Project Name:       MLLDCEE         Project No::       Project No::         Project No::       Peter Oitmaa         Project Mgr::       Peter Oitmaa         Project Mgr::       Peter Oitmaa         Project Mgr::       Peter Oitmaa         Mut DCEE       Mob. Phone: 0412         Email:       Peter Oitmaa       Mob. Phone: 0412         Date Required:       Peter Oitmaa       Mob. Phone: 0412         Sample       Sample       Lab       040         BH1       0-0:1       173/8       Sample         BH1       0-0:1       173/8       Sample         BH2       0-0:1       173/8       Type         BH3       0-0:1       173/8       Type         BH4       0-0:1       173/8       Type         BH5       0-0:1       173/8       Type         BH5       0-0:1       173/8       Type         BH5       0-0:1       173/8       Type         BH5       0-0:1       173/8       P         BH6       0-0:1       173/8       P         BH5       0-0:1       173/8       P		
Project No:       86.091.00       Sampler: LS         Project Mgr:       Peter Oitmaa       Mob. Phone: 0412         Email:       Peter Oitmaa       Mob. Phone: 0412         Email:       Peter Oitmaa       Mob. Phone: 0412         Date Required:       Peter Oitmaa@douglaspartners.com.au         Date Required:       Peter Oitmaa@douglaspartners.com.au         Sample       Sample       Inpeter Oitmaa@douglaspartners.com.au         BHI       Depth       ID       Sample         BHI       0-0-01       117/8       Sample         BHI       0-0-1       117/8       Sample         BH2       0-0-1       117/8       Sample         BH3       0-0-1       117/8       Sample         BH3       0-0-1       117/8       Sample         BH3       0-0-1       117/8       Sample         BH3       0-0-1       230       0         BH5       0-0-1       2       18/8       -         BH5       0-0-01       2       17/8       -         BH5       0-0-01       2       17/8       -		To: Envirolah Samiraa
Project Mgr:       Peter Oitmaa       Mob. Phone: 0412         Email:       peter Oitmaa@douglaspartners.com.au         Date Required:       peter Oitmaa@douglaspartners.com.au         Date Required:       peter Oitmaa@douglaspartners.com.au         Sample       Sample       Lab Quote         Date Required:       Peter Oitmaa@douglaspartners.com.au         Sample       Sample       Containe         BHI       Depth       ID       Sample       Sample         BHI       D-co:l       f       17/18       Sample       PH         BHI       D-co:l       f       17/18       S       Tay       PH         BHI       D-co:l       f       17/18       S       Tay       PH       PH         BHS       D-co:l       f       17/18       S       Tay       PH       <	e. 0412 574 518	12 Ashlev Street Chatswood NSM 2067
Date Required:       Sample       Sample       Sample       Contrained outglisspartners.com.au         Sample       Sample       Sample       Sample       PH L         ID       Depth       ID       Sample       Containet       PH L         BH1       0-0-1       I       17/8       S       Jor       Cecc         BH2       0-0-1       I       17/8       S       Jor       Cecc       BH       S       S       Jor       Cecc       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S	0.0 + 10 + 10 0	Attn: Tania Notaras
Sample     Sample     Lab     Sample       ID     Depth     ID     Depth     ID       BHI     D-0-1     1<17/8     5-soil     PH L       BHI     0-0-1     1<17/8     5-soil     PH L       BHI     0-0-1     1<17/8     5     Jav       BHI     0-0-1     1<17/8     5     Jav       BH2     0-0-1     7     18/8     -ccc       BH3     0-0-1     7     17/9e     -ccc       BH4     0-0-1     7     17/8     -ccc       BH4     0-0-1     7     17/8     -ccc       BH5     0-0-1     7     17/8     -ccc       BH5     0-0-1     7     17/8     -ccc       BH5     0-0-1     7     17/8     -ccc       BH6     0-0-1     7     17/8     -ccc	com.au	Phone: 02 9910 6200 Fax: 02 9910 6201 Email: tnotaras@envirolabservices.com.au
SampleSampleSampleLabIDDepthIDBHID-C-I1BHID-C-I1BHID-C-I1BHID-C-I1BHIA-WaterBHIA-WaterBHIA-WaterBHIA-WaterBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-IBHSC-O-ICo-IFCo-IFCo-IFCo-IFCo-IFCo-IFCo-IFCo-IFCo-IFCo-IFCo-I <t< td=""><td></td><td>Analytes</td></t<>		Analytes
BHI     0-0-1     1     17/8     5     5       BHI     0-0-1     1     17/8     5     5       BHI     0-0-1     1     17/8     5     7       BH2     0-0-1     7     17/8     5     7       BH2     0-0-1     7     17/8     5     7       BH3     0-0-1     7     18/8     5     5       BH3     0-0-1     7     18/8     5       BH4     0-0-1     7     17/8       BH5     0-4-05     7     18/8       BH5     0-0-1     7     17/8	PHEC Combo	Ż
BHI $0-0.1$ $f$ $i7/8$ $S$ $JaV$ BHI $0.5-0.6$ $z$ $ $ $ $ $ $ $ $ BH1 $0.5-0.6$ $z$ $ $ $ $ $ $ $ $ $ $ BH2 $0-0.1$ $q$ $ $ $ $ $ $ $ $ $ $ BH2 $0-0.1$ $q$ $ $ $ $ $ $ $ $ $ $ $ $ BH3 $0-0.1$ $z$ $ $ $ $ $ $ $ $ $ $ $ $ BH4 $0-0.1$ $z$ $ $ $ $ $ $ $ $ $ $ $ $ $ $ BH5 $0-0.1$ $z$ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ <	el sof Sa cec	
BH1       4.0-435       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       \$       <	•	
BH2     0-0:1     4     1       BH3     0:4-0:5     1     18       BH3     2:4-2:5     6     1       BH4     0-0:1     7     17       BH5     0:4-0:5     8     1       BH5     0:0:1     7     17       BH5     0:0:1     7     17       BH5     0:0:1     7     18	•	Envirolab Servicer
BH3 0.4-0.5 1 18 8 6 6 1 6 1 6 6 1 6 6 1 6 7 6 7 6 7 6 7 6	•	Chatswood NSW 2067
BH3 2.4-2.5 6 1 8 6 8 8 1 8 8 8 1 8 8 8 8 1 8 8 8 8	•	JOD NO: 124340 6200
BH4 0-0.1 7 178 BH5 0.4-0.5 8 1 BH6 0-0.1 9 188 0	•	Date Received: 28/8.
BHS 0.4-0.5 & 1 6 8 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	•	Received by: A3.
BH 6 0-0-1 9 18 8 .	•	Cooling: Isel/cepack
	5	Security. UtacuBroken/None
BH7 0.4-05 10 1	•	
8 41 1.0-0 .848	•	
BH9 0.4-0.5 12. 1 0		
Lab Report No.		Phone: (02) 9809 0666
Send Results to: Douglas Partners Address: 96 Hermitage F	nitage Road, West Ryde 2114	Fax: (02) 9809 4095
Relinquished by: PMD Signed:	Date & Time: 28 8	Received By: Date & Time:
Relinquished by: Signed:	Date & Time:	Received By: ELC AZ . Date & Time: 28/

Form COC Rev0/November 2006

-----

Project Nar	: :						******	To: Envirolab	Services		
Project Mar	: 0	ater Oitm		Sampler:	10110	071 7		12 Ashley	Street, Chatsw	100d NSW 2067	
Email:	L ä	eter oitma	аа аа@dougla	INIOD. MOI	ne: 0412 57. .com.au	4 518		Attn: Tan Phone: 02	ia Notaras 9910 6200	Fax: 02 9910 6201	
Date Requin	ed:			Lat	o Quote No.			Email: tho	taras@envirola	bservices.com.au	
			Sample Type					Analytes			
Dep Dep	D D	Sampling Date	S - soil W - Water	Container type	PH EC CEC	Combo 89		1			Notes
BHID 0-0	-1 3	8/81	v	32							
BH10 0.4.	-05 14	-	-								
- 75	15	2				•					
- 91	91					•					
	_										
_	_										
ab Report No. Send Results to:	Douglas	Partners	s Addres	s: 96 Hen	mitage Road,	West Ryde	2114		Phone: Fax:	(02) 9809 0666	
Relinquished by:	RLK		Signed:	and		Date & Time:	288	Received By:		Date & Time:	
Relinquished by:			Signed:			Date & Time:		Received By:	Pri 113	Date & Time:	10 10

Form COC Rev0/November 2006

# Appendix H

QA/QC Results



# **Quality Assurance/Quality Control Procedures and Results**

# Field QA/QC for Soil Samples

The field QA/QC procedures for sampling described in the Douglas Partners *Field Procedures Manual* were followed at all times during the field work.

Laboratory-prepared Trip Blank and Trip Spike soil samples were taken to site during the field work, stored in the same container used to store the field samples, and transported to the laboratory with the field samples selected for analysis. The purpose of the Trip Blank was to determine whether cross-contamination of the samples was likely to have occurred. The purpose of the Trip Spike was to determine whether the significant loss of volatile contaminants may have occurred.

The results for the Trip Blank and Trip Spike soil samples are provided in Table H1.

Semale ID	Total Concentration (mg/kg) or % Recovery					
Sample ID	Benzene	Toluene	Ethyl-benzene	Xylene		
ТВ	<0.2	<0.5	<1	<3		
TS	129%	130%	133%	132%		

#### Table H1: Trip Blank and Trip Spike QA/QC Results for Hydrocarbons in Soils

The concentrations of analytes in the Trip Blank were below the laboratory detection limits which indicates that cross-contamination is unlikely to have occurred. The recovery rates for the Trip Spike analytes were within an acceptable range which indicates that the significant loss of volatile contaminants is unlikely to have occurred. The field sampling protocols are therefore considered appropriate.

# Intra-Laboratory QA/QC Analysis on Soil Samples

Intra-laboratory analysis of soil samples was conducted as an internal check of the reproducibility of the results from the primary laboratory and as a measure of consistency of sampling techniques. The 'A' series of the triplicate QA/QC samples were analysed by the primary laboratory (Envirolab). The results were compared between the primary and 'A' samples to determine the relative percentage difference (RPD) between the samples. The RPD was then used to determine whether unacceptable errors may be present in the sample data.

Selected comparative results of the analysis of the intra-laboratory soil samples are summarised in Tables H2 to H4.



October 10	Total Concentration (mg/kg)							
Sample ID	Benzene	Toluene	Ethylbenzene	m + p xylene	o xylene			
BH4/0-0.1	<0.2	<0.5	<1	<2	<1			
T5	<0.2	<0.5	<1	<2	<1			
RPD	0%	0%	0%	0%	0%			
BH10/0-0.1	<0.2	<0.5	<1	<2	<1			
Т6	<0.2	<0.5	<1	<2	<1			
RPD	0%	0%	0%	0%	0%			
BH104/0-0.1	<0.2	<0.5	<1	<2	<1			
BT7	<0.2	<0.5	<1	<2	<1			
RPD	0%	0%	0%	0%	0%			
BH108/0-0.1	<0.2	<0.5	<1	<2	<1			
BT13	<0.2	<0.5	<1	<2	<1			
RPD	0%	0%	0%	0%	0%			

## Table H2: Intra-Laboratory QA/QC Results for BTEX in Soil

#### Table H3: Intra-Laboratory QA/QC Results for TRH in Soil

Comple ID		Total Concent	ration (mg/kg)	
Sample ID	$C_{6} - C_{9}$	$C_{10} - C_{14}$	$C_{15} - C_{28}$	$C_{29} - C_{36}$
BH4/0-0.1	<25	<50	<100	<100
Т5	<25	<50	<100	<100
RPD	0%	0%	0%	0%
BH10/0-0.1	<25	<50	<100	<100
Т6	<25	<50	<100	<100
RPD	0%	0%	0%	0%
BH104/0-0.1	<25	<50	<100	<100
BT7	<25	<50	<100	110
RPD	0%	0%	0%	10%
BH108/0-0.1	<25	5 <50 <1		<100
BT13	<25	<50	<100	<100
RPD	0%	0%	0%	0%



	<b>,</b>		То	tal Concent	ration (mg/	kg)		
Sample ID	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
BH4/0-0.1	5	<0.4	17	20	24	<0.1	10	59
T5	9	<0.4	13	17	42	<0.1	10	65
RPD	57%	0%	27%	16%	55%	0%	0%	10%
BH10/0-0.1	5	<0.4	11	18	40	<0.1	10	59
Т6	5	<0.4	12	18	45	<0.1	11	62
RPD	0%	0%	9%	0%	12%	0%	10%	5%
BH104/0-0.1	7	<0.4	13	26	57	0.2	10	110
BT7	7	<0.4	13	27	60	0.2	11	120
RPD	0%	0%	0%	4%	5%	0%	10%	9%
BH108/0-0.1	7	<0.4	14	17	14	<0.1	15	45
BT13	6	<0.4	17	17	16	<0.1	15	42
RPD	15%	0%	19%	0%	13%	0%	0%	7%

#### Table H4: Intra-Laboratory QA/QC Results for Heavy Metals in Soil

Notes: As = Arsenic; Cd = Cadmium; Cr = Chromium; Cu = Copper; Pb = Lead, Hg = Mercury; Ni = Nickel; Zn = Zinc

A RPD of  $\pm$  30% is generally considered acceptable for inorganic analytes and a wider range may be acceptable for organic analytes. The RPD values outside the generally acceptable range of  $\pm$  30% are indicated by yellow shading in Table H4. These values are not considered significant due to the relatively small actual differences between the sample pairs and, in the case of filling, the heterogeneous nature of the samples.

It is therefore considered that the results indicate acceptable consistency between the primary and 'A' soil samples, that suitable field sampling methodology was adopted and that adequate laboratory precision was achieved.

# Inter-Laboratory QA/QC Analysis on Soil Samples

Inter-laboratory analysis of soil samples was conducted as an internal check of the reproducibility of the results from the laboratories and as a measure of consistency of sampling techniques. The 'B' series of the triplicate QA/QC samples were analysed by the secondary laboratory (Eurofins). The results were compared between the primary and 'B' samples to determine the relative percentage difference (RPD) between the samples. The RPD was then used to determine whether unacceptable errors may be present in the sample data.

Selected comparative results of the analysis of the inter-laboratory soil samples are summarised in Tables H5 to H7.



Comula ID	Total Concentration (mg/kg)							
Sample ID	Benzene	Toluene	Ethylbenzene	m + p xylene	o xylene			
BH104/0-0.1	<0.2	<0.5	<1	<2	<1			
BT8	<0.1	<0.1	<0.1	<0.2	<0.1			
RPD	0%	0%	0%	0%	0%			
BH108/0-0.1	<0.2	<0.5	<1	<2	<1			
BT14	<0.1	<0.1	<0.1	<0.2	<0.1			
RPD	0%	0%	0%	0%	0%			

## Table H5: Inter-Laboratory QA/QC Results for BTEX in Soil

#### Table H6: Inter-Laboratory QA/QC Results for TRH in Soil

Semale ID	Total Concentration (mg/kg)						
Sample ID	$C_{6} - C_{9}$	$C_{10} - C_{14}$	$C_{15} - C_{28}$	$C_{29} - C_{36}$			
BH104/0-0.1	<25	<50	<100	<100			
BT8	<20	<20	89	170			
RPD	0%	0%	0%	52%			
BH108/0-0.1	<25	<50	<100	<100			
BT14	<20	<20	<50	<50			
RPD	0%	0%	0%	0%			

#### Table H7: Inter-Laboratory QA/QC Results for Heavy Metals in Soil

Completio		Total Concentration (mg/kg)								
Sample ID	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn		
BH104/0-0.1	7	<0.4	13	26	57	0.2	10	110		
BT8	8.6	<0.4	12	17	39	<0.1	8.6	85		
RPD	21%	0%	8%	42%	38%	67%	15%	26%		
BH108/0-0.1	7	<0.4	14	17	14	<0.1	15	45		
BT14	12	<0.4	18	20	21	<0.1	18	63		
RPD	53%	0%	25%	16%	40%	0%	18%	33%		

Notes: As = Arsenic; Cd = Cadmium; Cr = Chromium; Cu = Copper; Pb = Lead, Hg = Mercury; Ni = Nickel; Zn = Zinc

A RPD of  $\pm$  30% is generally considered acceptable for inorganic analytes and a wider range may be acceptable for organic analytes. The RPD values outside the generally acceptable range of  $\pm$  30% are indicated by yellow shading in Tables H6 and H7. These values are not considered significant due to the relatively small actual differences between the sample pairs and, in the case of filling, the

It is therefore considered that the results indicate acceptable consistency between the primary and 'B' soil samples, that suitable field sampling methodology was adopted and that adequate laboratory precision was achieved.

# Laboratory QA/QC Procedures

heterogeneous nature of the samples.

Quality control procedures used during the analyses include:

## Reagent Blank

A reagent blank sample is prepared and analysed at the beginning of every analytical run, following calibration of the analytical apparatus. The laboratory results for reagent blanks indicated that concentrations of all analytes were below respective laboratory practical quantitation limits.

## Duplicate

This is the complete duplicate of a sample from the process batch. The results of the two samples are compared to laboratory acceptance criteria and exceedences highlighted. Exceedances were detected for Cu, Pb and Zn, and therefore a triplicate result was reported as per laboratory guidelines.

### Matrix Spike

A portion of a sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and determine whether matrix interference exists. The matrix spike recovery is compared to laboratory acceptance criteria. No exceedences were noted.

### Laboratory Control Sample

This is a standard reference sample or control matrix used to check the analytical process. The results were within acceptable limits.

### Surrogate Spike

Surrogates are known additions of known compounds to each sample, blank, matrix spike and laboratory control sample. The surrogates are similar to the analyte of interest, however are not expected to be detected in real samples. The results were acceptable.