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Report Number 14001

Your Order

Report Title **Baseline Analysis of Water and Sediment From Patawalonga Lake System**

Sampling by On Site Technology Pty Ltd

Analysis by Eurofins MGT Environmental

Report by John Waters

Authorized

DipAppSc(Chem), CChem, MRACI, MARPS

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1 Executive Summary

A sampling and analysis program was undertaken for water, sediment and water recovered from the sediment in Basin A and the Diversion Basin of the Patawalonga Lake System (PLS). The program was undertaken to;

1. Establish the 95% upper confidence limit for identified key contaminants in the sediment.
2. Confirm that the current sediment is consistent with the previously analysed sediment with respect to potential contaminants that were not detected in previous investigations.
3. Establish the baseline levels of key contaminants and water quality parameters in the water currently present in the PLS.
4. Determine the level of key contaminants in the water recovered from the sediment.

It is proposed that the sediment recovered from a dredging and de-watering project will be disposed through beneficial re-use at a licensed composting facility. The sampling and analysis program has established that the levels of contaminants in the sediment are within the limits approved by the EPA for the proposed project. These results are consistent with previous investigations.

Analysis of water and water recovered from the sediment confirms that the water recovered during the de-watering process is suitable for return to the PLS by;

1. Return to Basin B for water recovered from sediment removed from Basin A
2. Return to the Diversion Basin for water recovered from the sediment removed from the Diversion Basin.

It is expected that this approach will result in improved water quality in the case of pH (in Basin A), Turbidity, Dissolved Oxygen and zinc.

pH (in the Diversion Basin), copper and Total Petroleum Hydrocarbons already meet the Environment Protection (Water Quality) Policy criteria. The proposed dredging and de-watering is not expected to change this situation.

The proposed dredging and de-watering is expected increase the salinity in Basins A and B, however the increase is expected to result in salinity that is well within the normal range present over a full year in the PLS.

2 Introduction

Various water bodies, including the Sturt River and Brown Hill Creek, flow into the Patawalonga Lake System (PLS) catchment. Large amounts of sediment and debris accumulate in both Basin A and the Diversion Basin The basins are known to become extremely turbid during storm-water flushing and, in periods of little or no water flow, are stagnant with insufficient dissolved oxygen to support aquatic flora and fauna.

A significant amount of historical data has been collected on the accumulated sediment, a summary of which has been provided in a previous report (On Site Technology report 13020A, provided as Appendix 1). The majority of the historical data is derived from work undertaken prior to 2008 and questions have been raised concerning the relevance of that data to the sediment currently in the PLS.

The SA-EPA has approved a sampling and analysis program (provided as Appendix 2) to collect representative samples from the sediment currently deposited in the Diversion Basin and Basin A. This report aims to provide the following information;

5. Establish the 95% upper confidence limit for identified key contaminants in the sediment. This is primarily to support the proposed beneficial reuse of the recovered sediment as compost feed stock. Key contaminants have been identified as Total Petroleum Hydrocarbons, Copper and Zinc.

6. Confirm that the current sediment is consistent with the previously analysed sediment with respect to potential contaminants that were not detected in previous investigations. These contaminants include the full list of compounds and elements listed in the SA-EPA Waste Derived Fill Standard.

7. Establish the baseline levels of key contaminants and water quality parameters in the water currently present in the PLS. Because the PLS water quality is significantly degraded this baseline data is required to establish limits for compliance with the Environment Protection (Water Quality) Policy.

8. Determine the level of key contaminants in the water recovered from the sediment. This data is required to support the proposed return of water recovered (by the sediment de-watering process) to the PLS.

3 Sampling Locations

Sample locations are provided in Figure 1.

Sediment sample locations were co-located with the water samples except for location W10. Sediment seemed (based on probing with a PVC pipe) to be absent from the bottom at location W10. The bottom appeared to be rough stones or concrete, it is hypothesised that sediment is scoured from the Diversion basin adjacent to Weir 1 when there are high storm water flows. A separate sediment sampling location S10 was used.

Field duplicate samples were collected and identified with a number ten higher than the original sample such that (for example) “W15” is a field duplicate of sample “W05”

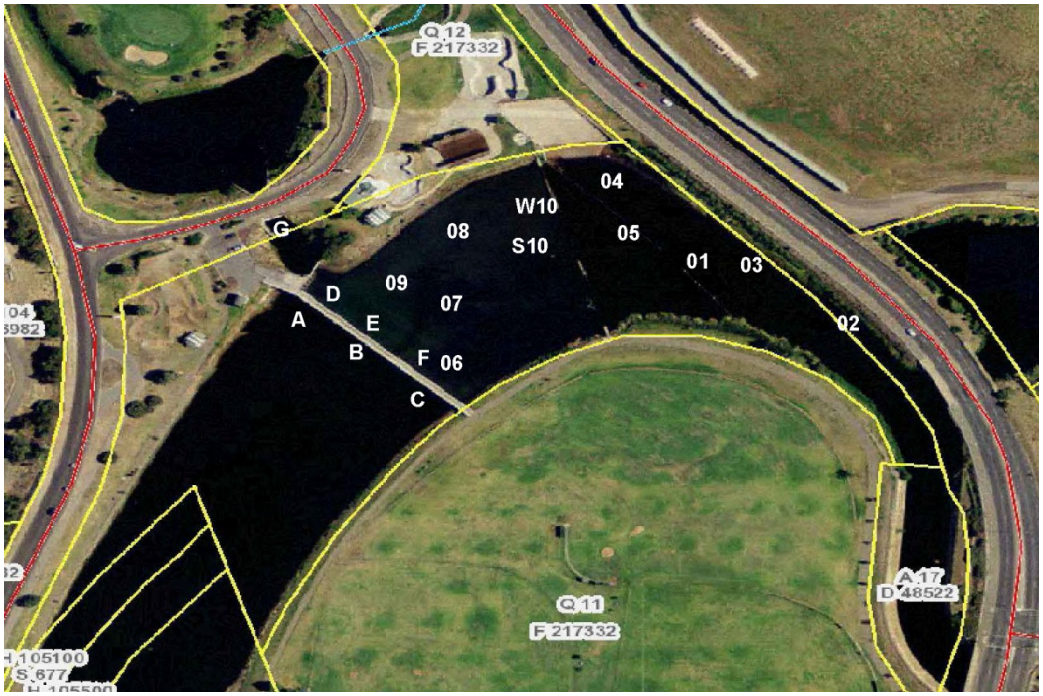

Figure 1 Sample Locations

4 Sample Collection and Analytical Parameters

Measurement of the following water quality parameters was undertaken in situ using a Horiba model U-52 probe, calibration dates (undertaken by the manufacturer) are listed against each parameter;

Parameter	Unit	Calibration	Operational Check
pH	pH units	3/4/14	pH buffer 8.0
Conductivity	mS/cm	2/12/13	
Turbidity	NTU	2/12/13	
DO	% saturation	30/12/13	in air check (100%)
DO	mg/l	30/12/13	

Measurements were taken approximately 15cm below the surface and approximately 15cm above the sediment. In two locations (07 and 09) the water was less than 30cm deep and a single measurement was taken. Locations A to G were tested only for major water quality parameters, namely pH, Turbidity, Electrical Conductivity and Dissolved Oxygen.

Surface water samples (approximately 15cm below the surface) identified as “W01” to “W10” were collected as follows from each location for laboratory analysis;

1. 1 litre unpreserved in glass for Total Recoverable Hydrocarbons (TRH) and Total Petroleum Hydrocarbons (TPH)
2. 250ml unpreserved in plastic for Total Dissolved Solids
3. 100ml unfiltered and acidified in plastic for Total copper, lead and zinc

Sediment samples identified as “S01” to “S10” were collected with a stainless steel Van Veen grab sampler or a beaker sampler (when submerged debris prevented the use of the Van Veen). At two locations (S07 and S09) samples were collected using a trowel. Sediment

samples were analysed for TPH, TRH, copper, lead and zinc. Four samples were analysed for the full list of potential contaminants listed in the Waste Derived Fill standard.

A duplicate bulk sediment sample (approximately 2kg) was collected from each location so that a "recovered water" sample could be extracted and analysed. These samples were processed by On Site Technology Pty Ltd using settling, filtration and centrifuging to extract a water sample that is considered representative of the recovered water to be returned to the PLS after sediment de-watering.

The recovered water samples identified as "RW01" to "RW10" were submitted to a NATA accredited laboratory for the determination of TPH, TRH, Turbidity, copper, lead and zinc. Total Dissolved Solids, pH, Electrical Conductivity and Dissolved Oxygen were determined by On Site Technology Pty Ltd.

It was anticipated that the sediment would contain significant amounts of biogenic hydrocarbons originating primarily from decaying plant matter which makes up a major proportion of the sediment. For this reason samples were analysed for both TRH (including biogenic hydrocarbons) and TPH (containing petroleum hydrocarbons). TPH are the contaminant of primary environmental concern.

5 Results and Discussion (Water)

Water quality data collected in the field (or in the case of Recovered Water, by On Site Technology when the samples were separated from the sediment) is provided in Appendix 3.

Copies of the Eurofins MGT Environmental Laboratory reports (including quality control and chain of custody documentation) are provided in Appendix 4 (report 405249 dealing with water samples), Appendix 5 (report 405436 dealing with sediment) and Appendix 6 (report 405600 dealing with Recovered Water).

5.1 In Situ Water Quality Parameters

The average, standard deviation and 95% range for the water quality parameters measured in-situ are provided in Tables 1 to 3. The same data for Recovered Water samples is provided in Table 4. It is important to note that the 95% range represents the lower and upper limits between which 95% of samples are expected to fall. This metric has been used in preference to the more usual 95% confidence interval for the estimation of the mean because the lateral and vertical variability of the water combined with the stagnation (particularly in Basin A) that currently exists preclude the assumption that the samples are drawn from a single (homogenous) population.

Basin A		Average	Std Dev	Range 95% of Data	
Parameter	Unit			Minimum	Maximum
pH		9.39	0.15	9.10	9.69
EC	mS/cm	2.08	0.28	1.53	2.64
Turbidity	NTU	72.3	98.6	0.0	265
DO	mg/l	0.95	1.26	0.00	3.42
DO	%	11.0	14.7	0.0	39.9
TDS	mg/l	962	133	701	1224

Table 1 In Situ Waters Quality Results, Basin A

Diversion Basin		Average	Std Dev	Range 95% of Data	
Parameter	Unit			Minimum	Maximum
pH		7.94	0.05	7.84	8.04
EC	mS/cm	56.8	1.6	53.7	59.9
Turbidity	NTU	16.7	4.0	8.9	24.4
DO	mg/l	4.49	0.67	3.18	5.80
DO	%	66.6	10.7	45.6	87.6
TDS	mg/l	36205	4340	27699	44711

Table 2 In Situ Water Quality Results, Diversion Basin

Low Rainfall Input Waters to Barcoo Outlet					
Parameter	Unit	Average	Std Dev	Range 95% of Data	
				Minimum	Maximum
pH		8.08	0.19	7.71	8.45
EC	mS/cm	56.9	2.9	51.1	62.7
Turbidity	NTU	12.1	5.1	2.0	22.2
DO	mg/l	4.12	1.01	2.13	6.10
DO	%	57.8	13.6	31.2	84.4
TDS	mg/l	36275	1872	32606	39945

Table 3 In Situ Water Quality Results, Barcoo Inlet Waters

The turbidity value for location "C" has been excluded from the statistical analysis. However the measured turbidity of 247NTU is consistent with observations of the Barcoo intake when the Weir 2 gates are open.

The bottom Total Dissolved Solids or TDS (26584 mg/l) and EC (41.7mS/cm) results for location "G" have been excluded from the statistical analysis. This location is most likely impacted by fresh to brackish water entering from the Basin to the North of the Road. It should be noted that over a full year the salinity of water entering the Barcoo outlet will range from fresh rain water (at times of high storm water flows) to sea water (when no stormwater flows).

At times of high flow rate (due either to the opening of Weir 2 gates or high storm water flows) the Total Suspended Solids (represented by Turbidity) will be considerably higher than the values recorded in Tables 1 to 3. At these times it is also expected that the Dissolved Oxygen (DO) will be significantly higher and probably approach 100% saturation.

These observations are relevant because the Barcoo outlet is the route through which any environmental degradation from dredging will impact on the environment external to the approved work area. Any impact on Basin A and the Diversion Basin will be temporary and result in an overall improvement of the PLS environment.

5.2 Recovered Water Quality Parameters

A statistical summary of the Water quality parameters for the recovered water samples is provided in Table 4.

The following points are of note when comparing Table 4 to Tables 1 to 3;

The pH of water recovered from the sediment is approximately 1 pH unit lower than the water in Basin A. The potential consequence of this change is the release of metals from the sediment into the recovered water (and consequentially into Basin B). The potential impact of this is discussed (for copper and zinc) below. No such change is noted for the Diversion Basin recovered water.

The Dissolved Oxygen in the recovered water is significantly higher than the Basin water. This is due to aeration of the sample during recovery of the water in the laboratory. It is expected that the de-watering undertaken after the sample dredging will have a similar impact on water discharged into Basin B. The effect replicates the situation during high storm water flow rates. An increase in Dissolved Oxygen is an improvement in water quality.

Turbidity in the recovered water is lower than in the Basin water. This is to be expected since the aim of the dewatering is to produce a return water flow with suspended solids removed. It is clear that in the context of the PLS a turbidity guideline limit of 10NTU is not relevant because the existing turbidity is higher than this (ranging up to 247NTU).

Salinity (expressed at electrical conductivity (EC) or Total Dissolved Solids (TDS) is higher in the recovered water from Basin A sediment than in the Basin A water. This is most obvious when considering the maximum salinity. Although statistically significant, the difference in average salinity between the recovered water and the Basin A water in not considered environmentally significant. It is expected that the natural salinity in Basin A and Basin B could increase above the maximum estimated in Table 4 due to evaporation over the summer period.

Of more significance is the difference in salinity between Basin A (and Basin B) and the Diversion Basin. Over a normal year the salinity in Basins A and B would be expected to vary between that of storm water (i.e. very low) and a maximum of (say) 2,500mg/l due to evaporation in the summer months. The water in Basins A and B would never be saline because of the effective backflow barrier provided by Weir 1. However, the salinity in the Diversion Basin varies from very low in time of high storm water flow to (effectively) sea water during the summer months. This observation is significant because it demonstrates the need to prevent recovered water from the Diversion Basin sediment from being returned to Basin B. It must be returned to the Diversion basin.

Basin A		Average	Std Dev	Range 95% of Data	
				Minimum	Maximum
pH		8.44	0.11	8.22	8.66
EC	mS/cm	3.52	0.67	2.22	4.83
Turbidity	NTU	15.1	5.8	0.0	26.5
DO	%	76.1	8.1	60.2	92.0
DO	mg/l	6.19	0.75	4.73	7.65
TDS	mg/l	1192	445	320	2064
Diversion Basin		Average	Std Dev	Range 95%	
				Minimum	Maximum
pH		7.95	0.09	7.77	8.13
EC	mS/cm	56.2	7.7	41.2	71.2
Turbidity	NTU	5.7	2.5	0.8	10.6
DO	%	75.2	4.5	66.3	84.1
DO	mg/l	5.22	0.30	4.64	5.80
TDS	mg/l	36300	5110	26285	46315

Table 4 Recovered Water Summary Results

5.3 Laboratory Water Analysis

Laboratory water analysis (see Appendices 4 and 6) demonstrates that Total Recoverable Hydrocarbons (TRH) and Total Petroleum Hydrocarbons (TPH) are not present at significant levels.

With the exception of three recovered water and one water sample from Basin A recording TRH in the range 0.1 to 0.2mg/l and one water sample from the Diversion Basin recording a TRH of 0.1mg/l all samples recorded “non detect” TRH.

All samples recorded “non detect” for TPH.

Lead was not found in any samples.

Copper was detected in all Basin A samples and Zinc was detected in all samples. Results for copper and zinc are provided in Table 5 and a statistical summary (including 95% confidence interval for the estimation of the mean) presented graphically in Figure 2.

Basin A	Copper	Zinc		Copper	Zinc
W01	0.007	0.078	RW01	0.009	0.079
W02	0.006	0.075	RW02	0.007	0.047
W03	0.006	0.078	RW03	0.005	0.024
W04	0.007	0.078	RW04	0.005	0.025
W14	0.007	0.076			
W05	0.005	0.074	RW05	0.011	0.085
			RW15	0.01	0.078
Average	0.006	0.077		0.007	0.056
Std Dev	0.001	0.002		0.003	0.028
95% CI	0.001	0.001		0.002	0.022
Diversion Basin					
W06	<0.005	0.024	RW06	<0.005	0.019
W07	<0.005	0.017	RW07	<0.005	0.023
W08	<0.005	0.052	RW08	<0.005	0.032
W09	<0.005	0.029	RW09	<0.005	0.029
W10	<0.005	0.017	RW10	<0.005	0.026
Average	<0.005	0.028		<0.005	0.026
Std Dev		0.014			0.005
95% CI		0.013			0.004

Table 5 Copper and Zinc Water Results mg/l

Statistical analysis (using the US-EPA ProUCL v5.0 software) confirms that at the 95% confidence limit there is no difference between the copper and zinc values in the water (W) and recovered water (RW) samples. Statistical tests were conducted using the two tailed t-Test, Wilcoxon-Mann-Whitney and Welch-Satterthwaite tests.

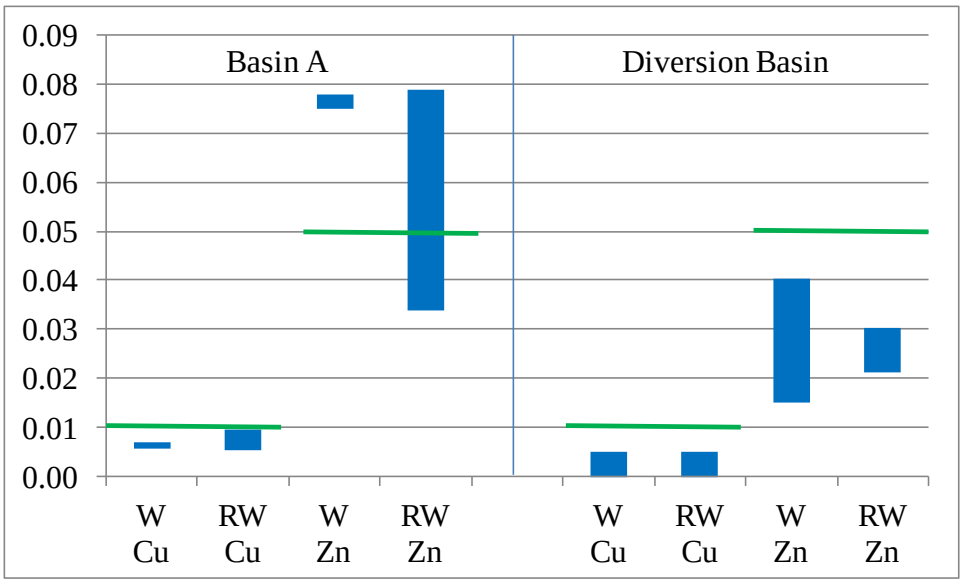

Figure 2 95% Confidence Interval for Copper and Zinc in Water mg/l

The green lines in Figure 1 represent the Environment Protection (Water Quality) Policy criteria for copper and zinc. It is clear that zinc in Basin A does not meet the criteria, however, this is true for both the water in the Basin now and the recovered water destined for

return to Basin B. Sampling was not undertaken in basin B, however Basin A and Basin B are a contiguous water body and it is expected that water quality will be comparable in both Basins.

5.4 Summary of Water Results

Table 6 compares the existing and return water parameters with the Environment Protection (Water Quality) Policy criteria for all parameters measured.

Parameter	Unit	Fresh Water Ecosystem			Marine Water Ecosystem		
		Basin A			Diversion Basin		
		Criteria	Existing	Recovered Water	Criteria	Existing	Recovered Water
pH	pH units	6.5 - 9.0	9.06-9.74	8.22-8.66	6.5 - 8.5	7.86-8.07	7.77-8.13
Turbidity	NTU	20	16-370	5.3-27	10	12-24	2.6-9.2
Dissolved Oxygen	mg/l	>6	0-4.54	4.73-5.66	>6	2.94-6.24	4.64-5.80
Salinity	mg/l	10% [1)]	820-980	320-2100	ND [2)]	24600-46900	26300-46300
TPH	mg/l	10 [3)]	<0.1	<0.1	10 [3)]	<0.1	<0.1
Copper	mg/l	0.01	0.005-0.007	0.005-0.011	0.01	<0.005	<0.005
Zinc	mg/l	0.05	0.074-0.078	0.024-0.085	0.05	0.017-0.052	0.019-0.032

Complies with criteria
Complies with criteria during dredging
Improved during dredging, but does not comply with criteria
Does not comply and/or does not improve

Table 6 Water Quality Results Compared to Criteria for Protection of Aquatic Ecosystems

Notes pertaining to Table 6 are;

1. The salinity criteria for Fresh Water ecosystems is for a salinity variation of less than 10% relative. This is not met in the current Basin A water and will not be met during the proposed dredging. However in the Patawalonga Lake System the fresh water salinity varies over a wide range due to evaporation and water column stratification. The expected natural variation in salinity in Basins A and B over a full year is between very low values (during high storm water flow) to (say) 2500mg/l or more in summer due to evaporation. The range of salinity concentration expected during the dredging and de-watering operation is expected to fall within this natural range provided that recovered water from the Diversion Basin sediment is not returned to Basin B.

2. There is no salinity criteria for the Marine Ecosystem. However, the salinity in the Diversion Basin naturally varies between very low (during high storm water flow) to greater than sea water due to evaporation in summer. The range of salinity concentration expected during the dredging and de-watering operation is expected to fall within this natural range.

3. Total Petroleum Hydrocarbons (TPH) was measured during this investigation however the criteria is expressed as “oil and grease”.

6 Conclusions (Water)

Samples of water removed from Basin A and the Diversion Basin (prefixed “W”) and of Recovered Water (prefixed “RW”) extracted from the sediment in Basin A and the Diversion Basin have been analysed for key potential contaminants and water quality parameters to establish baseline values and to estimate the likely impact of a proposed dredging and de-watering project.

The results of the analysis have been compared to the water quality protection criteria listed in the Environment Protection (Water Quality) Policy (referred to in the following text as the “criteria”) and are consistent with the following conclusions;

6.1 pH

The water currently in Basin A (and by extension Basin B because the two Basins are a single water body) does not meet the criteria and would not be expected to meet the criteria until the next storm water run-off event. However, the water recovered from the sediment by the proposed dredging and dewatering process (and to be returned to Basin B) is expected to comply.

The water currently in the Diversion Basin does meet the criteria. The water recovered from the sediment by the proposed dredging and dewatering process is also expected to comply.

6.2 Turbidity

The water currently in Basin A (and by extension Basin B) and in the Diversion Basin does not comply with the criteria.
The water recovered from sediment removed from Basin A will not comply with the criteria. However it is expected to be a significant improvement over currently existing conditions when returned to Basin B

Water recovered from the sediment removed from the Diversion Basin is expected to comply with the criteria prior to being returned to the Diversion Basin.

It must be noted that these comment relate to the water recovered by the de-watering process. It is expected that there will be significant local elevations in turbidity near and adjacent to the actual dredging operation, this is an unavoidable consequence of dredging. The monitoring of this impact will be undertaken as part of the project “Water Quality Monitoring Program”.

6.3 Dissolved Oxygen

Water in Basin A (and by extension Basin B) and in the Diversion Basin does not comply with the criteria. The water recovered from the sediment removed from Basin A and the Diversion Basin is still unlikely to meet the criteria, however, the quality with respect to Dissolved Oxygen is expected to be significantly improved by the proposed dredging and de-watering process.

6.4 Salinity

The criteria for salinity in a fresh water environment is for the variation to be less than 10% relative. The water in Basin A (and by extension Basin B) does not comply with the criteria. The water recovered from sediment removed from Basin A is unlikely to comply with the criteria and based on bench trials will probably be more saline than the water currently in Basin B. It is expected that the variation in salinity of the water recovered from sediment removed from Basin A will be within the natural variation (over a full year) for salinity in Basin B.

The salinity of water recovered from sediment removed from the Diversion Basin is expected to vary within the range found in the water already in the Diversion Basin. However, it is significantly more saline that the natural variation found in Basin B. For this reason monitoring and engineering controls should be implemented to ensure that saline water recovered from dredged sediment is not returned via Basin B but is returned to the Diversion Basin.

6.5 Total Petroleum Hydrocarbons (TPH)

TPH was not detected in any water samples. The proposed dredging and de-watering are not expected to impact on TPH levels in the Patawalonga Lake System.

6.6 Copper

Copper concentration in all water samples comply with the criteria. The proposed dredging and de-watering are not expected to impact on copper levels in the Patawalonga Lake System.

6.7 Zinc

Zinc levels in the existing Basin A and Diversion Basin water does not meet the criteria. Water recovered from the sediment removed from Basin A is expected to have a lower concentration than the water currently in Basin B, however it will not meet the criteria. The proposed dredging and de-watering project is expected to improve the water quality with respect to zinc.

Water recovered from the sediment removed from the Diversion basin is expected to have a lower concentration than the water currently in Basin B and will not meet the criteria. The proposed dredging and de-watering project is expected to improve the water quality with respect to zinc.

6.8 Summary

For all of the water quality parameters investigated the quality of the water recovered from the removed sediment will be improved (in most cases) or as a minimum (for salinity) not degraded when compared to the quality of the water currently in the Patawalonga Lake System (PLS).

For Total dissolved Solids (TDS) or salinity the water quality of the recovered water is expected to fall within the range of values naturally experienced in the PLS. Provided that water recovered from the Diversion Basin sediment is not returned to Basin B.

7 Results and Discussion (Sediment)

Ten samples of sediment (five from Basin A and five from the Diversion Basin) were collected and analysed for key potential contaminants identified during previous investigations (see Appendix 1).

Four of these samples (two from Basin A and two from the Diversion Basin) were analysed for all potential contaminants listed in the "Waste Derived Fill Standard".

Copies of the laboratory report and associated quality control information are provided in Appendix 5.

The following potential contaminants were not detected in any sample;

PAH	benzo(a)pyrene
Phenols	OCP
chlordane	DDT
aldrin/dieldrin	heptachlor
PCB	benzene
ethylbenzene	toluene
xylenes	tetrachloroethene
Cr^{6+}	beryllium
mercury	silver
cyanide (total)	

The statistical summary including 95% upper confidence limit for the estimation of the mean (95% UCL determined by ProUCL v5.0) for all detected contaminants is provided in Table 7.

Analyte	Average mg/kg	Std Dev mg/kg	95% UCL mg/kg	Maximum mg/kg
TPH C_{10}-C_{36} (Total)	1041	703	1406	1940
TRH C_6-C_9	<20	NA	<20	<20
Chromium (trivalent)	32	16	46	48
Arsenic	11	8	15	23
Barium	60	36	90	95
Cadmium	0.8	0.3	1.1	1.2
Cobalt	7	2	8	9
Copper	56	31	73	100
Lead	74	38	94	140
Manganese	114	62	165	180
Nickel	15	8	22	24
Zinc	672	359	858	1200

Table 7 Statistical Analysis for Detected Analytes

Copper, zinc and Total Petroleum Hydrocarbons (TPH C_{10}-C_{36}) do not comply with the requirements of the Waste Derived Fill standard. All other analytes comply with the standard.

The proposed disposal option for the de-watered sediment is beneficial reuse as a compost feed stock. Failure to comply with the Waste Derived Fill standard would normally preclude use of the material for compost feedstock. It is understood that the proposed receiver of the de-watered sediment has approval for exceedence in the case of copper, zinc and TPH (refer to a separate submission to the EPA by the composter.

The first round of analysis included only four samples for arsenic because previous investigations did not identify arsenic as a contaminant of concern. Using these four results (taken from Appendix 5) resulted in a 95% upper confidence limit of 24mg/kg which is above the waste derived fill standard. This was due to a single sample returning a result of 23mg/kg.

A further five samples were analysed for arsenic (see Appendix 7), the inclusion of these results provided the 95% upper confidence limit of 15mg/kg listed in Table 7.

8 Conclusions (Sediments)

Ten samples of sediment were collected from the Patawalonga Lake System (PLS), five from Basin A and five from the Diversion Basin.

The samples were analysed for the previously identified key potential contaminants with four samples analysed for all contaminants listed in the Waste Derived Fill standard, nine samples were analysed for arsenic. The results of the analysis confirm that the composition of the sediment currently deposited in Basin A and the diversion Basin is consistent with the results of previous investigations reported elsewhere (see Appendix 1).

With the exception of Total Petroleum Hydrocarbons (TPH C_{10}-C_{36}), copper and zinc all contaminants listed in the Waste Derived Fill standard comply with the standard.

It is understood that the proposed composter has approval to accept the material with Total Petroleum Hydrocarbons (TPH C_{10}-C_{36}), copper and zinc above the Waste Derived Fill standard provided that the concentrations do not exceed the “intermediate landfill cover” criteria. These contaminants do not exceed the “intermediate landfill cover” criteria.

Appendix 1

Previous Report 13020A

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Report Number 13020A

Your Order RfP document preparation

Report Title Patawalonga Lake System Sediment Disposal Data Summary

Report by John Waters

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2 Introduction

The Patawalonga Lake System (PLS) was established in 2001 to mitigate a number of adverse environmental impacts of storm water sediments on the then existing Patawalonga Lake and adjacent coastal and marine environments. These impacts included;

- Stormwater impacts on the amenity of local beaches
- Impacts on the receiving marine environment including the potential decline of coastal seagrass meadows
- Odour and visual amenity impacts caused by accumulation of sediment in the existing lake
- Fish kills resulting from rapid salinity and dissolved oxygen level changes

The sediment deposition in the Lake culminated in the need to remove approximately 150,000 m^3 of sediment from the Patawalonga Lake in 1996/7[(1)].

The PLS is constructed such that sediment and debris contaminated storm water entering from the catchment areas changes direction and velocity so that suspended sediment tend to settle out in one of two sedimentation basins. Floating debris is collected by a floating litter boom and diverted to two concrete pads for collection when water levels recede.

The storm water then passes over a Weir (Weir 1) and through a diversion basin and to the sea via a buried pipeline (the Barcoo Outlet). During storm events when water flows are higher than the capacity of the pipeline the Weir gates (Weir 2) to the Patawalonga Lake can be opened to divert storm water to the sea via the lake. Weir 2 can also be used to maintain a tidal sea water flow from South to North in the Parawalonga Lake.

A detailed description of the design features and intended operation of the PLS can be found in consultant reports held by the Department and the Adelaide and Mount Lofty Ranges Natural Resources Management Board[(2,3)].

The accumulation of silt in the sedimentation and diversion basins necessitates the occasional removal and disposal of sediment. One such exercise was undertaken in 2008 with the removal of approximately 10,000 tonnes (dry weight) of sediment[(4,5)].

Between 2008 and now sediment (an estimated 35,000m^3)[(2)] has accumulated to the point that the operation of the PLS is compromised such that;

- Operation of the Weir 2 gates is compromised by the accumulation of sediment in the diversion basin[(2)]
- Exposed islands of accumulated sediment are appearing in the diversion basin
- Operation of the litter boom is compromised[(2,6)]
- Retention times in the sedimentation basins has decreased to the point where sedimentation is minimal or non existent[(2,6)]

A number of options for the disposal of the sediment have been considered and implemented in the past. On Site Technology Pty Ltd was engaged to summarise the available analytical and physical data.

3 Regulatory Status of the Sediment

Previous disposal exercises have relied on composting of the removed sediment after mixing with green waste. Numerous reviewed documents make reference to the suitability of the sediment as a compost feedstock. For example;

1) "*Based upon initial responses from a number of composting operators there is a willingness from the market place to accept receipt of the material"* (2)

2) "*The results of the trial showed that overall this [composting] was an environmentally sustainable practice…"*(7)

3) *"In Golder's experience, materials with chemical concentrations comparable to sediments tested as part of this assessment have been accepted as feedstock for composting facilities in the past"* (8)

4) *"The outcome was that the material was found to be suitable for composting"* (9)

These comments and the previous practice of using the sediment as a compost feedstock appear to be based on a number of assumptions that may not be appropriate under the current regulatory framework, these assumptions include;

- Analysis of insufficient samples to comply with current regulatory guidelines
- Decisions that predate the current waste soil guidelines (for example the Waste Derived Fill guideline)(10)
- Consideration of the sediment as a biosolid which is not consistent with the scope of the Biosolids Guidelines(11)

Under current South Australian guidelines(10) the sediment is classified as "Waste Soil" as follows;

> *"All soil including dredge soil excavated and removed from any site"*

This is in contrast to the scope of the biosolids guideline(11) which includes;

> "*biosolids produced from wastewater treatment plants for populations greater than 1000 persons or smaller plants that also receive industrial waste*"

Any future proposal to dispose of the sediment via composting must consider the suitability of the sediment in the context of current EPA guidelines and any licence conditions of the proposed receiving or processing site.

Previous investigations have relied primarily on the National Environmental Protection (Site Contamination) Measure (NEPM 1999) to establish suitable reuse options for the sediment. It is important to note that under the current regulatory framework in South Australia the NEPM Health and Ecological Investigation levels are not relevant in determining the disposal options for contaminated soil. In fact the NEPM investigation levels were never intended to be used to assess disposal scenarios. However, prior to the adoption of the waste soil and waste disposal guidelines (in 2010) they were often used as de-facto standards by many consultants.

In theory, the sediment can be reused in almost any scenario that is technically possible provided that;

1. Suitable investigations are undertaken
2. SA-EPA approval is granted
3. Appropriate licenses are obtained and license conditions complied with

6 Previous Analysis

Numerous reports dated between 2005 and 2011 have been reviewed to identify the available analytical data on the PLS sediment. A number of these reports relate to smaller sediment traps located away from the PLS, however they have been included because these smaller traps are within the PLS catchment area. The reports included in the review are described in references 4, 5, 7, 8, 9, 15, 16, 19 and 20.

The analytical data has been reviewed and summarised by reference to the original laboratory reports (where these have been provided). To prevent weighting of results to particular samples the results for quality control samples (for example field, inter laboratory and intra laboratory duplicates and rinsate blanks) have not been included in the summary data.

A reasonably large number of sediment samples (approximately 220 over a 12 year period) have been analysed for metals, recoverable hydrocarbons (TPH) and poly-nuclear aromatic hydrocarbons (PAH, including benzo(a)pyrene, BaP). With respect to these contaminants there is sufficient data to undertake a statistical analysis, however the relevance of the previous results to the current PLS sediment in the context of regulatory compliance and waste classification under current guidelines may be limited.

The previous data is, however, of considerable use in identifying the probable most significant potential contaminants in the current PLS sediment. These are;

1) Copper
2) Zinc
3) C_{10}-C_{36} Petroleum hydrocarbons

and to a lesser extent poly-nuclear aromatic hydrocarbons (PAHs). The PAH content of the previously tested sediments appears to be limited to specific sites and specific time periods rather than being consistently above regulatory guidelines (see Table 3). In fact the frequency of PAHs above the waste fill guideline value in the PLS basins is very low.

A number of reports refer to the difference between Total Recoverable Hydrocarbons (TRH) which includes biogenic hydrocarbons (hydrocarbons from plants and other natural materials) from the leaf litter and other plant derived material and Total Petroleum Hydrocarbons (TPH) which only includes petrogenic hydrocarbons (hydrocarbons from fuel and industrial processes). The majority of the previous test work determined TRH and results will include biogenic hydrocarbons which, given the source of the organic debris, is likely to dominate. Tables 1,2 and 3 provide a summary of the available results for these key contaminants. The results are presented in the form of a “pass” or “fail” (Table 1) of the waste derived fill

guideline. That is, if the 95% upper confidence level (Table 2) is below or above the guideline value.

Fewer samples have been analysed for key contaminants including Cr(VI), Hg, organo-chlorine pesticides (OCP), Acid herbicides, phenolic compounds, cyanide, Monoaromatic hydrocarbons (commonly referred to as MAH or BTEX) and volatile chlorinated hydrocarbons. The limited number of samples analysed for these contaminants would support the hypothesis that they are not present in the sediment. It must be stressed that, although there is evidence to support this hypothesis, the sampling frequency falls significantly short of that required under current best practice and SA-EPA guidelines. There are certainly too few results to undertake any meaningful statistical analysis.

Table 1 provides the results of comparison of the 95% upper confidence limit (UCL) for key contaminants with the guideline limit for waste derived fill (WDF). This comparison is relevant because the waste derived fill limit is applicable to potential use of the material as compost feedstock, waste fill, civil fill and the most cost effective disposal to commercial landfill operators. Other contaminants including As, Cd, Cr, Pb, benzene, ethylbenzene, toluene and xylenes reported 95% upper confidence limits well below the waste fill guideline limit.

Of note in Table 1 is that the only reports indicating that Cu and C_{10}-C_{36} TPH were less than the WDF guideline value (i.e. “pass”) are for the two studies that have too few samples to be relied on.

Table 3 provides a breakdown of the PAH results for the Soil & Groundwater report, which is itself, a summary of pre 2005 data. Note that in the case of the Soil & Groundwater report, original laboratory reports were not available, data for Table 3 was extracted from the report summary. Of note in Table 3 is that no samples from the Tapleys Hill Road site (the PLS) failed the WDF guideline limit for PAHs or BaP.

Report	Cu	Zn	PAH	BaP	C_{10}-C_{36} TPH	Note
S&G 2005	Fail	Fail	Fail	Fail	Fail	
Golder 2005	Fail	Fail	Pass	Pass	Fail	Included in S&G report
Aurecon 2006	Fail	Fail	Pass	Pass	Pass	only 4 samples
Remediate 2008	Fail	Fail	Pass	Pass	Fail	
Golder 2011	Pass	Fail	Pass	Pass	Pass	only 2 samples
Golder 2011	Fail	Fail	Fail	Fail	Fail	Watson Ave (6 samples)

Table 1 Key Contaminant 95% UCL compared to WDF Guideline

Report	Cu	Zn	PAH	BaP	C_{10}-C_{36} TPH	Number of Samples
S&G 2005	64	810	8.3	1.1	2629	170
Golder 2005	77	907	1.2	0.5	3103	23
Aurecon 2006	64	716	<0.2	<0.2	<150	4
Remediate 2008	61	713	NA	NA	1679	16 (1 for PAH)
Golder 2011	29	251	NA	NA	<150	only 2 samples
Golder 2011	75	875	8	1.1	4800	6

Table 2 Key Contaminant 95% UCL mg/kg

Site	Year	# samples	# Fails
Airport	2002	26	4
Keswick Drain	2003	15	11
St Peters	2002	30	5
Watson Ave	2002	2	0
Taplys Hill Road	2005	19	0
Brownhill Creek	1999	5	5
Bradman Drive	2002	2	1

Table 2 S&G 2005 PAH "Fails" Breakdown

Based on the available data it can be concluded with reasonable confidence that the PLS sediment will not comply with WDF requirements with respect to copper (Cu), zinc (Zn) and C_{10}-C_{36} Petroleum Hydrocarbons.

1) A Review of Flow & Sediment Load Information for the Patawalonga Lake System
An Vu & Graeme Dandy
Adelaide Research and Innovation
Undated report (estimated at 2010 or 2011)

2) Business Case for Sediment Management at the Patawalong Lake System
Econsearch/KBR, 3rd December 2012
KBR document number AEG203-TD-0001-CV-GEN-0002 Rev.0

3) Patawalong Seawater Circulation and Stormwater System Operational Environmental Management Plan
21st June 2001
URS document number 20102-018

4) Patawalonga De-silting Project
Connell Wagner Pty Ltd contract AMLR63
28th April 2008 document number K133-006-01

5) Letter dated 23 September 2008
from Ben Dearman of Remediate
to Michael Hood of Connell Wagner Pty Ltd

6) Ralph Hack, Department for Environment, Water and Natural Resources
Personal communication May 2013

7) Summary of Options for an Alternative Management Solution for Surface Drain Sediment Material Adelaide, South Australia
Soil and Groundwater Consulting
Doc Ref SG051237 RP01 Revision 0 dated 28th July 2006

8) Morphett Road Sediment Dewatering Trials – Sediment and Water Quality Testing
Golder Associates report number 107663523 004 L Rev0
21st February 2011

9) Patawalonga Basin Desilting Project, Brief Scoping Study Department of Water Land and Biodiversity Conservation
Aurecom report 38835-002 dated 3rd February 2010

10) Standard for the Production and use of Waste Derived Fill
South Australian Environment Protection Authority
January 2010

11) South Australian Biosolids Guideline
for the Safe Handling, Reuse or Disposal of Biosolids
South Australian Environment Protection Authority
June 1997

12) Water Quality Guidelines, Dredging and earthworks drainage

EPA document 396/10 updated June 2010
South Australian Environment Protection Authority

13) Environment Protection (Water Quality) Policy 2012

14) Australian and New Zealand Guidelines for Fresh and Marine Water Quality
Prepared by ANSECC and ARMCANZ, 2000

15) Silt Trap Material Composting Trials
Patawalonga Catchment Water Management Board
15th July 2004
Prepared by Flinders Bioremediation

16) Silt Trap Material Composting Trials
Patawalonga Catchment Water Management Board
Addendum report 7th September 2004
Prepared by Flinders Bioremediation

17) Standard for the production and use of Waste Derived Soil Enhancer
April 2010
South Australian Environment Protection Authority

18) Waste disposal Information Sheet
Current criteria for the classification of waste
—including Industrial and Commercial Waste (Listed) and Waste Soil
Document 889/10 March 2010
South Australian Environment Protection Authority

19) Watson Avenue Sediment Basis and Gross Pollutant Trap –
Sampling and Analysis Prior to Desilting
Golder Associate project # 107663523 008 L Rev1
Dated 30th May 2011

20) Environmental Sampling and Analysis of Sediment Materials
Patawalonga Basin Tapleys Hill Road, West Beach
Golder Associate project # 05669005/007
Dated 10th May 2005

Appendix 2

Approved Sampling and Analysis Program

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Our Ref. 13054A-PLS SAP.doc/pjw

23rd December 2013

Mr Rajiv Mouveri
Department for Environment, Water and Natural Resources
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Sampling and Analysis Plan
Patawalonga Lake System Sediment

Introduction

Department for Environment, Water and Natural Resources (DEWNR) is currently negotiating with a number of contractors to remove accumulated sediment from the Patawalonga Lake System (PLS) at Glenelg. Part of the proposed project is the re-use

Over the last decade there have been numerous investigation to characterize the chemical composition of the sediment in order to formulate appropriate disposal options. The preferred sediment disposal option at this stage involves removal (following on site dewatering) of the sediment to an appropriately licensed composting facility for composting and subsequent beneficial reuse.

The SA-EPA has reviewed an application from the composter to process the sediment and has highlighted a concern, specifically, the fact that the current information about the sediment is dated and may not accurately reflect the composition of the sediment as it exists now.

Further to this concern a project risk analysis workshop conducted on 18th December has identified the quality of the water recovered from the sediment as being a significant potential project risk. The method identified to mitigate this risk is to conduct background water quality testing and testing of water recovered from the in situ sediment prior to mobilization for the project.

This SAP is aimed at addressing three specific pre project data gaps that have been identified, these are;

1. Sampling and analysis of sediment prior to project mobilization to confirm that the current status of the sediment with respect to key potential contaminants is consistent with the historic data

2. Sampling and analysis of the PLS water to establish background concentrations of potential contaminants and parameters in order to establish site specific criteria for the

return of recovered water to the PLS in compliance with the *"Environment Protection (Water Quality) Policy 2003"*

3. Sampling and analysis of water recovered from sediment samples to assess the potential for environmental impact when the recovered water is returned to the PLS

It must be stressed that this SAP does not address the process and environmental monitoring requirements of the proposed sediment management project. Those aspects of the project are detailed in the documents provided in support of the Development Application.

Sediment

Sediment Samples

Ten sediment samples will be collected from locations in PLS from the indicative locations shown in Figure 1. Exact locations will be determined at the time of sampling and will be dictated by access and operational conditions at the time.

Samples will be collected from an inflatable dingy using a van Veen grab sampler (or similar sampling device). Grab samples are preferred because;

- They provide a larger and more representative (with respect to area) sample than a core sample
- Previous attempts to recover core samples have not been successful because of the low density, high water content and non compacting properties of the in situ sediment
- The purpose of this SAP is to determine the bulk properties not the stratification (if any) of the sediment

The van Veen sampler is preferred because;

- It collects samples from a relatively large area ($250cm^2$)
- It provides a reasonable sample bulk for complex analyte suites
- It heavy enough to displace to loosely packed and suspended sediment at the base of the water column
- Will not compromise the (assumed) clay liner of the PLS
- It a recognized standard for sediment sampling

Sediment samples (free of extraneous water) will be sub-sampled into appropriate containers to be supplied by the preferred analytical laboratories, preserved and transported to the laboratories under standard chain of custody arrangements. Two field duplicates to be submitted to the laboratory as "blind" duplicates, will be prepared.

Based on discussions with SA-EPA personnel it is understood that written approval will be required to undertake the sediment sampling stage of this SAP.

Sediment Analysis

Analysis will be undertaken by Eurofins MGT Environmental Laboratory service which is NATA accredited for all tests to be requested.

Sediments will be analysed in accordance with *"Current criteria for the classification of waste-including Industrial and Commercial Waste (Listed) and Waste Soil"* as detailed in Table 1. The four samples listed in Table 1 will include two from the diversion basin and two from basin A. The six samples listed in Table 1 will include three from the diversion basin and three from basin A.

Analyte	4 samples	6 samples	2 Field Duplicate
moisture	X	X	X
TPH	X	X	X
TRH	X	X	X
PAH	X		X
benzo(a)pyrene	X		X
phenols	X		X
OCP	X		X
Chlordane	X		X
DDT	X		X
Aldrin/Dieldrin	X		X
Heptachlor	X		X
PCB	X		X
benzene	X		X
ethylbenzene	X		X
toluene	X		X
xylenes	X		X
tetrachloroethene	X		X
Cr^{6+}	X		X
Cr^{3+}	X		X
arsenic	X		X
barium	X		X
cobalt	X		X
beryllium	X		X
cadmium	X		X
chromium (total)	X		X
copper	X	X	X
manganese	X		X
nickel	X		X
lead	X	X	X
zinc	X	X	X
mercury	X		X
silver	X		X
iron	X		X
cyanide (total)	X		X

Table 1 Analyte List – Sediment Samples

Water

Water Samples

Water samples will be collected from the water column at the same locations as the sediment samples. These will be collected prior to the collection of the sediment samples to avoid possible contamination of the water with sediment disturbed during the sediment sampling process.

Water samples will be sub-sampled into appropriate (pre preserved) containers to be supplied by the preferred analytical laboratories, placed in cooled eskys and transported to the laboratories under standard chain of custody arrangements. One field duplicate to be submitted to the laboratory as "blind" duplicates, will be prepared.

Water Analysis

pH and dissolved oxygen will be determined at the sampling site using calibrated portable equipment. Water Samples will be analysed for contaminants of concern in accordance with *"Environment Protection (Water Quality) Policy 2003"* as detailed in Table 2.

The analytes listed in Table 2 represent contaminants of concern for the site taken from Schedule 2 of *"Environment Protection (Water Quality) Policy 2003"* plus TPH/TRH which has been added because these have been identified by previous sediment analysis as being key potential contaminants

As listed all samples will be analysed for the potential contaminants that are considered most likely to be present in the PLS water column.

Recovered Water

Recovered Water Samples

Water will be recovered from duplicate sediment samples collected in parallel with the sediment samples described above. These duplicates will have the extraneous and pore water removed (by On Site Technology Pty Ltd) to produce a recovered water sample typical of that expected from the operational dewatering process. A combination of decanting, filtration and centrifuge will be used to recover the water.

The described method of recovering water from the sediment is proposed in preference to a typical elutriation test because it is considered more representative of the proposed dewatering process. The use of an elutriation test would result in significant dilution of the recovered contaminants that will not occur in the proposed process. The proposed approach will provide a conservative worst case scenario.

Recovered Water samples will be sub-sampled into appropriate (pre preserved) containers to be supplied by the preferred analytical laboratories, placed in cooled eskys and transported to

the laboratories under standard chain of custody arrangements. One field duplicate to be submitted to the laboratory as "blind" duplicates, will be prepared.

Recovered Water Analysis

pH and dissolved oxygen will be determined at the sampling site using calibrated portable equipment. Water Samples will be analysed for contaminants of concern in accordance with *"Environment Protection (Water Quality) Policy 2003"* as detailed in Table 2.

The analytes listed in Table 2 represent contaminants of concern for the site taken from Schedule 2 of *"Environment Protection (Water Quality) Policy 2003"* plus TPH/TRH which has been added because these have been identified by previous sediment analysis as being key potential contaminants

As listed all samples will be analysed for the potential contaminants that are considered most likely to be present in the PLS recovered water.

Analyte	10 Water	10 Recovered Water	2 Field Duplicates
pH	X	X	X
DO	X	X	X
copper (total)	X	X	X
zinc (total)	X	X	X
TPH /TRH	X	X	X

Table 2 Analyte List- Recovered Water Samples

Reporting

All results will be collated and reported in a format designed to address the three identified data gaps, these being;

1. To confirm (or otherwise) that the current status of the sediment with respect to key potential contaminants is consistent with the historic data

2. To establish background concentrations of potential contaminants and parameters in order to establish site specific criteria for the return of recovered water to the PLS in compliance with the *"Environment Protection (Water Quality) Policy 2003"*

3. To assess the potential for environmental impact when the recovered water is returned to the PLS

Where available the results of previous investigations will be included to provide a comparison.

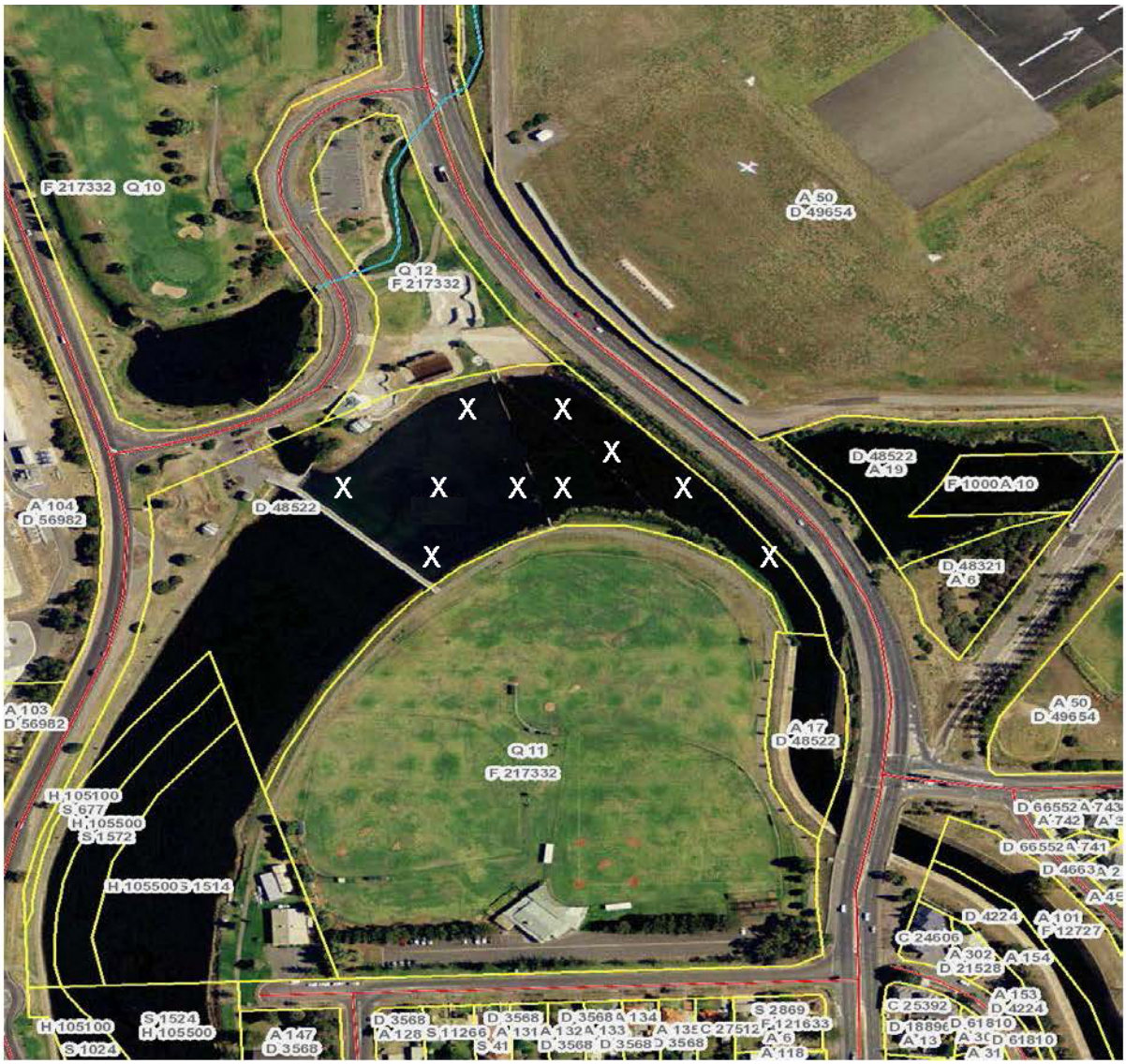

Figure 1 Nominal Sample Locations

Appendix 3

Field Water Quality Data

Basin A

Location		W01	W02	W03	W04	W05	Average	Std Dev	Range 95% of Data	
Surface Sample @ 15cm									Minimum	Maximum
pH		9.23	9.52	9.60	9.48	9.50	9.47	0.14	9.19	9.74
EC	mS/cm	1.94	1.95	1.95	1.94	1.95	1.95	0.01	1.94	1.96
Turbidity	NTU	18.0	17.0	17.0	62.7	17.2	26.4	20.3	0.00	66.2
DO	mg/l	4.13	0.83	1.59	0.20	0.91	1.53	1.53	0.00	4.54
DO	%	48.1	9.8	18.6	2.3	10.6	17.9	17.9	0.00	52.9
TDS	mg/l	891	967	856	879	903	899	42	818	981
Bottom Sample 15cm above										
pH		9.30	9.16	9.43	9.47	9.23	9.32	0.13	9.06	9.57
EC	mS/cm	1.97	2.71	1.94	1.96	2.51	2.22	0.36	1.50	2.93
Turbidity	NTU	337	16.4	54.9	114	68.7	118	127	0.0	367
DO	mg/l	0.22	0.00	1.45	0.12	0.03	0.36	0.61	0.00	1.57
DO	%	2.4	0.0	17.0	1.3	0.3	4.2	7.2	0.0	18.3
TDS	mg/l	910	1252	897	906	1160	1025	169	695	1356

Diversion Basin

Location		W06	W07	W08	W09	W10	Average	Std Dev	Range 95% of Data	
Surface Sample @ 15cm									Minumum	Maximum
pH		7.96	7.93	7.90	8.03	8.00	7.96	0.05	7.86	8.07
EC	mS/cm	57.9	56.5	55.8	56.6	53.6	56.1	1.6	53.0	59.2
Turbidity	NTU	16.3	14.7	13.2	24.1	20.6	17.8	4.5	9.0	26.6
DO	mg/l	4.74	3.58	3.91	5.61	5.12	4.59	0.84	2.94	6.24
DO	%	70.0	52.3	56.0	82.9	77.9	67.8	13.4	41.6	94.0
TDS	mg/l	40094	41624	30070	29412	37515	35743	5677	24615	46870
Bottom Sample 15cm above										
pH		7.92		7.89		7.91	7.91	0.02	7.88	7.94
EC	mS/cm	58.1		57.7		58.2	58.0	0.3	57.5	58.5
Turbidity	NTU	15.2		12.1		17.2	14.8	2.6	9.8	19.9
DO	mg/l	4.37		4.01		4.58	4.32	0.29	3.75	4.89
DO	%	64.5		58.6		70.5	64.5	6.0	52.9	76.2
TDS	mg/l	37040		36785		37104	36976	169	36646	37307

Recovered Water

Sample	pH	EC mS/cm	Turbidity NTU	DO mg/l	DO %	TDS mg/l
RW01	8.53	3.12	16	5.55	82.1	922
RW02	8.52	3.07	15	7.29	84.8	889
RW03	8.47	3.49	5.3	6.62	77.8	1168
RW04	8.25	3.26	19	5.87	70.5	1016
RW05	8.43	4.68	20	5.64	65.2	1964
RW15	8.41	4.28	40	5.66	68.3	1846
Average	8.44	3.52	15.1	6.19	76.1	1192
Std Dev	0.11	0.67	5.8	0.75	8.1	445
Range	8.22	2.22	0.0	4.73	60.2	320
95%	8.66	4.83	26.5	7.65	92.0	2064
RW06	7.84	60.9	2.6	5.66	80.6	39458
RW07	7.93	63.1	6.7	5.29	78.8	40938
RW08	7.96	45.1	4.3	5.25	73.0	28925
RW09	8.09	51.3	9.2	4.99	74.1	33049
RW10	7.95	60.4	5.6	4.90	69.4	39129
Average	7.95	56.2	5.7	5.22	75.2	36300
Std Dev	0.09	7.7	2.5	0.30	4.5	5110
Range	7.77	41.16	0.80	4.64	66.3	26285
95%	8.13	71.21	10.6	5.80	84.1	46315

Low Rainfall Input Waters to Barcoo Outlet

Location		A	B	C	D	E	F	G	Average	Std Dev	Range 95% of Data	
Surface Sample @ 15cm				note 1				note 2			Minimum	Maximum
pH		7.92	8.04	8.00	8.07	8.02	8.03	8.5	8.08	0.19	7.71	8.45
EC	mS/cm	59.2	59.1	58.9	51.6	56.6	56	41.7 [2)]	56.9	2.9	51.1	62.7
Turbidity	NTU	9.0	9.4	10.5	23.5	12.1	10.8	9.4	12.1	5.1	2.0	22.2
DO	mg/l	3.81	3.57	4.36	5.98	2.78	3.7	4.62	4.12	1.01	2.13	6.10
DO	%	54.4	50.6	62.9	82.5	38.9	52.9	62.5	57.8	13.6	31.2	84.4
TDS	mg/l	37741	37678	37550	32896	36084	35701.2	26584 [2)]	36275	1872	32606	39945
Bottom Sample 15cm above												
pH		7.85	7.91	7.92	8.22	7.93	7.9	8.1	7.98	0.13	7.71	8.24
EC	mS/cm	59.2	59.1	59.3	55.9	58.0	57.7	55.1	57.8	1.7	54.5	61.0
Turbidity	NTU	26.9	12.0	247 [1)]	17.4	10.1	15.3	19.5	16.9	6.0	5.1	28.6
DO	mg/l	3.21	2.56	3.46	3.49	3.06	3.65	4.62	3.44	0.63	2.19	4.68
DO	%	42.9	38.5	50.6	49.8	43.8	53.2	50.8	47.1	5.4	36.6	57.6
TDS	mg/l	37741	37678	37805	35637	36976	36785	35127.5	36821	1068	34728	38915

Note 1 The turbidity value for location "C" has been excluded from the statistical analysis.
However a turbidity of 247NTU is consistent with observations of the Barcoo intake
when the Weir 2 gates are open

Note 2 The bottom TDS and EC results for location "G" have been excluded from the statistical analysis
The location is most likely impacted by brackish water entering from the Basin to the North of the Road
It should be noted that over a full year the salinity of water entering the Barcoo outlet will
range from fresh rain water (at times of high storm water flows) to sea water (when no stormwater flows)

Appendix 4

Laboratory Water Report 405249

eurofins | mgt

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

OST Environmental
PO BOX 5143
ALBERTON
S.A 5014

Attention: **John Waters**

Report **405249-W**
Client Reference PLS DA 14001
Received Date Jan 10, 2014

Client Sample ID			G01**W-01**	G01**W-02**	G01**W-03**	G01**W-04**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**M14-Ja02206**	**M14-Ja02207**	**M14-Ja02208**	**M14-Ja02209**
Date Sampled			**Jan 08, 2014**	**Jan 08, 2014**	**Jan 08, 2014**	**Jan 08, 2014**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C10-C14 after Silica Cleanup (TPH)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28 after Silica Cleanup (TPH)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36 after Silica Cleanup (TPH)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	0.2
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	0.2
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	0.3
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Heavy Metals						
Copper	0.001	mg/L	0.007	0.006	0.006	0.007
Lead	0.001	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Zinc	0.001	mg/L	0.078	0.075	0.076	0.078

Client Sample ID			G01**W-05**	G01**W-06**	G01**W-07**	G01**W-08**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**M14-Ja02210**	**M14-Ja02211**	**M14-Ja02212**	**M14-Ja02213**
Date Sampled			**Jan 08, 2014**	**Jan 08, 2014**	**Jan 08, 2014**	**Jan 08, 2014**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C10-C14 after Silica Cleanup (TPH)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28 after Silica Cleanup (TPH)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36 after Silica Cleanup (TPH)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1

Client Sample ID			[G01]W-05	[G01]W-06	[G01]W-07	[G01]W-08
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**M14-Ja02210**	**M14-Ja02211**	**M14-Ja02212**	**M14-Ja02213**
Date Sampled			**Jan 08, 2014**	**Jan 08, 2014**	**Jan 08, 2014**	**Jan 08, 2014**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Heavy Metals						
Copper	0.001	mg/L	0.007	< 0.005	< 0.005	< 0.005
Lead	0.001	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Zinc	0.001	mg/L	0.074	0.024	0.017	0.052

Client Sample ID			[G03]W-09	[G01]W-10	[G01]W-14
Sample Matrix			**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**M14-Ja02214**	**M14-Ja02215**	**M14-Ja02216**
Date Sampled			**Jan 08, 2014**	**Jan 08, 2014**	**Jan 08, 2014**
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH C10-C14 after Silica Cleanup (TPH)	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH C15-C28 after Silica Cleanup (TPH)	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH C29-C36 after Silica Cleanup (TPH)	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	0.1
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene[N02]	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	0.2
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1
Heavy Metals					
Copper	0.001	mg/L	< 0.005	< 0.005	0.007
Lead	0.001	mg/L	< 0.005	< 0.005	< 0.005
Zinc	0.001	mg/L	0.029	0.017	0.076

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Jan 16, 2014	7 Day
- Method: TRH C6-C36 - MGT 100A			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Jan 16, 2014	7 Day
- Method: LM-LTM-ORG2010			
Heavy Metals	Melbourne	Jan 10, 2014	180 Day
- Method: USEPA 6010/6020 Heavy Metals			

Eurofins | mgt Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

UNITS

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data.

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Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.02			0.02	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH C6-C10 less BTEX (F1)	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Heavy Metals							
Copper	mg/L	< 0.001			0.001	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Zinc	mg/L	< 0.001			0.001	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	100			70-130	Pass	
TRH C10-C14	%	100			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH C6-C10	%	100			70-130	Pass	
TRH >C10-C16	%	101			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Copper	%	86			80-120	Pass	
Lead	%	88			80-120	Pass	
Zinc	%	85			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M14-Ja02295	NCP	%	116			70-130	Pass	
TRH C10-C14	M14-Ja05050	NCP	%	71			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH C6-C10	M14-Ja02295	NCP	%	116			70-130	Pass	
TRH >C10-C16	M14-Ja05050	NCP	%	73			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	M14-Ja02519	NCP	%	85			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M14-Ja02005	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	M14-Ja07228	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M14-Ja07228	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M14-Ja07228	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	

Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M14-Ja02005	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C6-C10	M14-Ja02005	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C6-C10 less BTEX (F1)	M14-Ja02005	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	M14-Ja07228	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	M14-Ja07228	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	M14-Ja07228	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Copper	M14-Ja03620	NCP	mg/L	0.022	0.023	3.0	30%	Pass	
Lead	M14-Ja03620	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc	M14-Ja03620	NCP	mg/L	0.98	1.0	2.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Organic samples had Teflon liners	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
G01	The LORs have been raised due to matrix interference
G03	Insufficient sample was supplied to conduct this analysis
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.

Authorised By

Andrew Thexton	Client Services
Carroll Lee	Senior Analyst-Volatile (VIC)
Emily Rosenberg	Senior Analyst-Metal (VIC)
Stacey Jenkins	Senior Analyst-Organic (VIC)

Glenn Jackson

Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

On Site Technology Pty Ltd **Chain of Custody Form** Page 1 of 1

Contact John Waters

PO Box 5143
Alberton
SA 5014

mobile 0417 846 826
facsimile 08 8241 2079
e-mial john@ostenvironment.com

Job Reference
14001
Job Description
PLS DA

Date	9/01/2014
Laboratory	Eurofins
Contact	Daryn
Address	140 Richmond Road Marleston SA 5033
Telephone	8154 3100

Sampled by John Waters Signature

	Sample ID	Sampled Date	Analytes	Matrix	Container	Preservation
	W-01	8/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	W-01	8/1/14	TPH and TRH	water	glass	chilled
	W-02	8/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	W-02	8/1/14	TPH and TRH	water	glass	chilled
	W-03	8/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	W-03	8/1/14	TPH and TRH	water	glass	chilled
	W-04	8/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	W-04	8/1/14	TPH and TRH	water	glass	chilled
	W-05	8/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	W-05	8/1/14	TPH and TRH	water	glass	chilled
	W-06	8/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	W-06	8/1/14	TPH and TRH	water	glass	chilled
	W-07	8/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	W-07	8/1/14	TPH and TRH	water	glass	chilled
	W-08	8/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	W-08	8/1/14	TPH and TRH	water	glass	chilled
	W-09	8/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	W-09	8/1/14	TPH and TRH	water	glass	chilled
	W-10	8/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	W-10	8/1/14	TPH and TRH	water	glass	chilled
	W-14	8/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	W-14	8/1/14	TPH and TRH	water	glass	chilled

Eurofins Mgt Report #

405249

Relinguished By	On	At	Received By	On	At
	9/1/14	14:50	Sarah	9/1/14	2.50pm
	On	At	John Eurofins Mgt	10/1/14	At 8.53 AM
	On	At		On	At

Appendix 5

Laboratory Sediment Report 405436

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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

OST Environmental
PO BOX 5143
ALBERTON
S.A 5014

Attention: **John Waters**

Report **405436-S**
Client Reference PLS DA 14001
Received Date Jan 14, 2014

Client Sample ID			**S-01**	**S-02**	**S-03**	**S-04**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M14-Ja03568**	**M14-Ja03569**	**M14-Ja03570**	**M14-Ja03571**
Date Sampled			**Jan 12, 2014**	**Jan 12, 2014**	**Jan 12, 2014**	**Jan 12, 2014**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	130	390	550	200
TRH C10-C14 after Silica Cleanup (TPH)	20	mg/kg	32	110	130	67
TRH C15-C28 after Silica Cleanup (TPH)	50	mg/kg	300	910	690	620
TRH C29-C36 after Silica Cleanup (TPH)	50	mg/kg	170	920	620	620
TRH C15-C28	50	mg/kg	800	3200	2700	1500
TRH C29-C36	50	mg/kg	980	3200	3200	1900
TRH C10-36 (Total)	50	mg/kg	1900	6800	6500	3600
BTEX						
Benzene	0.1	mg/kg	-	< 0.1	-	-
Toluene	0.1	mg/kg	-	< 0.1	-	-
Ethylbenzene	0.1	mg/kg	-	< 0.1	-	-
m&p-Xylenes	0.2	mg/kg	-	< 0.2	-	-
o-Xylene	0.1	mg/kg	-	< 0.1	-	-
Xylenes - Total	0.3	mg/kg	-	< 0.3	-	-
4-Bromofluorobenzene (surr.)	1	%	-	85	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	340	940	830	390
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	340	940	830	390
TRH >C16-C34	100	mg/kg	1300	5100	4800	2700
TRH >C34-C40	100	mg/kg	250	1500	1300	630
Volatile Organics						
Tetrachloroethene	0.05	mg/kg	-	< 0.05	-	-
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.5	mg/kg	-	< 0.5	-	-
Acenaphthylene	0.5	mg/kg	-	< 0.5	-	-
Anthracene	0.5	mg/kg	-	< 0.5	-	-
Benz(a)anthracene	0.5	mg/kg	-	< 0.5	-	-
Benzo(a)pyrene	0.5	mg/kg	-	< 0.5	-	-
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	-	< 0.5	-	-
Benzo(g.h.i)perylene	0.5	mg/kg	-	< 0.5	-	-
Benzo(k)fluoranthene	0.5	mg/kg	-	< 0.5	-	-
Chrysene	0.5	mg/kg	-	< 0.5	-	-

Client Sample ID			S-01	S-02	S-03	S-04
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-Ja03568	M14-Ja03569	M14-Ja03570	M14-Ja03571
Date Sampled			Jan 12, 2014	Jan 12, 2014	Jan 12, 2014	Jan 12, 2014
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Dibenz(a.h)anthracene	0.5	mg/kg	-	< 0.5	-	-
Fluoranthene	0.5	mg/kg	-	< 0.5	-	-
Fluorene	0.5	mg/kg	-	< 0.5	-	-
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	-	< 0.5	-	-
Naphthalene	0.5	mg/kg	-	< 0.5	-	-
Phenanthrene	0.5	mg/kg	-	< 0.5	-	-
Pyrene	0.5	mg/kg	-	< 0.5	-	-
Total PAH	0.5	mg/kg	-	< 0.5	-	-
Benzo(a)pyrene TEQ (lower bound)*	0.5	mg/kg	-	< 0.5	-	-
Benzo(a)pyrene TEQ (medium bound)*	0.5	mg/kg	-	0.6	-	-
Benzo(a)pyrene TEQ (upper bound)*	0.5	mg/kg	-	1.2	-	-
2-Fluorobiphenyl (surr.)	1	%	-	105	-	-
p-Terphenyl-d14 (surr.)	1	%	-	96	-	-
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	-	-
4.4'-DDD	0.05	mg/kg	-	< 0.05	-	-
4.4'-DDE	0.05	mg/kg	-	< 0.05	-	-
4.4'-DDT	0.05	mg/kg	-	< 0.05	-	-
a-BHC	0.05	mg/kg	-	< 0.05	-	-
Aldrin	0.05	mg/kg	-	< 0.05	-	-
b-BHC	0.05	mg/kg	-	< 0.05	-	-
d-BHC	0.05	mg/kg	-	< 0.05	-	-
Dieldrin	0.05	mg/kg	-	< 0.05	-	-
Endosulfan I	0.05	mg/kg	-	< 0.05	-	-
Endosulfan II	0.05	mg/kg	-	< 0.05	-	-
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	-	-
Endrin	0.05	mg/kg	-	< 0.05	-	-
Endrin aldehyde	0.05	mg/kg	-	< 0.05	-	-
Endrin ketone	0.05	mg/kg	-	< 0.05	-	-
g-BHC (Lindane)	0.05	mg/kg	-	< 0.05	-	-
Heptachlor	0.05	mg/kg	-	< 0.05	-	-
Heptachlor epoxide	0.05	mg/kg	-	< 0.05	-	-
Hexachlorobenzene	0.05	mg/kg	-	< 0.05	-	-
Methoxychlor	0.05	mg/kg	-	< 0.05	-	-
Toxaphene	1	mg/kg	-	< 1	-	-
Dibutylchlorendate (surr.)	1	%	-	110	-	-
Tetrachloro-m-xylene (surr.)	1	%	-	87	-	-
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1221	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1232	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1242	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1248	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1254	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1260	0.1	mg/kg	-	< 0.1	-	-
Total PCB	0.1	mg/kg	-	< 0.1	-	-
Dibutylchlorendate (surr.)	1	%	-	110	-	-
Tetrachloro-m-xylene (surr.)	1	%	-	87	-	-

Client Sample ID			S-01	S-02	S-03	S-04
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-Ja03568	M14-Ja03569	M14-Ja03570	M14-Ja03571
Date Sampled			Jan 12, 2014	Jan 12, 2014	Jan 12, 2014	Jan 12, 2014
Test/Reference	LOR	Unit				
Phenols (Halogenated)						
2-Chlorophenol	0.5	mg/kg	-	< 0.5	-	-
2.4-Dichlorophenol	0.5	mg/kg	-	< 0.5	-	-
2.4.5-Trichlorophenol	1.0	mg/kg	-	< 1	-	-
2.4.6-Trichlorophenol	1.0	mg/kg	-	< 1	-	-
2.6-Dichlorophenol	0.5	mg/kg	-	< 0.5	-	-
4-Chloro-3-methylphenol	1.0	mg/kg	-	< 1	-	-
Pentachlorophenol	1.0	mg/kg	-	< 1	-	-
Tetrachlorophenols - Total	1.0	mg/kg	-	< 1	-	-
Total Halogenated Phenol	1	mg/kg	-	< 1	-	-
Phenols (non-Halogenated)						
2-Cyclohexyl-4.6-dinitrophenol	20	mg/kg	-	< 20	-	-
2-Methyl-4.6-dinitrophenol	5	mg/kg	-	< 5	-	-
2-Methylphenol (o-Cresol)	0.2	mg/kg	-	< 0.2	-	-
2-Nitrophenol	1.0	mg/kg	-	< 1	-	-
2.4-Dimethylphenol	0.5	mg/kg	-	< 0.5	-	-
2.4-Dinitrophenol	5	mg/kg	-	< 5	-	-
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	-	< 1	-	-
4-Nitrophenol	5	mg/kg	-	< 5	-	-
Dinoseb	20	mg/kg	-	< 20	-	-
Phenol	0.5	mg/kg	-	< 0.5	-	-
Total Non-Halogenated Phenol	20	mg/kg	-	< 20	-	-
Phenol-d6 (surr.)	1	%	-	99	-	-
Chromium (hexavalent)	1	mg/kg	-	< 1	-	-
Cyanide (total)	5	mg/kg	-	< 5	-	-
Chromium (trivalent)	5	mg/kg	-	38	-	-
% Moisture	0.1	%	30	77	65	63
Heavy Metals						
Arsenic	2	mg/kg	-	20	-	-
Barium	10	mg/kg	-	93	-	-
Beryllium	2	mg/kg	-	< 2	-	-
Cadmium	0.4	mg/kg	-	0.8	-	-
Chromium	5	mg/kg	-	38	-	-
Cobalt	5	mg/kg	-	7.5	-	-
Copper	5	mg/kg	23	81	54	68
Lead	5	mg/kg	31	100	86	91
Manganese	5	mg/kg	-	130	-	-
Mercury	0.1	mg/kg	-	< 0.1	-	-
Nickel	5	mg/kg	-	18	-	-
Silver	5	mg/kg	-	< 5	-	-
Zinc	5	mg/kg	250	1000	670	840

Client Sample ID			S-05	S-06	S-07	S-08
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-Ja03572	M14-Ja03573	M14-Ja03574	M14-Ja03575
Date Sampled			Jan 12, 2014	Jan 12, 2014	Jan 12, 2014	Jan 12, 2014
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	320	63	850	54
TRH C10-C14 after Silica Cleanup (TPH)	20	mg/kg	95	25	270	22
TRH C15-C28 after Silica Cleanup (TPH)	50	mg/kg	1000	330	1300	130
TRH C29-C36 after Silica Cleanup (TPH)	50	mg/kg	780	280	220	67
TRH C15-C28	50	mg/kg	2500	560	6200	380
TRH C29-C36	50	mg/kg	2800	550	4500	290
TRH C10-36 (Total)	50	mg/kg	5600	1200	12000	720
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	-	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	-	< 0.3
4-Bromofluorobenzene (surr.)	1	%	74	72	-	84
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	760	140	3000	170
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	760	140	3000	170
TRH >C16-C34	100	mg/kg	4500	940	7200	510
TRH >C34-C40	100	mg/kg	850	220	1500	100
Volatile Organics						
Tetrachloroethene	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Total PAH	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Benzo(a)pyrene TEQ (lower bound)*	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Benzo(a)pyrene TEQ (medium bound)*	0.5	mg/kg	0.6	0.6	-	0.6
Benzo(a)pyrene TEQ (upper bound)*	0.5	mg/kg	1.2	1.2	-	1.2
2-Fluorobiphenyl (surr.)	1	%	114	103	-	100
p-Terphenyl-d14 (surr.)	1	%	97	100	-	107

Client Sample ID			S-05	S-06	S-07	S-08
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-Ja03572	M14-Ja03573	M14-Ja03574	M14-Ja03575
Date Sampled			Jan 12, 2014	Jan 12, 2014	Jan 12, 2014	Jan 12, 2014
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Toxaphene	1	mg/kg	< 1	< 1	-	< 1
Dibutylchlorendate (surr.)	1	%	128	98	-	84
Tetrachloro-m-xylene (surr.)	1	%	101	141	-	84
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Aroclor-1221	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Aroclor-1232	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Aroclor-1242	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Aroclor-1248	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Aroclor-1254	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Aroclor-1260	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Total PCB	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Dibutylchlorendate (surr.)	1	%	128	98	-	84
Tetrachloro-m-xylene (surr.)	1	%	101	141	-	84
Phenols (Halogenated)						
2-Chlorophenol	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
2.4-Dichlorophenol	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
2.4.5-Trichlorophenol	1.0	mg/kg	< 1	< 1	-	< 1
2.4.6-Trichlorophenol	1.0	mg/kg	< 1	< 1	-	< 1
2.6-Dichlorophenol	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
4-Chloro-3-methylphenol	1.0	mg/kg	< 1	< 1	-	< 1
Pentachlorophenol	1.0	mg/kg	< 1	< 1	-	< 1
Tetrachlorophenols - Total	1.0	mg/kg	< 1	< 1	-	< 1
Total Halogenated Phenol	1	mg/kg	< 1	< 1	-	< 1
Phenols (non-Halogenated)						
2-Cyclohexyl-4.6-dinitrophenol	20	mg/kg	< 20	< 20	-	< 20
2-Methyl-4.6-dinitrophenol	5	mg/kg	< 5	< 5	-	< 5
2-Methylphenol (o-Cresol)	0.2	mg/kg	< 0.2	< 0.2	-	< 0.2
2-Nitrophenol	1.0	mg/kg	< 1	< 1	-	< 1

Client Sample ID			S-05	S-06	S-07	S-08
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-Ja03572	M14-Ja03573	M14-Ja03574	M14-Ja03575
Date Sampled			Jan 12, 2014	Jan 12, 2014	Jan 12, 2014	Jan 12, 2014
Test/Reference	LOR	Unit				
Phenols (non-Halogenated)						
2.4-Dimethylphenol	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
2.4-Dinitrophenol	5	mg/kg	< 5	< 5	-	< 5
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	< 0.5	< 0.4	-	< 0.4
4-Nitrophenol	5	mg/kg	< 5	< 5	-	< 5
Dinoseb	20	mg/kg	< 20	< 20	-	< 20
Phenol	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Total Non-Halogenated Phenol	20	mg/kg	< 20	< 20	-	< 20
Phenol-d6 (surr.)	1	%	95	89	-	99
Chromium (hexavalent)	1	mg/kg	< 1	< 1	-	< 1
Cyanide (total)	5	mg/kg	< 5	< 5	-	< 5
Chromium (trivalent)	5	mg/kg	48	41	-	11
% Moisture	0.1	%	81	63	70	34
Heavy Metals						
Arsenic	2	mg/kg	24	20	-	3.8
Barium	10	mg/kg	95	58	-	15
Beryllium	2	mg/kg	< 2	< 2	-	< 2
Cadmium	0.4	mg/kg	1.1	1.2	-	< 0.4
Chromium	5	mg/kg	48	41	-	11
Cobalt	5	mg/kg	9.2	7.1	-	< 5
Copper	5	mg/kg	100	97	30	34
Lead	5	mg/kg	140	120	34	34
Manganese	5	mg/kg	180	140	-	35
Mercury	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Nickel	5	mg/kg	24	19	-	< 5
Silver	5	mg/kg	< 5	< 5	-	< 5
Zinc	5	mg/kg	1200	1100	640	260

Client Sample ID			S-09	S-10	S-15	S-18
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-Ja03576	M14-Ja03577	M14-Ja03578	M14-Ja03579
Date Sampled			Jan 12, 2014	Jan 12, 2014	Jan 12, 2014	Jan 12, 2014
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	29	230	550	52
TRH C10-C14 after Silica Cleanup (TPH)	20	mg/kg	< 20	84	120	21
TRH C15-C28 after Silica Cleanup (TPH)	50	mg/kg	62	520	920	110
TRH C29-C36 after Silica Cleanup (TPH)	50	mg/kg	58	140	650	100
TRH C15-C28	50	mg/kg	180	1800	2100	340
TRH C29-C36	50	mg/kg	130	1000	2400	320
TRH C10-36 (Total)	50	mg/kg	340	3000	5100	710
BTEX						
Benzene	0.1	mg/kg	-	-	< 0.1	< 0.1
Toluene	0.1	mg/kg	-	-	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	-	-	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	-	-	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	-	-	< 0.1	< 0.1

Client Sample ID			S-09	S-10	S-15	S-18
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-Ja03576	M14-Ja03577	M14-Ja03578	M14-Ja03579
Date Sampled			Jan 12, 2014	Jan 12, 2014	Jan 12, 2014	Jan 12, 2014
Test/Reference	LOR	Unit				
BTEX						
Xylenes - Total	0.3	mg/kg	-	-	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	-	-	86	64
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	63	720	820	100
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	63	720	820	100
TRH >C16-C34	100	mg/kg	250	2100	3500	520
TRH >C34-C40	100	mg/kg	< 100	320	700	120
Volatile Organics						
Tetrachloroethene	0.05	mg/kg	-	-	< 0.05	< 0.05
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.5	mg/kg	-	-	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	-	-	< 0.5	< 0.5
Anthracene	0.5	mg/kg	-	-	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	-	-	< 0.5	< 0.5
Chrysene	0.5	mg/kg	-	-	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	-	-	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	-	-	< 0.5	< 0.5
Fluorene	0.5	mg/kg	-	-	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	-	-	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	-	-	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	-	-	< 0.5	< 0.5
Pyrene	0.5	mg/kg	-	-	< 0.5	< 0.5
Total PAH	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(a)pyrene TEQ (lower bound)*	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound)*	0.5	mg/kg	-	-	0.6	0.6
Benzo(a)pyrene TEQ (upper bound)*	0.5	mg/kg	-	-	1.2	1.2
2-Fluorobiphenyl (surr.)	1	%	-	-	97	89
p-Terphenyl-d14 (surr.)	1	%	-	-	105	91
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	-	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	-	-	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	-	-	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	-	-	< 0.05	< 0.05
a-BHC	0.05	mg/kg	-	-	< 0.05	< 0.05
Aldrin	0.05	mg/kg	-	-	< 0.05	< 0.05
b-BHC	0.05	mg/kg	-	-	< 0.05	< 0.05
d-BHC	0.05	mg/kg	-	-	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	-	-	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	-	-	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	-	-	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	-	< 0.05	< 0.05
Endrin	0.05	mg/kg	-	-	< 0.05	< 0.05

Client Sample ID			S-09	S-10	S-15	S-18
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M14-Ja03576	M14-Ja03577	M14-Ja03578	M14-Ja03579
Date Sampled			Jan 12, 2014	Jan 12, 2014	Jan 12, 2014	Jan 12, 2014
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Endrin aldehyde	0.05	mg/kg	-	-	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	-	-	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	-	-	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	-	-	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	-	-	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	-	-	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	-	-	< 0.05	< 0.05
Toxaphene	1	mg/kg	-	-	< 1	< 1
Dibutylchlorendate (surr.)	1	%	-	-	100	117
Tetrachloro-m-xylene (surr.)	1	%	-	-	77	71
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	-	< 0.1	< 0.1
Aroclor-1221	0.1	mg/kg	-	-	< 0.1	< 0.1
Aroclor-1232	0.1	mg/kg	-	-	< 0.1	< 0.1
Aroclor-1242	0.1	mg/kg	-	-	< 0.1	< 0.1
Aroclor-1248	0.1	mg/kg	-	-	< 0.1	< 0.1
Aroclor-1254	0.1	mg/kg	-	-	< 0.1	< 0.1
Aroclor-1260	0.1	mg/kg	-	-	< 0.1	< 0.1
Total PCB	0.1	mg/kg	-	-	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	-	-	100	117
Tetrachloro-m-xylene (surr.)	1	%	-	-	77	71
Phenols (Halogenated)						
2-Chlorophenol	0.5	mg/kg	-	-	< 0.5	< 0.5
2.4-Dichlorophenol	0.5	mg/kg	-	-	< 0.5	< 0.5
2.4.5-Trichlorophenol	1.0	mg/kg	-	-	< 1	< 1
2.4.6-Trichlorophenol	1.0	mg/kg	-	-	< 1	< 1
2.6-Dichlorophenol	0.5	mg/kg	-	-	< 0.5	< 0.5
4-Chloro-3-methylphenol	1.0	mg/kg	-	-	< 1	< 1
Pentachlorophenol	1.0	mg/kg	-	-	< 1	< 1
Tetrachlorophenols - Total	1.0	mg/kg	-	-	< 1	< 1
Total Halogenated Phenol	1	mg/kg	-	-	< 1	< 1
Phenols (non-Halogenated)						
2-Cyclohexyl-4.6-dinitrophenol	20	mg/kg	-	-	< 20	< 20
2-Methyl-4.6-dinitrophenol	5	mg/kg	-	-	< 5	< 5
2-Methylphenol (o-Cresol)	0.2	mg/kg	-	-	< 0.2	< 0.2
2-Nitrophenol	1.0	mg/kg	-	-	< 1	< 1
2.4-Dimethylphenol	0.5	mg/kg	-	-	< 0.5	< 0.5
2.4-Dinitrophenol	5	mg/kg	-	-	< 5	< 5
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	-	-	< 0.4	< 0.4
4-Nitrophenol	5	mg/kg	-	-	< 5	< 5
Dinoseb	20	mg/kg	-	-	< 20	< 20
Phenol	0.5	mg/kg	-	-	< 0.5	< 0.5
Total Non-Halogenated Phenol	20	mg/kg	-	-	< 20	< 20
Phenol-d6 (surr.)	1	%	-	-	94	91
Chromium (hexavalent)	1	mg/kg	-	-	< 1	< 1
Cyanide (total)	5	mg/kg	-	-	< 5	< 5
Chromium (trivalent)	5	mg/kg	-	-	43	12
% Moisture	0.1	%	33	67	79	39

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	S-09 Soil M14-Ja03576 Jan 12, 2014	S-10 Soil M14-Ja03577 Jan 12, 2014	S-15 Soil M14-Ja03578 Jan 12, 2014	S-18 Soil M14-Ja03579 Jan 12, 2014
Heavy Metals						
Arsenic	2	mg/kg	-	-	21	5.1
Barium	10	mg/kg	-	-	81	18
Beryllium	2	mg/kg	-	-	< 2	< 2
Cadmium	0.4	mg/kg	-	-	1.0	< 0.4
Chromium	5	mg/kg	-	-	43	12
Cobalt	5	mg/kg	-	-	8.0	< 5
Copper	5	mg/kg	20	31	100	39
Lead	5	mg/kg	49	43	110	46
Manganese	5	mg/kg	-	-	160	39
Mercury	0.1	mg/kg	-	-	< 0.1	< 0.1
Nickel	5	mg/kg	-	-	19	6.2
Silver	5	mg/kg	-	-	< 5	< 5
Zinc	5	mg/kg	200	600	1000	300

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
SA Waste Screen			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Jan 17, 2014	14 Day
- Method: TRH C6-C36 - MGT 100A			
BTEX	Melbourne	Jan 17, 2014	14 Day
- Method: USEPA 8260 - MGT 350A Monocyclic Aromatic Hydrocarbons and MGT 100A			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Jan 17, 2014	14 Day
- Method: LM-LTM-ORG2010			
Volatile Organics	Melbourne	Jan 17, 2014	7 Day
- Method: USEPA 8260 - MGT 350A Volatile Organics by GCMS			
Polycyclic Aromatic Hydrocarbons	Melbourne	Jan 17, 2014	14 Day
- Method: USEPA 8270 Polycyclic Aromatic Hydrocarbons			
Organochlorine Pesticides	Melbourne	Jan 17, 2014	14 Day
- Method: USEPA 8081 Organochlorine Pesticides			
Polychlorinated Biphenyls	Melbourne	Jan 17, 2014	28 Day
- Method: USEPA 8082 Polychlorinated Biphenyls			
Phenols (Halogenated)	Melbourne	Jan 17, 2014	14 Day
- Method: USEPA 8270 Phenols			
Phenols (non-Halogenated)	Melbourne	Jan 17, 2014	14 Day
- Method: USEPA 8270 Phenols			
Chromium (hexavalent)	Melbourne	Jan 17, 2014	28 Day
- Method: APHA 3500-Cr Hexavalent Chromium- (Extraction:- USEPA3060)			
Cyanide (total)	Melbourne	Jan 20, 2014	14 Day
- Method: USEPA 9010 Cyanide			
SA Waste Metals : Metals M13SA	Melbourne	Jan 17, 2014	28 Day
- Method: USEPA 6010/6020 Heavy Metals & USEPA 7470/71 Mercury			
% Moisture	Melbourne	Jan 17, 2014	14 Day
- Method: Method 102 - ANZECC - % Moisture			
Heavy Metals	Melbourne	Jan 17, 2014	180 Day
- Method: USEPA 6010/6020 Heavy Metals			

Eurofins | mgt Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

UNITS

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH C6-C10 less BTEX (F1)	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Volatile Organics							
Tetrachloroethene	mg/kg	< 0.05			0.05	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-BHC	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
d-BHC	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 1			1	Pass	
Method Blank							
Polychlorinated Biphenyls							
Aroclor-1016	mg/kg	< 0.1			0.1	Pass	
Aroclor-1221	mg/kg	< 0.1			0.1	Pass	
Aroclor-1232	mg/kg	< 0.1			0.1	Pass	
Aroclor-1242	mg/kg	< 0.1			0.1	Pass	
Aroclor-1248	mg/kg	< 0.1			0.1	Pass	
Aroclor-1254	mg/kg	< 0.1			0.1	Pass	
Aroclor-1260	mg/kg	< 0.1			0.1	Pass	
Total PCB	mg/kg	< 0.1			0.1	Pass	
Method Blank							
Phenols (Halogenated)							
2-Chlorophenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
2.4.5-Trichlorophenol	mg/kg	< 1			1.0	Pass	
2.4.6-Trichlorophenol	mg/kg	< 1			1.0	Pass	
2.6-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
4-Chloro-3-methylphenol	mg/kg	< 1			1.0	Pass	
Pentachlorophenol	mg/kg	< 1			1.0	Pass	
Tetrachlorophenols - Total	mg/kg	< 1			1.0	Pass	
Method Blank							
Phenols (non-Halogenated)							
2-Cyclohexyl-4.6-dinitrophenol	mg/kg	< 20			20	Pass	
2-Methyl-4.6-dinitrophenol	mg/kg	< 5			5	Pass	
2-Methylphenol (o-Cresol)	mg/kg	< 0.2			0.2	Pass	
2-Nitrophenol	mg/kg	< 1			1.0	Pass	
2.4-Dimethylphenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dinitrophenol	mg/kg	< 5			5	Pass	
3&4-Methylphenol (m&p-Cresol)	mg/kg	< 0.4			0.4	Pass	
4-Nitrophenol	mg/kg	< 5			5	Pass	
Dinoseb	mg/kg	< 20			20	Pass	
Phenol	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Chromium (hexavalent)	mg/kg	< 1			1	Pass	
Cyanide (total)	mg/kg	< 5			5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Barium	mg/kg	< 10			10	Pass	
Beryllium	mg/kg	< 2			2	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Cobalt	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Manganese	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Silver	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	123			70-130	Pass	
TRH C10-C14	%	97			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	84			70-130	Pass	
Toluene	%	110			70-130	Pass	
Ethylbenzene	%	111			70-130	Pass	
m&p-Xylenes	%	110			70-130	Pass	
Xylenes - Total	%	109			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH C6-C10	%	124			70-130	Pass	
TRH >C10-C16	%	97			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	119			70-130	Pass	
Acenaphthylene	%	119			70-130	Pass	
Anthracene	%	125			70-130	Pass	
Benz(a)anthracene	%	122			70-130	Pass	
Benzo(a)pyrene	%	128			70-130	Pass	
Benzo(b&j)fluoranthene	%	120			70-130	Pass	
Benzo(g.h.i)perylene	%	130			70-130	Pass	
Benzo(k)fluoranthene	%	118			70-130	Pass	
Chrysene	%	122			70-130	Pass	
Dibenz(a.h)anthracene	%	126			70-130	Pass	
Fluoranthene	%	110			70-130	Pass	
Fluorene	%	119			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	120			70-130	Pass	
Naphthalene	%	115			70-130	Pass	
Phenanthrene	%	126			70-130	Pass	
Pyrene	%	109			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
4.4'-DDD	%	86			70-130	Pass	
4.4'-DDE	%	110			70-130	Pass	
4.4'-DDT	%	77			70-130	Pass	
a-BHC	%	97			70-130	Pass	
Aldrin	%	86			70-130	Pass	
b-BHC	%	100			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
d-BHC	%	125			70-130	Pass	
Dieldrin	%	88			70-130	Pass	
Endosulfan I	%	78			70-130	Pass	
Endosulfan II	%	78			70-130	Pass	
Endosulfan sulphate	%	83			70-130	Pass	
Endrin	%	109			70-130	Pass	
Endrin aldehyde	%	76			70-130	Pass	
Endrin ketone	%	74			70-130	Pass	
g-BHC (Lindane)	%	94			70-130	Pass	
Heptachlor	%	112			70-130	Pass	
Heptachlor epoxide	%	81			70-130	Pass	
Hexachlorobenzene	%	87			70-130	Pass	
Methoxychlor	%	78			70-130	Pass	
LCS - % Recovery							
Polychlorinated Biphenyls							
Aroclor-1260	%	95			70-130	Pass	
LCS - % Recovery							
Phenols (Halogenated)							
2-Chlorophenol	%	123			30-130	Pass	
2.4-Dichlorophenol	%	126			30-130	Pass	
2.4.5-Trichlorophenol	%	126			30-130	Pass	
2.4.6-Trichlorophenol	%	126			30-130	Pass	
2.6-Dichlorophenol	%	128			30-130	Pass	
4-Chloro-3-methylphenol	%	130			30-130	Pass	
Pentachlorophenol	%	106			30-130	Pass	
Tetrachlorophenols - Total	%	122			30-130	Pass	
LCS - % Recovery							
Phenols (non-Halogenated)							
2-Cyclohexyl-4.6-dinitrophenol	%	34			30-130	Pass	
2-Methyl-4.6-dinitrophenol	%	91			30-130	Pass	
2-Methylphenol (o-Cresol)	%	126			30-130	Pass	
2-Nitrophenol	%	125			30-130	Pass	
2.4-Dimethylphenol	%	125			30-130	Pass	
2.4-Dinitrophenol	%	36			30-130	Pass	
3&4-Methylphenol (m&p-Cresol)	%	124			30-130	Pass	
4-Nitrophenol	%	117			30-130	Pass	
Dinoseb	%	107			30-130	Pass	
Phenol	%	118			30-130	Pass	
LCS - % Recovery							
Chromium (hexavalent)	%	103			70-130	Pass	
Cyanide (total)	%	111			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	99			80-120	Pass	
Barium	%	116			80-120	Pass	
Beryllium	%	117			80-120	Pass	
Cadmium	%	108			80-120	Pass	
Chromium	%	114			80-120	Pass	
Cobalt	%	113			80-120	Pass	
Copper	%	104			80-120	Pass	
Lead	%	99			80-120	Pass	
Lead	%	111			80-120	Pass	
Manganese	%	119			80-120	Pass	
Mercury	%	99			75-125	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nickel			%	114			80-120	Pass	
Silver			%	82			80-120	Pass	
Zinc			%	94			80-120	Pass	
Zinc			%	113			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	M14-Ja05141	NCP	%	74			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	M14-Ja05141	NCP	%	74			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M14-Ja03568	CP	%	100			75-125	Pass	
Barium	M14-Ja03568	CP	%	116			75-125	Pass	
Beryllium	M14-Ja03568	CP	%	107			75-125	Pass	
Cadmium	M14-Ja03568	CP	%	107			75-125	Pass	
Chromium	M14-Ja03568	CP	%	109			75-125	Pass	
Cobalt	M14-Ja03568	CP	%	106			75-125	Pass	
Lead	M14-Ja03568	CP	%	102			75-125	Pass	
Nickel	M14-Ja03568	CP	%	107			75-125	Pass	
Silver	M14-Ja03568	CP	%	85			75-125	Pass	
Zinc	M14-Ja03568	CP	%	112			75-125	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	M14-Ja05154	NCP	%	78			70-130	Pass	
Toluene	M14-Ja05154	NCP	%	99			70-130	Pass	
Ethylbenzene	M14-Ja05154	NCP	%	85			70-130	Pass	
m&p-Xylenes	M14-Ja05154	NCP	%	86			70-130	Pass	
o-Xylene	M14-Ja05154	NCP	%	83			70-130	Pass	
Xylenes - Total	M14-Ja05154	NCP	%	85			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	M14-Ja06921	NCP	%	110			70-130	Pass	
Acenaphthylene	M14-Ja06921	NCP	%	104			70-130	Pass	
Anthracene	M14-Ja06921	NCP	%	109			70-130	Pass	
Benz(a)anthracene	M14-Ja06921	NCP	%	110			70-130	Pass	
Benzo(a)pyrene	M14-Ja06921	NCP	%	108			70-130	Pass	
Benzo(b&j)fluoranthene	M14-Ja06921	NCP	%	101			70-130	Pass	
Benzo(g.h.i)perylene	M14-Ja06921	NCP	%	110			70-130	Pass	
Benzo(k)fluoranthene	M14-Ja06921	NCP	%	102			70-130	Pass	
Chrysene	M14-Ja06921	NCP	%	105			70-130	Pass	
Dibenz(a.h)anthracene	M14-Ja06921	NCP	%	117			70-130	Pass	
Fluoranthene	M14-Ja06921	NCP	%	104			70-130	Pass	
Fluorene	M14-Ja06921	NCP	%	108			70-130	Pass	
Indeno(1.2.3-cd)pyrene	M14-Ja06921	NCP	%	115			70-130	Pass	
Naphthalene	M14-Ja06921	NCP	%	105			70-130	Pass	
Phenanthrene	M14-Ja06921	NCP	%	117			70-130	Pass	
Pyrene	M14-Ja06921	NCP	%	101			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
4.4'-DDD	M14-Ja05068	NCP	%	110			70-130	Pass	
4.4'-DDE	M14-Ja05068	NCP	%	116			70-130	Pass	
4.4'-DDT	M14-Ja05068	NCP	%	112			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
a-BHC	M14-Ja05068	NCP	%	110			70-130	Pass	
Aldrin	M14-Ja05068	NCP	%	96			70-130	Pass	
b-BHC	M14-Ja05068	NCP	%	113			70-130	Pass	
d-BHC	M14-Ja05068	NCP	%	126			70-130	Pass	
Dieldrin	M14-Ja05068	NCP	%	81			70-130	Pass	
Endosulfan I	M14-Ja05068	NCP	%	87			70-130	Pass	
Endosulfan II	M14-Ja05068	NCP	%	93			70-130	Pass	
Endosulfan sulphate	M14-Ja05068	NCP	%	101			70-130	Pass	
Endrin	M14-Ja05068	NCP	%	125			70-130	Pass	
Endrin aldehyde	M14-Ja05068	NCP	%	104			70-130	Pass	
Endrin ketone	M14-Ja05068	NCP	%	87			70-130	Pass	
g-BHC (Lindane)	M14-Ja05068	NCP	%	110			70-130	Pass	
Heptachlor	M14-Ja05068	NCP	%	123			70-130	Pass	
Heptachlor epoxide	M14-Ja05068	NCP	%	84			70-130	Pass	
Hexachlorobenzene	M14-Ja05068	NCP	%	90			70-130	Pass	
Methoxychlor	M14-Ja05068	NCP	%	106			70-130	Pass	
Spike - % Recovery									
Polychlorinated Biphenyls				Result 1					
Aroclor-1260	M14-Ja04964	NCP	%	111			70-130	Pass	
Spike - % Recovery									
Phenols (Halogenated)				Result 1					
2-Chlorophenol	M14-Ja06921	NCP	%	107			30-130	Pass	
2.4-Dichlorophenol	M14-Ja06921	NCP	%	103			30-130	Pass	
2.4.5-Trichlorophenol	M14-Ja06921	NCP	%	89			30-130	Pass	
2.4.6-Trichlorophenol	M14-Ja06921	NCP	%	88			30-130	Pass	
2.6-Dichlorophenol	M14-Ja06921	NCP	%	101			30-130	Pass	
4-Chloro-3-methylphenol	M14-Ja06921	NCP	%	106			30-130	Pass	
Pentachlorophenol	M14-Ja06921	NCP	%	47			30-130	Pass	
Tetrachlorophenols - Total	M14-Ja06921	NCP	%	78			30-130	Pass	
Spike - % Recovery									
Phenols (non-Halogenated)				Result 1					
2-Cyclohexyl-4.6-dinitrophenol	M14-Ja06536	NCP	%	117			30-130	Pass	
2-Methyl-4.6-dinitrophenol	M14-Ja06536	NCP	%	103			30-130	Pass	
2-Methylphenol (o-Cresol)	M14-Ja06921	NCP	%	106			30-130	Pass	
2-Nitrophenol	M14-Ja06921	NCP	%	110			30-130	Pass	
2.4-Dimethylphenol	M14-Ja06921	NCP	%	107			30-130	Pass	
2.4-Dinitrophenol	M14-Ja06536	NCP	%	69			30-130	Pass	
3&4-Methylphenol (m&p-Cresol)	M14-Ja06921	NCP	%	106			30-130	Pass	
4-Nitrophenol	M14-Ja06921	NCP	%	79			30-130	Pass	
Dinoseb	M14-Ja06921	NCP	%	32			30-130	Pass	
Phenol	M14-Ja06921	NCP	%	108			30-130	Pass	
Spike - % Recovery									
				Result 1					
Chromium (hexavalent)	M14-Ja06844	NCP	%	82			70-130	Pass	
Cyanide (total)	M14-Ja03569	CP	%	112			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M14-Ja03569	CP	%	106			75-125	Pass	
Barium	M14-Ja03569	CP	%	117			75-125	Pass	
Beryllium	M14-Ja03569	CP	%	113			75-125	Pass	
Cadmium	M14-Ja03569	CP	%	112			75-125	Pass	
Chromium	M14-Ja03569	CP	%	120			75-125	Pass	
Cobalt	M14-Ja03569	CP	%	112			75-125	Pass	
Lead	M14-Ja03569	CP	%	116			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Mercury	M14-Ja03569	CP	%	86			70-130	Pass	
Nickel	M14-Ja03569	CP	%	113			75-125	Pass	
Silver	M14-Ja03569	CP	%	87			75-125	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M14-Ja03578	CP	%	99			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH C6-C10	M14-Ja03578	CP	%	101			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M14-Ja03578	CP	%	94			75-125	Pass	
Barium	M14-Ja03578	CP	%	102			75-125	Pass	
Beryllium	M14-Ja03578	CP	%	106			75-125	Pass	
Cadmium	M14-Ja03578	CP	%	99			75-125	Pass	
Chromium	M14-Ja03578	CP	%	101			75-125	Pass	
Cobalt	M14-Ja03578	CP	%	99			75-125	Pass	
Copper	M14-Ja03578	CP	%	109			75-125	Pass	
Lead	M14-Ja03578	CP	%	103			75-125	Pass	
Manganese	M14-Ja03578	CP	%	108			75-125	Pass	
Mercury	M14-Ja03578	CP	%	86			70-130	Pass	
Nickel	M14-Ja03578	CP	%	99			75-125	Pass	
Silver	M14-Ja03578	CP	%	77			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M14-Ja03568	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	M14-Ja05141	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M14-Ja05141	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M14-Ja05141	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M14-Ja03568	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M14-Ja03568	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M14-Ja03568	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M14-Ja03568	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M14-Ja03568	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	M14-Ja03568	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M14-Ja03568	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M14-Ja03568	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C6-C10 less BTEX (F1)	M14-Ja03568	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	M14-Ja05141	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	M14-Ja05141	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	M14-Ja05141	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M14-Ja03568	CP	mg/kg	4.6	4.8	4.0	30%	Pass	
Barium	M14-Ja03568	CP	mg/kg	28	28	3.0	30%	Pass	
Beryllium	M14-Ja03568	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Cadmium	M14-Ja03568	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	M14-Ja03568	CP	mg/kg	11	9.7	8.0	30%	Pass	
Cobalt	M14-Ja03568	CP	mg/kg	< 5	< 5	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Copper	M14-Ja03568	CP	mg/kg	23	18	25	30%	Pass	
Lead	M14-Ja03568	CP	mg/kg	31	34	9.0	30%	Pass	
Nickel	M14-Ja03568	CP	mg/kg	5.3	5.7	8.0	30%	Pass	
Silver	M14-Ja03568	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	M14-Ja03568	CP	mg/kg	250	250	1.0	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M14-Ja05068	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	M14-Ja05068	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Toxaphene	M14-Ja05068	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1016	M14-Ja05068	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1221	M14-Ja05068	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1232	M14-Ja05068	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1242	M14-Ja05068	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1248	M14-Ja05068	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1254	M14-Ja05068	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	

Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1260	M14-Ja05068	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Total PCB	M14-Ja05068	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Phenols (Halogenated)				Result 1	Result 2	RPD			
2-Chlorophenol	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dichlorophenol	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4.5-Trichlorophenol	M14-Ja06921	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4.6-Trichlorophenol	M14-Ja06921	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.6-Dichlorophenol	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
4-Chloro-3-methylphenol	M14-Ja06921	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Pentachlorophenol	M14-Ja06921	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Tetrachlorophenols - Total	M14-Ja06921	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Duplicate									
Phenols (non-Halogenated)				Result 1	Result 2	RPD			
2-Cyclohexyl-4.6-dinitrophenol	M14-Ja06921	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
2-Methyl-4.6-dinitrophenol	M14-Ja06921	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
2-Methylphenol (o-Cresol)	M14-Ja06921	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
2-Nitrophenol	M14-Ja06921	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4-Dimethylphenol	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dinitrophenol	M14-Ja06921	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
3&4-Methylphenol (m&p-Cresol)	M14-Ja06921	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
4-Nitrophenol	M14-Ja06921	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Dinoseb	M14-Ja06921	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
Phenol	M14-Ja06921	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chromium (hexavalent)	M14-Ja06854	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Cyanide (total)	M14-Ja03569	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M14-Ja03569	CP	mg/kg	20	16	24	30%	Pass	
Barium	M14-Ja03569	CP	mg/kg	93	81	14	30%	Pass	
Beryllium	M14-Ja03569	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Cadmium	M14-Ja03569	CP	mg/kg	0.8	0.7	12	30%	Pass	
Chromium	M14-Ja03569	CP	mg/kg	38	34	11	30%	Pass	
Cobalt	M14-Ja03569	CP	mg/kg	7.5	6.8	8.0	30%	Pass	
Copper	M14-Ja03569	CP	mg/kg	81	78	4.0	30%	Pass	
Lead	M14-Ja03569	CP	mg/kg	100	90	15	30%	Pass	
Manganese	M14-Ja03569	CP	mg/kg	130	120	9.0	30%	Pass	
Mercury	M14-Ja03569	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	M14-Ja03569	CP	mg/kg	18	16	12	30%	Pass	
Silver	M14-Ja03569	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	M14-Ja03569	CP	mg/kg	1000	960	6.0	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M14-Ja03578	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M14-Ja03578	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M14-Ja03578	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M14-Ja03578	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M14-Ja03578	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M14-Ja03578	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	M14-Ja03578	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	

Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M14-Ja03578	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M14-Ja03578	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C6-C10 less BTEX (F1)	M14-Ja03578	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Volatile Organics				Result 1	Result 2	RPD			
Tetrachloroethene	M14-Ja03578	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M14-Ja03578	CP	mg/kg	21	20	3.0	30%	Pass	
Barium	M14-Ja03578	CP	mg/kg	81	80	1.0	30%	Pass	
Beryllium	M14-Ja03578	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Cadmium	M14-Ja03578	CP	mg/kg	1.0	0.9	10	30%	Pass	
Chromium	M14-Ja03578	CP	mg/kg	43	40	9.0	30%	Pass	
Cobalt	M14-Ja03578	CP	mg/kg	8.0	7.7	4.0	30%	Pass	
Copper	M14-Ja03578	CP	mg/kg	100	92	9.0	30%	Pass	
Lead	M14-Ja03578	CP	mg/kg	110	110	<1	30%	Pass	
Manganese	M14-Ja03578	CP	mg/kg	160	150	2.0	30%	Pass	
Mercury	M14-Ja03578	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	M14-Ja03578	CP	mg/kg	19	19	4.0	30%	Pass	
Silver	M14-Ja03578	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	M14-Ja03578	CP	mg/kg	1000	1300	21	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Organic samples had Teflon liners	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs

Authorised By

Andrew Thexton	Client Services
Carroll Lee	Senior Analyst-Volatile (VIC)
Emily Rosenberg	Senior Analyst-Metal (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)
Stacey Jenkins	Senior Analyst-Organic (VIC)

Glenn Jackson

Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

APC2009479

On Site Technology Pty Ltd **Chain of Custody Form** Page 1 of 1

Contact John Waters

PO Box 5143
Alberton
SA 5014

mobile 0417 846 826
facsimile 08 8241 2079
e-mial john@ostenvironment.com

Job Reference
14001
Job Description
PLS DA

Date	12/1/14
Laboratory	Eurofins
Contact	Daryn
Address	140 Richmond Road Marleston SA 5033
Telephone	8154 3100

Sampled by John Waters Signature 11-1-14

	Sample ID	Sampled Date	Analytes	Matrix	Container	Preservation
	S-01	11/1/14	Cu, Pb, Zn, TRH and TPH	sediment	glass	chilled
	S-02	12/1/14	R7 SA Waste Suite TPH	sediment	glass	chilled
	S-03	12/1/14	Cu, Pb, Zn, TRH and TPH	sediment	glass	chilled
	S-04	12/1/14	Cu, Pb, Zn, TRH and TPH	sediment	glass	chilled
	S-05	12/1/14	R7 SA Waste Suite TPH	sediment	glass	chilled
	S-06	12/1/14	R7 SA Waste Suite TPH	sediment	glass	chilled
	S-07	12/1/14	Cu, Pb, Zn, TRH and TPH	sediment	glass	chilled
	S-08	12/1/14	R7 SA Waste Suite TPH	sediment	glass	chilled
	S-09	12/1/14	Cu, Pb, Zn, TRH and TPH	sediment	glass	chilled
	S-10	12/1/14	Cu, Pb, Zn, TRH and TPH	sediment	glass	chilled
	S-15	12/1/14	R7 SA Waste Suite TPH	sediment	glass	chilled
	S-18	12/1/14	R7 SA Waste Suite TPH	sediment	glass	chilled

Refer to your quotation OST_140110 batch 2

Relinguished By	On	At	Received By	On	At
John Waters	13/1/14	1405	Sarah	13/1/14	2.10pm
	On	At	John-Eurofins mgt	On 14/1/14	At 8:15Am
	On	At		On	At

Eurofins mgt Report # 405436

Appendix 6

Laboratory Recovered Water Report 405600

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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

OST Environmental
PO BOX 5143
ALBERTON
S.A 5014

Attention: **John Waters**

Report **405600-W**
Client Reference PLS DA 14001
Received Date Jan 15, 2014

Client Sample ID			**RW-01**	**RW-02**	**RW-03**	**RW-04**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**M14-Ja04638**	**M14-Ja04639**	**M14-Ja04640**	**M14-Ja04641**
Date Sampled			**Jan 14, 2014**	**Jan 14, 2014**	**Jan 14, 2014**	**Jan 14, 2014**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C10-C14 after Silica Cleanup (TPH)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28 after Silica Cleanup (TPH)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36 after Silica Cleanup (TPH)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	0.1	0.2
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	0.1	0.2
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	0.1	0.1	0.2
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Turbidity	1	NTU	16	15	5.3	19
Heavy Metals						
Copper	0.001	mg/L	0.009	0.007	< 0.005	< 0.005
Lead	0.001	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Zinc	0.001	mg/L	0.079	0.047	0.024	0.025

Client Sample ID			**RW-05**	**RW-06**	**RW-07**	**RW-08**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**M14-Ja04642**	**M14-Ja04643**	**M14-Ja04644**	**M14-Ja04645**
Date Sampled			**Jan 14, 2014**	**Jan 14, 2014**	**Jan 14, 2014**	**Jan 14, 2014**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C10-C14 after Silica Cleanup (TPH)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28 after Silica Cleanup (TPH)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36 after Silica Cleanup (TPH)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1

Client Sample ID			RW-05	RW-06	RW-07	RW-08
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			M14-Ja04642	M14-Ja04643	M14-Ja04644	M14-Ja04645
Date Sampled			Jan 14, 2014	Jan 14, 2014	Jan 14, 2014	Jan 14, 2014
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	0.2	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Turbidity	1	NTU	20	2.6	6.7	4.3
Heavy Metals						
Copper	0.001	mg/L	0.011	< 0.005	< 0.005	< 0.005
Lead	0.001	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Zinc	0.001	mg/L	0.085	0.019	0.023	0.032

Client Sample ID			RW-09	RW-10	RW-15
Sample Matrix			Water	Water	Water
Eurofins | mgt Sample No.			M14-Ja04646	M14-Ja04647	M14-Ja04648
Date Sampled			Jan 14, 2014	Jan 14, 2014	Jan 14, 2014
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH C10-C14 after Silica Cleanup (TPH)	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH C15-C28 after Silica Cleanup (TPH)	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH C29-C36 after Silica Cleanup (TPH)	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene[N02]	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1
Turbidity	1	NTU	9.2	5.6	40
Heavy Metals					
Copper	0.001	mg/L	< 0.005	< 0.005	0.010
Lead	0.001	mg/L	< 0.005	< 0.005	< 0.005
Zinc	0.001	mg/L	0.029	0.026	0.078

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Jan 21, 2014	7 Day
- Method: TRH C6-C36 - MGT 100A			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Jan 21, 2014	7 Day
- Method: LM-LTM-ORG2010			
Turbidity	Melbourne	Jan 16, 2014	2 Day
- Method: APHA 2130 Turbidity			
Heavy Metals	Melbourne	Jan 15, 2014	180 Day
- Method: USEPA 6010/6020 Heavy Metals			

Eurofins | mgt Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

UNITS

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data.

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Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.02			0.02	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH C6-C10 less BTEX (F1)	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Turbidity	NTU	< 1			1	Pass	
Method Blank							
Heavy Metals							
Copper	mg/L	< 0.001			0.001	Pass	
Zinc	mg/L	< 0.001			0.001	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	123			70-130	Pass	
TRH C10-C14	%	121			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH C6-C10	%	123			70-130	Pass	
TRH >C10-C16	%	122			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M14-Ja06010	NCP	%	99			70-130	Pass	
TRH C10-C14	M14-Ja00548	NCP	%	129			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH C6-C10	M14-Ja06010	NCP	%	99			70-130	Pass	
TRH >C10-C16	M14-Ja00548	NCP	%	129			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M14-Ja04742	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	M14-Ja01278	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M14-Ja01278	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M14-Ja01278	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M14-Ja04742	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C6-C10	M14-Ja04742	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C6-C10 less BTEX (F1)	M14-Ja04742	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	M14-Ja01278	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	M14-Ja01278	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	M14-Ja01278	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Copper	M14-Ja04642	CP	mg/L	0.011	0.009	17	30%	Pass	
Lead	M14-Ja04642	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc	M14-Ja04642	CP	mg/L	0.085	0.083	2.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Turbidity	M14-Ja04648	CP	NTU	40	40	2.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Organic samples had Teflon liners	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.

Authorised By

Andrew Thexton	Client Services
Carroll Lee	Senior Analyst-Volatile (VIC)
Emily Rosenberg	Senior Analyst-Metal (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)
Stacey Jenkins	Senior Analyst-Organic (VIC)

Glenn Jackson
Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

APC2009484

On Site Technology Pty Ltd **Chain of Custody Form** Page 1 of 1

Contact John Waters

PO Box 5143
Alberton
SA 5014

mobile 0417 846 826
facsimile 08 8241 2079
e-mial john@ostenvironment.com

Job Reference
14001
Job Description
PLS DA

Date	14/01/2014
Laboratory	Eurofins
Contact	Daryn
Address	140 Richmond Road Marleston SA 5033
Telephone	8154 3100

Sampled by John Waters Signature 14-1-14

	Sample ID	Sampled Date	Analytes	Matrix	Container	Preservation
	RW-01	14/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	RW-01	14/1/14	TPH, TRH & turbidity	water	glass	chilled
	RW-02	14/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	RW-02	14/1/14	TPH, TRH & turbidity	water	glass	chilled
	RW-03	14/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	RW-03	14/1/14	TPH, TRH & turbidity	water	glass	chilled
	RW-04	14/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	RW-04	14/1/14	TPH, TRH & turbidity	water	glass	chilled
	RW-05	14/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	RW-05	14/1/14	TPH, TRH & turbidity	water	glass	chilled
	RW-06	14/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	RW-06	14/1/14	TPH, TRH & turbidity	water	glass	chilled
	RW-07	14/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	RW-07	14/1/14	TPH, TRH & turbidity	water	glass	chilled
	RW-08	14/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	RW-08	14/1/14	TPH, TRH & turbidity	water	glass	chilled
	RW-09	14/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	RW-09	14/1/14	TPH, TRH & turbidity	water	glass	chilled
	RW-10	14/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	RW-10	14/1/14	TPH, TRH & turbidity	water	glass	chilled
	RW-15	14/1/14	Total Cu, Pb and Zn	water	plastic	pH<2
	RW-15	14/1/14	TPH, TRH & turbidity	water	glass	chilled

Refer to your quotation OST_140110 batch 3

Turbidity (NTU) was not included in quote

Relinguished By	On	At	Received By	On	At
	14/1/14	2:40 pm		14/1/14	240pm
	On	At	John - mgt Eurofins	On 15/1/14	At 8:04Am
	On	At		On	At

Eurofins mgt Report # 405600

Appendix 7

Laboratory Arsenic Report 408111

Certificate of Analysis

ON Site Technology
PO BOX 5143
Alberton
SA 5014

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **John Waters**

Report **408111-S-V2**
Client Reference 14004
Received Date Feb 10, 2014

Client Sample ID			**S01**	**S03**	**S04**	**S07**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M14-Fe05754**	**M14-Fe05755**	**M14-Fe05756**	**M14-Fe05757**
Date Sampled			**Jan 24, 2014**	**Jan 24, 2014**	**Jan 24, 2014**	**Jan 24, 2014**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	3.7	7.4	9.2	9.7
% Moisture	0.1	%	48	67	61	79

Client Sample ID			**S09**	**S10**
Sample Matrix			**Soil**	**Soil**
Eurofins | mgt Sample No.			**M14-Fe05758**	**M14-Fe05759**
Date Sampled			**Jan 24, 2014**	**Jan 24, 2014**
Test/Reference	LOR	Unit		
Heavy Metals				
Arsenic	2	mg/kg	< 2	< 2
% Moisture	0.1	%	32	68

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Melbourne	Feb 10, 2014	180 Day
- Method: USEPA 6010/6020 Heavy Metals			
% Moisture	Melbourne	Feb 10, 2014	14 Day
- Method: Method 102 - ANZECC - % Moisture			

Eurofins | mgt Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

UNITS

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Arsenic			mg/kg	< 2			2	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic			%	97			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M14-Fe04897	NCP	%	76			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M14-Fe03931	NCP	mg/kg	< 2	< 2	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Organic samples had Teflon liners	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Andrew Thexton	Client Services
Emily Rosenberg	Senior Analyst-Metal (VIC)

Glenn Jackson
Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

EnviroSampleVIC

From: Natalie Krasselt
Sent: Monday, 10 February 2014 8:19 AM
To: EnviroSampleVIC
Subject: additional analysis - Report 406787 : Site 14004

Follow Up Flag: Follow up
Flag Status: Completed

Morning,

Can you please log in the additional analysis request below on 1 day TAT?

Thanks!

Kind Regards,

John - Eurofins mgt
Report #
408111

Natalie Krasselt
Client Services

Eurofins | mgt
2-5 Kingston Town Close, Oakleigh
3166, Victoria
Australia
Phone : +61 3 8564 5000
Fax : +61 3 8564 5090

Email: NatalieKrasselt@eurofins.com.au
Website: www.eurofins.com.au

From: John Waters [mailto:john@ostenvironment.com]
Sent: Friday, 7 February 2014 5:09 PM
To: Natalie Krasselt; Mark Rodriquez
Subject: Re: Eurofins | mgt Test Results - Report 406787 : Site 14004

Natalie Mark

Could you please analyse samples S01, S03, S04, S07, S09 and S10 from your report 405436-S for arsenic. These samples should be in storage at your laboratory.

I require 24 hour turnaround on this request (I realise this will be 24 hours from Monday).

Thankyou
John Waters
On Site Technology Pty Ltd

On 7 February 2014 10:35, <NatalieKrasselt@eurofins.com.au> wrote:
Hi John,