoc Huynh  
Fung Lim Chee, Richard

*(Signature)*

**Position**  
Senior Chemist  
General Manager

**Authorised results for**  
Organics  
Inorganics



Page Number : 2 of 9  
Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
Work Order : HK1202618

#### **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:

30-JAN-2012

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: **HK1202618**

Project Name: Agreement No. CE 43/2010 (HY) Central Kowloon Route - Design and Construction Sediment Sampling and Testing at Kowloon Bay.

Sample(s) were received in a chilled condition.

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

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





**Analytical Results**

Sub-Matrix: ELUTRIATE

Compound	CAS Number	LOR	Client sampling date / time		REFERENCE SAMPLER		REFERENCE SAMPLE	
			Unit	Value	Unit	Value	(ELUTRIATE BLANK)	Value
<b>ED/EK: Inorganic Nonmetallic Parameters</b>								
EK055K: Ammonia as N	7664-41-7	0.01	mg/L	1.30	HK1202618-001	0.14	HK1202618-002	
EK057A: Nitrite as N	---	0.01	mg/L	<0.01	21-JAN-2012 11:30	0.02		
EK058A: Nitrate as N	14797-55-8	0.01	mg/L	0.13		0.17		
EK061A: Total Kjeldahl Nitrogen as N	---	0.1	mg/L	1.7		0.3		
EK067A: Total Phosphorus as P	---	0.1	mg/L	0.1		<0.1		
EK071K: Reactive Phosphorus as P	---	10	µg/L	110		<10		
<b>EG: Metals and Major Cations - Filtered</b>								
EG020: Arsenic	7440-38-2	10	µg/L	<10		<10		
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2		<0.2		
EG020: Chromium	7440-47-3	1	µg/L	<1		<1		
EG020: Copper	7440-50-8	1	µg/L	<1		<1		
EG020: Lead	7439-92-1	1	µg/L	<1		<1		
EG020: Mercury	7439-97-6	0.1	µg/L	<0.1		<0.1		
EG020: Nickel	7440-02-0	1	µg/L	<1		<1		
EG020: Silver	7440-22-4	1	µg/L	<1		<1		
EG020: Zinc	7440-66-6	10	µg/L	<10		<10		
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs)</b>								
Naphthalene	9120-3	0.2	µg/L	<0.2		<0.2		
Acenaphthylene	208-96-8	0.2	µg/L	<0.2		<0.2		
Acenaphthene	83-32-9	0.2	µg/L	<0.2		<0.2		
Fluorene	86-73-7	0.2	µg/L	<0.2		<0.2		
Phenanthrene	85-01-8	0.2	µg/L	<0.2		<0.2		
Anthracene	120-12-7	0.2	µg/L	<0.2		<0.2		
Fluoranthene	206-44-0	0.2	µg/L	<0.2		<0.2		
Pyrene	129-00-0	0.2	µg/L	<0.2		<0.2		
Benzo(a)anthracene	56-55-3	0.2	µg/L	<0.2		<0.2		
Chrysene	218-01-9	0.2	µg/L	<0.2		<0.2		
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	<0.2		<0.2		
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	<0.2		<0.2		
Benzo(a)pyrene	50-32-8	0.2	µg/L	<0.2		<0.2		
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2		<0.2		
Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	<0.2		<0.2		
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2		<0.2		
Low M.W. PAHs	----	2.2	µg/L	<2.2		<2.2		
High M.W. PAHs	----	6.8	µg/L	<6.8		<6.8		
<b>EP-065A: PCB Single Congeners</b>								
PCB 8	34883-43-7	0.01	µg/L	<0.01		<0.01		
PCB 18	37680-65-2	0.01	µg/L	<0.01		<0.01		
PCB 28	7012-37-5	0.01	µg/L	<0.01		<0.01		
PCB 44	41464-39-5	0.01	µg/L	<0.01		<0.01		
PCB 52	35693-99-3	0.01	µg/L	<0.01		<0.01		





Compound	CAS Number	LOR	Client sample ID		REFERENCE SAMPLE REFERENCE SAMPLE (ELUTRIATE BLANK)
			Client sampling date / time	Unit	
Sub-Matrix: ELUTRIATE					
EP-065A: PCB Single Congeners - Continued					
PCB 66	32598-10-0	0.01	21-JAN-2012 11:30	µg/L	<0.01
PCB 77	32598-13-3	0.01	21-JAN-2012 11:30	µg/L	<0.01
PCB 101	37680-73-2	0.01	21-JAN-2012 11:30	µg/L	<0.01
PCB 105	32598-14-4	0.01	21-JAN-2012 11:30	µg/L	<0.01
PCB 118	31508-00-6	0.01	21-JAN-2012 11:30	µg/L	<0.01
PCB 126	57465-28-8	0.01	21-JAN-2012 11:30	µg/L	<0.01
PCB 128	38380-07-3	0.01	21-JAN-2012 11:30	µg/L	<0.01
PCB 138	35065-28-2	0.01	21-JAN-2012 11:30	µg/L	<0.01
PCB 153	35065-27-1	0.01	21-JAN-2012 11:30	µg/L	<0.01
PCB 169	32774-16-6	0.01	21-JAN-2012 11:30	µg/L	<0.01
PCB 170	35065-30-6	0.01	21-JAN-2012 11:30	µg/L	<0.01
PCB 180	35065-28-3	0.01	21-JAN-2012 11:30	µg/L	<0.01
PCB 187	52663-68-0	0.01	21-JAN-2012 11:30	µg/L	<0.01
Total Polychlorinated biphenyls	----	0.18	21-JAN-2012 11:30	µg/L	<0.18
EP-067A: Organochlorine Pesticides (OC)					
Aldrin	309-00-2	0.10	21-JAN-2012 11:30	µg/L	<0.10
alpha-BHC	319-84-6	0.10	21-JAN-2012 11:30	µg/L	<0.10
beta-BHC	319-85-7	0.10	21-JAN-2012 11:30	µg/L	<0.10
gamma-BHC	58-89-9	0.10	21-JAN-2012 11:30	µg/L	<0.10
delta-BHC	319-86-8	0.10	21-JAN-2012 11:30	µg/L	<0.10
Heptachlor	76-44-8	0.10	21-JAN-2012 11:30	µg/L	<0.10
Heptachlor epoxide	1024-57-3	0.10	21-JAN-2012 11:30	µg/L	<0.10
Endosulfan 1	959-98-8	0.10	21-JAN-2012 11:30	µg/L	<0.10
Endosulfan sulfate	1031-07-8	0.10	21-JAN-2012 11:30	µg/L	<0.10
4,4'-DDT	50-29-3	0.10	21-JAN-2012 11:30	µg/L	<0.10
4,4'-DDD	72-54-8	0.10	21-JAN-2012 11:30	µg/L	<0.10
4,4'-DDE	72-55-9	0.10	21-JAN-2012 11:30	µg/L	<0.10
EP-390: Triorganotin					
Tributyltin	56573-85-4	0.015	21-JAN-2012 11:30	µg TBT / L	<0.015
EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates					
2-Fluorobiphenyl	32150-8	0.1	21-JAN-2012 11:30	%	50.7
4-Terphenyl-d14	1718-51-0	0.1	21-JAN-2012 11:30	%	67.8
EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate					
Decachlorobiphenyl	2051-24-3	0.1	21-JAN-2012 11:30	%	73.3
EP-067S: Pesticide Surrogate					
Dibutylchloroendate	1770-80-5	0.1	21-JAN-2012 11:30	%	88.0





**Laboratory Duplicate (DUP) Report**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				
				LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>Matrix: WATER</b>								
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2146288)</b>								
HK1202581-001	Anonymous	EK055K: Ammonia as N	7664-41-7	0.01	mg/L	0.01	0.01	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2151420)</b>								
HK1202550-001	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	11.0	11.4	3.6
HK1202670-001	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	21.3	22.3	4.6
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2151421)</b>								
HK1202550-001	Anonymous	EK067A: Total Phosphorus as P	----	0.1	mg/L	1.8	1.9	0.0
HK1202646-004	Anonymous	EK067A: Total Phosphorus as P	----	0.1	mg/L	0.4	0.4	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2155761)</b>								
HK1203032-001	Anonymous	EK057A: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0
HK1203045-001	Anonymous	EK057A: Nitrite as N	----	0.01	mg/L	0.21	0.21	0.0
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2155778)</b>								
HK1203085-001	Anonymous	EK071K: Reactive Phosphorus as P	----	0.01	mg/L	0.09	0.09	0.0
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2160149)</b>								
HK1202618-002	REFERENCE SAMPLE (ELUTRIATE BLANK)	EG020: Mercury	7439-97-6	0.1	µg/L	<0.1	<0.1	0.0
		EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	0.0
		EG020: Chromium	7440-47-3	1	µg/L	<1	<1	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: Silver	7440-22-4	1	µg/L	<1	<1	0.0
		EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	0.0
		EG020: Zinc	7440-66-6	10	µg/L	<10	<10	0.0
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2149864)</b>								
HK1202618-002	REFERENCE SAMPLE (ELUTRIATE BLANK)	Naphthalene	91-20-3	0.2	µg/L	<0.2	<0.2	0.0
		Acenaphthylene	208-96-8	0.2	µg/L	<0.2	<0.2	0.0
		Acenaphthene	83-32-9	0.2	µg/L	<0.2	<0.2	0.0
		Fluorene	86-73-7	0.2	µg/L	<0.2	<0.2	0.0
		Phenanthrene	85-01-8	0.2	µg/L	<0.2	<0.2	0.0
		Anthracene	120-12-7	0.2	µg/L	<0.2	<0.2	0.0
		Fluoranthene	206-44-0	0.2	µg/L	<0.2	<0.2	0.0
		Pyrene	129-00-0	0.2	µg/L	<0.2	<0.2	0.0
		Benz(a)anthracene	56-55-3	0.2	µg/L	<0.2	<0.2	0.0
		Chrysene	218-01-9	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(b)fluoranthene	205-99-2	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(k)fluoranthene	207-08-9	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(a)pyrene	50-32-8	0.2	µg/L	<0.2	<0.2	0.0
		Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2	<0.2	0.0
		Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	<0.2	0.0
		Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2	<0.2	0.0
		Low M.W. PAHs	----	2.2	µg/L	<2.2	<2.2	0.0





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 Client : CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Work Order : HK1202618

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report		RPD (%)
						Original Result	Duplicate Result	
<b>Matrix: WATER</b>								
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2149864) - Continued</b>								
HK1202618-002	REFERENCE SAMPLE (ELUTRIATE BLANK)	High M.W. PAHs	----	6.8	µg/L	<6.8	<6.8	0.0
<b>EP-065A: PCB Single Congeners (QC Lot: 2149865)</b>								
HK1202618-002	REFERENCE SAMPLE (ELUTRIATE BLANK)	PCB 8	34883-43-7	0.01	µg/L	<0.01	<0.01	0.0
		PCB 18	37680-65-2	0.01	µg/L	<0.01	<0.01	0.0
		PCB 28	7012-37-5	0.01	µg/L	<0.01	<0.01	0.0
		PCB 44	41464-39-5	0.01	µg/L	<0.01	<0.01	0.0
		PCB 52	35693-99-3	0.01	µg/L	<0.01	<0.01	0.0
		PCB 66	32598-10-0	0.01	µg/L	<0.01	<0.01	0.0
		PCB 77	32598-13-3	0.01	µg/L	<0.01	<0.01	0.0
		PCB 101	37680-73-2	0.01	µg/L	<0.01	<0.01	0.0
		PCB 105	32598-14-4	0.01	µg/L	<0.01	<0.01	0.0
		PCB 118	31508-00-6	0.01	µg/L	<0.01	<0.01	0.0
		PCB 126	57465-28-8	0.01	µg/L	<0.01	<0.01	0.0
		PCB 128	38380-07-3	0.01	µg/L	<0.01	<0.01	0.0
		PCB 138	35065-28-2	0.01	µg/L	<0.01	<0.01	0.0
		PCB 153	35065-27-1	0.01	µg/L	<0.01	<0.01	0.0
		PCB 169	32774-16-6	0.01	µg/L	<0.01	<0.01	0.0
		PCB 170	35065-30-6	0.01	µg/L	<0.01	<0.01	0.0
		PCB 180	35065-29-3	0.01	µg/L	<0.01	<0.01	0.0
		PCB 187	52663-68-0	0.01	µg/L	<0.01	<0.01	0.0
		Total Polychlorinated biphenyls	----	0.18	µg/L	<0.18	<0.18	0.0
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2149867)</b>								
HK1202618-002	REFERENCE SAMPLE (ELUTRIATE BLANK)	Aldrin	309-00-2	0.10	µg/L	<0.10	<0.10	0.0
		alpha-BHC	319-84-6	0.10	µg/L	<0.10	<0.10	0.0
		beta-BHC	319-85-7	0.10	µg/L	<0.10	<0.10	0.0
		gamma-BHC	58-89-9	0.10	µg/L	<0.10	<0.10	0.0
		delta-BHC	319-86-8	0.10	µg/L	<0.10	<0.10	0.0
		Heptachlor	76-44-8	0.10	µg/L	<0.10	<0.10	0.0
		Heptachlor epoxide	1024-57-3	0.10	µg/L	<0.10	<0.10	0.0
		Endosulfan 1	959-98-8	0.10	µg/L	<0.10	<0.10	0.0
		Endosulfan sulfate	1031-07-8	0.10	µg/L	<0.10	<0.10	0.0
		4,4'-DDT	50-29-3	0.10	µg/L	<0.10	<0.10	0.0
		4,4'-DDD	72-54-8	0.10	µg/L	<0.10	<0.10	0.0
		4,4'-DDE	72-55-9	0.10	µg/L	<0.10	<0.10	0.0
<b>EP-390: Triorganotins (QC Lot: 2153956)</b>								
HK1202618-001	REFERENCE SAMPLE	Tributyltin	56573-85-4	6	ngSn/L	<6	<6	0.0

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

Method: Compound	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	Spike Recovery (%)	Recovery Limits (%)	RPD (%)
							Low	High	Value
							DCS		Control Limit





Matrix: WATER

Method: Compound	Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
	CAS Number	LOR	Unit	Result	Spike Concentration	LCS	Spike Recovery (%)	DCS	Recovery Limits (%)	Value	Control Limit
									Low	High	
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2146288)</b>											
EK055K: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	93.8	-----	-----	85	115	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2151420)</b>											
EK061A: Total Kjeldahl Nitrogen as N	-----	0.1	mg/L	<0.1	0.5 mg/L	104	-----	-----	85	115	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2151421)</b>											
EK067A: Total Phosphorus as P	-----	0.1	mg/L	<0.1	0.5 mg/L	96.2	-----	-----	85	115	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2155761)</b>											
EK057A: Nitrite as N	-----	0.01	mg/L	<0.01	0.4 mg/L	115	-----	-----	85	115	-----
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2155778)</b>											
EK071K: Reactive Phosphorus as P	-----	0.01	mg/L	<0.01	0.5 mg/L	98.7	-----	-----	85	115	-----
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2160149)</b>											
EG020: Arsenic	7440-38-2	10	µg/L	<10	10 µg/L	98.2	-----	-----	78	114	-----
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	10 µg/L	96.5	-----	-----	80	112	-----
EG020: Chromium	7440-47-3	1	µg/L	<1	10 µg/L	97.4	-----	-----	80	114	-----
EG020: Copper	7440-50-8	1	µg/L	<1	10 µg/L	98.8	-----	-----	79	113	-----
EG020: Lead	7439-92-1	1	µg/L	<1	10 µg/L	96.3	-----	-----	81	109	-----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.1	0.2 µg/L	110	-----	-----	81	113	-----
EG020: Nickel	7440-02-0	1	µg/L	<1	10 µg/L	98.3	-----	-----	78	112	-----
EG020: Silver	7440-22-4	1	µg/L	<1	10 µg/L	92.8	-----	-----	79	111	-----
EG020: Zinc	7440-66-6	10	µg/L	<10	10 µg/L	92.4	-----	-----	73	121	-----
<b>EP-076: Polycyclic Aromatics Hydrocarbons (PAHs) (QC Lot: 2149864)</b>											
Naphthalene	91-20-3	0.2	µg/L	<0.2	0.5 µg/L	72.0	-----	-----	44	114	-----
Acenaphthylene	208-96-8	0.2	µg/L	<0.2	0.5 µg/L	68.7	-----	-----	40	109	-----
Acenaphthene	83-32-9	0.2	µg/L	<0.2	0.5 µg/L	70.6	-----	-----	44	108	-----
Fluorene	86-73-7	0.2	µg/L	<0.2	0.5 µg/L	71.3	-----	-----	43	113	-----
Phenanthrene	85-01-8	0.2	µg/L	<0.2	0.5 µg/L	75.7	-----	-----	45	115	-----
Anthracene	120-12-7	0.2	µg/L	<0.2	0.5 µg/L	73.2	-----	-----	45	112	-----
Fluoranthene	206-44-0	0.2	µg/L	<0.2	0.5 µg/L	78.5	-----	-----	56	121	-----
Pyrene	129-00-0	0.2	µg/L	<0.2	0.5 µg/L	79.3	-----	-----	57	122	-----
Benz(a)anthracene	56-55-3	0.2	µg/L	<0.2	0.5 µg/L	91.5	-----	-----	61	118	-----
Chrysene	218-01-9	0.2	µg/L	<0.2	0.5 µg/L	99.2	-----	-----	65	126	-----
Benzo(b)fluoranthene	205-99-2	0.2	µg/L	<0.2	0.5 µg/L	87.9	-----	-----	49	138	-----
Benzo(k)fluoranthene	207-08-9	0.2	µg/L	<0.2	0.5 µg/L	93.7	-----	-----	69	123	-----
Benzo(a)pyrene	50-32-8	0.2	µg/L	<0.2	0.5 µg/L	91.0	-----	-----	51	134	-----
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	<0.2	0.5 µg/L	75.6	-----	-----	54	129	-----
Dibenzo(a,h)anthracene	53-70-3	0.2	µg/L	<0.2	0.5 µg/L	87.7	-----	-----	51	138	-----
Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	<0.2	0.5 µg/L	91.4	-----	-----	59	135	-----
Low M.W. PAHs	-----	1.2	µg/L	<1.2	-----	-----	-----	-----	-----	-----	-----
High M.W. PAHs	-----	2.0	µg/L	<2.0	-----	-----	-----	-----	-----	-----	-----
<b>EP-065A: PCB Single Congeners (QC Lot: 2149865)</b>											
PCB 8	34883-43-7	0.01	µg/L	<0.01	0.1 µg/L	82.4	-----	-----	50	130	-----
PCB 18	37680-65-2	0.01	µg/L	<0.01	0.1 µg/L	66.2	-----	-----	50	130	-----





Method: Compound	Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report				
	CAS Number	LOR	Unit	Result	Spike Recovery (%)		Recovery Limits (%)		RPD (%)
					LCS	DCS	Low	High	
<b>EP-065A: PCB Single Congeners (QC Lot: 2149865) - Continued</b>									
PCB 28	7012-37-5	0.01	µg/L	<0.01	56.0	-----	50	130	-----
PCB 44	41464-39-5	0.01	µg/L	<0.01	53.0	-----	50	130	-----
PCB 52	35693-99-3	0.01	µg/L	<0.01	95.9	-----	50	130	-----
PCB 66	32598-10-0	0.01	µg/L	<0.01	53.5	-----	50	130	-----
PCB 77	32598-13-3	0.01	µg/L	<0.01	79.3	-----	50	130	-----
PCB 101	37680-73-2	0.01	µg/L	<0.01	81.5	-----	50	130	-----
PCB 105	32598-14-4	0.01	µg/L	<0.01	79.9	-----	50	130	-----
PCB 118	31508-00-6	0.01	µg/L	<0.01	78.8	-----	50	130	-----
PCB 126	57465-28-8	0.01	µg/L	<0.01	78.8	-----	50	130	-----
PCB 128	38380-07-3	0.01	µg/L	<0.01	78.2	-----	50	130	-----
PCB 138	35065-28-2	0.01	µg/L	<0.01	78.4	-----	50	130	-----
PCB 153	35065-27-1	0.01	µg/L	<0.01	79.5	-----	50	130	-----
PCB 169	32774-16-6	0.01	µg/L	<0.01	77.5	-----	50	130	-----
PCB 170	35065-30-6	0.01	µg/L	<0.01	79.2	-----	50	130	-----
PCB 180	35065-29-3	0.01	µg/L	<0.01	79.8	-----	50	130	-----
PCB 187	52663-68-0	0.01	µg/L	<0.01	79.6	-----	50	130	-----
Total Polychlorinated biphenyls	-----	0.18	µg/L	<0.18	-----	-----	---	-----	-----
<b>EP-067A: Organochlorine Pesticides (OC) (QC Lot: 2149867)</b>									
Aldrin	309-00-2	0.02	µg/L	<0.02	70.2	-----	50	130	-----
alpha-BHC	319-84-6	0.02	µg/L	<0.02	100	-----	50	130	-----
beta-BHC	319-85-7	0.02	µg/L	<0.02	92.4	-----	50	130	-----
gamma-BHC	58-89-9	0.02	µg/L	<0.02	81.0	-----	50	130	-----
delta-BHC	319-86-8	0.02	µg/L	<0.02	56.6	-----	50	130	-----
Heptachlor	76-44-8	0.02	µg/L	<0.02	106	-----	50	130	-----
Heptachlor epoxide	1024-57-3	0.02	µg/L	<0.02	64.3	-----	50	130	-----
Endosulfan 1	959-98-8	0.02	µg/L	<0.02	66.4	-----	50	130	-----
Endosulfan sulfate	1031-07-8	0.02	µg/L	<0.02	67.7	-----	50	130	-----
4,4'-DDT	50-29-3	0.02	µg/L	<0.02	71.9	-----	50	130	-----
4,4'-DDD	72-54-8	0.02	µg/L	<0.02	74.8	-----	50	130	-----
4,4'-DDE	72-55-9	0.02	µg/L	<0.02	63.3	-----	50	130	-----
<b>EP-390: Triorganotin (QC Lot: 2153956)</b>									
Tributyltin	56573-85-4	5	ngSn/L	<5	94.3	-----	81	117	-----





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

Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
				Spike Concentration	MS	MSD	Recovery Limits (%)	RPD (%)	
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2146288)</b>									
HK1202581-001	Anonymous	EK055K: Ammonia as N	7664-41-7	0.5 mg/L	110	---	75	125	---
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2151420)</b>									
HK1202550-001	Anonymous	EK061A: Total Kjeldahl Nitrogen as N	---	5 mg/L	92.0	---	75	125	---
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2151421)</b>									
HK1202550-001	Anonymous	EK067A: Total Phosphorus as P	---	5 mg/L	100	---	75	125	---
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2155761)</b>									
HK1203032-001	Anonymous	EK057A: Nitrite as N	---	0.5 mg/L	119	---	75	125	---
<b>ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2155778)</b>									
HK1203085-001	Anonymous	EK071K: Reactive Phosphorus as P	---	0.5 mg/L	102	---	75	125	---
<b>EG: Metals and Major Cations - Filtered (QC Lot: 2160149)</b>									
HK1202618-001 REFERENCE SAMPLE									
		EG020: Arsenic	7440-38-2	10 µg/L	112	---	75	125	---
		EG020: Cadmium	7440-43-9	10 µg/L	96.7	---	75	125	---
		EG020: Chromium	7440-47-3	10 µg/L	99.6	---	75	125	---
		EG020: Copper	7440-50-8	10 µg/L	96.9	---	75	125	---
		EG020: Lead	7439-92-1	10 µg/L	99.2	---	75	125	---
		EG020: Mercury	7439-97-6	0.2 µg/L	100	---	75	125	---
		EG020: Nickel	7440-02-0	10 µg/L	90.9	---	75	125	---
		EG020: Silver	7440-22-4	10 µg/L	93.5	---	75	125	---
		EG020: Zinc	7440-66-6	10 µg/L	105	---	75	125	---

**Surrogate Control Limits**

Compound	CAS Number	Recovery Limits (%)	
		Low	High
<b>Sub-Matrix: ELUTRIATE</b>			
<b>EP-076S: Polycyclic Aromatics Hydrocarbons (PAHs) Surrogates</b>			
2-Fluorobiphenyl	321-60-8	50	130
4-Terphenyl-d14	1718-51-0	50	130
<b>EP-065S: PCB Congeners and Organochlorine Pesticides Surrogate</b>			
Decachlorobiphenyl	2051-24-3	50	130
<b>EP-067S: Pesticide Surrogate</b>			
Dibutylchloroendate	1770-80-5	50	130



## Section 3

# Summary of Sample Receipt Condition and Analysis Date



## Summary of Sample Receipt Condition and Analysis Date

**Date of Issue:** 10/02/2012  
**Client:** Civil Engineering and Development Department  
**Service Order No.:** GE/2009/16.41  
**Project:** Agreement No. CE43/2010(HY), Central Kowloon Route - Design and Construction  
 Sediment Sampling & Testing at Kowloon Bay

ALS Lab ID	Client Sample ID	Sampling Date	Sampling Time	Receipt Details			Storage Condition*	Testing Date				
				Date	Time	Condition		Metals	PCBs	PAHs	TBTs	Inorganic Nonmetallic Parameters
HK1201645001	VR5 0.9-1.9M	14/01/2012	10:27	14/01/2012	13:45	4°C	4°C	20/01/2012	27/01/2012	27/01/2012	30/01/2012	--
HK1201645002	VR5 1.9-2.9M	14/01/2012	10:27	14/01/2012	13:45	4°C	4°C	20/01/2012	27/01/2012	27/01/2012	30/01/2012	--
HK1201645003	VR5 2.9-3.9M	14/01/2012	20:27	14/01/2012	13:45	4°C	4°C	20/01/2012	27/01/2012	27/01/2012	30/01/2012	--
HK1201645004	VR5 6.0-7.0M	14/01/2012	11:20	14/01/2012	13:45	4°C	4°C	20/01/2012	27/01/2012	27/01/2012	30/01/2012	--
HK1201645005	VR5 GRAB	14/01/2012	11:55	14/01/2012	13:45	4°C	4°C	20/01/2012	27/01/2012	27/01/2012	30/01/2012	--
HK1201648001	VR5 0.9-1.9M	14/01/2012	10:27	14/01/2012	13:45	4°C	4°C	30/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012
HK1201648002	VR5 1.9-2.9M	14/01/2012	10:27	14/01/2012	13:45	4°C	4°C	30/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012
HK1201648003	VR5 2.9-3.9M	14/01/2012	10:27	14/01/2012	13:45	4°C	4°C	30/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012
HK1201648004	VR5 6.0-7.0M	14/01/2012	11:20	14/01/2012	13:45	4°C	4°C	30/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012
HK1201648005	VR5 GRAB	14/01/2012	11:55	14/01/2012	13:45	4°C	4°C	30/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012
HK1201648006	MW01 (ELUTRIATE BLANK)	14/01/2012	11:55	14/01/2012	13:45	4°C	4°C	30/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012
HK1201653001	VR5 GRAB	14/01/2012	11:55	14/01/2012	13:45	4°C	4°C	30/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012
HK1201661001	VR4 0.9-1.9M	16/01/2012	10:10	16/01/2012	17:45	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	--
HK1201661002	VR4 1.9-2.9M	16/01/2012	10:10	16/01/2012	17:45	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	--
HK1201661003	VR4 3.0-4.0M	16/01/2012	11:20	16/01/2012	17:45	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	--
HK1201661004	VR4 6.0-6.9M	16/01/2012	11:20	16/01/2012	17:45	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	--
HK1201661005	VR4 GRAB	16/01/2012	11:55	16/01/2012	17:45	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	--
HK1201664001	VR2 0.9-1.9M	16/01/2012	14:35	16/01/2012	17:45	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	--
HK1201664002	VR2 1.9-2.9M	16/01/2012	14:35	16/01/2012	17:45	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	--
HK1201664003	VR2 2.9-3.9M	16/01/2012	14:35	16/01/2012	17:45	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	--
HK1201664004	VR2 GRAB	16/01/2012	15:45	16/01/2012	17:45	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	--
HK1201670001	VR4 0.9-1.9M	16/01/2012	10:10	16/01/2012	17:45	4°C	4°C	30/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012
HK1201670002	VR4 1.9-2.9M	16/01/2012	10:10	16/01/2012	17:45	4°C	4°C	30/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012
HK1201670003	VR4 3.0-4.0M	16/01/2012	11:20	16/01/2012	17:45	4°C	4°C	30/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012
HK1201670004	VR4 6.0-6.9M	16/01/2012	11:20	16/01/2012	17:45	4°C	4°C	30/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012
HK1201670005	VR4 GRAB	16/01/2012	11:55	16/01/2012	17:45	4°C	4°C	30/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012
HK1201670006	VR2 0.9-1.9M	16/01/2012	14:35	16/01/2012	17:45	4°C	4°C	30/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012
HK1201670007	VR2 1.9-2.9M	16/01/2012	14:35	16/01/2012	17:45	4°C	4°C	30/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012
HK1201670008	VR2 2.9-3.9M	16/01/2012	14:35	16/01/2012	17:45	4°C	4°C	30/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012

\* Container for sample storage: 250mL Glass Jar with Teflon Lined Lid, High Density Polyethylene Bag and Plastic Bottle.



## Summary of Sample Receipt Condition and Analysis Date

**Date of Issue:** 10/02/2012  
**Client:** Civil Engineering and Development Department  
**Service Order No.:** GE/2009/16.41  
**Project:** Agreement No. CE43/2010(HY), Central Kowloon Route - Design and Construction  
 Sediment Sampling & Testing at Kowloon Bay

ALS Lab ID	Client Sample ID	Sampling Date	Sampling Time	Receipt Details			Storage Condition*	Testing Date					Inorganic Nonmetallic Parameters
				Date	Time	Condition		Metals	PCBs	PAHs	TBTs		
HK1201670009	VR2 GRAB	16/01/2012	15:45	16/01/2012	17:45	4°C	4°C	30/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012	27/01/2012
HK1201670010	MW02 (ELUTRIATE BLANK)	16/01/2012	15:30	16/01/2012	17:45	4°C	4°C	30/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012	27/01/2012
HK1201675001	VR2 GRAB	16/01/2012	11:55	16/01/2012	17:45	4°C	4°C	20/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012	27/01/2012
HK1201675002	VR2 GRAB	16/01/2012	15:45	16/01/2012	17:45	4°C	4°C	20/01/2012	25/01/2012	25/01/2012	27/01/2012	27/01/2012	27/01/2012
HK1201772001	VR1 0.9-1.9M	17/01/2012	14:00	17/01/2012	17:15	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	30/01/2012	--
HK1201772002	VR1 1.9-2.9M	17/01/2012	14:00	17/01/2012	17:15	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	30/01/2012	--
HK1201772003	VR1 2.9-3.9M	17/01/2012	14:00	17/01/2012	17:15	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	30/01/2012	--
HK1201772004	VR1 6.0-6.9M	17/01/2012	14:20	17/01/2012	17:15	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	30/01/2012	--
HK1201772005	VR1 GRAB	17/01/2012	15:00	17/01/2012	17:15	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	30/01/2012	--
HK1201772006	VR1 GRAB (DUPLICATE)	17/01/2012	15:40	17/01/2012	17:15	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	30/01/2012	--
HK1201774001	VR3 0.9-1.9M	17/01/2012	09:07	17/01/2012	17:15	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	30/01/2012	--
HK1201774002	VR3 1.9-2.9M	17/01/2012	09:07	17/01/2012	17:15	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	30/01/2012	--
HK1201774003	VR3 2.9-3.9M	17/01/2012	09:07	17/01/2012	17:15	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	30/01/2012	--
HK1201774004	VR3 6.0-6.9M	17/01/2012	09:33	17/01/2012	17:15	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	30/01/2012	--
HK1201774005	VR3 GRAB	17/01/2012	10:02	17/01/2012	17:15	4°C	4°C	26/01/2012	27/01/2012	27/01/2012	30/01/2012	30/01/2012	--
HK1201775001	VR1 0.9-1.9M	17/01/2012	14:00	17/01/2012	17:15	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	27/01/2012	30/01/2012
HK1201775002	VR1 1.9-2.9M	17/01/2012	14:00	17/01/2012	17:15	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	27/01/2012	30/01/2012
HK1201775003	VR1 2.9-3.9M	17/01/2012	14:00	17/01/2012	17:15	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	27/01/2012	30/01/2012
HK1201775004	VR1 6.0-6.9M	17/01/2012	14:20	17/01/2012	17:15	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	27/01/2012	30/01/2012
HK1201775005	VR1 GRAB	17/01/2012	15:00	17/01/2012	17:15	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	27/01/2012	30/01/2012
HK1201775006	VR1 GRAB (DUPLICATE)	17/01/2012	15:40	17/01/2012	17:15	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	27/01/2012	30/01/2012
HK1201775007	VR3 0.9-1.9M	17/01/2012	09:07	17/01/2012	17:15	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	27/01/2012	30/01/2012
HK1201775008	VR3 1.9-2.9M	17/01/2012	09:07	17/01/2012	17:15	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	27/01/2012	30/01/2012
HK1201775009	VR3 2.9-3.9M	17/01/2012	09:07	17/01/2012	17:15	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	27/01/2012	30/01/2012
HK1201775010	VR3 6.0-6.9M	17/01/2012	09:33	17/01/2012	17:15	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	27/01/2012	30/01/2012
HK1201775011	VR3 GRAB	17/01/2012	10:02	17/01/2012	17:15	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	27/01/2012	30/01/2012
HK1201775012	MW03 (ELUTRIATE BLANK)	17/01/2012	09:45	17/01/2012	17:15	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	27/01/2012	30/01/2012
HK1201779001	VR1 GRAB	17/01/2012	15:00	17/01/2012	17:15	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	27/01/2012	31/01/2012
HK1201779002	VR1 GRAB (DUPLICATE)	17/01/2012	15:40	17/01/2012	17:15	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	27/01/2012	31/01/2012

\* Container for sample storage: 250mL Glass Jar with Telfon Lined Lid, High Density Polyethylene Bag and Plastic Bottle.



## Summary of Sample Receipt Condition and Analysis Date

**Date of Issue:** 10/02/2012  
**Client:** Civil Engineering and Development Department  
**Service Order No.:** GE/2009/16.41  
**Project:** Agreement No. CE43/2010(HY), Central Kowloon Route - Design and Construction  
 Sediment Sampling & Testing at Kowloon Bay

ALS Lab ID	Client Sample ID	Sampling Date	Sampling Time	Receipt Details			Storage Condition*	Testing Date				
				Date	Time	Condition		Metals	PCBs	PAHs	TBTs	Inorganic Nonmetallic Parameters
HK1201779003	VR3 GRAB	17/01/2012	10:02	17/01/2012	17:15	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201843001	GB1	18/01/2012	09:10	18/01/2012	16:30	4°C	4°C	26/01/2012	02/02/2012	02/02/2012	31/01/2012	--
HK1201847001	GB2	18/01/2012	09:44	18/01/2012	16:30	4°C	4°C	27/01/2012	02/02/2012	02/02/2012	31/2/2012	--
HK1201848001	GB11	18/01/2012	10:10	18/01/2012	16:30	4°C	4°C	27/01/2012	02/02/2012	02/02/2012	31/2/2012	--
HK1201850001	GB3	18/01/2012	10:40	18/01/2012	16:30	4°C	4°C	27/01/2012	02/02/2012	02/02/2012	31/2/2012	--
HK1201851001	GB4	18/01/2012	11:05	18/01/2012	16:30	4°C	4°C	27/01/2012	02/02/2012	02/02/2012	31/2/2012	--
HK1201852001	GB5	18/01/2012	11:25	18/01/2012	16:30	4°C	4°C	27/01/2012	02/02/2012	02/02/2012	31/2/2012	--
HK1201852002	GB5 (DUPLICATE)	18/01/2012	11:30	18/01/2012	16:30	4°C	4°C	27/01/2012	02/02/2012	02/02/2012	31/2/2012	--
HK1201854001	GB6	18/01/2012	13:10	18/01/2012	16:30	4°C	4°C	27/01/2012	02/02/2012	02/02/2012	31/2/2012	--
HK1201856001	GB7	18/01/2012	13:35	18/01/2012	16:30	4°C	4°C	27/01/2012	02/02/2012	02/02/2012	31/2/2012	--
HK1201858001	GB8	18/01/2012	14:05	18/01/2012	16:30	4°C	4°C	27/01/2012	02/02/2012	02/02/2012	31/2/2012	--
HK1201859001	GB9	18/01/2012	14:25	18/01/2012	16:30	4°C	4°C	27/01/2012	02/02/2012	02/02/2012	31/2/2012	--
HK1201860001	GB10	18/01/2012	14:45	18/01/2012	16:30	4°C	4°C	27/01/2012	02/02/2012	02/02/2012	31/2/2012	--
HK1201868001	GB1	18/01/2012	09:10	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201868002	GB2	18/01/2012	09:44	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201868003	GB11	18/01/2012	10:10	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201868004	GB3	18/01/2012	10:40	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201868005	GB4	18/01/2012	11:05	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201868006	GB5	18/01/2012	11:25	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201868007	GB5 (DUPLICATE)	18/01/2012	11:30	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201868008	GB6	18/01/2012	13:10	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201868009	GB7	18/01/2012	13:35	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201868010	GB8	18/01/2012	14:05	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201868011	GB9	18/01/2012	14:25	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201868012	GB10	18/01/2012	14:45	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201868013	MW04 (ELUTRIATE BLANK)	18/01/2012	14:30	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201876001	GB1	18/01/2012	09:10	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201876002	GB2	18/01/2012	09:44	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201876003	GB11	18/01/2012	10:10	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012

\* Container for sample storage: 250mL Glass Jar with Teflon Lined Lid, High Density Polyethylene Bag and Plastic Bottle.



## Summary of Sample Receipt Condition and Analysis Date

**Date of Issue:** 10/02/2012  
**Client:** Civil Engineering and Development Department  
**Service Order No.:** GE/2009/16.41  
**Project:** Agreement No. CE43/2010(HY), Central Kowloon Route - Design and Construction  
 Sediment Sampling & Testing at Kowloon Bay

ALS Lab ID	Client Sample ID	Sampling Date	Sampling Time	Receipt Details			Storage Condition*	Testing Date				
				Date	Time	Condition		Metals	PCBs	PAHs	TBTs	Inorganic Nonmetallic Parameters
HK1201876004	GB3	18/01/2012	10:40	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201876005	GB4	18/01/2012	11:05	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201876006	GB5	18/01/2012	11:25	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201876007	GB5 (DUPLICATE)	18/01/2012	11:30	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201876008	GB6	18/01/2012	13:10	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201876009	GB7	18/01/2012	13:35	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201876010	GB8	18/01/2012	14:05	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201876011	GB9	18/01/2012	14:25	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1201876012	GB10	18/01/2012	14:45	18/01/2012	16:30	4°C	4°C	30/01/2012	30/01/2012	30/01/2012	27/01/2012	31/01/2012
HK1202616001	REFERENCE SAMPLE	21/01/2012	11:30	21/01/2012	12:05	4°C	4°C	01/02/2012	05/02/2012	09/02/2012	09/02/2012	--
HK1202618001	REFERENCE SAMPLE	21/01/2012	11:30	21/01/2012	12:05	4°C	4°C	08/02/2012	05/02/2012	05/02/2012	06/02/2012	06/02/2012
HK1202618002	REFERENCE SAMPLE (ELUTRIATE BLANK)	21/01/2012	11:30	21/01/2012	12:05	4°C	4°C	08/02/2012	05/02/2012	05/02/2012	06/02/2012	06/02/2012
HK1202619001	REFERENCE SAMPLE	21/01/2012	11:30	21/01/2012	12:05	4°C	4°C	08/02/2012	05/02/2012	05/02/2012	06/02/2012	06/02/2012

\* Container for sample storage: 250mL Glass Jar with Teflon Lined Lid, High Density Polyethylene Bag and Plastic Bottle.



## Section 4

# Chain of Custody (COC) Form



# CHAIN OF CUSTODY DOCUMENTATION

H 014510



ALS Laboratory Group

CLIENT: Highways  
 ADDRESS / OFFICE:  
 PROJECT MANAGER (PM):  
 PROJECT ID: 616 / 2007 / 02-506  
 SITE: 616 / 2007 / 16.41

SAMPLER:  
 MOBILE:  
 PHONE:  
 EMAIL REPORT TO:  
 EMAIL INVOICE TO: (if different to report)

RESULTS REQUIRED (Date):  
 FOR LABORATORY USE ONLY:  
 COOLER SEAL (circle appropriate)  
 Intact: Yes No N/A  
 SAMPLE TEMPERATURE  
 CHILLED: Yes No

ANALYSIS REQUIRED INCLUDING SUITES (note - suite codes must be listed to attract suite prices)  
 Notes: e.g. Highly contaminated samples  
 e.g. "High PAHs expected"  
 Extra volume for QC or trace LORs etc.

ALS ID	SAMPLE INFORMATION (note: S = Soil, W=Water)		CONTAINER INFORMATION	
	SAMPLE ID	MATRIX	DATE	TIME
1	VR1 0.5m - 1.9m	Sediment	17/01/12	14:00
2	VR1 1.9m - 2.9m	Sediment	17/01/12	14:00
3	VR1 2.9m - 3.5m	Sediment	17/01/12	14:00
4	VR1 6.0m - 6.90m	Sediment	17/01/12	14:20
5	VR6 1 grab	Sediment	17/01/12	15:00
6	VR6 1 grab (Duplicate)	Sediment	17/01/12	15:40

RELINQUISHED BY:		RECEIVED BY:	
Name:	Date:	Name:	Date:
Of: <u>Kenny Mak</u>	Time: <u>17 Jan 2012</u>	Of: <u>Janice Wai</u>	Time: <u>17/1/12</u>
Name: <u>Gene Arup</u>	Date:	Name:	Date:
Of:	Time:	Of:	Time:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved;  
 V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulphuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulphuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soil; B = Unpreserved Bag.



# CHAIN OF CUSTODY DOCUMENTATION

H 014504



ALS Laboratory Group

CLIENT: Highways

ADDRESS / OFFICE:

PROJECT MANAGER (PM):

PROJECT ID: G7/2010/02-50A

SITE: G7/2010/02-50A

RESULTS REQUIRED (Date): G7/2009/16.41

QUOTE NO.:

EMAIL INVOICE TO: (if different to report)

EMAIL REPORT TO:

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY

COOLER SEAL: (circle appropriate)

Intact: Yes No N/A

SAMPLE TEMPERATURE

CHILLED: Yes No

Notes: e.g. Highly contaminated samples  
e.g. "High PAHs expected"  
Extra volume for QC or trace LORs etc.

Comments / SPECIAL HANDLING / STORAGE OR DISPOSAL:

Heavy metals

PAHs

Total PCBs

TBT

Nutrients

Chlorinated Pesticides

Reporting limit for:

Cd - 0.2 µg/L

Hg - 0.1 µg/L

Zn - 10 µg/L

SAMPLE INFORMATION (note: S = Soil, W = Water)

CONTAINER INFORMATION

ALS ID

SAMPLE ID

MATRIX

DATE

Time

Type / Code

Total bottles

1 VR4 0.9 ~ 1.9m Sediment 16/01/12 10:10 Vibracore 1

2 VR4 1.8 ~ 2.9m Sediment 10:10 1

3 VR4 3.0 ~ 4.0m Sediment 11:20 1

4 VR4 6.0 ~ 6.9m 11:20 1

5 VR4 Grab 11:55 3 bags + 1 bottle

6 VR2 0.9 ~ 1.9m 14:35 Vibracore 1

7 VR2 1.9 ~ 2.9m 1

8 VR2 2.9 ~ 3.9m 1

9 VR2 Grab 15:45 3 bags + 1 bottle

RELINQUISHED BY:

Name: W.L. Kund

Of: LAM Goshalskis

Name: Jodie Chan

Of: Amy

RECEIVED BY:

Name: Jodie Chan

Of: Jodie Chan

Name: Jodie Chan

Of: Jodie Chan

METHOD OF SHIPMENT

Con' Note No:

Date: 16/1/12

Time: 15:45

Date:

Time:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulphuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulphuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soil; B = Unpreserved Bag.

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H 014507

CHAIN OF CUSTODY DOCUMENTATION



ALS Laboratory Group

CLIENT: Highways  
 ADDRESS / OFFICE:  
 PROJECT MANAGER (PM):  
 PROJECT ID: GTE/2011/02.50A  
 P.O. NO.: GTE/2009/16.41  
 SITE:

SAMPLER:  
 MOBILE:  
 PHONE  
 EMAIL REPORT TO:  
 EMAIL INVOICE TO: (if different to report)

RESULTS REQUIRED (Date):  
 QUOTE NO.:  
 COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:  
 FOR LABORATORY USE ONLY  
 COOLER SEAL (circle appropriate)  
 Intact: Yes No N/A  
 SAMPLE TEMPERATURE  
 CHILLED: Yes No

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)  
 Notes: e.g. Highly contaminated samples  
 e.g. "High PAHs expected"  
 Extra volume for QC or trace LORs etc.

ALS ID	SAMPLE INFORMATION (note: S = Soil, W=Water)			CONTAINER INFORMATION		
	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles
1	VR3 0.5m - 1.5m	sediment	17/01/12	9:07	vibro core	1
2	VR3 1.5m - 2.5m	sediment	17/01/12	9:07	vibro core	1
3	VR3 2.5m - 3.5m	sediment	17/01/12	9:07	vibro core	1
4	VR3 6.0m - 6.5m	sediment	17/01/12	9:33	vibro core	1
5	VR6 3 grab	sediment	17/01/12	10:02	3 bags + 1 bottle	

Heavy metals	PAHs	Total PCBs	TBT	Nutrients	Chlorinated Pesticides
✓	✓	✓	✓		
✓	✓	✓	✓		
✓	✓	✓	✓		
✓	✓	✓	✓		
✓	✓	✓	✓		

Reporting Unit for:  
 Cd - 0.2 ug/L  
 Hg - 0.1 ug/L  
 Zn - 10 ug/L

RELINQUISHED BY:  
 Name: Kevin Mak  
 Of: Ove Arup  
 Date: 17 Jan 2012  
 Time:

RECEIVED BY:  
 Name: [Signature]  
 Of: [Signature]  
 Date: 17/01/12  
 Time:  
 Con' Note No:  
 Transport Co:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved;  
 V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulphuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulphuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soil; B = Unpreserved Bag.



# CHAIN OF CUSTODY DOCUMENTATION

H 014501



ALS Laboratory Group

CLIENT: Highways  
 ADDRESS / OFFICE:  
 PROJECT MANAGER (PM):  
 PROJECT ID: GE/2010/02-50A  
 SITE: GE/2009/16.41

P.O. NO.: GE/2009/16.41  
 QUOTE NO.:

RESULTS REQUIRED (Date):

FOR LABORATORY USE ONLY  
 COOLER SEAL (circle appropriate)  
 Intact: Yes No N/A  
 SAMPLE TEMPERATURE  
 CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

Notes: e.g. Highly contaminated samples  
 e.g. "High PAHs expected"  
 Extra volume for QC or trace LORs etc.

ALS ID	SAMPLE INFORMATION (note: S = Soil, W=Water)			CONTAINER INFORMATION		PAHs	Total PCBs	TBT	Nutrients	Chlorinated Pesticides	Reporting limit for:
	MATRIX	DATE	Time	Type / Code	Total bottles						
1	VR5 0.9-1.9 m	Sediment	14/01/12	10:27	vibracore	1	✓	✓	✓	✓	Cd - 0.2 µg/L
2	VR5 1.9-2.9 m	Sediment	14/01/12	10:27	vibracore	1	✓	✓	✓	✓	Hg - 0.1 µg/L
3	VR5 2.9-3.9 m	Sediment	14/01/12	10:27	vibracore	1	✓	✓	✓	✓	Zn - 10 µg/L
4	VR5 6.0-7.0 m	Sediment	14/01/12	11:20	vibracore	1	✓	✓	✓	✓	
5	VR65 grab	Sediment	14/01/12	11:55	2 bags + 1 bottle		✓	✓	✓	✓	

RELINQUISHED BY: Name: W.L. Kudle Date: 14-1-2012  
 Of: Loh Geotechnics Ltd. Time:  
 Name: Sally Chan Date: 14 Jan 2012  
 Of: Am Time:

RECEIVED BY: Name: Judy AS Date: 14/1/12  
 Of: #1345 Time:  
 Name: Date:  
 Of: Time:

METHOD OF SHIPMENT  
 Con' Note No:  
 Transport Co:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved;  
 V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulphuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Special Bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soil; B = Unpreserved Bag.

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# CHAIN OF CUSTODY DOCUMENTATION

## H 014516



ALS Laboratory Group

CLIENT: Highways  
 ADDRESS / OFFICE: \_\_\_\_\_  
 PROJECT MANAGER (PM): \_\_\_\_\_  
 PROJECT ID: GB/2010/02.S0A  
 SITE: \_\_\_\_\_

SAMPLER: \_\_\_\_\_  
 MOBILE: \_\_\_\_\_  
 PHONE: \_\_\_\_\_  
 EMAIL REPORT TO: \_\_\_\_\_  
 EMAIL INVOICE TO: (if different to report) \_\_\_\_\_

ANALYSIS REQUIRED INCLUDING SUITES (note - suite codes must be listed to attract suite prices)

ALS ID	SAMPLE INFORMATION (note: S = Soil, W=Water)			CONTAINER INFORMATION		Heavy Metals	PAHs	Total PCBs	Nutrients	Chlorinated Pesticides	Notes: e.g. Highly contaminated samples e.g. "High PAHs expected" Extra volume for QC or trace LORs etc.
	MATRIX	DATE	Time	Type / Code	Total bottles						
1	GB1	Sediment	18/1/12	09:10	4 bags + 1 bottle	✓	✓	✓	✓	✓	Reporting limit for = Cd = 0.2 ug/L Hg = 0.1 ug/L Zn = 10 ug/L
2	GB2	Sediment	18/1/12	09:44	4 bags + 1 bottle	✓	✓	✓	✓	✓	
3	GB3	Sediment	18/1/12	10:20	4 bags + 1 bottle	✓	✓	✓	✓	✓	
4	GB4	Sediment	18/1/12	10:40	4 bags + 1 bottle	✓	✓	✓	✓	✓	
5	GB5	Sediment	18/1/12	11:05	4 bags + 1 bottle	✓	✓	✓	✓	✓	
6	GB5	Sediment	18/1/12	11:25	4 bags + 1 bottle	✓	✓	✓	✓	✓	
7	GB5 (Duplicate)	Sediment	18/1/12	11:30	4 bags + 1 bottle	✓	✓	✓	✓	✓	
8	GB6	Sediment	18/1/12	13:10	4 bags + 1 bottle	✓	✓	✓	✓	✓	
9	GB7	Sediment	18/1/12	13:35	4 bags + 1 bottle	✓	✓	✓	✓	✓	
10	GB8	Sediment	18/1/12	14:05	4 bags + 1 bottle	✓	✓	✓	✓	✓	
11	GB9	Sediment	18/1/12	14:25	4 bags + 1 bottle	✓	✓	✓	✓	✓	
12	GB10	Sediment	18/1/12	14:45	4 bags + 1 bottle	✓	✓	✓	✓	✓	

RECEIVED BY: \_\_\_\_\_  
 Name: \_\_\_\_\_ Date: 18/1/12  
 Of: Juancho AS Time: 1630  
 Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Of: \_\_\_\_\_ Time: \_\_\_\_\_

RESULTS REQUIRED (Date): \_\_\_\_\_  
 QUOTE NO.: \_\_\_\_\_  
 COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL: \_\_\_\_\_  
 FOR LABORATORY USE ONLY:  
 COOLER SEAL (circle appropriate) Yes No (N/A)  
 Intact: Yes No (N/A)  
 SAMPLE TEMPERATURE: \_\_\_\_\_  
 CHILLED: (Yes) No

Water ContAINER Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved;  
 V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulphuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soil; B = Unpreserved Bag.







# CHAIN OF CUSTODY DOCUMENTATION

H 014511



ALS Laboratory Group

CLIENT: Highways  
 ADDRESS / OFFICE:  
 PROJECT MANAGER (PM):  
 PROJECT ID: 97/2011/02.50A  
 SITE: P.O. NO.: 97/200/1641

SAMPLER:  
 MOBILE:  
 PHONE:  
 EMAIL REPORT TO:  
 EMAIL INVOICE TO: (if different to report)

RESULTS REQUIRED (Date):  
 QUOTE NO.:  
 COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:  
 FOR LABORATORY USE ONLY:  
 COOLER SEAL (circle appropriate)  
 Intact: Yes No N/A  
 SAMPLE TEMPERATURE  
 CHILLED: Yes No

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)  
 Notes: e.g. Highly contaminated samples  
 e.g. "High PAHs expected"  
 Extra volume for QC or trace LORs etc.

SAMPLE INFORMATION (note: S = Soil, W=Water)		CONTAINER INFORMATION				
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles
1	VR1 0.9m - 1.5m	Electrode	17/01/12	14:00	Vibrocore	1
2	VR1 1.5m - 2.9m	Electrode	17/01/12	14:00	Vibrocore	1
3	VR1 2.9m - 3.9m	Electrode	17/01/12	14:00	Vibrocore	1
4	VR1 6.0m - 6.90m	Electrode	17/01/12	14:20	Vibrocore	1
5	WV 03	Electrode	17/01/12	14:25	bottle	4
6	VGR1 grab	Electrode	17/01/12	15:00	3 bags + 1 bottle	
7	VGR1 grab (Duplicate)	Electrode	17/01/12	15:40	3 bags + 1 bottle	

Heavy metals	PAHs	Total PCBs	TRT	Nitrates	Chlorinated Pesticides
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
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✓	✓	✓	✓	✓	✓

RELINQUISHED BY:  
 Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Of: \_\_\_\_\_ Time: \_\_\_\_\_  
 Name: Kevin Mak Date: 17 Jan 2012  
 Of: Que Anup Time: \_\_\_\_\_

RECEIVED BY:  
 Name: \_\_\_\_\_ Date: 17/1/12  
 Of: \_\_\_\_\_ Time: 17:15  
 Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Of: \_\_\_\_\_ Time: \_\_\_\_\_

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved;  
 V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulphuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulphuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soil; B = Unpreserved Bag.



# CHAIN OF CUSTODY DOCUMENTATION

H 014505



ALS Laboratory Group

CLIENT: Highways  
 ADDRESS / OFFICE:  
 PROJECT MANAGER (PM):  
 PROJECT ID:  
 SITE:

P.O. NO.: 6E/2010/02-50A  
 QUOTE NO.: 6E/2009/16.4

EMAIL REPORT TO:  
 EMAIL INVOICE TO: (if different to report)

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

Notes: e.g. Highly contaminated samples  
 e.g. "High PAHs expected"  
 Extra volume for QC or trace LORs etc.

Heavy Metals	PAHs	Total PCBs	TBT	Nutrients	Chlorinated Pesticides
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# CHAIN OF CUSTODY DOCUMENTATION

H 014508



ALS Laboratory Group

CLIENT: Hightways  
 ADDRESS / OFFICE:  
 PROJECT MANAGER (PM):  
 PROJECT ID: GF 2011/164  
 P.O. NO.: GF 2011/164  
 SITE:

SAMPLER:  
 MOBILE:  
 PHONE:  
 EMAIL REPORT TO:  
 EMAIL INVOICE TO: (if different to report)

RESULTS REQUIRED (Date):  
 QUOTE NO.:  
 COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:  
 FOR LABORATORY USE ONLY  
 COOLER SEAL (circle appropriate)  
 Intact: Yes No N/A  
 SAMPLE TEMPERATURE  
 CHILLED: Yes No

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)  
 Notes: e.g. Highly contaminated samples  
 e.g. "High PAHs expected"  
 Extra volume for QC or trace LORs etc.

ALS ID	SAMPLE INFORMATION (note: S = Soil, W = Water)		CONTAINER INFORMATION	
	SAMPLE ID	MATRIX	DATE	Time
1	VR3 1.9m - 1.9m	Electrode	17/10/12	9:07
2	VR3 1.9m - 2.9m	Electrode	17/10/12	9:07
3	VR3 2.9m - 3.9m	Electrode	17/10/12	9:07
4	VR3 6.0m - 6.9m	Electrode	17/10/12	9:33
5	MW03	V	V	9:45
6	VRG3 grab	V	V	10:02

Heavy metals	PAHs	Total PCBs	TBT	Asbestos	Chlorinated Pesticides
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓

RELINQUISHED BY:  
 Name:  
 Of:  
 Date:  
 Time:

RECEIVED BY:  
 Name:  
 Of:  
 Date:  
 Time:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved;  
 V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulphuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulphuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soil; B = Unpreserved Bag.

Con' Note No:  
 Transport Co:  
 METHOD OF SHIPMENT



# CHAIN OF CUSTODY DOCUMENTATION

H 014502



ALS Laboratory Group

CLIENT: Highways  
 ADDRESS / OFFICE:  
 PROJECT MANAGER (PM):  
 PROJECT ID: GT/2010/02.50A  
 P.O. NO.: GT/2009/16.41  
 SITE:  
 QUOTE NO.:

SAMPLER:  
 MOBILE:  
 PHONE:  
 EMAIL REPORT TO:  
 EMAIL INVOICE TO: (if different to report)

RESULTS REQUIRED (Date):  
 FOR LABORATORY USE ONLY:  
 COOLER SEAL (circle appropriate)  
 Intact: Yes No N/A  
 SAMPLE TEMPERATURE  
 CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:  
 ANALYSIS REQUIRED INCLUDING SUITES (note - suite codes must be listed to attract suite prices)  
 Notes: e.g. Highly contaminated samples  
 e.g. "High PAHs expected"  
 Extra volume for QC or trace LORs etc.

ALS ID	SAMPLE ID	SAMPLE INFORMATION (note: S = Soil, W=Water)			CONTAINER INFORMATION		
		MATRIX	DATE	Time	Type / Code	Total bottles	
1	VR5 0.9m-1.9m	Zinc/lead	14/01/12	10:27	vibrocore	1	
2	VR5 1.9m-2.9m	"	"	"	"	1	
3	VR5 2.9m-3.9m	"	"	"	"	1	
4	VR5 6.0m-7.0m	"	"	11:20	"	1	
5	VRG5 grab	"	"	11:55	2 bags + 1 bottle	2	
6	MW01	"	"	11:55	bottle	2	

RELINQUISHED BY:		RECEIVED BY:	
Name:	<u>W.L. Kumb</u>	Name:	<u>Andy</u>
Of:	<u>Lon Geotechnics Ltd.</u>	Of:	<u>ALS</u>
Name:	<u>Sandy Chan</u>	Date:	<u>14/1/12</u>
Of:	<u>ALS</u>	Time:	<u>1345</u>
		Date:	
		Time:	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved;  
 V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulphuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulphuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soil; B = Unpreserved Bag.



# CHAIN OF CUSTODY DOCUMENTATION

H 014517



ALS Laboratory Group

CLIENT: Highways  
 ADDRESS / OFFICE:  
 PROJECT MANAGER (PM):  
 PROJECT ID: 676/2010/02-50A  
 SITE: 676/2010/02-50A

EMAIL REPORT TO:

EMAIL INVOICE TO: (if different to report)

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

Notes: e.g. Highly contaminated samples  
 e.g. "High PAHs expected"  
 Extra volume for QC or trace LORs etc.

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

FOR LABORATORY USE ONLY

COOLER SEAL (circle appropriate)

Intact: Yes No (N/A)

SAMPLE TEMPERATURE

CHILLED: (Yes) No

SAMPLE INFORMATION (note: S = Soil, W=Water)

CONTAINER INFORMATION

ALS ID	SAMPLE ID	MATRIX	DATE	Time	CONTAINER INFORMATION	
					Type / Code	Total bottles
1	GB1	Electrode	18/11/12	09:20	4 bags + 1 bottle	✓
2	GB2	Electrode	18/11/12	09:44	4 bags + 1 bottle	✓
3	GB11	Electrode	18/11/12	10:10	4 bags + 1 bottle	✓
4	GB3	Electrode	18/11/12	10:40	4 bags + 1 bottle	✓
5	GB4	Electrode	18/11/12	11:05	4 bags + 1 bottle	✓
6	GB5	Electrode	18/11/12	11:25	4 bags + 1 bottle	✓
7	GB5 (Duplicate)	Electrode	18/11/12	11:30	4 bags + 1 bottle	✓
8	GB6	Electrode	18/11/12	12:10	4 bags + 1 bottle	✓
9	GB7	Electrode	18/11/12	13:35	4 bags + 1 bottle	✓
10	GB8	Electrode	18/11/12	14:05	4 bags + 1 bottle	✓
11	GB9	Electrode	18/11/12	14:25	4 bags + 1 bottle	✓
12	GB10	Electrode	18/11/12	14:45	4 bags + 1 bottle	✓

Heavy Metals  
 PAHs  
 Total PCBs  
 TBT  
 Nutrients  
 Chlorinated Pesticides

Reporting limit for  
 Cd - 0.2 ug/L  
 Hg - 0.1 ug/L  
 Zn - 10 ug/L

RELINQUISHED BY:

Name: W.L. Kirk  
 Of: Lane Goodhouse Ltd.  
 Name: Kenny Mak  
 Of: One Arnp

RECEIVED BY:

Name: Jammy Ans  
 Of: Jammy Ans  
 Name: Jammy Ans  
 Of: Jammy Ans

METHOD OF SHIPMENT

Date: 18/11/12  
 Time: 16:30  
 Date: 18 Jan 2012  
 Time:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Gd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved;  
 V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulphuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulphuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soli; B = Unpreserved Bag.

ALS Laboratory Group

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 YELLOW - CUSTOMER COPY  
 PINK - BOOK COPY

COC Page 1 of 2







# CHAIN OF CUSTODY DOCUMENTATION

H 014512



ALS Laboratory Group

CLIENT: Highways  
 ADDRESS / OFFICE:  
 PROJECT MANAGER (PM):

SAMPLER:  
 MOBILE:  
 PHONE  
 EMAIL REPORT TO:

PROJECT ID: 626/2011/02-50A

P.O. NO.: 626/2009/16.41

SITE:

EMAIL INVOICE TO: (if different to report)

QUOTE NO.:

ANALYSIS REQUIRED INCLUDING SUITES (note - suite codes must be listed to attract suite prices)

Notes: e.g. Highly contaminated samples  
 e.g. "High PAHs expected"  
 Extra volume for QC or trace LORs etc.

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

FOR LABORATORY USE ONLY

COOLER SEAL (circle appropriate)

Intact: Yes No N/A

SAMPLE TEMPERATURE

CHILLED: Yes No

SAMPLE INFORMATION (note: S = Soil, W = Water)

ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles
1	VGR1 grab	Soil	17/01/12	15:00	3 bags + 1 bottle	4
2	VGR1 grab (Duplicate)	Soil	17/01/12	15:40	3 bags + 1 bottle	4

CONTAINER INFORMATION

Heavy metals

PAHs

ESTC PCBs

TBT

Nuclides

Chlorinated pesticides

Reporting limit for:  
 Cd - 0.2ug/L  
 Hg - 0.1ug/L  
 Zn - 10ug/L

RECEIVED BY:

RELINQUISHED BY:

NAME: Name: Janey ALS

OF: Of:

DATE: Date: 17/1/12

TIME: Time: 14:15

CON' NOTE NO: Con' Note No:

TRANSPORT CO: Transport Co:

METHOD OF SHIPMENT

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved;

V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulphuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulphuric Preserved Plastic; F = Formaldehyde Preserved Glass;

Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soil; B = Unpreserved Bag.

WHITE - LAB COPY

YELLOW - CUSTOMER COPY

PINK - BOOK COPY

ALS Laboratory Group

COC Page \_\_\_ of \_\_\_







# CHAIN OF CUSTODY DOCUMENTATION

H 014506



ALS Laboratory Group

SAMPLER:  
MOBILE:  
PHONE

EMAIL REPORT TO:

EMAIL INVOICE TO: (if different to report)

ANALYSIS REQUIRED INCLUDING SUITES (note - suite codes must be listed to attract suite prices)

Notes: e.g. Highly contaminated samples  
e.g. "High PAHs expected"  
Extra volume for QC or trace LORs etc.

CLIENT: Highways  
ADDRESS / OFFICE:  
PROJECT MANAGER (PM):  
PROJECT ID: GE/2010/02.50A  
SITE:  
P.O. NO.: GE/2009/16.41  
QUOTE NO.:

RESULTS REQUIRED (Date):

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

FOR LABORATORY USE ONLY:  
COOLER SEAL (circle appropriate)  
Intact: Yes No N/A  
SAMPLE TEMPERATURE  
CHILLED: Yes No

SAMPLE INFORMATION (note: S = Soil, W=Water)

ALS ID	SAMPLE ID	MATRIX		DATE	Time	CONTAINER INFORMATION	
		Type	Code			Type / Code	Total bottles
1	VR4 Grab	Soil	16/01/12	11:55	3 bags + 1 bottle		
2	VR3 Grab	Soil	15/01/12	15:45			

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY: Name: J. M. P. ALS Date: 16/1/12  
Of: J. M. P. ALS Time: 17:45  
Name: Date: Time:  
Of: Date: Time:

RELINQUISHED BY: Name: Date: Time:  
Of: Date: Time:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved;  
V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulphuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulphuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soil; B = Unpreserved Bag.



# CHAIN OF CUSTODY DOCUMENTATION

H 014503



ALS Laboratory Group

CLIENT: Highways  
 ADDRESS / OFFICE:  
 PROJECT MANAGER (PM):  
 PROJECT ID: GTE/2010/02-30A  
 P.O. NO.: GTE/2009/16.41  
 SITE:

EMAIL REPORT TO:  
 EMAIL INVOICE TO: (if different to report)  
 ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

RESULTS REQUIRED (Date):  
 FOR LABORATORY USE ONLY  
 COOLER SEAL (circle appropriate)  
 Intact: Yes No N/A  
 SAMPLE TEMPERATURE  
 CHILLED: Yes No

ALS ID	SAMPLE ID	SAMPLE INFORMATION (note: S = Soil, W=Water)		CONTAINER INFORMATION	
		MATRIX	DATE	Type / Code	Total bottles
1	VRG5 grab	Porewater	14/01/12 11:55	2 bags + 1 bottle	

RELINQUISHED BY:		RECEIVED BY:	
Name:	Date:	Name:	Date:
<u>Kate Wilkin</u>	<u>14-1-2012</u>	<u>James HVS</u>	<u>14/1/12</u>
Of:	Time:	Of:	Time:
<u>Sean Chan</u>	<u>14 Jan 2012</u>		
Of:	Time:		Time:

CONTRACT NO.:  
 QUOTE NO.:  
 COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:  
 Notes: e.g. Highly contaminated samples  
 e.g. "High PAHs expected"  
 Extra volume for QC or trace LORs etc.

Heavy metals  
 PAHs  
 Total PCBs  
 TBT  
 Nutrients  
 Chlorinated Pesticides  
 Reporting limit for:  
 Cd - 0.2 µg/L  
 Hg - 0.1 µg/L  
 Zn - 10 µg/L

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved;  
 V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soil; B = Unpreserved Bag.



# CHAIN OF CUSTODY DOCUMENTATION

H 014518



ALS Laboratory Group

CLIENT: Highways  
 ADDRESS / OFFICE:  
 PROJECT MANAGER (PM):  
 PROJECT ID: GB1 2010 / 02-52A  
 SITE: GB1 2010 / 02-52A

SAMPLER:  
 MOBILE:  
 PHONE:  
 EMAIL REPORT TO:  
 EMAIL INVOICE TO: (if different to report)

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

RESULTS REQUIRED (Date): QUOTE NO.:

FOR LABORATORY USE ONLY  
 COOLER SEAL (circle appropriate) (N/A)  
 Intact: Yes No  
 SAMPLE TEMPERATURE  
 CHILLED: (Yes) No

ALS ID	SAMPLE INFORMATION (note: S = Soil, W=Water)		CONTAINER INFORMATION	
	MATRIX	DATE	Type / Code	Total bottles
1	Soil	18/11/12 09:10	4 bags + 1 bottle	
2	Soil	18/11/12 09:44	4 bags + 1 bottle	
3	Soil	18/11/12 10:10	4 bags + 1 bottle	
4	Soil	18/11/12 10:40	4 bags + 1 bottle	
5	Soil	18/11/12 11:05	4 bags + 1 bottle	
6	Soil	18/11/12 11:25	4 bags + 1 bottle	
7	Soil (Duplicate)	18/11/12 11:30	4 bags + 1 bottle	
8	Soil	18/11/12 13:10	4 bags + 1 bottle	
9	Soil	18/11/12 13:35	4 bags + 1 bottle	
10	Soil	18/11/12 14:05	4 bags + 1 bottle	
11	Soil	18/11/12 14:05	4 bags + 1 bottle	
12	Soil	18/11/12 14:45	4 bags + 1 bottle	

Heavy Metals	PAHs	Total PCBs	<del>Asbestos</del> TBT	Mutagens	Chlorinated Pesticides
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
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✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓

Notes: e.g. Highly contaminated samples  
 e.g. "High PAHs expected"  
 Extra volume for QC or trace LORs etc.

Reporting last for  
Cd - 0.26ug/L  
Hg - 0.1ug/L  
Zn - 10ug/L

RELINQUISHED BY: W.L. Gb Date: 18/11/12  
L.A.M. Gb Time: 16:30  
Kenny Mak Date: 18 Jan 2012  
Drew Arup Time:

RECEIVED BY: [Signature] Name: [Name] Date: 18/11/12  
 Cont' Note No:  
 Name: Of: [Signature] Date: 16:30  
 Name: Of: [Signature] Date: 16:30  
 Name: Of: [Signature] Date: 16:30  
 Name: Of: [Signature] Date: 16:30

**Water Container Codes:** P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved;  
 V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulphuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SF = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soil; B = Unpreserved Bag.

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**ALS Laboratory Group** **COC Page 1 of 1**





*CEDD Contract No. GE/2009/16*

*Chemical and Biological Testing (Service Contract)*

*Service Order No. GE/2009/16.41*

*Agreement No. CE43/2010(HY), Central Kowloon Route  
- Design and Construction*

*Sediment Sampling & Testing at Kowloon Bay  
Laboratory Chemical and Biological Testing (Batch 2)*

**Laboratory Biological Testing Report (Final Report)**

Prepared for

**Civil Engineering and Development Department**

Prepared By

**ALS Technichem (HK) Pty Ltd**

**May 11, 2012**



***CEDD Contract No. GE/2009/16***

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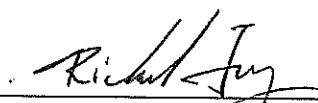
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Person Appointed to Act for the Contractor

Date: May 11, 2012





ALS TECHNICHEM (HK) Pty Ltd



## SEDIMENT TOXICITY TESTS REPORT

10-day Amphipod Survival Test – *Leptocheirus plumulosus*

20-day Polychaete Growth and Survival Test – *Neanthes arenaceodentata*

48-60-hour Bivalve Larvae Survival and Normality Test – *Crassostrea gigas*

11-May-2012

Project: GE/2009/16.41 - AGREEMENT NO CE 43\_2010 (HY) CENTRAL KOWLOON  
ROUTE - DESIGN AND CONSTRUCTION

### Biological Testing Report

Prepared for

#### **CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT**

GEOTECHNICAL PROJECTS DIVISION,  
GEOTECHNICAL ENGINEERING OFFICE,  
23/F., KWUN TONG VIEW,  
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KOWLOON, HONG KONG

Prepared by

**ALS Technichem (HK) Pty Ltd**

ALS Work Order Number HK1206252

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11 May 12

Attention: IR POPHIL LAM

RE: GE/2009/16.41 - AGREEMENT NO CE 43\_2010 (HY) CENTRAL KOWLOON ROUTE - DESIGN AND CONSTRUCTION

Dear IR POPHIL LAM,

Toxicity Test Result for Sediment Samples

We are pleased to provide the results of the toxicity testing performed on the sediment samples and reference sediment of the captioned project. The sediment samples were received within the period of 14 January 2012 to 27 January 2012. Each sample was assigned with an ALS identification (ID) code as stated in Table 1.2. The samples were tested with the three toxicity tests:

- 10-day Amphipod Survival Test – *Leptocheirus plumulosus*
- 20-day Polychaete Growth and Survival Test – *Neanthes arenaceodentata*
- 48-60-hour Bivalve Larvae Survival and Normality Test – *Crassostrea gigas*

The Amphipod testing was performed according to the United States Environmental Protection Agency (US EPA) Methods for Assessing the Toxicity of the Sediment-associated Contaminants with Estuarine and Marine Amphipods (EPA/600/R-94/025, 1994). The Polychaete Survival and Growth and the Bivalve Larval Development testing were performed according to the Puget Sound Estuary Program (PSEP, 1995) protocol.

A QA/QC review confirmed that the tests met all acceptability criteria for test validity as outlined in the respective protocols. Reference toxicant results for all three species were within warning limits (Mean  $\pm$ 2SD) based on historical laboratory performance, indicating that the relative health and sensitivity of the test organisms were consistent with previous batches of test organisms.

Should you have any questions or comments related to the report, please feel free to contact the undersigned at 2610 1044 or via e-mail at [Ivan.leung@alsglobal.com](mailto:Ivan.leung@alsglobal.com)

Yours sincerely,



---

Mr. Leung Sai Ho, Ivan  
Supervisor - Ecotoxicology Section  
ALS Technichem (HK) Pty Ltd



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1 SAMPLE INFORMATION

Table 1.1 Sample Details

ALS work order number:	HK1206252
Number of sample(s) for Testing:	10 testing samples, 1 reference sample
Condition of sample(s) at receipt:	Temperature: CHILLED - Ice Present Container: Miscellaneous Plastic Bag and Vibrocore
Quantity of each sample(s) at receipt:	Various
Sample storage after receipt:	Stored in dark at 4°C



Table 1.2 Sample Identifications

Lab ID	Client ID	Lab ID (Ecotox. Section)	Date Sampled	Date Received	<sup>b</sup> Category
HK1202616001	REFERENCE SEDIMENT	HK1206252001	21-Jan-12	21-Jan-12	L
HK1201645001, 002, 005	VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	HK1206252002	14-Jan-12	14-Jan-12	10xLCEL
HK1201645003	VR5 2.9-3.9M	HK1206252003	14-Jan-12	14-Jan-12	M
HK1201661001, 002, 003, 005	VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	HK1206252004	16-Jan-12	16-Jan-12	10xLCEL
HK1201774001, 005	VR3 GRAB, 0.9-1.9M	HK1206252005	17-Jan-12	17-Jan-12	10xLCEL
HK1201774002	VR3 1.9-2.9M	HK1206252006	17-Jan-12	17-Jan-12	M
HK1201772005, HK1201654004, HK1201847001	VR1 GRAB, VR2 GRAB, GB2	HK1206252007	16-Jan-12	16-Jan-12	10xLCEL
HK1201843001	GB1	HK1206252008	18-Jan-12	18-Jan-12	10xLCEL
HK120184005, HK120195000, HK1201851001, HK1201843001	GB11, GB3, GB4, GB5	HK1206252009	20-Jan-12	20-Jan-12	10xLCEL
HK1201858001	GB8	HK1206252010	27-Jan-12	27-Jan-12	10xLCEL
HK120184001, HK120185001, HK120185001, HK120185001	GB6, GB7, GB9, GB10	HK1206252011	25-Jan-12	25-Jan-12	10xLCEL

<sup>b</sup> Sediments are categorized according to ETWB TCW No. 34/2002

Table 1.3 Total Organic Carbon (TOC), Moisture Content and Porewater characteristics (pH, Salinity and Ammonia) of Testing Sediments

Client ID	ALS ID (Ecotox. Section)	Total Organic Carbon (TOC) (%)	Moisture Content (%)	Grain Size (<63µm) (%)	pH	Porewater # Salinity (ppt)	*Ammonia-N (Total, mgN/L)
REFERENCE SEDIMENT	HK1206252001	2.22	43.5	64.1	7.7	33	5.12
VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	HK1206252002	1.77	53.6	74.6	7.5	32	4.82
VR5 2.9-3.9M	HK1206252003	0.71	40.2	72.2	7.7	33	9.92
VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	HK1206252004	1.42	49.8	79.6	7.7	32	3.05
VR3 GRAB, 0.9-1.9M	HK1206252005	1.84	48.3	78.1	7.7	32	2.48
VR3 1.9-2.9M	HK1206252006	1.00	22.7	39.2	NA	NA	NA
VR1 GRAB, VR2 GRAB, GB2	HK1206252007	1.34	45.3	56.2	7.7	31	5.54
GB1	HK1206252008	1.08	46.8	75.4	7.7	32	5.19
GB11, GB3, GB4, GB5	HK1206252009	1.74	47.9	71.7	7.7	32	6.47
GB8	HK1206252010	1.21	49.7	83.9	7.8	33	6.52
GB6, GB7, GB9, GB10	HK1206252011	1.56	48.4	64.1	7.8	33	6.39

# NA is reported when no porewater could be extracted from sample

\* Ammonia is reported as mgN/L



Table 1.4 Summary of Test Results

ALS ID	Sample ID	Overall Result	10-Day Amphipod Survival Test			20-Day Polychaete Survival and Growth Test			48-60-hour Bivalve Survival and Normality Test		
			Survival (%)		Pass / Fail	Total Dry Weight (mg)		Pass / Fail	Normal Survival (%)		Pass / Fail
			Mean	SD		Mean	SD	Mean	SD		
HK1206252001	REFERENCE SEDIMENT	NA	94.0	4.2	NA	94.6	15.0	NA	94.5	2.3	NA
HK1206252002	VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	Fail	*80.0	5.0	Pass	#*68.0	17.0	Fail	*88.1	4.2	Pass
HK1206252003	VR5 2.9-3.9M	Fail	#*63.0	7.6	Fail	#*0.0	0.0	Fail	92.7	4.7	Pass
HK1206252004	VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	Fail	*81.0	8.2	Pass	#*62.7	18.5	Fail	#*70.1	6.3	Fail
HK1206252005	VR3 GRAB, 0.9-1.9M	Pass	89.0	7.4	Pass	87.7	25.4	Pass	*90.7	1.7	Pass
HK1206252006	VR3 1.9-2.9M	Fail	*82.0	2.7	Pass	#*11.1	7.1	Fail	*88.6	5.0	Pass
HK1206252007	VR1 GRAB, VR2 GRAB, GB2	Pass	*81.0	4.2	Pass	101.6	23.0	Pass	*88.8	2.8	Pass
HK1206252008	GB1	Fail	#*73.0	6.7	Fail	93.0	18.2	Fail	*88.5	2.6	Pass
HK1206252009	GB11, GB3, GB4, GB5	Fail	#*62.0	8.4	Fail	96.9	16.1	Fail	*88.1	2.1	Pass
HK1206252010	GB8	Fail	#*73.0	2.7	Fail	88.5	14.8	Fail	*88.2	1.7	Pass
HK1206252011	GB6, GB7, GB9, GB10	Pass	*77.0	4.5	Pass	104.4	40.1	Pass	*88.8	2.1	Pass

\* Mean survival in test sediment is significantly different ( $p \leq 0.05$ ) from that in reference sediment  
 For Amphipod Survival Test, # Mean survival in test sediment is <80% of that in reference sediment  
 For Polychaete Survival and Growth Test, # Mean total dry weight in test sediment is <90% of that in reference sediment  
 For Bivalve Survival and Normality Test, # Mean normal survival in test sediment is <80% of that in reference sediment

2 10-DAY AMPHIPOD SURVIVAL TEST - *Leptocheirus plumulosus*

Table 2.1 Test Methodology for the 10-day Amphipod Survival Test  
– *Leptocheirus plumulosus*

Parameter	Conditions
1 Reference protocols:	USEPA (1994) & ALS (2000) (Ref. 3 & 4)
2 Organism source:	Collected from Aquatic Biosystem; body length 2-4 mm; no mature males or females
3 Testing periods:	09 Mar 2012 - 19 Mar 2012
4 Test type:	Sediment toxicity test, static, non-renewal
5 Test duration:	10 days
6 Temperature:	25 ± 1°C
7 Salinity:	20 ± 1 ppt
8 Light quality:	Wide-spectrum fluorescent lights
9 Illuminance:	500-1000 lux
10 Photoperiod:	24h : 0h (Light : Dark)
11 Test chamber:	1L glass jar with 10cm internal diameter; 175mL sediment; 800mL overlying seawater; position of test container randomized
12 Number of organisms per chamber:	20
13 Number of replicates:	5
14 Feeding regime:	None
15 Aeration:	Overlying water aerated overnight before the start of test and throughout the test at approximately 100 bubbles/min; maintains ≥60% dissolved oxygen saturation
16 Overlying water:	Reconstituted seawater made up from artificial sea salt (Brand: Red Sea®); filtered through a 0.5µm filter; sterilized by ultraviolet light
17 Overlying water quality monitoring:	Temperature, pH, salinity and dissolved oxygen measured daily; total ammonia and sulfide content taken at 0 d and 10 d
18 Control sediment:	Collected from Port Shelter at PS6 (E850234 N820057) on 12 December 2011 by grab sampler; expires on 09 June 2012; stored at -20°C after collection; sieved with 0.5mm sieve before testing; ALS Ref ID: HK1129264001
19 Endpoints:	Emergence <sup>1</sup> (recorded daily); survival; reburial <sup>2</sup>
20 Statistical analysis:	Data tested for normality and homogeneity of variance; Statistically significant differences between the mean survivals in testing sediments and reference sediment determined at a probability of p ≤ 0.05 using ToxCalc 5.0 (Ref 7)
21 Test acceptability criterion:	≥90% mean survival in control sediment



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**Reference Toxicant Test**

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22	Test type:	Water only test, static
23	Toxicant:	Cadmium
24	Test duration:	96 hours
25	Photoperiod:	0h : 24h (Light : Dark)
26	Test Chamber:	1L glass jar with 10cm internal diameter; 900 mL
27	Number of organisms per chamber:	10
28	Number of replicates:	2
29	Overlying seawater quality monitoring:	Temperature, pH, salinity and dissolved oxygen of the
30	Endpoints:	Survival
31	Statistical analysis:	96-h LC50 for Cadmium determined by ToxCalc 5.0
32	Test acceptability criterion:	≥ 90% mean survival in control seawater
33	Other testing conditions are the same as in the sediment test	

---

<sup>1</sup> Number of amphipods appearing on the sediment surface or water column<sup>2</sup> Number of surviving amphipods that rebury within 1 h in a separate container containing a 2-cm layer of control sediment and overlying clean seawater

Table 2.2 Results Summary of the 10-day Amphipod Survival Test  
-*Leptocheirus plumulosus*

Lab ID	Sample ID	Survival (%)		Avoidance (amphipod/jar/day)		Reburial (%)
		Mean	SD	Mean	SD	Mean
Control	Control	93.0	2.7	0.00	0.00	98.0
HK1206252001	REFERENCE SEDIMENT	94.0	4.2	0.00	0.00	100.0
HK1206252002	VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	*80.0	5.0	0.00	0.00	100.0
HK1206252003	VR5 2.9-3.9M	#*63.0	7.6	0.00	0.00	100.0
HK1206252004	VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	*81.0	8.2	0.00	0.00	100.0
HK1206252005	VR3 GRAB, 0.9-1.9M	89.0	7.4	0.00	0.00	100.0
HK1206252006	VR3 1.9-2.9M	*82.0	2.7	0.00	0.00	100.0
HK1206252007	VR1 GRAB, VR2 GRAB, GB2	*81.0	4.2	0.00	0.00	100.0
HK1206252008	GB1	#*73.0	6.7	0.00	0.00	100.0
HK1206252009	GB11, GB3, GB4, GB5	#*62.0	8.4	0.00	0.00	100.0
HK1206252010	GB8	#*73.0	2.7	0.00	0.00	100.0
HK1206252011	GB6, GB7, GB9, GB10	*77.0	4.5	0.00	0.00	100.0

\* Mean survival in test sediment is significantly different ( $p \leq 0.05$ ) from that in reference sediment

# Mean survival in test sediment is <80% of that in reference sediment



Table 2.3 Water Quality Summary of 10-day amphipod survival test – *Leptocheirus plumulosus*

Lab ID	Sample ID	Ammonia (Total, mg/L)		Sulfide (mg/L)		Temp(°C)		pH		Salinity (ppt)		DO (mg/L)	
		Day 0	Day 10	Day 0	Day 10	min	max	min	max	min	max	min	max
Control	CONTROL	<1.00	<1.00	<0.1	<0.1	24	25	7.4	7.5	20	20	7.4	7.5
HK1206252001	REFERENCE SEDIMENT	<1.00	<1.00	<0.1	<0.1	24	25	7.4	7.5	20	20	7.4	7.5
HK1206252002	VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	4.25	7.38	<0.1	<0.1	24	25	7.4	7.5	20	20	7.4	7.5
HK1206252003	VR5 2.9-3.9M	9.95	2.03	<0.1	<0.1	24	26	7.3	7.5	20	20	7.3	7.5
HK1206252004	VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	4.16	9.43	<0.1	<0.1	24	26	7.4	7.5	20	20	7.4	7.5
HK1206252005	VR3 GRAB, 0.9-1.9M	1.51	1.08	<0.1	<0.1	24	25	7.3	7.5	20	20	7.3	7.5
HK1206252006	VR3 1.9-2.9M	8.58	2.01	<0.1	<0.1	24	26	7.3	7.5	20	20	7.3	7.5
HK1206252007	VR1 GRAB, VR2 GRAB, GB2	<1.00	<1.00	<0.1	<0.1	24	25	7.3	7.5	20	20	7.3	7.5
HK1206252008	GB1	<1.00	<1.00	<0.1	<0.1	24	25	7.3	7.5	20	20	7.3	7.5
HK1206252009	GB11, GB3, GB4, GB5	<1.00	1.07	<0.1	<0.1	24	26	7.4	7.5	20	20	7.4	7.5
HK1206252010	GB8	<1.00	<1.00	<0.1	<0.1	24	25	7.3	7.5	20	20	7.3	7.5
HK1206252011	GB6, GB7, GB9, GB10	<1.00	<1.00	<0.1	<0.1	24	25	7.3	7.5	20	20	7.3	7.5

Table 2.4 Summary of Quality Control Data of the 10-day Amphipod Survival Test – *Leptocheirus plumulosus*

Date of Test	Sediment Test		Reference Toxicant Test	
	Mean survival (%) in control sediment	Mean survival (%) in 0 mg Cd/L seawater	96-h <sup>a</sup> LC50 (mgCd/L)	Acceptability Criterion
09 Mar 2012 - 19 Mar 2012	93.0%	≥ 90%	0.70	0.33 - 1.45

<sup>a</sup>Median Lethal Concentration, a concentration which kills 50% of the testing population

3 20-DAY POLYCHAETE GROWTH AND SURVIVAL TEST  
– *Neanthes arenaceodentata*

Table 3.1 Test Methodology for the 20-day Polychaete Growth and Survival Test – *Neanthes arenaceodentata*

Parameter	Conditions
1 Reference protocols:	PSEP (1995) & ALS (2000) (Ref. 2 & 5)
2 Organism source:	Collected from Aquatic Toxicology Support; 2-3 weeks post emergence; dry weight 0.5-1.0 mg
3 Organism acclimation:	Polychaetes were acclimated in plastic container (20cm x 26cm x 8cm) at 20 ± 1°C with 28 ± 2ppt aerated seawater of 16h : 8h (light : dark) photoperiod Overlying seawater renewed; water quality (temperature, pH, salinity and dissolved oxygen) measured; organisms fed by grounded TetraMarin® in slurry form three times a week Temperature and salinity adjusted to testing condition at <3°C and <5ppt per day respectively
4 Testing periods:	09 Mar 2012 - 29 Mar 2012
5 Test type:	Sediment toxicity test; static; renewal
6 Test duration:	20 days
7 Temperature:	20 ± 1°C
8 Salinity:	28 ± 1 ppt
9 Light quality:	Wide-spectrum fluorescent lights
10 Illuminance:	500-1000 lux
11 Photoperiod:	24h : 0h (Light : Dark)
12 Test chamber:	1L glass jar with 10cm internal diameter; 175mL sediment; 800mL overlying seawater; position of test container randomized
13 Number of organisms per chamber:	5
14 Number of replicates:	5
15 Feeding regime:	Fed every second day (from day 0) with 40mg (dry weight) grounded TetraMarin® in slurry form in each testing chamber
16 Aeration:	Overlying water aerated overnight before the start of test and throughout the test at approximately 100 bubbles/min; maintains >60% dissolved oxygen saturation
17 Overlying water:	Reconstituted seawater made up from artificial sea salt (Brand: Red Sea®); filtered through a 0.5µm filter; sterilized by ultraviolet light
18 Overlying water quality monitoring:	Temperature monitored daily; pH, salinity and dissolved oxygen measured every third day before water renewal; total ammonia and sulfide taken at 0 d and 20 d
19 Control sediment:	Collected from Port Shelter at PS6 (E850234 N820057) on 12 December 2011 by grab sampler; expires on 09 June 2012; stored at -20°C after collection; sieved with 0.5mm sieve before testing; ALS Ref ID: HK1129264001



11-May-12

20	Endpoints:	Survival; total biomass <sup>1</sup> ; average individual biomass <sup>1</sup> ; average individual growth rate
21	Statistical analysis:	Data tested for normality and homogeneity of variance; Statistically significant differences between the mean total dry weight in testing sediments and reference sediment determined at a probability of $p \leq 0.05$ using ToxCalc 5.0 (Ref 7)
22	Test acceptability criterion:	$\geq 90\%$ mean survival and $\geq 0.38\text{mg/ind/day}$ individual growth rate in control sediment

---

Reference Toxicant Test

---

23	Test type:	Water only test, static
24	Toxicant:	Cadmium
25	Test duration:	96 hours
26	Photoperiod:	0h : 24h (Light : Dark)
27	Test Chamber:	1L glass jar with 10cm internal diameter; 900 mL seawater; position of test container randomized
28	Number of organisms per chamber:	10
29	Number of replicates:	2
30	Overlying seawater quality monitoring:	Temperature, pH, salinity and dissolved oxygen of the seawater measured at test initiation and termination
31	Endpoints:	Survival
32	Statistical analysis:	96-h LC50 for Cadmium determined by ToxCalc 5.0 (Ref 7)
33	Test acceptability criterion:	$\geq 90\%$ mean survival in control seawater
34	Other testing conditions are the same as in the sediment test	

---

Table 3.2 Results Summary of the 20-day Polychaete Growth and Survival Test –  
*Neanthes arenaceodentata*

Lab ID	Sample ID	Survival (%)		Individual Dry Weight (mg)		Individual Growth Rate (mg/ind/day)		Total Dry Weight (mg)	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Control	CONTROL	100.0	0.0	18.3	3.8	0.88	0.19	91.6	18.8
HK1206252001	REFERENCE SEDIMENT	100.0	0.0	18.9	3.0	0.91	0.15	94.6	15.0
HK1206252002	VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	100.0	0.0	13.6	3.4	0.65	0.17	#*68.0	17.0
HK1206252003	VR5 2.9-3.9M	0.0	0.0	0.0	0.0	-0.03	0.00	#*0.0	0.0
HK1206252004	VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	100.0	0.0	12.5	3.7	0.59	0.18	#*62.7	18.5
HK1206252005	VR3 GRAB, 0.9-1.9M	96.0	8.9	18.0	4.2	0.87	0.21	87.7	25.4
HK1206252006	VR3 1.9-2.9M	56.0	16.7	3.8	1.8	0.16	0.09	#*11.1	7.1
HK1206252007	VR1 GRAB, VR2 GRAB, GB2	96.0	8.9	21.4	5.4	1.03	0.27	101.6	23.0
HK1206252008	GB1	100.0	0.0	18.6	3.6	0.90	0.18	93.0	18.2
HK1206252009	GB11, GB3, GB4, GB5	100.0	0.0	19.4	3.2	0.93	0.16	96.9	16.1
HK1206252010	GB8	100.0	0.0	17.7	3.0	0.85	0.15	88.5	14.8
HK1206252011	GB6, GB7, GB9, GB10	100.0	0.0	20.9	8.0	1.01	0.40	104.4	40.1

\*Mean total dry weight in test sediment is significantly different ( $p \leq 0.05$ ) from that in reference sediment

# Mean total dry weight in test sediment is <90% of that in reference sediment



**Table 2.3 Water Quality Summary of 20-day Polychaete Growth and Survival Test – *Neanthes arenaceodentata***

Lab ID	Sample ID	Ammonia (Total, mg/L)		Sulfide (mg/L)		Temp(°C)		pH		Salinity (ppt)		DO (mg/L)	
		Day 0	Day 20	Day 0	Day 20	min	max	min	max	min	max	min	max
Control	CONTROL	<1.00	9.20	<0.1	<0.1	19	21	7.7	8.3	28	28	7.4	7.8
HK1206252001	REFERENCE SEDIMENT	<1.00	12.8	<0.1	<0.1	19	21	7.8	8.2	28	29	7.5	7.5
HK1206252002	VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	5.04	9.78	<0.1	<0.1	19	21	7.6	8.3	28	29	7.4	7.4
HK1206252003	VR5 2.9-3.9M	12.2	27.2	<0.1	<0.1	19	21	7.7	8.3	28	29	7.3	7.5
HK1206252004	VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	6.88	12.5	<0.1	<0.1	19	21	7.6	8.2	28	29	7.4	7.5
HK1206252005	VR3 GRAB, 0.9-1.9M	1.97	11.4	<0.1	<0.1	19	21	7.9	8.3	28	29	7.3	7.5
HK1206252006	VR3 1.9-2.9M	7.85	25.6	<0.1	<0.1	19	20	7.8	8.2	28	29	7.3	7.5
HK1206252007	VR1 GRAB, VR2 GRAB, GB2	<1.00	11.9	<0.1	<0.1	19	21	7.9	8.1	28	29	7.4	7.4
HK1206252008	GB1	<1.00	12.0	<0.1	<0.1	19	21	7.6	8.2	28	28	7.4	7.5
HK1206252009	GB11, GB3, GB4, GB5	<1.00	11.4	<0.1	<0.1	19	21	7.7	8.1	28	29	7.4	7.5
HK1206252010	GB8	<1.00	12.8	<0.1	<0.1	19	21	7.7	8.1	28	29	7.3	7.5
HK1206252011	GB6, GB7, GB9, GB10	<1.00	13.3	<0.1	<0.1	19	21	7.7	8.2	28	29	7.3	7.5

**Table 2.4 Summary of Quality Control Data of the 20-day Polychaete Growth and Survival test – *Neanthes arenaceodentata***

Date of Test	Sediment Test				Reference Toxicant Test					
	Initial dry weight (mg/ind)	Acceptability Criterion	Mean survival (%) in control sediment	Acceptability Criterion	Mean ind growth rate (mg/ind/day) in control sediment	Acceptability Criterion	Mean survival (%) in 0 mgCd / L seawater	Acceptability Criterion	96-h <sup>a</sup> LC50 (mgCd / L)	Acceptability Criterion
09 Mar 2012 - 29 Mar 2012	0.69	0.5-1.0 (mg/ind)	100.0	≥ 90%	0.88	> 0.38 (mg/ind/day)	100.0	≥ 90%	7.53	5.37 - 8.89

<sup>a</sup> Median Lethal Concentration, a concentration which kills 50% of the testing population

4.0 48-60-HOUR BIVALVE LARVAE SURVIVAL AND NORMALITY TEST –  
Crassostrea gigas

Table 4.1 Test Methodology for the 48-60-hour Bivalve Larvae Survival and Normality Test – Crassostrea gigas

Parameter	Condition
1 Reference protocols:	PSEP (1995) and ALS (2009) (Ref 2 and 6)
2 Organism Source:	Collected from Guernsey Sea Farm
3 Organism acclimation:	Organisms are stored in individual chambers at 20°C with aerated clean seawater for a night prior to testing.
4 Initiation and termination dates:	06 Mar 2012 - 08 Mar 2012
5 Test type:	Static; non-renewal
6 Test duration:	48 hours
7 Temperature:	20 ± 1°C
8 Salinity:	28 ± 1 ppt
9 Light quality:	Wide-spectrum fluorescent lights
10 Illuminance:	500 – 1000 lux
11 Photoperiod:	14h : 10h (Light : Dark)
12 Test chamber:	1L glass jar with 10cm internal diameter; 18.0 ± 0.5 g of sediment; 900mL overlying seawater; sediment stirred for 10sec and allowed to settle for 4h prior to the inoculation of embryos; position of test container randomized
13 Method for obtaining gametes:	Organisms were dissected to obtain the gametes
14 Life stage of organism:	<2h post-fertilization
15 Number of organisms per chamber:	20,000 – 40,000 (around 30 embryos / mL)
16 Number of replicates:	6 (5 for testing, 1 for water quality measurement)
17 Feeding regime:	None
18 Aeration:	100 bubbles/minute if dissolved oxygen drops to <60% saturation
19 Overlying water:	Natural seawater collected from uncontaminated area in Sai Kung; Filtered through a 0.5µm; sterilized by ultraviolet light; salinity adjusted to 28ppt with fresh water or artificial sea salt (Brand: Red Sea®)
20 Overlying water quality monitoring:	Temperature, pH, salinity and dissolved oxygen were recorded daily
21 Negative control:	Seawater without sediment
22 Endpoints:	Survival, normal development, and normality survival
23 Statistical analysis:	Data tested for normality and homogeneity of variance; Statistically significant differences between the mean normality survival in testing sediments and reference sediment determined at a probability of p≤0.05 using ToxCalc 5.0 (Ref 7)
24 Test acceptability criterion:	>70% mean normal survival in seawater control
<b>Reference Toxicant Test</b>	
25 Toxicant:	Copper
26 Test chamber:	1L glass jar with 10cm internal diameter; 900mL seawater; position of test container randomized
27 Number of replicates:	4 (3 for testing; 1 for water quality measurement)
28 Endpoints:	Normal Survival
29 Statistical analysis:	48-60-h EC50 (and 95% confidence interval) for Cu calculated using ToxCalc 5.0 (Ref. 7)
30 Other testing conditions are the same as in the sediment samples test	

<sup>1</sup> Normality survival integrates the normality and survival end points, and measures survival of only the normal larvae relative to the starting number



Table 4.2

Results Summary of the 48-60-hour Bivalve Larvae Survival and Normality Test – *Crassostrea gigas*

Lab ID	Sample ID	Survival (%)		Normality (%)		Normal Survival (%)	
		Mean	SD	Mean	SD	Mean	SD
Control	CONTROL	83.7	6.0	97.2	2.3	81.4	5.9
HK1206252001	REFERENCE SEDIMENT	97.3	2.6	97.2	0.5	94.5	2.3
HK1206252002	VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	92.7	4.4	95.1	0.8	*88.1	4.2
HK1206252003	VR5 2.9-3.9M	96.3	4.5	96.3	1.0	92.7	4.7
HK1206252004	VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	76.8	9.5	91.7	6.3	#*70.1	6.3
HK1206252005	VR3 GRAB, 0.9-1.9M	94.0	2.7	96.5	1.1	*90.7	1.7
HK1206252006	VR3 1.9-2.9M	91.7	5.9	96.7	1.1	*88.6	5.0
HK1206252007	VR1 GRAB, VR2 GRAB, GB2	91.6	3.3	96.9	0.9	*88.8	2.8
HK1206252008	GB1	92.0	3.0	96.2	1.2	*88.5	2.6
HK1206252009	GB11, GB3, GB4, GB5	91.3	2.3	96.5	0.6	*88.1	2.1
HK1206252010	GB8	90.4	1.7	97.6	0.4	*88.2	1.7
HK1206252011	GB6, GB7, GB9, GB10	91.5	2.5	97.0	0.9	*88.8	2.1

\* Mean percentage in test sediment is significantly different ( $p \leq 0.05$ ) from that in reference sediment

# Mean normal survival in test sediment is <80% of that in reference sediment

Table 2.3 Water Quality Summary of 48-60-h bivalve Survival and Normality Test – Crassostrea gigas

Lab ID	Sample ID	Ammonia (Total, mg/L)		Sulfide (mg/L)		Temp(°C)		pH		Salinity (ppt)		DO (mg/L)	
		Day 0	Day 2	Day 0	Day 2	min	max	min	max	min	max	min	max
Control	CONTROL	<1.00	<1.00	<0.1	<0.1	20	20	7.8	8.9	28	28	7.0	7.1
HK1206252001	REFERENCE SEDIMENT	<1.00	<1.00	<0.1	<0.1	20	20	7.7	7.8	28	28	6.8	7.1
HK1206252002	VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	1.69	<1.00	<0.1	<0.1	20	20	7.8	7.9	28	28	6.8	7.2
HK1206252003	VR5 2.9-3.9M	1.80	1.48	<0.1	<0.1	20	20	7.8	7.9	28	28	6.7	7.1
HK1206252004	VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	1.38	1.19	<0.1	<0.1	20	20	7.8	7.9	28	28	6.8	7.2
HK1206252005	VR3 GRAB, 0.9-1.9M	<1.00	<1.00	<0.1	<0.1	20	20	7.7	7.9	28	28	6.8	7.2
HK1206252006	VR3 1.9-2.9M	2.07	2.21	<0.1	<0.1	20	20	7.7	7.8	28	28	6.8	7.3
HK1206252007	VR1 GRAB, VR2 GRAB, GB2	<1.00	<1.00	<0.1	<0.1	20	20	7.7	7.8	28	28	6.8	7.2
HK1206252008	GB1	<1.00	<1.00	<0.1	<0.1	20	20	7.8	7.8	28	28	6.8	7.2
HK1206252009	GB11, GB3, GB4, GB5	<1.00	<1.00	<0.1	<0.1	20	20	7.8	7.9	28	28	6.8	7.3
HK1206252010	GB8	<1.00	<1.00	<0.1	<0.1	20	20	7.7	7.8	28	28	6.8	7.2
HK1206252011	GB6, GB7, GB9, GB10	<1.00	<1.00	<0.1	<0.1	20	20	7.8	7.8	28	28	6.8	7.2

Table 2.4 Summary of Quality Control Data of the 48-60-hour Bivalve Larvae Survival and Normality test – Crassostrea gigas

Date of Test	Water Control		Reference Toxicant Test	
	Mean Normal survival (%) in control	Mean Normal survival (%) in 0 µg Cu/L	48-60-h EC50 (µgCu / L)	Acceptability Criterion
06 Mar 2012 - 08 Mar 2012	81.4%	≥70.0%	6.88	2.80 - 14.99



## 5 References

- (1) APHA (American Public Health Association) 1995. Standard Methods for the Examination of Water and Wastewater. 19th edition. American Public Health Association, American Water Works Association and Water Environment Federation, Washington, DC.
- (2) PSEP (Puget Sound Estuary Program) 1995. Recommended guidelines for conducting laboratory bioassays on Puget Sound sediments. U.S. Environmental Protection Agency, Region 10, Office of Puget Sound, Seattle WA.
- (3) USEPA (U.S. Environmental Protection Agency) 1994. Methods for assessing the toxicity of sediment-associated contaminants with estuarine and marine amphipods. Office of Research and Development. U.S. Environmental Protection Agency, Cincinnati, OH. EPA/600/R94/025.
- (4) ALS 2000. 10-Day Amphipod Survival Test – *Leptocheirus plumulosus*. QWI-HK/ET001. In: Ecotoxicology Work Instruction. ALS Technichem (HK) Pty Ltd, Hong Kong.
- (5) ALS 2000. 20-Day Polychaete Growth and Survival Test – *Neanthes arenaceodentata*. QWI-HK/ET002. In: Ecotoxicology Work Instruction. ALS Technichem (HK) Pty Ltd, Hong Kong.
- (6) ALS 2009. 48 Hour Bivalve Larvae Survival and Normality Test – *Crassostrea gigas*. QWI-HK/ET012. In: Ecotoxicology Work Instruction. ALS Technichem (HK) Pty Ltd, Hong Kong.
- (7) TOXCALC™-Toxicity Data Analysis Software (v5.0.32) User's Guide. 1994-2008. Tidepool Scientific Software, Nckinleyville, CA 95519.

APPENDIX A  
Sediment Description



Table A.1: Sample Identification

<sup>a</sup> Lot ID	Lab ID	Client ID	Lab ID (Ecotox. Section)
M-01	Control	Control	Control
M-10	HK1202616001	REFERENCE SEDIMENT	HK1206252001
M-11	HK1201645001, 002, 005	VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	HK1206252002
M-12	HK1201645003	VR5 2.9-3.9M	HK1206252003
M-13	HK1201661001, 002, 003, 005	VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	HK1206252004
M-14	HK1201774001, 005	VR3 GRAB, 0.9-1.9M	HK1206252005
M-15	HK1201774002	VR3 1.9-2.9M	HK1206252006
M-16	HK1201772005, HK1201664004,	VR1 GRAB, VR2 GRAB, GB2	HK1206252007
M-17	HK1201843001	GB1	HK1206252008
M-18	HK1201848001, HK1201850001,	GB11, GB3, GB4, GB5	HK1206252009
M-19	HK1201858001	GB8	HK1206252010
M-20	HK1201854001, HK1201856001,	GB6, GB7, GB9, GB10	HK1206252011

<sup>a</sup> Lot ID is identification used during testing







**ALS Technichem (HK) Pty Ltd**

## CERTIFICATE OF ANALYSIS

<b>CONTACT:</b> --	<b>WORK ORDER:</b> HK1206252
<b>CLIENT:</b> CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	<b>SUB-BATCH:</b> 1
<b>ADDRESS:</b> CIVIL ENGINEERING AND DEVELOPMENT BUILDING, 101 PRINCESS MARGARET ROAD, KOWLOON, HONG KONG.	<b>LABORATORY:</b> HONG KONG
	<b>DATE RECEIVED:</b> 07/03/2012
	<b>DATE OF ISSUE:</b> 20/03/2012
	<b>SAMPLE TYPE:</b> SEDIMENT
<b>ORDER:</b> GE/2009/16.41 - AGREEMENT NO CE 43_2010 (HY) CENTRAL KOWLOON ROUTE-DESIGN AND CONSTRUCTION	<b>No. of SAMPLES:</b> 11

### COMMENTS

Samples analysed on an as received basis. Results reported on an as dry weight basis.  
The results of particle size distribution were shown on next page.

### NOTES

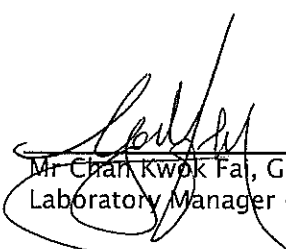
This is the Final Report and supersedes any preliminary report with this batch number.  
Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

### ISSUING LABORATORY: HONG KONG

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

Page 1 of 3

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# CERTIFICATE OF ANALYSIS



**Work Order:** HK1206252  
**Sub-batch:** 1  
**Date of Issue:** 20/03/2012  
**Client:** CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
**Client Reference:** GE/2009/16.41 - AGREEMENT NO CE 43\_2010 (HY)  
 CENTRAL KOWLOON ROUTE-DESIGN AND CONSTRUCTION

## Particle Size Distribution

### Weight Retained

Sample	Lab no.	Total dry weight (gram)	Sieve Size									
			+2mm	+710um	+300um	+150um	+106um	+75um	+63um	-63um		
REFERENCE SEDIMENT	HK1206252 -001	70.1	< 0.1	1.0	1.2	4.7	8.8	7.5	2.0	2.0	44.9	
VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	HK1206252 -002	63.6	< 0.1	1.9	1.2	2.0	2.4	6.1	2.4	47.5		
VR5 2.9-3.9M	HK1206252 -003	82.9	5.5	5.1	3.9	3.0	2.2	2.6	0.7	59.8		
VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M GRAB	HK1206252 -004	74.5	0.2	1.6	2.2	2.8	2.3	4.8	1.4	59.3		
VR3 GRAB, 0.9-1.9M	HK1206252 -005	84.4	0.8	2.5	2.8	3.0	2.4	5.3	1.7	65.9		
VR3 1.9-2.9M	HK1206252 -006	109.4	7.5	15.7	24.7	13.3	2.6	2.2	0.6	42.8		
VR1 GRAB, VR2 GRAB, GB2	HK1206252 -007	83.5	4.0	7.6	5.1	4.3	4.6	9.4	1.7	46.9		
GB1	HK1206252 -008	62.1	1.2	1.4	1.4	2.0	2.4	5.8	1.2	46.8		
GB11, GB3, GB4, GB5	HK1206252 -009	67.1	2.5	4.0	3.0	3.0	1.9	3.7	0.9	48.1		
GB8	HK1206252 -010	56.1	< 0.1	0.4	0.7	1.3	1.5	4.0	1.1	47.1		

### Percent Retained

Sample	Lab no.	Total dry weight (%)	Sieve Size									
			+2mm	+710um	+300um	+150um	+106um	+75um	+63um	-63um		
REFERENCE SEDIMENT	HK1206252 -001	100.0	< 1	1.4	1.7	6.7	12.6	10.7	2.9	64.1		
VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	HK1206252 -002	100.0	< 1	3.0	1.9	3.2	3.8	9.6	3.8	74.6		
VR5 2.9-3.9M	HK1206252 -003	100.0	6.7	6.2	4.7	3.6	2.6	3.2	< 1	72.2		
VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M GRAB	HK1206252 -004	100.0	< 1	2.1	2.9	3.8	3.1	6.4	1.9	79.6		
VR3 GRAB, 0.9-1.9M	HK1206252 -005	100.0	< 1	2.9	3.3	3.6	2.8	6.3	2.0	78.1		
VR3 1.9-2.9M	HK1206252 -006	100.0	6.8	14.3	22.6	12.2	2.4	2.0	< 1	39.2		
VR1 GRAB, VR2 GRAB, GB2	HK1206252 -007	100.0	4.7	9.1	6.1	5.1	5.6	11.2	2.1	56.2		
GB1	HK1206252 -008	100.0	1.9	2.3	2.2	3.1	3.8	9.4	1.9	75.4		
GB11, GB3, GB4, GB5	HK1206252 -009	100.0	3.7	5.9	4.5	4.5	2.9	5.5	1.3	71.7		
GB8	HK1206252 -010	100.0	< 1	< 1	1.2	2.2	2.7	7.2	1.9	83.9		

### Cumulative Percentage Retained

Sample	Lab no.	Total dry weight (%)	Sieve Size									
			+2mm	+710um	+300um	+150um	+106um	+75um	+63um	-63um		
REFERENCE SEDIMENT	HK1206252 -001	---	< 1	1.4	3.1	9.8	22.4	33.0	35.9	100.0		
VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	HK1206252 -002	---	< 1	3.0	4.9	8.2	12.0	21.6	25.4	100.0		
VR5 2.9-3.9M	HK1206252 -003	---	6.7	12.9	17.6	21.2	23.9	27.0	27.8	100.0		
VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M GRAB	HK1206252 -004	---	< 1	2.4	5.3	9.0	12.1	18.5	20.4	100.0		
VR3 GRAB, 0.9-1.9M	HK1206252 -005	---	< 1	3.8	7.2	10.8	13.6	19.9	21.9	100.0		
VR3 1.9-2.9M	HK1206252 -006	---	6.8	21.1	43.7	55.9	58.3	60.3	60.8	100.0		
VR1 GRAB, VR2 GRAB, GB2	HK1206252 -007	---	4.7	13.8	19.9	25.0	30.5	41.7	43.8	100.0		
GB1	HK1206252 -008	---	1.9	4.2	6.4	9.6	13.4	22.8	24.6	100.0		
GB11, GB3, GB4, GB5	HK1206252 -009	---	3.7	9.6	14.1	18.6	21.5	27.0	28.3	100.0		
GB8	HK1206252 -010	---	< 1	< 1	2.0	4.3	7.0	14.2	16.1	100.0		



# CERTIFICATE OF ANALYSIS



**Work Order:** HK1206252  
**Sub-batch:** 1  
**Date of Issue:** 20/03/2012  
**Client:** CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
**Client Reference:** GE/2009/16.41 - AGREEMENT NO CE 43\_2010 (HY)  
 CENTRAL KOWLOON ROUTE-DESIGN AND CONSTRUCTION

## Particle Size Distribution

Sample	Lab no.	Total dry weight (gram)	Sieve Size								
			+2mm	+710um	+300um	+150um	+106um	+63um			
GB6, GB7, GB9, GB10	HK1206252 -001	70.1	< 0.1	1.0	1.2	4.7	8.8	7.5	2.0	-63um	44.9

Sample	Lab no.	Total dry weight (%)	Sieve Size								
			+2mm	+710um	+300um	+150um	+106um	+63um			
GB6, GB7, GB9, GB10	HK1206252 -001	100.0	< 1	1.4	1.7	6.7	12.6	10.7	2.9	-63um	64.1

Sample	Lab no.	Total dry weight (%)	Sieve Size								
			+2mm	+710um	+300um	+150um	+106um	+63um			
GB6, GB7, GB9, GB10	HK1206252 -001	--	< 1	1.4	3.1	9.8	22.4	33.0	35.9	-63um	100.0

### Cumulative Percentage Retained

APPENDIX B

Complete Data for the 10-day Amphipod Survival Test  
– *Leptocheirus plumulosus*



Client: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Batch No.: HK1206252  
 Initiation Date: 09-Mar-12

ID	Rep	Group	Clinet ID	Initial no.	Final no.	Avoidance	No. Not Reburying	Duration (Days)	Survival (%)			Avoidance (%)			Reburial (%)		
									S %	S Mean	S SD	A %	A Mean	A SD	R %	R Mean	
-	1	A	Control	CONTROL	20	18	0	0	10	90	93.0	2.7	0.00	0.00	0.00	100.0	98.0
-	2	B	Control	CONTROL	20	18	0	1	10	90			0.00			94.4	
-	3	C	Control	CONTROL	20	19	0	0	10	95			0.00			100.0	
-	4	D	Control	CONTROL	20	19	0	0	10	95			0.00			100.0	
-	5	E	Control	CONTROL	20	19	0	1	10	95			0.00			94.7	
1	1	A	HK1206252001	REFERENCE SEDIMENT	20	18	0	0	10	90	94.0	4.2	0.00	0.00	0.00	100.0	100.0
2	2	B	HK1206252001	REFERENCE SEDIMENT	20	19	0	0	10	95			0.00			100.0	
3	3	C	HK1206252001	REFERENCE SEDIMENT	20	19	0	0	10	95			0.00			100.0	
4	4	D	HK1206252001	REFERENCE SEDIMENT	20	20	0	0	10	100			0.00			100.0	
5	5	E	HK1206252001	REFERENCE SEDIMENT	20	18	0	0	10	90			0.00			100.0	
6	1	A	HK1206252002	VR5 2.9-3.9M, VR5 1.9-2.9M, VR5 GRAB	20	15	0	0	10	75	80.0	5.0	0.00	0.00	0.00	100.0	100.0
7	2	B	HK1206252002	VR5 2.9-3.9M, VR5 1.9-2.9M, VR5 GRAB	20	17	0	0	10	85			0.00			100.0	
8	3	C	HK1206252002	VR5 2.9-3.9M, VR5 1.9-2.9M, VR5 GRAB	20	15	0	0	10	75			0.00			100.0	
9	4	D	HK1206252002	VR5 2.9-3.9M, VR5 1.9-2.9M, VR5 GRAB	20	16	0	0	10	80			0.00			100.0	
10	5	E	HK1206252002	VR5 2.9-3.9M, VR5 1.9-2.9M, VR5 GRAB	20	17	0	0	10	85			0.00			100.0	
11	1	A	HK1206252003	VR5 2.9-3.9M	20	15	0	0	10	75	63.0	7.6	0.00	0.00	0.00	100.0	100.0
12	2	B	HK1206252003	VR5 2.9-3.9M	20	12	0	0	10	60			0.00			100.0	
13	3	C	HK1206252003	VR5 2.9-3.9M	20	13	0	0	10	65			0.00			100.0	
14	4	D	HK1206252003	VR5 2.9-3.9M	20	11	0	0	10	55			0.00			100.0	
15	5	E	HK1206252003	VR5 2.9-3.9M	20	12	0	0	10	60			0.00			100.0	
16	1	A	HK1206252004	VR4 0.9-1.9M, VR4 1.9-2.9M, VR4 2.9-3.9M, VR4 GRAB	20	15	0	0	10	75	81.0	8.2	0.00	0.00	0.00	100.0	100.0
17	2	B	HK1206252004	VR4 0.9-1.9M, VR4 1.9-2.9M, VR4 2.9-3.9M, VR4 GRAB	20	15	0	0	10	75			0.00			100.0	
18	3	C	HK1206252004	VR4 0.9-1.9M, VR4 1.9-2.9M, VR4 2.9-3.9M, VR4 GRAB	20	18	0	0	10	90			0.00			100.0	
19	4	D	HK1206252004	VR4 0.9-1.9M, VR4 1.9-2.9M, VR4 2.9-3.9M, VR4 GRAB	20	15	0	0	10	75			0.00			100.0	
20	5	E	HK1206252004	VR4 0.9-1.9M, VR4 1.9-2.9M, VR4 2.9-3.9M, VR4 GRAB	20	18	0	0	10	90			0.00			100.0	
21	1	A	HK1206252005	VR3 GRAB, 0.9-1.9M	20	18	0	0	10	90	89.0	7.4	0.00	0.00	0.00	100.0	100.0
22	2	B	HK1206252005	VR3 GRAB, 0.9-1.9M	20	18	0	0	10	90			0.00			100.0	
23	3	C	HK1206252005	VR3 GRAB, 0.9-1.9M	20	17	0	0	10	85			0.00			100.0	
24	4	D	HK1206252005	VR3 GRAB, 0.9-1.9M	20	16	0	0	10	80			0.00			100.0	
25	5	E	HK1206252005	VR3 GRAB, 0.9-1.9M	20	20	0	0	10	100			0.00			100.0	
26	1	A	HK1206252006	VR3 1.9-2.9M	20	17	0	0	10	85	82.0	2.7	0.00	0.00	0.00	100.0	100.0
27	2	B	HK1206252006	VR3 1.9-2.9M	20	16	0	0	10	80			0.00			100.0	
28	3	C	HK1206252006	VR3 1.9-2.9M	20	17	0	0	10	85			0.00			100.0	
29	4	D	HK1206252006	VR3 1.9-2.9M	20	16	0	0	10	80			0.00			100.0	
30	5	E	HK1206252006	VR3 1.9-2.9M	20	16	0	0	10	80			0.00			100.0	
31	1	A	HK1206252007	VR1 GRAB, VR2 GRAB, GB2	20	17	0	0	10	85	81.0	4.2	0.00	0.00	0.00	100.0	100.0
32	2	B	HK1206252007	VR1 GRAB, VR2 GRAB, GB2	20	17	0	0	10	85			0.00			100.0	
33	3	C	HK1206252007	VR1 GRAB, VR2 GRAB, GB2	20	16	0	0	10	80			0.00			100.0	
34	4	D	HK1206252007	VR1 GRAB, VR2 GRAB, GB2	20	15	0	0	10	75			0.00			100.0	
35	5	E	HK1206252007	VR1 GRAB, VR2 GRAB, GB2	20	16	0	0	10	80			0.00			100.0	
36	1	A	HK1206252008	GB1	20	14	0	0	10	70	73.0	6.7	0.00	0.00	0.00	100.0	100.0
37	2	B	HK1206252008	GB1	20	13	0	0	10	65			0.00			100.0	
38	3	C	HK1206252008	GB1	20	16	0	0	10	80			0.00			100.0	
39	4	D	HK1206252008	GB1	20	14	0	0	10	70			0.00			100.0	
40	5	E	HK1206252008	GB1	20	16	0	0	10	80			0.00			100.0	
41	1	A	HK1206252009	GB11, GB3, GB4, GB5	20	12	0	0	10	60	62.0	8.4	0.00	0.00	0.00	100.0	100.0
42	2	B	HK1206252009	GB11, GB3, GB4, GB5	20	10	0	0	10	50			0.00			100.0	
43	3	C	HK1206252009	GB11, GB3, GB4, GB5	20	14	0	0	10	70			0.00			100.0	
44	4	D	HK1206252009	GB11, GB3, GB4, GB5	20	12	0	0	10	60			0.00			100.0	
45	5	E	HK1206252009	GB11, GB3, GB4, GB5	20	14	0	0	10	70			0.00			100.0	
46	1	A	HK1206252010	GB8	20	15	0	0	10	75	73.0	2.7	0.00	0.00	0.00	100.0	100.0
47	2	B	HK1206252010	GB8	20	14	0	0	10	70			0.00			100.0	
48	3	C	HK1206252010	GB8	20	15	0	0	10	75			0.00			100.0	
49	4	D	HK1206252010	GB8	20	14	0	0	10	70			0.00			100.0	
50	5	E	HK1206252010	GB8	20	15	0	0	10	75			0.00			100.0	
51	1	A	HK1206252011	GB6, GB7, GB9, GB10	20	16	0	0	10	80	77.0	4.5	0.00	0.00	0.00	100.0	100.0
52	2	B	HK1206252011	GB6, GB7, GB9, GB10	20	16	0	0	10	80			0.00			100.0	
53	3	C	HK1206252011	GB6, GB7, GB9, GB10	20	15	0	0	10	75			0.00			100.0	
54	4	D	HK1206252011	GB6, GB7, GB9, GB10	20	16	0	0	10	80			0.00			100.0	
55	5	E	HK1206252011	GB6, GB7, GB9, GB10	20	14	0	0	10	70			0.00			100.0	

Reviewed by: 

Test: LP Test ID: HK1206252a  
 Species: LP Protocol: -EPA600 R-  
 Sample ID: VA Sample Type: MSE  
 Start Date: 9/03/2012 End Date: 19/03/2012 Lab ID: ALS

Pos	ID	Rep	Group	Initial no.	Final no.	Avoidance	Reburying	T. Duration (Days)	Notes
	1	1	REFERENCE	20	18	0	0	10	
	2	2	REFERENCE	20	19	0	0	10	
	3	3	REFERENCE	20	19	0	0	10	
	4	4	REFERENCE	20	20	0	0	10	
	5	5	REFERENCE	20	18	0	0	10	
	6	1	1206252-02	20	15	0	0	10	
	7	2	1206252-02	20	17	0	0	10	
	8	3	1206252-02	20	15	0	0	10	
	9	4	1206252-02	20	16	0	0	10	
	10	5	1206252-02	20	17	0	0	10	
	11	1	1206252-03	20	15	0	0	10	
	12	2	1206252-03	20	12	0	0	10	
	13	3	1206252-03	20	13	0	0	10	
	14	4	1206252-03	20	11	0	0	10	
	15	5	1206252-03	20	12	0	0	10	
	16	1	1206252-04	20	15	0	0	10	
	17	2	1206252-04	20	15	0	0	10	
	18	3	1206252-04	20	18	0	0	10	
	19	4	1206252-04	20	15	0	0	10	
	20	5	1206252-04	20	18	0	0	10	
	21	1	1206252-05	20	18	0	0	10	
	22	2	1206252-05	20	18	0	0	10	
	23	3	1206252-05	20	17	0	0	10	
	24	4	1206252-05	20	16	0	0	10	
	25	5	1206252-05	20	20	0	0	10	
	26	1	1206252-06	20	17	0	0	10	
	27	2	1206252-06	20	16	0	0	10	
	28	3	1206252-06	20	17	0	0	10	
	29	4	1206252-06	20	16	0	0	10	
	30	5	1206252-06	20	16	0	0	10	
	31	1	1206252-07	20	17	0	0	10	
	32	2	1206252-07	20	17	0	0	10	
	33	3	1206252-07	20	16	0	0	10	
	34	4	1206252-07	20	15	0	0	10	
	35	5	1206252-07	20	16	0	0	10	
	36	1	1206252-08	20	14	0	0	10	
	37	2	1206252-08	20	13	0	0	10	
	38	3	1206252-08	20	16	0	0	10	
	39	4	1206252-08	20	14	0	0	10	
	40	5	1206252-08	20	16	0	0	10	
	41	1	1206252-09	20	12	0	0	10	
	42	2	1206252-09	20	10	0	0	10	
	43	3	1206252-09	20	14	0	0	10	
	44	4	1206252-09	20	12	0	0	10	
	45	5	1206252-09	20	14	0	0	10	
	46	1	1206252-10	20	15	0	0	10	
	47	2	1206252-10	20	14	0	0	10	
	48	3	1206252-10	20	15	0	0	10	
	49	4	1206252-10	20	14	0	0	10	
	50	5	1206252-10	20	15	0	0	10	
	51	1	1206252-11	20	16	0	0	10	
	52	2	1206252-11	20	16	0	0	10	
	53	3	1206252-11	20	15	0	0	10	
	54	4	1206252-11	20	16	0	0	10	
	55	5	1206252-11	20	14	0	0	10	

Comments:



**-Survival**

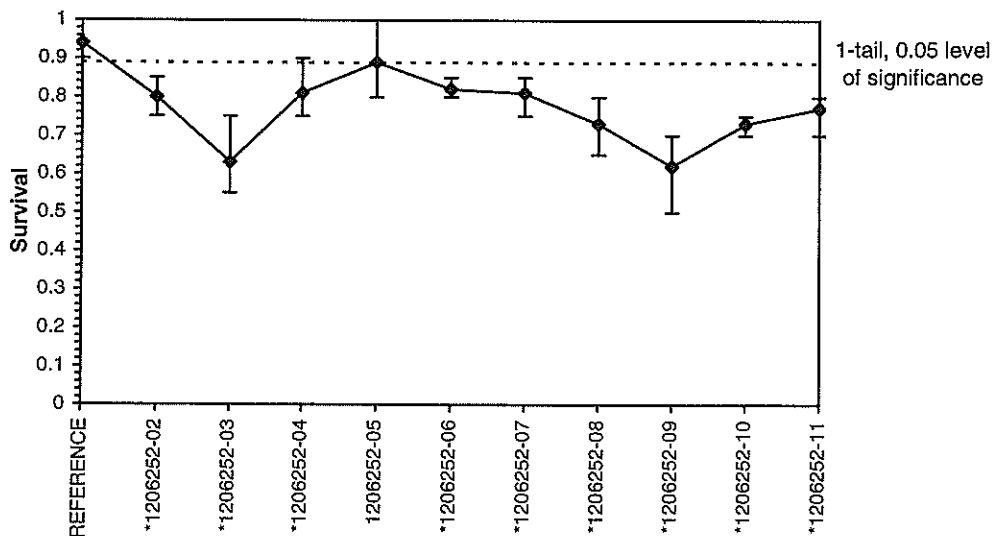
Start Date: 9/03/2012	Test ID: HK1206252a	Sample ID: VA
End Date: 19/03/2012	Lab ID: ALS	Sample Type: MSE
Sample Date:	Protocol: -EPA600 R-	Test Species: LP

Conc-	1	2	3	4	5
REFERENCE	0.9000	0.9500	0.9500	1.0000	0.9000
1206252-02	0.7500	0.8500	0.7500	0.8000	0.8500
1206252-03	0.7500	0.6000	0.6500	0.5500	0.6000
1206252-04	0.7500	0.7500	0.9000	0.7500	0.9000
1206252-05	0.9000	0.9000	0.8500	0.8000	1.0000
1206252-06	0.8500	0.8000	0.8500	0.8000	0.8000
1206252-07	0.8500	0.8500	0.8000	0.7500	0.8000
1206252-08	0.7000	0.6500	0.8000	0.7000	0.8000
1206252-09	0.6000	0.5000	0.7000	0.6000	0.7000
1206252-10	0.7500	0.7000	0.7500	0.7000	0.7500
1206252-11	0.8000	0.8000	0.7500	0.8000	0.7000

Conc-	Transform: Untransformed							1-Tailed		
	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
REFERENCE	0.9400	1.0000	0.9400	0.9000	1.0000	4.450	5			
*1206252-02	0.8000	0.8511	0.8000	0.7500	0.8500	6.250	5	4.802	1.860	0.0542
*1206252-03	0.6300	0.6702	0.6300	0.5500	0.7500	12.036	5	8.004	1.860	0.0720
*1206252-04	0.8100	0.8617	0.8100	0.7500	0.9000	10.143	5	3.153	1.860	0.0767
1206252-05	0.8900	0.9468	0.8900	0.8000	1.0000	8.333	5	1.313	1.860	0.0708
*1206252-06	0.8200	0.8723	0.8200	0.8000	0.8500	3.340	5	5.367	1.860	0.0416
*1206252-07	0.8100	0.8617	0.8100	0.7500	0.8500	5.165	5	4.914	1.860	0.0492
*1206252-08	0.7300	0.7766	0.7300	0.6500	0.8000	9.189	5	5.940	1.860	0.0657
*1206252-09	0.6200	0.6596	0.6200	0.5000	0.7000	13.495	5	7.649	1.860	0.0778
*1206252-10	0.7300	0.7766	0.7300	0.7000	0.7500	3.752	5	9.391	1.860	0.0416
*1206252-11	0.7700	0.8191	0.7700	0.7000	0.8000	5.808	5	6.208	1.860	0.0509

Auxiliary Tests	Statistic	Critical	Skew	Kurt		
Kolmogorov D Test indicates normal distribution (p > 0.05)	0.8861	0.895	0.20421	-0.429		
Bartlett's Test indicates equal variances (p = 0.37)	10.837	23.2093				
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences , Treatments vs REFERENCE	0.05093	0.05418	0.04731	0.00355	2.4E-10	10, 44

**Dose-Response Plot**



Test: LP Test ID: RTLPCD090  
 Species: LP Protocol: -EPA600 R-  
 Sample ID: REF Sample Type: CDCL  
 Start Date: 3/9/2012 End Date: 3/13/2012 Lab ID: ALS

Pos	ID	Rep	Group	Initial no.	Final no.	Avoidance	Reburying	T. Duration (Days)	Notes
	1	1	D-Control	10	10			4	
	2	2	D-Control	10	10			4	
	3	1	0.15	10	9			4	
	4	2	0.15	10	9			4	
	5	1	0.6	10	5			4	
	6	2	0.6	10	6			4	
	7	1	1.25	10	3			4	
	8	2	1.25	10	3			4	
	9	1	2.5	10	4			4	
	10	2	2.5	10	0			4	
	11	1	5	10	0			4	
	12	2	5	10	0			4	

Comments:



**-Survival**

Start Date: 3/9/2012	Test ID: RTLPCD090	Sample ID: REF
End Date: 3/13/2012	Lab ID: ALS	Sample Type: CDCL
Sample Date:	Protocol: -EPA600 R-	Test Species: LP

Comments:

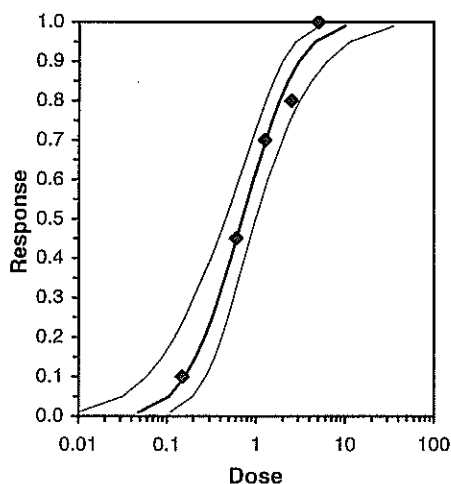
Conc-	1	2
D-Control	1.0000	1.0000
0.15	0.9000	0.9000
0.6	0.5000	0.6000
1.25	0.3000	0.3000
2.5	0.4000	0.0000
5	0.0000	0.0000

Conc-	Transform: Untransformed							Number Resp	Total Number
	Mean	N-Mean	Mean	Min	Max	CV%	N		
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	2	0	20
0.15	0.9000	0.9000	0.9000	0.9000	0.9000	0.000	2	2	20
0.6	0.5500	0.5500	0.5500	0.5000	0.6000	12.856	2	9	20
1.25	0.3000	0.3000	0.3000	0.3000	0.3000	0.000	2	14	20
2.5	0.2000	0.2000	0.2000	0.0000	0.4000	141.421	2	16	20
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	2	20	20

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed				
Equality of variance cannot be confirmed				

Parameter	Value	SE	95% Fiducial Limits		Maximum Likelihood-Probit						
			Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter		
Slope	2.00979	0.34656	1.33054	2.68904	0	1.71211	7.81473	0.63425	-0.1569	0.49756	3
Intercept	5.3153	0.15321	5.01501	5.61559							

Point	Probits	95% Fiducial Limits	
EC01	2.674	0.04849	0.01003 0.10881
EC05	3.355	0.10585	0.03203 0.19875
EC10	3.718	0.1605	0.05911 0.27562
EC15	3.964	0.21253	0.08902 0.34503
EC20	4.158	0.26568	0.12283 0.4139
EC25	4.326	0.32175	0.16136 0.48549
EC40	4.747	0.52127	0.31373 0.74224
EC50	5.000	0.69682	0.45636 0.9827
EC60	5.253	0.93148	0.64507 1.33888
EC75	5.674	1.5091	1.06781 2.40431
EC80	5.842	1.82758	1.27757 3.09645
EC85	6.036	2.28459	1.55857 4.2013
EC90	6.282	3.02532	1.97951 6.23633
EC95	6.645	4.58708	2.78135 11.3602
EC99	7.326	10.0144	5.14147 35.8244



**REFERENCE TOXICANT CONTROL CHART**

*Leptocheirus plumulosus* - 96-h Survival LC50 Values (mg Cd / L)

	Log	Antilog
Mean	-0.16	0.69
SD	0.16	1.45
2 x SD	0.32	2.11
UCL	0.32	2.11
UWL	0.16	1.45
LWL	-0.49	0.33
LCL	-0.65	0.22
CV(%)	-100	

WARNING / CONTROL LIMIT CALCULATIONS	
Mean: Mean is calculated for the last 20 logarithms of EC50, convert to antilogarithm to give Geomean	
SD: Standard deviation is calculated for the last 20 logarithms of EC50	
UCL: Upper Control Limit = Mean + 3 x SD, illustrated as antilogarithms in Control Chart	
UWL: Upper Warning Limit = Mean + 2 x SD, illustrated as antilogarithms in Control Chart	
LWL: Lower Warning Limit = Mean - 2 x SD, illustrated as antilogarithms in Control Chart	
LCL: Lower Control Limit = Mean - 3 x SD, illustrated as antilogarithms in Control Chart	

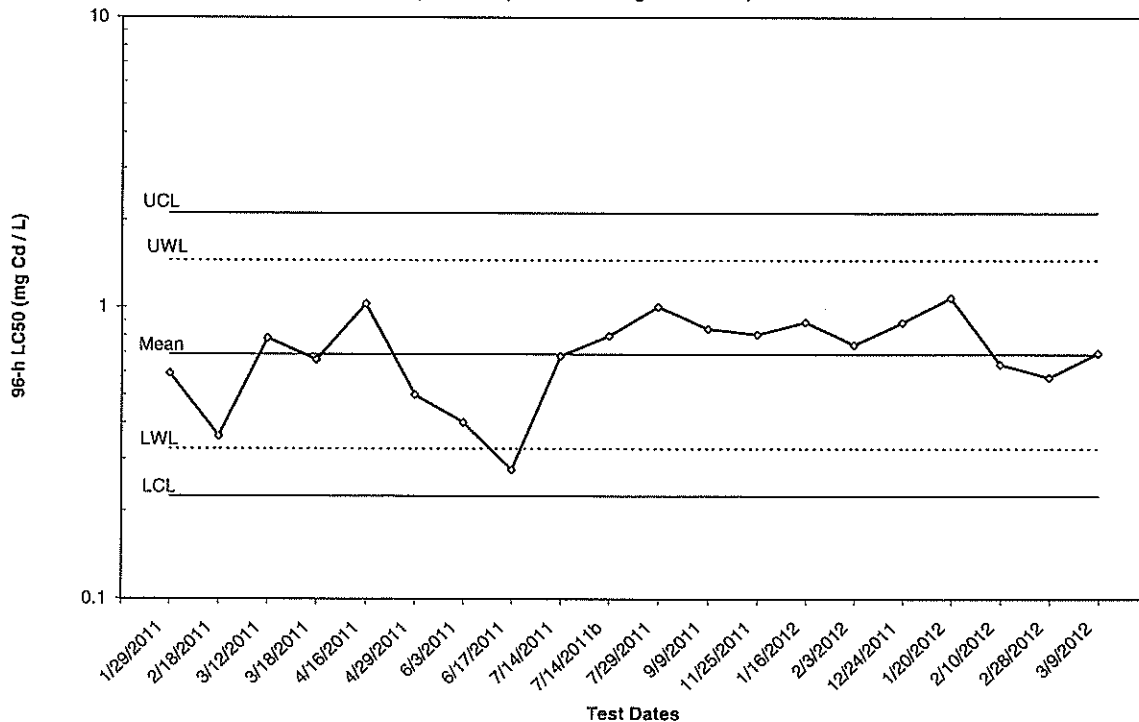
Point No.	LC50	log LC50
0	1.07	0.03
1	0.59	-0.23
2	0.36	-0.44
3	0.78	-0.11
4	0.66	-0.18
5	1.03	0.01
6	0.50	-0.30
7	0.40	-0.40
8	0.28	-0.56
9	0.68	-0.17
10	0.80	-0.10
11	1.00	0.00
12	0.84	-0.07
13	0.81	-0.09
14	0.89	-0.05
15	0.74	-0.13
16	0.89	-0.05
17	1.08	0.03
18	0.64	-0.20
19	0.57	-0.24

CONTROL CHART - DATA PLOT				
Point No.	Test Date	96-h LC50	Acceptable Result?	Calculation Method
0	01/07/2011	1.07	-----	Trimmed Spearman Karber
1	01/29/2011	0.59	OK	Trimmed Spearman Karber
2	02/18/2011	0.36	OK	Trimmed Spearman Karber
3	03/12/2011	0.78	OK	Trimmed Spearman Karber
4	03/18/2011	0.66	OK	Trimmed Spearman Karber
5	04/16/2011	1.03	OK	Trimmed Spearman Karber
6	04/29/2011	0.50	OK	Trimmed Spearman Karber
7	06/03/2011	0.40	OK	Trimmed Spearman Karber
8	06/17/2011	0.28	OUTSIDE 2SD	Trimmed Spearman Karber
9	07/14/2011	0.68	OK	Trimmed Spearman Karber
10	7/14/2011b	0.80	OK	Trimmed Spearman Karber
11	07/29/2011	1.00	OK	Trimmed Spearman Karber
12	09/09/2011	0.84	OK	Trimmed Spearman Karber
13	11/25/2011	0.81	OK	Maximum Likelihood-Probit
14	01/16/2012	0.89	OK	Maximum Likelihood-Probit
15	02/03/2012	0.74	OK	Maximum Likelihood-Probit
16	12/24/2011	0.89	OK	Maximum Likelihood-Probit
17	01/20/2012	1.08	OK	Maximum Likelihood-Probit
18	02/10/2012	0.64	OK	Maximum Likelihood-Probit
19	02/28/2012	0.57	OK	Maximum Likelihood-Probit
20	03/09/2012	0.70	OK	Maximum Likelihood-Probit

**REFERENCE TOXICANT CONTROL CHART**

*Leptocheirus plumulosus* - 96-h LC50

(Arithmetic plot based on log calculations)



Reviewed by:





10-d MARINE AMPHIPOD SEDIMENT TOXICITY TEST – DAILY WATER QUALITY

Client CZPD Test Initiation Date (Day 0) 09-Mar-12  
 Batch No. HK020612 Test Termination Date (Day 10) 19-Mar-12  
 Sample ID F1 Test Species/Date Collected Leptocheirus plumulosus-05/Mar/12

Day	0	1	2	3	4	5	6	7	8	9	10
Sample ID	Salinity (ppt)										
M-01	20	20	20	20	20	20	20	20	20	20	20
Initial	2	2	2	2	2	2	2	2	2	2	2
Sample ID	pH										
M-01	8.0	8.1	8.3	8.3	8.2	8.2	8.3	8.3	8.3	8.3	8.4
Initial	2	2	2	2	2	2	2	2	2	2	2
Sample ID	Temperature (°C)										
M-01	24	24	25	25	25	25	25	25	25	25	25
Initial	2	2	2	2	2	2	2	2	2	2	2
Sample ID	Dissolved Oxygen (mg/L)										
M-01	87.5	7.5	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.4	7.5
Initial	2	2	2	2	2	2	2	2	2	2	2

WQ instrument pH HK895 temp. HK384  
 DO HK412 Salinity HK897

Comment \_\_\_\_\_

Test Set up By F Data verified by 20 Date Verified 20/11/12



**10-d MARINE AMPHIPOD SEDIMENT TOXICITY TEST – DAILY WATER QUALITY**

Client CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT Test Initiation Date (Day 0) 09-Mar-12  
 Batch No. HKD-0672 Test Termination Date (Day 10) 19-Mar-12  
 Sample ID 1-11 Test Species/Date Collected Leptocheirus plumulosus-05/Mar/12

Day	0	1	2	3	4	5	6	7	8	9	10
Sample ID	Salinity (ppt)										
M-10	20	20	20	20	20	20	20	20	20	20	20
M-11	20	20	20	20	20	20	20	20	20	20	20
M-12	20	20	20	20	20	20	20	20	20	20	20
M-13	20	20	20	20	20	20	20	20	20	20	20
M-14	20	20	20	20	20	20	20	20	20	20	20
M-15	20	20	20	20	20	20	20	20	20	20	20
M-16	20	20	20	20	20	20	20	20	20	20	20
M-17	20	20	20	20	20	20	20	20	20	20	20
Initial	20	20	20	20	20	20	20	20	20	20	20
Sample ID	pH										
M-10	8.0	8.2	8.2	8.3	8.4	8.4	8.3	8.2	8.3	8.2	8.3
M-11	8.0	8.2	8.1	8.2	8.2	8.3	8.3	8.3	8.2	8.2	8.3
M-12	8.1	8.1	8.3	8.4	8.3	8.4	8.3	8.3	8.3	8.2	8.3
M-13	8.0	8.2	8.3	8.3	8.2	8.3	8.4	8.3	8.3	8.3	8.0
M-14	7.9	8.0	8.0	8.0	8.2	8.3	8.3	8.2	8.3	8.5	8.1
M-15	8.0	8.2	8.2	8.2	8.2	8.4	8.3	8.3	8.2	8.2	8.3
M-16	8.1	8.1	8.1	8.1	8.1	8.2	8.3	8.3	8.3	8.3	8.4
M-17	8.0	8.2	8.2	8.3	8.2	8.3	8.3	8.2	8.4	8.4	8.2
Initial	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Sample ID	Temperature (°C)										
M-10	24	25	25	25	25	25	24	25	25	25	25
M-11	24	24	25	25	24	25	25	24	25	25	25
M-12	24	25	24	25	25	24	25	25	25	25	26
M-13	24	24	25	24	24	25	25	25	26	25	25
M-14	24	25	25	25	25	25	24	25	25	25	25
M-15	24	25	25	25	25	25	25	26	26	26	25
M-16	24	24	25	24	25	25	25	25	25	25	25
M-17	24	25	25	25	25	24	24	25	25	25	25
Initial	24	24	24	24	24	24	24	24	24	24	24
Sample ID	Dissolved Oxygen (mg/L)										
M-10	7.4	7.5	7.5	7.4	7.4	7.5	7.5	7.5	7.5	7.5	7.5
M-11	7.4	7.5	7.5	7.5	7.5	7.5	7.4	7.5	7.5	7.5	7.4
M-12	7.5	7.4	7.5	7.5	7.5	7.4	7.3	7.4	7.4	7.5	7.4
M-13	7.4	7.4	7.4	7.5	7.5	7.4	7.5	7.5	7.4	7.4	7.5
M-14	7.3	7.5	7.5	7.5	7.5	7.5	7.5	7.4	7.3	7.4	7.5
M-15	7.4	7.4	7.3	7.4	7.5	7.4	7.4	7.4	7.4	7.4	7.5
M-16	7.4	7.3	7.4	7.4	7.4	7.4	7.3	7.4	7.4	7.3	7.5
M-17	7.4	7.5	7.5	7.5	7.3	7.5	7.5	7.5	7.5	7.4	7.4
Initial	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4

WQ instrument pH HK895 temp. HK384  
 DO HK412 Salinity HK897

Comment \_\_\_\_\_

Test Set up By FW Data verified by 268 Date Verified 2/16/12

10-d MARINE AMPHIPOD SEDIMENT TOXICITY TEST – DAILY WATER QUALITY

Client CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT Test Initiation Date (Day 0) 09-Mar-12  
 Batch No. HK020612 Test Termination Date (Day 10) 19-Mar-12  
 Sample ID 1-11 Test Species/Date Collected Leptocheirus plumulosus-05/Mar/12

Day	0	1	2	3	4	5	6	7	8	9	10
Sample ID	Salinity (ppt)										
M-18	20	20	20	20	20	20	20	20	20	20	20
M-19	20	20	20	20	20	20	20	20	20	20	20
M-20	20	20	20	20	20	20	20	20	20	20	20
Initial	12	12	12	12	12	12	12	12	12	12	12
Sample ID	pH										
M-18	8.0	8.1	8.2	8.3	8.3	8.3	8.3	8.2	8.2	8.3	8.3
M-19	8.1	8.1	8.2	8.2	8.2	8.2	8.2	8.3	8.3	8.4	8.3
M-20	8.0	8.2	8.3	8.3	8.3	8.2	8.3	8.4	8.4	8.7	8.3
Initial	12	12	12	12	12	12	12	12	12	12	12
Sample ID	Temperature (°C)										
M-18	24	25	25	25	25	26	25	25	25	25	25
M-19	24	25	25	25	24	25	25	25	25	25	25
M-20	24	25	24	25	25	25	24	25	25	25	25
Initial	12	12	12	12	12	12	12	12	12	12	12
Sample ID	Dissolved Oxygen (mg/L)										
M-18	7.4	7.5	7.4	7.5	7.5	7.5	7.5	7.4	7.5	7.5	7.5
M-19	7.4	7.4	7.5	7.5	7.4	7.5	7.4	7.3	7.4	7.4	7.4
M-20	7.3	7.3	7.4	7.4	7.4	7.5	7.4	7.5	7.5	7.4	7.4
Initial	12	12	12	12	12	12	12	12	12	12	12

WQ instrument pH HK895 temp. HK384  
 DO HK412 Salinity HK897

Comment \_\_\_\_\_

Set up By fu Data verified by W8 Date Verified 2/14/12



**10-d AMPHIPOD SEDIMENT TOXICITY TEST  
EMERGENCE, SURVIVAL AND DAY 10 WATER QUALITY**

Client CEPD  
Batch No. HC (2007)

Test Initiation Date (Day 0) 09-Mar-12  
Test Termination Date (Day 10) 19-Mar-12  
Test Species Leptocheirus plumulosus  
Source/Collection Date Aquatic Biosystem-05/Mar/12

SAMPLE ID M-01

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										NUMBER ALIVE AT DAY 10	initial	NO. NOT REBURYSING AT DAY 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10				Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	0	0	0	0	0	0	0	0	0	18	7	0	24.5	8.3	20	7.3
B	0	0	0	0	0	0	0	0	0	0	18	7	1	24.5	8.3	20	7.3
C	0	0	0	0	0	0	0	0	0	0	19	12	0	24.6	8.0	20	7.4
D	0	0	0	0	0	0	0	0	0	0	19	8	0	24.8	8.2	20	7.6
E	0	0	0	0	0	0	0	0	0	0	19	12	1	24.7	8.3	20	7.5
Initial	2	2	2	2	2	2	2	2	2	2							

(# dead: # missing) - A (0:2) B (0:2) C (0:1) D (0:1) E (0:1)

SAMPLE ID

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										NUMBER ALIVE AT DAY 10	initial	NO. NOT REBURYSING AT DAY 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10				Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A																	
B																	
C																	
D																	
E																	
Initial																	

(# dead: # missing) - A ( : ) B ( : ) C ( : ) D ( : ) E ( : )

SAMPLE ID

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										NUMBER ALIVE AT DAY 10	initial	NO. NOT REBURYSING AT DAY 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10				Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A																	
B																	
C																	
D																	
E																	
Initial																	

(# dead: # missing) - A ( : ) B ( : ) C ( : ) D ( : ) E ( : )

SAMPLE ID

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										NUMBER ALIVE AT DAY 10	initial	NO. NOT REBURYSING AT DAY 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10				Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A																	
B																	
C																	
D																	
E																	
Initial																	

(# dead: # missing) - A ( : ) B ( : ) C ( : ) D ( : ) E ( : )

WQ Instruments Used:

Temp. HK384 Salinity HK897 pH HK895 DO HK412

Data Verified By 118

Date Verified 20/12/12





**10-d AMPHIPOD SEDIMENT TOXICITY TEST  
EMERGENCE, SURVIVAL AND DAY 10 WATER QUALITY**

Client CIVIL ENGINEERING AND DEVELOPMENT D  
Batch No. HK020612

Test Initiation Date (Day 0) 09-Mar-12  
Test Termination Date (Day 10) 19-Mar-12  
Test Species Leptocheirus plumulosus  
Source/Collection Date Aquatic Biosystem-05/Mar/12

SAMPLE ID M-14

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										NUMBER ALIVE AT DAY 10	initial	NO. NOT REBURYSING AT DAY 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10				Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	0	0	0	0	0	0	0	0	0	18	P	0	25	7.9	20	7.3
B	0	0	0	0	0	0	0	0	0	0	15	P	0	25	8.2	20	7.3
C	0	0	0	0	0	0	0	0	0	0	17	P	0	25	8.3	20	7.3
D	0	0	0	0	0	0	0	0	0	0	16	P	0	25	8.2	20	7.4
E	0	0	0	0	0	0	0	0	0	0	20	P	0	25	8.0	20	7.9
Initial	P	P	P	P	P	P	P	P	P	P				25	8.2	20	7.9

(# dead: # missing) - A (0:2) B (0:2) C (0:5) D (0:4) E (0:0)

SAMPLE ID M-15

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										NUMBER ALIVE AT DAY 10	initial	NO. NOT REBURYSING AT DAY 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10				Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	0	0	0	0	0	0	0	0	0	17	P	0	26	8.5	20	7.2
B	0	0	0	0	0	0	0	0	0	0	16	P	0	26	8.4	20	7.3
C	0	0	0	0	0	0	0	0	0	0	17	P	0	26	8.1	20	7.6
D	0	0	0	0	0	0	0	0	0	0	18	P	0	25	8.1	20	7.8
E	0	0	0	0	0	0	0	0	0	0	16	P	0	25	8.1	20	7.4
Initial	P	P	P	P	P	P	P	P	P	P				26	8.2	20	7.2

(# dead: # missing) - A (0:3) B (0:4) C (0:3) D (0:4) E (0:4)

SAMPLE ID M-16

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										NUMBER ALIVE AT DAY 10	initial	NO. NOT REBURYSING AT DAY 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10				Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	0	0	0	0	0	0	0	0	0	17	P	0	25	8.5	20	7.3
B	0	0	0	0	0	0	0	0	0	0	17	P	0	26	8.2	20	7.2
C	0	0	0	0	0	0	0	0	0	0	16	P	0	25	8.3	20	7.4
D	0	0	0	0	0	0	0	0	0	0	15	P	0	25	8.0	20	7.4
E	0	0	0	0	0	0	0	0	0	0	16	P	0	25	8.1	20	7.5
Initial	P	P	P	P	P	P	P	P	P	P				25	8.2	20	7.2

(# dead: # missing) - A (0:3) B (0:3) C (0:4) D (0:5) E (0:4)

SAMPLE ID M-17

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										NUMBER ALIVE AT DAY 10	initial	NO. NOT REBURYSING AT DAY 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10				Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	0	0	0	0	0	0	0	0	0	14	P	0	26	8.4	20	7.5
B	0	0	0	0	0	0	0	0	0	0	13	P	0	25	8.1	20	7.6
C	0	0	0	0	0	0	0	0	0	0	14	P	0	25	8.1	20	7.2
D	0	0	0	0	0	0	0	0	0	0	14	P	0	25	8.0	20	7.2
E	0	0	0	0	0	0	0	0	0	0	15	P	0	26	8.2	20	7.3
Initial	P	P	P	P	P	P	P	P	P	P				26	8.2	20	7.3

(# dead: # missing) - A (0:6) B (0:7) C (0:4) D (0:6) E (0:5)

WQ Instruments Used: Temp. HK384 Salinity HK897 pH HK895 DO HK412

Data Verified By [Signature] Date Verified 2/14/12

**10-d AMPHIPOD SEDIMENT TOXICITY TEST  
EMERGENCE, SURVIVAL AND DAY 10 WATER QUALITY**

Client CIVIL ENGINEERING AND DEVELOPMENT D  
Batch No. HK020753

Test Initiation Date (Day 0) 09-Mar-12  
Test Termination Date (Day 10) 19-Mar-12  
Test Species Leptocheirus plumulosus  
Source/Collection Date Aquatic Biosystem-05/Mar/12

SAMPLE ID M-18

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										NUMBER ALIVE AT DAY 10	initial	NO. NOT REBURYING AT DAY 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10				Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	0	0	0	0	0	0	0	0	0	6/12	2	0	26	8.1	20	7.6
B	0	0	0	0	0	0	0	0	0	0	10	2	0	26	8.1	20	7.3
C	0	0	0	0	0	0	0	0	0	0	14	2	0	25	8.0	20	7.2
D	0	0	0	0	0	0	0	0	0	0	12	2	0	25	8.0	20	7.3
E	0	0	0	0	0	0	0	0	0	0	14	2	0	26	8.1	20	7.6
Initial	2	2	2	2	2	2	2	2	2	2				2	2	2	2

(# dead: # missing) - A (0:8) B (0:10) C (2:4) D (2:6) E (0:6)

SAMPLE ID M-19

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										NUMBER ALIVE AT DAY 10	initial	NO. NOT REBURYING AT DAY 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10				Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	0	0	0	0	0	0	0	0	0	15	2	0	25	8.1	20	7.4
B	0	0	0	0	0	0	0	0	0	0	14	2	0	25	8.0	20	7.6
C	0	0	0	0	0	0	0	0	0	0	2/15	2	0	25	8.3	20	7.3
D	0	0	0	0	0	0	0	0	0	0	14	2	0	26	8.2	20	7.2
E	0	0	0	0	0	0	0	0	0	0	15	2	0	25	8.0	20	7.2
Initial	2	2	2	2	2	2	2	2	2	2				2	2	2	2

(# dead: # missing) - A (0:5) B (0:6) C (0:5) D (0:6) E (0:5)

SAMPLE ID M-20

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										NUMBER ALIVE AT DAY 10	initial	NO. NOT REBURYING AT DAY 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10				Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A	0	0	0	0	0	0	0	0	0	0	6/6	2	0	25	8.1	20	7.5
B	0	0	0	0	0	0	0	0	0	0	6/6	2	0	20	8.1	20	7.5
C	0	0	0	0	0	0	0	0	0	0	15	2	0	25	8.0	20	7.8
D	0	0	0	0	0	0	0	0	0	0	16	2	0	25	8.0	20	7.8
E	0	0	0	0	0	0	0	0	0	0	16	2	0	25	8.3	20	7.7
Initial	2	2	2	2	2	2	2	2	2	2				2	2	2	2

(# dead: # missing) - A (0:4) B (0:4) C (0:5) D (0:4) E (0:6)

SAMPLE ID \_\_\_\_\_

Rep.	Number of Amphipods Emerged From Sediment at Days 1-10										NUMBER ALIVE AT DAY 10	initial	NO. NOT REBURYING AT DAY 10	Water Chemistry at Day 10			
	1	2	3	4	5	6	7	8	9	10				Temp. (°C)	pH	Sal. (ppt)	DO (mg/L)
A																	
B																	
C																	
D																	
E																	
Initial																	

(# dead: # missing) - A ( : ) B ( : ) C ( : ) D ( : ) E ( : )

WQ Instruments Used:

Temp. HK384 Salinity HK897 pH HK895 DO HK412

Data Verified By AK

Date Verified 2/11/12



APPENDIX C

Complete Data for the 20-day Polychaete Growth and Survival Test  
– *Neanthes arenaceodentata*

CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Batch No.: HK1206252

Initiation Date: 09-Mar-12

Termination Date: 29-Mar-12

Summary Results for the 20-d Polychaete Growth and Survival Test - *Neanthes arenaceodentata*

ID	Rep	Group	Cinet ID	Duration (Days)	Initial no.	Final no.	No. weighed	Initial weight (mg)	pan weight (mg)	pan + worm weight (mg)	Survival (%)			Total Dry Weight (mg)			Ind. Dry Weight (mg)			Ind. Growth Rate (mg/d)		
											S (%)	SI Mean	SSD	TDW	TDW Mean	TDW SD	IDW	IDW Mean	IDW SD	IGR	IGR Mean	IGR SD
-	1	Control		20	5	5	5	0.69	1151.41	1240.86	100.0	100.0	0.0	89.45	91.5	16.8	17.9	18.3	3.8	0.86	0.86	0.19
-	2	Control		20	5	5	5	0.69	1153.95	1260.74	100.0	100.0	0.0	106.79	106.79	16.8	21.4	21.4	3.8	1.03	1.03	0.19
-	3	Control		20	5	5	5	0.69	1159.54	1247.87	100.0	100.0	0.0	88.33	88.33	16.8	17.7	17.7	3.8	0.85	0.85	0.19
-	4	Control		20	5	5	5	0.69	1155.45	1265.70	100.0	100.0	0.0	110.25	110.25	16.8	22.1	22.1	3.8	1.07	1.07	0.19
-	5	Control		20	5	5	5	0.69	1162.00	1225.06	100.0	100.0	0.0	63.06	63.06	16.8	12.6	12.6	3.8	0.60	0.60	0.19
1	1	HK1206252001	REFERENCE SEDIMENT	20	5	5	5	0.69	1162.72	1242.72	100.0	100.0	0.0	80.15	94.6	15.0	16.0	18.9	3.0	0.77	0.91	0.15
2	2	HK1206252001	REFERENCE SEDIMENT	20	5	5	5	0.69	1157.33	1239.92	100.0	100.0	0.0	82.59	82.59	15.0	16.5	16.5	3.0	0.79	0.79	0.15
3	3	HK1206252001	REFERENCE SEDIMENT	20	5	5	5	0.69	1149.93	1261.83	100.0	100.0	0.0	111.90	111.90	15.0	22.4	22.4	3.0	1.08	1.08	0.15
4	4	HK1206252001	REFERENCE SEDIMENT	20	5	5	5	0.69	1155.50	1264.93	100.0	100.0	0.0	109.33	109.33	15.0	21.9	21.9	3.0	1.06	1.06	0.15
5	5	HK1206252001	REFERENCE SEDIMENT	20	5	5	5	0.69	1157.10	1246.31	100.0	100.0	0.0	89.21	89.21	15.0	17.8	17.8	3.0	0.86	0.86	0.15
6	1	HK1206252002	VRS 0.9-1.9M, VRS 1.9-2.9M, VRS GRAB	20	5	5	5	0.69	1153.54	1209.32	100.0	100.0	0.0	55.78	68.0	17.0	11.2	13.6	3.4	0.62	0.65	0.17
7	2	HK1206252002	VRS 0.9-1.9M, VRS 1.9-2.9M, VRS GRAB	20	5	5	5	0.69	1169.94	1265.59	100.0	100.0	0.0	55.65	55.65	17.0	11.1	11.1	3.4	0.52	0.52	0.17
8	3	HK1206252002	VRS 0.9-1.9M, VRS 1.9-2.9M, VRS GRAB	20	5	5	5	0.69	1165.66	1262.62	100.0	100.0	0.0	96.96	96.96	17.0	19.4	19.4	3.4	0.94	0.94	0.17
9	4	HK1206252002	VRS 0.9-1.9M, VRS 1.9-2.9M, VRS GRAB	20	5	5	5	0.69	1158.44	1224.82	100.0	100.0	0.0	66.38	66.38	17.0	13.3	13.3	3.4	0.63	0.63	0.17
10	5	HK1206252002	VRS 0.9-1.9M, VRS 1.9-2.9M, VRS GRAB	20	5	5	5	0.69	1147.86	1213.10	100.0	100.0	0.0	65.24	65.24	17.0	13.0	13.0	3.4	0.62	0.62	0.17
11	1	HK1206252003	VRS 2.9-3.9M	20	5	0	0	0.69	1159.46	1153.46	0.0	0.0	0.0	0.00	0.00	0.0	0.0	0.0	0.0	-0.03	-0.03	0.00
12	2	HK1206252003	VRS 2.9-3.9M	20	5	0	0	0.69	1156.94	1156.94	0.0	0.0	0.0	0.00	0.00	0.0	0.0	0.0	0.0	-0.03	-0.03	0.00
13	3	HK1206252003	VRS 2.9-3.9M	20	5	0	0	0.69	1141.82	1141.82	0.0	0.0	0.0	0.00	0.00	0.0	0.0	0.0	0.0	-0.03	-0.03	0.00
14	4	HK1206252003	VRS 2.9-3.9M	20	5	0	0	0.69	1152.25	1152.25	0.0	0.0	0.0	0.00	0.00	0.0	0.0	0.0	0.0	-0.03	-0.03	0.00
15	5	HK1206252003	VRS 2.9-3.9M	20	5	0	0	0.69	1154.52	1154.52	0.0	0.0	0.0	0.00	0.00	0.0	0.0	0.0	0.0	-0.03	-0.03	0.00
16	1	HK1206252004	VRS 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	20	5	5	5	0.69	1154.05	1217.24	100.0	100.0	0.0	69.19	62.7	18.5	12.6	12.5	3.7	0.60	0.59	0.18
17	2	HK1206252004	VRS 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	20	5	5	5	0.69	1154.30	1198.73	100.0	100.0	0.0	44.43	44.43	18.5	8.9	8.9	3.7	0.41	0.41	0.18
18	3	HK1206252004	VRS 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	20	5	5	5	0.69	1162.09	1222.23	100.0	100.0	0.0	60.14	60.14	18.5	12.0	12.0	3.7	0.57	0.57	0.18
19	4	HK1206252004	VRS 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	20	5	5	5	0.69	1160.86	1213.70	100.0	100.0	0.0	52.84	52.84	18.5	10.6	10.6	3.7	0.49	0.49	0.18
20	5	HK1206252004	VRS 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	20	5	5	5	0.69	1154.85	1247.96	100.0	100.0	0.0	93.11	93.11	18.5	20.3	20.3	3.7	0.90	0.90	0.18
21	1	HK1206252005	VRS 3 GRAB, 0.9-1.9M	20	5	5	5	0.69	1155.23	1256.92	100.0	96.0	8.9	101.69	87.7	25.4	20.3	18.0	4.2	0.98	0.87	0.21
22	2	HK1206252005	VRS 3 GRAB, 0.9-1.9M	20	5	4	4	0.69	1158.00	1204.08	80.0	80.0	0.0	48.08	48.08	25.4	11.5	11.5	4.2	0.54	0.54	0.21
23	3	HK1206252005	VRS 3 GRAB, 0.9-1.9M	20	5	5	5	0.69	1154.15	1237.13	100.0	100.0	0.0	82.98	82.98	25.4	16.6	16.6	4.2	0.80	0.80	0.21
24	4	HK1206252005	VRS 3 GRAB, 0.9-1.9M	20	5	5	5	0.69	1160.18	1256.66	100.0	100.0	0.0	96.48	96.48	25.4	19.3	19.3	4.2	0.93	0.93	0.21
25	5	HK1206252005	VRS 3 GRAB, 0.9-1.9M	20	5	5	5	0.69	1138.50	1249.65	100.0	100.0	0.0	111.35	111.35	25.4	22.3	22.3	4.2	1.08	1.08	0.21
26	1	HK1206252006	VRS 1.9-2.9M	20	5	2	2	0.69	1155.91	1166.36	40.0	56.0	16.7	10.45	11.1	7.1	5.2	3.8	1.8	0.23	0.16	0.09
27	2	HK1206252006	VRS 1.9-2.9M	20	5	3	3	0.69	1152.28	1156.50	60.0	60.0	0.0	4.22	4.22	7.1	1.4	1.4	1.8	0.04	0.04	0.09
28	3	HK1206252006	VRS 1.9-2.9M	20	5	4	4	0.69	1158.36	1180.15	80.0	80.0	0.0	21.79	21.79	7.1	5.4	5.4	1.8	0.24	0.24	0.09
29	4	HK1206252006	VRS 1.9-2.9M	20	5	3	3	0.69	1169.64	1183.31	60.0	60.0	0.0	13.67	13.67	7.1	4.6	4.6	1.8	0.19	0.19	0.09
30	5	HK1206252006	VRS 1.9-2.9M	20	5	2	2	0.69	1173.07	1178.25	40.0	40.0	0.0	5.18	5.18	7.1	2.6	2.6	1.8	0.09	0.09	0.09
31	1	HK1206252007	VRI GRAB, VR2 GRAB, GB2	20	5	4	4	0.69	1167.63	1274.00	80.0	96.0	8.9	106.37	101.6	23.0	26.6	21.4	5.4	1.30	1.03	0.27
32	2	HK1206252007	VRI GRAB, VR2 GRAB, GB2	20	5	5	5	0.69	1171.42	1287.31	100.0	100.0	0.0	115.89	115.89	23.0	23.2	23.2	5.4	1.12	1.12	0.27
33	3	HK1206252007	VRI GRAB, VR2 GRAB, GB2	20	5	5	5	0.69	1173.82	1237.69	100.0	100.0	0.0	63.87	63.87	23.0	12.8	12.8	5.4	0.60	0.60	0.27
34	4	HK1206252007	VRI GRAB, VR2 GRAB, GB2	20	5	5	5	0.69	1151.68	1250.70	100.0	100.0	0.0	99.02	99.02	23.0	19.8	19.8	5.4	0.96	0.96	0.27
35	5	HK1206252007	VRI GRAB, VR2 GRAB, GB2	20	5	5	5	0.69	1154.84	1277.73	100.0	100.0	0.0	122.89	122.89	23.0	24.6	24.6	5.4	1.19	1.19	0.27
36	1	HK1206252008	GB1	20	5	5	5	0.69	1151.64	1236.06	100.0	100.0	0.0	84.42	93.0	18.2	16.9	18.6	3.6	0.81	0.90	0.18
37	2	HK1206252008	GB1	20	5	5	5	0.69	1153.70	1234.45	100.0	100.0	0.0	80.75	80.75	18.2	16.2	16.2	3.6	0.77	0.77	0.18
38	3	HK1206252008	GB1	20	5	5	5	0.69	1151.87	1246.10	100.0	100.0	0.0	94.23	94.23	18.2	18.8	18.8	3.6	0.91	0.91	0.18
39	4	HK1206252008	GB1	20	5	5	5	0.69	1154.63	1236.26	100.0	100.0	0.0	81.63	81.63	18.2	16.3	16.3	3.6	0.78	0.78	0.18
40	5	HK1206252008	GB1	20	5	5	5	0.69	1151.23	1275.35	100.0	100.0	0.0	124.12	124.12	18.2	24.8	24.8	3.6	1.21	1.21	0.18
41	1	HK1206252009	GB11, GB3, GB4, GB5	20	5	5	5	0.69	1171.72	1254.25	100.0	100.0	0.0	82.53	96.9	16.1	16.5	19.4	3.2	0.79	0.93	0.16
42	2	HK1206252009	GB11, GB3, GB4, GB5	20	5	5	5	0.69	1171.31	1264.16	100.0	100.0	0.0	92.85	92.85	16.1	18.6	18.6	3.2	0.89	0.89	0.16
43	3	HK1206252009	GB11, GB3, GB4, GB5	20	5	5	5	0.69	1162.54	1248.96	100.0	100.0	0.0	86.42	86.42	16.1	17.3	17.3	3.2	0.83	0.83	0.16
44	4	HK1206252009	GB11, GB3, GB4, GB5	20	5	5	5	0.69	1157.58	1256.79	100.0	100.0	0.0	99.21	99.21	16.1	19.8	19.8				





Test ID: HK1206252b  
 Species: NA  
 Protocol: PSEP 1995  
 Sample ID: VA  
 Sample Type: MS  
 Start Date: 9/03/2012  
 End Date: 29/03/2012  
 Lab ID: ALS

Pos ID	Rep	Group	T. Duration (Days)	Initial no.	Final no.	No. weighed	Initial weight	pan weight (mg)	pan + worm weight (mg)
1	1	REFERENCE	20	5	5	5	0.69	1162.57	1242.72
2	2	REFERENCE	20	5	5	5	0.69	1157.33	1239.92
3	3	REFERENCE	20	5	5	5	0.69	1149.93	1261.83
4	4	REFERENCE	20	5	5	5	0.69	1155.5	1264.83
5	5	REFERENCE	20	5	5	5	0.69	1157.1	1246.31
6	1	1206252-02	20	5	5	5	0.69	1153.54	1209.32
7	2	1206252-02	20	5	5	5	0.69	1169.94	1225.59
8	3	1206252-02	20	5	5	5	0.69	1165.66	1262.62
9	4	1206252-02	20	5	5	5	0.69	1158.44	1224.82
10	5	1206252-02	20	5	5	5	0.69	1147.86	1213.1
11	1	1206252-03	20	5	0	0	0.69	1153.46	1153.46
12	2	1206252-03	20	5	0	0	0.69	1156.94	1156.94
13	3	1206252-03	20	5	0	0	0.69	1141.82	1141.82
14	4	1206252-03	20	5	0	0	0.69	1152.25	1152.25
15	5	1206252-03	20	5	0	0	0.69	1154.52	1154.52
16	1	1206252-04	20	5	5	5	0.69	1154.05	1217.24
17	2	1206252-04	20	5	5	5	0.69	1154.3	1198.73
18	3	1206252-04	20	5	5	5	0.69	1162.09	1222.23
19	4	1206252-04	20	5	5	5	0.69	1160.86	1213.7
20	5	1206252-04	20	5	5	5	0.69	1154.85	1247.96
21	1	1206252-05	20	5	5	5	0.69	1155.23	1256.92
22	2	1206252-05	20	5	4	4	0.69	1158	1204.08
23	3	1206252-05	20	5	5	5	0.69	1154.15	1237.13
24	4	1206252-05	20	5	5	5	0.69	1160.18	1256.66
25	5	1206252-05	20	5	5	5	0.69	1138.5	1249.85
26	1	1206252-06	20	5	2	2	0.69	1155.91	1166.36
27	2	1206252-06	20	5	3	3	0.69	1152.28	1156.5
28	3	1206252-06	20	5	4	4	0.69	1158.36	1180.15
29	4	1206252-06	20	5	3	3	0.69	1169.64	1183.31
30	5	1206252-06	20	5	2	2	0.69	1173.07	1178.25
31	1	1206252-07	20	5	4	4	0.69	1167.63	1274
32	2	1206252-07	20	5	5	5	0.69	1171.42	1287.31
33	3	1206252-07	20	5	5	5	0.69	1173.82	1237.69
34	4	1206252-07	20	5	5	5	0.69	1151.68	1250.7
35	5	1206252-07	20	5	5	5	0.69	1154.84	1277.73
36	1	1206252-08	20	5	5	5	0.69	1151.64	1236.06
37	2	1206252-08	20	5	5	5	0.69	1153.7	1234.45
38	3	1206252-08	20	5	5	5	0.69	1151.87	1246.1
39	4	1206252-08	20	5	5	5	0.69	1154.63	1236.26

ToxCalc 5.0

Reviewed by: *[Signature]*



Test ID: HK1206252b									
Species: NA									
Protocol: PSEP 1995									
Sample ID: VA									
Sample Type: MS									
Lab ID: ALS									
Start Date: 9/03/2012									
End Date: 29/03/2012									
Pos ID	Rep	Group	T. Duration (Days)	Initial no.	Final no.	No. weighed	Initial weight	pan weight (mg)	pan + worm weight (mg)
40	5	1206252-08	20	5	5	5	0.69	1151.23	1275.35
41	1	1206252-09	20	5	5	5	0.69	1171.72	1254.25
42	2	1206252-09	20	5	5	5	0.69	1171.31	1264.16
43	3	1206252-09	20	5	5	5	0.69	1162.54	1248.96
44	4	1206252-09	20	5	5	5	0.69	1157.58	1256.79
45	5	1206252-09	20	5	5	5	0.69	1152.18	1275.49
46	1	1206252-10	20	5	5	5	0.69	1164.23	1245.56
47	2	1206252-10	20	5	5	5	0.69	1163.28	1270.03
48	3	1206252-10	20	5	5	5	0.69	1149.08	1217.7
49	4	1206252-10	20	5	5	5	0.69	1173.37	1271.89
50	5	1206252-10	20	5	5	5	0.69	1169.4	1256.82
51	1	1206252-11	20	5	5	5	0.69	1177	1347.41
52	2	1206252-11	20	5	5	5	0.69	1175.42	1277.97
53	3	1206252-11	20	5	5	5	0.69	1178.36	1250.49
54	4	1206252-11	20	5	5	5	0.69	1171.36	1276.35
55	5	1206252-11	20	5	5	5	0.69	1168.24	1240.39

Comments:

**-Total Dry Weight (mg)**

Start Date: 9/03/2012	Test ID: HK1206252b	Sample ID: VA
End Date: 29/03/2012	Lab ID: ALS	Sample Type: MS
Sample Date:	Protocol: PSEP 1995	Test Species: NA

Comments:

Conc-	1	2	3	4	5
REFERENCE	80.15	82.59	111.90	109.33	89.21
1206252-02	55.78	55.65	96.96	66.38	65.24
1206252-03	0.00	0.00	0.00	0.00	0.00
1206252-04	63.19	44.43	60.14	52.84	93.11
1206252-05	101.69	46.08	82.98	96.48	111.35
1206252-06	10.45	4.22	21.79	13.67	5.18
1206252-07	106.37	115.89	63.87	99.02	122.89
1206252-08	84.42	80.75	94.23	81.63	124.12
1206252-09	82.53	92.85	86.42	99.21	123.31
1206252-10	81.33	106.75	68.62	98.52	87.42
1206252-11	170.41	102.55	72.13	104.99	72.15

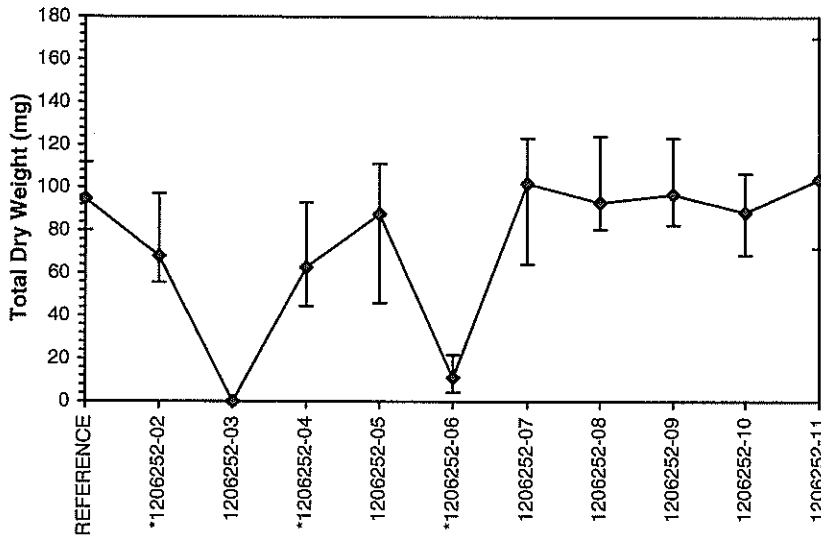
Conc-	Transform: Untransformed							Rank Sum	1-Tailed Critical
	Mean	N-Mean	Mean	Min	Max	CV%	N		
REFERENCE	94.64	1.0000	94.636	80.150	111.900	15.836	5		
*1206252-02	68.00	0.7186	68.002	55.650	96.960	24.943	5	18.00	19.00
1206252-03	0.00	0.0000	0.000	0.000	0.000	0.000	5		
*1206252-04	62.74	0.6630	62.742	44.430	93.110	29.416	5	18.00	19.00
1206252-05	87.72	0.9269	87.716	46.080	111.350	28.991	5	27.00	19.00
*1206252-06	11.06	0.1169	11.062	4.220	21.790	64.507	5	15.00	19.00
1206252-07	101.61	1.0737	101.608	63.870	122.890	22.606	5	31.00	19.00
1206252-08	93.03	0.9830	93.030	80.750	124.120	19.549	5	27.00	19.00
1206252-09	96.86	1.0235	96.864	82.530	123.310	16.611	5	29.00	19.00
1206252-10	88.53	0.9355	88.528	68.620	106.750	16.766	5	24.00	19.00
1206252-11	104.45	1.1037	104.446	72.130	170.410	38.424	5	26.00	19.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.95941	0.947	0.62695	2.02263
Equality of variance cannot be confirmed				

**Hypothesis Test (1-tail, 0.05)**

Wilcoxon Two-Sample Test indicates significant differences  
Treatments vs REFERENCE

**Dose-Response Plot**





Test ID: RTNACD088 Species: NA Protocol: PSEP 1995 Sample ID: REF Sample Type: CDCL Start Date: 9/03/2012 End Date: 13/03/2012 Lab ID: ALS											
Pos ID	Rep	Group	T. Duration (Days)	Initial no.	Final no.	No. weighed	Initial weight	pan weight	pan weight (mg)	pan + worm weight	(mg)
1	1	D-Control	4	10	10	10					
2	2	D-Control	4	10	10	10					
3	1	2.4	4	10	10	10					
4	2	2.4	4	10	10	10					
5	1	6.9	4	10	10	7					
6	2	6.9	4	10	10	10					
7	1	9.8	4	10	10	1					
8	2	9.8	4	10	10	0					
9	1	14	4	10	10	0					
10	2	14	4	10	10	0					
11	1	20	4	10	10	0					
12	2	20	4	10	10	0					

Comments:

**-Survival**

Start Date: 9/03/2012	Test ID: RTNACD088	Sample ID: REF
End Date: 13/03/2012	Lab ID: ALS	Sample Type: CDCL
Sample Date:	Protocol: PSEP 1995	Test Species: NA

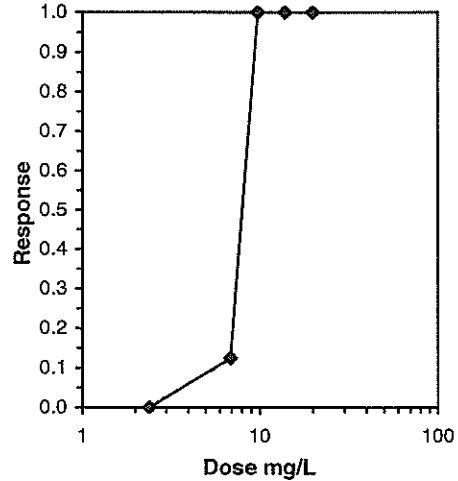
Comments:

Conc-mg/L	1	2
D-Control	1.0000	1.0000
2.4	1.0000	1.0000
6.9	0.7000	1.0000
9.8	0.1000	0.0000
14	0.0000	0.0000
20	0.0000	0.0000

Conc-mg/L	Mean	N-Mean	Transform: Untransformed					N	Number Resp	Total Number
			Mean	Min	Max	CV%				
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	2	0	8	
2.4	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	2	0	8	
6.9	0.8500	0.8500	0.8500	0.7000	1.0000	24.957	2	1	8	
9.8	0.0500	0.0500	0.0500	0.0000	0.1000	141.421	2	8	8	
14	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	2	8	8	
20	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	2	8	8	

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed				
Equality of variance cannot be confirmed				

Trim Level	Trimmed Spearman-Kärber		
	EC50	95% CL	
0.0%	7.5309	6.3886	8.8776
5.0%	7.8205	6.3735	9.5958
10.0%	7.9944	5.9003	10.8319
20.0%	8.0196	7.6012	8.4611
Auto-0.0%	7.5309	6.3886	8.8776





**REFERENCE TOXICANT CONTROL CHART**  
*Neanthes arenaceodentata* - 96-h Survival LC50 Values (mg Cd / L)

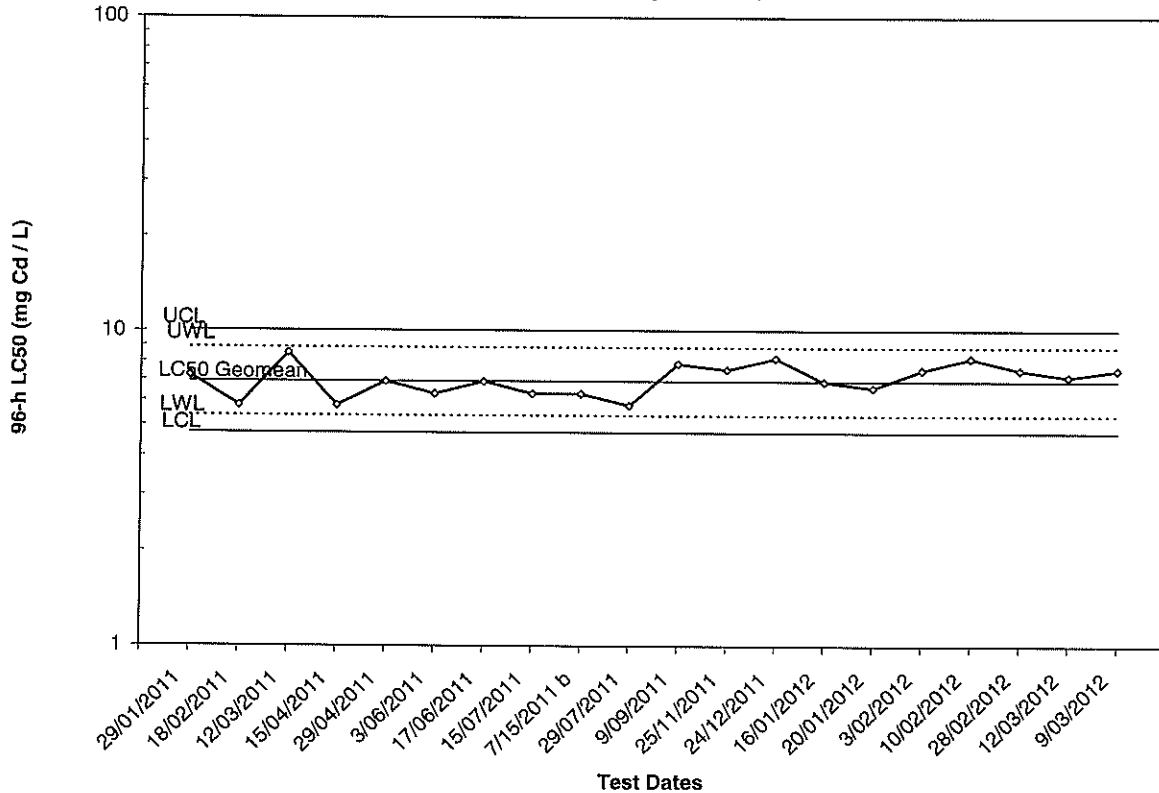
	Log	Antilog
Mean	0.84	6.91
SD	0.05	1.13
2 x SD	0.11	1.29
UCL	1.00	10.08
UWL	0.95	8.89
LWL	0.73	5.37
LCL	0.68	4.74
CV(%)	6.51	

WARNING / CONTROL LIMIT CALCULATIONS	
Mean: Mean is calculated for the last 20 logarithms of EC50, convert to antilogarithm to give Geomean	
SD: Standard deviation is calculated for the last 20 logarithms of EC50	
UCL: Upper Control Limit = Mean + 3 x SD, illustrated as antilogarithms in Control Chart	
UWL: Upper Warning Limit = Mean + 2 x SD, illustrated as antilogarithms in Control Chart	
LWL: Lower Warning Limit = Mean - 2 x SD, illustrated as antilogarithms in Control Chart	
LCL: Lower Control Limit = Mean - 3 x SD, illustrated as antilogarithms in Control Chart	

Point No.	LC50	log LC50
0	5.78	0.76
1	7.21	0.86
2	5.78	0.76
3	8.54	0.93
4	5.78	0.76
5	6.90	0.84
6	6.32	0.80
7	6.90	0.84
8	6.32	0.80
9	6.32	0.80
10	5.78	0.76
11	7.88	0.90
12	7.54	0.88
13	8.22	0.92
14	6.90	0.84
15	6.60	0.82
16	7.53	0.88
17	8.22	0.91
18	7.53	0.88
19	7.17	0.86

CONTROL CHART - DATA PLOT				
Point No.	Test Date	96-h LC50	Acceptable Result?	Calculation Method
0	07/01/2011	5.78	-----	Trimmed Spearman Karber
1	29/01/2011	7.21	OK	Trimmed Spearman Karber
2	18/02/2011	5.78	OK	Trimmed Spearman Karber
3	12/03/2011	8.54	OK	Trimmed Spearman Karber
4	15/04/2011	5.78	OK	Trimmed Spearman Karber
5	29/04/2011	6.90	OK	Trimmed Spearman Karber
6	03/06/2011	6.32	OK	Trimmed Spearman Karber
7	17/06/2011	6.90	OK	Trimmed Spearman Karber
8	15/07/2011	6.32	OK	Trimmed Spearman Karber
9	7/15/2011 b	6.32	OK	Trimmed Spearman Karber
10	29/07/2011	5.78	OK	Trimmed Spearman Karber
11	09/09/2011	7.88	OK	Trimmed Spearman Karber
12	25/11/2011	7.54	OK	Trimmed Spearman Karber
13	24/12/2011	8.22	OK	Trimmed Spearman Karber
14	16/01/2012	6.90	OK	Trimmed Spearman Karber
15	20/01/2012	6.60	OK	Trimmed Spearman Karber
16	03/02/2012	7.53	OK	Trimmed Spearman Karber
17	10/02/2012	8.22	OK	Maximum Likelihood-Probit
18	28/02/2012	7.53	OK	Trimmed Spearman Karber
19	12/03/2012	7.17	OK	Maximum Likelihood-Probit
20	09/03/2012	7.53	OK	Trimmed Spearman Karber

**REFERENCE TOXICANT CONTROL CHART**  
*Neanthes arenaceodentata* - 96-h Survival LC50 Values (mg Cd / L)  
 (Arithmetic plot based on log calculations)



Reviewed by:     JAB













**20-d *Neanthes* SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING**

CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Client

Batch No. FLC 206212

Sample ID K1

Test Species

*Neanthes arenaceodentata*

Source/Date Received

Aquatic Toxicology Support-09444412-5Ma

Test Initiation Date (Day 0)

16-Jan-12 9-Mar-12

Test Termination Date (Day 20)

~~05-Feb-12~~ 29-Mar-12

Sample ID	Temperature (°C)																				
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
M-10	21.4	19.5	19.6	19.2	19	20	20	20	20	20	20	20	20	20	20	20	20	20	20	21	20
M-11	21	19.6	19.7	19.2	20	20	19	20	20	20	17	20	20	20	20	19	20	20	21	20	20
M-12	21	19.4	19.7	19.2	20	19	20	19	20	20	20	19	20	20	20	20	20	20	21	20	20
M-13	21.3	19.5	19.6	18.5	20	20	20	19	20	20	20	20	20	20	21	20	20	20	21	21	20
M-14	20.5	19.2	19.4	19.1	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
M-15	21.4	19.4	19.5	19.3	20	19	20	20	20	19	20	19	20	20	20	20	20	20	20	20	20
M-16	21	19.6	19.4	19.3	20	20	20	20	20	20	20	20	19	20	20	20	20	20	20	21	20
M-17	20	19.6	19.4	19	20	20	20	20	20	20	20	20	20	20	19	20	20	20	20	21	20
M-18	20.4	19.8	19.6	19.3	17	19	20	19	20	20	20	19	20	20	20	20	19	20	20	21	20
M-19	20.6	19.4	19.5	19	20	20	19	20	20	20	19	20	20	20	20	20	20	20	20	20	20
M-20	21.2	19.3	19.2	19.2	20	20	20	20	20	20	19	20	19	20	21	20	20	20	20	20	20
Technician Initials																					

WQ Instruments Used:

Temp. HK384

Comments

Test Set Up By J

Data Verified By KAB

Date Verified 20/4/12









**POLYCHAETE SEDIMENT TOXICITY TESTS - SURVIVAL, DRY WEIGHT AND FINAL WATER QUALITY DATA**

*Ensure that another technician carries out one of the tear down replicates*

Client CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Test Species/Test Type: Neanthes arenaceodentata / Static; Renewal

Batch No. HK/2062A

16-Jan-2012 12/1 9 - 11 Oct - 1

Sample ID H1

05-Feb-2012 12 - 11 Oct - 12

Sample ID	Rep.	Pan No.	Pan Weight (g)	Final Weight (g)	No. Alive	No. Dead	Total Recovered	No. Missing	Init.	Temp. (°C)	pH	Salinity (ppt)	DO (mg/L)
M-13	A	61M	1.15405	1.21724	5	0	5	0	✓	21	8.1	28	6.5
	B	62M	1.15470	1.19873	5	0	5	0	✓	21	8.1	28	6.6
	C	63M	1.16209	1.22223	5	0	5	0	✓	21	8.1	28	6.7
	D	64M	1.16086	1.21870	5	0	5	0	✓	20	8.1	28	6.8
	E	65M	1.15485	1.24796	5	0	5	0	✓	21	8.1	28	6.6
M-14	A	66M	1.15523	1.25692	5	0	5	0	✓	20	8.1	28	6.6
	B	67M	1.15800	1.20408	4	0	4	1	✓	21	8.1	28	6.8
	C	68M	1.15415	1.23713	5	0	5	0	✓	21	8.1	28	6.8
	D	69M	1.16018	1.25666	5	0	5	0	✓	21	8.1	28	6.8
M-15	E	70M	1.13850	1.24985	5	0	5	0	✓	20	8.2	28	6.9
	A	71M	1.15591	1.16636	2	0	2	3	✓	21	7.9	28	6.4
	B	72M	1.15228	1.15650	3	0	3	2	✓	21	8.1	28	6.5
	C	73M	1.15836	1.18015	4	0	4	1	✓	21	8.1	28	6.5
	D	74M	1.16964	1.18331	3	0	3	2	✓	20	8.0	28	6.8
E	75M	1.16957	1.17825	2	0	2	3	✓	20	8.1	28	6.7	
										1.17307	12	28	6.7
										Initials			

WQ Instruments Us Temp. HK384 pH HK895 Sal. HK897 DO HK412 Balance HK565

Data Verified By SAB Date Verified 20/1/12

Main technician performing tear down F Second technician performing replicate tear down 12

**POLYCHAETE SEDIMENT TOXICITY TESTS - SURVIVAL, DRY WEIGHT AND FINAL WATER QUALITY DATA**

*Ensure that another technician carries out one of the tear down replicates*

Client: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Test Species/Test Type:

*Neanthes arenaceodentata / Static; Renewal*

Batch No. HK206202

Test Initiation Date (Day 0):

16-Jan-2012 ✓ 9-Mar-12

Sample ID 1-1

Test Termination Date (Day 20):

05-Feb-2012 29-Mar-12

Sample ID	Rep.	Pan No.	Pan Weight (g)	Final Weight (g)	No. Alive	No. Dead	Total Recovered	No. Missing	Init.	Temp. (°C)	pH	Salinity (ppt)	DO (mg/L)
M-16	A	76M	1.1518	1.27400	4	1	4	0	✓	21	8.0	28	6.4
	B	77M	1.1518	1.28731	5	0	5	0	✓	21	8.1	28	6.5
	C	78M	1.1518	1.23769	5	0	5	0	✓	20	8.2	28	6.6
	D	79M	1.1518	1.25670	5	0	5	0	✓	21	8.2	28	6.6
	E	80M	1.15484	1.27773	5	0	5	0	✓	21	8.0	28	6.6
M-17	A	81M	1.15164	1.23606	5	0	5	0	✓	20	8.2	28	6.6
	B	82M	1.15370	1.23445	5	0	5	0	✓	21	8.1	28	6.5
	C	83M	1.15187	1.24610	5	0	5	0	✓	22	8.1	28	6.7
	D	84M	1.15463	1.23626	5	0	5	0	✓	22	8.1	28	6.6
	E	85M	1.15123	1.27535	5	0	5	0	✓	21	8.1	28	6.6
M-18	A	86M	1.17172	1.25425	5	0	5	0	✓	21	8.1	28	6.8
	B	87M	1.17131	1.26416	5	0	5	0	✓	21	8.1	28	6.7
	C	88M	1.16254	1.24896	5	0	5	0	✓	21	8.1	28	6.5
	D	89M	1.15758	1.25679	5	0	5	0	✓	20	8.1	28	6.6
	E	90M	1.15218	1.27549	5	0	5	0	✓	21	8.1	28	6.7
Initials													

WQ Instruments Us Temp. HK384 pH HK895 Sal. HK897 DO HK412 Balance HK565

Data Verified By 208 Date Verified 20/3/12

Main technician performing tear down 7 Second technician performing replicate tear down ✓





MARINE SPECIES REFERENCE TOXICANT TEST DATA

Test Species *Neanthes arenaceodentata*

Test Initiation Date (Time) 09-Mar-12 Client CZPD Reference Toxicant Cd Source/Collection Date 09Mar12  
 Aquatic Toxicology Support 05/04/12  
 Test Termination Date (Time) 13-Mar-12 Batch No./Sample ID HK(1206242) Stock ID HK1206242 No. Organisms/Test Volume 10, 900ml

Rep	Ref. Toxicant Conc.	Number of Survivors (24 to 96 hours)			Dissolved Oxygen (mg/L)						Temperature (°C)						pH						Salinity (ppt)	
		24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96		
A	0.0			10	7.1				7.5	70				20	7.8				7.7	28	28	28		
	2.4			10	7.2				7.5	70				20	7.7				7.9	28	28	28		
	6.9			7	7.3				7.4	20				20	7.9				7.7	24	24	28		
	9.8			1	7.3				7.5	20				20	7.8				7.8	29	28	28		
	14.0			0	7.2				7.5	20				20	7.8				7.8	28	28	28		
	20.0			0	7.2				7.4	20				20	7.7				7.7	28	28	28		
B	0.0			10	7.1				7.4	20				20	7.8				7.8	28	28	28		
	2.4			10	7.2				7.4	20				20	7.9				7.9	28	28	28		
	6.9			10	7.3				7.4	20				20	7.8				7.8	28	28	28		
	9.8			0	7.3				7.4	20				20	7.8				7.8	28	28	28		
	14.0			0	7.2				7.5	20				20	7.9				7.8	28	28	28		
	20.0			0	7.3				7.4	20				20	7.8				7.7	28	28	28		
	Initials																							

Instruments Used:

Auto Pipette HK903.HK338  
 Temperature HK384  
 pH HK895  
 DO HK412  
 Salinity HK897  
 Balance HK565

Dry Weight (g) Determination of Organism

rep org. no.	wt pan	wt pan+org.	dry wt of pan + org.	dry wt of each org.	mean dry wt of each org.
1	1.15694	1.16059	1.16058	0.00073	6.00069
2	1.16461	1.16795	1.16791	0.00086	
3	1.15969	1.16313	1.16312	0.00069	

Test Set Up By JW

Data Verified By JW

Date Verified 2/14/12



APPENDIX D

Complete Data for the 48-60-hour Bivalve Larvae Survival and Normality Test  
– *Crassostrea gigas*

Client: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Batch No.: HK1206252  
 Initiation Date: 6-Mar-12

**Summary of Results for the 48-60-hr Bivalve Larval Survival and Development Test - Crassostrea gigas**

ID	Rep	Group	Client ID	Initial Density	Number Normal	Number Abnormal	Normal Survival%			Survival %			Normality %		
							NS (%)	NS Mean	NS SD	S (%)	S Mean	S SD	N (%)	N Mean	N SD
-	1	Control	Control	354	318	3	89.8	81.4	5.9	90.7	83.7	6.0	99.1	97.2	2.3
-	2	Control	Control	354	278	6	78.5			80.2			97.9		
-	3	Control	Control	354	267	2	75.4			76.0			99.3		
-	4	Control	Control	354	301	13	85.0			88.7			95.9		
-	5	Control	Control	354	276	18	78.0			83.1			93.9		
1	1	HK1206252001	REFERENCE SEDIMENT	354	334	11	94.4	94.5	2.3	97.5	97.3	2.6	96.8	97.2	0.5
2	2	HK1206252001	REFERENCE SEDIMENT	354	348	10	98.3			101.1			97.2		
3	3	HK1206252001	REFERENCE SEDIMENT	354	335	12	94.6			98.0			96.5		
4	4	HK1206252001	REFERENCE SEDIMENT	354	327	8	92.4			94.6			97.6		
5	5	HK1206252001	REFERENCE SEDIMENT	354	329	8	92.9			95.2			97.6		
6	1	HK1206252002	VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	354	318	16	89.8	88.1	4.2	94.4	92.7	4.4	95.2	95.1	0.8
7	2	HK1206252002	VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	354	308	12	87.0			90.4			96.3		
8	3	HK1206252002	VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	354	302	19	85.3			90.7			94.1		
9	4	HK1206252002	VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	354	297	16	83.9			88.4			94.9		
10	5	HK1206252002	VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	354	335	17	94.6			99.4			95.2		
11	1	HK1206252003	VR5 2.9-3.9M	354	307	12	86.7	92.7	4.7	90.1	96.3	4.5	96.2	96.3	1.0
12	2	HK1206252003	VR5 2.9-3.9M	354	317	18	89.6			94.6			94.6		
13	3	HK1206252003	VR5 2.9-3.9M	354	339	12	95.8			99.2			96.6		
14	4	HK1206252003	VR5 2.9-3.9M	354	349	12	98.6			102.0			96.7		
15	5	HK1206252003	VR5 2.9-3.9M	354	329	9	92.9			95.5			97.3		
16	1	HK1206252004	VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	354	274	46	77.4	70.1	6.3	90.4	76.8	9.5	85.6	91.7	6.3
17	2	HK1206252004	VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	354	225	41	63.6			75.1			84.6		
18	3	HK1206252004	VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	354	270	20	76.3			81.9			93.1		
19	4	HK1206252004	VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	354	237	6	67.0			68.6			97.5		
20	5	HK1206252004	VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M, GRAB	354	234	6	66.1			67.8			97.5		
21	1	HK1206252005	VR3 GRAB, 0.9-1.9M	354	319	12	90.1	90.7	1.7	93.5	94.0	2.7	96.4	96.5	1.1
22	2	HK1206252005	VR3 GRAB, 0.9-1.9M	354	328	18	92.7			97.7			94.8		
23	3	HK1206252005	VR3 GRAB, 0.9-1.9M	354	313	8	88.4			90.7			97.5		
24	4	HK1206252005	VR3 GRAB, 0.9-1.9M	354	326	12	92.1			95.5			96.5		
25	5	HK1206252005	VR3 GRAB, 0.9-1.9M	354	319	8	90.1			92.4			97.6		
26	1	HK1206252006	VR3 1.9-2.9M	354	302	8	85.3	88.6	5.0	87.6	91.7	5.9	97.4	96.7	1.1
27	2	HK1206252006	VR3 1.9-2.9M	354	299	6	84.5			86.2			98.0		
28	3	HK1206252006	VR3 1.9-2.9M	354	303	11	85.6			88.7			96.5		
29	4	HK1206252006	VR3 1.9-2.9M	354	326	17	92.1			96.9			95.0		
30	5	HK1206252006	VR3 1.9-2.9M	354	339	12	95.8			99.2			96.6		
31	1	HK1206252007	VR1 GRAB, VR2 GRAB, GB2	354	315	12	89.0	88.8	2.8	92.4	91.6	3.3	96.3	96.9	0.9
32	2	HK1206252007	VR1 GRAB, VR2 GRAB, GB2	354	319	7	90.1			92.1			97.9		
33	3	HK1206252007	VR1 GRAB, VR2 GRAB, GB2	354	307	12	86.7			90.1			96.2		
34	4	HK1206252007	VR1 GRAB, VR2 GRAB, GB2	354	328	13	92.7			96.3			96.2		
35	5	HK1206252007	VR1 GRAB, VR2 GRAB, GB2	354	303	6	85.6			87.3			98.1		
36	1	HK1206252008	GB1	354	311	6	87.9	88.5	2.6	89.6	92.0	3.0	98.1	96.2	1.2
37	2	HK1206252008	GB1	354	311	17	87.9			92.7			94.8		
38	3	HK1206252008	GB1	354	327	14	92.4			96.3			95.9		
39	4	HK1206252008	GB1	354	302	12	85.3			88.7			96.2		
40	5	HK1206252008	GB1	354	316	13	89.3			92.9			96.1		
41	1	HK1206252009	GB11, GB3, GB4, GB5	354	304	12	85.9	88.1	2.1	89.3	91.3	2.3	96.2	96.5	0.6
42	2	HK1206252009	GB11, GB3, GB4, GB5	354	321	10	90.7			93.5			97.0		
43	3	HK1206252009	GB11, GB3, GB4, GB5	354	305	9	86.2			88.7			97.1		
44	4	HK1206252009	GB11, GB3, GB4, GB5	354	318	14	89.8			93.8			95.8		
45	5	HK1206252009	GB11, GB3, GB4, GB5	354	311	12	87.9			91.2			96.3		
46	1	HK1206252010	GB8	354	303	8	85.6	88.2	1.7	87.9	90.4	1.7	97.4	97.6	0.4
47	2	HK1206252010	GB8	354	318	9	89.8			92.4			97.3		
48	3	HK1206252010	GB8	354	316	7	89.3			91.2			97.8		
49	4	HK1206252010	GB8	354	309	9	87.3			89.8			97.2		
50	5	HK1206252010	GB8	354	315	6	89.0			90.7			98.1		
51	1	HK1206252011	GB6, GB7, GB9, GB10	354	307	6	86.7	88.8	2.1	88.4	91.5	2.5	98.1	97.0	0.9
52	2	HK1206252011	GB6, GB7, GB9, GB10	354	319	13	90.1			93.8			96.1		
53	3	HK1206252011	GB6, GB7, GB9, GB10	354	309	8	87.3			89.6			97.5		
54	4	HK1206252011	GB6, GB7, GB9, GB10	354	312	13	88.1			91.8			96.0		
55	5	HK1206252011	GB6, GB7, GB9, GB10	354	325	8	91.8			94.1			97.6		



Test: BV-Bivalve Larval Survival and Development Test  
 Species: CG-Crassostrea gigas  
 Sample ID: VA  
 Start Date: 6/03/2012

Test ID: HK1206252c  
 Protocol: CG  
 Sample Type: MS  
 Lab ID: ALS

End Date: 8/03/2012

Pos	ID	Rep	Group	Initial Dens	Normal Co	Abnormal Count	Notes
	1	1	REFERENCE	354	334	11	
	2	2	REFERENCE	354	348	10	
	3	3	REFERENCE	354	335	12	
	4	4	REFERENCE	354	327	8	
	5	5	REFERENCE	354	329	8	
	6	1	1206252-02	354	318	16	
	7	2	1206252-02	354	308	12	
	8	3	1206252-02	354	302	19	
	9	4	1206252-02	354	297	16	
	10	5	1206252-02	354	335	17	
	11	1	1206252-03	354	307	12	
	12	2	1206252-03	354	317	18	
	13	3	1206252-03	354	339	12	
	14	4	1206252-03	354	349	12	
	15	5	1206252-03	354	329	9	
	16	1	1206252-04	354	274	46	
	17	2	1206252-04	354	225	41	
	18	3	1206252-04	354	270	20	
	19	4	1206252-04	354	237	6	
	20	5	1206252-04	354	234	6	
	21	1	1206252-05	354	319	12	
	22	2	1206252-05	354	328	18	
	23	3	1206252-05	354	313	8	
	24	4	1206252-05	354	326	12	
	25	5	1206252-05	354	319	8	
	26	1	1206252-06	354	302	8	
	27	2	1206252-06	354	299	6	
	28	3	1206252-06	354	303	11	
	29	4	1206252-06	354	326	17	
	30	5	1206252-06	354	339	12	
	31	1	1206252-07	354	315	12	
	32	2	1206252-07	354	319	7	
	33	3	1206252-07	354	307	12	
	34	4	1206252-07	354	328	13	
	35	5	1206252-07	354	303	6	
	36	1	1206252-08	354	311	6	
	37	2	1206252-08	354	311	17	
	38	3	1206252-08	354	327	14	
	39	4	1206252-08	354	302	12	
	40	5	1206252-08	354	316	13	
	41	1	1206252-09	354	304	12	
	42	2	1206252-09	354	321	10	
	43	3	1206252-09	354	305	9	
	44	4	1206252-09	354	318	14	
	45	5	1206252-09	354	311	12	
	46	1	1206252-10	354	303	8	
	47	2	1206252-10	354	318	9	
	48	3	1206252-10	354	316	7	
	49	4	1206252-10	354	309	9	
	50	5	1206252-10	354	315	6	
	51	1	1206252-11	354	307	6	
	52	2	1206252-11	354	319	13	
	53	3	1206252-11	354	309	8	
	54	4	1206252-11	354	312	13	
	55	5	1206252-11	354	325	8	

Comments:

**Bivalve Larval Survival and Development Test-Normality Survival**

Start Date: 6/03/2012	Test ID: HK1206252c	Sample ID: VA
End Date: 8/03/2012	Lab ID: ALS	Sample Type: MS
Sample Date:	Protocol: CG	Test Species: CG-Crassostrea gigas

Conc-	1	2	3	4	5
REFERENCE	0.9435	0.9831	0.9463	0.9237	0.9294
1206252-02	0.8983	0.8701	0.8531	0.8390	0.9463
1206252-03	0.8672	0.8955	0.9576	0.9859	0.9294
1206252-04	0.7740	0.6356	0.7627	0.6695	0.6610
1206252-05	0.9011	0.9266	0.8842	0.9209	0.9011
1206252-06	0.8531	0.8446	0.8559	0.9209	0.9576
1206252-07	0.8898	0.9011	0.8672	0.9266	0.8559
1206252-08	0.8785	0.8785	0.9237	0.8531	0.8927
1206252-09	0.8588	0.9068	0.8616	0.8983	0.8785
1206252-10	0.8559	0.8983	0.8927	0.8729	0.8898
1206252-11	0.8672	0.9011	0.8729	0.8814	0.9181

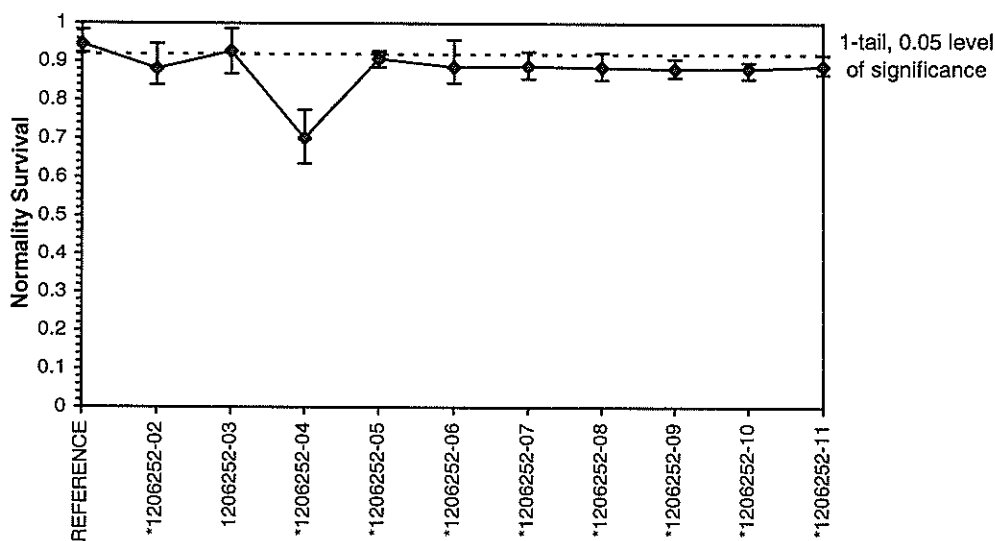
Conc-	Transform: Untransformed							1-Tailed		
	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
REFERENCE	0.9452	1.0000	0.9452	0.9237	0.9831	2.452	5			
*1206252-02	0.8814	0.9325	0.8814	0.8390	0.9463	4.824	5	2.948	1.860	0.0403
1206252-03	0.9271	0.9809	0.9271	0.8672	0.9859	5.109	5	0.767	1.860	0.0439
*1206252-04	0.7006	0.7412	0.7006	0.6356	0.7740	9.030	5	8.119	1.860	0.0560
*1206252-05	0.9068	0.9594	0.9068	0.8842	0.9266	1.882	5	2.985	1.860	0.0239
*1206252-06	0.8864	0.9378	0.8864	0.8446	0.9576	5.653	5	2.380	1.860	0.0459
*1206252-07	0.8881	0.9396	0.8881	0.8559	0.9266	3.145	5	3.515	1.860	0.0302
*1206252-08	0.8853	0.9366	0.8853	0.8531	0.9237	2.912	5	3.863	1.860	0.0288
*1206252-09	0.8808	0.9319	0.8808	0.8588	0.9068	2.436	5	4.560	1.860	0.0263
*1206252-10	0.8819	0.9331	0.8819	0.8559	0.8983	1.967	5	4.888	1.860	0.0241
*1206252-11	0.8881	0.9396	0.8881	0.8672	0.9181	2.376	5	4.071	1.860	0.0261

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.05)	0.59125	0.895	0.44937	-0.1536
Bartlett's Test indicates equal variances (p = 0.11)	15.6836	23.2093		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs REFERENCE	0.02606	0.02758	0.01979	0.00128	2.2E-11	10, 44

**Dose-Response Plot**





Test: BV-Bivalve Larval Survival and Development Test ID: RTCGCU025							
Species: CG-Crassostrea gigas				Protocol: CG			
Sample ID: REF				Sample Type: CUCL			
Start Date: 3/6/2012		End Date: 3/8/2012		Lab ID: ALS			
Pos	ID	Rep	Group	Initial Density	Normal Count	Abnormal Count	Notes
	1	1	D-Control	254	218	3	
	2	2	D-Control	254	278	6	
	3	3	D-Control	254	267	2	
	4	4	D-Control	254	301	13	
	5	5	D-Control	254	276	18	
	6	1	1	254	266	11	
	7	2	1	254	258	13	
	8	3	1	254	271	8	
	9	1	5	254	156	56	
	10	2	5	254	169	63	
	11	3	5	254	177	55	
	12	1	10	254	89	112	
	13	2	10	254	76	153	
	14	3	10	254	80	148	
	15	1	20	254	20	199	
	16	2	20	254	18	157	
	17	3	20	254	15	134	
	18	1	50	254	2	98	
	19	2	50	254	1	77	
	20	3	50	254	3	80	

Comments:

**Bivalve Larval Survival and Development Test-Normality Survival**

Start Date: 3/6/2012      Test ID: RTCGCU025      Sample ID: REF  
 End Date: 3/8/2012      Lab ID: ALS      Sample Type: CUCL  
 Sample Date:      Protocol: CG      Test Species: CG-Crassostrea gigas  
 Comments:

Conc-ug/L	1	2	3	4	5
D-Control	0.8583	1.0000	1.0000	1.0000	1.0000
1	1.0000	1.0000	1.0000		
5	0.6142	0.6654	0.6969		
10	0.3504	0.2992	0.3150		
20	0.0787	0.0709	0.0591		
50	0.0079	0.0039	0.0118		

Conc-ug/L	Transform: Untransformed							Number Resp	Total Number
	Mean	N-Mean	Mean	Min	Max	CV%	N		
D-Control	0.9717	1.0000	0.9717	0.8583	1.0000	6.523	5	0	42
1	1.0000	1.0292	1.0000	1.0000	1.0000	0.000	3	0	32
5	0.6588	0.6780	0.6588	0.6142	0.6969	6.334	3	60	174
10	0.3215	0.3309	0.3215	0.2992	0.3504	8.153	3	281	413
20	0.0696	0.0716	0.0696	0.0591	0.0787	14.245	3	455	490
50	0.0079	0.0081	0.0079	0.0039	0.0118	50.000	3	253	255

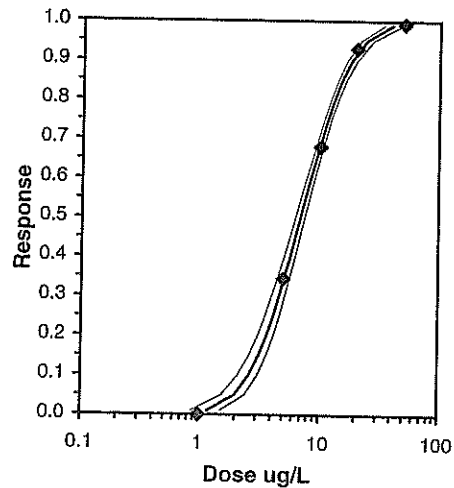
**Auxiliary Tests**

	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution ( $p \leq 0.05$ )	0.7764	0.905	-2.1845	6.65274
Equality of variance cannot be confirmed				

**Maximum Likelihood-Probit**

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	3.05272	0.189	2.68228	3.42316	0	1.51437	7.81473	0.67896	0.83768	0.32758	3
Intercept	2.4428	0.20077	2.0493	2.83631							

Point	Probits	ug/L	95% Fiducial Limits	
EC01	2.674	1.1902	0.87008	1.52401
EC05	3.355	1.99004	1.55819	2.41592
EC10	3.718	2.61741	2.12448	3.09049
EC15	3.964	3.14896	2.61761	3.65059
EC20	4.158	3.64739	3.08889	4.16876
EC25	4.326	4.13743	3.55905	4.67313
EC40	4.747	5.68444	5.07461	6.24562
EC50	5.000	6.88142	6.26476	7.45651
EC60	5.253	8.33045	7.7048	8.93595
EC75	5.674	11.4452	10.7132	12.2467
EC80	5.842	12.983	12.1361	13.9634
EC85	6.036	15.038	13.9812	16.3331
EC90	6.282	18.0919	16.6348	19.9794
EC95	6.645	23.7954	21.4098	27.0748
EC99	7.326	39.7865	34.1124	48.2416

















LARVAL DEVELOPMENT TOXICITY TEST - SEDIMENT (SAMPLES)

Client CEPD  
 Batch No. H100622  
 Initial Embryo Density 357  
 Test Volume (mL) 900  
 Aliquot Size (mL) 10

Test Initiation Date 06-Mar-12  
 Test Termination Date 08-Mar-12  
 Fertilization initiation time 13:00  
 Inoculation time 14:00  
 Test Species Crassostrea gigas  
 Source/Date Received Guernsey Sea Farm-05/Mar/12

Sample ID	Rep.	Primary Count		Backup Count		Comments	Tech. Init.
		Normal Larvae	Abnormal Larvae	Normal Larvae	Abnormal Larvae		
M-01	A	<del>278</del> 218	3				B
	B	278	6				R
	C	267	2				B
	D	301	13				Z
	E	276	18				R

Rep.	Count / 10 mL		Backup Count		Comments	Tech. Init.
	Fertilized Egg	Unfertilized Egg	Normal Larvae	Abnormal Larvae		
Day 0 Count	A	322	121			B
	B	350	100			R
	C	369	98			B
	D	377	78			Z
	E	353	93			R

\* Embryo must be inoculated within 2 hours after initiation of fertilization

Data Verified By MS

Date Verified 2/4/12

**LARVAL DEVELOPMENT TOXICITY TEST - SEDIMENT (SAMPLES)**

Client CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Batch No. HK1206252

Test Initiation Date 06-Mar-12  
 Test Termination Date 08-Mar-12  
 Fertilization initiation time 13:00  
 Inoculation time 14:00  
 Test Species Crassostrea gigas  
 Source/Date Received Guernsey Sea Farm-05/Mar/12

Initial Embryo Density 314  
 Test Volume (mL) 900  
 Aliquot Size (mL) 10

Sample ID	Rep.	Primary Count		Backup Count		Comments	Tech. Init.
		Normal Larvae	Abnormal Larvae	Normal Larvae	Abnormal Larvae		
HK1206252001 M-10	A	334	11				✓
	B	348	10				✓
	C	335	12				✓
	D	327	8				✓
	E	329	8				✓
HK1206252002 M-11	A	318	16				✓
	B	308	12				✓
	C	302	9				✓
	D	297	16				✓
	E	335	17				✓
HK1206252003 M-12	A	307	12				✓
	B	317	18				✓
	C	339	12				✓
	D	349	12				✓
	E	<del>339</del> 399	9				✓
HK1206252004 M-13	A	274	46				✓
	B	225	41				✓
	C	270	20				✓
	D	237	6				✓
	E	234	6				✓
HK1206252005 M-14	A	319	12				✓
	B	328	18				✓
	C	313	8				✓
	D	326	12				✓
	E	319	8				✓
HK1206252006 M-15	A	302	8				✓
	B	299	6				✓
	C	303	11				✓
	D	326	17				✓
	E	339	12				✓
HK1206252007 M-16	A	315	12				✓
	B	319	7				✓
	C	307	12				✓
	D	328	13				✓
	E	303	6				✓

\* Embryo must be inoculated within 2 hours after initiation of fertilization

Data Verified By 318

Date Verified 10/4/12



LARVAL DEVELOPMENT TOXICITY TEST - SEDIMENT (SAMPLES)

Client CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT  
 Batch No. HK1206252

Test Initiation Date 06-Mar-12  
 Test Termination Date 08-Mar-12  
 Fertilization initiation time 13:00  
 Inoculation time 14:00  
 Test Species Crassostrea gigas  
 Source/Date Received Guernsey Sea Farm-05/Mar/12

Initial Embryo Density 354  
 Test Volume (mL) 900  
 Aliquot Size (mL) 10

Sample ID	Rep.	Primary Count		Backup Count		Comments	Tech. Init.
		Normal Larvae	Abnormal Larvae	Normal Larvae	Abnormal Larvae		
HK1206252008 M-17	A	311	6				✓
	B	311	17				✓
	C	327	14				✓
	D	302	12				✓
	E	316	13				✓
HK1206252009 M-18	A	304	12				✓
	B	321	10				✓
	C	305	9				✓
	D	318	14				✓
	E	311	12				✓
HK1206252010 M-19	A	303	8				✓
	B	318	9				✓
	C	316	7				✓
	D	309	9				✓
	E	315	6				✓
HK1206252011 M-20	A	307	6				✓
	B	319	13				✓
	C	309	8				✓
	D	312	13				✓
	E	325	8				✓
	A						
	B						
	C						
	D						
	E						
	A						
	B						
	C						
	D						
	E						

\* Embryo must be inoculated within 2 hours after initiation of fertilization

Data Verified By JR

Date Verified 22/4/12

# LARVAL DEVELOPMENT TOXICITY TEST - SEDIMENT (CONTROLS)

Client	<u>CGDD</u>	Test Initiation Date/Time	<u>06-Mar-12/14:00</u>
Batch No.	<u>HK1206752</u>	Test Termination Date/Time	<u>08-Mar-12/14:00</u>
Reference Toxicant	<u>Cu</u>	Fertilization initiation Time	<u>13:00</u>
Stock ID	<u>HK1117761 <del>01</del> HK206867001</u>	Inoculation Time	<u>14:00</u>
Initial Embryo Density	<u>374</u>	Test Species	<u>Crassostrea gigas</u>
Test Volume (mL)	<u>900</u>	Source/Date Received	<u>Guernsey Sea Farm-05/Mar/12</u>
Aliquot Size (mL)	<u>10</u>		

Concentration (µg/L)	Rep.	Primary Count		Backup Count		Comments	Tech. Init.
		Normal Larvae	Abnormal Larvae	Normal Larvae	Abnormal Larvae		
<b>Reference Toxicant</b>							
1.0	A	266	71				✓
	B	258	13				✓
	C	271	8				✓
5.0	A	156	56				✓
	B	164	<del>56</del> 63				✓
	C	177	<del>57</del> 55				✓
10.0	A	89	112				✓
	B	76	153				✓
	C	80	148				✓
20.0	A	20	199				✓
	B	18	157				✓
	C	15	134				✓
50.0	A	2	98				✓
	B	1	77				✓
	C	3	80				✓
<b>Control Seawater</b>							
0.0	A	318	3				✓
	B	278	6				✓
	C	267	2				✓
	D	301	13				✓
	E	276	18				✓

Data Verified By 318 Date Verified 2/4/12



LARVAL DEVELOPMENT TOXICITY TEST - REFERENCE TOXICANT TEST DATA

Client CEDD  
 Batch No. HK (206) 14  
 Initial Embryo Density 3.74  
 Test Initiation Date/Time 06-Mar-12/14:00  
 Test Termination Date 08-Mar-12/14:00  
 Test Species Crassostrea gigas  
 Source/Date Received Guernsey Sea Farm / 05/Mar/12  
 Test Volume (mL) 800  
 Aliquot Size (mL) 10

Concentration (µg/L)	Dissolved Oxygen (mg/L)			Temperature (°C)			pH			Salinity (ppt)	
	0	24	48	0	24	48	0	24	48	0	48
0.0	7.2	7.1	7.0	20	20	20	7.8	7.8	7.8	28	28
1.0	7.3	7.1	7.0	20	20	20	7.9	7.8	7.8	28	28
5.0	7.2	7.0	6.9	20	20	20	7.8	7.9	7.8	28	28
10.0	7.2	7.0	7.0	20	20	20	7.8	7.9	7.8	28	28
20.0	7.3	6.9	7.0	20	20	20	7.8	7.8	7.8	28	28
50.0	7.3	7.0	6.9	20	20	20	7.8	7.8	7.8	28	28
Technician	7	7	7	7	7	7	7	7	7	7	7

WQ Instruments Used: Temp. HK384 pH HK895 Salinity HK897 DO HK412

Comments \_\_\_\_\_

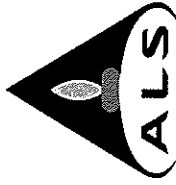
Test Set Up By [Signature] Date Verified 20/4/12

APPENDIX E  
Analytical Reports



# ALS Technichem (HK) Pty Ltd

**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES



## CERTIFICATE OF ANALYSIS

<b>Client</b>	: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	<b>Laboratory</b>	: ALS Technichem HK Pty Ltd	<b>Page</b>	: 1 of 3
<b>Contact Address</b>	: IR POPHIL LAM : GEOTECHNICAL PROJECTS DIVISION, : GEOTECHNICAL ENGINEERING OFFICE, 23/F., KWUN TONG VIEW, 410 KWUN TONG ROAD, KOWLOON, HONG KONG	<b>Contact Address</b>	: Chan Kwok Fai, Godfrey : 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong	<b>Work Order</b>	: <b>HK1206252</b>
<b>E-mail</b>	: Pophilkiam@cedd.gov.hk	<b>E-mail</b>	: Godfrey.Chan@alsglobal.com	<b>Date received</b>	: 07-MAR-2012
<b>Telephone</b>	: +852 2716 8609	<b>Telephone</b>	: +852 2610 1044	<b>Date of issue</b>	: 20-MAR-2012
<b>Facsimile</b>	: ---	<b>Facsimile</b>	: +852 2610 2021	<b>No. of samples</b>	: - Received : 11
<b>Project</b>	: GE_2009_16 41 - AGREEMENT NO CE 43_2010 (HY) CENTRAL KOWLOON ROUTE-DESIGN AND CONSTRUCTION	<b>Quote number</b>	: ---		: - Analysed : 11
<b>Order number</b>	: ---				
<b>C-O-C number</b>	: ---				
<b>Site</b>	: ---				

### Report Comments

This report for ALS Technichem (HK) Pty Ltd work order reference HK1206252 supersedes any previous reports with this reference. The completion date of analysis is 16-MAR-2012. Results apply to 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 process purposes. Abbreviations: CAS number = Chemical Abstract Services number. LOR = Limit of reporting.

Specific comments for Work Order HK1206252 : Sample(s) were received in an ambient condition.

Sediment 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.

**Signatory**

PP Fung Lim Chee, Richard

**Position**

General Manager

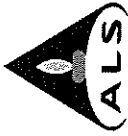
**Authorised results for:-**

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  
Tel: +852 2610 1044 Fax: +852 2610 2021 www.alsenviro.com

A Campbell Brothers Limited Company



**Analytical Results**

Sub-Matrix: SEDIMENT

Client sample ID	Client sampling date / time	Laboratory sample ID	Compound	EA055: Moisture Content (dried @ 103° C)	EP005: Total Organic Carbon
				0.1 %	0.05 %
				EA/ED: Physical and Aggregate Properties	EP: Aggregate Organics
REFERENCE SEDIMENT	[05-MAR-2012]	HK1206252-001		43.5	2.22
VR5 0.9-1.9M, VR5 1.9-2.9M, VR5 GRAB	[05-MAR-2012]	HK1206252-002		53.6	1.77
VR5 2.9-3.9M	[05-MAR-2012]	HK1206252-003		40.2	0.71
VR4 0.9-1.9M, 1.9-2.9M, 3.0-4.0M GRAB	[05-MAR-2012]	HK1206252-004		49.8	1.42
VR3 GRAB, 0.9-1.9M	[05-MAR-2012]	HK1206252-005		48.3	1.84
VR3 1.9-2.9M	[05-MAR-2012]	HK1206252-006		22.7	1.00
VR1 GRAB, VR2 GRAB, GB2	[05-MAR-2012]	HK1206252-007		45.3	1.34
GB1	[05-MAR-2012]	HK1206252-008		46.8	1.08
GB11, GB3, GB4, GB5	[05-MAR-2012]	HK1206252-009		47.9	1.74
GB8	[05-MAR-2012]	HK1206252-010		49.7	1.21
GB6, GB7, GB9, GB10	[05-MAR-2012]	HK1206252-011		48.4	1.56





### Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
<b>EA/ED: Physical and Aggregate Properties (QC Lot: 2207164)</b>								
HK1206279-001	Anonymous	EA055: Moisture Content (dried @ 103°C)		0.1	%	12.2	12.2	0.0
HK1206337-001	Anonymous	EA055: Moisture Content (dried @ 103°C)		0.1	%	5.8	6.2	7.9
<b>EA/ED: Physical and Aggregate Properties (QC Lot: 2207165)</b>								
HK1206337-002	Anonymous	EA055: Moisture Content (dried @ 103°C)		0.1	%	5.4	4.8	11.1
<b>EP: Aggregate Organics (QC Lot: 2206297)</b>								
HK1206244-001	Anonymous	EP005: Total Organic Carbon		0.05	%	1.39	1.31	6.0
HK1206248-001	Anonymous	EP005: Total Organic Carbon		0.05	%	1.77	1.61	9.4
<b>EP: Aggregate Organics (QC Lot: 2206298)</b>								
HK1206251-001	Anonymous	EP005: Total Organic Carbon		0.05	%	1.87	1.82	2.5

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

Method Blank (MB) Report				Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report			
Method: Compound	CAS Number	LOR	Unit	Spike Concentration	LCS	DCS	Control Limit
<b>EP: Aggregate Organics (QCLot: 2206297)</b>							
EP005: Total Organic Carbon		0.05	%	40 %	112	85	115
<b>EP: Aggregate Organics (QCLot: 2206298)</b>							
EP005: Total Organic Carbon		0.05	%	40 %	111	85	115

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

Method: Compound				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report			
Laboratory sample ID	Client sample ID	CAS Number	Concentration	MS	MSD	Recovery Limits (%)	Control Limit
<b>EP: Aggregate Organics (QCLot: 2206297)</b>							
HK1206233-001	Anonymous		80 %	102	75	75	125
<b>EP: Aggregate Organics (QCLot: 2206298)</b>							
HK1206233-003	Anonymous		80 %	101	75	75	125