

# **Australia Pacific LNG Project Supplemental information to the EIS**

## **Materials Offloading Facility, Jetty and Jetty Berth - Sediment Characterisation Report LNG Facility**



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## Abbreviations

Abbreviation	Description
AAA	Advanced Analytical Australia
Ag	Silver
Al	Aluminium
ALS	Australian Laboratory Services
ANC	Acid Neutralising Capacity
Australia Pacific LNG	Australia Pacific LNG Pty Limited
As	Arsenic
AASS	Actual Acid Sulfate Soil
ASS	Acid Sulfate Soil
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
Cd	Cadmium
Co	Cobalt
Cr	Chromium
CSG	Coal Seam Gas
Cu	Copper
DEH	Department of Environment and Heritage (Queensland) – now DERM
DERM	Department of Environment and Resource Management (Queensland)
DEWHA	Department of the Environment, Water, Heritage and the Arts
EIL	Environmental Investigation Levels
Fe	Iron
GPC	Gladstone Ports Corporation
Hg	Mercury
HIL-A	Health Investigation Levels for residential land use
LNG	Liquefied Natural Gas
LAT	Lowest Astronomical Tide
LOR	Limits of Reporting
Mn	Manganese
MOF	Material Offloading Facility
NAGD	National Assessment Guidelines for Dredging
NATA	National Association of Testing Authorities
Ni	Nickel
OCP	Organochlorine Pesticide
OPP	Organophosphorus Pesticide
PAH	Polycyclic Aromatic Hydrocarbon (Polynuclear Aromatic Hydrocarbon)

Abbreviation	Description
Pb	Lead
PCB	Polychlorinated Biphenyl
pH <sub>F</sub>	pH Field
pH <sub>Fox</sub>	pH Field Oxidised
pH <sub>KCl</sub>	pH Potassium Chloride
PSD	Particle Size Distribution
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QASSIT	Queensland Acid Sulfate Soils Investigation Team
QC	Quality Control
RPD	Relative Percent Difference
RSD	Relative Standard Deviation
PASS	Potential Acid Sulfate Soil
SAP	Sampling and Analysis Plan
Sb	Antimony
S <sub>CR</sub>	Chromium Reducible Sulfur
Se	Selenium
SPP2/02	State Planning Policy 2/02
TAA	Titrateable Actual Acidity
TBT	Tributyltin
TKN	Total Kjeldahl Nitrogen
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
UCL	Upper Confidence Limit
V	Vanadium
Zn	Zinc

## Executive Summary

Australia Pacific LNG Pty Limited (Australia Pacific LNG) is seeking to accelerate the development and production of its coal seam gas (CSG) reserves in Queensland through the development of a CSG to liquefied natural gas (LNG) project. The proposed CSG to LNG Project, which is the largest under consideration in Australia, will encompass the further development of Australia Pacific LNG's CSG fields, the construction of a gas transmission pipeline(s), together with the construction of a LNG plant and associated port infrastructure to export LNG to international markets.

Australia Pacific LNG is proposing to develop the LNG plant on the western side of Curtis Island. The establishment of the LNG plant will require the construction of wharf and jetty structures to enable the loading of the LNG vessels. Construction will also involve the establishment of a materials offloading facility (MOF) for the transfer of building materials, heavy equipment and people to the project site.

The construction of the marine infrastructure will involve dredging at the MOF construction access, MOF channel, jetty berth, jetty construction access and construction docks. Much of the area to be dredged has been previously assessed within GPC WBDDP EIS (WorleyParsons, 2009a). The design has been optimised since that study and has led to sections of the required dredge area lying outside of that already assessed. The access and construction of the temporary rock dock, construction ferry dock and RO-RO dock has been determined and designed since the GPC WBDDP study. Therefore the focus of this current study is to characterise those areas which lay outside of the dredge Option 2A area. The total dredge footprint covers an area of approximately 1,445,683m<sup>2</sup> and will require a dredge volume of approximately 9,665,000m<sup>3</sup> to obtain a depth of between RL-3m and RL-13.3m. The dredge footprint which lies outside of the dredge Option 2A covers an area of approximately 400,781m<sup>2</sup> and will be the basis for this current study. This additional dredging has been assessed within the scope of the Australia Pacific EIS.

Dredged material is proposed to be placed in the proposed Western Basin reclamation area at Fisherman's Landing along with other material dredged from Gladstone Port Corporation's (GPC's) Western Basin Dredging and Disposal Project. The disposal of the dredged material is being assessed for approval through GPC's approval processes.

The sediment sampling and analysis undertaken largely reflects that proposed by GPC in the sediment sampling and analysis plan (SAP) for the Western Basin Dredging and Disposal Project (GHD 2009) which was submitted to the Department of the Environment, Water, Heritage and the Arts (DEWHA) in July 2009 and approved in September 2009. The main difference between the approved SAP and this study is that the SAP was based on a pilot-level sample collection program (ie 20% of sample locations), where as this study uses half the minimum number of samples required for screening level assessment in the *National Assessment Guidelines for Dredging* (NAGD) (Commonwealth of Australia 2009). In addition, sampling and analysis for acid sulphate soils (ASS) was undertaken.

Where possible, sample material for laboratory analyses was taken from the following horizon depths: 0-0.5m; 0.5- 1.0m; 1.0-2.0m; 2.0-3.0m; and 3.0-4.0m. Refusal of the coring apparatus on stiff substrate typically limited the number of horizons submitted for laboratory analyses.

Samples were analysed for the following contaminants:

- Particle Size Distribution (PSD)
- Moisture Content

- Total Organic Carbon (TOC)
- Metals (Al, Fe, Sb, As, Cd, Cr, Cu, Co, Pb, Mn, Ni, Se, Ag, V, Zn, Hg)
- Organotins (Tributyltin – TBT)
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Nutrients
- Benzene, toluene, ethylbenzene, and xylenes (BTEX)
- Total Petroleum Hydrocarbons (TPH)
- Organophosphorus Pesticides (OPP)
- Organochlorine Pesticides (OCP)
- Polychlorinated Biphenyls (PCB)

Samples were collected at each location using a piston and vibracoring techniques. The piston corer was used to collect a sediment core to 1m of depth, or until refusal was met. The vibracore was used to collect a sediment sample to the required predetermined dredge depth at that location, or to refusal. The corers were boat deployed, or diver assisted as necessitated by water depth.

At numerous sites that contained only a thin veneer of silts over very stiff substrate, the piston corer was used to collect the silty layer while stiffer sediments were collected using vibracore. The use of the piston corer to collect surface sediments enabled better quality environmental cores to be collected of fine material, since vibracore can significantly disturb this material.

Sediment contaminant concentrations were assessed against the NAGD (Commonwealth of Australia 2009) screening levels and Environmental Investigation Levels (EIL) and Health Investigation Levels for residential land use (HIL-A) as detailed in the *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland* (DEH 1998).

Chemical analyses of sediments within the MOF, Jetty and Jetty Berth dredge areas identifies that contaminant substances, if present, are generally below NAGD Screening Levels. The only exception to this is the presence of arsenic at three locations. Arsenic was identified in the surface sediments (0.0-0.5m and 0.5-1.0m) above the NAGD Screening Levels, from three locations within the Jetty and Jetty Berth dredge areas. These results are consistent with the assessment of the adjacent 2A dredge area (WorleyParsons 2009a), which identified sediments within the southern extent of the dredge area had elevated concentrations of arsenic, above NAGD Screening Levels, throughout the sediment profile. A study by URS (2009) also identified elevated arsenic concentrations in the area). Arsenic has also been previously identified as occurring naturally within sediments in the Port of Gladstone (GHD 2009).

In comparison with the DEH (1998) guidelines arsenic concentrations, as discussed above, exceeded the EILs. In addition, manganese was identified in surface sediments and through to a depth of 2m. Exceedances occurred at three locations within the MOF dredge area. These results are in accordance with a number of previous studies completed within the area which have also identified manganese as exceeding DEH EILs (WorleyParsons 2009a; WorleyParsons 2009b; URS 2009). Manganese, as with arsenic, is considered a naturally occurring element within the local geology and is often recorded at elevated levels (Storey et al. 2007).

In general, the results of this study are consistent with those of previous studies within the area. A major difference between this study and others in the area is that previous studies have also identified exceedances in mercury, zinc, nickel, copper, antimony and chromium. Concentrations of these elements were all below NAGD Screening Levels and DEH EILs in this current study.

For organic substances within the dredge area results are summarised below:

- Total Petroleum Hydrocarbon fractions C6-C9 and C10-C14 were not detected in any sample
- TPH fractions C15-C28 and C29-C36 were detected from surface sediments at one location
- The majority of PAH species were detected in at least one sample, seven species were not detected in any sample. Four locations did not record any PAH species above LOR
- Tributyltin, BTEX, Organochlorine Pesticides, Organophosphorus Pesticides and Polychlorinated Biphenyls were not detected in any sample

The 95% UCL of the mean for all contaminants tested across the MOF, Jetty and Jetty Berth areas was below respective NAGD Screening Levels and EIL and HIL-A. Therefore, based on the analyses undertaken, it is considered that the capital material to be dredged these areas is suitable for unconfined placement at sea, according to the NAGD contaminant assessment framework. The material is also suitable for placement on land according to the DEH (1998) guidelines.

Within ASS investigations, two profiles were generally encountered: 1) very weak, very dark grey surface silt with a weak to firm dark grey silty base clay or 2) very weak, very dark grey surface silt with a firm, grey with brown / red / yellow mottle silty base clay. The first of these profiles was PASS, while the base clay of the second profile was non-ASS.

Field screening indicated all samples collected from all ASS coring locations were not AASS, however three (3) samples collected from one jetty location were indicative of PASS. Further testing conducted in a laboratory using the Chromium Suite analysis indicated nearly all samples were PASS. Samples which were not AASS or PASS were collected within the firm, grey with brown / red / yellow mottle silty base clay which has previously been reported as non-PASS (GeoCoastal 2009). Samples collected within very dark grey surface silt or the weak to firm dark grey silty base clay were PASS.

ANC was reported to buffer all potential acid generated at one MOF and jetty berth location. All other ASS coring locations will require treatment rated from high to extra high.

This limited assessment, which should be considered preliminary, indicated the weak surface sediment layers encountered at all ASS coring locations are PASS. This weak (soft) surface layer was encountered at most other coring locations and may be considered PASS. Similarly, the deeper weak to firm dark grey silty clay was also PASS. It too was encountered at other coring locations. Where these layers are encountered during the proposed dredging works, further assessment may be required to determine accurate liming rates for treatment (if required depending on ANC) if onshore disposal methods are selected. The dredge management plan to be developed for the dredging will outline any further assessment requirements which would include the QASSIT recommended sampling intensity of one sample per 500m<sup>3</sup> of spoil.

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- Appendix 3    Primary Laboratory Reports (ALS)
- Appendix 4    Secondary Laboratory Reports (AAA)

# 1. Introduction

## 1.1 Background

Australia Pacific LNG Pty Limited (Australia Pacific LNG) is seeking to accelerate the development and production of its coal seam gas (CSG) reserves in Queensland through the development of a CSG to liquefied natural gas (LNG) project. The proposed CSG to LNG Project, which is the largest under consideration in Australia, will encompass the further development of Australia Pacific LNG's CSG fields, the construction of a gas transmission pipeline(s), together with the construction of a LNG plant and associated port infrastructure to export LNG to international markets.

Australia Pacific LNG is proposing to develop the LNG plant on the western side of Curtis Island. The establishment of the LNG plant will require the construction of wharf and jetty structures to enable the loading of the LNG vessels. Construction will also involve the establishment of a materials offloading facility (MOF) for the transfer of building materials, heavy equipment and people to the project site.

The construction of the marine infrastructure will involve dredging at the MOF construction access, MOF channel, jetty berth, jetty construction access and construction docks. Much of the area to be dredged has been previously assessed within GPC WBDDP EIS (WorleyParsons, 2009a). The design has been optimised since that study this has led to sections of the required dredge area lying outside of that already assessed. The access and construction of the temporary rock dock, construction ferry dock and RO-RO dock in the vicinity of the MOF has been determined and designed since the GPC WBDDP study. Therefore the focus of this current study is to characterise those areas which lay outside of the dredge Option 2A area. The total dredge footprint covers an area of approximately 1,445,683m<sup>2</sup> and will require a dredge volume of approximately 9,665,000m<sup>3</sup> to obtain a depth of between RL-3m and RL-13.3m. The dredge footprint which lies outside of the dredge Option 2A covers an area of approximately 400,781m<sup>2</sup> and forms the basis for this current study. This additional dredging has been assessed within the scope of the Australia Pacific EIS.

Dredged material is proposed to be placed in the proposed Western Basin reclamation area at Fisherman's Landing along with other material dredged from Gladstone Port Corporation's (GPC's) Western Basin Dredging and Disposal Project. The disposal of the dredged material is being assessed for approval through GPC's approval processes.

### 1.1.1 Sampling and Analysis Plan

The sediment sampling and analysis undertaken largely reflects that proposed by GPC in the sediment sampling and analysis plan (SAP) for the Western Basin Dredging and Disposal Project (GHD 2009) which was submitted to the Department of the Environment, Water, Heritage and the Arts (DEWHA) in July 2009 and approved in September 2009. The GPC SAP was based on a pilot-level sampling collection program, testing for a wide range of contaminant substances.

One departure from the GPC SAP in the present study is that the MOF, Jetty and Jetty Berth dredge area sediment characterisation study used half the minimum number of locations required in Table 6 of the *National Assessment Guidelines for Dredging* (NAGD) (Commonwealth of Australia 2009) for the given volume of 'potentially contaminated' material, rather than for a pilot study that samples 20% of locations required. For a capital dredging project, the NAGD takes 'potentially contaminated' material to be represented by the top 1m of sediment over the dredge footprint. Halving the number of

sample locations required is permitted under the NAGD given that current good quality data exists for the area.

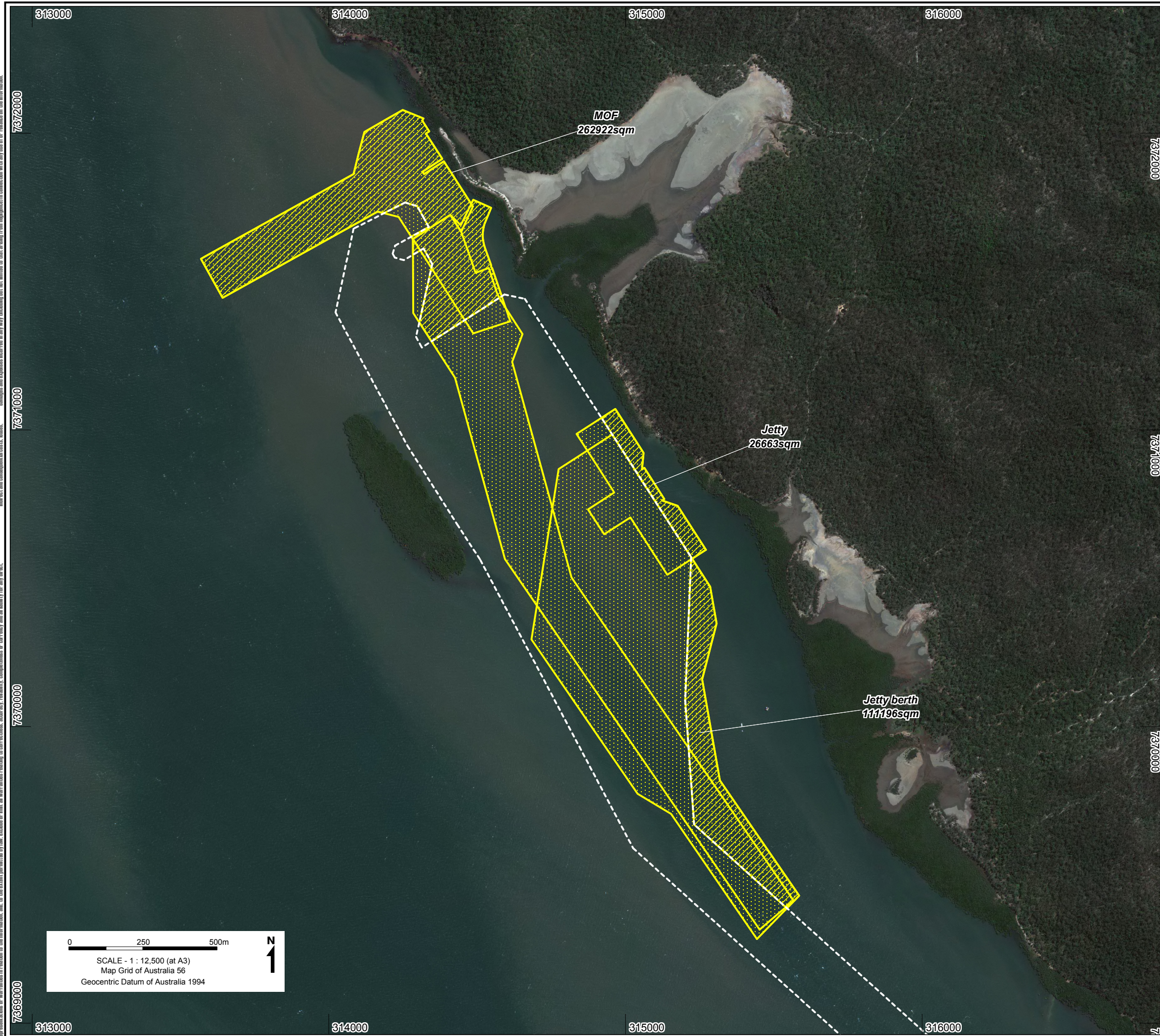
In addition, sampling and analysis for acid sulphate soils was undertaken.

## 1.2 Project Objectives

WorleyParsons was commissioned by Australia Pacific LNG to characterise sediments within the MOF (including construction docks), Jetty and Jetty Berth dredge areas which had not been covered under previous investigations. The objectives of the study were to:

- Undertake a sediment sampling and analysis program consistent with the Western Basin Dredging and Disposal Project draft SAP study methods (GHD 2009)
- Test and analyse sediments for a range of physical and chemical properties
- Provide a comparison of contaminant concentrations against the NAGD Screening Levels and the DEH (1998) environment and health investigation levels
- Determine the suitability of sediments for placement on land or unconfined sea disposal
- To identify and assess ASS in order understand the potential acid generating capacity of these sediments

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#### LEGEND

- Proposed dredge area
- Proposed dredge area outside APLNG Option 2A dredge area
- APLNG Option 2A dredge area

#### Source Information

Satellite imagery  
Captured by GeoEye-1 on 24 March 2009  
APLNG dredge areas  
Translated from Bechtel CAD drawings received from ConocoPhillips 08/04/2010  
Proposed dredge area 2a  
Digitised from Bechtel CAD drawing 25509-100-K0-K01-00002.dgn



**Figure 1.1**  
**Location of MOF, Jetty and**  
**Jetty Berth dredge areas**

## 2. Methods

### 2.1 Sampling Locations and Horizons

The number of locations sampled within the dredging area was determined with regard to the volume of 'potentially contaminated' sediments (ie sediments that could contain contaminants above background) within the dredge footprint. For capital dredging projects, this is based typically on the volume of material in the top 1m of sediment over the dredge area. Sampling within the vicinity of the MOF, Jetty and Jetty Berth areas has been completed previously (WorleyParsons, 2009). Therefore the area sampled in this study only included those areas outside that which was previously sampled. The three areas were considered as one dredge area given that all were considered 'probably clean' based on the results of previous assessment, as allowed for under the NAGD.

Based on this rationale, the total dredge area to be sampled in this assessment is 400,781m<sup>2</sup> and the calculated volume of potentially contaminated material is 400,781m<sup>3</sup>, upon which the minimum sample location numbers have been identified. Based on that volume, Table 6 of the NAGD requires a minimum of 26 sampling locations. Given that current good quality data exists for sediments within the vicinity the NAGD allows for the number of sampling locations required to be halved, therefore a minimum of 13 sample locations are required. Sample locations were assigned on a pro-rata basis across the three areas based on the total dredge area, location numbers were rounded up and as such a total of 15 sample locations were assessed as follows:

- MOF – 9 sample locations
- Jetty – 2 sample locations
- Jetty Berth – 4 sample locations

Under the NAGD, sampling locations are randomly allocated over the dredge area using a grid with at least five times the number of required sampling locations. A map showing the sampling locations for physical and chemical testing of sediments is provided in Figure 2.1. Table 2.1 provides a list of the GPS coordinates and sampling depth for each core.

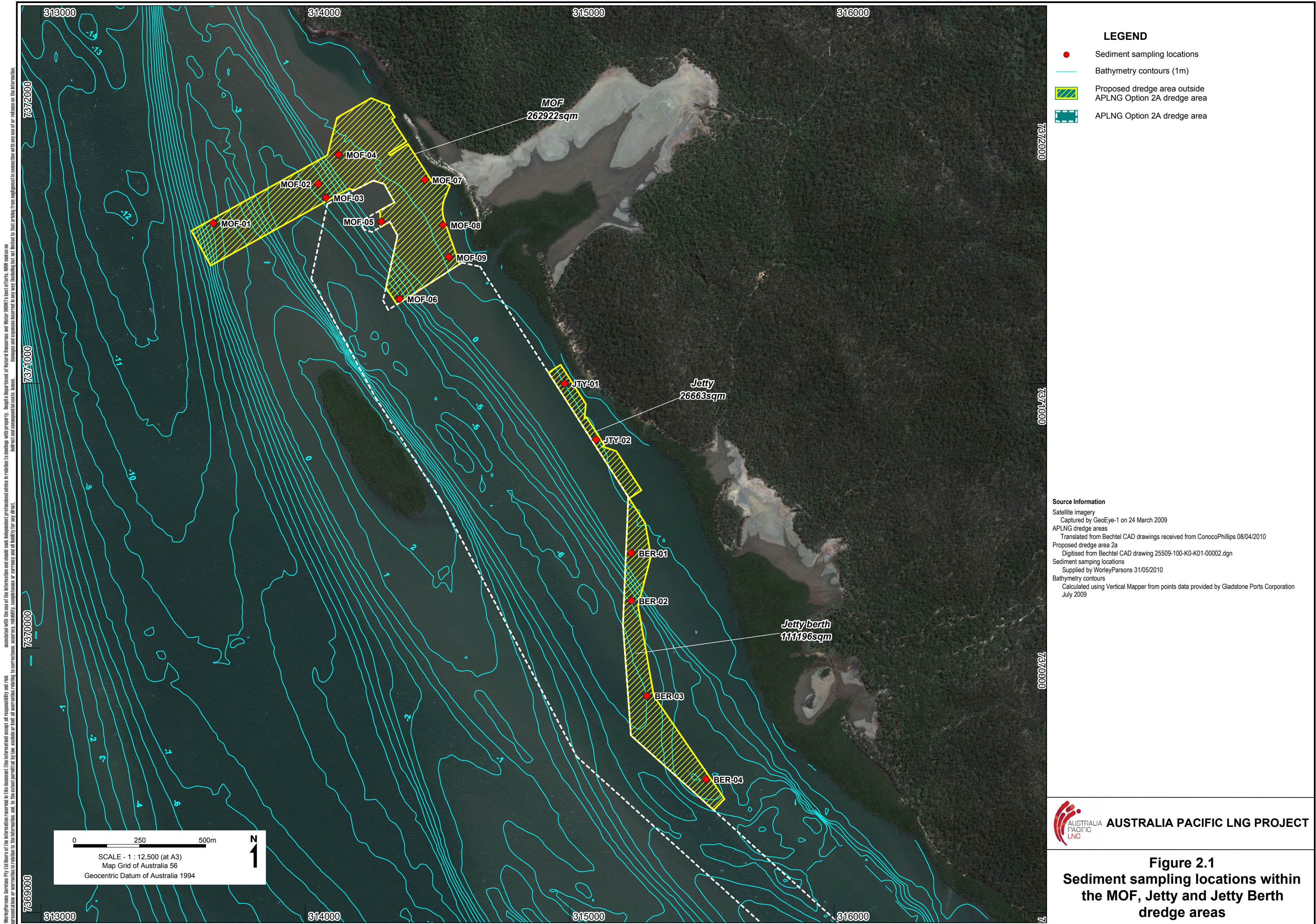
Where possible, sample material for laboratory analyses was taken from the following horizon depths: 0-0.5m; 0.5- 1.0m; 1.0-2.0m; 2.0-3.0m; 3.0-4.0m. Refusal of the coring apparatus on stiff substrate typically limited the number of horizons submitted for laboratory analyses.

ASS testing was undertaken at five of the total fifteen locations (refer Table 2.1). Although this is below the recommended sampling intensity of two locations per hectare within the State Planning Policy 2/02 (SPP2/02) and the guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland 1998 (Ahern et al. 1998), it was considered adequate for the purpose of this investigation due to the extent of sampling already undertaken as part of the Option 2A dredge area (WorleyParsons 2009). These locations were cored to refusal.

**Table 2.1 Sample locations, depth of cores and number of horizons sampled**

Sample Site	Latitude (S)	Longitude (E)	Coring depth (m)	Analysis Completed	No. Horizons Analysed for Contaminants	No. Horizons Laboratory Analysed for ASS
MOF 1	-23° 45.348'	151° 10.320'	1.8	Contaminant	3	-
MOF 2	-23° 45.270'	151° 10.500'	0.15	Contaminant	1	-
MOF 3	-23° 45.300'	151° 10.560'	0.04	Contaminant	1	-
MOF 4	-23° 45.216'	151° 10.560'	1.0	Contaminant	2	-
MOF 5	-23° 45.354'	151° 10.680'	2.3	Contaminant	3	11
MOF 6	-23° 45.510'	151° 10.680'	0.15	Contaminant	1	2
MOF 7	-23° 45.270'	151° 10.740'	1.0	Contaminant	2	-
MOF 8	-23° 45.360'	151° 10.800'	1.7	Contaminant	3	8
MOF 9	-23° 45.426'	151° 10.800'	1.23	Contaminant	3	-
JTY 1	-23° 45.690'	151° 11.040'	0.4	Contaminant	1	-
JTY 2	-23° 45.804'	151° 11.160'	0.95	Contaminant	2	5
BER 1	-23° 46.038'	151° 11.220'	1.12	Contaminant	2	-
BER 2	-23° 46.134'	151° 11.220'	0.3	Contaminant	1	-
BER 3	-23° 46.332'	151° 11.220'	0.3	Contaminant	1	2
BER 4	-23° 46.500'	151° 11.400'	Surface	Contaminant	1	-

Datum: WGS84



## 2.2 Sample Collection

Samples were collected at each location using a piston corer of 60mm diameter and a vibracore of 40mm diameter. The corers were boat deployed, or diver assisted as necessitated by water depth.

The piston corer was constructed of stainless steel, and had an internal barrel length of 1.0m. When deployed from the boat, the corer was lowered over the side of the vessel to the seabed using extension rods. The corer was used to collect a sediment core to 1m of depth, or until refusal was met. Once a sediment core had been collected, the piston corer was retrieved to the surface and extruded manually into a plastic core sock for geotechnical logging and subsequent sample processing and containment. At each location, between one and five cores were taken to obtain the necessary sample volume for chemical analysis.

The vibracore was constructed of stainless steel with an internal barrel length of 6.0m. The head of the vibracore was attached to a pulley system, mounted to an A-frame on the bow of the vessel. This allowed the vibracore to be lowered and raised via a winch. When deployed from the boat, the corer was lowered over the side of the vessel to the seabed via this system and guided to an upright position to ensure a vertical core profile. A sediment sample was collected to the required predetermined dredge depth at that location, or to refusal. Once a sample had been collected the vibracore was retrieved to the surface and the sample extruded under mild back-pressure into a plastic core tube for subsequent logging and sample processing. At each location, between one and three vibracores were taken to obtain the necessary sample volume for chemical and acid sulphate soils analysis.

At numerous sites that contained only a thin veneer of silts over very stiff substrate, the piston corer was used to collect the silty layer while stiffer sediments were collected using vibracore. The use of the piston corer to collect surface sediments enabled better quality environmental cores to be collected of fine material, since vibracore can significantly disturb this material.

For locations where sampling was completed with diver assistance, a shot line was deployed from the bow of the vessel to the seabed. Once on the seabed, the piston corer was attached and lowered to the seabed. A diver was then deployed to operate the corer and obtain a sediment sample to a depth of 1m. Once a sediment core had been collected the piston corer was retrieved to the surface and extruded, as per boat deployment. Once piston coring had been completed the diver assisted in the positioning of the vibracore into the sediments, ensuring a vertical core profile. A sediment sample was collected to the required predetermined dredge depth, or to refusal. Once a sediment core had been collected the vibracore was retrieved to the surface and extruded, as per boat deployment.

## 2.3 Sample Handling and Processing

Sediment samples were returned to shore twice a day for logging, processing and containment. Samples were split into relevant horizons and homogenised in a large stainless steel bowl using powderless nitrile gloved hands. Decontamination between samples included washing of all sampling equipment with ambient sea water and a laboratory grade detergent (Decon 90), and successive rinsing with deionised water. Samples to be tested for contaminants were placed in sample containers with zero headspace and stored in chilled eskies, while samples to be tested for ASS were placed into laboratory supplied resealable plastic bags and stored on dry ice. All samples were consigned under chain of custody (COC) documentation to the analytical laboratories; Australian Laboratory Services (ALS) and Advanced Analytical Australia (AAA). Following receipt at the laboratories, samples were

stored under refrigerated conditions (or frozen for ASS) prior to analysis. The jars for chemical analyses were solvent washed, acid rinsed glass jars with Teflon lined lids and were provided by the analytical laboratories.

At each site a site description sheet was completed. The following information was collected:

- Name of client
- Sampling date
- General location number and sample identifiers assigned
- Name of the sample collector
- Type of sampler used
- Weather conditions at the time of sampling
- Sea state at the time of sampling
- General comments (eg wind speed, level of shipping traffic etc)
- GPS location
- Time of sampling
- Water depth at each sampling location (based on boat mounted depth sounder)
- Photograph of each sediment sample

A sediment log of each core was recorded on a field data sheet, providing a description of the composition of each sample, including the following information:

- Colour
- Field texture
- Observed sand grain size
- Plasticity
- Moisture content of sample (eg wet, moist, dry)
- Consistency
- % stones
- Presence of shell/shell grit
- Odour (eg marine, sulphurous)

Sediment core logs are provided in Appendix 1.

### **2.3.1 Physical and Chemical Testing**

Primary sediment analyses were conducted by Australian Laboratory Services (ALS). Inter-laboratory quality control testing was undertaken by Advanced Analytical Australia (AAA). Both Laboratories are NATA (National Association of Testing Authorities) accredited for the analyses performed.

All horizons from each location were analysed for the basic suite of analysis. In addition, 20% of the sample locations were also analysed for the detailed suite of analysis, consistent with the approach of the approved SAP for the Western Basin Dredging and Disposal Project (GHD 2009).

Table 2.2 provides a summary of the analyses performed, which includes the following:

Basic Suite:

- Particle Size Distribution (PSD)
- Moisture content
- Total Organic Carbon (TOC)
- Metals (Al, Sb, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Se, Ag, V, Zn)
- Organotins (TBT)
- Polycyclic Aromatic Hydrocarbons (PAH)

Detailed Suite:

- Benzene, toluene, ethylbenzene, and xylenes (BTEX)
- Total Petroleum Hydrocarbons (TPH)
- Organophosphorus Pesticides (OPP)
- Organochlorine Pesticides (OCP)
- Polychlorinated Biphenyls (PCB)

**Table 2.2 Contaminant analysis undertaken at each sampling location**

Sample Location	Horizon	Basic (all locations)						Detailed (20% sample locations)					
		Moisture Content	PSD	TOC	Metals	TBT	PAH	TPH	OPP	OCP	PCB	BTEX	Nutrients
MOF 1	0.0-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	0.5-1.0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	1.0-2.0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MOF 2	0.0-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MOF 3	0.0-0.5	✓	✓	✓	✓	✓	✓						
MOF 4	0.0-0.5	✓	✓	✓	✓	✓	✓						
	0.5-1.0	✓	✓	✓	✓	✓	✓						
MOF 5	0.0-0.5	✓	✓	✓	✓	✓	✓						
	0.5-1.0	✓	✓	✓	✓	✓	✓						
	1.0-2.0	✓	✓	✓	✓	✓	✓						
MOF 6	0.0-0.5	✓	✓	✓	✓	✓	✓						
MOF 7	0.0-0.5	✓	✓	✓	✓	✓	✓						
	0.5-1.0	✓	✓	✓	✓	✓	✓						
MOF 8	0.0-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	0.5-1.0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	1.0-2.0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MOF 9	0.0-0.5	✓	✓	✓	✓	✓	✓						
	0.5-1.0	✓	✓	✓	✓	✓	✓						
	1.0-2.0	✓	✓	✓	✓	✓	✓						
JTY 1	0.0-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
JTY 2	0.0-0.5	✓	✓	✓	✓	✓	✓						
	0.5-1.0	✓	✓	✓	✓	✓	✓						
BER 1	0.0-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	0.5-1.0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BER 2	0.0-0.5	✓	✓	✓	✓	✓	✓						
	0.5-1.0	✓	✓	✓	✓	✓	✓						
	1.0-2.0	✓	✓	✓	✓	✓	✓						
	2.0-3.0	✓	✓	✓	✓	✓	✓						
BER 3	0.0-0.5	✓	✓	✓	✓	✓	✓						
	0.5-1.0	✓	✓	✓	✓	✓	✓						
	1.0-2.0	✓	✓	✓	✓	✓	✓						
	2.0-3.0	✓	✓	✓	✓	✓	✓						
BER 4	0.0-0.5	✓	✓	✓	✓	✓	✓						
	0.5-1.0	✓	✓	✓	✓	✓	✓						
	1.0-2.0	✓	✓	✓	✓	✓	✓						
	2.0-3.0	✓	✓	✓	✓	✓	✓						

Material submitted for testing included additional samples for quality control (QC) purposes in accordance with NAGD requirements (refer to Section 4 for details). These QC samples assessed:

- Sediment homogeneity – a ‘replicate triplicate’ sample (ie three separate samples taken within 1m<sup>2</sup>)
- Laboratory variation – a ‘split triplicate’ sample – two samples sent to the ‘primary laboratory’ and a third sent to a secondary (‘check’) laboratory
- Analytical variation – a sample ‘split duplicate’ analysed in one batch was submitted in a later batch
- Volatile transfer between samples – a ‘trip blank’ consisting of inert chromatographic sand was shipped in the sealed eskies with samples

Laboratory limits of reporting (LOR) are identified as the lowest chemical analysis level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The LOR reported in Table 2.3 were applicable to the analyses undertaken for both the top 1m and sediment below 1m. Apart from moisture content, the LOR meet the NAGD practical quantitation limit (PQL) requirements.

**Table 2.3 Laboratory LOR for analyses undertaken**

Analyte	NAGD PQL		Laboratory LOR for Analysis
Moisture Content	0.1%		1%
Total Organic Carbon	0.1%		0.02%
Metals	Al	200mg/kg	50mg/kg
	Fe	100mg/kg	50mg/kg
	Mn	10mg/kg	10mg/kg
	V	2mg/kg	2mg/kg
	As, Cr, Cu, Pb, Ni, Zn	1mg/kg	1mg/kg
	Sb, Co	0.5mg/kg	0.5mg/kg
	Cd, Se, Ag	0.1mg/kg	0.1mg/kg
	Hg	0.01mg/kg	0.01mg/kg
TBT	1 µgSn/kg		0.5 µgSn/kg
BTEX	0.2mg/kg		0.2mg/kg
TPH	100mg/kg		3mg/kg
OPP	10-100µg/kg (varies according to toxicity)		10µg/kg

Analyte	NAGD PQL	Laboratory LOR for Analysis
OCP	1µg/kg	0.5µg/kg (HCB and chlordanes 0.25µg/kg)
PCB	5µg/kg	5µg/kg
PAH	5µg/kg	4µg/kg (Naphthalene, 2-Methylnaphthalene, Coronene 5µg/kg)

## 2.3.2 Acid Sulphate Soils

### 2.3.2.1 Field Screening Tests

Field screening tests were carried out on a total of 28 samples at nominal 0.25m intervals at each sample location to provide preliminary assessment of the presence of ASS. The pH of a 1:5 soil/water extract ( $pH_F$ ) and the pH of an extract after the addition of 30% hydrogen peroxide ( $pH_{Fox}$ ) were measured using a spear point double reference Ionode IJ44 pH electrode, connected to a Lutron PH-207HA meter. The meter was calibrated to two points of reference (pH 4 and pH 7) prior to sampling.

In addition to recording  $pH_F$  and  $pH_{Fox}$ , the initial reactions between the soil and the 30% hydrogen peroxide mixture were recorded.

### 2.3.2.2 Soil Sampling and Laboratory Analysis

A total of 20 samples were collected for laboratory analysis from five sample locations. These discrete grab samples were collected approximately every half metre of the profile within a uniform horizon or adjusted to take into account specific visually or texturally discrete horizons that were not intercepted within the half metre interval. All discrete samples collected were tested for Chromium suite analysis at ALS's National Association of Testing Authorities (NATA) accredited laboratory in Brisbane.

## 2.4 Procedures for Sample Handling, Preservations, Storage and QA/QC

Prior to use, the vessel to be used for the coring operations and all equipment was inspected and washed down. Any evident sources of potential contamination such as exposed metal, galvanized or oily surfaces were thoroughly cleaned.

Core samples collected from the vibracore were recovered in a clear plastic sleeve. The vibracore method for collecting soil cores prevents cross contamination and vertical mixing of samples. Onshore, the cores were sub-sampled into appropriate sample containers supplied by the analytical laboratories. Samples were transported to the laboratory in eskies with crushed ice so that they remained cold and were delivered to the laboratory within 10 hours of collection.

Soil samples are retained at the laboratory for three months after reporting.

#### 2.4.1 Quality Control – Field and Laboratory Analysis

The laboratories used for sediment sample analysis, ALS (primary) and AAA (secondary) are NATA accredited for the methods used and are experienced in the analysis of marine sediments.

Quality control (QC) procedures for contaminant assessment were used from sampling through to completion of laboratory analysis, including:

- Chain of custody (COC) documentation
- Field and intra-laboratory QC protocols
- Inter-laboratory analyses

Field QC samples included two inter-batch duplicate, three field replicate triplicate, and two field split triplicate, which were taken from the following sites:

- Inter-batch duplicate (ie one sample split into two and submitted to the laboratory in two different batches):
  - MOF 01
  - BER 03
- Field replicate triplicate (ie. Three separate samples taken at the one site):
  - MOF 02
  - MOF 06
  - MOF 07
- Field split triplicate (ie one sample split into three and tested at two laboratories):
  - JTY 01
  - BER 03
- Two field trip blank samples

Laboratory QC procedures were conducted in accordance with the requirements of Appendix F of the NAGD. These requirements included analysis of laboratory blanks, certified reference materials, replicates and spiked samples.

Validation of the laboratory analyses was undertaken in accordance with Appendix A of the NAGD to confirm that the data quality was suitable for undertaking an assessment to characterise material proposed for dredging and disposal. Laboratory data validation included assessment of results for laboratory blanks, standards, surrogate and matrix spikes and duplicate samples. Field data validation included calculation of relative standard deviation (RSD) for field split triplicates and replicate triplicate samples, and comparison against laboratory and NAGD criteria.

## 2.5 Data Analysis

### 2.5.1 Chemical Analysis

Contaminant levels for sediments are compared against the following guidelines:

- Screening Level concentrations listed in Appendix A Table 2 of the NAGD (Commonwealth of Australia, 2009) to assess whether the material is suitable for unconfined placement at sea or if further testing is required (eg elutriate, bioavailability and/or direct toxicity assessment)
- Environmental Investigation Level (EIL) and Health Investigation Level for residential land use (HIL-A) listed in the *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland* (DEH, 1998) to assess the suitability for placement of dredged material on land, using the most stringent of the health investigation categories (residential use)

The comparison against guideline levels involves the comparison of mean contaminant concentrations at the upper 95% confidence level (95% UCL) of the mean. For the purposes of calculation of normalised values and of 95% UCLs, values below detection limits were set to one-half of the LOR in accordance with NAGD recommendations. Results for organic parameters are normalised to 1% TOC where the recorded value is within the range of 0.2 – 10%. If TOC values are outside this range, then the highest or lowest of the 0.2 – 10% range is adopted as appropriate. Organic contaminants below LOR were not normalised to 1% TOC in 95% UCL calculations, but left at half the LOR.

The methods used to calculate the 95% UCLs were based on those required in Appendix A of the NAGD (P58, Comparison of Data to Screening Levels). Normality of datasets was determined using Shapiro-Wilks test and quantile-quantile plots in ProUCL Version 4 (4.00.02) developed by the US EPA. Datasets were determined as being normal, log-normal or neither in their distributions. Normal datasets were analysed using the 1-tailed student's 't' UCL. Log-normal datasets were analysed using non-parametric jackknife analysis as recommended in the NAGD. Similarly, datasets that were neither normal nor log-normally distributed were analysed using non-parametric jackknife analysis.

Outcomes regarding the tests are presented in Section 3. Under the NAGD, if the 95% UCL values for all substances are below relevant Screening Levels, it is considered unlikely that sediment contaminants will have adverse effects on organisms living in or on that sediment or on water quality during disposal. The sediment is therefore considered non-toxic and there are no chemical obstacles to unconfined placement at sea. The 95% UCLs of the mean are also compared against EIL and HIL-A guidelines as a conservative measure when assessing the suitability of the material for disposal on land.

### 2.5.2 Acid Sulfate Soils Analysis

The *Queensland Acid Sulfate Soil Technical Manual – Soil Management Guidelines* (Dear et al. 2002) provides action criteria for when ASS is disturbed at a site and should be managed (refer Table 2.4). To account for a soil's natural ability to resist pH change (buffering capacity), generally influenced by clay content, the action criteria have been grouped into the following three broad soil texture categories: coarse; medium; and fine.

**Table 2.4 Soil Management Guidelines Action Criteria**

Type of material		Action criteria if 1 to 1000 tonnes of material is disturbed		Action criteria if more than 1000 tonnes of material is disturbed	
Texture range (McDonald et al. 1990)	Approx. clay content (%)	Existing + Potential Acidity		Existing + Potential Acidity	
		Equivalent sulfur (%S) (oven-dry basis)	Equivalent acidity (mol H <sup>+</sup> /tonne) (oven-dry basis)	Equivalent sulfur (%S) (oven-dry basis)	Equivalent acidity (mol H <sup>+</sup> /tonne) (oven-dry basis)
Coarse texture - Sands to loamy sands	≤5	0.03	18	0.03	18
Medium texture - Sandy loams to light clays	5 - 40	0.06	36	0.03	18
Fine texture - Medium to heavy clays and silty clays	>40	0.1	62	0.03	18

(Dear et al. 2002)

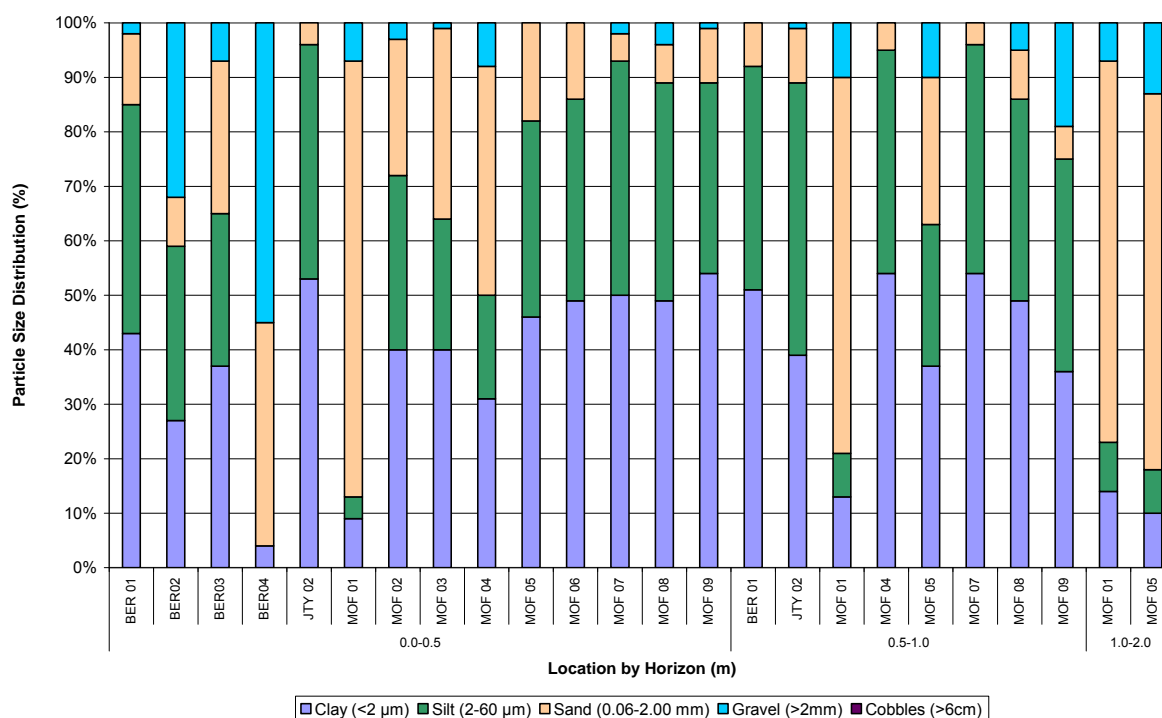
Action criteria for disturbances greater than 1,000 tonnes have been selected as the appropriate criteria based on the earthworks that are likely to occur.

## 3. Results

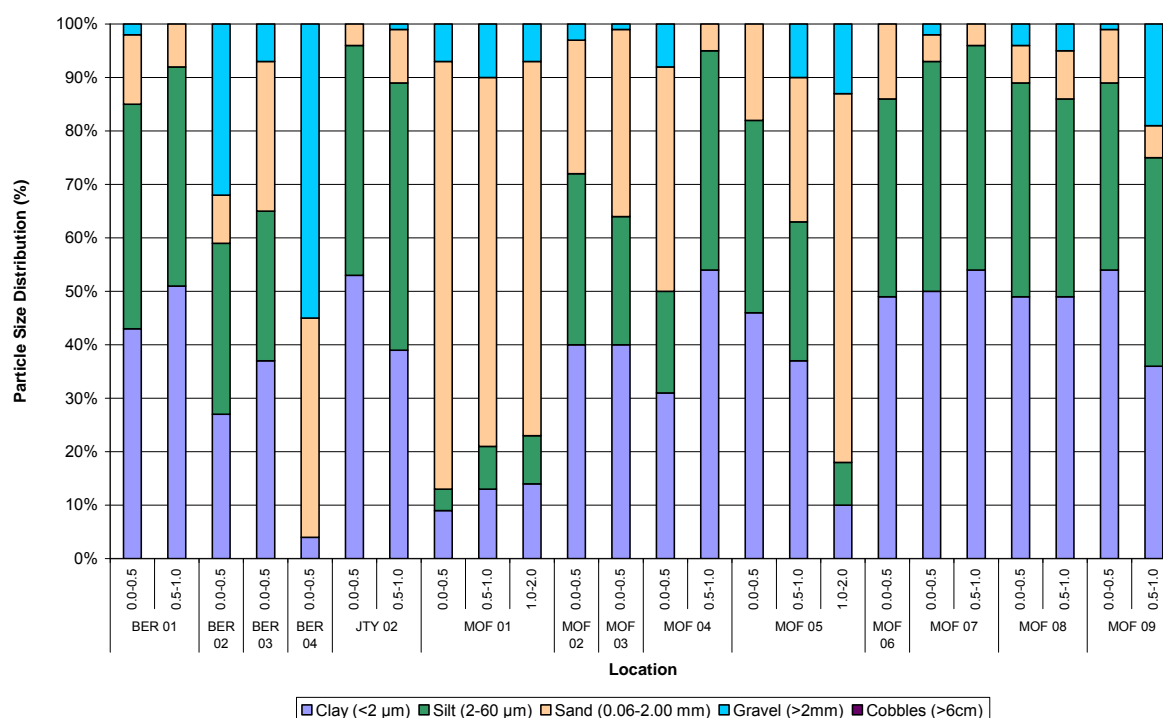
### 3.1 Physical Characteristics

Samples were collected from each sampling location and sample horizon and analysed for particle size distribution (PSD). Core logs from each bore hole are presented in Appendix 1 and laboratory reports for PSD analysis are included in Appendix 2.

Figure 3.1 and Figure 3.2 provide a graphical summary of PSD across the MOF, Jetty and Jetty Berth dredge areas. Figure 3.1 shows that sediments at locations in shallower water, closer to the shoreline of Curtis Island have higher clay and silt content than those within the deeper channel areas. In comparison the sites in the deeper channel areas consist predominantly of sand and gravel fractions. Figure 3.2 identifies that, clay content increases with depth across the majority of sites. One exception to this is MOF05, where clay and silt fractions decrease with depth, while sand and gravel content increases.



**Figure 3.1** Graphical summary of particle size distribution by depth at each location across the MOF, Jetty and Jetty Berth dredge areas.



**Figure 3.2 Graphical summary of particle size distribution at each location across the MOF, Jetty and Jetty Berth dredge areas.**

Table 3.1 provides the summary statistics for PSD across the MOF, Jetty and Jetty Berth dredge areas. The results show that clays are the dominant fraction (37%) with relatively even portions of silt (30%) and sand (25%).

**Table 3.1 Summary statistics for particle size distribution of sediments across all sample locations and depth horizons for the MOF, Jetty and Jetty Berth Dredge areas.**

	Percent Clay (<2µm)	Percent Silt (2 - 60µm)	Percent Sand (0.06-2.00 mm)	Percent Gravel (>2mm)	Percent Cobbles (>6cm)
Number of Samples	24	24	24	24	24
Mean	37.04	29.83	25.33	7.79	0.00
Standard Deviation	16.02	14.41	24.24	12.50	0.00
Minimum	4	0	4	0	0
Maximum	54	50	80	55	0

## 3.2 Chemical Results

Laboratory results obtained during the study are summarised in Table 3.2. Primary analytical reports are provided in Appendix 3. Results are compared against the Screening Levels listed in Table 2, Appendix A of the NAGD (Commonwealth of Australia, 2009) and against DEH (1998) EIL and HIL-A concentrations and are summarised below. Exceedances of these Screening Levels by individual sample locations are identified within Figure 3.3.

### 3.2.1 Assessment of Results against the NAGD

#### Metals

- Aluminium, iron, cobalt, manganese, selenium and vanadium were above LOR in all samples at all locations. There are no NAGD Screening Levels for these metals
- Cadmium and silver were below LOR in all samples
- Antimony was below LOR in all but two samples. These samples were from two locations (JTY02: 0.5-1.0m and MOF04: 0.5-1.0m) and results were below the NAGD Screening Level. The 95% UCL of the mean was below the NAGD Screening Level
- Arsenic was above LOR in all samples across all locations. Three samples, each from different locations (BER01, BER04 and JTY02) exceeded the NAGD Screening Level. Two of these exceedances occurred in the 0.0-0.5m horizon and one in the 0.5-1.0m horizon respectively. The 95% UCL of the mean was below the NAGD Screening Level
- Chromium, copper, lead, nickel and zinc were above LOR and below respective NAGD Screening Levels in all samples across all locations. All 95% UCL of the means were below respective NAGD Screening Levels
- Mercury was above LOR in approximately half of all samples. All detections were below the NAGD Screening Level. The 95% UCL of the mean was also below the NAGD Screening Level

#### Organotins

- Tributyltin was below LOR in all samples, across all locations

#### Polycyclic Aromatic Hydrocarbons (PAHs)

- All PAH species, except naphthalene, 2-methylnaphthalene, acenaphthylene, acenaphthene, fluorene, anthracene, and dibenz(a,h)anthracene, were above LOR in at least one sample. There are no NAGD Screening Levels for individual PAH species
- In samples where PAHs were detected, the Sum of PAHs was below the NAGD Screening Level

#### Nutrients

- Nitrite was below LOR in all samples, across all locations
- Nitrate was above LOR in six out of 10 samples
- Total Kjeldahl Nitrogen (TKN) was variable across locations ranging from 80 to 1,090mg/kg
- Ammonia was above LOR in three samples across two locations (BER01: 0.5-1.0m and MOF08: 0.0-0.5m, 1.0-2.0m)
- Total Phosphorus was relatively consistent across locations, ranging from 137 to 329mg/kg
- Reactive Phosphorus was relatively consistent across locations, ranging from <0.1 to 4mg/kg

#### BTEX

- All BTEX species were below LOR in all samples, across all locations

### **Total Petroleum Hydrocarbons (TPHs)**

- C6-C9 and C10-C14 fractions were below LOR in all samples, across all locations
- C15-C28 and C29-C36 fractions were above LOR in one sample (MOF02: 0.0-0.5m). All other samples analysed were below the LOR
- The NAGD Screening Level for the Sum of TPHs was not exceeded in any sample. The 95% UCL of the mean was also below the NAGD Screening Level

### **Organophosphorus Pesticides**

- All organophosphorus pesticides were below LOR in all samples, across all locations

### **Organochlorine Pesticides**

- All organochlorine pesticides were below LOR in all samples, across all locations

### **Polychlorinated Biphenyls (PCBs)**

- All polychlorinated biphenyls were below LOR in all samples, across all locations

### **3.2.2 Assessment of Results against DEH Guidelines**

The following parameters reported concentrations exceeding EIL guidelines detailed in DEH (1998):

- Manganese exceeded EIL guidelines in three samples from three locations (MOF01: 0.0-0.5m; MOF05:1.0-2.0m and MOF07:0.5-1.0m)
- Arsenic exceeded EIL guidelines in three samples from three locations (BER01: 0.0-0.5m; BER04: 0.0-0.5m and JTY02:0.5-1.0m)

There were no exceedances of HIL-A guidelines.

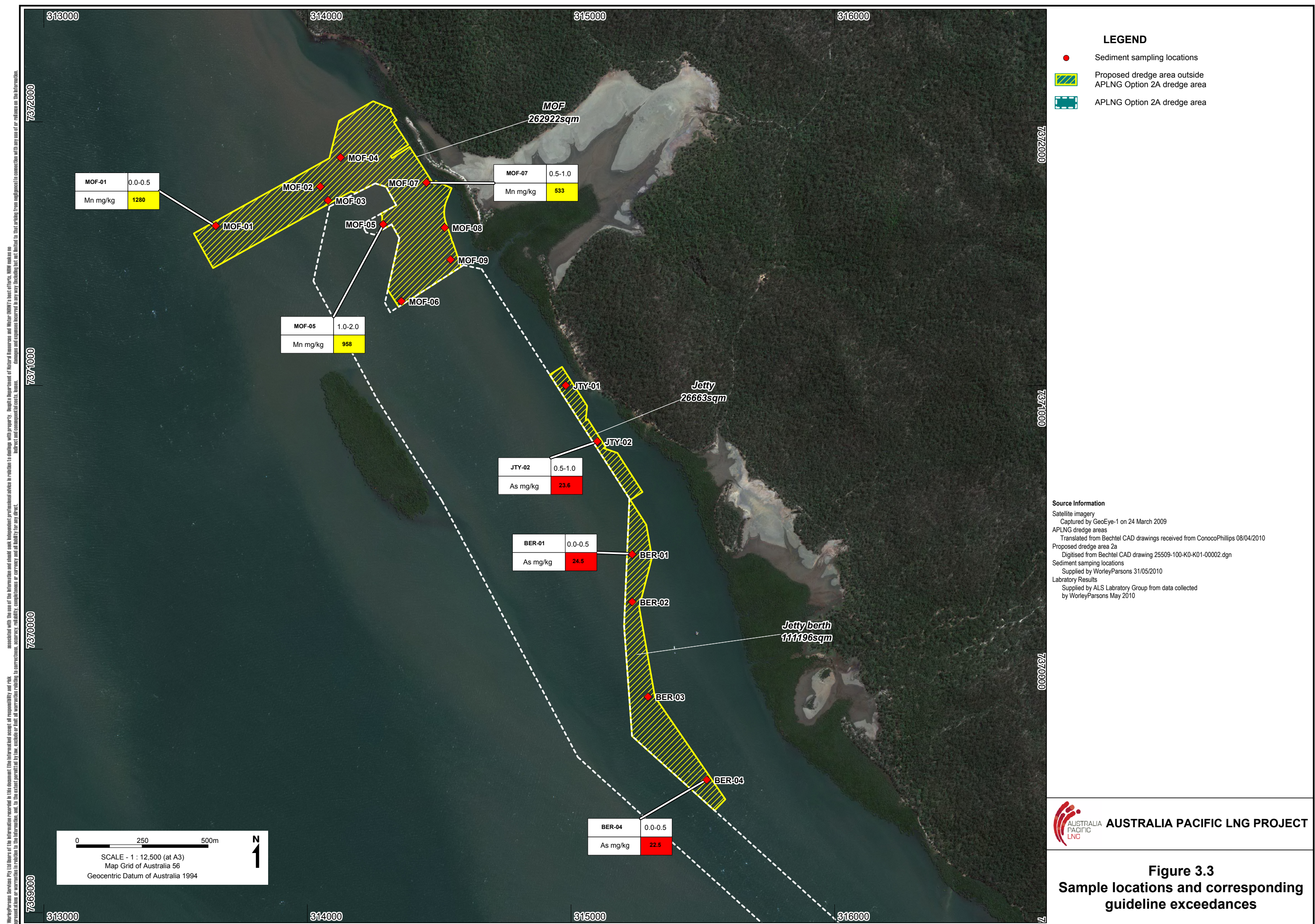
Table 3-2: Contaminant results for sedimetns within the MOF, Jetty and Jetty Berth dredge area

Location	Units	LOR	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	BER 01	BER 01	BER02	BER03	BER04	JTY 01	JTY 02	JTY 02	MOF 01	MOF 01	MOF 01	MOF 02	MOF 03	MOF 04	MOF 04	MOF 05	MOF 05	MOF 05	MOF 06	MOF 07	MOF 07	MOF 08	MOF 08	MOF 08	MOF 09	MOF 09	MOF 09	Mean/ Geomean	Standard Deviaiton	95% UCL	Normal (N) Log-normal (L) Neither (X)
Horizon							0-0.5	0.5-1	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0.5-1	0-0.5	0.5-1.0	1.0-2.0	0-0.5	0-0.5	0-0.5	0.5-1.0	0-0.5	0.5-1.0	1.0-1.2	0-0.5	0-0.5	0.5-1.0	0-0.5	0.5-1.0	1.0-2.0	0-0.5	0.5-1.0	1.0-2.0				
Date							30/4/10	30/4/10	5/5/10	5/5/10	5/5/10	30/4/10	30/4/10	30/4/10	29/4/10	29/4/10	29/4/10	6/5/10	6/5/10	29/4/10	29/4/10	29/4/10	29/4/10	29/4/10	6/5/10	29/4/10	29/4/10	29/4/10	29/4/10	29/4/10	29/4/10	29/4/10	29/4/10				
Moisture Content	%	1	0.1				52.2	41.3	46.2	41.8	25.6	31.5	41.9	46	28.2	29.3	21.2	49	48.5	48.2	26.2	49.4	39.5	22.8	34	51.4	48.2	49	44.8	41.7	45.2	43.1	39.5	40.21	9.385	43.29	X
Total Organic Carbon	%	0.02	0.1				1.79	1.28	0.85	0.76	0.14	0.48	0.92	2.79	0.3	0.32	0.26	0.96	1	2.72	2.29	3.15	1.55	0.36	0.35	2.91	2.19	1.12	1.09	1.11	1.18	1.33	1.71	1.293	2.3	1.583	L
Metals																																					
Aluminium	mg/kg	50	200				21300	21700	19800	18100	3000	15400	23200	17300	3220	4960	3360	15000	12900	15600	14100	19100	15700	3800	13600	22000	22800	12000	20800	21000	20600	20300	19800	15572	6567	17728	X
Iron	mg/kg	50	100				35700	26500	36200	32700	23200	19200	34500	48700	11000	12300	9720	20200	18800	27600	30800	28700	15300	9230	23500	37100	40300	17000	29500	32200	31000	30100	34100	26487	10083	29797	N
Antimony	mg/kg	0.5	0.5	20		2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.51	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.55	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.271	0.0749	0.295	X
Arsenic	mg/kg	1	1	20	100	20	24.5	9.62	19.1	15.7	22.5	11	13.3	23.6	10.8	9.28	8.32	6.94	9.73	14.2	11.4	13.7	3.41	7.44	8.22	16.2	13	7	13.4	14.6	12.1	12.2	11.5	12.69	5.126	14.38	N
Cadmium	mg/kg	0.1	0.1	3	20	1.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	
Chromium	mg/kg	1	1	50	100	80	31.2	25.2	30	28	11	14.8	29	19.5	7.2	9.9	6.5	20.3	20.4	23	18.9	26	16.4	8	16.3	29.8	29.5	15.6	28.4	28.8	27	26.6	24.6	21.18	7.846	23.76	X
Copper	mg/kg	1	1	60	1,000	65	23.4	24.2	22	18.9	4.2	15.7	33	31.8	4.2	6.2	5.5	23.8	23.7	26.7	27	34.1	28.4	5.4	18.9	33.5	36.6	13.4	27.9	31.2	27.8	31.4	35	22.74	10.32	26.12	X
Cobalt	mg/kg	0.5	0.5				13.6	9.8	11.3	12.4	11.3	14.7	12.1	18.7	7.2	6.6	4.2	8.7	9.8	15.2	22.2	13.1	9.5	5.7	7.3	16.7	18.4	6.2	13.5	14.1	13.3	16.3	18.4	12.23	4.541	13.72	N
Lead	mg/kg	1	1	300	300	50	10.3	9.2	9.3	8.7	3.7	12.7	9.6	10	2.4	3.9	3.7	7.8	7.2	8.5	6.3	9.1	7.4	2.9	7.9	10	9.9	5.1	9.9	11	9.2	9.2	8.8	7.915	2.675	8.793	X
Manganese	mg/kg	10	10	500	1,500		263	152	133	161	419	347	195	380	1280	395	186	168	250	316	290	239	111	958	122	345	533	154	303	296	183	302	324	326.1	1.779	409.7	L
Nickel	mg/kg	1	1	60	600	21	16	11.8	13.7	13.6	4.4	8.6	14	12.7	4.2	5.2	2.7	9.6	10.6	12.4	12.1	13.8	8.7	4	9	15.2	14.8	7	13.4	13.6	11.7	13	13.5	10.71	3.874	11.99	X
Selenium	mg/kg	0.1	0.1				0.7	0.7	1	0.7	0.4	1.6	0.9	1	0.3	0.4	0.3	0.8	0.7	0.8	0.7	1	0.7	0.3	0.5	0.9	1.1	0.5	0.7	0.8	0.7	0.8	0.8	0.733	0.283	0.826	X
Silver	mg/kg	0.1	0.1			1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-
Vanadium	mg/kg	2	2				60.9	55.9	67.9	65.2	59.4	55.1	83.6	79	24.5	27.5	20.9	60.8	49.8	51.6	70.8	66.3	39.2	21.6	50.9	82.4	81.2	33.9	62.5	70.4	66.4	64.4	76.6	57.36	18.72	63.5	X
Zinc	mg/kg	1	1	200	7,000	200	48.3	40.5	38	41.9	16.3	47.2	47.3	36.8	10.6	13.3	9.6	34	34.6	38.2	34.3	42.1	28.9	10.3	32.9	47.8	50.9	23.8	45.9	45.8	41.1	41.7	41.5	34.95	12.78	39.14	X
Mercury	mg/kg	0.01	0.01	1	15	0.15	0.02	<0.01	0.01	0.02	<0.01	0.04	<0.01	0.01	<0.01	<0.01	0.04	0.02	0.02	0.02	0.01	0.02	0.01	<0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.0122	0.00994	0.0155	X
Organotin																																					
Tributyltin	µgSn/kg	0.5	1			9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	
Polynuclear Aromatic Hydrocarbons																																					
Naphthalene	µg/kg	5	5				<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	-	<5	-	
2-Methylnaphthalene	µg/kg	5	5				<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	-	<5	-	
Acenaphthylene	µg/kg	4	5				<5	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<5	<4	<4	<4	<4	<4	<4	<4	<4	-	<4	-	
Acenaphthene	µg/kg	4	5				<5	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<5	<4	<4	<4	<4	<4	<4	<4	<4	-	<4	-	
Fluorene	µg/kg	4	5				<5	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<5	<4	<4	<4	<4	<4	<4	<4	<4	-	<4	-	
Phenanthrene	µg/kg	4	5				<5	<4	6	7	<4	<4	<4	<4	<4	<4	<4	5	4	<4	<4	<4	<4	<4	<5	<4	<4	<4	<4								

Location	Units	LOR	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	BER 01	BER 01	BER02	BER03	BER04	JTY 01	JTY 02	JTY 02	MOF 01	MOF 01	MOF 01	MOF 02	MOF 03	MOF 04	MOF 04	MOF 05	MOF 05	MOF 05	MOF 06	MOF 07	MOF 07	MOF 08	MOF 08	MOF 08	MOF 09	MOF 09	MOF 09	Mean/ Geomean	Standard Deviaiton	95% UCL	Normal (N) Log-normal (L) Neither (X)	
Horizon							0-0.5	0.5-1	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0.5-1	0-0.5	0.5-1.0	1.0-2.0	0-0.5	0-0.5	0-0.5	0.5-1.0	0-0.5	0.5-1.0	1.0-1.2	0-0.5	0-0.5	0.5-1.0	0-0.5	0.5-1.0	1.0-2.0	0-0.5	0.5-1.0	1.0-2.0					
Date							30/4/10	30/4/10	5/5/10	5/5/10	5/5/10	30/4/10	30/4/10	30/4/10	29/4/10	29/4/10	29/4/10	6/5/10	6/5/10	29/4/10	29/4/10	29/4/10	29/4/10	29/4/10	6/5/10	29/4/10	29/4/10	29/4/10	29/4/10	29/4/10	29/4/10	29/4/10	29/4/10					
Nutrients																																						
Ammonia as N	mg/kg	1	0.1				<1	4				<1			<1	<1	<1	<1										4	<1	7				1.85	2.322	3.196	X	
Nitrite as N (Sol.)	mg/kg	0.1	0.1				<0.1	<0.1				<0.1			<0.1	<0.1	<0.1	<0.1										<0.1	<0.1	<0.1				<0.1	-	<0.1	-	
Nitrate as N (Sol.)	mg/kg	0.1	0.1				0.1	0.2				<0.1			<0.1	0.3	0.1	<0.1										0.3	<0.1	1.2				0.24	2.915	0.444	L	
Nitrite + Nitrate as N (Sol.)	mg/kg	0.1	0.1				0.1	0.2				<0.1			<0.1	0.3	0.1	<0.1										0.3	<0.1	1.2				0.24	2.915	0.444	L	
Total Kjeldahl Nitrogen as N	mg/kg	20	0.1				1090	700				500			80	180	210	800										830	720	670				578	327.7	767.9	N	
Total Phosphorus as P	mg/kg	2	0.1				278	191				329			141	149	137	241										272	241	272				225.1	66.91	263.9	N	
Reactive Phosphorus as P	mg/kg	0.1	0.1				1.4	2.1				1.2			0.6	0.8	0.3	0.4										4	<0.1	<0.1				1.09	4.328	1.792	L	
BTEX																																						
Benzene	mg/kg	0.2	0.2	1,000			<0.2	<0.2				<0.2			<0.2	<0.2	<0.2	<0.2										<0.2	<0.2	<0.2				<0.2	-	<0.2	-	
Toluene	mg/kg	0.2	0.2				<0.2	<0.2				<0.2			<0.2	<0.2	<0.2	<0.2										<0.2	<0.2	<0.2				<0.2	-	<0.2	-	
Ethylbenzene	mg/kg	0.2	0.2				<0.2	<0.2				<0.2			<0.2	<0.2	<0.2	<0.2										<0.2	<0.2	<0.2				<0.2	-	<0.2	-	
meta- & para-Xylene	mg/kg	0.2	0.2				<0.2	<0.2				<0.2			<0.2	<0.2	<0.2	<0.2										<0.2	<0.2	<0.2				<0.2	-	<0.2	-	
ortho-Xylene	mg/kg	0.2	0.2				<0.2	<0.2				<0.2			<0.2	<0.2	<0.2	<0.2										<0.2	0.2	<0.2				<0.2	-	<0.2	-	
Total Petroleum Hydrocarbons																																						
C6 - C9 Fraction	mg/kg	3	100				<3	<3				<3			<3	<3	<3	<3										<3	<3	<3				<3	-	<3	-	
C10 - C14 Fraction	mg/kg	3	100				<3	<3				<3			<3	<3	<3	<3										<3	<3	<3				<3	-	<3	-	
C15 - C28 Fraction	mg/kg	3	100				<5	<3				<3			<3	<3	<3	9										<3	<3	<3								
Normalised to 1% TOC																		9.4															2.388	2.475	3.822	X		
C29 - C36 Fraction	mg/kg	5	100				<5	<5				<5			<5	<5	<5	11										<5	<5	<5								
Normalised to 1% TOC																		11.5															3.396	2.833	5.038	X		
C10 - C36 Fraction (sum)	mg/kg	3				550	<3	<3				<3			<3	<3	<3	20										<3	<3	<3								
Normalised to 1% TOC																		20.8															3.433	6.114	6.977	X		
Organophosphorus Pesticides																																						
Bromophos-ethyl	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	
Carbophenothion	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	
Chlorfenvinphos (E)	µg/kg	10	10				<10.0	<10.0				<10.0			<10.0	<10.0	<10.0	<10.0										<10.0	<10.0	<10.0				<10	-	<10	-	
Chlorfenvinphos (Z)	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	
Chlorpyrifos	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	
Chlorpyrifos-methyl	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	
Demeton-S-methyl	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	
Diazinon	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	
Dichlorvos	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	
Dimethoate	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	
Ethion	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	
Fenamiphos	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	
Fenthion	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	
Malathion	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	
Azinphos Methyl	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	
Monocrotophos	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	
Parathion	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	
Parathion-methyl	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	
Pirimphos-ethyl	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	
Prothiofos	µg/kg	10	10				<10	<10				<10			<10	<10	<10	<10										<10	<10	<10				<10	-	<10	-	

Location	Units	LOR	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	BER 01	BER 01	BER02	BER03	BER04	JTY 01	JTY 02	JTY 02	MOF 01	MOF 01	MOF 01	MOF 02	MOF 03	MOF 04	MOF 04	MOF 05	MOF 05	MOF 05	MOF 06	MOF 07	MOF 07	MOF 08	MOF 08	MOF 08	MOF 09	MOF 09	MOF 09	Mean/ Geomean	Standard Deviaiton	95% UCL	Normal (N) Log-normal (L) Neither (X)	
Horizon							0-0.5	0.5-1	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0.5-1	0-0.5	0.5-1.0	1.0-2.0	0-0.5	0-0.5	0-0.5	0.5-1.0	0-0.5	0.5-1.0	1.0-1.2	0-0.5	0-0.5	0.5-1.0	0-0.5	0.5-1.0	1.0-2.0	0-0.5	0.5-1.0	1.0-2.0					
Date							30/4/10	30/4/10	5/5/10	5/5/10	5/5/10	30/4/10	30/4/10	30/4/10	29/4/10	29/4/10	29/4/10	6/5/10	6/5/10	29/4/10	29/4/10	29/4/10	29/4/10	29/4/10	6/5/10	29/4/10	29/4/10	29/4/10	29/4/10	29/4/10	29/4/10	29/4/10	29/4/10					
Organochlorine Pesticides																																						
Aldrin	µg/kg	0.5	1	200	10,000		<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
alpha-BHC	µg/kg	0.5	1				<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
beta-BHC	µg/kg	0.5	1				<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
delta-BHC	µg/kg	0.5					<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
4,4'-DDD	µg/kg	0.5	1			2	<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
4,4'-DDE	µg/kg	0.5	1			2.2	<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
4,4'-DDT	µg/kg	0.5	1	200	200,000		<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
DDT (total)	µg/kg	0.5				1.6	<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
Dieldrin	µg/kg	0.5	1	200	10,000	280	<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
alpha-Endosulfan	µg/kg	0.5	1				<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
beta-Endosulfan	µg/kg	0.5	1				<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
Endosulfan sulfate	µg/kg	0.5	1				<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
Endosulfan (sum)	µg/kg	0.5					<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
Endrin	µg/kg	0.5	1			10	<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
Endrin aldehyde	µg/kg	0.5					<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
Endrin ketone	µg/kg	0.5					<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
Heptachlor	µg/kg	0.5	1		10,000		<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
Heptachlor epoxide	µg/kg	0.5	1				<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
Hexachlorobenzene (HCB)	µg/kg	0.5	1				<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
gamma-BHC	µg/kg	0.25					<0.25	<0.25				<0.25			<0.25	<0.25	<0.25	<0.25										<0.25	<0.25	<0.25				<0.25	-	<0.25	-	
Methoxychlor	µg/kg	0.5	1				<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
cis-Chlordane	µg/kg	0.25			50,000		<0.25	<0.25				<0.25			<0.25	<0.25	<0.25	<0.25										<0.25	<0.25	<0.25				<0.25	-	<0.25	-	
trans-Chlordane	µg/kg	0.25					<0.25	<0.25				<0.25			<0.25	<0.25	<0.25	<0.25										<0.25	<0.25	<0.25				<0.25	-	<0.25	-	
Total Chlordane (sum)	µg/kg	0.25	1			0.5	<0.25	<0.25				<0.25			<0.25	<0.25	<0.25	<0.25										<0.25	<0.25	<0.25				<0.25	-	<0.25	-	
Oxychlordane	µg/kg	0.5	1				<0.50	<0.50				<0.50			<0.50	<0.50	<0.50	<0.50										<0.50	<0.50	<0.50				<0.50	-	<0.50	-	
Polychlorinated Biphenyls (as Aroclors)																																						
Total Polychlorinated biphenyls	µg/kg	5	5	1,000	10,000	23	<5.0	<5.0				<5.0			<5.0	<5.0	<5.0	<5.0										<5.0	<5.0	<5.0				<5.0	-	<5.0	-	
Aroclor 1016	µg/kg	5					<5.0	<5.0				<5.0			<5.0	<5.0	<5.0	<5.0										<5.0	<5.0	<5.0				<5.0	-	<5.0	-	
Aroclor 1221	µg/kg	5					<5.0	<5.0				<5.0			<5.0	<5.0	<5.0	<5.0										<5.0	<5.0	<5.0				<5.0	-	<5.0	-	
Aroclor 1232	µg/kg	5					<5.0	<5.0				<5.0			<5.0	<5.0	<5.0	<5.0										<5.0	<5.0	<5.0				<5.0	-	<5.0	-	
Aroclor 1242	µg/kg	5					<5.0	<5.0				<5.0			<5.0	<5.0	<5.0	<5.0										<5.0	<5.0	<5.0				<5.0	-	<5.0	-	
Aroclor 1248	µg/kg	5					<5.0	<5.0				<5.0			<5.0	<5.0	<5.0	<5.0										<5.0	<5.0	<5.0				<5.0	-	<5.0	-	
Aroclor 1254	µg/kg	5					<5.0	<5.0				<5.0			<5.0	<5.0	<5.0	<5.0										<5.0	<5.0	<5.0				<5.0	-	<5.0	-	
Aroclor 1260	µg/kg	5					<5.0	<5.0				<5.0			<5.0	<5.0	<5.0	<5.0										<5.0	<5.0	<5.0				<5.0	-	<5.0	-	

Legend	
Note	When calculating averages and 95% UCLs, values below detection for individual results were set to half the detection levels, consistent with the NAGD
PQL	Practical Quantitation Limit
-	No guideline levels (ie. Screening levels) or no analysis undertaken for a given sample
50	Value exceeds NAGD Screening Level
50	Value exceeds Queensland EPA soil 'environmental investigation level' (as given in DEH (1998)). The DEH (1998) guideline for dieldrin and aldrin is based on the sum of the concentrations reported for the two analytes
Normalised to 1% TOC	Normalised to 1% TOC, over the range of TOC from 0.2 to 10%



### 3.3 Acid Sulfate Soils

Field screening tests and laboratory analysis, conducted using the Chromium Reducible Sulfur ( $S_{CR}$ ) analysis, was undertaken at five locations: MOF05, MOF06, MOF08, JTY02 and BER03. A summary of these results, compared to the QASSIT guidelines, is discussed below and provided in Table 3.3.

#### 3.3.1 Physical

Two layers were generally encountered at coring locations tested for ASS: very weak, very dark grey silt and weak to firm dark grey silty clay. Firm, grey with brown / red / yellow mottle silty clay was also encountered. This only occurred at ASS coring locations BER03 and MOF06, but also occurred at JTY01, BER02, MOF02 and MOF03. This base clay, where refusal occurred, is suspected of being the very stiff non-ASS Pleistocene clay described by GeoCoastal (2009) and supported by  $S_{CR}$  results (discussed below) which indicate this clay is not AASS or PASS. No coarse fragments, shells, organics or odour was identified within this profile.

The very weak (soft) surface material encountered at ASS coring locations BER03, JTY02, MOF06 and MOF08, but also common to most other coring locations, is indicative of material located on the mudflats of Curtis Island. This layer, commonly containing organics and shells, has been reported by WorleyParsons (2009) and ERM (2010) as PASS. This is supported by the  $S_{CR}$  results of this investigation (discussed below) which indicate this silt is PASS.

Similarly, the weak to firm dark grey base clay encountered at ASS coring locations JTY02, MOF05 and MOF08, but also at BER01, MOF01, MOF04, MOF07 and MOF09 are indicative of material located on the mudflats on Curtis Island and have also been reported as PASS (WorleyParsons, 2009 and ERM, 2010).

Layers of sand were encountered at ASS coring location MOF05, but also BER04, MOF01 and MOF04. As reported by WorleyParsons (2010), coarse sand material is indicative of material located on the beach of Laird Point on Curtis Island.

#### 3.3.2 Field Screening Tests

Field screening tests are used to compare the measured differences between  $pH_F$  to  $pH_{FOX}$  to assess the presence of actual and potential acidity with changes greater than 1 pH unit indicative of a PASS.

$pH_F$  values for all 28 samples were greater than 7, while  $pH_{FOX}$  values ranged from 3.06 to 8.5. This indicates a range of sulfidic or organic matter levels with a highly variable potential to oxidise and generate acid. Three (3) samples with  $pH_{FOX}$  values less than 5 were recorded at JTY02, with only one of these samples (JTY 02: 0.85-0.95) returning a  $pH_{FOX}$  value less than 4. All three samples reduced in pH by more than 1 pH unit. These values indicate these samples are PASS. All remaining  $pH_{FOX}$  values were greater than 6.

Generally speaking screening results do not provide definitive data which can be used to assess ASS. They merely provide preliminary data from which subsequent test work requirements and early management strategies may be formulated. Laboratory testing is always required to provide an accurate assessment of the presence of ASS. This testing is described below.

### 3.3.3 Actual Acidity

Actual acidity is assessed by the measurement of Titratable Actual Acidity (TAA). The determination of pH potassium chloride ( $\text{pH}_{\text{KCl}}$ ) is a means of estimating the actual soil acidity which is used to calculate TAA.

TAA in all 28 samples was less than the laboratory detection level of 2.0 mole  $\text{H}^+/\text{t}$ . This is also less than the QASSIT guideline of 18 mole  $\text{H}^+/\text{t}$ . This indicates all samples collected have very little or no actual acidity. Furthermore, as no samples returned  $\text{pH}_{\text{KCl}}$  values less than 4.5, they were not tested for retained acidity. This result is expected as all sampling locations are continuously submerged and therefore in an anaerobic state excluding oxidation.

### 3.3.4 Potential Acidity

Potential acidity is assessed through the measurement of  $\text{S}_{\text{CR}}$ . Nearly all ASS samples tested at the laboratory returned  $\text{S}_{\text{CR}}$  values greater than the QASSIT guideline of 0.03%S. The exceptions were samples MOF06: 0.0-0.05, MOF06: 0.1-0.2 and BER03: 0.2-0.3, all of which were collected within the firm, grey with brown / red / yellow mottle silty base clay.  $\text{S}_{\text{CR}}$  values for these three samples were less than the QASSIT guideline. All remaining samples tested were collected within either very weak, very dark grey surface silt or the weak to firm dark grey silty base clay. These samples are PASS.

### 3.3.5 Acid Neutralising Capacity, Net Acidity and Liming

Acid neutralising capacity (ANC) is a soil's natural ability to buffer acidity either through the dissolution of calcium and/or magnesium carbonates (ie shells), cation exchange reactions, reaction of organic and clay fractions or other soil minerals. The effectiveness of neutralisation can be hindered somewhat depending on the available forms of acid buffering. For example, where carbonates are stored in coarse shells, acid buffering may not be readily available. In the laboratory, samples are ground making any carbonates (such as shell fragments) more available for neutralisation therefore 'over estimating' ANC. This is somewhat accounted for by 1.5 correction factor incorporated into liming rates reported with the final acid base accounting. Here net acidity, which is the final measure of acidity within a sample, is determined by subtracting the sum of all acid (actual, potential and retained) from ANC.

ANC, ranging from 90 to 2,720 mole  $\text{H}^+/\text{t}$ , was detected. This resulted in a final net acidity of less than the laboratory detection level of 10 mole  $\text{H}^+/\text{t}$  and a liming rate of less than 1kg of lime per tonne only for ASS coring locations MOF05 and BER03. This was due to the shell content of MOF05 and the surface of BER03. The deeper sample within BER03 was the non-ASS firm, grey with brown / red / yellow mottle silty base clay. Samples collected from MOF06, MOF08 and JTY02 had insufficient ANC to buffer all acid. As a result the net acidity of these samples ranged from 29 to 1,740 mole  $\text{H}^+/\text{t}$ . This requires 2 to 130kg lime per tonne of sediment. Based on the treatment categories presented within Queensland Acid Sulfate Soil Technical Manual – Soil Management Guidelines (Dear et al. 2002) and the proposed dredge volume, these liming rates are considered to be high to extra high.

Table 3.3 Summary of ASS Results

Screening Analysis					Actual Acidity		Potential Acidity		EA033-C: Acid Neutralising Capacity			
Sample	Date	pH (F)	pH (Fox)	Reaction Rate	pH KCl (23A)	Titrateable Actual Acidity (23F)	sulfidic - Titrateable Actual Acidity (s-23F)	Chromium Reducible Sulfur (22B)	acidity - Chromium Reducible Sulfur (a-22B)	Acid Neutralisin g Capacity (19A2)	acidity - Acid Neutralising Capacity (a-19A2)	sulfidic - Acid Neutralising Capacity (s-19A2)
Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998 - Action Criteria (> 1000 tonnes disturbed)		-	-	-	-	18	-	0.03	-	-	-	-
Units		pH Unit	pH Unit	-	pH Unit	mole H+ / t	% pyrite S	% S	mole H+ / t	% CaCO3	mole H+ / t	% pyrite S
Laboratory Detection Limit		0.1	0.1	1	0.1	2	0.02	0.02	10	0.01	10	0.01
MOF 5/0.0-0.1	29/04/2010	8.21	7.09	2	9.1	<2	<0.02	0.13	83	10.2	2030	3.25
MOF 5/0.25	29/04/2010	8.14	7.51	2								
MOF 5/0.5	29/04/2010	8.16	6.98	2								
MOF 5/0.6-0.7	29/04/2010	7.86	7.22	2	8.9	<2	<0.02	0.43	268	10.3	2060	3.31
MOF 5/0.9-1.0	29/04/2010	7.64	7.49	2	9.2	<2	<0.02	0.22	138	10.6	2110	3.39
MOF 5/1.25	29/04/2010	7.61	6.78	2								
MOF 5/1.3-1.4	29/04/2010	7.67	7.03	2	9.2	<2	<0.02	0.18	109	13.6	2720	4.37
MOF 5/1.5-1.6	29/04/2010	7.67	7.23	2	9.1	<2	<0.02	0.27	170	11.1	2220	3.56
MOF 5/1.75	29/04/2010	7.74	7.36	2								
MOF 5/1.9-2.0	29/04/2010	7.57	6.49	2	8.8	<2	<0.02	0.41	254	8.52	1700	2.73
MOF 5/2.2-2.3	29/04/2010	7.92	8.29	1	8.6	<2	<0.02	0.36	228	2.85	570	0.91
MOF 6/0-0.05	6/05/2010	7.34	7.61	1	8	<2	<0.02	<0.02	<10	0.87	174	0.28
MOF 6/0.1-0.2	6/05/2010	7.19	7.43	1	6.2	15	0.02	0.02	14			
MOF 8/0.0-0.1	29/04/2010	8.32	6.26	1	8.2	<2	<0.02	1.57	977	1.45	289	0.46
MOF 8/0.25	29/04/2010	7.52	7.23	1								
MOF 8/0.1-0.5	29/04/2010	7.17	7.82	1	7.9	<2	<0.02	0.75	468	0.98	196	0.31
MOF 8/0.75-0.85	29/04/2010	7.28	8.07	1	7.4	<2	<0.02	0.75	470	0.98	196	0.31
MOF 8/1.0	29/04/2010	7.33	7.28	1								
MOF 8/1.25-1.35	29/04/2010	7.15	7.10	1	7.2	<2	<0.02	0.67	420	0.92	183	0.29
MOF 8/1.5	29/04/2010	7.44	7.19	1								
MOF 8/1.6-1.7	29/04/2010	7.55	6.48	1	7.1	<2	<0.02	0.65	404	0.82	163	0.26
JTY 02/0.0-0.1	30/04/2010	7.81	7.21	1	8.4	<2	<0.02	1.42	883	6.36	1270	2.04
JTY 02/0.1-0.2	30/04/2010	7.83	7.21	1	8.5	<2	<0.02	0.87	540	0.9	179	0.29
JTY 02/0.5-0.6	30/04/2010	7.17	4.37	2	6.8	<2	<0.02	2.91	1820	0.61	122	0.2
JTY 02/0.75	30/04/2010	7.16	4.67	2								
JTY 02/0.85-0.95	30/04/2010	7.56	3.06	2	6.8	<2	<0.02	2.16	1340	0.45	90	0.14
BER 03/0-0.1	5/05/2010	7.83	7.64	1	8.8	<2	<0.02	0.26	164	9.36	1870	3
BER 03/0.2-0.3	5/05/2010	8.27	8.50	1	8.6	<2	<0.02	<0.02	<10	0.88	176	0.28

		EA033-D: Retained Acidity					EA033-E: Acid Base Accounting			
Sample	Date	KCl Extractable Sulfur (23Ce)	HCl Extractable Sulfur (20Be)	Net Acid Soluble Sulfur (20Je)	acidity - Net Acid Soluble Sulfur (a-20J)	sulfidic - Net Acid Soluble Sulfur (s-20J)	ANC Fineness Factor	Net Acidity (sulfur units)	Net Acidity (acidity units)	Liming Rate
Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998 - Action Criteria (> 1000 tonnes disturbed)		-	-	-	-	-	-	0.03	18	-
Units		% S	% S	% S	mole H+ / t	% pyrite S	-	% S	mole H+ / t	kg CaCO3/t
Laboratory Detection Limit		0.02	0.02	0.02	10	0.02	0.5	0.02	10	1
MOF 5/0.0-0.1	29/04/2010						1.5	<0.02	<10	<1
MOF 5/0.25	29/04/2010									
MOF 5/0.5	29/04/2010									
MOF 5/0.6-0.7	29/04/2010						1.5	<0.02	<10	<1
MOF 5/0.9-1.0	29/04/2010						1.5	<0.02	<10	<1
MOF 5/1.25	29/04/2010									
MOF 5/1.3-1.4	29/04/2010						1.5	<0.02	<10	<1
MOF 5/1.5-1.6	29/04/2010						1.5	<0.02	<10	<1
MOF 5/1.75	29/04/2010									
MOF 5/1.9-2.0	29/04/2010						1.5	<0.02	<10	<1
MOF 5/2.2-2.3	29/04/2010						1.5	<0.02	<10	<1
MOF 6/0-0.05	6/05/2010						1.5	<0.02	<10	<1
MOF 6/0.1-0.2	6/05/2010						1.5	0.05	29	2
MOF 8/0.0-0.1	29/04/2010						1.5	1.26	784	59
MOF 8/0.25	29/04/2010									
MOF 8/0.1-0.5	29/04/2010						1.5	0.54	338	25
MOF 8/0.75-0.85	29/04/2010						1.5	0.54	340	26
MOF 8/1.0	29/04/2010									
MOF 8/1.25-1.35	29/04/2010						1.5	0.48	297	22
MOF 8/1.5	29/04/2010									
MOF 8/1.6-1.7	29/04/2010						1.5	0.47	295	22
JTY 02/0.0-0.1	30/04/2010						1.5	0.06	36	3
JTY 02/0.1-0.2	30/04/2010						1.5	0.67	421	32
JTY 02/0.5-0.6	30/04/2010						1.5	2.78	1740	130
JTY 02/0.75	30/04/2010									
JTY 02/0.85-0.95	30/04/2010						1.5	2.06	1280	96
BER 03/0-0.1	5/05/2010						1.5	<0.02	<10	<1
BER 03/0.2-0.3	5/05/2010						1.5	<0.02	<10	<1

**Notes:**

‘-’ Denotes no criteria

Yellow highlighting indicates parameters above applied guideline/criteria.

Reaction rate is a subjective assessment of the strength of the reaction to hydrogen peroxide. 1 (minor bubbling) to 4 (violent with frothing and heat produced)

## 4. Chemical Data Validation

This section examines the validity of the analytical data obtained in the study. It provides the scientific confidence in the actual results presented.

### 4.1 Laboratory Accuracy and Precision

The primary laboratory (ALS) and secondary laboratory (AAA) incorporated a range of quality assurance (QA) and QC (QA/QC) methods to ensure accuracy of data. These are detailed further below. Laboratory QA/QC reports are included in laboratory reports in Appendix 3 (ALS) and Appendix 4 (AAA).

#### 4.1.1 Laboratory Blanks

Laboratory blanks are samples analysed by the laboratory during sample analysis to assist in identifying any cross contamination of samples during laboratory preparation, extraction or analysis. Analysis of laboratory blank samples should result in a concentration not exceeding the detection limit for a particular contaminant. An assessment of laboratory blank samples reported by ALS demonstrates concentrations below the detection limit for all parameters, so cross-contamination of samples does not appear to have occurred.

#### 4.1.2 Laboratory Duplicates

The precision of analysis performed by the laboratory is determined by the calculation of the relative percent difference (RPD). The RPD is calculated based on a comparison of an intra-laboratory split of the sample sediment material (not aliquot splits) with results representing the percent difference between the two sample concentrations for a specific contaminant. The NAGD recommends that laboratory duplicate samples should be within an RPD of  $\pm 35\%$ . Review of laboratory QC results identifies that TKN, reactive phosphorus, TPH C15-C28 and silver were outside this criterion, while magnesium was outside this twice.

While NAGD states that the RPD should be within  $\pm 35\%$ , ALS prefers to use a sliding scale to account for greater analytical uncertainty for contaminant concentrations nearer to the detection limit. The laboratory RPDs have been assessed using the following protocol:

- Results <10 times LOR: no limits
- Results between 10 and 20 times LOR: 0% - 50%
- Results >20 time LOR: 0% - 20%

Three metals, manganese, aluminium and iron, were recorded outside of the above criteria for laboratory duplicates. Aluminium and iron were each recorded on a single occasion and manganese was recorded twice.

#### 4.1.3 Surrogate Spikes

Surrogate spikes are compounds similar in composition to the target analyte but are not likely to be present within the environment. Samples are spiked with the surrogate material and a calculation of the percent recovery of the spiked amount against the returned concentration is performed. The percent recovery result provides an indication of the ability of the laboratory to extract a specified contaminant type from the sample matrix. Typically surrogate spikes are performed only on organic compounds. NAGD states that recovery limits of 75% - 125% are generally acceptable.

For the analysis, a few organophosphorus pesticides (OPP), organochlorine pesticides (OCP) and PAHs were outside of the accepted NAGD recovery limits.

The NAGD criteria range is likely based on surrogate recoveries from 'clean' matrix free samples. In real samples, the range of recoveries can be much greater and often lower due to matrix interference. As such, ALS has developed dynamic recovery limits for different contaminants, which are identified within laboratory reports in Appendix 3. Based on these limits, there are no surrogate spikes that fall outside of the adopted criteria.

Matrix interference occurs when samples contain certain properties such as high moisture content, high salinity and/or contain substances such as plant sterols, waxes, lipids or other organic matter that can inhibit the full extrusion of a contaminant during laboratory surrogate extraction.

#### 4.1.4 Matrix Spikes

Matrix spikes are undertaken by the laboratory to identify the amount of interference from the sediment matrix on contaminant recovery. Samples collected from the field are split from the base sample and spiked with a known contaminant concentration. The percent recovery of the contaminant is then calculated.

The accuracy of the data is determined through analysis of spiked samples. NAGD recommends that:

*"Recovery Rates (for matrix spiked samples) should be within the limits specified for the analysis method (typically 75-125%)".*

Matrix spike recoveries show that a number of OCP, OPP, PCB, PAH and TPH species were outside of the NAGD criteria and ALS specified limits in the majority of batches. ALS reported that this was due to matrix interference and confirmed results through re-analysis.

Consequently, reported contaminant concentrations by the laboratory are potentially lower than actual contaminant concentrations found within sediment samples. Given that these analytical groups were typically not detected or were well below Screening Levels, these matrix spike recovery exceedances are not of significant concern.

#### 4.1.5 Field Split Triplicate, Replicate Triplicate and Inter-Batch Duplicate Analysis

Table 4.1 provides a summary of RPDs and Relative Standard deviations (RSDs) of field split triplicate, field replicate triplicate and inter-batch duplicate analyses. Results for the various analyses are discussed below.

### Field Split Triplicate Sample Analyses

Field split triplicates are samples that are split from the original sample with two of the samples submitted to the primary laboratory and the third sample submitted to the secondary laboratory for analysis. This assesses variation associated with sub-sample handling and repeatability of laboratory analysis. Contaminant concentrations are compared between the split samples through calculation of the Relative Standard Deviation (RSD). Two field split triplicates were collected from location BER03 and JTY01.

The NAGD states that RSDs for field split samples should be within  $\pm 50\%$ . Assessment of field split triplicate samples identified that only one contaminant, nickel (58%), was marginally outside of the 50% criterion Table 4.1. In addition Total Kjeldahl Nitrogen (82%) was above the 50% criterion. Based on RSD data analysis for field split triplicate samples, sub-sample handling was undertaken effectively to a standard that ensured sample contaminant concentrations were representative of sampled sediments.

### Field Replicate Triplicate Analyses

Three field replicate triplicate samples (ie three separate samples collected in the field at a given sampling location) were collected from location MOF02, MOF06 and MOF07, to test for sediment homogeneity. Contaminant results were compared through calculation of the RSD. According to NAGD:

*“Field replicates (that is, two separate samples taken at the same location) should agree within an RPD (or for three samples at the one location, the relative standard deviation, RSD) of  $\pm 50\%$ , although they may not always do so where the sediments are very inhomogeneous or greatly differing in grain size”.*

One sample returned a result of 50%, equal to the criterion, for mercury. All other contaminants were compliant with the 50% criterion, indicating that sample contaminant concentrations are relatively homogenous across the dredge area.

### Inter-batch Duplicate Sample Analyses

Inter-batch duplicates are samples that are split from the original sample and each sample is then submitted to the laboratory in a different sample batch for analysis. This is to identify any analysis variation between sample batches. Contaminant concentrations are compared between the two split samples through calculation of the RPD. The RPD value provides an indication of the accuracy of laboratory analysis between samples/batches. The NAGD states that RPDs for duplicate split samples should be within  $\pm 50\%$ . Two inter-batch duplicate samples were taken from location BER03 and MOF01.

Manganese, mercury and reactive phosphorus were each outside of the 50% criterion in one sample. All other contaminants were compliant with the NAGD criteria in all samples.

Based on RPD data analysis for the inter-batch duplicate, laboratory analysis between batches appears to be relatively consistent.

#### **4.1.6 Trip Blanks**

Field trip blank samples provide an indication of cross-contamination from volatile substances during field sampling. Two trip blank samples were collected in the field and sent to the primary laboratory for BTEX analysis. BTEX concentrations were below detection limits, so no cross-contamination is likely to have occurred during in-field sample processing.

### **4.2 Holding Times**

Samples were kept chilled whilst in the field, during storage and during delivery, and stored under refrigeration at the laboratories. All sample analyses were undertaken within required holding times by the primary laboratory (ALS) and the secondary laboratory (AAA).

Table 4.1 Results for field split triplicate, replicate triplicate and inter-batch precision testing.

Location	Horizon	Date	Moisture Content	Total Organic Carbon	Aluminium	Iron	Arsenic	Chromium	Copper	Cobalt	Lead	Manganese	Nickel	Selenium	Vanadium	Zinc	Mercury	Total Kjeldahl Nitrogen as N	Total Phosphorus as P	Reactive Phosphorus as P	C15 - C28 Fraction	C29 - C36 Fraction	C10 - C36 Fraction (sum)
Units			%	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
<b>Inter-batch Duplicate</b>																							
BER03	0-0.5	5/05/2010	41.8	0.76	18100	32700	15.7	28	18.9	12.4	8.7	161	13.6	0.7	65.2	41.9	0.02						
IB4	0-0.5	6/05/2010	41.3	0.89	12500	28200	19.5	23.3	16.8	12.2	8.7	163	11.7	0.6	68.3	32	0.01						
<b>RPD</b>			<b>1.20%</b>	<b>15.76%</b>	<b>36.60%</b>	<b>14.78%</b>	<b>21.59%</b>	<b>18.32%</b>	<b>11.76%</b>	<b>1.63%</b>	<b>0.00%</b>	<b>1.23%</b>	<b>15.02%</b>	<b>15.38%</b>	<b>4.64%</b>	<b>26.79%</b>	<b>66.67%</b>	---	---	---	---	---	---
MOF 01	0-0.5	29-Apr-10	28.2	0.3	3220	11000	10.8	7.2	4.2	7.2	2.4	1280	4.2	0.3	24.5	10.6	<0.01	80	141	0.6	<3	<5	<3
IB1	0-0.5	29/04/2010	26.7	0.45	3290	9730	8.05	6.4	3.6	5.6	1.8	575	3.6	0.2	23.8	10.1	<0.01	100	179	0.3	<3	<5	<3
<b>RPD</b>			<b>5.46%</b>	<b>40.00%</b>	<b>2.15%</b>	<b>12.25%</b>	<b>29.18%</b>	<b>11.76%</b>	<b>15.38%</b>	<b>25.00%</b>	<b>28.57%</b>	<b>76.01%</b>	<b>15.38%</b>	<b>40.00%</b>	<b>2.90%</b>	<b>4.83%</b>	<b>ND</b>	<b>22.22%</b>	<b>23.75%</b>	<b>66.67%</b>	<b>ND</b>	<b>ND</b>	<b>ND</b>
<b>Field Replicate Triplicate</b>																							
MOF 02	0-0.5	6/05/2010	49	0.96	15000	20200	6.94	20.3	23.8	8.7	7.8	168	9.6	0.8	60.8	34	0.02	800	241	0.4	9	11	20
T5	0-0.5	6/05/2010	54.5	0.91	14300	20800	8.96	20.2	21.5	9.3	7.8	262	10.7	0.7	54.4	35.4	0.02	880	288	0.2	10	14	24
T6	0-0.5	6/05/2010	43.1	0.87	13400	17500	5.92	17.6	22.2	7.2	7.2	190	8.1	0.6	54.1	29.8	0.02	720	207	0.4	8	12	20
<b>RSD</b>			<b>11.67%</b>	<b>4.94%</b>	<b>5.64%</b>	<b>9.01%</b>	<b>21.27%</b>	<b>7.90%</b>	<b>5.24%</b>	<b>12.88%</b>	<b>4.56%</b>	<b>23.79%</b>	<b>13.79%</b>	<b>14.29%</b>	<b>6.71%</b>	<b>8.81%</b>	<b>0.00%</b>	<b>10.00%</b>	<b>16.58%</b>	<b>34.64%</b>	<b>11.11%</b>	<b>12.39%</b>	<b>10.83%</b>
MOF 06	0-0.5	6/05/2010	34	0.35	13600	23500	8.22	16.3	18.9	7.3	7.9	122	9	0.5	50.9	32.9	<0.01						
T7	0-0.5	6/05/2010	44.8	0.64	14900	25800	10.4	19.7	22	8.6	8.3	156	11.1	0.7	59.8	37.8	0.02						
T8	0-0.5	6/05/2010	57.7	0.62	19900	35700	13.9	25.5	36.2	11.6	11.6	166	14.7	1	84.9	48.9	0.02						
<b>RSD</b>			<b>26.08%</b>	<b>30.18%</b>	<b>20.62%</b>	<b>22.88%</b>	<b>26.43%</b>	<b>22.69%</b>	<b>35.89%</b>	<b>24.06%</b>	<b>21.91%</b>	<b>15.58%</b>	<b>24.85%</b>	<b>34.32%</b>	<b>27.04%</b>	<b>20.56%</b>	<b>0.00%</b>	---	---	---	---	---	---
MOF 07	0-0.5	29-Apr-10	51.4	2.91	22000	37100	16.2	29.8	33.5	16.7	10	345	15.2	0.9	82.4	47.8	0.01						
T9	0-0.5	29-Apr-10	52.8	5.55	15900	32700	21	24.1	28.3	14.9	9.4	308	12.7	1	60.4	42.5	0.03						
T10	0-0.5	29-Apr-10	47.9	2.81	20800	29600	11	28.2	36.6	14.6	10	257	14.2	1	74.6	45.7	0.02						
<b>RSD</b>			<b>4.98%</b>	<b>41.36%</b>	<b>16.52%</b>	<b>11.37%</b>	<b>31.13%</b>	<b>10.74%</b>	<b>12.79%</b>	<b>7.38%</b>	<b>3.53%</b>	<b>14.57%</b>	<b>8.97%</b>	<b>5.97%</b>	<b>15.39%</b>	<b>5.89%</b>	<b>50.00%</b>	---	---	---	---	---	---
<b>Field Split Triplicate</b>																							
BER03	0-0.5	5/05/2010	41.8	0.76	18100	32700	15.7	28	18.9	12.4	8.7	161	13.6	0.7	65.2	41.9	0.02						
T14	0-0.5	5/05/2010	40.5	0.68	16200	54300	27	37.1	18.2	12	12.6	155	12.1	0.9	133	35	0.01						
T15	0-0.5	5/05/2010	35.6	1		39000	20	24	18		8	170	11		76	31	0.01						
<b>RSD</b>			<b>8.32%</b>	<b>20.48%</b>	<b>7.83%</b>	<b>26.45%</b>	<b>27.29%</b>	<b>22.60%</b>	<b>2.57%</b>	<b>2.32%</b>	<b>25.38%</b>	<b>4.66%</b>	<b>10.67%</b>	<b>17.68%</b>	<b>39.86%</b>	<b>15.33%</b>	<b>43.30%</b>	---	---	---	---	---	---
JTY 01	0-0.5	30/04/2010	31.5	0.48	15400	19200	11	14.8	15.7	14.7	12.7	347	8.6	1.6	55.1	47.2	0.04	500	329	1.2	<3	<5	<3
T11	0-0.5	30/04/2010	31.6	0.83	17600	23100	15.7	20.3	16.4	29.4	20.8	364	26.5	1.8	61.6	69.8	0.03	620	271	1.2	<3	<5	<3
T12	0-0.5	30/04/2010	29.1			33000	24	23	19		13	630	13		66	61	0.04	28			<50	<50	<3
<b>RSD</b>			<b>4.61%</b>	<b>37.78%</b>	<b>9.43%</b>	<b>28.34%</b>	<b>38.95%</b>	<b>21.58%</b>	<b>10.21%</b>	<b>47.14%</b>	<b>29.63%</b>	<b>35.51%</b>	<b>58.18%</b>	<b>8.32%</b>	<b>9.00%</b>	<b>19.20%</b>	<b>15.75%</b>	<b>81.78%</b>	<b>13.67%</b>	<b>0.00%</b>	<b>ND</b>	<b>ND</b>	<b>ND</b>

## 5. Discussion and Conclusions

Chemical analyses of sediments within the MOF (including construction docks), Jetty and Jetty Berth dredge areas identifies that contaminant substances, if present, are generally below NAGD Screening Levels. The only exception to this is the presence of arsenic at three locations. Arsenic was identified in the surface sediments (0.0-0.5m and 0.5-1.0m) above the NAGD Screening Levels, from three locations within the Jetty and Jetty Berth dredge areas. These results are consistent with the assessment of the adjacent 2A dredge area (WorleyParsons 2009a), which identified sediments within the southern extent of the dredge area had elevated concentrations of arsenic, above NAGD Screening Levels, throughout the sediment profile. A study by URS (2009) also identified elevated arsenic concentrations in the area). Arsenic has also been previously identified as occurring naturally within sediments in the Port of Gladstone (GHD 2009).

In comparison with the DEH (1998) guidelines arsenic concentrations, as discussed above, exceeded the EILs. In addition, manganese was identified in surface sediments and through to a depth of 2m. Exceedances occurred at three locations within the MOF dredge area. These results are in accordance with a number of previous studies completed within the area which have also identified manganese as exceeding DEH EILs (WorleyParsons 2009a; WorleyParsons 2009b; URS 2009). Manganese, as with arsenic, is considered a naturally occurring element within the local geology and is often recorded at elevated levels (Storey et al. 2007).

In general, the results of this study are consistent with those of previous studies within the area. A major difference between this study and others in the area is that previous studies have also identified exceedances in mercury, zinc, nickel, copper, antimony and chromium. Concentrations of these elements were all below NAGD Screening Levels and DEH EILs in this current study.

For organic substances within the dredge area results are summarised below:

- Total Petroleum Hydrocarbon fractions C6-C9 and C10-C14 were not detected in any sample
- TPH fractions C15-C28 and C29-C36 were detected from surface sediments at one location
- The majority of PAH species were detected in at least one sample, seven species were not detected in any sample. Four locations did not record any PAH species above LOR
- Tributyltin, BTEX, Organochlorine Pesticides, Organophosphorus Pesticides and Polychlorinated Biphenyls were not detected in any sample

The 95% UCL of the mean for all contaminants tested across the MOF, Jetty and Jetty Berth dredge areas was below respective NAGD Screening Levels and EIL and HIL-A. Therefore, based on the analyses undertaken, it is considered that the capital material to be dredged these areas is suitable for unconfined placement at sea, according to the NAGD contaminant assessment framework. The material is also suitable for placement on land according to the DEH (1998) guidelines.

### 5.1 ASS Investigation Summary

Two profiles were generally encountered: 1) very weak, very dark grey surface silt with a weak to firm dark grey silty base clay or 2) very weak, very dark grey surface silt with a firm, grey with brown / red / yellow mottle silty base clay. The first of these profiles was PASS, while the base clay of the second profile was non-ASS.

Field screening indicated all samples collected from all ASS coring locations were not AASS, however three (3) samples collected from JTY02 were indicative of PASS. Further testing conducted in a laboratory using the Chromium Suite analysis indicated nearly all samples were PASS. Samples which were not AASS or PASS were collected within the firm, grey with brown / red / yellow mottle silty base clay which has previously been reported as non-PASS (GeoCoastal 2009). Samples collected within very dark grey surface silt or the weak to firm dark grey silty base clay were PASS.

ANC was reported to buffer all potential acid generated at MOF05 and BER03. All other ASS coring locations will require treatment rated from high to extra high.

This limited assessment, which should be considered preliminary, indicated the weak surface sediment layers encountered at all ASS coring locations are PASS. This weak (soft) surface layer was encountered at most other coring locations and may be considered PASS. Similarly, the deeper weak to firm dark grey silty clay was also PASS. It too was encountered at other coring locations. Where these layers are encountered during the proposed dredging works, further assessment may be required to determine accurate liming rates for treatment (if required depending on ANC) if onshore disposal methods are selected. The dredge management plan to be developed for the dredging will outline any further assessment requirements which would include the QASSIT recommended sampling intensity of one sample per 500m<sup>3</sup> of spoil.

The grey with brown / red / yellow mottle silty base clay, common to many coring locations, was neither AASS nor PASS. This is a similar result to those reported by GeoCoastal (2009).

## 6. References


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## Appendix 1 Core Logs and Photos


<b>General Location of Sampling</b>		Curtis Island							
<b>Site Number</b>		JTY 01							
<b>Date/Sample Time</b>		30 April 2010/ 10:20am							
<b>Water Depth at Site</b>		2.5m							
<b>Type of Core Sampler</b>		Vibracore + Piston Core							
<b>Depth Retained</b>		40cm							
<b>Weather Conditions</b>		Wind SE 2km, Calm							
<b>General Information</b>		Refusal at 0.3m							
<b>PSD (%)</b>									
Gravel ()	Sand ()	Silt ()	Clay ()						
<b>Strata Change (m)</b>	<b>Colour</b>	<b>Field Texture</b>	<b>Moist.</b>	<b>Consist.</b>	<b>Sand Grain Size</b>	<b>Plasticity</b>	<b>% Stones</b>	<b>Shell/Grit/Biota</b>	<b>Odour</b>
0 – 0.1	Gley 1 3\1 Very dark greenish grey	Clay silt	High	Very Weak	Trace coarse	High	20% <1cm	5% shell 20% organic	Nil
0.1 – 0.4	Gley 2 4\1 Dark Bluish Grey. Red/ orange mottle	Silty clay	Low	Firm	Nil	High	10% <1cm	5% shell Organic decrease with depth	Nil




<b>General Location of Sampling</b>				Curtis Island									
<b>Site Number</b>				JTY 02									
<b>Date/Sample Time</b>				30 April 2010/ 9:10am									
<b>Water Depth at Site</b>				2.4m									
<b>Type of Core Sampler</b>				Vibracore + Piston Core									
<b>Depth Retained</b>				0.95m									
<b>Weather Conditions</b>				Wind 5km SE, Calm									
<b>General Information</b>				Refused at 1.3m									
<b>PSD (%)</b>													
Gravel (0.5)		Sand (7)		Silt (46.5)		Clay (46)							
<b>Strata Change (m)</b>		<b>Colour</b>		<b>Field Texture</b>		<b>Moist.</b>		<b>Consist.</b>	<b>Sand Grain Size</b>	<b>Plasticity</b>	<b>% Stones</b>	<b>Shell/Grit/ Biota</b>	<b>Odour</b>
0. – 0.1		Gley 1 4\ Dark Grey		Silty clay		High		Very Weak	Trace, medium	Very high	Nil	5% shell <10mm 5% organics	Nil
0.1 – 0.95		Gley 1 5\ Grey		Silty clay		Moderate		Weak	Nil	Very high	Nil	1% shell <5mm 20% organics	Nil




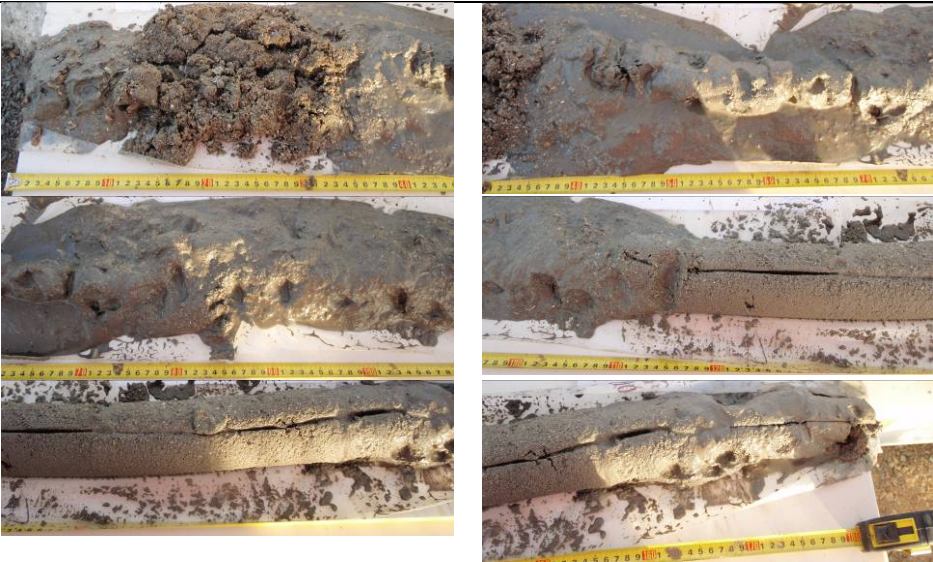
General Location of Sampling		Curtis Island							
Site Number		BER 01							
Date/Sample Time		30 April 2010/ 8:45am							
Water Depth at Site		2.4m							
Type of Core Sampler		Vibracore + Piston Core							
Depth Retained		1.12m							
Weather Conditions		Wind SE 5km, Calm							
General Information		Refusal at 1.8m							
PSD (%)									
Gravel (1)	Sand (10.5)	Silt (41.5)	Clay (47)						
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.3	Gley 1 4\ Dark Grey	Clay silt	High	Very Weak	Trace medium	High	Nil	5% <1cm Organics moderate	Nil
0.3 – 0.8	Gley 1 4\ Dark Grey	Silty clay	High	Weak	Trace medium	High	Nil	5% <1cm Organics moderate	Nil
0.8 – 1.12	Gley 1 3\ Very Dark Grey	Silty clay	Moderate	Firm	Nil	High	Nil	Trace	Nil

<b>General Location of Sampling</b>													
<b>Site Number</b>													
<b>Date/Sample Time</b>													
<b>Water Depth at Site</b>													
<b>Type of Core Sampler</b>													
<b>Depth Retained</b>													
<b>Weather Conditions</b>													
<b>General Information</b>													
<b>PSD (%)</b>													
Gravel (32)		Sand (9)		Silt (32)		Clay (27)							
<b>Strata Change (m)</b>	<b>Colour</b>	<b>Field Texture</b>	<b>Moist.</b>	<b>Consist.</b>	<b>Sand Grain Size</b>	<b>Plasticity</b>	<b>% Stones</b>	<b>Shell/Grit/Biota</b>	<b>Odour</b>				
0 – 0.2	Gley 1 3\ Very Dark Grey	Clay silt	High	Very Weak	Medium	Low	10mm few 5%	30% shell <20mm 5% organic <5mm	Faint marine				
0.2 – 0.3	Gley 1 5\ Grey 2.5yr 4\6 mottle (red)	Clay	Dry	Very Firm	Nil	High	Nil	Nil	Nil				



<b>General Location of Sampling</b>		Curtis Island							
<b>Site Number</b>		BER 03							
<b>Date/Sample Time</b>		5 May 2010/ 12:45pm							
<b>Water Depth at Site</b>		7.6m							
<b>Type of Core Sampler</b>		Vibracore + Piston Core							
<b>Depth Retained</b>		0.3m							
<b>Weather Conditions</b>		Fine. 0kn wind. Calm seas							
<b>General Information</b>		Piston refusal at 30cm. Vibracore refusal at 35cm. Refusal on hard clays							
<b>PSD (%)</b>									
Gravel (7)	Sand (28)	Silt (28)	Clay (37)						
<b>Strata Change (m)</b>	<b>Colour</b>	<b>Field Texture</b>	<b>Moist.</b>	<b>Consist.</b>	<b>Sand Grain Size</b>	<b>Plasticity</b>	<b>% Stones</b>	<b>Shell/Grit/ Biota</b>	<b>Odour</b>
0 – 0.2	Gley 1 3\ Very Dark Grey	Clay silt	High	Very Weak	Medium	Low	10mm few 5%	30% shell <20mm 5% organic <5mm	Faint marine
0.2 – 0.3	Gley 1 5\ Grey 2.5yr 4\6 mottle (red)	Clay	Dry	Very Firm	Nil	High	Nil	Nil	Nil

<b>General Location of Sampling</b>		Curtis Island							
<b>Site Number</b>		BER 04							
<b>Date/Sample Time</b>		05 May 2010/ 12:15pm							
<b>Water Depth at Site</b>									
<b>Type of Core Sampler</b>		Piston Core							
<b>Depth Retained</b>		Surface							
<b>Weather Conditions</b>		<5kn SE, calm seas							
<b>General Information</b>		Large rocks common (up to 600mm) with coarse sand in between. No vibracore possible. Dead and live hard coral and gorgonians present.							
<b>PSD (%)</b>									
Gravel (55)	Sand (41)	Silt (0)	Clay (4)						
<b>Strata Change (m)</b>	<b>Colour</b>	<b>Field Texture</b>	<b>Moist.</b>	<b>Consist.</b>	<b>Sand Grain Size</b>	<b>Plasticity</b>	<b>% Stones</b>	<b>Shell/Grit/ Biota</b>	<b>Odour</b>
Surface	10yr 4¼ Dark yellowish brown	Silty gravelly sand	High	Loose	Medium – coarse	Nil	50% <1mm – 5cm	80% shell <1mm – 50mm Corals	Nil

<b>General Location of Sampling</b>		Curtis Island							
<b>Site Number</b>		MOF 01							
<b>Date/Sample Time</b>		29 April 2010/ 1:40pm							
<b>Water Depth at Site</b>		3.1m							
<b>Type of Core Sampler</b>		Vibracore + Piston Core							
<b>Depth Retained</b>		1.80							
<b>Weather Conditions</b>		Wind 5kn SE, Calm seas							
<b>General Information</b>		Refusal at 4.3m							
<b>PSD (%)</b>									
Gravel (8)	Sand (73)	Silt (7)	Clay (12)						
<b>Strata Change (m)</b>	<b>Colour</b>	<b>Field Texture</b>	<b>Moist.</b>	<b>Consist.</b>	<b>Sand Grain Size</b>	<b>Plasticity</b>	<b>% Stones</b>	<b>Shell/Grit/ Biota</b>	<b>Odour</b>
0 – 0.1	Dark grey	Silty sandy clay	High	Very Weak	Medium	High	Trace <5mm	20% <2cm organic	Nil
0.1 – 0.3	Dark grey	Silty clay sand	Moderate	Low	Medium	Nil	Trace <5mm	40% <2mm	Nil
0.3 – 1.10	Very dark grey	Silty sandy clay	High	Weak	Medium	High	Trace <5mm	40% <2cm	Nil
1.10 – 1.70	Very dark grey	Silty clay sand	High	Weak	Medium	Low	Trace <5mm	40cm <10mm	Nil
1.70 – 1.80	Grey / Brown mottle	Silt clay	Low	Firm	Trace, medium	Very high	Nil	Nil	Nil




<b>General Location of Sampling</b>				Curtis Island					
<b>Site Number</b>				MOF 02					
<b>Date/Sample Time</b>				06 May 2010/ 9:45am					
<b>Water Depth at Site</b>									
<b>Type of Core Sampler</b>				Vibracore + Piston Core					
<b>Depth Retained</b>				0.15					
<b>Weather Conditions</b>				Fine. 15kn SE winds.					
<b>General Information</b>				10cm of soupy surface silts overlying very stiff clays. Piston refusal at 10cm. Vibracore refusal at 15cm.					
<b>PSD (%)</b>									
Gravel (3)		Sand (25)		Silt (32)		Clay (40)			


Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/ Biota	Odour
0 – 0.1	Gley 1 3\ Very dark grey	Clay silt	High	Very Weak	Nil	Nil	Nil	Trace shell & organics	Marine
0.1 – 0.15	Gley 1 5\ Grey 10yr 5\8 Yellowish brown mottle	Silty clay	Dry	Firm	Nil	High	Nil	Nil	Faint marine




<b>General Location of Sampling</b>				Curtis Island								
<b>Site Number</b>				MOF 03								
<b>Date/Sample Time</b>				06 May 2010/ 8:50am								
<b>Water Depth at Site</b>				5.1m								
<b>Type of Core Sampler</b>				Vibracore + Piston Core								
<b>Depth Retained</b>				40mm								
<b>Weather Conditions</b>				Fine. 15kn SE wind, slight chop								
<b>General Information</b>				40mm soupy silt over hard clay. Vibracore penetrated clay about 50mm								
<b>PSD (%)</b>												
Gravel (1)		Sand (35)		Silt (24)		Clay (40)						
<b>Strata Change (m)</b>		<b>Colour</b>		<b>Field Texture</b>		<b>Moist.</b>	<b>Consist.</b>	<b>Sand Grain Size</b>	<b>Plasticity</b>	<b>% Stones</b>	<b>Shell/Grit/ Biota</b>	<b>Odour</b>
0.1 – 0.15		Gley 1 5\ Grey 10yr 5\8 Yellowish brown mottle		Silty clay		Dry	Firm	Nil	High	Nil	Nil	Faint marine







General Location of Sampling		Curtis Island							
Site Number		MOF 04							
Date/Sample Time		30 April 2010/ 11:05am							
Water Depth at Site		2.8m							
Type of Core Sampler		Vibracore + Piston Core							
Depth Retained		1m							
Weather Conditions		Wind speed 5kn – calm.							
General Information		Refusal at 1.4m							
PSD (%)									
Gravel (4)	Sand (23.5)	Silt (30)	Clay (42.5)						
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/ Biota	Odour
0 – 0.2	Black	Silty clay sand	High	Very Weak	Medium	Low	Nil	20% shell <2mm Organic 50%	Nil
0.2 – 1.0	Gley 1 3\ Very dark grey	Silty clay	Low	Weak	Trace	High	Nil	Trace shell Organic bands = 50%	Nil

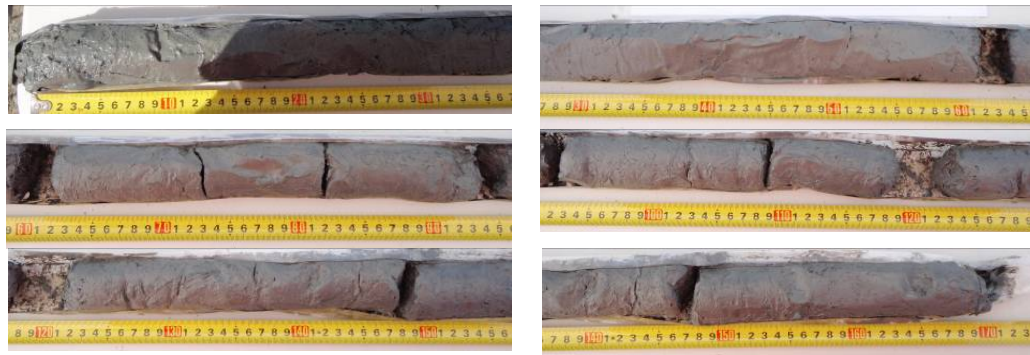
<b>General Location of Sampling</b>		Curtis Island							
<b>Site Number</b>		MOF 05							
<b>Date/Sample Time</b>		29 April 2010							
<b>Water Depth at Site</b>		1.3m							
<b>Type of Core Sampler</b>		Vibracore + Piston Core							
<b>Depth Retained</b>		2.30m							
<b>Weather Conditions</b>		Wind SE 12kn, choppy seas							
<b>General Information</b>		Refusal at 1m							
<b>PSD (%)</b>									
Gravel (7.67)	Sand (38)	Silt (23.33)	Clay (31)						
<b>Strata Change (m)</b>	<b>Colour</b>	<b>Field Texture</b>	<b>Moist.</b>	<b>Consist.</b>	<b>Sand Grain Size</b>	<b>Plasticity</b>	<b>% Stones</b>	<b>Shell/Grit/Biota</b>	<b>Odour</b>
0 – 0.6	Grey	Silty clay sand	High	Very Weak	Medium	Nil	Nil	80% <20mm	Nil
0.6 – 0.9	Dark grey	Silty sandy clay	High	Weak	Medium	High	Nil	50% <10mm	Nil
0.9 – 1.30	Grey	Silty clay sand	High	Very Weak	Medium - coarse	Nil	Nil	80% <20mm	Nil
1.3 – 1.90	Grey	Silty clay sand	Moderate	Loose	Medium – coarse	Nil	Trace <5mm	Organics 70% <10mm	Nil

1.9 – 2.20	Very dark grey	Silty sandy clay	Moderate	Weak	Medium	Moderate	Trace <10mm	10% <5mm	Nil
2.20 – 2.30	Grey / Brown Mottle	Silty clay	Low	Firm	Trace medium	Very High	Nil	Nil	Nil


<b>General Location of Sampling</b>															
<b>Site Number</b>										<b>MOF 06</b>					
<b>Date/Sample Time</b>										06 May 2010/ 10:45am					
<b>Water Depth at Site</b>										5.7m					
<b>Type of Core Sampler</b>										Vibracore + Piston Core					
<b>Depth Retained</b>										0.15m					
<b>Weather Conditions</b>										Fine. 10kn SE wind, Slight chop					
<b>General Information</b>										Piston refusal 50mm. Vibracore refusal 100mm. Soft silt over hard clay					
<b>PSD (%)</b>															
Gravel (0)		Sand (14)		Silt (37)		Clay (49)									
<b>Strata Change (m)</b>	<b>Colour</b>	<b>Field Texture</b>	<b>Moist.</b>	<b>Consist.</b>	<b>Sand Grain Size</b>	<b>Plasticity</b>	<b>% Stones</b>	<b>Shell/Grit/Biota</b>	<b>Odour</b>						
0 – 0.1	Gley 1 3\ Very dark grey	Clay silt	High	Very Weak	Nil	Nil	Nil	Trace shell & organics	Marine						
0.1 – 0.15	Gley 1 5\ Grey 10yr 5\8 Yellowish brown mottle	Silty clay	Dry	Firm	Nil	High	Nil	Nil	Faint marine						

General Location of Sampling		Curtis Island							
Site Number		MOF 07							
Date/Sample Time		29 April 2010/ 10:35am							
Water Depth at Site		2.0 – 2.5m							
Type of Core Sampler		Vibracore							
Depth Retained		1m							
Weather Conditions		Wind SE 10kn, moderate seas							
General Information		Refusal at 1.2m							
PSD (%)									
Gravel (1)	Sand (4.5)	Silt (42.5)	Clay (52)						
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/ Biota	Odour
0 – 0.1	Dark grey	Silty Clay	High	Very weak	Trace fine	High	Nil	40% shell Abundant organic layer	Faint Marine
0.1 – 1m	Dark grey / greenish	Clay	Low	Weak	Nil	High	Nil	Trace shell Abundant organic layer	Faint marine



General Location of Sampling		Curtis Island							
Site Number		MOF 08							
Date/Sample Time		29 April 2010/ 9:25am							
Water Depth at Site		2.7m							
Type of Core Sampler		Vibracore + Piston Core							
Depth Retained		1.7m							
Weather Conditions		Wind 5kn SE Calm							
General Information		Refusal at 1.8m							
PSD (%)									
Gravel (4.5)	Sand (8)	Silt (38.5)	Clay (49)						
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/ Biota	Odour
0 – 0.07	Dark grey / greenish	Silty clay	Moderate	Low	Trace	Moderate	20% <2mm	Trace shell Organic material	Faint marine
0.07 – 1.7	Dark grey / greenish	Clay	Low	High	Nil	High	Nil	Trace	Faint marine

<b>General Location of Sampling</b>				Curtis Island									
<b>Site Number</b>				MOF 09									
<b>Date/Sample Time</b>				29 April 2010/ 8:45am									
<b>Water Depth at Site</b>				2.5m									
<b>Type of Core Sampler</b>				Vibracore + Piston Core									
<b>Depth Retained</b>				1.23m									
<b>Weather Conditions</b>				Wind 5kn SE Calm									
<b>General Information</b>				1.4m refusal									
<b>PSD (%)</b>													
Gravel (10)		Sand (8)		Silt (37)		Clay (45)							
<b>Strata Change (m)</b>		<b>Colour</b>		<b>Field Texture</b>		<b>Moist.</b>		<b>Consist.</b>	<b>Sand Grain Size</b>	<b>Plasticity</b>	<b>% Stones</b>	<b>Shell/Grit/Biota</b>	<b>Odour</b>
0 – 0.1		Dark grey		Silty clay		High		Weak	Fine	High	Nil	40%	Faint marine
0.1 – 1.23		Dark grey / greenish clay		Clay		Low		Firm	Nil	High	Nil	Organics trace	Faint marine



## **Appendix 2 Particle Size Analysis Reports (ALS)**

# Certificate of Analysis

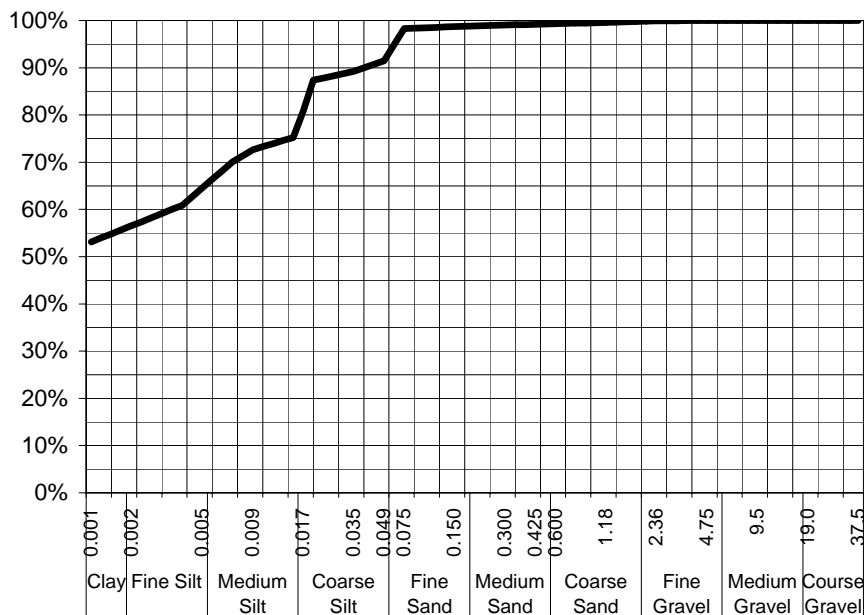
ALS Laboratory Group Pty Ltd  
5 Rosegum Road  
Warabrook, NSW 2304  
pH 02 4968 9433  
fax 02 4968 0349  
samples.newcastle@alsenviro.com

**ALS Environmental**  
**Newcastle, NSW**



**CLIENT:** Vivian Seto **DATE REPORTED:** 18-May-2010  
**COMPANY:** Worley Parsons - Infrastructure **DATE RECEIVED:** 5-May-2010  
**ADDRESS:** Level 3, 60 Albert Street **REPORT NO:** ES1008245-002 / PSD  
PoO Box 15081  
**PROJECT:** NAGD - Asia Pacific LNG **SAMPLE ID:** JTY 02

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	100%
1.18	100%
0.600	99%
0.425	99%
0.300	99%
0.150	99%
0.075	98%
Particle Size (microns)	
49	91%
35	89%
17	81%
9	73%
5	65%
3	61%
1	53%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Silty clay

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation: 825 Site: Newcastle**

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**Analysed:** 7-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

**Dianne Blane**  
Laboratory Supervisor  
**Authorised Signatory**

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**ALS Environmental**

**Newcastle, NSW**



**CLIENT:** Vivian Seto

**DATE REPORTED:** 18-May-2010

**COMPANY:** Worley Parsons - Infrastructure  
MWE

**DATE RECEIVED:** 5-May-2010

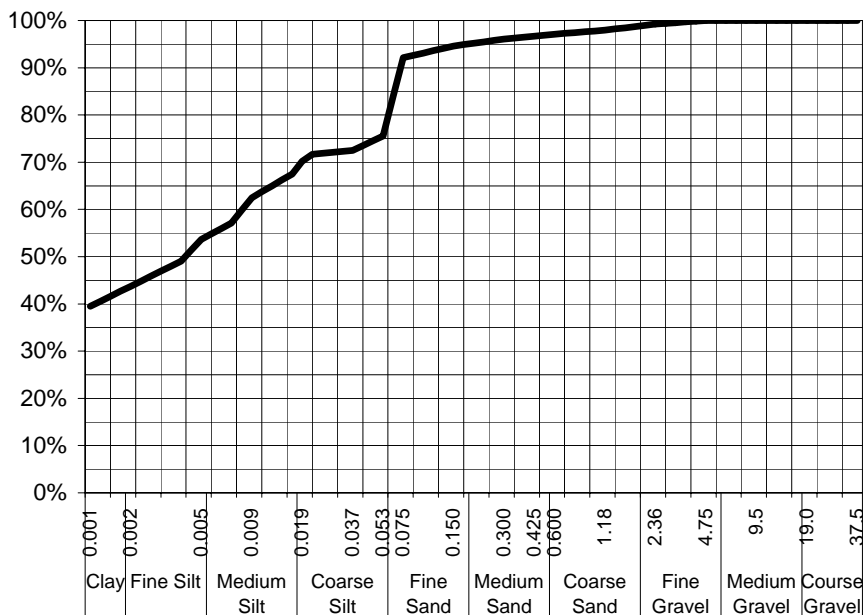
**ADDRESS:** Level 3, 60 Albert Street  
PoO Box 15081

**REPORT NO:** ES1008245-003 / PSD

**PROJECT:** NAGD - Asia Pacific LNG

**SAMPLE ID:** JTY 02

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	99%
1.18	98%
0.600	97%
0.425	97%
0.300	96%
0.150	95%
0.075	92%
Particle Size (microns)	
53	76%
37	72%
19	70%
9	62%
5	54%
3	49%
1	39%

Samples analysed as received.

## Sample Comments:

**Analysed:** 7-May-10

**Loss on Pretreatment** NA

**Limit of Reporting:** 1%

**Sample Description:** Silty clay

**Dispersion Method** Shaker

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Hydrometer Type** ASTM E100

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation:** 825 **Site:** Newcastle

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*D Blane*

**Dianne Blane**  
Laboratory Supervisor  
**Authorised Signatory**

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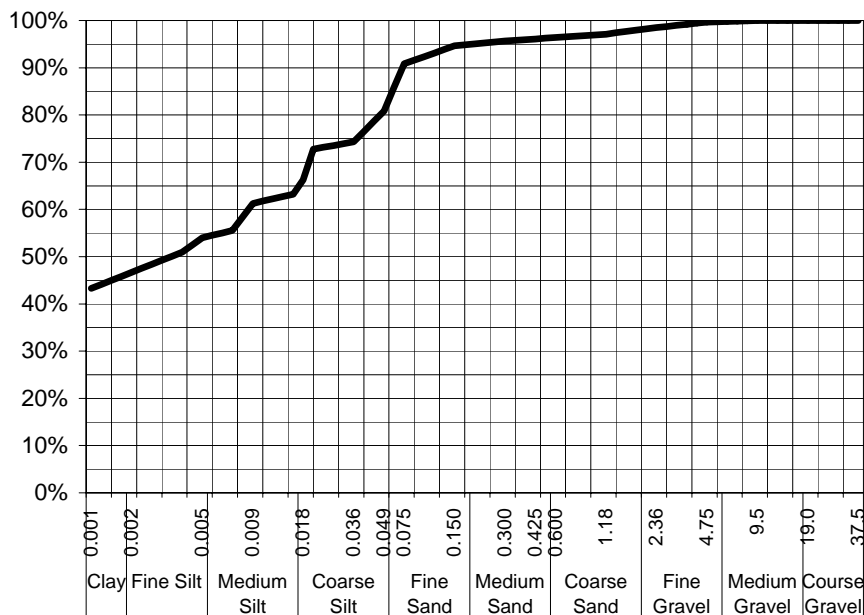
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**Newcastle, NSW**



**CLIENT:** Vivian Seto **DATE REPORTED:** 18-May-2010  
**COMPANY:** Worley Parsons - Infrastructure **DATE RECEIVED:** 5-May-2010  
**ADDRESS:** Level 3, 60 Albert Street **REPORT NO:** ES1008245-004 / PSD  
PoO Box 15081  
**PROJECT:** NAGD - Asia Pacific LNG **SAMPLE ID:** BER 01

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	98%
1.18	97%
0.600	96%
0.425	96%
0.300	96%
0.150	95%
0.075	91%
Particle Size (microns)	
49	81%
36	74%
18	66%
9	61%
5	54%
3	51%
1	43%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Silty clay

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation: 825 Site: Newcastle**

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**Analysed:** 7-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

**Dianne Blane**  
Laboratory Supervisor  
**Authorised Signatory**

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Newcastle, NSW



**CLIENT:** Vivian Seto

**DATE REPORTED:** 18-May-2010

**COMPANY:** Worley Parsons - Infrastructure  
MWE

**DATE RECEIVED:** 5-May-2010

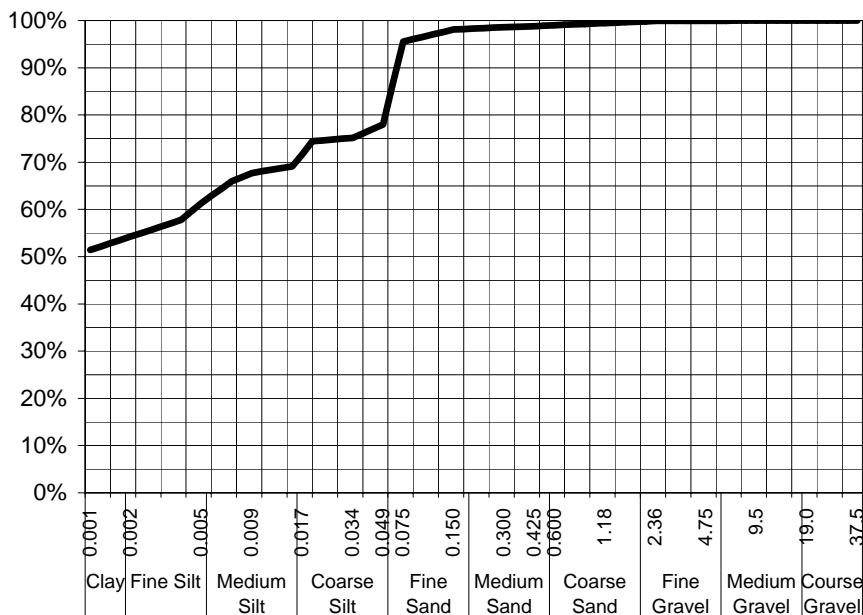
**ADDRESS:** Level 3, 60 Albert Street  
PoO Box 15081

**REPORT NO:** ES1008245-005 / PSD

**PROJECT:** NAGD - Asia Pacific LNG

**SAMPLE ID:** BER 01

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	100%
1.18	99%
0.600	99%
0.425	99%
0.300	99%
0.150	98%
0.075	96%
Particle Size (microns)	
49	78%
34	75%
17	72%
9	68%
5	61%
3	58%
1	51%

Samples analysed as received.

## Sample Comments:

**Analysed:** 7-May-10

**Loss on Pretreatment** NA

**Limit of Reporting:** 1%

**Sample Description:** Silty clay

**Dispersion Method** Shaker

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Hydrometer Type** ASTM E100

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation:** 825 **Site:** Newcastle

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**Dianne Blane**  
Laboratory Supervisor  
**Authorised Signatory**

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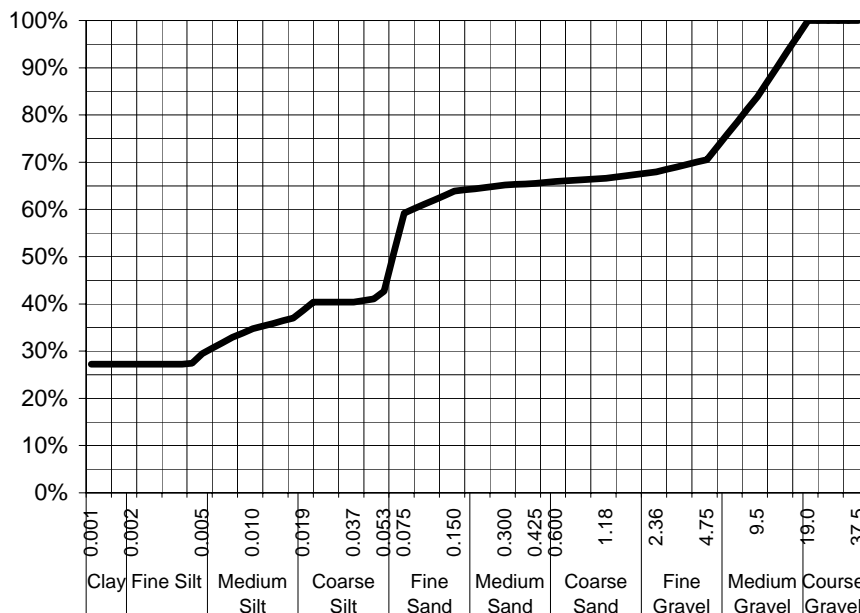
**ALS Environmental**

**Newcastle, NSW**



**CLIENT:** Tom Koskela **DATE REPORTED:** 25-May-2010  
**COMPANY:** Worley Parsons - Infrastructure **DATE RECEIVED:** 5-May-2010  
**ADDRESS:** MWE  
Level 3, 60 Albert Street **REPORT NO:** ES1008494-003 / PSD  
PO Box 15081, City East  
BRISBANE 4000  
**PROJECT:** NAGD - Asia Pacific LNG **SAMPLE ID:** BER02 0 - 0.5  
301001-00752

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	84%
4.75	71%
2.36	68%
1.18	67%
0.600	66%
0.425	66%
0.300	65%
0.150	64%
0.075	59%
Particle Size (microns)	
53	43%
37	40%
19	39%
10	35%
5	29%
3	27%
1	27%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Gravel, silt, clay & sand

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation: 825 Site: Newcastle**

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**Analysed:** 17-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

**Dianne Blane**

Laboratory Supervisor, Newcastle  
**Authorised Signatory**

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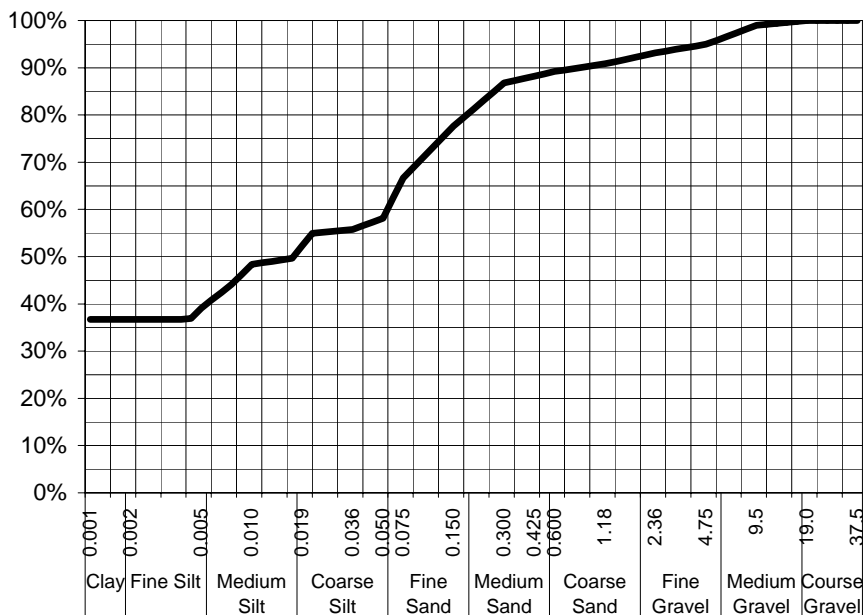
ALS Environmental

Newcastle, NSW



**CLIENT:** Tom Koskela  
**DATE REPORTED:** 25-May-2010  
**COMPANY:** Worley Parsons - Infrastructure MWE  
**DATE RECEIVED:** 5-May-2010  
**ADDRESS:** Level 3, 60 Albert Street  
**REPORT NO:** ES1008494-001 / PSD  
PO Box 15081, City East  
**PROJECT:** NAGD - Asia Pacific LNG  
**SAMPLE ID:** BER03 0 - 0.5  
301001-00752

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	99%
4.75	95%
2.36	93%
1.18	91%
0.600	89%
0.425	88%
0.300	87%
0.150	78%
0.075	67%
Particle Size (microns)	
50	58%
36	56%
19	52%
10	48%
5	39%
3	37%
1	37%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Clay, silt & sand

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation:** 825 **Site:** Newcastle

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**Analysed:** 17-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

**Dianne Blane**

Laboratory Supervisor, Newcastle  
**Authorised Signatory**

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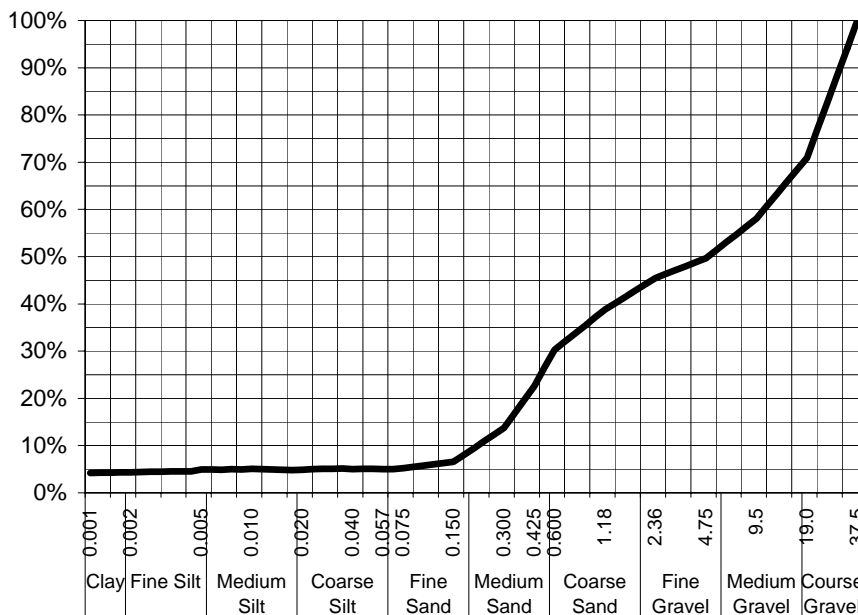
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**Newcastle, NSW**



**CLIENT:** Tom Koskela **DATE REPORTED:** 25-May-2010  
**COMPANY:** Worley Parsons - Infrastructure **DATE RECEIVED:** 5-May-2010  
**ADDRESS:** Level 3, 60 Albert Street **REPORT NO:** ES1008494-004 / PSD  
PO Box 15081, City East  
BRISBANE 4000  
**PROJECT:** NAGD - Asia Pacific LNG **SAMPLE ID:** BER04 0 - 0.5  
301001-00752

## Particle Size Distribution



Particle Size (mm)	Percent Passing
37.5	100%
19.0	71%
9.5	58%
4.75	50%
2.36	45%
1.18	39%
0.600	30%
0.425	23%
0.300	14%
0.150	7%
0.075	5%
Particle Size (microns)	
57	5%
40	5%
20	5%
10	5%
5	5%
4	5%
1	4%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Gravel, sand & clay

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation:** 825 **Site:** Newcastle

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**Analysed:** 17-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

**Dianne Blane**

Laboratory Supervisor, Newcastle  
**Authorised Signatory**

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samples.newcastle@alsenviro.com

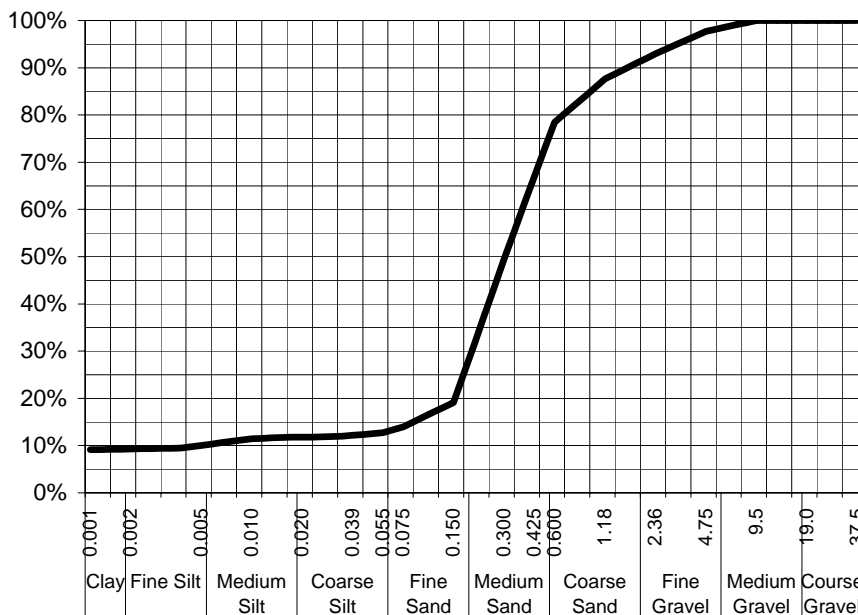
**ALS Environmental**

**Newcastle, NSW**



**CLIENT:** Vivian Seto **DATE REPORTED:** 20-May-2010  
**COMPANY:** Worley Parsons - Infrastructure **DATE RECEIVED:** 5-May-2010  
**ADDRESS:** Level 3, 60 Albert Street **REPORT NO:** ES1008252-014 / PSD  
PO Box 15081 City East,  
BRISBANE 4000  
**PROJECT:** NAGD - Asia Pacific LNG **SAMPLE ID:** MOF 01 0-0.5

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	98%
2.36	93%
1.18	88%
0.600	78%
0.425	67%
0.300	49%
0.150	19%
0.075	14%
Particle Size (microns)	
55	13%
39	12%
20	12%
10	11%
5	10%
4	9%
1	9%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Sand, shell & fines

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation: 825 Site: Newcastle**

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**Analysed:** 13-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

**Dianne Blane**  
Laboratory Supervisor  
**Authorised Signatory**

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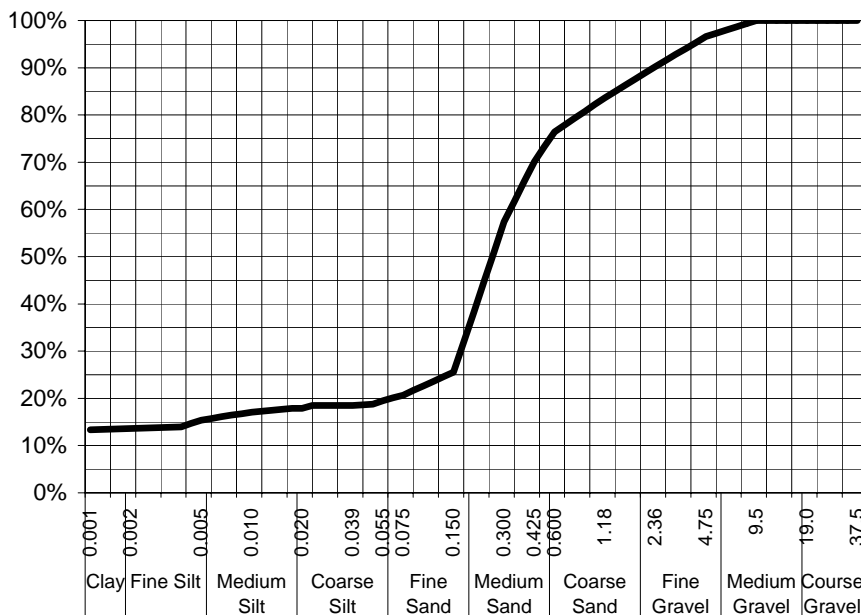
**ALS Environmental**

**Newcastle, NSW**



**CLIENT:** Vivian Seto **DATE REPORTED:** 20-May-2010  
**COMPANY:** Worley Parsons - Infrastructure **DATE RECEIVED:** 5-May-2010  
**ADDRESS:** Level 3, 60 Albert Street **REPORT NO:** ES1008252-015 / PSD  
PO Box 15081 City East,  
BRISBANE 4000  
**PROJECT:** NAGD - Asia Pacific LNG **SAMPLE ID:** MOF 01 0.5-1.0

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	97%
2.36	90%
1.18	84%
0.600	76%
0.425	70%
0.300	57%
0.150	26%
0.075	21%
Particle Size (microns)	
55	20%
39	19%
20	18%
10	17%
5	15%
4	14%
1	13%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Sand, shell & fines

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation: 825 Site: Newcastle**

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**Analysed:** 13-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

**Dianne Blane**  
Laboratory Supervisor  
**Authorised Signatory**

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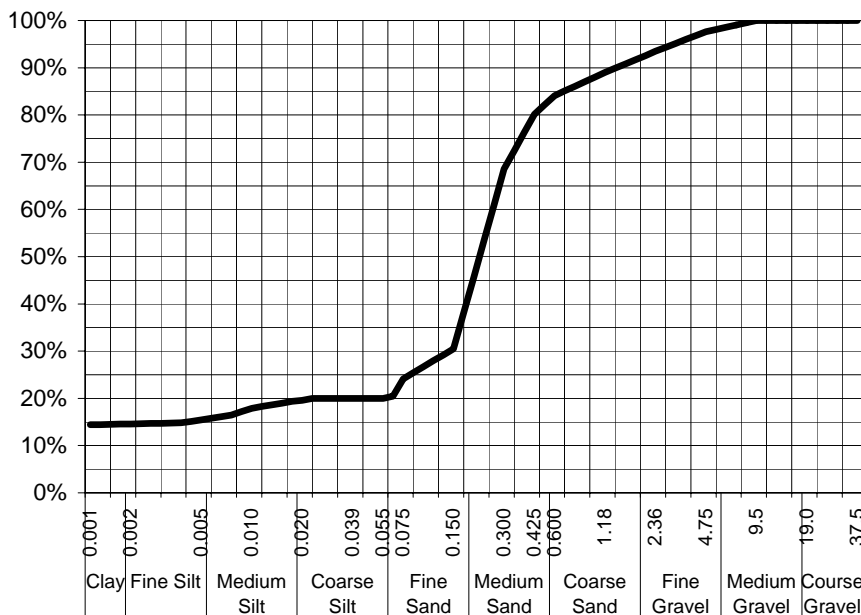
ALS Environmental

Newcastle, NSW



**CLIENT:** Vivian Seto **DATE REPORTED:** 20-May-2010  
**COMPANY:** Worley Parsons - Infrastructure **DATE RECEIVED:** 5-May-2010  
**ADDRESS:** Level 3, 60 Albert Street **REPORT NO:** ES1008252-016 / PSD  
PO Box 15081 City East,  
BRISBANE 4000  
**PROJECT:** NAGD - Asia Pacific LNG **SAMPLE ID:** MOF 01 1.0-2.0

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	98%
2.36	93%
1.18	89%
0.600	84%
0.425	80%
0.300	69%
0.150	31%
0.075	24%
Particle Size (microns)	
55	20%
39	20%
20	20%
10	18%
5	15%
4	15%
1	14%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Sand, shell & fines

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation:** 825 **Site:** Newcastle

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**Analysed:** 13-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

**Dianne Blane**  
Laboratory Supervisor  
**Authorised Signatory**

# Certificate of Analysis

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ALS Environmental

Newcastle, NSW



**CLIENT:** Vivian Seto

**DATE REPORTED:** 25-May-2010

**COMPANY:** Worley Parsons - Infrastructure  
MWE

**DATE RECEIVED:** 11-May-2010

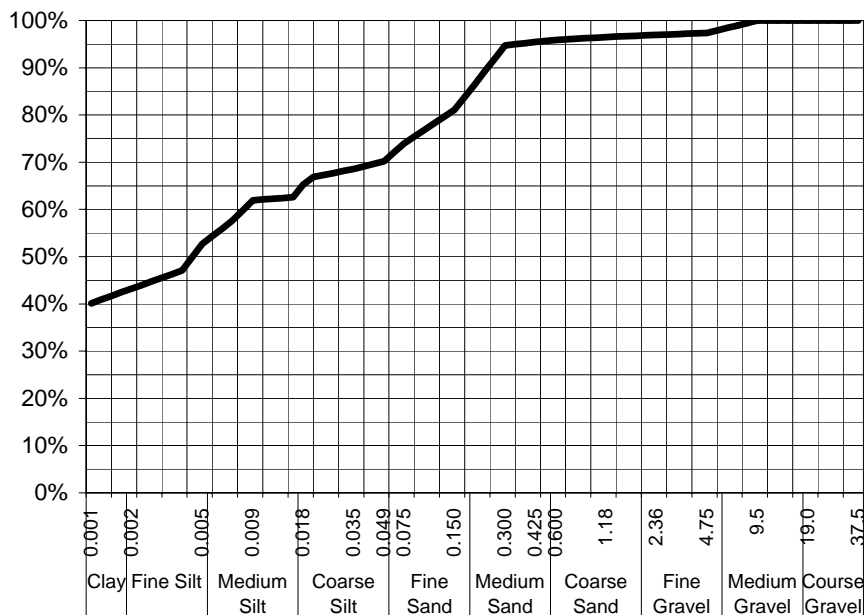
**ADDRESS:** Level 3, 60 Albert Street  
PO Box 15081, City East  
BRISBANE 4000

**REPORT NO:** ES1008691-002 / PSD

**PROJECT:** 301001-00752

**SAMPLE ID:** MOF 02 0.0 - 0.5

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	97%
2.36	97%
1.18	97%
0.600	96%
0.425	95%
0.300	95%
0.150	81%
0.075	74%
Particle Size (microns)	
49	70%
35	69%
18	65%
9	62%
5	53%
3	47%
1	40%

Samples analysed as received.

## Sample Comments:

**Analysed:** 19-May-10

**Loss on Pretreatment** NA

**Limit of Reporting:** 1%

**Sample Description:** Silty clay

**Dispersion Method** Shaker

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Hydrometer Type** ASTM E100

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation:** 825 **Site:** Newcastle

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**Dianne Blane**

Laboratory Supervisor, Newcastle  
**Authorised Signatory**

# Certificate of Analysis

ALS Laboratory Group Pty Ltd  
5 Rosegum Road  
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samples.newcastle@alsenviro.com

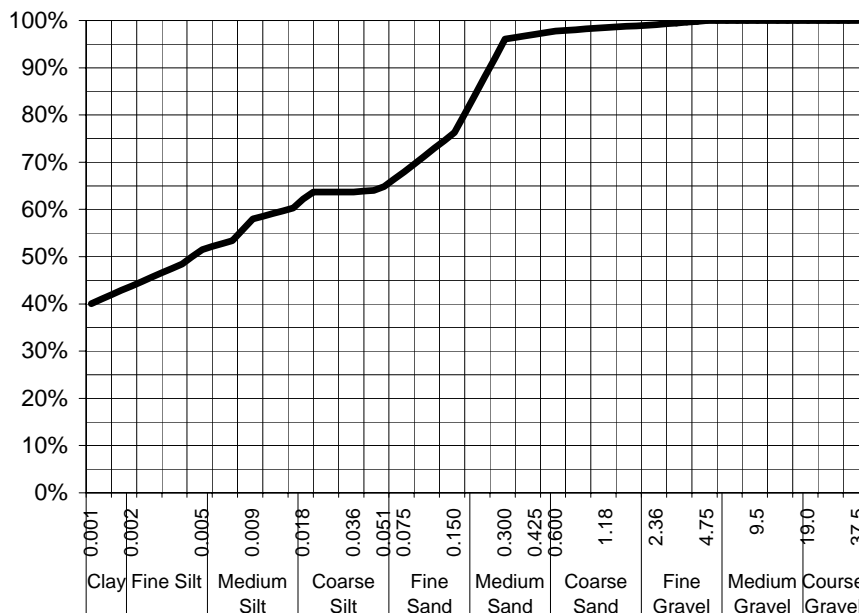
**ALS Environmental**

**Newcastle, NSW**



**CLIENT:** Vivian Seto **DATE REPORTED:** 25-May-2010  
**COMPANY:** Worley Parsons - Infrastructure MWE **DATE RECEIVED:** 11-May-2010  
**ADDRESS:** Level 3, 60 Albert Street **REPORT NO:** ES1008691-001 / PSD  
PO Box 15081, City East  
BRISBANE 4000  
**PROJECT:** 301001-00752 **SAMPLE ID:** MOF 03 0.0 - 0.5

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	99%
1.18	99%
0.600	98%
0.425	97%
0.300	96%
0.150	76%
0.075	68%
Particle Size (microns)	
51	65%
36	64%
18	62%
9	58%
5	52%
3	48%
1	40%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Silty clay

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation: 825 Site: Newcastle**

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**Analysed:** 19-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

**Dianne Blane**

Laboratory Supervisor, Newcastle  
**Authorised Signatory**

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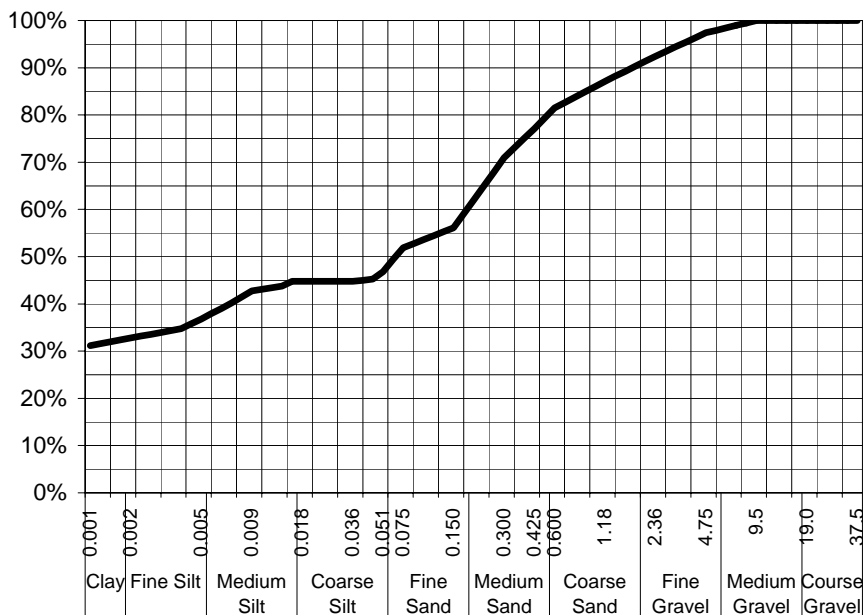
**ALS Environmental**

**Newcastle, NSW**



**CLIENT:** Vivian Seto **DATE REPORTED:** 20-May-2010  
**COMPANY:** Worley Parsons - Infrastructure **DATE RECEIVED:** 5-May-2010  
**ADDRESS:** Level 3, 60 Albert Street **REPORT NO:** ES1008252-017 / PSD  
PO Box 15081 City East,  
BRISBANE 4000  
**PROJECT:** NAGD - Asia Pacific LNG **SAMPLE ID:** MOF 04 0-0.5

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	97%
2.36	92%
1.18	87%
0.600	81%
0.425	77%
0.300	71%
0.150	56%
0.075	52%
Particle Size (microns)	
51	47%
36	45%
18	45%
9	43%
5	37%
3	35%
1	31%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Sand, clay, silt & shell

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation: 825 Site: Newcastle**

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**Analysed:** 13-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

**Dianne Blane**  
Laboratory Supervisor  
**Authorised Signatory**

# Certificate of Analysis

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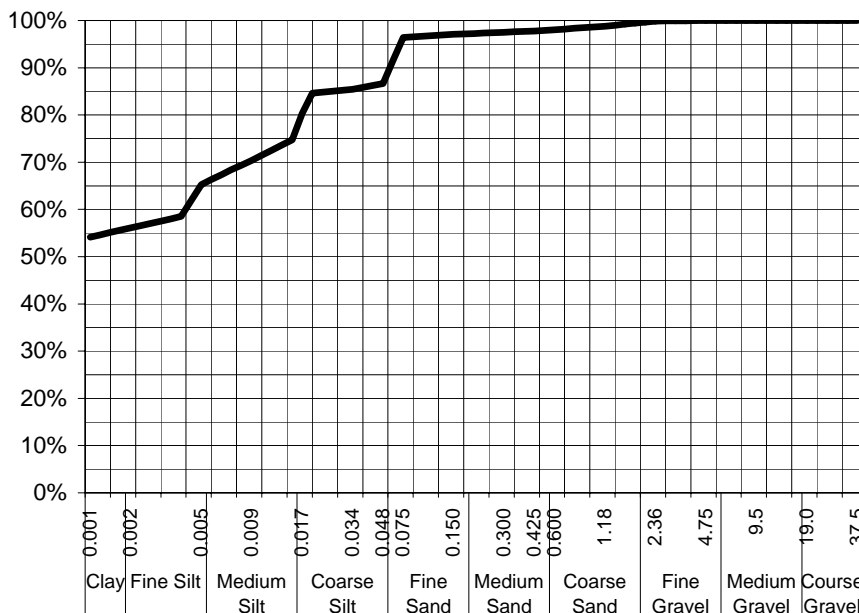
**ALS Environmental**

**Newcastle, NSW**



**CLIENT:** Vivian Seto **DATE REPORTED:** 20-May-2010  
**COMPANY:** Worley Parsons - Infrastructure MWE **DATE RECEIVED:** 5-May-2010  
**ADDRESS:** Level 3, 60 Albert Street **REPORT NO:** ES1008252-018 / PSD  
PO Box 15081 City East,  
BRISBANE 4000  
**PROJECT:** NAGD - Asia Pacific LNG **SAMPLE ID:** MOF 04 0.5-1.0

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	100%
1.18	99%
0.600	98%
0.425	98%
0.300	98%
0.150	97%
0.075	96%
Particle Size (microns)	
48	87%
34	85%
17	80%
9	70%
5	65%
3	59%
1	54%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Silty Clay

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation: 825 Site: Newcastle**

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**Analysed:** 13-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

**Dianne Blane**  
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# Certificate of Analysis

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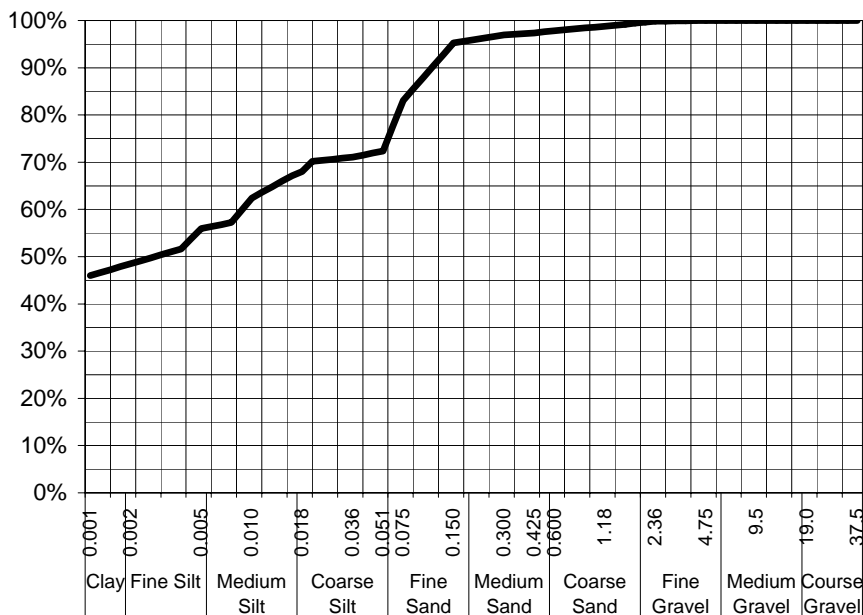
**ALS Environmental**

**Newcastle, NSW**



**CLIENT:** Vivian Seto **DATE REPORTED:** 20-May-2010  
**COMPANY:** Worley Parsons - Infrastructure MWE **DATE RECEIVED:** 5-May-2010  
**ADDRESS:** Level 3, 60 Albert Street **REPORT NO:** ES1008252-011 / PSD  
PO Box 15081 City East,  
BRISBANE 4000  
**PROJECT:** NAGD - Asia Pacific LNG **SAMPLE ID:** MOF 05 0-0.5

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	100%
1.18	99%
0.600	98%
0.425	97%
0.300	97%
0.150	95%
0.075	83%
Particle Size (microns)	
51	72%
36	71%
18	68%
10	62%
5	56%
3	52%
1	46%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Silty Clay

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation: 825 Site: Newcastle**

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**Analysed:** 13-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

**Dianne Blane**  
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**Authorised Signatory**

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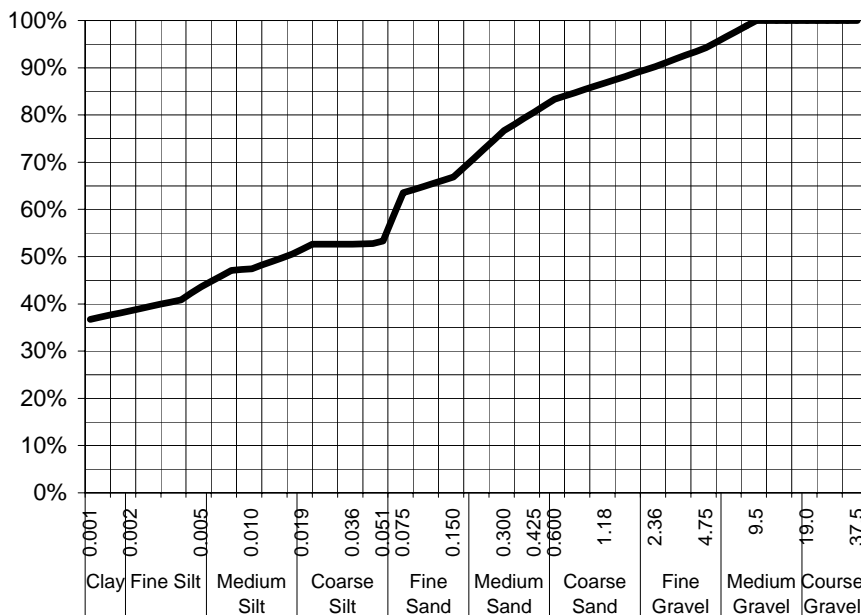
**ALS Environmental**

**Newcastle, NSW**



**CLIENT:** Vivian Seto **DATE REPORTED:** 20-May-2010  
**COMPANY:** Worley Parsons - Infrastructure **DATE RECEIVED:** 5-May-2010  
**ADDRESS:** Level 3, 60 Albert Street **REPORT NO:** ES1008252-012 / PSD  
PO Box 15081 City East,  
BRISBANE 4000  
**PROJECT:** NAGD - Asia Pacific LNG **SAMPLE ID:** MOF 05 0.5-1.0

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	94%
2.36	90%
1.18	87%
0.600	83%
0.425	81%
0.300	77%
0.150	67%
0.075	64%
Particle Size (microns)	
51	53%
36	53%
19	52%
10	47%
5	44%
3	41%
1	37%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Silty Clay

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

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**Analysed:** 13-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

**Dianne Blane**  
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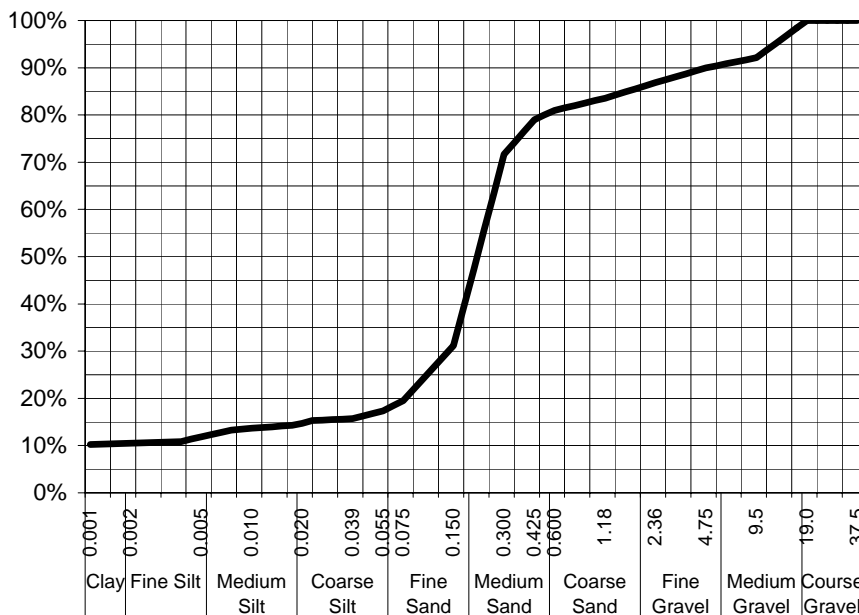
**ALS Environmental**

**Newcastle, NSW**



**CLIENT:** Vivian Seto **DATE REPORTED:** 20-May-2010  
**COMPANY:** Worley Parsons - Infrastructure MWE **DATE RECEIVED:** 5-May-2010  
**ADDRESS:** Level 3, 60 Albert Street **REPORT NO:** ES1008252-013 / PSD  
PO Box 15081 City East,  
BRISBANE 4000  
**PROJECT:** NAGD - Asia Pacific LNG **SAMPLE ID:** MOF 05 1.0-1.2

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	92%
4.75	90%
2.36	87%
1.18	84%
0.600	81%
0.425	79%
0.300	72%
0.150	31%
0.075	19%
Particle Size (microns)	
55	17%
39	16%
20	15%
10	14%
5	12%
4	11%
1	10%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Sand, shell & fines

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation: 825 Site: Newcastle**

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**Analysed:** 13-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

**Dianne Blane**  
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**ALS Environmental**

**Newcastle, NSW**



**CLIENT:** Vivian Seto

**DATE REPORTED:** 25-May-2010

**COMPANY:** Worley Parsons - Infrastructure  
MWE

**DATE RECEIVED:** 11-May-2010

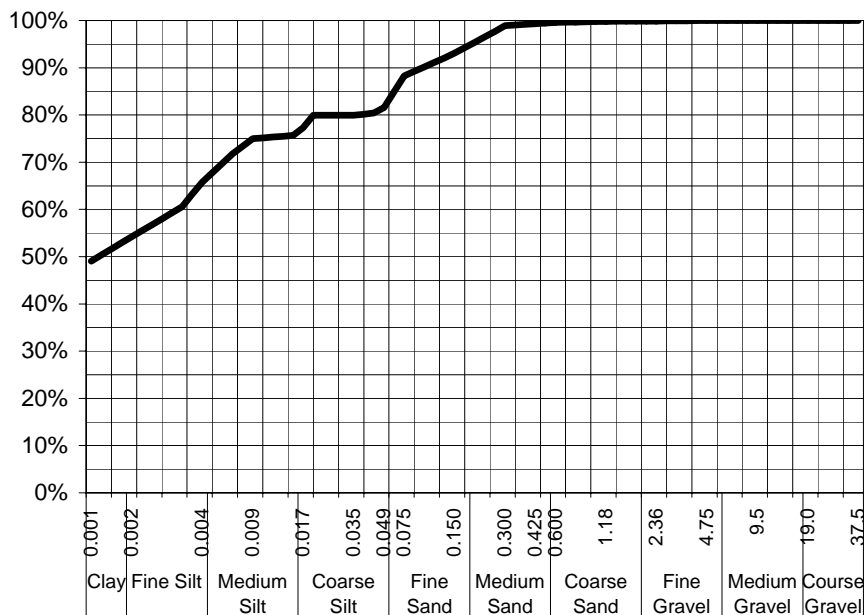
**ADDRESS:** Level 3, 60 Albert Street  
PO Box 15081, City East  
BRISBANE 4000

**REPORT NO:** ES1008691-005 / PSD

**PROJECT:** 301001-00752

**SAMPLE ID:** MOF 06 0.0 - 0.5

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	100%
1.18	100%
0.600	100%
0.425	99%
0.300	99%
0.150	93%
0.075	88%
Particle Size (microns)	
49	82%
35	80%
17	77%
9	75%
4	66%
3	61%
1	49%

Samples analysed as received.

## Sample Comments:

**Analysed:** 19-May-10

**Loss on Pretreatment** NA

**Limit of Reporting:** 1%

**Sample Description:** Silty clay

**Dispersion Method** Shaker

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Hydrometer Type** ASTM E100

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation:** 825 **Site:** Newcastle

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**Dianne Blane**

Laboratory Supervisor, Newcastle  
**Authorised Signatory**

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samples.newcastle@alsenviro.com

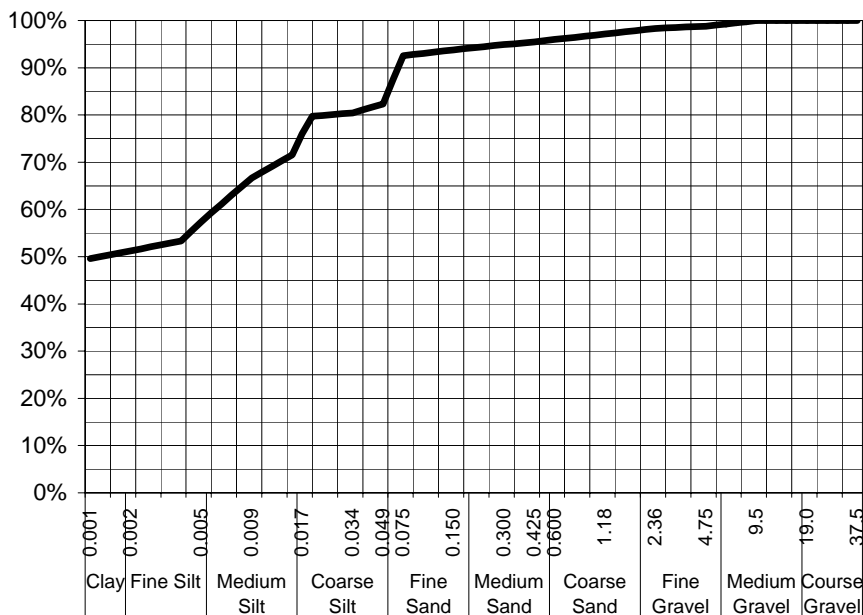
**ALS Environmental**

**Newcastle, NSW**



**CLIENT:** Vivian Seto **DATE REPORTED:** 20-May-2010  
**COMPANY:** Worley Parsons - Infrastructure MWE **DATE RECEIVED:** 5-May-2010  
**ADDRESS:** Level 3, 60 Albert Street **REPORT NO:** ES1008252-007 / PSD  
PO Box 15081 City East,  
BRISBANE 4000  
**PROJECT:** NAGD - Asia Pacific LNG **SAMPLE ID:** MOF 07 0-0.5

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	99%
2.36	98%
1.18	97%
0.600	96%
0.425	95%
0.300	95%
0.150	94%
0.075	93%
Particle Size (microns)	
49	82%
34	80%
17	76%
9	67%
5	57%
3	53%
1	50%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Silty Clay

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation: 825 Site: Newcastle**

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**Analysed:** 13-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

**Dianne Blane**  
Laboratory Supervisor  
**Authorised Signatory**

# Certificate of Analysis

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samples.newcastle@alsenviro.com

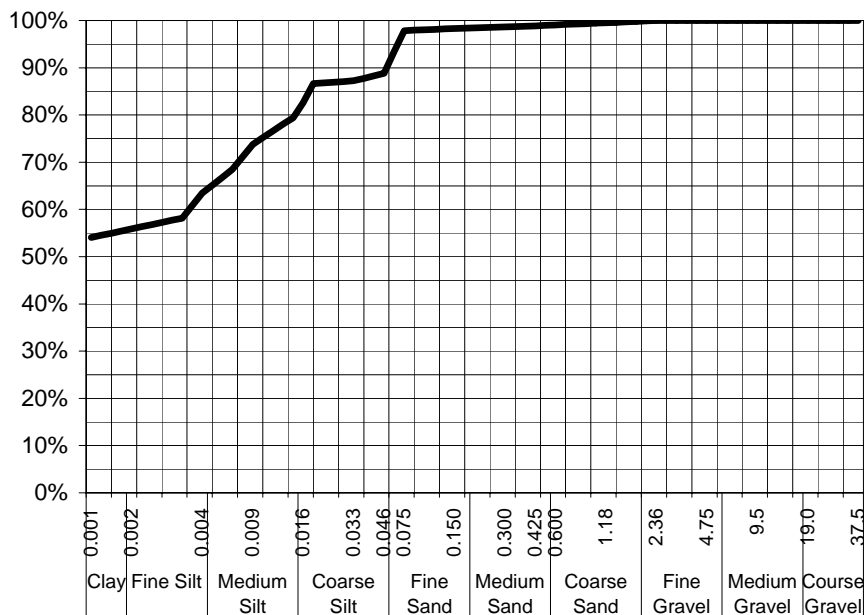
**ALS Environmental**

**Newcastle, NSW**



**CLIENT:** Vivian Seto **DATE REPORTED:** 20-May-2010  
**COMPANY:** Worley Parsons - Infrastructure MWE **DATE RECEIVED:** 5-May-2010  
**ADDRESS:** Level 3, 60 Albert Street **REPORT NO:** ES1008252-008 / PSD  
PO Box 15081 City East,  
BRISBANE 4000  
**PROJECT:** NAGD - Asia Pacific LNG **SAMPLE ID:** MOF 07 0.5-1.0

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	100%
1.18	100%
0.600	99%
0.425	99%
0.300	99%
0.150	98%
0.075	98%
Particle Size (microns)	
46	89%
33	87%
16	83%
9	74%
4	63%
3	58%
1	54%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Silty Clay

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation: 825 Site: Newcastle**

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**Analysed:** 13-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

**Dianne Blane**  
Laboratory Supervisor  
**Authorised Signatory**

# Certificate of Analysis

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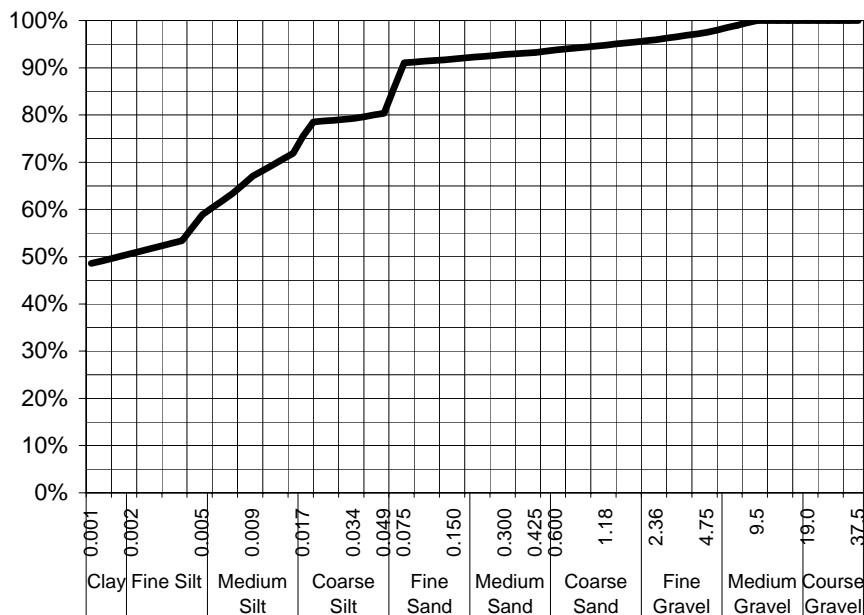
**ALS Environmental**

**Newcastle, NSW**



**CLIENT:** Vivian Seto **DATE REPORTED:** 20-May-2010  
**COMPANY:** Worley Parsons - Infrastructure MWE **DATE RECEIVED:** 5-May-2010  
**ADDRESS:** Level 3, 60 Albert Street **REPORT NO:** ES1008252-001 / PSD  
PO Box 15081 City East,  
BRISBANE 4000  
**PROJECT:** NAGD - Asia Pacific LNG **SAMPLE ID:** MOF 08 0-0.5

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	97%
2.36	96%
1.18	95%
0.600	94%
0.425	93%
0.300	93%
0.150	92%
0.075	91%
Particle Size (microns)	
49	80%
34	79%
17	76%
9	67%
5	59%
3	53%
1	49%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Silty Clay

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation: 825 Site: Newcastle**

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**Analysed:** 13-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

**Dianne Blane**  
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# Certificate of Analysis

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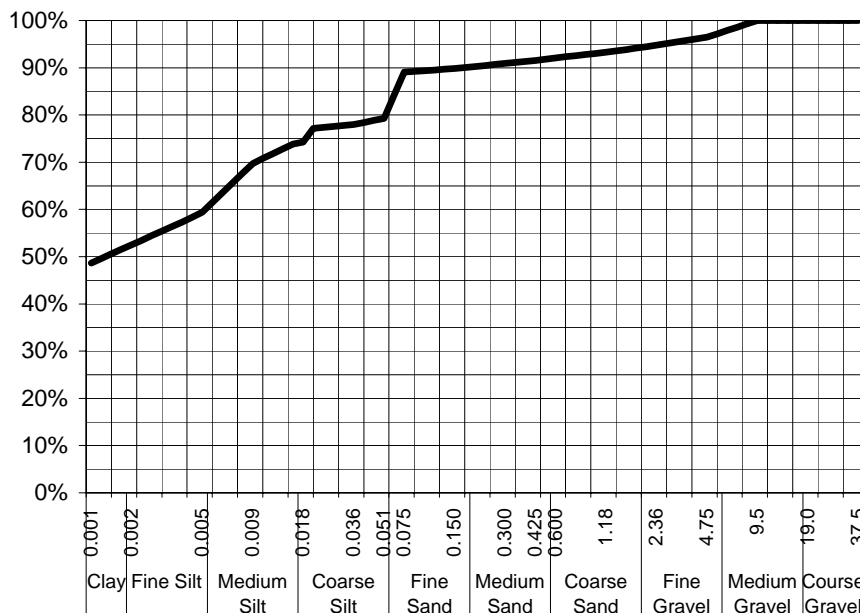
**ALS Environmental**

**Newcastle, NSW**



**CLIENT:** Vivian Seto **DATE REPORTED:** 20-May-2010  
**COMPANY:** Worley Parsons - Infrastructure MWE **DATE RECEIVED:** 5-May-2010  
**ADDRESS:** Level 3, 60 Albert Street **REPORT NO:** ES1008252-002 / PSD  
PO Box 15081 City East,  
BRISBANE 4000  
**PROJECT:** NAGD - Asia Pacific LNG **SAMPLE ID:** MOF 08 0.5-1.0

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	96%
2.36	95%
1.18	93%
0.600	92%
0.425	92%
0.300	91%
0.150	90%
0.075	89%
Particle Size (microns)	
51	79%
36	78%
18	74%
9	70%
5	59%
3	57%
1	49%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Silty Clay

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation: 825 Site: Newcastle**

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**Analysed:** 13-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

**Dianne Blane**  
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**Authorised Signatory**

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fax 02 4968 0349  
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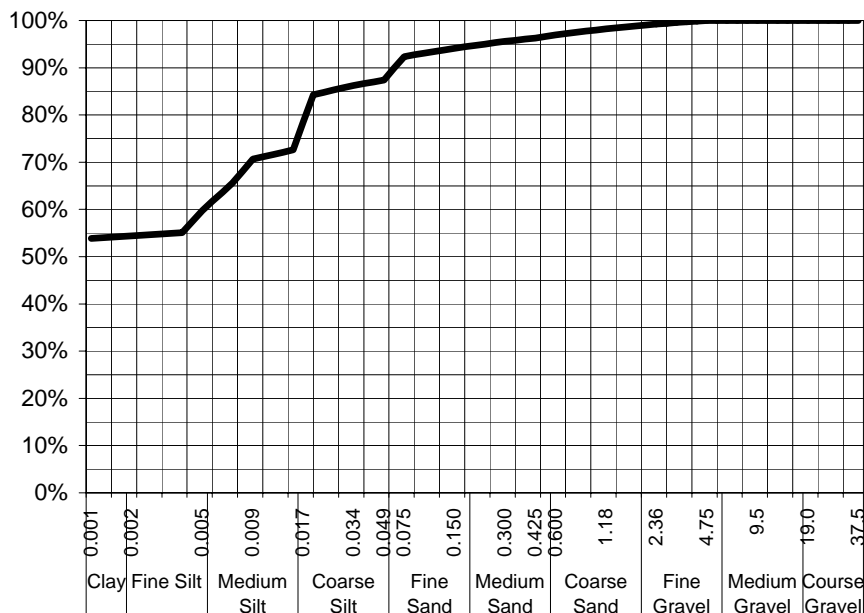
**ALS Environmental**

**Newcastle, NSW**



**CLIENT:** Vivian Seto **DATE REPORTED:** 20-May-2010  
**COMPANY:** Worley Parsons - Infrastructure MWE **DATE RECEIVED:** 5-May-2010  
**ADDRESS:** Level 3, 60 Albert Street **REPORT NO:** ES1008252-004 / PSD  
PO Box 15081 City East,  
BRISBANE 4000  
**PROJECT:** NAGD - Asia Pacific LNG **SAMPLE ID:** MOF 09 0-0.5

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	99%
1.18	98%
0.600	97%
0.425	96%
0.300	96%
0.150	94%
0.075	92%
Particle Size (microns)	
49	87%
34	86%
17	78%
9	71%
5	60%
3	55%
1	54%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Silty Clay

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation: 825 Site: Newcastle**

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**Analysed:** 13-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

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fax 02 4968 0349  
samples.newcastle@alsenviro.com

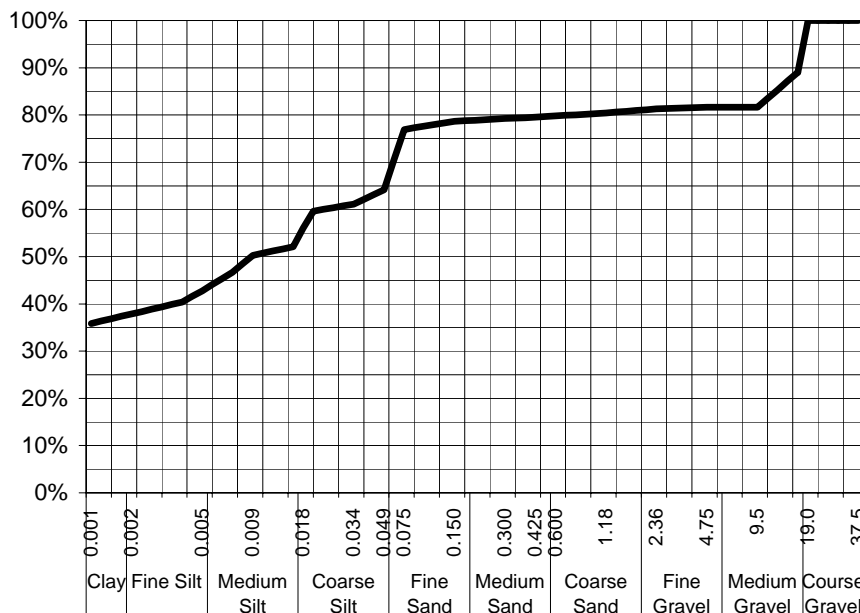
**ALS Environmental**

**Newcastle, NSW**



**CLIENT:** Vivian Seto **DATE REPORTED:** 20-May-2010  
**COMPANY:** Worley Parsons - Infrastructure **DATE RECEIVED:** 5-May-2010  
**ADDRESS:** Level 3, 60 Albert Street **REPORT NO:** ES1008252-005 / PSD  
PO Box 15081 City East,  
BRISBANE 4000  
**PROJECT:** NAGD - Asia Pacific LNG **SAMPLE ID:** MOF 09 0.5-1.0

## Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	82%
4.75	82%
2.36	81%
1.18	80%
0.600	80%
0.425	80%
0.300	79%
0.150	79%
0.075	77%
Particle Size (microns)	
49	64%
34	61%
18	56%
9	50%
5	43%
3	40%
1	36%

Samples analysed as received.

## Sample Comments:

**Loss on Pretreatment** NA

**Sample Description:** Silty Clay

**Test Method:** AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density** 2.65 Assumed

**NATA Accreditation: 825 Site: Newcastle**

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**Analysed:** 13-May-10

**Limit of Reporting:** 1%

**Dispersion Method** Shaker

**Hydrometer Type** ASTM E100

*D Blane*

**Dianne Blane**  
Laboratory Supervisor  
**Authorised Signatory**

## **Appendix 3 Primary Laboratory Reports (ALS)**



## Environmental Division

### CERTIFICATE OF ANALYSIS

Work Order	: <b>EB1007688</b>	Page	: 1 of 6
Client	: <b>WORLEY PARSONS - INFRASTRUCTURE MWE</b>	Laboratory	: Environmental Division Brisbane
Contact	: MS VIVIAN SETO	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: vivian.seto@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3982	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: ----	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 05-MAY-2010
Sampler	: ----	Issue Date	: 13-MAY-2010
Site	: ----		
Quote number	: BN/187/10	No. of samples received	: 12
		No. of samples analysed	: 12

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



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accordance with NATA  
accreditation requirements.

Accredited for compliance with  
ISO/IEC 17025.

#### Signatories

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

*Signatories*

*Position*

*Accreditation Category*

Myles.Clark

Acid Sulfate Soils Supervisor

Bne Acid Sulphate Soils

---

**Environmental Division Brisbane**

Part of the **ALS Laboratory Group**

32 Shand Street Stafford QLD Australia 4053

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## General Comments

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

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

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

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

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

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

LOR = Limit of reporting

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

- **Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO<sub>3</sub>) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m<sup>3</sup> in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m<sup>3</sup>'.**
- **Retained Acidity not required because pH KCl greater than or equal to 4.5**



## Analytical Results

Sub-Matrix: MARINE SEDIMENT

Client sample ID

Client sampling date / time

				MOF 8/0.0-0.1	MOF 8/0.1-0.5	MOF 8/0.75-0.85	MOF 8/1.25-1.35	MOF 8/1.6-1.7
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00
Compound	CAS Number	LOR	Unit	EB1007688-001	EB1007688-002	EB1007688-003	EB1007688-004	EB1007688-005
<b>EA033-A: Actual Acidity</b>								
pH KCl (23A)	----	0.1	pH Unit	8.2	7.9	7.4	7.2	7.1
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
<b>EA033-B: Potential Acidity</b>								
Chromium Reducible Sulfur (22B)	----	0.02	% S	1.57	0.75	0.75	0.67	0.65
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	977	468	470	420	404
<b>EA033-C: Acid Neutralising Capacity</b>								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	1.45	0.98	0.98	0.92	0.82
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	289	196	196	183	163
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.46	0.31	0.31	0.29	0.26
<b>EA033-E: Acid Base Accounting</b>								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	1.26	0.54	0.54	0.48	0.47
Net Acidity (acidity units)	----	10	mole H+ / t	784	338	340	297	295
Liming Rate	----	1	kg CaCO3/t	59	25	26	22	22



## Analytical Results

Sub-Matrix: MARINE SEDIMENT

Client sample ID

Client sampling date / time

				MOF 5/0.0-0.1	MOF 5/0.6-0.7	MOF 5/0.9-1.0	MOF 5/1.3-1.4	MOF 5/1.5-1.6
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00
Compound	CAS Number	LOR	Unit	EB1007688-006	EB1007688-007	EB1007688-008	EB1007688-009	EB1007688-010
<b>EA033-A: Actual Acidity</b>								
pH KCl (23A)	----	0.1	pH Unit	9.1	8.9	9.2	9.2	9.1
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
<b>EA033-B: Potential Acidity</b>								
Chromium Reducible Sulfur (22B)	----	0.02	% S	0.13	0.43	0.22	0.18	0.27
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	83	268	138	109	170
<b>EA033-C: Acid Neutralising Capacity</b>								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	10.2	10.3	10.6	13.6	11.1
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	2030	2060	2110	2720	2220
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	3.25	3.31	3.39	4.37	3.56
<b>EA033-E: Acid Base Accounting</b>								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1



## Analytical Results

Sub-Matrix: MARINE SEDIMENT

Client sample ID

Client sampling date / time

				MOF 5/1.9-2.0	MOF 5/2.2-2.3			
				29-APR-2010 15:00	29-APR-2010 15:00	----	----	----
Compound	CAS Number	LOR	Unit	EB1007688-011	EB1007688-012	----	----	----
<b>EA033-A: Actual Acidity</b>								
pH KCl (23A)	----	0.1	pH Unit	8.8	8.6	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	----	----	----
<b>EA033-B: Potential Acidity</b>								
Chromium Reducible Sulfur (22B)	----	0.02	% S	0.41	0.36	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	254	228	----	----	----
<b>EA033-C: Acid Neutralising Capacity</b>								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	8.52	2.85	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1700	570	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	2.73	0.91	----	----	----
<b>EA033-E: Acid Base Accounting</b>								
ANC Fineness Factor	----	0.5	-	1.5	1.5	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	<1	----	----	----



## Environmental Division

### INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: <b>EB1007688</b>	Page	: 1 of 6
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Brisbane
Contact	: MS VIVIAN SETO	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: vivian.seto@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3982	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: ----	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 05-MAY-2010
Sampler	: ----	Issue Date	: 13-MAY-2010
Order number	: ----		
Quote number	: BN/187/10	No. of samples received	: 12
		No. of samples analysed	: 12

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

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

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## Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
Snap Lock Bag - frozen		29-APR-2010	11-MAY-2010	29-APR-2011	✔	12-MAY-2010	09-AUG-2010	✔
MOF 8/0.0-0.1,	MOF 8/0.1-0.5,							
MOF 8/0.75-0.85,	MOF 8/1.25-1.35,							
MOF 8/1.6-1.7,	MOF 5/0.0-0.1,							
MOF 5/0.6-0.7,	MOF 5/0.9-1.0,							
MOF 5/1.3-1.4,	MOF 5/1.5-1.6,							
MOF 5/1.9-2.0,	MOF 5/2.2-2.3							
EA033-B: Potential Acidity								
Snap Lock Bag - frozen		29-APR-2010	11-MAY-2010	29-APR-2011	✔	12-MAY-2010	09-AUG-2010	✔
MOF 8/0.0-0.1,	MOF 8/0.1-0.5,							
MOF 8/0.75-0.85,	MOF 8/1.25-1.35,							
MOF 8/1.6-1.7,	MOF 5/0.0-0.1,							
MOF 5/0.6-0.7,	MOF 5/0.9-1.0,							
MOF 5/1.3-1.4,	MOF 5/1.5-1.6,							
MOF 5/1.9-2.0,	MOF 5/2.2-2.3							
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen		29-APR-2010	11-MAY-2010	29-APR-2011	✔	12-MAY-2010	09-AUG-2010	✔
MOF 8/0.0-0.1,	MOF 8/0.1-0.5,							
MOF 8/0.75-0.85,	MOF 8/1.25-1.35,							
MOF 8/1.6-1.7,	MOF 5/0.0-0.1,							
MOF 5/0.6-0.7,	MOF 5/0.9-1.0,							
MOF 5/1.3-1.4,	MOF 5/1.5-1.6,							
MOF 5/1.9-2.0,	MOF 5/2.2-2.3							



Matrix: **SOIL**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-D: Retained Acidity								
Snap Lock Bag - frozen		29-APR-2010	11-MAY-2010	29-APR-2011	✓	12-MAY-2010	09-AUG-2010	✓
MOF 8/0.0-0.1,	MOF 8/0.1-0.5,							
MOF 8/0.75-0.85,	MOF 8/1.25-1.35,							
MOF 8/1.6-1.7,	MOF 5/0.0-0.1,							
MOF 5/0.6-0.7,	MOF 5/0.9-1.0,							
MOF 5/1.3-1.4,	MOF 5/1.5-1.6,							
MOF 5/1.9-2.0,	MOF 5/2.2-2.3							
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen		29-APR-2010	11-MAY-2010	29-APR-2011	✓	12-MAY-2010	09-AUG-2010	✓
MOF 8/0.0-0.1,	MOF 8/0.1-0.5,							
MOF 8/0.75-0.85,	MOF 8/1.25-1.35,							
MOF 8/1.6-1.7,	MOF 5/0.0-0.1,							
MOF 5/0.6-0.7,	MOF 5/0.9-1.0,							
MOF 5/1.3-1.4,	MOF 5/1.5-1.6,							
MOF 5/1.9-2.0,	MOF 5/2.2-2.3							



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement



## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house



## Summary of Outliers

### Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

#### **Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes**

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Duplicate outliers occur.
- For all matrices, no Laboratory Control outliers occur.
- For all matrices, no Matrix Spike outliers occur.

#### **Regular Sample Surrogates**

- For all regular sample matrices, no surrogate recovery outliers occur.

### Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- No Analysis Holding Time Outliers exist.

### Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- No Quality Control Sample Frequency Outliers exist.



## Environmental Division

### CERTIFICATE OF ANALYSIS

Work Order	: <b>EB1007691</b>	Page	: 1 of 4
Client	: <b>WORLEY PARSONS - INFRASTRUCTURE MWE</b>	Laboratory	: Environmental Division Brisbane
Contact	: MS VIVIAN SETO	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: vivian.seto@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3982	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: ----	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 05-MAY-2010
Sampler	: ----	Issue Date	: 13-MAY-2010
Site	: ----		
Quote number	: BN/187/10	No. of samples received	: 4
		No. of samples analysed	: 4

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

This document is issued in  
accordance with NATA  
accreditation requirements.

Accredited for compliance with  
ISO/IEC 17025.

#### Signatories

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

*Signatories*

*Position*

*Accreditation Category*

Myles.Clark

Acid Sulfate Soils Supervisor

Bne Acid Sulphate Soils

---

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## General Comments

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

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

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

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

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

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

LOR = Limit of reporting

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

- **Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO<sub>3</sub>) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m<sup>3</sup> in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m<sup>3</sup>'.**
- **Retained Acidity not required because pH KCl greater than or equal to 4.5**



## Analytical Results

Sub-Matrix: MARINE SEDIMENT

Client sample ID

Client sampling date / time

				JTY02 0.0-0.1	JTY02 0.1-0.2	JTY02 0.5-0.6	JTY02 0.85-0.95	----
				30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	----
Compound	CAS Number	LOR	Unit	EB1007691-001	EB1007691-002	EB1007691-003	EB1007691-004	----
<b>EA033-A: Actual Acidity</b>								
pH KCl (23A)	----	0.1	pH Unit	8.4	8.5	6.8	6.8	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	----
<b>EA033-B: Potential Acidity</b>								
Chromium Reducible Sulfur (22B)	----	0.02	% S	1.42	0.87	2.91	2.16	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	883	540	1820	1340	----
<b>EA033-C: Acid Neutralising Capacity</b>								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	6.36	0.90	0.61	0.45	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1270	179	122	90	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	2.04	0.29	0.20	0.14	----
<b>EA033-E: Acid Base Accounting</b>								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	0.06	0.67	2.78	2.06	----
Net Acidity (acidity units)	----	10	mole H+ / t	36	421	1740	1280	----
Liming Rate	----	1	kg CaCO3/t	3	32	130	96	----



## Environmental Division

### QUALITY CONTROL REPORT

<b>Work Order</b>	<b>: EB1007691</b>	<b>Page</b>	: 1 of 5
<b>Client</b>	<b>: WORLEY PARSONS - INFRASTRUCTURE MWE</b>	<b>Laboratory</b>	: Environmental Division Brisbane
<b>Contact</b>	<b>: MS VIVIAN SETO</b>	<b>Contact</b>	: Greg Vogel
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<b>Facsimile</b>	<b>: +61 07 3319 7791</b>	<b>Facsimile</b>	: +61-7-3243 7218
<b>Project</b>	<b>: ----</b>	<b>QC Level</b>	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
<b>Site</b>	<b>: ----</b>	<b>Date Samples Received</b>	: 05-MAY-2010
<b>C-O-C number</b>	<b>: ----</b>	<b>Issue Date</b>	: 13-MAY-2010
<b>Sampler</b>	<b>: ----</b>		
<b>Order number</b>	<b>: ----</b>		
<b>Quote number</b>	<b>: BN/187/10</b>	<b>No. of samples received</b>	: 4
		<b>No. of samples analysed</b>	: 4

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

This Quality Control Report contains the following information:

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



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

### Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Myles.Clark	Acid Sulfate Soils Supervisor	Bne Acid Sulphate Soils



## General Comments

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

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

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

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

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



## Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA033-A: Actual Acidity (QC Lot: 1341058)									
EB1007688-001	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.2	8.2	0.0	0% - 20%
EB1007688-011	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.8	8.9	1.1	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1341058)									
EB1007688-001	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	1.57	1.58	0.7	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	977	984	0.7	0% - 20%
EB1007688-011	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.41	0.42	3.1	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	254	262	3.1	0% - 20%
EA033-C: Acid Neutralising Capacity (QC Lot: 1341058)									
EB1007688-001	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	1.45	1.43	1.4	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.46	0.46	0.0	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	289	285	1.4	0% - 20%
EB1007688-011	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	8.52	8.54	0.2	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	2.73	2.74	0.0	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1700	1710	0.2	0% - 20%



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

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

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit			Result	LCS	Low
EA033-A: Actual Acidity (QCLot: 1341058)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1341058)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1341058)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	----	----	----	----
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----



### ***Matrix Spike (MS) Report***

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

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



## Environmental Division

### INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: <b>EB1007691</b>	Page	: 1 of 5
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Brisbane
Contact	: MS VIVIAN SETO	Contact	: Greg Vogel
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E-mail	: vivian.seto@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3982	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: ----	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 05-MAY-2010
Sampler	: ----	Issue Date	: 13-MAY-2010
Order number	: ----		
Quote number	: BN/187/10	No. of samples received	: 4
		No. of samples analysed	: 4

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

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

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## Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA033-A: Actual Acidity								
Snap Lock Bag - frozen JTY02 0.0-0.1, JTY02 0.5-0.6,	JTY02 0.1-0.2, JTY02 0.85-0.95	30-APR-2010	11-MAY-2010	30-APR-2011	✓	12-MAY-2010	09-AUG-2010	✓
EA033-B: Potential Acidity								
Snap Lock Bag - frozen JTY02 0.0-0.1, JTY02 0.5-0.6,	JTY02 0.1-0.2, JTY02 0.85-0.95	30-APR-2010	11-MAY-2010	30-APR-2011	✓	12-MAY-2010	09-AUG-2010	✓
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen JTY02 0.0-0.1, JTY02 0.5-0.6,	JTY02 0.1-0.2, JTY02 0.85-0.95	30-APR-2010	11-MAY-2010	30-APR-2011	✓	12-MAY-2010	09-AUG-2010	✓
EA033-D: Retained Acidity								
Snap Lock Bag - frozen JTY02 0.0-0.1, JTY02 0.5-0.6,	JTY02 0.1-0.2, JTY02 0.85-0.95	30-APR-2010	11-MAY-2010	30-APR-2011	✓	12-MAY-2010	09-AUG-2010	✓
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen JTY02 0.0-0.1, JTY02 0.5-0.6,	JTY02 0.1-0.2, JTY02 0.85-0.95	30-APR-2010	11-MAY-2010	30-APR-2011	✓	12-MAY-2010	09-AUG-2010	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Evaluation	Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected		
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	2	16	12.5	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	16	6.3	5.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement



## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house



## Summary of Outliers

### Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

#### **Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes**

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Duplicate outliers occur.
- For all matrices, no Laboratory Control outliers occur.
- For all matrices, no Matrix Spike outliers occur.

#### **Regular Sample Surrogates**

- For all regular sample matrices, no surrogate recovery outliers occur.

### Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- No Analysis Holding Time Outliers exist.

### Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- No Quality Control Sample Frequency Outliers exist.



## Environmental Division

### CERTIFICATE OF ANALYSIS

<b>Work Order</b>	<b>: ES1008245</b>	<b>Page</b>	<b>: 1 of 18</b>
<b>Client</b>	<b>: WORLEY PARSONS - INFRASTRUCTURE MWE</b>	<b>Laboratory</b>	<b>: Environmental Division Sydney</b>
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<b>Project</b>	<b>: NAGD - Asia Pacific LNG</b>	<b>QC Level</b>	<b>: NEPM 1999 Schedule B(3) and ALS QCS3 requirement</b>
<b>Order number</b>	<b>: ----</b>	<b>Date Samples Received</b>	<b>: 05-MAY-2010</b>
<b>C-O-C number</b>	<b>: ----</b>	<b>Issue Date</b>	<b>: 20-MAY-2010</b>
<b>Sampler</b>	<b>: ----</b>	<b>No. of samples received</b>	<b>: 11</b>
<b>Site</b>	<b>: ----</b>	<b>No. of samples analysed</b>	<b>: 11</b>
<b>Quote number</b>	<b>: BN/187/10</b>		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

### Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Organics
Ankit Joshi	Inorganic Chemist	Inorganics
Celine Conceicao	Spectroscopist	Inorganics
Dianne Blane	Laboratory Supervisor	Newcastle
Matt Frost	Organic Instrument Chemist	Organics
Stephen Hislop	Senior Inorganic Chemist	Stafford Minerals - AY

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## General Comments

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

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

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

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

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

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

LOR = Limit of reporting

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

- **EP131A+B: Poor matrix spike recoveries due to sample matrix interference.**



## Analytical Results

Sub-Matrix: **SEDIMENT**

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	IB1 0-0.5	JTY 02 0-0.5	JTY 02 0.5-1	BER 01 0-0.5	BER 01 0.5-1
				29-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00
				ES1008245-001	ES1008245-002	ES1008245-003	ES1008245-004	ES1008245-005
<b>EA150: Particle Sizing</b>								
+75µm	----	1	%	----	2	8	9	4
+150µm	----	1	%	----	2	6	5	2
+300µm	----	1	%	----	1	4	4	1
+425µm	----	1	%	----	1	4	4	<1
+600µm	----	1	%	----	1	3	4	<1
+1180µm	----	1	%	----	<1	2	3	<1
+2.36mm	----	1	%	----	<1	<1	1	<1
+4.75mm	----	1	%	----	<1	<1	<1	<1
+9.5mm	----	1	%	----	<1	<1	<1	<1
+19.0mm	----	1	%	----	<1	<1	<1	<1
+37.5mm	----	1	%	----	<1	<1	<1	<1
+75.0mm	----	1	%	----	<1	<1	<1	<1
<b>EA055: Moisture Content</b>								
^ Moisture Content (dried @ 103°C)	----	1.0	%	26.7	41.9	46.0	52.2	41.3
<b>EA150: Soil Classification based on Particle Size</b>								
Clay (<2 µm)	----	1	%	----	53	39	43	51
Silt (2-60 µm)	----	1	%	----	43	50	42	41
Sand (0.06-2.00 mm)	----	1	%	----	4	10	13	8
Gravel (>2mm)	----	1	%	----	<1	1	2	<1
Cobbles (>6cm)	----	1	%	----	<1	<1	<1	<1
<b>EG005-SD: Total Metals in Sediments by ICP-AES</b>								
Aluminium	7429-90-5	50	mg/kg	3290	23200	17300	21300	21700
Iron	7439-89-6	50	mg/kg	9730	34500	48700	35700	26500
<b>EG020-SD: Total Metals in Sediments by ICPMS</b>								
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	0.51	<0.50	<0.50
Arsenic	7440-38-2	1.00	mg/kg	8.05	13.3	23.6	24.5	9.62
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	1.0	mg/kg	6.4	29.0	19.5	31.2	25.2
Copper	7440-50-8	1.0	mg/kg	3.6	33.0	31.8	23.4	24.2
Cobalt	7440-48-4	0.5	mg/kg	5.6	12.1	18.7	13.6	9.8
Lead	7439-92-1	1.0	mg/kg	1.8	9.6	10.0	10.3	9.2
Manganese	7439-96-5	10	mg/kg	575	195	380	263	152
Nickel	7440-02-0	1.0	mg/kg	3.6	14.0	12.7	16.0	11.8
Selenium	7782-49-2	0.1	mg/kg	0.2	0.9	1.0	0.7	0.7
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium	7440-62-2	2.0	mg/kg	23.8	83.6	79.0	60.9	55.9
Zinc	7440-66-6	1.0	mg/kg	10.1	47.3	36.8	48.3	40.5



## Analytical Results

Sub-Matrix: **SEDIMENT**

Client sample ID

Client sampling date / time

				IB1 0-0.5	JTY 02 0-0.5	JTY 02 0.5-1	BER 01 0-0.5	BER 01 0.5-1
				29-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008245-001	ES1008245-002	ES1008245-003	ES1008245-004	ES1008245-005
<b>EG020-SD: Total Metals in Sediments by ICPMS - Continued</b>								
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
Mercury	7439-97-6	0.01	mg/kg	<0.01	<0.01	0.01	0.02	<0.01
<b>EK055: Ammonia as N</b>								
Ammonia as N	7664-41-7	1	mg/kg	<1	----	----	<1	4
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	----	----	<0.1	<0.1
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	----	----	0.1	0.2
<b>EK059G: NOX as N by Discrete Analyser</b>								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	----	----	0.1	0.2
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	100	----	----	1090	700
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>								
Total Phosphorus as P	----	2	mg/kg	179	----	----	278	191
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>								
Reactive Phosphorus as P	----	0.1	mg/kg	0.3	----	----	1.4	2.1
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	0.02	%	0.45	0.92	2.79	1.79	1.28
<b>EP080-SD / EP071-SD: Total Petroleum Hydrocarbons</b>								
C6 - C9 Fraction	----	3	mg/kg	<3	----	----	<3	<3
C10 - C14 Fraction	----	3	mg/kg	<3	----	----	<3	<3
C15 - C28 Fraction	----	3	mg/kg	<3	----	----	<5	<3
C29 - C36 Fraction	----	5	mg/kg	<5	----	----	<5	<5
C10 - C36 Fraction (sum)	----	3	mg/kg	<3	----	----	<3	<3
<b>EP080-SD: BTEX</b>								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	<0.2	<0.2
Toluene	108-88-3	0.2	mg/kg	<0.2	----	----	<0.2	<0.2
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	----	----	<0.2	<0.2
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	----	----	<0.2	<0.2
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	----	----	<0.2	<0.2
<b>EP090: Organotin Compounds</b>								
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	<0.5	<0.5	<0.5
<b>EP130A: Organophosphorus Pesticides (Ultra-trace)</b>								
Bromophos-ethyl	4824-78-6	10	µg/kg	<10	----	----	<10	<10
Carbophenothion	786-19-6	10	µg/kg	<10	----	----	<10	<10



## Analytical Results

Sub-Matrix: SEDIMENT

Client sample ID

Client sampling date / time

				IB1 0-0.5	JTY 02 0-0.5	JTY 02 0.5-1	BER 01 0-0.5	BER 01 0.5-1
				29-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008245-001	ES1008245-002	ES1008245-003	ES1008245-004	ES1008245-005
<b>EP130A: Organophosphorus Pesticides (Ultra-trace) - Continued</b>								
Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	<10.0	----	----	<10.0	<10.0
Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	----	----	<10	<10
Chlorpyrifos	2921-88-2	10	µg/kg	<10	----	----	<10	<10
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	----	----	<10	<10
Demeton-S-methyl	919-86-8	10	µg/kg	<10	----	----	<10	<10
Diazinon	333-41-5	10	µg/kg	<10	----	----	<10	<10
Dichlorvos	62-73-7	10	µg/kg	<10	----	----	<10	<10
Dimethoate	60-51-5	10	µg/kg	<10	----	----	<10	<10
Ethion	563-12-2	10	µg/kg	<10	----	----	<10	<10
Fenamiphos	22224-92-6	10	µg/kg	<10	----	----	<10	<10
Fenthion	55-38-9	10	µg/kg	<10	----	----	<10	<10
Malathion	121-75-5	10	µg/kg	<10	----	----	<10	<10
Azinphos Methyl	86-50-0	10	µg/kg	<10	----	----	<10	<10
Monocrotophos	6923-22-4	10	µg/kg	<10	----	----	<10	<10
Parathion	56-38-2	10	µg/kg	<10	----	----	<10	<10
Parathion-methyl	298-00-0	10	µg/kg	<10	----	----	<10	<10
Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	----	----	<10	<10
Prothiofos	34643-46-4	10	µg/kg	<10	----	----	<10	<10
<b>EP131A: Organochlorine Pesticides</b>								
Aldrin	309-00-2	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
alpha-BHC	319-84-6	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
beta-BHC	319-85-7	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
delta-BHC	319-86-8	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
4,4'-DDD	72-54-8	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
4,4'-DDE	72-55-9	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
4,4'-DDT	50-29-3	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
^ DDT (total)	----	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
Dieldrin	60-57-1	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
Endrin	72-20-8	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
Heptachlor	76-44-8	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	----	----	<0.50	<0.50



## Analytical Results

Sub-Matrix: SEDIMENT

Client sample ID

Client sampling date / time

				IB1 0-0.5	JTY 02 0-0.5	JTY 02 0.5-1	BER 01 0-0.5	BER 01 0.5-1
				29-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008245-001	ES1008245-002	ES1008245-003	ES1008245-004	ES1008245-005
<b>EP131A: Organochlorine Pesticides - Continued</b>								
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
gamma-BHC	58-89-9	0.25	µg/kg	<0.25	----	----	<0.25	<0.25
Methoxychlor	72-43-5	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	----	----	<0.25	<0.25
trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	----	----	<0.25	<0.25
^ Total Chlordane (sum)	----	0.25	µg/kg	<0.25	----	----	<0.25	<0.25
Oxychlordane	27304-13-8	0.50	µg/kg	<0.50	----	----	<0.50	<0.50
<b>EP131B: Polychlorinated Biphenyls (as Aroclors)</b>								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	----	----	<5.0	<5.0
Aroclor 1016	12974-11-2	5.0	µg/kg	<5.0	----	----	<5.0	<5.0
Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	----	----	<5.0	<5.0
Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	----	----	<5.0	<5.0
Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	----	----	<5.0	<5.0
Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	----	----	<5.0	<5.0
Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	----	----	<5.0	<5.0
Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	----	----	<5.0	<5.0
<b>EP132B: Polynuclear Aromatic Hydrocarbons</b>								
Naphthalene	91-20-3	5	µg/kg	<5	<5	<5	<5	<5
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	<5	<5	<5
Acenaphthylene	208-96-8	4	µg/kg	<4	<4	<4	<5	<4
Acenaphthene	83-32-9	4	µg/kg	<4	<4	<4	<5	<4
Fluorene	86-73-7	4	µg/kg	<4	<4	<4	<5	<4
Phenanthrene	85-01-8	4	µg/kg	<4	<4	<4	<5	<4
Anthracene	120-12-7	4	µg/kg	<4	<4	<4	<5	<4
Fluoranthene	206-44-0	4	µg/kg	<4	<4	<4	<5	<4
Pyrene	129-00-0	4	µg/kg	<4	<4	<4	<5	<4
Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	<4	<5	<4
Chrysene	218-01-9	4	µg/kg	<4	<4	4	<5	<4
Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	<4	8	<4
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	<4	<5	<4
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	<4	<5	<4
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	<4	<5	<4
Perylene	198-55-0	4	µg/kg	<4	<4	<4	<5	<4
Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	<4	<5	<4
Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	<4	<5	<4
Indeno(1,2,3-cd)pyrene	193-39-5	4	µg/kg	<4	<4	<4	<5	<4
Coronene	191-07-1	5	µg/kg	<5	<5	<5	<5	<5



## Analytical Results

Sub-Matrix: **SEDIMENT**

Client sample ID

Client sampling date / time

				IB1 0-0.5	JTY 02 0-0.5	JTY 02 0.5-1	BER 01 0-0.5	BER 01 0.5-1
				29-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008245-001	ES1008245-002	ES1008245-003	ES1008245-004	ES1008245-005
<b>EP132B: Polynuclear Aromatic Hydrocarbons - Continued</b>								
^ Sum of PAHs	----	4	µg/kg	<4	<4	4	8	<4
<b>EP080-SD: TPH(V)/BTEX Surrogates</b>								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	106	----	----	111	122
Toluene-D8	2037-26-5	0.1	%	84.3	----	----	87.2	89.2
4-Bromofluorobenzene	460-00-4	0.1	%	97.7	----	----	100	123
<b>EP090S: Organotin Surrogate</b>								
Tripopyltin	----	0.1	%	90.0	35.7	69.8	76.0	65.1
<b>EP130S: Organophosphorus Pesticide Surrogate</b>								
DEF	78-48-8	0.1	%	60.2	----	----	66.6	73.0
<b>EP131S: OC Pesticide Surrogate</b>								
Dibromo-DDE	21655-73-2	0.1	%	48.4	----	----	47.2	44.9
<b>EP131T: PCB Surrogate</b>								
Decachlorobiphenyl	2051-24-3	0.1	%	56.6	----	----	49.6	53.0
<b>EP132T: Base/Neutral Extractable Surrogates</b>								
2-Fluorobiphenyl	321-60-8	0.1	%	115	101	89.6	112	113
Anthracene-d10	1719-06-8	0.1	%	109	90.3	80.7	119	113
4-Terphenyl-d14	1718-51-0	0.1	%	89.0	112	86.4	112	122



## Analytical Results

Sub-Matrix: **SEDIMENT**

Client sample ID

Client sampling date / time

				TRIP BLANK	JTY 01 0-0.5	T11 0-0.5	EMB03 0-0.5	T1 0-0.5
				30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008245-006	ES1008245-007	ES1008245-008	ES1008245-009	ES1008245-010
<b>EA150: Particle Sizing</b>								
+75µm	----	1	%	----	----	----	11	----
+150µm	----	1	%	----	----	----	7	----
+300µm	----	1	%	----	----	----	4	----
+425µm	----	1	%	----	----	----	3	----
+600µm	----	1	%	----	----	----	2	----
+1180µm	----	1	%	----	----	----	1	----
+2.36mm	----	1	%	----	----	----	<1	----
+4.75mm	----	1	%	----	----	----	<1	----
+9.5mm	----	1	%	----	----	----	<1	----
+19.0mm	----	1	%	----	----	----	<1	----
+37.5mm	----	1	%	----	----	----	<1	----
+75.0mm	----	1	%	----	----	----	<1	----
<b>EA055: Moisture Content</b>								
^ Moisture Content (dried @ 103°C)	----	1.0	%	----	31.5	31.6	37.5	36.1
<b>EA150: Soil Classification based on Particle Size</b>								
Clay (<2 µm)	----	1	%	----	----	----	44	----
Silt (2-60 µm)	----	1	%	----	----	----	43	----
Sand (0.06-2.00 mm)	----	1	%	----	----	----	12	----
Gravel (>2mm)	----	1	%	----	----	----	1	----
Cobbles (>6cm)	----	1	%	----	----	----	<1	----
<b>EG005-SD: Total Metals in Sediments by ICP-AES</b>								
Aluminium	7429-90-5	50	mg/kg	----	15400	17600	22400	15100
Iron	7439-89-6	50	mg/kg	----	19200	23100	29900	21900
<b>EG020-SD: Total Metals in Sediments by ICPMS</b>								
Antimony	7440-36-0	0.50	mg/kg	----	<0.50	0.54	<0.50	<0.50
Arsenic	7440-38-2	1.00	mg/kg	----	11.0	15.7	6.73	6.76
Cadmium	7440-43-9	0.1	mg/kg	----	<0.1	0.2	<0.1	<0.1
Chromium	7440-47-3	1.0	mg/kg	----	14.8	20.3	21.0	16.3
Copper	7440-50-8	1.0	mg/kg	----	15.7	16.4	38.3	18.5
Cobalt	7440-48-4	0.5	mg/kg	----	14.7	29.4	10.4	8.1
Lead	7439-92-1	1.0	mg/kg	----	12.7	20.8	8.4	5.9
Manganese	7439-96-5	10	mg/kg	----	347	364	124	126
Nickel	7440-02-0	1.0	mg/kg	----	8.6	26.5	11.0	8.2
Selenium	7782-49-2	0.1	mg/kg	----	1.6	1.8	0.7	0.5
Silver	7440-22-4	0.1	mg/kg	----	<0.1	<0.1	<0.1	<0.1
Vanadium	7440-62-2	2.0	mg/kg	----	55.1	61.6	75.2	51.9
Zinc	7440-66-6	1.0	mg/kg	----	47.2	69.8	40.4	32.6



## Analytical Results

Sub-Matrix: **SEDIMENT**

Client sample ID

Client sampling date / time

				TRIP BLANK	JTY 01 0-0.5	T11 0-0.5	EMB03 0-0.5	T1 0-0.5
				30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008245-006	ES1008245-007	ES1008245-008	ES1008245-009	ES1008245-010
<b>EG020-SD: Total Metals in Sediments by ICPMS - Continued</b>								
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
Mercury	7439-97-6	0.01	mg/kg	----	0.04	0.03	<0.01	<0.01
<b>EK055: Ammonia as N</b>								
Ammonia as N	7664-41-7	1	mg/kg	----	<1	<1	<1	<1
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N (Sol.)	----	0.1	mg/kg	----	<0.1	<0.1	<0.1	<0.1
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	----	<0.1	0.4	<0.1	<0.1
<b>EK059G: NOX as N by Discrete Analyser</b>								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	----	<0.1	0.4	<0.1	<0.1
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	----	500	620	220	410
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>								
Total Phosphorus as P	----	2	mg/kg	----	329	271	157	160
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>								
Reactive Phosphorus as P	----	0.1	mg/kg	----	1.2	1.2	0.7	0.6
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	0.02	%	----	0.48	0.83	0.40	0.35
<b>EP080-SD / EP071-SD: Total Petroleum Hydrocarbons</b>								
C6 - C9 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3
C10 - C14 Fraction	----	3	mg/kg	----	<3	<3	<3	<3
C15 - C28 Fraction	----	3	mg/kg	----	<3	<3	<3	<3
C29 - C36 Fraction	----	5	mg/kg	----	<5	<5	<5	<5
C10 - C36 Fraction (sum)	----	3	mg/kg	----	<3	<3	<3	<3
<b>EP080-SD: BTEX</b>								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
<b>EP090: Organotin Compounds</b>								
Tributyltin	56573-85-4	0.5	µgSn/kg	----	<0.5	<0.5	<0.5	<0.5
<b>EP130A: Organophosphorus Pesticides (Ultra-trace)</b>								
Bromophos-ethyl	4824-78-6	10	µg/kg	----	<10	<10	<10	<10
Carbophenothion	786-19-6	10	µg/kg	----	<10	<10	<10	<10



## Analytical Results

Sub-Matrix: SEDIMENT

Client sample ID

Client sampling date / time

				TRIP BLANK	JTY 01 0-0.5	T11 0-0.5	EMB03 0-0.5	T1 0-0.5
				30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008245-006	ES1008245-007	ES1008245-008	ES1008245-009	ES1008245-010
<b>EP130A: Organophosphorus Pesticides (Ultra-trace) - Continued</b>								
Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	----	<10.0	<10.0	<10.0	<10.0
Chlorfenvinphos (Z)	470-90-8	10	µg/kg	----	<10	<10	<10	<10
Chlorpyrifos	2921-88-2	10	µg/kg	----	<10	<10	<10	<10
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	----	<10	<10	<10	<10
Demeton-S-methyl	919-86-8	10	µg/kg	----	<10	<10	<10	<10
Diazinon	333-41-5	10	µg/kg	----	<10	<10	<10	<10
Dichlorvos	62-73-7	10	µg/kg	----	<10	<10	<10	<10
Dimethoate	60-51-5	10	µg/kg	----	<10	<10	<10	<10
Ethion	563-12-2	10	µg/kg	----	<10	<10	<10	<10
Fenamiphos	22224-92-6	10	µg/kg	----	<10	<10	<10	<10
Fenthion	55-38-9	10	µg/kg	----	<10	<10	<10	<10
Malathion	121-75-5	10	µg/kg	----	<10	<10	<10	<10
Azinphos Methyl	86-50-0	10	µg/kg	----	<10	<10	<10	<10
Monocrotophos	6923-22-4	10	µg/kg	----	<10	<10	<10	<10
Parathion	56-38-2	10	µg/kg	----	<10	<10	<10	<10
Parathion-methyl	298-00-0	10	µg/kg	----	<10	<10	<10	<10
Pirimphos-ethyl	23505-41-1	10	µg/kg	----	<10	<10	<10	<10
Prothiofos	34643-46-4	10	µg/kg	----	<10	<10	<10	<10
<b>EP131A: Organochlorine Pesticides</b>								
Aldrin	309-00-2	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
alpha-BHC	319-84-6	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
beta-BHC	319-85-7	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
delta-BHC	319-86-8	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
4,4'-DDD	72-54-8	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
4,4'-DDE	72-55-9	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
4,4'-DDT	50-29-3	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
^ DDT (total)	----	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
Dieldrin	60-57-1	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
alpha-Endosulfan	959-98-8	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
beta-Endosulfan	33213-65-9	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
Endosulfan sulfate	1031-07-8	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
Endrin	72-20-8	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
Endrin aldehyde	7421-93-4	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
Endrin ketone	53494-70-5	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
Heptachlor	76-44-8	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
Heptachlor epoxide	1024-57-3	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50



## Analytical Results

Sub-Matrix: SEDIMENT

Client sample ID

Client sampling date / time

				TRIP BLANK	JTY 01 0-0.5	T11 0-0.5	EMB03 0-0.5	T1 0-0.5
				30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008245-006	ES1008245-007	ES1008245-008	ES1008245-009	ES1008245-010
<b>EP131A: Organochlorine Pesticides - Continued</b>								
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
gamma-BHC	58-89-9	0.25	µg/kg	----	<0.25	<0.25	<0.25	<0.25
Methoxychlor	72-43-5	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
cis-Chlordane	5103-71-9	0.25	µg/kg	----	<0.25	<0.25	<0.25	<0.25
trans-Chlordane	5103-74-2	0.25	µg/kg	----	<0.25	<0.25	<0.25	<0.25
^ Total Chlordane (sum)	----	0.25	µg/kg	----	<0.25	<0.25	<0.25	<0.25
Oxychlordane	27304-13-8	0.50	µg/kg	----	<0.50	<0.50	<0.50	<0.50
<b>EP131B: Polychlorinated Biphenyls (as Aroclors)</b>								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	----	<5.0	<5.0	<5.0	<5.0
Aroclor 1016	12974-11-2	5.0	µg/kg	----	<5.0	<5.0	<5.0	<5.0
Aroclor 1221	11104-28-2	5.0	µg/kg	----	<5.0	<5.0	<5.0	<5.0
Aroclor 1232	11141-16-5	5.0	µg/kg	----	<5.0	<5.0	<5.0	<5.0
Aroclor 1242	53469-21-9	5.0	µg/kg	----	<5.0	<5.0	<5.0	<5.0
Aroclor 1248	12672-29-6	5.0	µg/kg	----	<5.0	<5.0	<5.0	<5.0
Aroclor 1254	11097-69-1	5.0	µg/kg	----	<5.0	<5.0	<5.0	<5.0
Aroclor 1260	11096-82-5	5.0	µg/kg	----	<5.0	<5.0	<5.0	<5.0
<b>EP132B: Polynuclear Aromatic Hydrocarbons</b>								
Naphthalene	91-20-3	5	µg/kg	----	<5	<5	<5	<5
2-Methylnaphthalene	91-57-6	5	µg/kg	----	<5	<5	<5	<5
Acenaphthylene	208-96-8	4	µg/kg	----	<4	<4	<4	<4
Acenaphthene	83-32-9	4	µg/kg	----	<4	<4	<4	<4
Fluorene	86-73-7	4	µg/kg	----	<4	<4	<4	<4
Phenanthrene	85-01-8	4	µg/kg	----	<4	<4	<4	5
Anthracene	120-12-7	4	µg/kg	----	<4	<4	<4	<4
Fluoranthene	206-44-0	4	µg/kg	----	<4	<4	<4	<4
Pyrene	129-00-0	4	µg/kg	----	<4	<4	<4	<4
Benz(a)anthracene	56-55-3	4	µg/kg	----	<4	<4	<4	<4
Chrysene	218-01-9	4	µg/kg	----	<4	<4	<4	<4
Benzo(b)fluoranthene	205-99-2	4	µg/kg	----	<4	<4	<4	<4
Benzo(k)fluoranthene	207-08-9	4	µg/kg	----	<4	<4	<4	<4
Benzo(e)pyrene	192-97-2	4	µg/kg	----	<4	<4	<4	<4
Benzo(a)pyrene	50-32-8	4	µg/kg	----	<4	<4	<4	<4
Perylene	198-55-0	4	µg/kg	----	<4	<4	<4	<4
Benzo(g,h,i)perylene	191-24-2	4	µg/kg	----	<4	<4	<4	<4
Dibenz(a,h)anthracene	53-70-3	4	µg/kg	----	<4	<4	<4	<4
Indeno(1,2,3-cd)pyrene	193-39-5	4	µg/kg	----	<4	<4	<4	<4
Coronene	191-07-1	5	µg/kg	----	<5	<5	<5	<5



## Analytical Results

Sub-Matrix: **SEDIMENT**

Client sample ID

Client sampling date / time

				TRIP BLANK	JTY 01 0-0.5	T11 0-0.5	EMB03 0-0.5	T1 0-0.5
				30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00	30-APR-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008245-006	ES1008245-007	ES1008245-008	ES1008245-009	ES1008245-010
<b>EP132B: Polynuclear Aromatic Hydrocarbons - Continued</b>								
^ Sum of PAHs	----	4	µg/kg	----	<4	<4	<4	5
<b>EP080-SD: TPH(V)/BTEX Surrogates</b>								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	120	108	113	109	112
Toluene-D8	2037-26-5	0.1	%	95.4	85.7	83.9	86.6	91.9
4-Bromofluorobenzene	460-00-4	0.1	%	124	102	104	99.3	104
<b>EP090S: Organotin Surrogate</b>								
Tripopyltin	----	0.1	%	----	85.6	75.6	74.4	79.4
<b>EP130S: Organophosphorus Pesticide Surrogate</b>								
DEF	78-48-8	0.1	%	----	59.0	65.7	59.6	62.3
<b>EP131S: OC Pesticide Surrogate</b>								
Dibromo-DDE	21655-73-2	0.1	%	----	26.1	30.2	45.6	41.4
<b>EP131T: PCB Surrogate</b>								
Decachlorobiphenyl	2051-24-3	0.1	%	----	23.1	30.7	59.6	45.4
<b>EP132T: Base/Neutral Extractable Surrogates</b>								
2-Fluorobiphenyl	321-60-8	0.1	%	----	114	105	120	104
Anthracene-d10	1719-06-8	0.1	%	----	109	106	103	114
4-Terphenyl-d14	1718-51-0	0.1	%	----	108	114	108	118



## Analytical Results

Sub-Matrix: **SEDIMENT**

Client sample ID

				T2 0-0.5	----	----	----	----
Client sampling date / time				30-APR-2010 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1008245-011	----	----	----	----
<b>EA055: Moisture Content</b>								
^ Moisture Content (dried @ 103°C)	----	1.0	%	54.3	----	----	----	----
<b>EG005-SD: Total Metals in Sediments by ICP-AES</b>								
Aluminium	7429-90-5	50	mg/kg	30500	----	----	----	----
Iron	7439-89-6	50	mg/kg	42100	----	----	----	----
<b>EG020-SD: Total Metals in Sediments by ICPMS</b>								
Antimony	7440-36-0	0.50	mg/kg	<0.50	----	----	----	----
Arsenic	7440-38-2	1.00	mg/kg	11.2	----	----	----	----
Cadmium	7440-43-9	0.1	mg/kg	<0.1	----	----	----	----
Chromium	7440-47-3	1.0	mg/kg	29.5	----	----	----	----
Copper	7440-50-8	1.0	mg/kg	33.6	----	----	----	----
Cobalt	7440-48-4	0.5	mg/kg	14.2	----	----	----	----
Lead	7439-92-1	1.0	mg/kg	10.6	----	----	----	----
Manganese	7439-96-5	10	mg/kg	184	----	----	----	----
Nickel	7440-02-0	1.0	mg/kg	14.9	----	----	----	----
Selenium	7782-49-2	0.1	mg/kg	0.9	----	----	----	----
Silver	7440-22-4	0.1	mg/kg	<0.1	----	----	----	----
Vanadium	7440-62-2	2.0	mg/kg	103	----	----	----	----
Zinc	7440-66-6	1.0	mg/kg	56.5	----	----	----	----
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
Mercury	7439-97-6	0.01	mg/kg	<0.01	----	----	----	----
<b>EK055: Ammonia as N</b>								
Ammonia as N	7664-41-7	1	mg/kg	<1	----	----	----	----
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	----	----	----	----
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	----	----	----	----
<b>EK059G: NOX as N by Discrete Analyser</b>								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	----	----	----	----
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	660	----	----	----	----
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>								
Total Phosphorus as P	----	2	mg/kg	278	----	----	----	----
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>								
Reactive Phosphorus as P	----	0.1	mg/kg	1.7	----	----	----	----
<b>EP005: Total Organic Carbon (TOC)</b>								



## Analytical Results

Sub-Matrix: **SEDIMENT**

Client sample ID

Client sampling date / time

				T2 0-0.5	----	----	----	----
				30-APR-2010 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1008245-011	----	----	----	----
<b>EP005: Total Organic Carbon (TOC) - Continued</b>								
Total Organic Carbon	----	0.02	%	0.27	----	----	----	----
<b>EP080-SD / EP071-SD: Total Petroleum Hydrocarbons</b>								
C6 - C9 Fraction	----	3	mg/kg	<3	----	----	----	----
C10 - C14 Fraction	----	3	mg/kg	<3	----	----	----	----
C15 - C28 Fraction	----	3	mg/kg	<5	----	----	----	----
C29 - C36 Fraction	----	5	mg/kg	<5	----	----	----	----
C10 - C36 Fraction (sum)	----	3	mg/kg	<3	----	----	----	----
<b>EP080-SD: BTEX</b>								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.2	mg/kg	<0.2	----	----	----	----
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	----	----	----	----
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	----	----	----	----
<b>EP090: Organotin Compounds</b>								
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	----	----	----	----
<b>EP130A: Organophosphorus Pesticides (Ultra-trace)</b>								
Bromophos-ethyl	4824-78-6	10	µg/kg	<10	----	----	----	----
Carbophenothion	786-19-6	10	µg/kg	<10	----	----	----	----
Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	<10.0	----	----	----	----
Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	----	----	----	----
Chlorpyrifos	2921-88-2	10	µg/kg	<10	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	----	----	----	----
Demeton-S-methyl	919-86-8	10	µg/kg	<10	----	----	----	----
Diazinon	333-41-5	10	µg/kg	<10	----	----	----	----
Dichlorvos	62-73-7	10	µg/kg	<10	----	----	----	----
Dimethoate	60-51-5	10	µg/kg	<10	----	----	----	----
Ethion	563-12-2	10	µg/kg	<10	----	----	----	----
Fenamiphos	22224-92-6	10	µg/kg	<10	----	----	----	----
Fenthion	55-38-9	10	µg/kg	<10	----	----	----	----
Malathion	121-75-5	10	µg/kg	<10	----	----	----	----
Azinphos Methyl	86-50-0	10	µg/kg	<10	----	----	----	----
Monocrotophos	6923-22-4	10	µg/kg	<10	----	----	----	----
Parathion	56-38-2	10	µg/kg	<10	----	----	----	----
Parathion-methyl	298-00-0	10	µg/kg	<10	----	----	----	----
Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	----	----	----	----
Prothiofos	34643-46-4	10	µg/kg	<10	----	----	----	----



## Analytical Results

Sub-Matrix: **SEDIMENT**

Client sample ID

Client sampling date / time

				<b>T2</b>				
				<b>0-0.5</b>				
				30-APR-2010 15:00	----	----	----	----
				<b>ES1008245-011</b>	----	----	----	----
Compound	CAS Number	LOR	Unit					
<b>EP131A: Organochlorine Pesticides</b>								
Aldrin	309-00-2	0.50	µg/kg	<0.50	----	----	----	----
alpha-BHC	319-84-6	0.50	µg/kg	<0.50	----	----	----	----
beta-BHC	319-85-7	0.50	µg/kg	<0.50	----	----	----	----
delta-BHC	319-86-8	0.50	µg/kg	<0.50	----	----	----	----
4,4'-DDD	72-54-8	0.50	µg/kg	<0.50	----	----	----	----
4,4'-DDE	72-55-9	0.50	µg/kg	<0.50	----	----	----	----
4,4'-DDT	50-29-3	0.50	µg/kg	<0.50	----	----	----	----
^ DDT (total)	----	0.50	µg/kg	<0.50	----	----	----	----
Dieldrin	60-57-1	0.50	µg/kg	<0.50	----	----	----	----
alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	----	----	----	----
beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	----	----	----	----
Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	----	----	----	----
Endrin	72-20-8	0.50	µg/kg	<0.50	----	----	----	----
Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	----	----	----	----
Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	----	----	----	----
Heptachlor	76-44-8	0.50	µg/kg	<0.50	----	----	----	----
Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	----	----	----	----
gamma-BHC	58-89-9	0.25	µg/kg	<0.25	----	----	----	----
Methoxychlor	72-43-5	0.50	µg/kg	<0.50	----	----	----	----
cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	----	----	----	----
trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	----	----	----	----
^ Total Chlordane (sum)	----	0.25	µg/kg	<0.25	----	----	----	----
Oxychlordane	27304-13-8	0.50	µg/kg	<0.50	----	----	----	----
<b>EP131B: Polychlorinated Biphenyls (as Aroclors)</b>								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1016	12974-11-2	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	----	----	----	----
<b>EP132B: Polynuclear Aromatic Hydrocarbons</b>								
Naphthalene	91-20-3	5	µg/kg	<5	----	----	----	----
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	----	----	----	----



## Analytical Results

Sub-Matrix: **SEDIMENT**

Client sample ID

Client sampling date / time

				<b>T2</b>				
				<b>0-0.5</b>				
				30-APR-2010 15:00	----	----	----	----
				<b>ES1008245-011</b>	----	----	----	----
Compound	CAS Number	LOR	Unit					
<b>EP132B: Polynuclear Aromatic Hydrocarbons - Continued</b>								
Acenaphthylene	208-96-8	4	µg/kg	<5	----	----	----	----
Acenaphthene	83-32-9	4	µg/kg	<5	----	----	----	----
Fluorene	86-73-7	4	µg/kg	<5	----	----	----	----
Phenanthrene	85-01-8	4	µg/kg	<5	----	----	----	----
Anthracene	120-12-7	4	µg/kg	<5	----	----	----	----
Fluoranthene	206-44-0	4	µg/kg	<5	----	----	----	----
Pyrene	129-00-0	4	µg/kg	<5	----	----	----	----
Benz(a)anthracene	56-55-3	4	µg/kg	<5	----	----	----	----
Chrysene	218-01-9	4	µg/kg	<5	----	----	----	----
Benzo(b)fluoranthene	205-99-2	4	µg/kg	<5	----	----	----	----
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<5	----	----	----	----
Benzo(e)pyrene	192-97-2	4	µg/kg	<5	----	----	----	----
Benzo(a)pyrene	50-32-8	4	µg/kg	<5	----	----	----	----
Perylene	198-55-0	4	µg/kg	<5	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<5	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<5	----	----	----	----
Indeno(1,2,3,cd)pyrene	193-39-5	4	µg/kg	<5	----	----	----	----
Coronene	191-07-1	5	µg/kg	<5	----	----	----	----
^ Sum of PAHs	----	4	µg/kg	<4	----	----	----	----
<b>EP080-SD: TPH(V)/BTEX Surrogates</b>								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	<b>90.1</b>	----	----	----	----
Toluene-D8	2037-26-5	0.1	%	<b>80.7</b>	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	<b>83.5</b>	----	----	----	----
<b>EP090S: Organotin Surrogate</b>								
Tripopyltin	----	0.1	%	<b>79.2</b>	----	----	----	----
<b>EP130S: Organophosphorus Pesticide Surrogate</b>								
DEF	78-48-8	0.1	%	<b>64.9</b>	----	----	----	----
<b>EP131S: OC Pesticide Surrogate</b>								
Dibromo-DDE	21655-73-2	0.1	%	<b>41.4</b>	----	----	----	----
<b>EP131T: PCB Surrogate</b>								
Decachlorobiphenyl	2051-24-3	0.1	%	<b>47.4</b>	----	----	----	----
<b>EP132T: Base/Neutral Extractable Surrogates</b>								
2-Fluorobiphenyl	321-60-8	0.1	%	<b>114</b>	----	----	----	----
Anthracene-d10	1719-06-8	0.1	%	<b>107</b>	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	<b>103</b>	----	----	----	----



## Surrogate Control Limits

Sub-Matrix: <b>SEDIMENT</b>		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP080-SD: TPH(V)/BTEX Surrogates</b>			
1,2-Dichloroethane-D4	17060-07-0	67	137
Toluene-D8	2037-26-5	74	134
4-Bromofluorobenzene	460-00-4	73	137
<b>EP090S: Organotin Surrogate</b>			
Tripopyltin	----	34	108
<b>EP130S: Organophosphorus Pesticide Surrogate</b>			
DEF	78-48-8	51.3	136.9
<b>EP131S: OC Pesticide Surrogate</b>			
Dibromo-DDE	21655-73-2	10	136
<b>EP131T: PCB Surrogate</b>			
Decachlorobiphenyl	2051-24-3	10	164
<b>EP132T: Base/Neutral Extractable Surrogates</b>			
2-Fluorobiphenyl	321-60-8	30	115
Anthracene-d10	1719-06-8	27	133
4-Terphenyl-d14	1718-51-0	18	137



## Environmental Division

### QUALITY CONTROL REPORT

<b>Work Order</b>	<b>: ES1008245</b>	<b>Page</b>	: 1 of 18
<b>Client</b>	<b>: WORLEY PARSONS - INFRASTRUCTURE MWE</b>	<b>Laboratory</b>	: Environmental Division Sydney
<b>Contact</b>	<b>: MS VIVIAN SETO</b>	<b>Contact</b>	: Charlie Pierce
<b>Address</b>	<b>: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000</b>	<b>Address</b>	: 277-289 Woodpark Road Smithfield NSW Australia 2164
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<b>Telephone</b>	: +61 07 3319 3982	<b>Telephone</b>	: +61-2-8784 8555
<b>Facsimile</b>	: +61 07 3319 7791	<b>Facsimile</b>	: +61-2-8784 8500
<b>Project</b>	: NAGD - Asia Pacific LNG	<b>QC Level</b>	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
<b>Site</b>	: ----	<b>Date Samples Received</b>	: 05-MAY-2010
<b>C-O-C number</b>	: ----	<b>Issue Date</b>	: 20-MAY-2010
<b>Sampler</b>	: ----		
<b>Order number</b>	: ----		
<b>Quote number</b>	: BN/187/10	<b>No. of samples received</b>	: 11
		<b>No. of samples analysed</b>	: 11

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

This Quality Control Report contains the following information:

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



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

### Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Organics
Ankit Joshi	Inorganic Chemist	Inorganics
Celine Conceicao	Spectroscopist	Inorganics
Dianne Blane	Laboratory Supervisor	Newcastle
Matt Frost	Organic Instrument Chemist	Organics
Stephen Hislop	Senior Inorganic Chemist	Stafford Minerals - AY



## General Comments

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

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

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

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

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



## Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (QC Lot: 1334485)									
EB1007610-013	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	5.4	4.4	18.7	No Limit
ES1008245-001	IB1 0-0.5	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	26.7	30.4	13.2	0% - 20%
EG005-SD: Total Metals in Sediments by ICP-AES (QC Lot: 1334302)									
ES1007990-001	Anonymous	EG005-SD: Aluminium	7429-90-5	50	mg/kg	21000	20500	2.6	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	26400	29300	10.5	0% - 20%
ES1008245-002	JTY 02 0-0.5	EG005-SD: Aluminium	7429-90-5	50	mg/kg	23200	22600	2.6	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	34500	29700	14.9	0% - 20%
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 1334301)									
ES1007990-001	Anonymous	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.9	0.9	0.0	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	9.0	10.1	11.9	0% - 20%
		EG020-SD: Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	0.0	No Limit
		EG020-SD: Chromium	7440-47-3	1.0	mg/kg	16.3	15.8	3.4	0% - 50%
		EG020-SD: Copper	7440-50-8	1.0	mg/kg	31.4	29.7	5.5	0% - 20%
		EG020-SD: Lead	7439-92-1	1.0	mg/kg	7.8	9.2	16.0	No Limit
		EG020-SD: Nickel	7440-02-0	1.0	mg/kg	8.2	8.4	2.0	No Limit
		EG020-SD: Zinc	7440-66-6	1.0	mg/kg	28.6	28.0	2.3	0% - 20%
		EG020-SD: Arsenic	7440-38-2	1.00	mg/kg	3.69	4.20	12.8	No Limit
		EG020-SD: Manganese	7439-96-5	10	mg/kg	129	130	0.9	0% - 50%
		EG020-SD: Vanadium	7440-62-2	2.0	mg/kg	87.4	94.7	8.1	0% - 20%
ES1008245-002	JTY 02 0-0.5	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.9	0.9	0.0	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	12.1	10.9	10.1	0% - 20%
		EG020-SD: Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	0.0	No Limit
		EG020-SD: Chromium	7440-47-3	1.0	mg/kg	29.0	28.5	1.6	0% - 20%
		EG020-SD: Copper	7440-50-8	1.0	mg/kg	33.0	34.1	3.3	0% - 20%
		EG020-SD: Lead	7439-92-1	1.0	mg/kg	9.6	9.6	0.0	No Limit
		EG020-SD: Nickel	7440-02-0	1.0	mg/kg	14.0	13.8	1.6	0% - 50%
		EG020-SD: Zinc	7440-66-6	1.0	mg/kg	47.3	46.7	1.3	0% - 20%
		EG020-SD: Arsenic	7440-38-2	1.00	mg/kg	13.3	9.57	32.9	No Limit
		EG020-SD: Manganese	7439-96-5	10	mg/kg	195	198	1.2	0% - 50%
		EG020-SD: Vanadium	7440-62-2	2.0	mg/kg	83.6	70.7	16.7	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1334300)									



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1334300) - continued									
ES1007990-001	Anonymous	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	<0.01	0.0	No Limit
ES1008245-002	JTY 02 0-0.5	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	<0.01	0.0	No Limit
EK055: Ammonia as N (QC Lot: 1342139)									
ES1008245-001	IB1 0-0.5	EK055-SD: Ammonia as N	7664-41-7	1	mg/kg	<1	<1	0.0	No Limit
ES1008252-001	Anonymous	EK055-SD: Ammonia as N	7664-41-7	1	mg/kg	4	4	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1340499)									
ES1008245-001	IB1 0-0.5	EK057G: Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES1008246-002	Anonymous	EK057G: Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EK059G: NOX as N by Discrete Analyser (QC Lot: 1340496)									
ES1008041-004	Anonymous	EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	3.5	3.4	3.6	0% - 20%
ES1008245-009	EMB03 0-0.5	EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1338779)									
ES1008041-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	3080	2940	4.9	0% - 20%
ES1008245-009	EMB03 0-0.5	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	220	360	47.2	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1338780)									
ES1008041-001	Anonymous	EK067G: Total Phosphorus as P	----	2	mg/kg	852	769	10.2	0% - 20%
ES1008245-009	EMB03 0-0.5	EK067G: Total Phosphorus as P	----	2	mg/kg	157	169	7.7	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1340500)									
ES1008245-001	IB1 0-0.5	EK071G: Reactive Phosphorus as P	----	0.1	mg/kg	0.3	0.4	0.0	No Limit
ES1008246-002	Anonymous	EK071G: Reactive Phosphorus as P	----	0.1	mg/kg	2.3	2.4	0.0	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 1337241)									
ES1008245-001	IB1 0-0.5	EP005: Total Organic Carbon	----	0.02	%	0.45	0.42	7.6	0% - 20%
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QC Lot: 1334225)									
ES1008245-001	IB1 0-0.5	EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
ES1008246-002	Anonymous	EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QC Lot: 1334260)									
ES1008245-001	IB1 0-0.5	EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
		EP071-SD: C15 - C28 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
		EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	<5	0.0	No Limit
ES1008252-001	Anonymous	EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
		EP071-SD: C15 - C28 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
		EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	<5	0.0	No Limit
EP080-SD: BTEX (QC Lot: 1334225)									
ES1008245-001	IB1 0-0.5	EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit



Sub-Matrix: <b>SOIL</b>				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP080-SD: BTEX (QC Lot: 1334225) - continued</b>									
ES1008245-001	IB1 0-0.5	EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
ES1008246-002	Anonymous	EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: meta- & para-Xylene	108-38-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
			106-42-3						
		EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
<b>EP090: Organotin Compounds (QC Lot: 1335525)</b>									
ES1008245-001	IB1 0-0.5	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	0.0	No Limit
ES1008252-010	Anonymous	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	0.0	No Limit
<b>EP090: Organotin Compounds (QC Lot: 1338950)</b>									
ES1008241-001	Anonymous	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	0.0	No Limit
ES1008245-007	JTY 01 0-0.5	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	0.0	No Limit
<b>EP130A: Organophosphorus Pesticides (Ultra-trace) (QC Lot: 1334458)</b>									
ES1008245-001	IB1 0-0.5	EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Carbophenothion	786-19-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Diazinon	333-41-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dichlorvos	62-73-7	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dimethoate	60-51-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Ethion	563-12-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Fenthion	55-38-9	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Malathion	121-75-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Azinphos Methyl	86-50-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion	56-38-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Prothiofos	34643-46-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	<10.0	<10.0	0.0	No Limit
ES1008252-001	Anonymous	EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Carbophenothion	786-19-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	0.0	No Limit



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP130A: Organophosphorus Pesticides (Ultra-trace) (QC Lot: 1334458) - continued									
ES1008252-001	Anonymous	EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Diazinon	333-41-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dichlorvos	62-73-7	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dimethoate	60-51-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Ethion	563-12-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Fenthion	55-38-9	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Malathion	121-75-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Azinphos Methyl	86-50-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion	56-38-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Prothiofos	34643-46-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	<10.0	<10.0	0.0	No Limit
EP131A: Organochlorine Pesticides (QC Lot: 1334459)									
ES1008245-001	IB1 0-0.5	EP131A: gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Aldrin	309-00-2	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-BHC	319-84-6	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-BHC	319-85-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: delta-BHC	319-86-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4'-DDD	72-54-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4'-DDE	72-55-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4'-DDT	50-29-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: DDT (total)	----	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Dieldrin	60-57-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin	72-20-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor	76-44-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP131A: Organochlorine Pesticides (QC Lot: 1334459) - continued									
ES1008245-001	IB1 0-0.5	EP131A: Methoxychlor	72-43-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
ES1008252-001	Anonymous	EP131A: gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Aldrin	309-00-2	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-BHC	319-84-6	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-BHC	319-85-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: delta-BHC	319-86-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4'-DDD	72-54-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4'-DDE	72-55-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4'-DDT	50-29-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: DDT (total)	----	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Dieldrin	60-57-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin	72-20-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor	76-44-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Methoxychlor	72-43-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
EP131B: Polychlorinated Biphenyls (as Aroclors) (QC Lot: 1334460)									
ES1008245-001	IB1 0-0.5	EP131B: Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1016	12974-11-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
ES1008252-001	Anonymous	EP131B: Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1016	12974-11-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	<5.0	0.0	No Limit



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP131B: Polychlorinated Biphenyls (as Aroclors) (QC Lot: 1334460) - continued									
ES1008252-001	Anonymous	EP131B: Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1334259)									
ES1008245-001	IB1 0-0.5	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.0	No Limit
ES1008252-001	Anonymous	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	42	37	11.7	No Limit



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1334259) - continued									
ES1008252-001	Anonymous	EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	42	37	12.6	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.0	No Limit
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1334261)									
ES1008241-001	Anonymous	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.0	No Limit
ES1008246-006	Anonymous	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1334261) - continued									
ES1008246-006	Anonymous	EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Indeno(1,2,3-cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.0	No Limit



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

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG005-SD: Total Metals in Sediments by ICP-AES (QCLot: 1334302)								
EG005-SD: Aluminium	7429-90-5	50	mg/kg	<50	----	----	----	----
EG005-SD: Iron	7439-89-6	50	mg/kg	<50	----	----	----	----
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 1334301)								
EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	----	----	----	----
EG020-SD: Arsenic	7440-38-2	1.0	mg/kg	<1.00	13.1 mg/kg	110	70	130
EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	2.76 mg/kg	92.7	70	130
EG020-SD: Chromium	7440-47-3	1.0	mg/kg	<1.0	60.9 mg/kg	95.1	70	130
EG020-SD: Copper	7440-50-8	1.0	mg/kg	<1.0	54.7 mg/kg	97.4	70	130
EG020-SD: Cobalt	7440-48-4	10	mg/kg	<10.0	24.5 mg/kg	94.3	70	130
EG020-SD: Lead	7439-92-1	1.0	mg/kg	<1.0	54.8 mg/kg	94.2	70	130
EG020-SD: Manganese	7439-96-5	10	mg/kg	<10	136 mg/kg	91.6	70	130
EG020-SD: Nickel	7440-02-0	1.0	mg/kg	<1.0	55.2 mg/kg	98.5	70	130
EG020-SD: Selenium	7782-49-2	0.1	mg/kg	<0.1	----	----	----	----
EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	5.6 mg/kg	106	70	130
EG020-SD: Vanadium	7440-62-2	2	mg/kg	<2.0	50 mg/kg	100	70	130
EG020-SD: Zinc	7440-66-6	1.0	mg/kg	<1.0	104 mg/kg	101	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1334300)								
EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	0.090 mg/kg	81.1	74.2	126
EK055: Ammonia as N (QCLot: 1342139)								
EK055-SD: Ammonia as N	7664-41-7	1	mg/kg	<1	25 mg/kg	87.4	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1340499)								
EK057G: Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	4.8 mg/kg	102	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 1340496)								
EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	4.8 mg/kg	102	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1338779)								
EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	<20	1000 mg/kg	107	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1338780)								
EK067G: Total Phosphorus as P	----	2	mg/kg	<2	442 mg/kg	95.5	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1340500)								
EK071G: Reactive Phosphorus as P	----	0.1	mg/kg	<0.1	2.5 mg/kg	97.6	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 1337241)								
EP005: Total Organic Carbon	----	0.02	%	<0.02	100 %	98.5	70	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1334225)								



Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
<b>EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1334225) - continued</b>								
EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	26 mg/kg	104	68.4	128
<b>EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1334260)</b>								
EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	5 mg/kg	95.0	75.2	116
EP071-SD: C15 - C28 Fraction	----	3	mg/kg	<3	5 mg/kg	92.0	75.3	113
EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	5 mg/kg	91.0	72.6	117
<b>EP080-SD: BTEX (QCLot: 1334225)</b>								
EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	114	67.5	125
EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	1 mg/kg	108	69	122
EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	1 mg/kg	116	65.3	126
EP080-SD: meta- & para-Xylene	108-38-3	0.2	mg/kg	<0.2	2 mg/kg	123	66.5	124
	106-42-3							
EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	1 mg/kg	117	66.7	123
<b>EP090: Organotin Compounds (QCLot: 1335525)</b>								
EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	1.25 µgSn/kg	101	19.5	129
<b>EP090: Organotin Compounds (QCLot: 1338950)</b>								
EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	1.25 µgSn/kg	99.2	19.5	129
<b>EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 1334458)</b>								
EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	50 µg/kg	83.3	36.9	142
EP130: Carbophenothion	786-19-6	10	µg/kg	<10	50 µg/kg	83.8	0.5	157
EP130: Chlorfenvinphos (E)	470-90-6	10	µg/kg	<10.0	5 µg/kg	104	50.3	137
EP130: Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	50 µg/kg	91.0	55.9	152
EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	50 µg/kg	82.2	49	140
EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	50 µg/kg	83.8	28.1	142
EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	50 µg/kg	88.3	36.6	172
EP130: Diazinon	333-41-5	10	µg/kg	<10	50 µg/kg	86.8	37.2	148
EP130: Dichlorvos	62-73-7	10	µg/kg	<10	50 µg/kg	78.4	32.7	153
EP130: Dimethoate	60-51-5	10	µg/kg	<10	50 µg/kg	89.9	33.2	150
EP130: Ethion	563-12-2	10	µg/kg	<10	50 µg/kg	89.7	44	146
EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	50 µg/kg	108	3.08	162
EP130: Fenthion	55-38-9	10	µg/kg	<10	50 µg/kg	81.6	10.6	157
EP130: Malathion	121-75-5	10	µg/kg	<10	50 µg/kg	88.4	38.1	143
EP130: Azinphos Methyl	86-50-0	10	µg/kg	<10	50 µg/kg	83.8	8.13	159
EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	50 µg/kg	127	19.7	176
EP130: Parathion	56-38-2	10	µg/kg	<10	50 µg/kg	92.0	39.2	145
EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	50 µg/kg	89.8	23.5	152
EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	50 µg/kg	80.9	47.1	141
EP130: Prothiofos	34643-46-4	10	µg/kg	<10	50 µg/kg	87.4	36.1	148
<b>EP131A: Organochlorine Pesticides (QCLot: 1334459)</b>								



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP131A: Organochlorine Pesticides (QCLot: 1334459) - continued								
EP131A: Aldrin	309-00-2	0.5	µg/kg	<0.50	5 µg/kg	81.3	31.7	140
EP131A: alpha-BHC	319-84-6	0.5	µg/kg	<0.50	5 µg/kg	81.0	24.5	150
EP131A: beta-BHC	319-85-7	0.5	µg/kg	<0.50	5 µg/kg	103	36.9	139
EP131A: delta-BHC	319-86-8	0.5	µg/kg	<0.50	5 µg/kg	107	38.2	137
EP131A: 4,4'-DDD	72-54-8	0.5	µg/kg	<0.50	5 µg/kg	72.4	42.5	141
EP131A: 4,4'-DDE	72-55-9	0.5	µg/kg	<0.50	5 µg/kg	103	34.8	140
EP131A: 4,4'-DDT	50-29-3	0.5	µg/kg	<0.50	5 µg/kg	90.0	38	143
EP131A: DDT (total)	----	0.5	µg/kg	<0.50	----	----	----	----
EP131A: Dieldrin	60-57-1	0.5	µg/kg	<0.50	5 µg/kg	66.0	43.2	134
EP131A: alpha-Endosulfan	959-98-8	0.5	µg/kg	<0.50	5 µg/kg	97.0	23.7	139
EP131A: beta-Endosulfan	33213-65-9	0.5	µg/kg	<0.50	5 µg/kg	89.5	35.8	138
EP131A: Endosulfan sulfate	1031-07-8	0.5	µg/kg	<0.50	5 µg/kg	105	7.45	158
EP131A: Endosulfan (sum)	115-29-7	0.5	µg/kg	<0.50	----	----	----	----
EP131A: Endrin	72-20-8	0.5	µg/kg	<0.50	5 µg/kg	101	21.6	162
EP131A: Endrin aldehyde	7421-93-4	0.5	µg/kg	<0.50	5 µg/kg	86.1	19.3	131
EP131A: Endrin ketone	53494-70-5	0.5	µg/kg	<0.50	5 µg/kg	101	17.9	141
EP131A: Heptachlor	76-44-8	0.5	µg/kg	<0.50	5 µg/kg	105	31	153
EP131A: Heptachlor epoxide	1024-57-3	0.5	µg/kg	<0.50	5 µg/kg	93.9	34.3	138
EP131A: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/kg	<0.50	5 µg/kg	70.7	18.6	146
EP131A: gamma-BHC	58-89-9	0.5	µg/kg	<0.50	5 µg/kg	92.2	30.7	145
EP131A: Methoxychlor	72-43-5	0.5	µg/kg	<0.50	5 µg/kg	118	15	157
EP131A: cis-Chlordane	5103-71-9	0.5	µg/kg	<0.50	5 µg/kg	79.4	22.3	145
EP131A: trans-Chlordane	5103-74-2	0.5	µg/kg	<0.50	5 µg/kg	94.0	42.4	139
EP131A: Total Chlordane (sum)	----	0.5	µg/kg	<0.50	----	----	----	----
EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 1334460)								
EP131B: Total Polychlorinated biphenyls	----	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1016	12974-11-2	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1221	11104-28-2	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1232	11141-16-5	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1242	53469-21-9	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1248	12672-29-6	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1254	11097-69-1	5	µg/kg	<5.0	50 µg/kg	95.1	61.3	121
EP131B: Aroclor 1260	11096-82-5	5	µg/kg	<5.0	----	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1334259)								
EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	25 µg/kg	115	----	----
EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	25 µg/kg	109	----	----
EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	25 µg/kg	113	----	----
EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	25 µg/kg	98.3	----	----
EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	25 µg/kg	103	----	----



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1334259) - continued								
EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	25 µg/kg	117	----	----
EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	25 µg/kg	117	----	----
EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	25 µg/kg	120	----	----
EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	25 µg/kg	118	----	----
EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	25 µg/kg	118	----	----
EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	25 µg/kg	85.1	----	----
EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	25 µg/kg	99.6	----	----
EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	25 µg/kg	95.6	----	----
EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	25 µg/kg	84.2	----	----
EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	25 µg/kg	101	----	----
EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	25 µg/kg	111	----	----
EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	25 µg/kg	82.6	----	----
EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	25 µg/kg	93.6	----	----
EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	25 µg/kg	81.2	----	----
EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	25 µg/kg	50.2	----	----
EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	----	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1334261)								
EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	25 µg/kg	100	----	----
EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	25 µg/kg	98.6	----	----
EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	25 µg/kg	112	----	----
EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	25 µg/kg	110	----	----
EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	25 µg/kg	112	----	----
EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	25 µg/kg	112	----	----
EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	25 µg/kg	108	----	----
EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	25 µg/kg	116	----	----
EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	25 µg/kg	111	----	----
EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	25 µg/kg	105	----	----
EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	25 µg/kg	104	----	----
EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	25 µg/kg	97.6	----	----
EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	25 µg/kg	91.5	----	----
EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	25 µg/kg	75.8	----	----
EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	25 µg/kg	95.8	----	----
EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	25 µg/kg	105	----	----
EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	25 µg/kg	96.8	----	----
EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	25 µg/kg	97.5	----	----
EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	25 µg/kg	90.9	----	----
EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	25 µg/kg	116	----	----
EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	----	----	----	----



## Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number				
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 1334301)							
ES1007990-001	Anonymous	EG020-SD: Arsenic	7440-38-2	50 mg/kg	82.2	70	130
		EG020-SD: Cadmium	7440-43-9	50 mg/kg	90.2	70	130
		EG020-SD: Chromium	7440-47-3	50 mg/kg	90.7	70	130
		EG020-SD: Copper	7440-50-8	250 mg/kg	85.8	70	130
		EG020-SD: Lead	7439-92-1	250 mg/kg	91.3	70	130
		EG020-SD: Nickel	7440-02-0	50 mg/kg	89.2	70	130
		EG020-SD: Zinc	7440-66-6	250 mg/kg	91.7	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1334300)							
ES1007990-001	Anonymous	EG035T-LL: Mercury	7439-97-6	0.50 mg/kg	78.6	70	130
EK055: Ammonia as N (QCLot: 1342139)							
ES1008245-001	IB1 0-0.5	EK055-SD: Ammonia as N	7664-41-7	25 mg/kg	81.2	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1340499)							
ES1008245-001	IB1 0-0.5	EK057G: Nitrite as N (Sol.)	----	3.0 mg/kg	100	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 1340496)							
ES1008041-004	Anonymous	EK059G: Nitrite + Nitrate as N (Sol.)	----	3.0 mg/kg	87.3	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1338779)							
ES1008041-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	500 mg/kg	# Not Determined	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1338780)							
ES1008041-001	Anonymous	EK067G: Total Phosphorus as P	----	100 mg/kg	# Not Determined	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1340500)							
ES1008245-001	IB1 0-0.5	EK071G: Reactive Phosphorus as P	----	2.5 mg/kg	97.6	70	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1334225)							
ES1008245-001	IB1 0-0.5	EP080-SD: C6 - C9 Fraction	----	26 mg/kg	93.0	70	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1334260)							
ES1008245-001	IB1 0-0.5	EP071-SD: C10 - C14 Fraction	----	19.75 mg/kg	77.2	70	130
		EP071-SD: C15 - C28 Fraction	----	87.25 mg/kg	80.3	70	130
		EP071-SD: C29 - C36 Fraction	----	60 mg/kg	112	70	130
EP080-SD: BTEX (QCLot: 1334225)							
ES1008245-001	IB1 0-0.5	EP080-SD: Benzene	71-43-2	2.5 mg/kg	103	70	130
		EP080-SD: Toluene	108-88-3	2.5 mg/kg	88.2	70	130
		EP080-SD: Ethylbenzene	100-41-4	2.5 mg/kg	86.0	70	130
		EP080-SD: meta- & para-Xylene	108-38-3	2.5 mg/kg	92.5	70	130
			106-42-3				



Sub-Matrix: **SOIL**

Sub-Matrix: <b>SOIL</b>				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number				
EP080-SD: BTEX (QCLot: 1334225) - continued							
ES1008245-001	IB1 0-0.5	EP080-SD: ortho-Xylene	95-47-6	2.5 mg/kg	99.1	70	130
EP090: Organotin Compounds (QCLot: 1335525)							
ES1008252-001	Anonymous	EP090: Tributyltin	56573-85-4	1.25 µgSn/kg	95.6	20	130
EP090: Organotin Compounds (QCLot: 1338950)							
ES1008241-002	Anonymous	EP090: Tributyltin	56573-85-4	1.25 µgSn/kg	83.7	20	130
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 1334458)							
ES1008245-001	IB1 0-0.5	EP130: Bromophos-ethyl	4824-78-6	50 µg/kg	58.1	36.9	142
		EP130: Carbophenothion	786-19-6	50 µg/kg	64.7	0.5	157
		EP130: Chlorfenvinphos (E)	470-90-6	5 µg/kg	71.8	50.3	137
		EP130: Chlorfenvinphos (Z)	470-90-8	50 µg/kg	62.3	55.9	152
		EP130: Chlorpyrifos	2921-88-2	50 µg/kg	56.7	49	140
		EP130: Chlorpyrifos-methyl	5598-13-0	50 µg/kg	53.4	28.1	142
		EP130: Demeton-S-methyl	919-86-8	50 µg/kg	61.5	36.6	172
		EP130: Diazinon	333-41-5	50 µg/kg	65.6	37.2	148
		EP130: Dichlorvos	62-73-7	50 µg/kg	63.8	32.7	153
		EP130: Dimethoate	60-51-5	50 µg/kg	67.9	33.2	150
		EP130: Ethion	563-12-2	50 µg/kg	62.0	44	146
		EP130: Fenamiphos	22224-92-6	50 µg/kg	80.8	3.08	162
		EP130: Fenthion	55-38-9	50 µg/kg	55.4	10.6	157
		EP130: Malathion	121-75-5	50 µg/kg	58.2	38.1	143
		EP130: Azinphos Methyl	86-50-0	50 µg/kg	45.1	8.13	159
		EP130: Monocrotophos	6923-22-4	50 µg/kg	100	19.7	176
		EP130: Parathion	56-38-2	50 µg/kg	66.6	39.2	145
		EP130: Parathion-methyl	298-00-0	50 µg/kg	56.9	23.5	152
		EP130: Pirimphos-ethyl	23505-41-1	50 µg/kg	58.0	47.1	141
		EP130: Prothiofos	34643-46-4	50 µg/kg	63.2	36.1	148
EP131A: Organochlorine Pesticides (QCLot: 1334459)							
ES1008245-001	IB1 0-0.5	EP131A: Aldrin	309-00-2	5 µg/kg	51.3	31.7	140
		EP131A: alpha-BHC	319-84-6	5 µg/kg	26.1	24.5	150
		EP131A: beta-BHC	319-85-7	5 µg/kg	54.3	36.9	139
		EP131A: delta-BHC	319-86-8	5 µg/kg	39.9	38.2	137
		EP131A: 4,4`-DDD	72-54-8	5 µg/kg	# 24.5	42.5	141
		EP131A: 4,4`-DDE	72-55-9	5 µg/kg	43.4	34.8	140
		EP131A: 4,4`-DDT	50-29-3	5 µg/kg	# 33.2	38	143
		EP131A: Dieldrin	60-57-1	5 µg/kg	# 33.9	43.2	134
		EP131A: alpha-Endosulfan	959-98-8	5 µg/kg	53.9	23.7	139
		EP131A: beta-Endosulfan	33213-65-9	5 µg/kg	# 34.5	35.8	138
		EP131A: Endosulfan sulfate	1031-07-8	5 µg/kg	39.6	7.45	158



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number				
EP131A: Organochlorine Pesticides (QCLot: 1334459) - continued							
ES1008245-001	IB1 0-0.5	EP131A: Endrin	72-20-8	5 µg/kg	35.8	21.6	162
		EP131A: Endrin aldehyde	7421-93-4	5 µg/kg	36.1	19.3	131
		EP131A: Endrin ketone	53494-70-5	5 µg/kg	40.4	17.9	141
		EP131A: Heptachlor	76-44-8	5 µg/kg	43.5	31	153
		EP131A: Heptachlor epoxide	1024-57-3	5 µg/kg	55.1	34.3	138
		EP131A: Hexachlorobenzene (HCB)	118-74-1	5 µg/kg	30.5	18.6	146
		EP131A: gamma-BHC	58-89-9	5 µg/kg	37.5	30.7	145
		EP131A: Methoxychlor	72-43-5	5 µg/kg	49.9	15	157
		EP131A: cis-Chlordane	5103-71-9	5 µg/kg	34.8	22.3	145
		EP131A: trans-Chlordane	5103-74-2	5 µg/kg	52.6	42.4	139
EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 1334460)							
ES1008245-001	IB1 0-0.5	EP131B: Aroclor 1254	11097-69-1	50 µg/kg	# 51.4	61.3	121
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1334259)							
ES1008245-001	IB1 0-0.5	EP132B-SD: Naphthalene	91-20-3	25 µg/kg	91.6	70	130
		EP132B-SD: 2-Methylnaphthalene	91-57-6	25 µg/kg	105	70	130
		EP132B-SD: Acenaphthylene	208-96-8	25 µg/kg	120	70	130
		EP132B-SD: Acenaphthene	83-32-9	25 µg/kg	106	70	130
		EP132B-SD: Fluorene	86-73-7	25 µg/kg	102	70	130
		EP132B-SD: Phenanthrene	85-01-8	25 µg/kg	114	70	130
		EP132B-SD: Anthracene	120-12-7	25 µg/kg	114	70	130
		EP132B-SD: Fluoranthene	206-44-0	25 µg/kg	118	70	130
		EP132B-SD: Pyrene	129-00-0	25 µg/kg	113	70	130
		EP132B-SD: Benz(a)anthracene	56-55-3	25 µg/kg	110	70	130
		EP132B-SD: Chrysene	218-01-9	25 µg/kg	76.7	70	130
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	25 µg/kg	104	70	130
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	25 µg/kg	96.8	70	130
		EP132B-SD: Benzo(e)pyrene	192-97-2	25 µg/kg	91.7	70	130
		EP132B-SD: Benzo(a)pyrene	50-32-8	25 µg/kg	112	70	130
		EP132B-SD: Perylene	198-55-0	25 µg/kg	121	70	130
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	25 µg/kg	99.4	70	130
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	25 µg/kg	109	70	130
		EP132B-SD: Indeno(1,2,3.cd)pyrene	193-39-5	25 µg/kg	98.6	70	130
		EP132B-SD: Coronene	191-07-1	25 µg/kg	81.0	70	130
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1334261)							
ES1008241-001	Anonymous	EP132B-SD: Naphthalene	91-20-3	25 µg/kg	102	70	130
		EP132B-SD: 2-Methylnaphthalene	91-57-6	25 µg/kg	86.2	70	130
		EP132B-SD: Acenaphthylene	208-96-8	25 µg/kg	110	70	130
		EP132B-SD: Acenaphthene	83-32-9	25 µg/kg	106	70	130



Sub-Matrix: SOIL

Sub-Matrix: SOIL				Matrix Spike (MS) Report		
				Spike Concentration	Spike Recovery (%) MS	Recovery Limits (%) LowHigh
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number			
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1334261) - continued						
ES1008241-001	Anonymous	EP132B-SD: Fluorene	86-73-7	25 µg/kg	112	70130
		EP132B-SD: Phenanthrene	85-01-8	25 µg/kg	107	70130
		EP132B-SD: Anthracene	120-12-7	25 µg/kg	94.8	70130
		EP132B-SD: Fluoranthene	206-44-0	25 µg/kg	101	70130
		EP132B-SD: Pyrene	129-00-0	25 µg/kg	99.1	70130
		EP132B-SD: Benz(a)anthracene	56-55-3	25 µg/kg	104	70130
		EP132B-SD: Chrysene	218-01-9	25 µg/kg	104	70130
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	25 µg/kg	91.0	70130
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	25 µg/kg	# 64.2	70130
		EP132B-SD: Benzo(e)pyrene	192-97-2	25 µg/kg	# 64.0	70130
		EP132B-SD: Benzo(a)pyrene	50-32-8	25 µg/kg	74.3	70130
		EP132B-SD: Perylene	198-55-0	25 µg/kg	83.9	70130
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	25 µg/kg	81.4	70130
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	25 µg/kg	91.2	70130
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	25 µg/kg	71.7	70130
		EP132B-SD: Coronene	191-07-1	25 µg/kg	102	70130



## Environmental Division

### INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: <b>ES1008245</b>	Page	: 1 of 12
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Sydney
Contact	: MS VIVIAN SETO	Contact	: Charlie Pierce
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
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Telephone	: +61 07 3319 3982	Telephone	: +61-2-8784 8555
Facsimile	: +61 07 3319 7791	Facsimile	: +61-2-8784 8500
Project	: NAGD - Asia Pacific LNG	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 05-MAY-2010
C-O-C number	: ----	Issue Date	: 20-MAY-2010
Sampler	: ----		
Order number	: ----	No. of samples received	: 11
Quote number	: BN/187/10	No. of samples analysed	: 11

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

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers



## Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content							
Soil Glass Jar - Unpreserved IB1 - 0-0.5	29-APR-2010	----	----	----	05-MAY-2010	06-MAY-2010	✓
Soil Glass Jar - Unpreserved JTY 02 - 0-0.5, BER 01 - 0-0.5, JTY 01 - 0-0.5, EMB03 - 0-0.5, T2 - 0-0.5 JTY 02 - 0.5-1, BER 01 - 0.5-1, T11 - 0-0.5, T1 - 0-0.5,	30-APR-2010	----	----	----	05-MAY-2010	07-MAY-2010	✓
EA150: Particle Sizing							
Snap Lock Bag JTY 02 - 0-0.5, BER 01 - 0-0.5, EMB03 - 0-0.5 JTY 02 - 0.5-1, BER 01 - 0.5-1,	30-APR-2010	---	---	----	11-MAY-2010	27-OCT-2010	✓
EA150: Soil Classification based on Particle Size							
Snap Lock Bag JTY 02 - 0-0.5, BER 01 - 0-0.5, EMB03 - 0-0.5 JTY 02 - 0.5-1, BER 01 - 0.5-1,	30-APR-2010	---	---	----	11-MAY-2010	27-OCT-2010	✓
EG005-SD: Total Metals in Sediments by ICP-AES							
Soil Glass Jar - Unpreserved IB1 - 0-0.5	29-APR-2010	05-MAY-2010	27-MAY-2010	✓	06-MAY-2010	26-OCT-2010	✓
Soil Glass Jar - Unpreserved JTY 02 - 0-0.5, BER 01 - 0-0.5, JTY 01 - 0-0.5, EMB03 - 0-0.5, T2 - 0-0.5 JTY 02 - 0.5-1, BER 01 - 0.5-1, T11 - 0-0.5, T1 - 0-0.5,	30-APR-2010	05-MAY-2010	28-MAY-2010	✓	06-MAY-2010	27-OCT-2010	✓



Matrix: **SOIL**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020-SD: Total Metals in Sediments by ICPMS								
Soil Glass Jar - Unpreserved IB1 - 0-0.5		29-APR-2010	05-MAY-2010	27-MAY-2010	✓	06-MAY-2010	26-OCT-2010	✓
Soil Glass Jar - Unpreserved JTY 02 - 0-0.5, JTY 02 - 0.5-1, BER 01 - 0-0.5, BER 01 - 0.5-1, JTY 01 - 0-0.5, T11 - 0-0.5, EMB03 - 0-0.5, T1 - 0-0.5, T2 - 0-0.5		30-APR-2010	05-MAY-2010	28-MAY-2010	✓	06-MAY-2010	27-OCT-2010	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved IB1 - 0-0.5		29-APR-2010	05-MAY-2010	27-MAY-2010	✓	06-MAY-2010	27-MAY-2010	✓
Soil Glass Jar - Unpreserved JTY 02 - 0-0.5, JTY 02 - 0.5-1, BER 01 - 0-0.5, BER 01 - 0.5-1, JTY 01 - 0-0.5, T11 - 0-0.5, EMB03 - 0-0.5, T1 - 0-0.5, T2 - 0-0.5		30-APR-2010	05-MAY-2010	28-MAY-2010	✓	06-MAY-2010	28-MAY-2010	✓
EK055: Ammonia as N								
Soil Glass Jar - Unpreserved IB1 - 0-0.5		29-APR-2010	----	----	----	12-MAY-2010	26-OCT-2010	✓
Soil Glass Jar - Unpreserved BER 01 - 0-0.5, BER 01 - 0.5-1, JTY 01 - 0-0.5, T11 - 0-0.5, EMB03 - 0-0.5, T1 - 0-0.5, T2 - 0-0.5		30-APR-2010	----	----	----	12-MAY-2010	27-OCT-2010	✓
EK057G: Nitrite as N by Discrete Analyser								
Soil Glass Jar - Unpreserved IB1 - 0-0.5		29-APR-2010	11-MAY-2010	26-OCT-2010	✓	11-MAY-2010	26-OCT-2010	✓
Soil Glass Jar - Unpreserved BER 01 - 0-0.5, BER 01 - 0.5-1, JTY 01 - 0-0.5, T11 - 0-0.5, EMB03 - 0-0.5, T1 - 0-0.5, T2 - 0-0.5		30-APR-2010	11-MAY-2010	27-OCT-2010	✓	11-MAY-2010	27-OCT-2010	✓
EK059G: NOX as N by Discrete Analyser								
Soil Glass Jar - Unpreserved IB1 - 0-0.5		29-APR-2010	11-MAY-2010	26-OCT-2010	✓	11-MAY-2010	26-OCT-2010	✓
Soil Glass Jar - Unpreserved BER 01 - 0-0.5, BER 01 - 0.5-1, JTY 01 - 0-0.5, T11 - 0-0.5, EMB03 - 0-0.5, T1 - 0-0.5, T2 - 0-0.5		30-APR-2010	11-MAY-2010	27-OCT-2010	✓	11-MAY-2010	27-OCT-2010	✓



Matrix: **SOIL**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Soil Glass Jar - Unpreserved IB1 - 0-0.5	29-APR-2010	10-MAY-2010	26-OCT-2010	✓	10-MAY-2010	26-OCT-2010	✓
Soil Glass Jar - Unpreserved BER 01 - 0-0.5, JTY 01 - 0-0.5, EMB03 - 0-0.5, T2 - 0-0.5	30-APR-2010	10-MAY-2010	27-OCT-2010	✓	10-MAY-2010	27-OCT-2010	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Soil Glass Jar - Unpreserved IB1 - 0-0.5	29-APR-2010	10-MAY-2010	26-OCT-2010	✓	10-MAY-2010	26-OCT-2010	✓
Soil Glass Jar - Unpreserved BER 01 - 0-0.5, JTY 01 - 0-0.5, EMB03 - 0-0.5, T2 - 0-0.5	30-APR-2010	10-MAY-2010	27-OCT-2010	✓	10-MAY-2010	27-OCT-2010	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Soil Glass Jar - Unpreserved IB1 - 0-0.5	29-APR-2010	11-MAY-2010	26-OCT-2010	✓	11-MAY-2010	26-OCT-2010	✓
Soil Glass Jar - Unpreserved BER 01 - 0-0.5, JTY 01 - 0-0.5, EMB03 - 0-0.5, T2 - 0-0.5	30-APR-2010	11-MAY-2010	27-OCT-2010	✓	11-MAY-2010	27-OCT-2010	✓
EP005: Total Organic Carbon (TOC)							
Pulp Bag IB1 - 0-0.5	29-APR-2010	07-MAY-2010	27-MAY-2010	✓	07-MAY-2010	27-MAY-2010	✓
Pulp Bag JTY 02 - 0-0.5, BER 01 - 0-0.5, JTY 01 - 0-0.5, EMB03 - 0-0.5, T2 - 0-0.5	30-APR-2010	07-MAY-2010	28-MAY-2010	✓	07-MAY-2010	28-MAY-2010	✓



Matrix: **SOIL**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved IB1 - 0-0.5		29-APR-2010	05-MAY-2010	13-MAY-2010	✓	06-MAY-2010	14-JUN-2010	✓
Soil Glass Jar - Unpreserved IB1 - 0-0.5		29-APR-2010	05-MAY-2010	13-MAY-2010	✓	10-MAY-2010	13-MAY-2010	✓
Soil Glass Jar - Unpreserved BER 01 - 0-0.5, JTY 01 - 0-0.5, EMB03 - 0-0.5, T2 - 0-0.5	BER 01 - 0.5-1, T11 - 0-0.5, T1 - 0-0.5,	30-APR-2010	05-MAY-2010	14-MAY-2010	✓	06-MAY-2010	14-JUN-2010	✓
Soil Glass Jar - Unpreserved BER 01 - 0-0.5, TRIP BLANK, T11 - 0-0.5, T1 - 0-0.5,	BER 01 - 0.5-1, JTY 01 - 0-0.5, EMB03 - 0-0.5, T2 - 0-0.5	30-APR-2010	05-MAY-2010	14-MAY-2010	✓	10-MAY-2010	14-MAY-2010	✓
EP080-SD: BTEX								
Soil Glass Jar - Unpreserved IB1 - 0-0.5		29-APR-2010	05-MAY-2010	13-MAY-2010	✓	10-MAY-2010	13-MAY-2010	✓
Soil Glass Jar - Unpreserved BER 01 - 0-0.5, TRIP BLANK, T11 - 0-0.5, T1 - 0-0.5,	BER 01 - 0.5-1, JTY 01 - 0-0.5, EMB03 - 0-0.5, T2 - 0-0.5	30-APR-2010	05-MAY-2010	14-MAY-2010	✓	10-MAY-2010	14-MAY-2010	✓
EP090: Organotin Compounds								
Soil Glass Jar - Unpreserved IB1 - 0-0.5		29-APR-2010	07-MAY-2010	13-MAY-2010	✓	10-MAY-2010	16-JUN-2010	✓
Soil Glass Jar - Unpreserved JTY 02 - 0-0.5, BER 01 - 0-0.5, JTY 01 - 0-0.5, EMB03 - 0-0.5, T2 - 0-0.5	JTY 02 - 0.5-1, BER 01 - 0.5-1, T11 - 0-0.5, T1 - 0-0.5,	30-APR-2010	10-MAY-2010	14-MAY-2010	✓	12-MAY-2010	19-JUN-2010	✓
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Soil Glass Jar - Unpreserved IB1 - 0-0.5		29-APR-2010	05-MAY-2010	13-MAY-2010	✓	12-MAY-2010	14-JUN-2010	✓
Soil Glass Jar - Unpreserved BER 01 - 0-0.5, JTY 01 - 0-0.5, EMB03 - 0-0.5, T2 - 0-0.5	BER 01 - 0.5-1, T11 - 0-0.5, T1 - 0-0.5,	30-APR-2010	05-MAY-2010	14-MAY-2010	✓	12-MAY-2010	14-JUN-2010	✓



Matrix: **SOIL**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP131A: Organochlorine Pesticides							
Soil Glass Jar - Unpreserved IB1 - 0-0.5	29-APR-2010	05-MAY-2010	13-MAY-2010	✓	12-MAY-2010	14-JUN-2010	✓
Soil Glass Jar - Unpreserved BER 01 - 0-0.5, JTY 01 - 0-0.5, EMB03 - 0-0.5, T2 - 0-0.5 BER 01 - 0.5-1, T11 - 0-0.5, T1 - 0-0.5,	30-APR-2010	05-MAY-2010	14-MAY-2010	✓	12-MAY-2010	14-JUN-2010	✓
EP131B: Polychlorinated Biphenyls (as Aroclors)							
Soil Glass Jar - Unpreserved IB1 - 0-0.5	29-APR-2010	05-MAY-2010	13-MAY-2010	✓	12-MAY-2010	14-JUN-2010	✓
Soil Glass Jar - Unpreserved BER 01 - 0-0.5, JTY 01 - 0-0.5, EMB03 - 0-0.5, T2 - 0-0.5 BER 01 - 0.5-1, T11 - 0-0.5, T1 - 0-0.5,	30-APR-2010	05-MAY-2010	14-MAY-2010	✓	12-MAY-2010	14-JUN-2010	✓
EP132B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved IB1 - 0-0.5	29-APR-2010	05-MAY-2010	13-MAY-2010	✓	07-MAY-2010	14-JUN-2010	✓
Soil Glass Jar - Unpreserved BER 01 - 0-0.5, JTY 01 - 0-0.5, EMB03 - 0-0.5, T2 - 0-0.5 BER 01 - 0.5-1, T11 - 0-0.5, T1 - 0-0.5,	30-APR-2010	05-MAY-2010	14-MAY-2010	✓	07-MAY-2010	14-JUN-2010	✓
Soil Glass Jar - Unpreserved JTY 02 - 0-0.5, JTY 02 - 0.5-1	30-APR-2010	05-MAY-2010	14-MAY-2010	✓	11-MAY-2010	14-JUN-2010	✓



## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Buchi Ammonia - Low-Level in Sediment	EK055-SD	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Moisture Content	EA055-103	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Soluble by Discrete Analyser	EK057G	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	4	36	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	4	36	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	2	21	9.5	9.5	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Fe and Al in Sediments by ICPAES	EG005-SD	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	10	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Buchi Ammonia - Low-Level in Sediment	EK055-SD	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	2	36	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	2	36	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	1	21	4.8	4.8	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	10	10.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement



Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
TPH - Semivolatile Fraction	EP071-SD	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Buchi Ammonia - Low-Level in Sediment	EK055-SD	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	2	36	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	2	36	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	1	21	4.8	4.8	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Fe and Al in Sediments by ICPAES	EG005-SD	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	10	10.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Buchi Ammonia - Low-Level in Sediment	EK055-SD	1	20	5.0	5.0	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	16	6.3	5.0	✓	ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	1	16	6.3	5.0	✓	ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	16	6.3	5.0	✓	ALS QCS3 requirement
Organotin Analysis	EP090	2	36	5.6	5.0	✓	ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	2	36	5.6	5.0	✓	ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	16	6.3	5.0	✓	ALS QCS3 requirement
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	1	16	6.3	5.0	✓	ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	1	21	4.8	4.8	✓	ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	1	20	5.0	5.0	✓	ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	1	20	5.0	5.0	✓	ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	1	16	6.3	5.0	✓	ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	18	5.6	5.0	✓	ALS QCS3 requirement



## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055-103	SOIL	A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (1999) Schedule B(3) (Method 102)
Particle Size Analysis (Sieving)	EA150	SOIL	Particle Size Analysis by Sieving according to AS1289.3.6.1 - 1995
Particle Size Analysis by Hydrometer	EA150H	SOIL	Particle Size Analysis by Hydrometer according to AS1289.3.6.3 - 2003
Total Fe and Al in Sediments by ICPAES	EG005-SD	SOIL	(APHA 21st ed., 3120; USEPA SW 846 - 6010) (ICPAES) Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (1999) Schedule B(3). LORs per NODG
Total Metals in Sediments by ICPMS	EG020-SD	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector. Analyte list and LORs per NODG.
Total Mercury by FIMS (Low Level)	EG035T-LL	SOIL	AS 3550, APHA 21st ed., 3112 Hg - B (Flow-injection (SnCl <sub>2</sub> )(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl <sub>2</sub> which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3)
Buchi Ammonia - Low-Level in Sediment	EK055-SD	SOIL	APHA 21st ed., 4500 NH <sub>3</sub> +B&G, H Samples are steam distilled (Buchi) prior to analysis and quantified using titrimetric determination.
Nitrite as N - Soluble by Discrete Analyser	EK057G	SOIL	APHA 21st ed., 4500 NO <sub>3</sub> - B. Nitrite in a water extract is determined by direct colourimetry by Discrete Analyser.
Nitrate as N - Soluble by Discrete Analyser	EK058G	SOIL	APHA 21st ed., 4500 NO <sub>3</sub> --F. Nitrate in the 1:5 soil:water extract is reduced to nitrite by way of a cadmium reduction column followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results.
Nitrite and Nitrate as N (NO <sub>x</sub> )- Soluble by Discrete Analyser	EK059G	SOIL	APHA 21st ed., 4500 NO <sub>3</sub> - F. Combined oxidised Nitrogen (NO <sub>2</sub> +NO <sub>3</sub> ) in a water extract is determined by Cadmium Reduction, and direct colourimetry by Discrete Analyser.
TKN as N By Discrete Analyser	EK061G	SOIL	APHA 21st ed., 4500-Norg-D Soil samples are digested using Kjeldahl digestion followed by determination by Discrete Analyser.
Total Phosphorus By Discrete Analyser	EK067G	SOIL	APHA 21st ed., 4500 P-B&F This procedure involves sulfuric acid digestion and quantification using Discrete Analyser.
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	SOIL	APHA 21st ed., 4500 P-F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2



Analytical Methods	Method	Matrix	Method Descriptions
Total Organic Carbon	EP005	SOIL	In-house. Dried and pulverised sample is reacted with acid to remove inorganic Carbonates, then combusted in a LECO furnace in the presence of strong oxidants / catalysts. The evolved (Organic) Carbon (as CO <sub>2</sub> ) is automatically measured by infra-red detector.
TPH - Semivolatile Fraction	EP071-SD	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 504)
TPH Volatiles/BTEX in Sediments	EP080-SD	SOIL	(USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 501)
Organotin Analysis	EP090	SOIL	(USEPA SW 846 - 8270D) Prepared sample extracts are analysed by GC/MS coupled with high volume injection, and quantified against an established calibration curve.
Organophosphorus Pesticides (Ultra-trace)	EP130	SOIL	USEPA Method 3640 (GPC cleanup), 8141 (GC/FPD - Capillary Column) This technique is compliant with NEPM (1999) Schedule B(3) (Method 505)
Organochlorine Pesticides (Ultra-trace)	EP131A	SOIL	USEPA Method 3640 (GPC cleanup), 3620 (Florisil), 8081/8082 (GC/uECD/uECD) This technique is compliant with NEPM (1999) Schedule B(3) (Method 504)
PCB's (Ultra-trace)	EP131B	SOIL	USEPA Method 3640 (GPC cleanup), 3620 (Florisil), 8081/8082 (GC/uECD/uECD) This technique is compliant with NEPM (1999) Schedule B(3) (Method 504)
PAHs in Sediments by GCMS(SIM)	EP132B-SD	SOIL	8270 GCMS Capillary column, SIM mode using large volume programmed temperature vaporisation injection.
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	SOIL	APHA 21st ed., 4500 Norg- D; APHA 21st ed., 4500 P - H. Macro Kjeldahl digestion.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of distilled water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	USEPA 200.2 Mod. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (1999) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	* ORG16	SOIL	(USEPA SW 846 - 5030A) 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids/ Sample Cleanup	ORG17A-UTP	SOIL	In-house, Mechanical agitation (tumbler). 20g of sample, Na <sub>2</sub> SO <sub>4</sub> and surrogate are extracted with 150mL 1:1 DCM/Acetone by end over end tumble. Samples are extracted, concentrated (by KD) and exchanged into an appropriate solvent for GPC and florisil cleanup as required.
Tumbler Extraction of Solids for LVI (Non-concentrating)	ORG17D	SOIL	In house: 10g of sample, Na <sub>2</sub> SO <sub>4</sub> and surrogate are extracted with 50mL 1:1 DCM/Acetone by end over end tumbling. An aliquot is concentrated by nitrogen blowdown to a reduced volume for analysis if required.
Organotin Sample Preparation	ORG35	SOIL	In house. 20g sample is spiked with surrogate and leached in a methanol:acetic acid:UHP water mix and vacuum filtered. Reagents and solvents are added to the sample and the mixture tumbled. The butyltin compounds are simultaneously derivatised and extracted. The extract is further extracted with petroleum ether. The resultant extracts are combined and concentrated for analysis.



## Summary of Outliers

### Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

#### Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Matrix Spike (MS) Recoveries</b>							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	ES1008041-001	Anonymous	Total Kjeldahl Nitrogen as N	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK067G: Total Phosphorus as P by Discrete Analyser	ES1008041-001	Anonymous	Total Phosphorus as P	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP131A: Organochlorine Pesticides	ES1008245-001	IB1 0-0.5	4,4'-DDD	72-54-8	24.5 %	42.5-141%	Recovery less than lower data quality objective
EP131A: Organochlorine Pesticides	ES1008245-001	IB1 0-0.5	4,4'-DDT	50-29-3	33.2 %	38-143%	Recovery less than lower data quality objective
EP131A: Organochlorine Pesticides	ES1008245-001	IB1 0-0.5	Dieldrin	60-57-1	33.9 %	43.2-134%	Recovery less than lower data quality objective
EP131A: Organochlorine Pesticides	ES1008245-001	IB1 0-0.5	beta-Endosulfan	33213-65-9	34.5 %	35.8-138%	Recovery less than lower data quality objective
EP131B: Polychlorinated Biphenyls (as Aroclors)	ES1008245-001	IB1 0-0.5	Aroclor 1254	11097-69-1	51.4 %	61.3-121%	Recovery less than lower data quality objective
EP132B: Polynuclear Aromatic Hydrocarbons	ES1008241-001	Anonymous	Benzo(k)fluoranthene	207-08-9	64.2 %	70-130%	Recovery less than lower data quality objective
EP132B: Polynuclear Aromatic Hydrocarbons	ES1008241-001	Anonymous	Benzo(e)pyrene	192-97-2	64.0 %	70-130%	Recovery less than lower data quality objective

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Duplicate outliers occur.
- For all matrices, no Laboratory Control outliers occur.

#### Regular Sample Surrogates

Sub-Matrix: **SEDIMENT**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Samples Submitted</b>							
EP132T: Base/Neutral Extractable Surrogates	ES1008245-009	EMB03 0-0.5	2-Fluorobiphenyl	321-60-8	120 %	30-115 %	Recovery greater than upper data quality objective

### Outliers : Analysis Holding Time Compliance



This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- **No Analysis Holding Time Outliers exist.**

### ***Outliers : Frequency of Quality Control Samples***

The following report highlights breaches in the Frequency of Quality Control Samples.

- **No Quality Control Sample Frequency Outliers exist.**



## Environmental Division

### CERTIFICATE OF ANALYSIS

<b>Work Order</b>	<b>: ES1008252</b>	<b>Page</b>	<b>: 1 of 21</b>
<b>Client</b>	<b>: WORLEY PARSONS - INFRASTRUCTURE MWE</b>	<b>Laboratory</b>	<b>: Environmental Division Sydney</b>
<b>Contact</b>	<b>: MS VIVIAN SETO</b>	<b>Contact</b>	<b>: Charlie Pierce</b>
<b>Address</b>	<b>: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000</b>	<b>Address</b>	<b>: 277-289 Woodpark Road Smithfield NSW Australia 2164</b>
<b>E-mail</b>	<b>: vivian.seto@worleyparsons.com</b>	<b>E-mail</b>	<b>: charlie.pierce@alsenviro.com</b>
<b>Telephone</b>	<b>: +61 07 3319 3982</b>	<b>Telephone</b>	<b>: +61-2-8784 8555</b>
<b>Facsimile</b>	<b>: +61 07 3319 7791</b>	<b>Facsimile</b>	<b>: +61-2-8784 8500</b>
<b>Project</b>	<b>: NAGD - Asia Pacific LNG</b>	<b>QC Level</b>	<b>: NEPM 1999 Schedule B(3) and ALS QCS3 requirement</b>
<b>Order number</b>	<b>: ----</b>	<b>Date Samples Received</b>	<b>: 05-MAY-2010</b>
<b>C-O-C number</b>	<b>: ----</b>	<b>Issue Date</b>	<b>: 27-MAY-2010</b>
<b>Sampler</b>	<b>: ----</b>	<b>No. of samples received</b>	<b>: 18</b>
<b>Site</b>	<b>: ----</b>	<b>No. of samples analysed</b>	<b>: 18</b>
<b>Quote number</b>	<b>: BN/187/10</b>		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

### Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Organics
Ankit Joshi	Inorganic Chemist	Inorganics
Celine Conceicao	Spectroscopist	Inorganics
Dianne Blane	Laboratory Supervisor	Newcastle
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
Matt Frost	Organic Instrument Chemist	Organics

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## General Comments

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

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

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

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

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

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

LOR = Limit of reporting

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

- **EG005T: Poor precision was obtained for Aluminium on sample ES1008369#1 due to sample heterogeneity.**



## Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	MOF 08 0-0.5	MOF 08 0.5-1.0	MOF 08 1.0-2.0	MOF 09 0-0.5	MOF 09 0.5-1.0
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00
				ES1008252-001	ES1008252-002	ES1008252-003	ES1008252-004	ES1008252-005
<b>EA150: Particle Sizing</b>								
+75µm	----	1	%	9	11	----	8	23
+150µm	----	1	%	8	10	----	6	21
+300µm	----	1	%	7	9	----	5	21
+425µm	----	1	%	7	9	----	4	20
+600µm	----	1	%	6	8	----	3	20
+1180µm	----	1	%	5	7	----	2	20
+2.36mm	----	1	%	4	5	----	1	19
+4.75mm	----	1	%	2	4	----	<1	18
+9.5mm	----	1	%	<1	<1	----	<1	18
+19.0mm	----	1	%	<1	<1	----	<1	<1
+37.5mm	----	1	%	<1	<1	----	<1	<1
+75.0mm	----	1	%	<1	<1	----	<1	<1
<b>EA055: Moisture Content</b>								
^ Moisture Content (dried @ 103°C)	----	1.0	%	49.0	44.8	41.7	45.2	43.1
<b>EA150: Soil Classification based on Particle Size</b>								
Clay (<2 µm)	----	1	%	49	49	----	54	36
Silt (2-60 µm)	----	1	%	40	37	----	35	39
Sand (0.06-2.00 mm)	----	1	%	7	9	----	10	6
Gravel (>2mm)	----	1	%	4	5	----	1	19
Cobbles (>6cm)	----	1	%	<1	<1	----	<1	<1
<b>EG005-SD: Total Metals in Sediments by ICP-AES</b>								
Aluminium	7429-90-5	50	mg/kg	12000	20800	21000	20600	20300
Iron	7439-89-6	50	mg/kg	17000	29500	32200	31000	30100
<b>EG020-SD: Total Metals in Sediments by ICPMS</b>								
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Arsenic	7440-38-2	1.00	mg/kg	7.00	13.4	14.6	12.1	12.2
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	1.0	mg/kg	15.6	28.4	28.8	27.0	26.6
Copper	7440-50-8	1.0	mg/kg	13.4	27.9	31.2	27.8	31.4
Cobalt	7440-48-4	0.5	mg/kg	6.2	13.5	14.1	13.3	16.3
Lead	7439-92-1	1.0	mg/kg	5.1	9.9	11.0	9.2	9.2
Manganese	7439-96-5	10	mg/kg	154	303	296	183	302
Nickel	7440-02-0	1.0	mg/kg	7.0	13.4	13.6	11.7	13.0
Selenium	7782-49-2	0.1	mg/kg	0.5	0.7	0.8	0.7	0.8
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium	7440-62-2	2.0	mg/kg	33.9	62.5	70.4	66.4	64.4
Zinc	7440-66-6	1.0	mg/kg	23.8	45.9	45.8	41.1	41.7



## Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				MOF 08 0-0.5	MOF 08 0.5-1.0	MOF 08 1.0-2.0	MOF 09 0-0.5	MOF 09 0.5-1.0
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008252-001	ES1008252-002	ES1008252-003	ES1008252-004	ES1008252-005
<b>EG020-SD: Total Metals in Sediments by ICPMS - Continued</b>								
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
Mercury	7439-97-6	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	0.01
<b>EK055: Ammonia as N</b>								
Ammonia as N	7664-41-7	1	mg/kg	4	<1	7	----	----
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	0.3	<0.1	1.2	----	----
<b>EK059G: NOX as N by Discrete Analyser</b>								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	0.3	<0.1	1.2	----	----
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	830	720	670	----	----
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>								
Total Phosphorus as P	----	2	mg/kg	272	241	272	----	----
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>								
Reactive Phosphorus as P	----	0.1	mg/kg	4.0	<0.1	<0.1	----	----
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	0.02	%	1.12	1.09	1.11	1.18	1.33
<b>EP080-SD / EP071-SD: Total Petroleum Hydrocarbons</b>								
C6 - C9 Fraction	----	3	mg/kg	<3	<3	<3	----	----
C10 - C14 Fraction	----	3	mg/kg	<3	<3	<3	----	----
C15 - C28 Fraction	----	3	mg/kg	<3	<3	<3	----	----
C29 - C36 Fraction	----	5	mg/kg	<5	<5	<5	----	----
C10 - C36 Fraction (sum)	----	3	mg/kg	<3	<3	<3	----	----
<b>EP080-SD: BTEX</b>								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	0.2	<0.2	----	----
<b>EP090: Organotin Compounds</b>								
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	<0.5	<0.5	<0.5
<b>EP130A: Organophosphorus Pesticides (Ultra-trace)</b>								
Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	<10	----	----
Carbophenothion	786-19-6	10	µg/kg	<10	<10	<10	----	----



## Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	MOF 08 0-0.5	MOF 08 0.5-1.0	MOF 08 1.0-2.0	MOF 09 0-0.5	MOF 09 0.5-1.0
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00
				ES1008252-001	ES1008252-002	ES1008252-003	ES1008252-004	ES1008252-005
<b>EP130A: Organophosphorus Pesticides (Ultra-trace) - Continued</b>								
Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	<10.0	<10.0	<10.0	----	----
Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	<10	<10	----	----
Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	<10	----	----
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	<10	----	----
Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	<10	----	----
Diazinon	333-41-5	10	µg/kg	<10	<10	<10	----	----
Dichlorvos	62-73-7	10	µg/kg	<10	<10	<10	----	----
Dimethoate	60-51-5	10	µg/kg	<10	<10	<10	----	----
Ethion	563-12-2	10	µg/kg	<10	<10	<10	----	----
Fenamiphos	22224-92-6	10	µg/kg	<10	<10	<10	----	----
Fenthion	55-38-9	10	µg/kg	<10	<10	<10	----	----
Malathion	121-75-5	10	µg/kg	<10	<10	<10	----	----
Azinphos Methyl	86-50-0	10	µg/kg	<10	<10	<10	----	----
Monocrotophos	6923-22-4	10	µg/kg	<10	<10	<10	----	----
Parathion	56-38-2	10	µg/kg	<10	<10	<10	----	----
Parathion-methyl	298-00-0	10	µg/kg	<10	<10	<10	----	----
Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	<10	----	----
Prothiofos	34643-46-4	10	µg/kg	<10	<10	<10	----	----
<b>EP131A: Organochlorine Pesticides</b>								
Aldrin	309-00-2	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
alpha-BHC	319-84-6	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
beta-BHC	319-85-7	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
delta-BHC	319-86-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
4,4'-DDD	72-54-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
4,4'-DDE	72-55-9	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
4,4'-DDT	50-29-3	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
^ DDT (total)	----	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Dieldrin	60-57-1	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Endrin	72-20-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Heptachlor	76-44-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	<0.50	<0.50	----	----



## Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				MOF 08 0-0.5	MOF 08 0.5-1.0	MOF 08 1.0-2.0	MOF 09 0-0.5	MOF 09 0.5-1.0
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008252-001	ES1008252-002	ES1008252-003	ES1008252-004	ES1008252-005
<b>EP131A: Organochlorine Pesticides - Continued</b>								
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	<0.25	----	----
Methoxychlor	72-43-5	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	<0.25	----	----
trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	<0.25	----	----
^ Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	<0.25	----	----
Oxychlordane	27304-13-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
<b>EP131B: Polychlorinated Biphenyls (as Aroclors)</b>								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1016	12974-11-2	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
<b>EP132B: Polynuclear Aromatic Hydrocarbons</b>								
Naphthalene	91-20-3	5	µg/kg	<5	<5	<5	<5	<5
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	<5	<5	<5
Acenaphthylene	208-96-8	4	µg/kg	<4	<4	<4	<4	<4
Acenaphthene	83-32-9	4	µg/kg	<4	<4	<4	<4	<4
Fluorene	86-73-7	4	µg/kg	<4	<4	<4	<4	<4
Phenanthrene	85-01-8	4	µg/kg	<4	<4	<4	<4	<4
Anthracene	120-12-7	4	µg/kg	<4	<4	<4	<4	<4
Fluoranthene	206-44-0	4	µg/kg	<4	<4	<4	<4	<4
Pyrene	129-00-0	4	µg/kg	<4	<4	4	<4	<4
Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	<4	<4	<4
Chrysene	218-01-9	4	µg/kg	<4	<4	<4	<4	<4
Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	5	<4	<4	<4
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	<4	<4	<4
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	<4	<4	<4
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	<4	<4	<4
Perylene	198-55-0	4	µg/kg	42	240	264	11	36
Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	<4	<4	<4
Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	<4	<4	<4
Indeno(1,2,3-cd)pyrene	193-39-5	4	µg/kg	<4	<4	<4	<4	<4
Coronene	191-07-1	5	µg/kg	<5	<5	<5	<5	<5



## Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				MOF 08 0-0.5	MOF 08 0.5-1.0	MOF 08 1.0-2.0	MOF 09 0-0.5	MOF 09 0.5-1.0
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008252-001	ES1008252-002	ES1008252-003	ES1008252-004	ES1008252-005
<b>EP132B: Polynuclear Aromatic Hydrocarbons - Continued</b>								
^ Sum of PAHs	----	4	µg/kg	42	245	268	11	36
<b>EP080-SD: TPH(V)/BTEX Surrogates</b>								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	87.8	117	110	----	----
Toluene-D8	2037-26-5	0.1	%	85.1	81.5	84.2	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	99.3	119	100	----	----
<b>EP090S: Organotin Surrogate</b>								
Tripopyltin	----	0.1	%	99.0	88.8	96.5	96.3	82.3
<b>EP130S: Organophosphorus Pesticide Surrogate</b>								
DEF	78-48-8	0.1	%	66.4	59.8	62.5	----	----
<b>EP131S: OC Pesticide Surrogate</b>								
Dibromo-DDE	21655-73-2	0.1	%	49.2	41.3	29.2	----	----
<b>EP131T: PCB Surrogate</b>								
Decachlorobiphenyl	2051-24-3	0.1	%	58.8	47.2	29.2	----	----
<b>EP132T: Base/Neutral Extractable Surrogates</b>								
2-Fluorobiphenyl	321-60-8	0.1	%	110	112	118	111	86.1
Anthracene-d10	1719-06-8	0.1	%	117	119	118	119	118
4-Terphenyl-d14	1718-51-0	0.1	%	114	116	98.0	105	110



## Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				MOF 09 1.0-2.0	MOF 07 0-0.5	MOF 07 0.5-1.0	T9 0-0.5	T10 0-0.5
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008252-006	ES1008252-007	ES1008252-008	ES1008252-009	ES1008252-010
<b>EA150: Particle Sizing</b>								
+75µm	----	1	%	----	7	2	----	----
+150µm	----	1	%	----	6	2	----	----
+300µm	----	1	%	----	5	1	----	----
+425µm	----	1	%	----	4	1	----	----
+600µm	----	1	%	----	4	<1	----	----
+1180µm	----	1	%	----	2	<1	----	----
+2.36mm	----	1	%	----	1	<1	----	----
+4.75mm	----	1	%	----	<1	<1	----	----
+9.5mm	----	1	%	----	<1	<1	----	----
+19.0mm	----	1	%	----	<1	<1	----	----
+37.5mm	----	1	%	----	<1	<1	----	----
+75.0mm	----	1	%	----	<1	<1	----	----
<b>EA055: Moisture Content</b>								
^ Moisture Content (dried @ 103°C)	----	1.0	%	39.5	51.4	48.2	52.8	47.9
<b>EA150: Soil Classification based on Particle Size</b>								
Clay (<2 µm)	----	1	%	----	50	54	----	----
Silt (2-60 µm)	----	1	%	----	43	42	----	----
Sand (0.06-2.00 mm)	----	1	%	----	5	4	----	----
Gravel (>2mm)	----	1	%	----	2	<1	----	----
Cobbles (>6cm)	----	1	%	----	<1	<1	----	----
<b>EG005-SD: Total Metals in Sediments by ICP-AES</b>								
Aluminium	7429-90-5	50	mg/kg	19800	22000	22800	15900	20800
Iron	7439-89-6	50	mg/kg	34100	37100	40300	32700	29600
<b>EG020-SD: Total Metals in Sediments by ICPMS</b>								
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Arsenic	7440-38-2	1.00	mg/kg	11.5	16.2	13.0	21.0	11.0
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	1.0	mg/kg	24.6	29.8	29.5	24.1	28.2
Copper	7440-50-8	1.0	mg/kg	35.0	33.5	36.6	28.3	36.6
Cobalt	7440-48-4	0.5	mg/kg	18.4	16.7	18.4	14.9	14.6
Lead	7439-92-1	1.0	mg/kg	8.8	10.0	9.9	9.4	10.0
Manganese	7439-96-5	10	mg/kg	324	345	533	308	257
Nickel	7440-02-0	1.0	mg/kg	13.5	15.2	14.8	12.7	14.2
Selenium	7782-49-2	0.1	mg/kg	0.8	0.9	1.1	1.0	1.0
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Vanadium	7440-62-2	2.0	mg/kg	76.6	82.4	81.2	60.4	74.6
Zinc	7440-66-6	1.0	mg/kg	41.5	47.8	50.9	42.5	45.7



## Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				MOF 09 1.0-2.0	MOF 07 0-0.5	MOF 07 0.5-1.0	T9 0-0.5	T10 0-0.5
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008252-006	ES1008252-007	ES1008252-008	ES1008252-009	ES1008252-010
<b>EG020-SD: Total Metals in Sediments by ICPMS - Continued</b>								
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
Mercury	7439-97-6	0.01	mg/kg	<0.01	0.01	0.01	0.03	0.02
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	0.02	%	1.71	2.91	2.19	5.55	2.81
<b>EP090: Organotin Compounds</b>								
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	<0.5	<0.5	<0.5
<b>EP132B: Polynuclear Aromatic Hydrocarbons</b>								
Naphthalene	91-20-3	5	µg/kg	<5	<5	<5	<5	<5
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	<5	<5	<5
Acenaphthylene	208-96-8	4	µg/kg	<4	<5	<4	<5	<4
Acenaphthene	83-32-9	4	µg/kg	<4	<5	<4	<5	<4
Fluorene	86-73-7	4	µg/kg	<4	<5	<4	<5	<4
Phenanthrene	85-01-8	4	µg/kg	<4	<5	<4	<5	<4
Anthracene	120-12-7	4	µg/kg	<4	<5	<4	<5	<4
Fluoranthene	206-44-0	4	µg/kg	<4	<5	<4	<5	<4
Pyrene	129-00-0	4	µg/kg	<4	<5	5	<5	<4
Benz(a)anthracene	56-55-3	4	µg/kg	<4	<5	<4	<5	<4
Chrysene	218-01-9	4	µg/kg	<4	<5	<4	<5	<4
Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<5	<4	<5	<4
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<5	<4	<5	<4
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<5	<4	<5	<4
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<5	<4	<5	<4
Perylene	198-55-0	4	µg/kg	28	22	85	<5	73
Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<5	<4	<5	<4
Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<5	<4	<5	<4
Indeno(1,2,3,cd)pyrene	193-39-5	4	µg/kg	<4	<5	<4	<5	<4
Coronene	191-07-1	5	µg/kg	<5	<5	<5	<5	<5
^ Sum of PAHs	----	4	µg/kg	28	22	90	<4	73
<b>EP090S: Organotin Surrogate</b>								
Tripropyltin	----	0.1	%	88.4	84.5	35.2	81.5	69.3
<b>EP132T: Base/Neutral Extractable Surrogates</b>								
2-Fluorobiphenyl	321-60-8	0.1	%	105	106	109	120	113
Anthracene-d10	1719-06-8	0.1	%	112	116	112	110	102
4-Terphenyl-d14	1718-51-0	0.1	%	102	110	117	89.1	106



## Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				MOF 05 0-0.5	MOF 05 0.5-1.0	MOF 05 1.0-1.2	MOF 01 0-0.5	MOF 01 0.5-1.0
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008252-011	ES1008252-012	ES1008252-013	ES1008252-014	ES1008252-015
<b>EA150: Particle Sizing</b>								
+75µm	----	1	%	17	36	81	86	79
+150µm	----	1	%	5	33	69	81	74
+300µm	----	1	%	3	23	29	50	42
+425µm	----	1	%	3	19	22	33	30
+600µm	----	1	%	2	16	20	22	23
+1180µm	----	1	%	1	13	17	12	16
+2.36mm	----	1	%	<1	9	14	7	9
+4.75mm	----	1	%	<1	5	10	2	3
+9.5mm	----	1	%	<1	<1	8	<1	<1
+19.0mm	----	1	%	<1	<1	<1	<1	<1
+37.5mm	----	1	%	<1	<1	<1	<1	<1
+75.0mm	----	1	%	<1	<1	<1	<1	<1
<b>EA055: Moisture Content</b>								
^ Moisture Content (dried @ 103°C)	----	1.0	%	49.4	39.5	22.8	28.2	29.3
<b>EA150: Soil Classification based on Particle Size</b>								
Clay (<2 µm)	----	1	%	46	37	10	9	13
Silt (2-60 µm)	----	1	%	36	26	8	4	8
Sand (0.06-2.00 mm)	----	1	%	18	27	69	80	69
Gravel (>2mm)	----	1	%	<1	10	13	7	10
Cobbles (>6cm)	----	1	%	<1	<1	<1	<1	<1
<b>EG005-SD: Total Metals in Sediments by ICP-AES</b>								
Aluminium	7429-90-5	50	mg/kg	19100	15700	3800	3220	4960
Iron	7439-89-6	50	mg/kg	28700	15300	9230	11000	12300
<b>EG020-SD: Total Metals in Sediments by ICPMS</b>								
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Arsenic	7440-38-2	1.00	mg/kg	13.7	3.41	7.44	10.8	9.28
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	1.0	mg/kg	26.0	16.4	8.0	7.2	9.9
Copper	7440-50-8	1.0	mg/kg	34.1	28.4	5.4	4.2	6.2
Cobalt	7440-48-4	0.5	mg/kg	13.1	9.5	5.7	7.2	6.6
Lead	7439-92-1	1.0	mg/kg	9.1	7.4	2.9	2.4	3.9
Manganese	7439-96-5	10	mg/kg	239	111	958	1280	395
Nickel	7440-02-0	1.0	mg/kg	13.8	8.7	4.0	4.2	5.2
Selenium	7782-49-2	0.1	mg/kg	1.0	0.7	0.3	0.3	0.4
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium	7440-62-2	2.0	mg/kg	66.3	39.2	21.6	24.5	27.5
Zinc	7440-66-6	1.0	mg/kg	42.1	28.9	10.3	10.6	13.3



## Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				MOF 05 0-0.5	MOF 05 0.5-1.0	MOF 05 1.0-1.2	MOF 01 0-0.5	MOF 01 0.5-1.0
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008252-011	ES1008252-012	ES1008252-013	ES1008252-014	ES1008252-015
<b>EG020-SD: Total Metals in Sediments by ICPMS - Continued</b>								
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
Mercury	7439-97-6	0.01	mg/kg	0.02	0.01	<0.01	<0.01	<0.01
<b>EK055: Ammonia as N</b>								
Ammonia as N	7664-41-7	1	mg/kg	----	----	----	<1	<1
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N (Sol.)	----	0.1	mg/kg	----	----	----	<0.1	<0.1
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	----	----	----	<0.1	0.3
<b>EK059G: NOX as N by Discrete Analyser</b>								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	----	----	----	<0.1	0.3
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	----	----	----	80	180
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>								
Total Phosphorus as P	----	2	mg/kg	----	----	----	141	149
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>								
Reactive Phosphorus as P	----	0.1	mg/kg	----	----	----	0.6	0.8
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	0.02	%	3.15	1.55	0.36	0.30	0.32
<b>EP080-SD / EP071-SD: Total Petroleum Hydrocarbons</b>								
C6 - C9 Fraction	----	3	mg/kg	----	----	----	<3	<3
C10 - C14 Fraction	----	3	mg/kg	----	----	----	<3	<3
C15 - C28 Fraction	----	3	mg/kg	----	----	----	<3	<3
C29 - C36 Fraction	----	5	mg/kg	----	----	----	<5	<5
C10 - C36 Fraction (sum)	----	3	mg/kg	----	----	----	<3	<3
<b>EP080-SD: BTEX</b>								
Benzene	71-43-2	0.2	mg/kg	----	----	----	<0.2	<0.2
Toluene	108-88-3	0.2	mg/kg	----	----	----	<0.2	<0.2
Ethylbenzene	100-41-4	0.2	mg/kg	----	----	----	<0.2	<0.2
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	----	----	----	<0.2	<0.2
ortho-Xylene	95-47-6	0.2	mg/kg	----	----	----	<0.2	<0.2
<b>EP090: Organotin Compounds</b>								
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	<0.5	<0.5	<0.5
<b>EP130A: Organophosphorus Pesticides (Ultra-trace)</b>								
Bromophos-ethyl	4824-78-6	10	µg/kg	----	----	----	<10	<10
Carbophenothion	786-19-6	10	µg/kg	----	----	----	<10	<10



## Analytical Results

Sub-Matrix: SOIL

Client sample ID

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Compound	CAS Number	LOR	Unit	MOF 05 0-0.5	MOF 05 0.5-1.0	MOF 05 1.0-1.2	MOF 01 0-0.5	MOF 01 0.5-1.0
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00
				ES1008252-011	ES1008252-012	ES1008252-013	ES1008252-014	ES1008252-015
<b>EP130A: Organophosphorus Pesticides (Ultra-trace) - Continued</b>								
Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	----	----	----	<10.0	<10.0
Chlorfenvinphos (Z)	470-90-8	10	µg/kg	----	----	----	<10	<10
Chlorpyrifos	2921-88-2	10	µg/kg	----	----	----	<10	<10
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	----	----	----	<10	<10
Demeton-S-methyl	919-86-8	10	µg/kg	----	----	----	<10	<10
Diazinon	333-41-5	10	µg/kg	----	----	----	<10	<10
Dichlorvos	62-73-7	10	µg/kg	----	----	----	<10	<10
Dimethoate	60-51-5	10	µg/kg	----	----	----	<10	<10
Ethion	563-12-2	10	µg/kg	----	----	----	<10	<10
Fenamiphos	22224-92-6	10	µg/kg	----	----	----	<10	<10
Fenthion	55-38-9	10	µg/kg	----	----	----	<10	<10
Malathion	121-75-5	10	µg/kg	----	----	----	<10	<10
Azinphos Methyl	86-50-0	10	µg/kg	----	----	----	<10	<10
Monocrotophos	6923-22-4	10	µg/kg	----	----	----	<10	<10
Parathion	56-38-2	10	µg/kg	----	----	----	<10	<10
Parathion-methyl	298-00-0	10	µg/kg	----	----	----	<10	<10
Pirimphos-ethyl	23505-41-1	10	µg/kg	----	----	----	<10	<10
Prothiofos	34643-46-4	10	µg/kg	----	----	----	<10	<10
<b>EP131A: Organochlorine Pesticides</b>								
Aldrin	309-00-2	0.50	µg/kg	----	----	----	<0.50	<0.50
alpha-BHC	319-84-6	0.50	µg/kg	----	----	----	<0.50	<0.50
beta-BHC	319-85-7	0.50	µg/kg	----	----	----	<0.50	<0.50
delta-BHC	319-86-8	0.50	µg/kg	----	----	----	<0.50	<0.50
4,4'-DDD	72-54-8	0.50	µg/kg	----	----	----	<0.50	<0.50
4,4'-DDE	72-55-9	0.50	µg/kg	----	----	----	<0.50	<0.50
4,4'-DDT	50-29-3	0.50	µg/kg	----	----	----	<0.50	<0.50
^ DDT (total)	----	0.50	µg/kg	----	----	----	<0.50	<0.50
Dieldrin	60-57-1	0.50	µg/kg	----	----	----	<0.50	<0.50
alpha-Endosulfan	959-98-8	0.50	µg/kg	----	----	----	<0.50	<0.50
beta-Endosulfan	33213-65-9	0.50	µg/kg	----	----	----	<0.50	<0.50
Endosulfan sulfate	1031-07-8	0.50	µg/kg	----	----	----	<0.50	<0.50
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	----	----	----	<0.50	<0.50
Endrin	72-20-8	0.50	µg/kg	----	----	----	<0.50	<0.50
Endrin aldehyde	7421-93-4	0.50	µg/kg	----	----	----	<0.50	<0.50
Endrin ketone	53494-70-5	0.50	µg/kg	----	----	----	<0.50	<0.50
Heptachlor	76-44-8	0.50	µg/kg	----	----	----	<0.50	<0.50
Heptachlor epoxide	1024-57-3	0.50	µg/kg	----	----	----	<0.50	<0.50



## Analytical Results

Sub-Matrix: SOIL

Client sample ID

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				MOF 05 0-0.5	MOF 05 0.5-1.0	MOF 05 1.0-1.2	MOF 01 0-0.5	MOF 01 0.5-1.0
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008252-011	ES1008252-012	ES1008252-013	ES1008252-014	ES1008252-015
<b>EP131A: Organochlorine Pesticides - Continued</b>								
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	----	----	----	<0.50	<0.50
gamma-BHC	58-89-9	0.25	µg/kg	----	----	----	<0.25	<0.25
Methoxychlor	72-43-5	0.50	µg/kg	----	----	----	<0.50	<0.50
cis-Chlordane	5103-71-9	0.25	µg/kg	----	----	----	<0.25	<0.25
trans-Chlordane	5103-74-2	0.25	µg/kg	----	----	----	<0.25	<0.25
^ Total Chlordane (sum)	----	0.25	µg/kg	----	----	----	<0.25	<0.25
Oxychlordane	27304-13-8	0.50	µg/kg	----	----	----	<0.50	<0.50
<b>EP131B: Polychlorinated Biphenyls (as Aroclors)</b>								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1016	12974-11-2	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1221	11104-28-2	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1232	11141-16-5	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1242	53469-21-9	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1248	12672-29-6	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1254	11097-69-1	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1260	11096-82-5	5.0	µg/kg	----	----	----	<5.0	<5.0
<b>EP132B: Polynuclear Aromatic Hydrocarbons</b>								
Naphthalene	91-20-3	5	µg/kg	<5	<5	<5	<5	<5
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	<5	<5	<5
Acenaphthylene	208-96-8	4	µg/kg	<4	<4	<4	<4	<4
Acenaphthene	83-32-9	4	µg/kg	<4	<4	<4	<4	<4
Fluorene	86-73-7	4	µg/kg	<4	<4	<4	<4	<4
Phenanthrene	85-01-8	4	µg/kg	<4	<4	<4	<4	<4
Anthracene	120-12-7	4	µg/kg	<4	<4	<4	<4	<4
Fluoranthene	206-44-0	4	µg/kg	<4	<4	<4	<4	<4
Pyrene	129-00-0	4	µg/kg	<4	<4	<4	<4	<4
Benz(a)anthracene	56-55-3	4	µg/kg	4	5	<4	<4	<4
Chrysene	218-01-9	4	µg/kg	<4	5	<4	<4	<4
Benzo(b)fluoranthene	205-99-2	4	µg/kg	5	6	<4	<4	<4
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	<4	<4	<4
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	<4	<4	<4
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	4	<4	<4	<4
Perylene	198-55-0	4	µg/kg	49	66	<4	4	<4
Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	5	<4	<4	<4
Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	<4	<4	<4
Indeno(1,2,3-cd)pyrene	193-39-5	4	µg/kg	<4	<4	<4	<4	<4
Coronene	191-07-1	5	µg/kg	<5	<5	<5	<5	<5



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				MOF 05 0-0.5	MOF 05 0.5-1.0	MOF 05 1.0-1.2	MOF 01 0-0.5	MOF 01 0.5-1.0
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008252-011	ES1008252-012	ES1008252-013	ES1008252-014	ES1008252-015
<b>EP132B: Polynuclear Aromatic Hydrocarbons - Continued</b>								
^ Sum of PAHs	----	4	µg/kg	58	91	<4	4	<4
<b>EP080-SD: TPH(V)/BTEX Surrogates</b>								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	----	----	----	108	109
Toluene-D8	2037-26-5	0.1	%	----	----	----	93.1	90.2
4-Bromofluorobenzene	460-00-4	0.1	%	----	----	----	99.4	97.8
<b>EP090S: Organotin Surrogate</b>								
Tripopyltin	----	0.1	%	44.2	82.6	88.8	90.1	79.1
<b>EP130S: Organophosphorus Pesticide Surrogate</b>								
DEF	78-48-8	0.1	%	----	----	----	60.1	79.1
<b>EP131S: OC Pesticide Surrogate</b>								
Dibromo-DDE	21655-73-2	0.1	%	----	----	----	30.9	68.3
<b>EP131T: PCB Surrogate</b>								
Decachlorobiphenyl	2051-24-3	0.1	%	----	----	----	25.7	77.2
<b>EP132T: Base/Neutral Extractable Surrogates</b>								
2-Fluorobiphenyl	321-60-8	0.1	%	107	112	94.5	120	114
Anthracene-d10	1719-06-8	0.1	%	103	114	112	111	107
4-Terphenyl-d14	1718-51-0	0.1	%	105	117	102	112	112



## Analytical Results

Sub-Matrix: SOIL

Client sample ID

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				MOF 01 1.0-2.0	MOF 04 0-0.5	MOF 04 0.5-1.0	----	----
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	----	----
Compound	CAS Number	LOR	Unit	ES1008252-016	ES1008252-017	ES1008252-018	----	----
<b>EA150: Particle Sizing</b>								
+75µm	----	1	%	76	48	4	----	----
+150µm	----	1	%	70	44	3	----	----
+300µm	----	1	%	32	29	3	----	----
+425µm	----	1	%	20	23	3	----	----
+600µm	----	1	%	16	18	2	----	----
+1180µm	----	1	%	11	13	2	----	----
+2.36mm	----	1	%	7	8	<1	----	----
+4.75mm	----	1	%	2	2	<1	----	----
+9.5mm	----	1	%	<1	<1	<1	----	----
+19.0mm	----	1	%	<1	<1	<1	----	----
+37.5mm	----	1	%	<1	<1	<1	----	----
+75.0mm	----	1	%	<1	<1	<1	----	----
<b>EA055: Moisture Content</b>								
^ Moisture Content (dried @ 103°C)	----	1.0	%	21.2	48.2	26.2	----	----
<b>EA150: Soil Classification based on Particle Size</b>								
Clay (<2 µm)	----	1	%	14	31	54	----	----
Silt (2-60 µm)	----	1	%	9	19	41	----	----
Sand (0.06-2.00 mm)	----	1	%	70	42	5	----	----
Gravel (>2mm)	----	1	%	7	8	<1	----	----
Cobbles (>6cm)	----	1	%	<1	<1	<1	----	----
<b>EG005-SD: Total Metals in Sediments by ICP-AES</b>								
Aluminium	7429-90-5	50	mg/kg	3360	15600	14100	----	----
Iron	7439-89-6	50	mg/kg	9720	27600	30800	----	----
<b>EG020-SD: Total Metals in Sediments by ICPMS</b>								
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	0.55	----	----
Arsenic	7440-38-2	1.00	mg/kg	8.32	14.2	11.4	----	----
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
Chromium	7440-47-3	1.0	mg/kg	6.5	23.0	18.9	----	----
Copper	7440-50-8	1.0	mg/kg	5.5	26.7	27.0	----	----
Cobalt	7440-48-4	0.5	mg/kg	4.2	15.2	22.2	----	----
Lead	7439-92-1	1.0	mg/kg	3.7	8.5	6.3	----	----
Manganese	7439-96-5	10	mg/kg	186	316	290	----	----
Nickel	7440-02-0	1.0	mg/kg	2.7	12.4	12.1	----	----
Selenium	7782-49-2	0.1	mg/kg	0.3	0.8	0.7	----	----
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
Vanadium	7440-62-2	2.0	mg/kg	20.9	51.6	70.8	----	----
Zinc	7440-66-6	1.0	mg/kg	9.6	38.2	34.3	----	----



## Analytical Results

Sub-Matrix: **SOIL**

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				MOF 01 1.0-2.0	MOF 04 0-0.5	MOF 04 0.5-1.0	----	----
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	----	----
Compound	CAS Number	LOR	Unit	ES1008252-016	ES1008252-017	ES1008252-018	----	----
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
Mercury	7439-97-6	0.01	mg/kg	0.04	0.02	0.01	----	----
<b>EK055: Ammonia as N</b>								
Ammonia as N	7664-41-7	1	mg/kg	<1	----	----	----	----
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	----	----	----	----
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	0.1	----	----	----	----
<b>EK059G: NOX as N by Discrete Analyser</b>								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	0.1	----	----	----	----
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	210	----	----	----	----
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>								
Total Phosphorus as P	----	2	mg/kg	137	----	----	----	----
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>								
Reactive Phosphorus as P	----	0.1	mg/kg	0.3	----	----	----	----
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	0.02	%	0.26	2.72	2.29	----	----
<b>EP080-SD / EP071-SD: Total Petroleum Hydrocarbons</b>								
C6 - C9 Fraction	----	3	mg/kg	<3	----	----	----	----
C10 - C14 Fraction	----	3	mg/kg	<3	----	----	----	----
C15 - C28 Fraction	----	3	mg/kg	<3	----	----	----	----
C29 - C36 Fraction	----	5	mg/kg	<5	----	----	----	----
C10 - C36 Fraction (sum)	----	3	mg/kg	<3	----	----	----	----
<b>EP080-SD: BTEX</b>								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.2	mg/kg	<0.2	----	----	----	----
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	----	----	----	----
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	----	----	----	----
<b>EP090: Organotin Compounds</b>								
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	<0.5	----	----
<b>EP130A: Organophosphorus Pesticides (Ultra-trace)</b>								
Bromophos-ethyl	4824-78-6	10	µg/kg	<10	----	----	----	----
Carbophenothion	786-19-6	10	µg/kg	<10	----	----	----	----
Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	<10.0	----	----	----	----



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Sub-Matrix: SOIL

Client sample ID

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				MOF 01 1.0-2.0	MOF 04 0-0.5	MOF 04 0.5-1.0	----	----
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	----	----
Compound	CAS Number	LOR	Unit	ES1008252-016	ES1008252-017	ES1008252-018	----	----
<b>EP130A: Organophosphorus Pesticides (Ultra-trace) - Continued</b>								
Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	----	----	----	----
Chlorpyrifos	2921-88-2	10	µg/kg	<10	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	----	----	----	----
Demeton-S-methyl	919-86-8	10	µg/kg	<10	----	----	----	----
Diazinon	333-41-5	10	µg/kg	<10	----	----	----	----
Dichlorvos	62-73-7	10	µg/kg	<10	----	----	----	----
Dimethoate	60-51-5	10	µg/kg	<10	----	----	----	----
Ethion	563-12-2	10	µg/kg	<10	----	----	----	----
Fenamiphos	22224-92-6	10	µg/kg	<10	----	----	----	----
Fenthion	55-38-9	10	µg/kg	<10	----	----	----	----
Malathion	121-75-5	10	µg/kg	<10	----	----	----	----
Azinphos Methyl	86-50-0	10	µg/kg	<10	----	----	----	----
Monocrotophos	6923-22-4	10	µg/kg	<10	----	----	----	----
Parathion	56-38-2	10	µg/kg	<10	----	----	----	----
Parathion-methyl	298-00-0	10	µg/kg	<10	----	----	----	----
Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	----	----	----	----
Prothiofos	34643-46-4	10	µg/kg	<10	----	----	----	----
<b>EP131A: Organochlorine Pesticides</b>								
Aldrin	309-00-2	0.50	µg/kg	<0.50	----	----	----	----
alpha-BHC	319-84-6	0.50	µg/kg	<0.50	----	----	----	----
beta-BHC	319-85-7	0.50	µg/kg	<0.50	----	----	----	----
delta-BHC	319-86-8	0.50	µg/kg	<0.50	----	----	----	----
4,4'-DDD	72-54-8	0.50	µg/kg	<0.50	----	----	----	----
4,4'-DDE	72-55-9	0.50	µg/kg	<0.50	----	----	----	----
4,4'-DDT	50-29-3	0.50	µg/kg	<0.50	----	----	----	----
^ DDT (total)	----	0.50	µg/kg	<0.50	----	----	----	----
Dieldrin	60-57-1	0.50	µg/kg	<0.50	----	----	----	----
alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	----	----	----	----
beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	----	----	----	----
Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	----	----	----	----
Endrin	72-20-8	0.50	µg/kg	<0.50	----	----	----	----
Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	----	----	----	----
Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	----	----	----	----
Heptachlor	76-44-8	0.50	µg/kg	<0.50	----	----	----	----
Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	----	----	----	----



## Analytical Results

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				MOF 01 1.0-2.0	MOF 04 0-0.5	MOF 04 0.5-1.0	----	----
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	----	----
Compound	CAS Number	LOR	Unit	ES1008252-016	ES1008252-017	ES1008252-018	----	----
<b>EP131A: Organochlorine Pesticides - Continued</b>								
gamma-BHC	58-89-9	0.25	µg/kg	<0.25	----	----	----	----
Methoxychlor	72-43-5	0.50	µg/kg	<0.50	----	----	----	----
cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	----	----	----	----
trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	----	----	----	----
^ Total Chlordane (sum)	----	0.25	µg/kg	<0.25	----	----	----	----
Oxychlordane	27304-13-8	0.50	µg/kg	<0.50	----	----	----	----
<b>EP131B: Polychlorinated Biphenyls (as Aroclors)</b>								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1016	12974-11-2	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	----	----	----	----
<b>EP132B: Polynuclear Aromatic Hydrocarbons</b>								
Naphthalene	91-20-3	5	µg/kg	<5	<5	<5	----	----
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	<5	----	----
Acenaphthylene	208-96-8	4	µg/kg	<4	<4	<4	----	----
Acenaphthene	83-32-9	4	µg/kg	<4	<4	<4	----	----
Fluorene	86-73-7	4	µg/kg	<4	<4	<4	----	----
Phenanthrene	85-01-8	4	µg/kg	<4	<4	<4	----	----
Anthracene	120-12-7	4	µg/kg	<4	<4	<4	----	----
Fluoranthene	206-44-0	4	µg/kg	<4	<4	<4	----	----
Pyrene	129-00-0	4	µg/kg	<4	<4	<4	----	----
Benz(a)anthracene	56-55-3	4	µg/kg	<4	21	<4	----	----
Chrysene	218-01-9	4	µg/kg	<4	19	<4	----	----
Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	27	<4	----	----
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	15	<4	----	----
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	15	<4	----	----
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	26	<4	----	----
Perylene	198-55-0	4	µg/kg	<4	10	21	----	----
Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	19	<4	----	----
Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	<4	----	----
Indeno(1,2,3-cd)pyrene	193-39-5	4	µg/kg	<4	16	<4	----	----
Coronene	191-07-1	5	µg/kg	<5	7	<5	----	----
^ Sum of PAHs	----	4	µg/kg	<4	175	21	----	----



## Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				MOF 01 1.0-2.0	MOF 04 0-0.5	MOF 04 0.5-1.0	----	----
				29-APR-2010 15:00	29-APR-2010 15:00	29-APR-2010 15:00	----	----
Compound	CAS Number	LOR	Unit	ES1008252-016	ES1008252-017	ES1008252-018	----	----
<b>EP080-SD: TPH(V)/BTEX Surrogates</b>								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	120	----	----	----	----
Toluene-D8	2037-26-5	0.1	%	91.7	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	110	----	----	----	----
<b>EP090S: Organotin Surrogate</b>								
Tripopyltin	----	0.1	%	83.7	84.5	37.3	----	----
<b>EP130S: Organophosphorus Pesticide Surrogate</b>								
DEF	78-48-8	0.1	%	76.5	----	----	----	----
<b>EP131S: OC Pesticide Surrogate</b>								
Dibromo-DDE	21655-73-2	0.1	%	40.7	----	----	----	----
<b>EP131T: PCB Surrogate</b>								
Decachlorobiphenyl	2051-24-3	0.1	%	42.9	----	----	----	----
<b>EP132T: Base/Neutral Extractable Surrogates</b>								
2-Fluorobiphenyl	321-60-8	0.1	%	116	97.6	99.3	----	----
Anthracene-d10	1719-06-8	0.1	%	102	122	107	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	109	122	121	----	----



## Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP080-SD: TPH(V)/BTEX Surrogates</b>			
1,2-Dichloroethane-D4	17060-07-0	67	137
Toluene-D8	2037-26-5	74	134
4-Bromofluorobenzene	460-00-4	73	137
<b>EP090S: Organotin Surrogate</b>			
Tripropyltin	----	34	108
<b>EP130S: Organophosphorus Pesticide Surrogate</b>			
DEF	78-48-8	51.3	136.9
<b>EP131S: OC Pesticide Surrogate</b>			
Dibromo-DDE	21655-73-2	10	136
<b>EP131T: PCB Surrogate</b>			
Decachlorobiphenyl	2051-24-3	10	164
<b>EP132T: Base/Neutral Extractable Surrogates</b>			
2-Fluorobiphenyl	321-60-8	30	115
Anthracene-d10	1719-06-8	27	133
4-Terphenyl-d14	1718-51-0	18	137



## Environmental Division

### QUALITY CONTROL REPORT

<b>Work Order</b>	<b>: ES1008252</b>	<b>Page</b>	<b>: 1 of 22</b>
<b>Client</b>	<b>: WORLEY PARSONS - INFRASTRUCTURE MWE</b>	<b>Laboratory</b>	<b>: Environmental Division Sydney</b>
<b>Contact</b>	<b>: MS VIVIAN SETO</b>	<b>Contact</b>	<b>: Charlie Pierce</b>
<b>Address</b>	<b>: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000</b>	<b>Address</b>	<b>: 277-289 Woodpark Road Smithfield NSW Australia 2164</b>
<b>E-mail</b>	<b>: vivian.seto@worleyparsons.com</b>	<b>E-mail</b>	<b>: charlie.pierce@alsenviro.com</b>
<b>Telephone</b>	<b>: +61 07 3319 3982</b>	<b>Telephone</b>	<b>: +61-2-8784 8555</b>
<b>Facsimile</b>	<b>: +61 07 3319 7791</b>	<b>Facsimile</b>	<b>: +61-2-8784 8500</b>
<b>Project</b>	<b>: NAGD - Asia Pacific LNG</b>	<b>QC Level</b>	<b>: NEPM 1999 Schedule B(3) and ALS QCS3 requirement</b>
<b>Site</b>	<b>: ----</b>	<b>Date Samples Received</b>	<b>: 05-MAY-2010</b>
<b>C-O-C number</b>	<b>: ----</b>	<b>Issue Date</b>	<b>: 27-MAY-2010</b>
<b>Sampler</b>	<b>: ----</b>	<b>No. of samples received</b>	<b>: 18</b>
<b>Order number</b>	<b>: ----</b>	<b>No. of samples analysed</b>	<b>: 18</b>
<b>Quote number</b>	<b>: BN/187/10</b>		

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

This Quality Control Report contains the following information:

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



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

### Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Organics
Ankit Joshi	Inorganic Chemist	Inorganics
Celine Conceicao	Spectroscopist	Inorganics
Dianne Blane	Laboratory Supervisor	Newcastle
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
Matt Frost	Organic Instrument Chemist	Organics



## General Comments

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

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

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

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

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



## Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (QC Lot: 1334525)									
ES1008246-014	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	46.6	46.2	0.9	0% - 20%
ES1008252-009	T9 0-0.5	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	52.8	52.1	1.4	0% - 20%
EG005-SD: Total Metals in Sediments by ICP-AES (QC Lot: 1334305)									
ES1008246-002	Anonymous	EG005-SD: Aluminium	7429-90-5	50	mg/kg	18900	19400	2.2	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	32600	33300	2.1	0% - 20%
ES1008246-013	Anonymous	EG005-SD: Aluminium	7429-90-5	50	mg/kg	12000	11000	8.5	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	23000	21900	4.7	0% - 20%
EG005-SD: Total Metals in Sediments by ICP-AES (QC Lot: 1338283)									
ES1008252-009	T9 0-0.5	EG005-SD: Aluminium	7429-90-5	50	mg/kg	15900	18300	14.1	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	32700	35700	8.8	0% - 20%
ES1008369-001	Anonymous	EG005-SD: Aluminium	7429-90-5	50	mg/kg	10800	8800	# 20.2	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	31800	27500	14.5	0% - 20%
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 1334304)									
ES1008246-002	Anonymous	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.8	0.6	29.4	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	14.8	14.8	0.0	0% - 20%
		EG020-SD: Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	0.0	No Limit
		EG020-SD: Chromium	7440-47-3	1.0	mg/kg	29.1	29.5	1.6	0% - 20%
		EG020-SD: Copper	7440-50-8	1.0	mg/kg	24.0	24.1	0.6	0% - 20%
		EG020-SD: Lead	7439-92-1	1.0	mg/kg	9.3	9.4	0.0	No Limit
		EG020-SD: Nickel	7440-02-0	1.0	mg/kg	14.4	14.7	2.4	0% - 50%
		EG020-SD: Zinc	7440-66-6	1.0	mg/kg	46.4	48.4	4.2	0% - 20%
		EG020-SD: Arsenic	7440-38-2	1.00	mg/kg	15.7	15.2	2.9	0% - 50%
		EG020-SD: Manganese	7439-96-5	10	mg/kg	226	232	2.5	0% - 20%
		EG020-SD: Vanadium	7440-62-2	2.0	mg/kg	61.5	60.0	2.4	0% - 20%
		ES1008246-013	Anonymous	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1
EG020-SD: Selenium	7782-49-2			0.1	mg/kg	0.7	0.6	0.0	No Limit
EG020-SD: Silver	7440-22-4			0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EG020-SD: Cobalt	7440-48-4			0.5	mg/kg	10.1	9.4	6.9	0% - 50%
EG020-SD: Antimony	7440-36-0			0.50	mg/kg	<0.50	<0.50	0.0	No Limit
EG020-SD: Chromium	7440-47-3			1.0	mg/kg	19.5	18.6	4.6	0% - 50%
EG020-SD: Copper	7440-50-8			1.0	mg/kg	16.8	15.9	5.3	0% - 50%
EG020-SD: Lead	7439-92-1			1.0	mg/kg	7.5	7.6	1.4	No Limit
EG020-SD: Nickel	7440-02-0			1.0	mg/kg	10.0	9.1	8.6	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 1334304) - continued									
ES1008246-013	Anonymous	EG020-SD: Zinc	7440-66-6	1.0	mg/kg	27.0	26.3	2.4	0% - 20%
		EG020-SD: Arsenic	7440-38-2	1.00	mg/kg	16.9	16.2	4.4	0% - 50%
		EG020-SD: Manganese	7439-96-5	10	mg/kg	231	230	0.0	0% - 20%
		EG020-SD: Vanadium	7440-62-2	2.0	mg/kg	43.8	42.3	3.3	0% - 20%
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 1338282)									
ES1008252-009	T9 0-0.5	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	1.0	1.0	0.0	0% - 50%
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	14.9	15.5	4.3	0% - 20%
		EG020-SD: Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	0.0	No Limit
		EG020-SD: Chromium	7440-47-3	1.0	mg/kg	24.1	27.1	11.6	0% - 20%
		EG020-SD: Copper	7440-50-8	1.0	mg/kg	28.3	32.5	13.9	0% - 20%
		EG020-SD: Lead	7439-92-1	1.0	mg/kg	9.4	10.2	8.4	0% - 50%
		EG020-SD: Nickel	7440-02-0	1.0	mg/kg	12.7	13.8	8.4	0% - 50%
		EG020-SD: Zinc	7440-66-6	1.0	mg/kg	42.5	46.1	8.2	0% - 20%
		EG020-SD: Arsenic	7440-38-2	1.00	mg/kg	21.0	20.2	3.8	0% - 20%
		EG020-SD: Manganese	7439-96-5	10	mg/kg	308	302	2.2	0% - 20%
		EG020-SD: Vanadium	7440-62-2	2.0	mg/kg	60.4	63.6	5.1	0% - 20%
ES1008369-001	Anonymous	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.5	0.6	0.0	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	13.2	13.4	1.7	0% - 20%
		EG020-SD: Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	0.0	No Limit
		EG020-SD: Chromium	7440-47-3	1.0	mg/kg	21.5	22.6	4.8	0% - 20%
		EG020-SD: Copper	7440-50-8	1.0	mg/kg	11.5	9.6	17.5	No Limit
		EG020-SD: Lead	7439-92-1	1.0	mg/kg	6.9	5.4	25.0	No Limit
		EG020-SD: Nickel	7440-02-0	1.0	mg/kg	10.7	9.5	11.6	No Limit
		EG020-SD: Zinc	7440-66-6	1.0	mg/kg	30.1	27.2	10.0	0% - 20%
		EG020-SD: Arsenic	7440-38-2	1.00	mg/kg	20.4	19.5	4.5	0% - 50%
		EG020-SD: Manganese	7439-96-5	10	mg/kg	204	218	6.4	0% - 20%
		EG020-SD: Vanadium	7440-62-2	2.0	mg/kg	67.4	60.4	10.9	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1334303)									
ES1008246-002	Anonymous	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	0.01	<0.01	0.0	No Limit
ES1008246-013	Anonymous	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	0.01	0.02	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1338281)									
ES1008252-009	T9 0-0.5	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	0.03	0.03	0.0	No Limit
ES1008369-001	Anonymous	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	0.01	0.01	0.0	No Limit
EK055: Ammonia as N (QC Lot: 1342139)									
ES1008245-001	Anonymous	EK055-SD: Ammonia as N	7664-41-7	1	mg/kg	<1	<1	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK055: Ammonia as N (QC Lot: 1342139) - continued									
ES1008252-001	MOF 08 0-0.5	EK055-SD: Ammonia as N	7664-41-7	1	mg/kg	4	4	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1340499)									
ES1008245-001	Anonymous	EK057G: Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES1008246-002	Anonymous	EK057G: Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EK059G: NOX as N by Discrete Analyser (QC Lot: 1340496)									
ES1008041-004	Anonymous	EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	3.5	3.4	3.6	0% - 20%
ES1008245-009	Anonymous	EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1338779)									
ES1008041-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	3080	2940	4.9	0% - 20%
ES1008245-009	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	220	360	47.2	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1338780)									
ES1008041-001	Anonymous	EK067G: Total Phosphorus as P	----	2	mg/kg	852	769	10.2	0% - 20%
ES1008245-009	Anonymous	EK067G: Total Phosphorus as P	----	2	mg/kg	157	169	7.7	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1340500)									
ES1008245-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.1	mg/kg	0.3	0.4	0.0	No Limit
ES1008246-002	Anonymous	EK071G: Reactive Phosphorus as P	----	0.1	mg/kg	2.3	2.4	0.0	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 1358653)									
ES1008252-001	MOF 08 0-0.5	EP005: Total Organic Carbon	----	0.02	%	1.12	1.10	1.2	0% - 20%
ES1008252-011	MOF 05 0-0.5	EP005: Total Organic Carbon	----	0.02	%	3.15	3.11	1.3	0% - 20%
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QC Lot: 1334225)									
ES1008245-001	Anonymous	EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
ES1008246-002	Anonymous	EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QC Lot: 1334260)									
ES1008245-001	Anonymous	EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
		EP071-SD: C15 - C28 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
		EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	<5	0.0	No Limit
ES1008252-001	MOF 08 0-0.5	EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
		EP071-SD: C15 - C28 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
		EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	<5	0.0	No Limit
EP080-SD: BTEX (QC Lot: 1334225)									
ES1008245-001	Anonymous	EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: meta- & para-Xylene	108-38-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
			106-42-3						
ES1008246-002	Anonymous	EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit



Sub-Matrix: <b>SOIL</b>				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080-SD: BTEX (QC Lot: 1334225) - continued									
ES1008246-002	Anonymous	EP080-SD: meta- & para-Xylene	108-38-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
			106-42-3						
		EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP090: Organotin Compounds (QC Lot: 1335525)									
ES1008245-001	Anonymous	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	0.0	No Limit
ES1008252-010	T10 0-0.5	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	0.0	No Limit
EP130A: Organophosphorus Pesticides (Ultra-trace) (QC Lot: 1334458)									
ES1008245-001	Anonymous	EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Carbophenothion	786-19-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Diazinon	333-41-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dichlorvos	62-73-7	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dimethoate	60-51-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Ethion	563-12-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Fenthion	55-38-9	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Malathion	121-75-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Azinphos Methyl	86-50-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion	56-38-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Prothiofos	34643-46-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	<10.0	<10.0	0.0	No Limit
ES1008252-001	MOF 08 0-0.5	EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Carbophenothion	786-19-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Diazinon	333-41-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dichlorvos	62-73-7	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dimethoate	60-51-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Ethion	563-12-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Fenthion	55-38-9	10	µg/kg	<10	<10	0.0	No Limit



Sub-Matrix: <b>SOIL</b>				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP130A: Organophosphorus Pesticides (Ultra-trace) (QC Lot: 1334458) - continued</b>									
ES1008252-001	MOF 08 0-0.5	EP130: Malathion	121-75-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Azinphos Methyl	86-50-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion	56-38-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Prothiofos	34643-46-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	<10.0	<10.0	0.0	No Limit
<b>EP131A: Organochlorine Pesticides (QC Lot: 1334459)</b>									
ES1008245-001	Anonymous	EP131A: gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Aldrin	309-00-2	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-BHC	319-84-6	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-BHC	319-85-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: delta-BHC	319-86-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4'-DDD	72-54-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4'-DDE	72-55-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4'-DDT	50-29-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: DDT (total)	----	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Dieldrin	60-57-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin	72-20-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor	76-44-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Methoxychlor	72-43-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
ES1008252-001	MOF 08 0-0.5	EP131A: gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Aldrin	309-00-2	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-BHC	319-84-6	0.50	µg/kg	<0.50	<0.50	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP131A: Organochlorine Pesticides (QC Lot: 1334459) - continued									
ES1008252-001	MOF 08 0-0.5	EP131A: beta-BHC	319-85-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: delta-BHC	319-86-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4'-DDD	72-54-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4'-DDE	72-55-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4'-DDT	50-29-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: DDT (total)	----	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Dieldrin	60-57-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin	72-20-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor	76-44-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Methoxychlor	72-43-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
EP131B: Polychlorinated Biphenyls (as Aroclors) (QC Lot: 1334460)									
ES1008245-001	Anonymous	EP131B: Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1016	12974-11-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
ES1008252-001	MOF 08 0-0.5	EP131B: Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1016	12974-11-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1334259)									
ES1008245-001	Anonymous	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.0	No Limit



Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1334259) - continued</b>									
ES1008245-001	Anonymous	EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Indeno(1,2,3-cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.0	No Limit
ES1008252-001	MOF 08 0-0.5	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	42	37	11.7	No Limit
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Indeno(1,2,3-cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	42	37	12.6	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.0	No Limit



Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1334261)</b>									
ES1008241-001	Anonymous	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.0	No Limit
ES1008246-006	Anonymous	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1334261) - continued									
ES1008246-006	Anonymous	EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.0	No Limit
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1334927)									
ES1008252-005	MOF 09 0.5-1.0	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	36	30	17.8	No Limit
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	36	30	18.2	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.0	No Limit
ES1008252-018	MOF 04 0.5-1.0	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	21	18	17.4	No Limit
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1334927) - continued									
ES1008252-018	MOF 04 0.5-1.0	EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	21	18	15.4	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.0	No Limit



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

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG005-SD: Total Metals in Sediments by ICP-AES (QCLot: 1334305)								
EG005-SD: Aluminium	7429-90-5	50	mg/kg	<50	----	----	----	----
EG005-SD: Iron	7439-89-6	50	mg/kg	<50	----	----	----	----
EG005-SD: Total Metals in Sediments by ICP-AES (QCLot: 1338283)								
EG005-SD: Aluminium	7429-90-5	50	mg/kg	<50	----	----	----	----
EG005-SD: Iron	7439-89-6	50	mg/kg	<50	----	----	----	----
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 1334304)								
EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	----	----	----	----
EG020-SD: Arsenic	7440-38-2	1.0	mg/kg	<1.00	13.1 mg/kg	112	70	130
EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	2.76 mg/kg	94.7	70	130
EG020-SD: Chromium	7440-47-3	1.0	mg/kg	<1.0	60.9 mg/kg	99.9	70	130
EG020-SD: Copper	7440-50-8	1.0	mg/kg	<1.0	54.7 mg/kg	96.7	70	130
EG020-SD: Cobalt	7440-48-4	10	mg/kg	<10.0	24.5 mg/kg	101	70	130
EG020-SD: Lead	7439-92-1	1.0	mg/kg	<1.0	54.8 mg/kg	98.6	70	130
EG020-SD: Manganese	7439-96-5	10	mg/kg	<10	136 mg/kg	94.2	70	130
EG020-SD: Nickel	7440-02-0	1.0	mg/kg	<1.0	55.2 mg/kg	100	70	130
EG020-SD: Selenium	7782-49-2	0.1	mg/kg	<0.1	----	----	----	----
EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	5.6 mg/kg	106	70	130
EG020-SD: Vanadium	7440-62-2	2	mg/kg	<2.0	50 mg/kg	100	70	130
EG020-SD: Zinc	7440-66-6	1.0	mg/kg	<1.0	104 mg/kg	100	70	130
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 1338282)								
EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	----	----	----	----
EG020-SD: Arsenic	7440-38-2	1.0	mg/kg	<1.00	13.1 mg/kg	112	70	130
EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	2.76 mg/kg	95.2	70	130
EG020-SD: Chromium	7440-47-3	1.0	mg/kg	<1.0	60.9 mg/kg	96.2	70	130
EG020-SD: Copper	7440-50-8	1.0	mg/kg	<1.0	54.7 mg/kg	96.4	70	130
EG020-SD: Cobalt	7440-48-4	10	mg/kg	<10.0	24.5 mg/kg	98.6	70	130
EG020-SD: Lead	7439-92-1	1.0	mg/kg	<1.0	54.8 mg/kg	90.8	70	130
EG020-SD: Manganese	7439-96-5	10	mg/kg	<10	136 mg/kg	90.9	70	130
EG020-SD: Nickel	7440-02-0	1.0	mg/kg	<1.0	55.2 mg/kg	103	70	130
EG020-SD: Selenium	7782-49-2	0.1	mg/kg	<0.1	----	----	----	----
EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	5.6 mg/kg	109	70	130
EG020-SD: Vanadium	7440-62-2	2	mg/kg	<2.0	50 mg/kg	101	70	130
EG020-SD: Zinc	7440-66-6	1.0	mg/kg	<1.0	104 mg/kg	95.8	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1334303)								



Sub-Matrix: <b>SOIL</b>				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
<b>EG035T: Total Recoverable Mercury by FIMS (QCLot: 1334303) - continued</b>								
EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	0.090 mg/kg	75.6	74.2	126
<b>EG035T: Total Recoverable Mercury by FIMS (QCLot: 1338281)</b>								
EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	0.090 mg/kg	92.9	74.2	126
<b>EK055: Ammonia as N (QCLot: 1342139)</b>								
EK055-SD: Ammonia as N	7664-41-7	1	mg/kg	<1	25 mg/kg	87.4	70	130
<b>EK057G: Nitrite as N by Discrete Analyser (QCLot: 1340499)</b>								
EK057G: Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	4.8 mg/kg	102	70	130
<b>EK059G: NOX as N by Discrete Analyser (QCLot: 1340496)</b>								
EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	4.8 mg/kg	102	70	130
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1338779)</b>								
EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	<20	1000 mg/kg	107	70	130
<b>EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1338780)</b>								
EK067G: Total Phosphorus as P	----	2	mg/kg	<2	442 mg/kg	95.5	70	130
<b>EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1340500)</b>								
EK071G: Reactive Phosphorus as P	----	0.1	mg/kg	<0.1	2.5 mg/kg	97.6	70	130
<b>EP005: Total Organic Carbon (TOC) (QCLot: 1358653)</b>								
EP005: Total Organic Carbon	----	0.02	%	<0.02	100 %	98.2	70	130
<b>EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1334225)</b>								
EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	26 mg/kg	104	68.4	128
<b>EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1334260)</b>								
EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	5 mg/kg	95.0	75.2	116
EP071-SD: C15 - C28 Fraction	----	3	mg/kg	<3	5 mg/kg	92.0	75.3	113
EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	5 mg/kg	91.0	72.6	117
<b>EP080-SD: BTEX (QCLot: 1334225)</b>								
EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	114	67.5	125
EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	1 mg/kg	108	69	122
EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	1 mg/kg	116	65.3	126
EP080-SD: meta- & para-Xylene	108-38-3	0.2	mg/kg	<0.2	2 mg/kg	123	66.5	124
	106-42-3							
EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	1 mg/kg	117	66.7	123
<b>EP090: Organotin Compounds (QCLot: 1335525)</b>								
EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	1.25 µgSn/kg	101	19.5	129
<b>EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 1334458)</b>								
EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	50 µg/kg	83.3	36.9	142
EP130: Carbophenothion	786-19-6	10	µg/kg	<10	50 µg/kg	83.8	0.5	157
EP130: Chlorfenvinphos (E)	470-90-6	10	µg/kg	<10.0	5 µg/kg	104	50.3	137
EP130: Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	50 µg/kg	91.0	55.9	152



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			LCS	Low
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 1334458) - continued								
EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	50 µg/kg	82.2	49	140
EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	50 µg/kg	83.8	28.1	142
EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	50 µg/kg	88.3	36.6	172
EP130: Diazinon	333-41-5	10	µg/kg	<10	50 µg/kg	86.8	37.2	148
EP130: Dichlorvos	62-73-7	10	µg/kg	<10	50 µg/kg	78.4	32.7	153
EP130: Dimethoate	60-51-5	10	µg/kg	<10	50 µg/kg	89.9	33.2	150
EP130: Ethion	563-12-2	10	µg/kg	<10	50 µg/kg	89.7	44	146
EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	50 µg/kg	108	3.08	162
EP130: Fenthion	55-38-9	10	µg/kg	<10	50 µg/kg	81.6	10.6	157
EP130: Malathion	121-75-5	10	µg/kg	<10	50 µg/kg	88.4	38.1	143
EP130: Azinphos Methyl	86-50-0	10	µg/kg	<10	50 µg/kg	83.8	8.13	159
EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	50 µg/kg	127	19.7	176
EP130: Parathion	56-38-2	10	µg/kg	<10	50 µg/kg	92.0	39.2	145
EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	50 µg/kg	89.8	23.5	152
EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	50 µg/kg	80.9	47.1	141
EP130: Prothiofos	34643-46-4	10	µg/kg	<10	50 µg/kg	87.4	36.1	148
EP131A: Organochlorine Pesticides (QCLot: 1334459)								
EP131A: Aldrin	309-00-2	0.5	µg/kg	<0.50	5 µg/kg	81.3	31.7	140
EP131A: alpha-BHC	319-84-6	0.5	µg/kg	<0.50	5 µg/kg	81.0	24.5	150
EP131A: beta-BHC	319-85-7	0.5	µg/kg	<0.50	5 µg/kg	103	36.9	139
EP131A: delta-BHC	319-86-8	0.5	µg/kg	<0.50	5 µg/kg	107	38.2	137
EP131A: 4,4'-DDD	72-54-8	0.5	µg/kg	<0.50	5 µg/kg	72.4	42.5	141
EP131A: 4,4'-DDE	72-55-9	0.5	µg/kg	<0.50	5 µg/kg	103	34.8	140
EP131A: 4,4'-DDT	50-29-3	0.5	µg/kg	<0.50	5 µg/kg	90.0	38	143
EP131A: DDT (total)	----	0.5	µg/kg	<0.50	----	----	----	----
EP131A: Dieldrin	60-57-1	0.5	µg/kg	<0.50	5 µg/kg	66.0	43.2	134
EP131A: alpha-Endosulfan	959-98-8	0.5	µg/kg	<0.50	5 µg/kg	97.0	23.7	139
EP131A: beta-Endosulfan	33213-65-9	0.5	µg/kg	<0.50	5 µg/kg	89.5	35.8	138
EP131A: Endosulfan sulfate	1031-07-8	0.5	µg/kg	<0.50	5 µg/kg	105	7.45	158
EP131A: Endosulfan (sum)	115-29-7	0.5	µg/kg	<0.50	----	----	----	----
EP131A: Endrin	72-20-8	0.5	µg/kg	<0.50	5 µg/kg	101	21.6	162
EP131A: Endrin aldehyde	7421-93-4	0.5	µg/kg	<0.50	5 µg/kg	86.1	19.3	131
EP131A: Endrin ketone	53494-70-5	0.5	µg/kg	<0.50	5 µg/kg	101	17.9	141
EP131A: Heptachlor	76-44-8	0.5	µg/kg	<0.50	5 µg/kg	105	31	153
EP131A: Heptachlor epoxide	1024-57-3	0.5	µg/kg	<0.50	5 µg/kg	93.9	34.3	138
EP131A: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/kg	<0.50	5 µg/kg	70.7	18.6	146
EP131A: gamma-BHC	58-89-9	0.5	µg/kg	<0.50	5 µg/kg	92.2	30.7	145
EP131A: Methoxychlor	72-43-5	0.5	µg/kg	<0.50	5 µg/kg	118	15	157
EP131A: cis-Chlordane	5103-71-9	0.5	µg/kg	<0.50	5 µg/kg	79.4	22.3	145



Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
<b>EP131A: Organochlorine Pesticides (QCLot: 1334459) - continued</b>								
EP131A: trans-Chlordane	5103-74-2	0.5	µg/kg	<0.50	5 µg/kg	94.0	42.4	139
EP131A: Total Chlordane (sum)	----	0.5	µg/kg	<0.50	----	----	----	----
<b>EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 1334460)</b>								
EP131B: Total Polychlorinated biphenyls	----	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1016	12974-11-2	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1221	11104-28-2	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1232	11141-16-5	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1242	53469-21-9	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1248	12672-29-6	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1254	11097-69-1	5	µg/kg	<5.0	50 µg/kg	95.1	61.3	121
EP131B: Aroclor 1260	11096-82-5	5	µg/kg	<5.0	----	----	----	----
<b>EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1334259)</b>								
EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	25 µg/kg	115	----	----
EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	25 µg/kg	109	----	----
EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	25 µg/kg	113	----	----
EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	25 µg/kg	98.3	----	----
EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	25 µg/kg	103	----	----
EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	25 µg/kg	117	----	----
EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	25 µg/kg	117	----	----
EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	25 µg/kg	120	----	----
EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	25 µg/kg	118	----	----
EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	25 µg/kg	118	----	----
EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	25 µg/kg	85.1	----	----
EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	25 µg/kg	99.6	----	----
EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	25 µg/kg	95.6	----	----
EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	25 µg/kg	84.2	----	----
EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	25 µg/kg	101	----	----
EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	25 µg/kg	111	----	----
EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	25 µg/kg	82.6	----	----
EP132B-SD: Dibenzo(a,h)anthracene	53-70-3	4	µg/kg	<4	25 µg/kg	93.6	----	----
EP132B-SD: Indeno(1,2,3-cd)pyrene	193-39-5	4	µg/kg	<4	25 µg/kg	81.2	----	----
EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	25 µg/kg	50.2	----	----
EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	----	----	----	----
<b>EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1334261)</b>								
EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	25 µg/kg	100	----	----
EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	25 µg/kg	98.6	----	----
EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	25 µg/kg	112	----	----
EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	25 µg/kg	110	----	----
EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	25 µg/kg	112	----	----



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1334261) - continued								
EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	25 µg/kg	112	----	----
EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	25 µg/kg	108	----	----
EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	25 µg/kg	116	----	----
EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	25 µg/kg	111	----	----
EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	25 µg/kg	105	----	----
EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	25 µg/kg	104	----	----
EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	25 µg/kg	97.6	----	----
EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	25 µg/kg	91.5	----	----
EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	25 µg/kg	75.8	----	----
EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	25 µg/kg	95.8	----	----
EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	25 µg/kg	105	----	----
EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	25 µg/kg	96.8	----	----
EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	25 µg/kg	97.5	----	----
EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	25 µg/kg	90.9	----	----
EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	25 µg/kg	116	----	----
EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	----	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1334927)								
EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	25 µg/kg	105	----	----
EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	25 µg/kg	102	----	----
EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	25 µg/kg	112	----	----
EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	25 µg/kg	103	----	----
EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	25 µg/kg	118	----	----
EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	25 µg/kg	120	----	----
EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	25 µg/kg	96.6	----	----
EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	25 µg/kg	118	----	----
EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	25 µg/kg	114	----	----
EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	25 µg/kg	110	----	----
EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	25 µg/kg	98.4	----	----
EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	25 µg/kg	80.1	----	----
EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	25 µg/kg	85.9	----	----
EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	25 µg/kg	71.1	----	----
EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	25 µg/kg	104	----	----
EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	25 µg/kg	103	----	----
EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	25 µg/kg	96.4	----	----
EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	25 µg/kg	88.9	----	----
EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	25 µg/kg	86.6	----	----
EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	25 µg/kg	111	----	----
EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	----	----	----	----



## Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number				
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 1334304)							
ES1008246-002	Anonymous	EG020-SD: Arsenic	7440-38-2	50 mg/kg	89.7	70	130
		EG020-SD: Cadmium	7440-43-9	50 mg/kg	88.6	70	130
		EG020-SD: Chromium	7440-47-3	50 mg/kg	93.0	70	130
		EG020-SD: Copper	7440-50-8	250 mg/kg	85.5	70	130
		EG020-SD: Lead	7439-92-1	250 mg/kg	85.5	70	130
		EG020-SD: Nickel	7440-02-0	50 mg/kg	88.7	70	130
		EG020-SD: Zinc	7440-66-6	250 mg/kg	90.5	70	130
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 1338282)							
ES1008252-010	T10 0-0.5	EG020-SD: Arsenic	7440-38-2	50 mg/kg	90.9	70	130
		EG020-SD: Cadmium	7440-43-9	50 mg/kg	95.7	70	130
		EG020-SD: Chromium	7440-47-3	50 mg/kg	90.8	70	130
		EG020-SD: Copper	7440-50-8	250 mg/kg	84.0	70	130
		EG020-SD: Lead	7439-92-1	250 mg/kg	85.7	70	130
		EG020-SD: Nickel	7440-02-0	50 mg/kg	94.2	70	130
		EG020-SD: Zinc	7440-66-6	250 mg/kg	90.6	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1334303)							
ES1008246-002	Anonymous	EG035T-LL: Mercury	7439-97-6	0.50 mg/kg	77.8	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1338281)							
ES1008252-009	T9 0-0.5	EG035T-LL: Mercury	7439-97-6	0.50 mg/kg	74.9	70	130
EK055: Ammonia as N (QCLot: 1342139)							
ES1008245-001	Anonymous	EK055-SD: Ammonia as N	7664-41-7	25 mg/kg	81.2	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1340499)							
ES1008245-001	Anonymous	EK057G: Nitrite as N (Sol.)	----	3.0 mg/kg	100	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 1340496)							
ES1008041-004	Anonymous	EK059G: Nitrite + Nitrate as N (Sol.)	----	3.0 mg/kg	87.3	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1338779)							
ES1008041-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	500 mg/kg	# Not Determined	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1338780)							
ES1008041-001	Anonymous	EK067G: Total Phosphorus as P	----	100 mg/kg	# Not Determined	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1340500)							
ES1008245-001	Anonymous	EK071G: Reactive Phosphorus as P	----	2.5 mg/kg	97.6	70	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1334225)							
ES1008245-001	Anonymous	EP080-SD: C6 - C9 Fraction	----	26 mg/kg	93.0	70	130



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number				
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1334260)							
ES1008245-001	Anonymous	EP071-SD: C10 - C14 Fraction	----	19.75 mg/kg	77.2	70	130
		EP071-SD: C15 - C28 Fraction	----	87.25 mg/kg	80.3	70	130
		EP071-SD: C29 - C36 Fraction	----	60 mg/kg	112	70	130
EP080-SD: BTEX (QCLot: 1334225)							
ES1008245-001	Anonymous	EP080-SD: Benzene	71-43-2	2.5 mg/kg	103	70	130
		EP080-SD: Toluene	108-88-3	2.5 mg/kg	88.2	70	130
		EP080-SD: Ethylbenzene	100-41-4	2.5 mg/kg	86.0	70	130
		EP080-SD: meta- & para-Xylene	108-38-3	2.5 mg/kg	92.5	70	130
			106-42-3				
EP080-SD: ortho-Xylene	95-47-6	2.5 mg/kg	99.1	70	130		
EP090: Organotin Compounds (QCLot: 1335525)							
ES1008252-001	MOF 08 0-0.5	EP090: Tributyltin	56573-85-4	1.25 µgSn/kg	95.6	20	130
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 1334458)							
ES1008245-001	Anonymous	EP130: Bromophos-ethyl	4824-78-6	50 µg/kg	58.1	36.9	142
		EP130: Carbophenothion	786-19-6	50 µg/kg	64.7	0.5	157
		EP130: Chlorfenvinphos (E)	470-90-6	5 µg/kg	71.8	50.3	137
		EP130: Chlorfenvinphos (Z)	470-90-8	50 µg/kg	62.3	55.9	152
		EP130: Chlorpyrifos	2921-88-2	50 µg/kg	56.7	49	140
		EP130: Chlorpyrifos-methyl	5598-13-0	50 µg/kg	53.4	28.1	142
		EP130: Demeton-S-methyl	919-86-8	50 µg/kg	61.5	36.6	172
		EP130: Diazinon	333-41-5	50 µg/kg	65.6	37.2	148
		EP130: Dichlorvos	62-73-7	50 µg/kg	63.8	32.7	153
		EP130: Dimethoate	60-51-5	50 µg/kg	67.9	33.2	150
		EP130: Ethion	563-12-2	50 µg/kg	62.0	44	146
		EP130: Fenamiphos	22224-92-6	50 µg/kg	80.8	3.08	162
		EP130: Fenthion	55-38-9	50 µg/kg	55.4	10.6	157
		EP130: Malathion	121-75-5	50 µg/kg	58.2	38.1	143
		EP130: Azinphos Methyl	86-50-0	50 µg/kg	45.1	8.13	159
		EP130: Monocrotophos	6923-22-4	50 µg/kg	100	19.7	176
		EP130: Parathion	56-38-2	50 µg/kg	66.6	39.2	145
		EP130: Parathion-methyl	298-00-0	50 µg/kg	56.9	23.5	152
		EP130: Pirimphos-ethyl	23505-41-1	50 µg/kg	58.0	47.1	141
		EP130: Prothiofos	34643-46-4	50 µg/kg	63.2	36.1	148
EP131A: Organochlorine Pesticides (QCLot: 1334459)							
ES1008245-001	Anonymous	EP131A: Aldrin	309-00-2	5 µg/kg	51.3	31.7	140
		EP131A: alpha-BHC	319-84-6	5 µg/kg	26.1	24.5	150
		EP131A: beta-BHC	319-85-7	5 µg/kg	54.3	36.9	139
		EP131A: delta-BHC	319-86-8	5 µg/kg	39.9	38.2	137



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number		MS	Low	High
EP131A: Organochlorine Pesticides (QCLot: 1334459) - continued							
ES1008245-001	Anonymous	EP131A: 4,4`-DDD	72-54-8	5 µg/kg	# 24.5	42.5	141
		EP131A: 4,4`-DDE	72-55-9	5 µg/kg	43.4	34.8	140
		EP131A: 4,4`-DDT	50-29-3	5 µg/kg	# 33.2	38	143
		EP131A: Dieldrin	60-57-1	5 µg/kg	# 33.9	43.2	134
		EP131A: alpha-Endosulfan	959-98-8	5 µg/kg	53.9	23.7	139
		EP131A: beta-Endosulfan	33213-65-9	5 µg/kg	# 34.5	35.8	138
		EP131A: Endosulfan sulfate	1031-07-8	5 µg/kg	39.6	7.45	158
		EP131A: Endrin	72-20-8	5 µg/kg	35.8	21.6	162
		EP131A: Endrin aldehyde	7421-93-4	5 µg/kg	36.1	19.3	131
		EP131A: Endrin ketone	53494-70-5	5 µg/kg	40.4	17.9	141
		EP131A: Heptachlor	76-44-8	5 µg/kg	43.5	31	153
		EP131A: Heptachlor epoxide	1024-57-3	5 µg/kg	55.1	34.3	138
		EP131A: Hexachlorobenzene (HCB)	118-74-1	5 µg/kg	30.5	18.6	146
		EP131A: gamma-BHC	58-89-9	5 µg/kg	37.5	30.7	145
		EP131A: Methoxychlor	72-43-5	5 µg/kg	49.9	15	157
		EP131A: cis-Chlordane	5103-71-9	5 µg/kg	34.8	22.3	145
		EP131A: trans-Chlordane	5103-74-2	5 µg/kg	52.6	42.4	139
EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 1334460)							
ES1008245-001	Anonymous	EP131B: Aroclor 1254	11097-69-1	50 µg/kg	# 51.4	61.3	121
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1334259)							
ES1008245-001	Anonymous	EP132B-SD: Naphthalene	91-20-3	25 µg/kg	91.6	70	130
		EP132B-SD: 2-Methylnaphthalene	91-57-6	25 µg/kg	105	70	130
		EP132B-SD: Acenaphthylene	208-96-8	25 µg/kg	120	70	130
		EP132B-SD: Acenaphthene	83-32-9	25 µg/kg	106	70	130
		EP132B-SD: Fluorene	86-73-7	25 µg/kg	102	70	130
		EP132B-SD: Phenanthrene	85-01-8	25 µg/kg	114	70	130
		EP132B-SD: Anthracene	120-12-7	25 µg/kg	114	70	130
		EP132B-SD: Fluoranthene	206-44-0	25 µg/kg	118	70	130
		EP132B-SD: Pyrene	129-00-0	25 µg/kg	113	70	130
		EP132B-SD: Benz(a)anthracene	56-55-3	25 µg/kg	110	70	130
		EP132B-SD: Chrysene	218-01-9	25 µg/kg	76.7	70	130
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	25 µg/kg	104	70	130
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	25 µg/kg	96.8	70	130
		EP132B-SD: Benzo(e)pyrene	192-97-2	25 µg/kg	91.7	70	130
		EP132B-SD: Benzo(a)pyrene	50-32-8	25 µg/kg	112	70	130
		EP132B-SD: Perylene	198-55-0	25 µg/kg	121	70	130
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	25 µg/kg	99.4	70	130
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	25 µg/kg	109	70	130



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number				
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1334259) - continued							
ES1008245-001	Anonymous	EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	25 µg/kg	98.6	70	130
		EP132B-SD: Coronene	191-07-1	25 µg/kg	81.0	70	130
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1334261)							
ES1008241-001	Anonymous	EP132B-SD: Naphthalene	91-20-3	25 µg/kg	102	70	130
		EP132B-SD: 2-Methylnaphthalene	91-57-6	25 µg/kg	86.2	70	130
		EP132B-SD: Acenaphthylene	208-96-8	25 µg/kg	110	70	130
		EP132B-SD: Acenaphthene	83-32-9	25 µg/kg	106	70	130
		EP132B-SD: Fluorene	86-73-7	25 µg/kg	112	70	130
		EP132B-SD: Phenanthrene	85-01-8	25 µg/kg	107	70	130
		EP132B-SD: Anthracene	120-12-7	25 µg/kg	94.8	70	130
		EP132B-SD: Fluoranthene	206-44-0	25 µg/kg	101	70	130
		EP132B-SD: Pyrene	129-00-0	25 µg/kg	99.1	70	130
		EP132B-SD: Benz(a)anthracene	56-55-3	25 µg/kg	104	70	130
		EP132B-SD: Chrysene	218-01-9	25 µg/kg	104	70	130
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	25 µg/kg	91.0	70	130
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	25 µg/kg	# 64.2	70	130
		EP132B-SD: Benzo(e)pyrene	192-97-2	25 µg/kg	# 64.0	70	130
		EP132B-SD: Benzo(a)pyrene	50-32-8	25 µg/kg	74.3	70	130
		EP132B-SD: Perylene	198-55-0	25 µg/kg	83.9	70	130
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	25 µg/kg	81.4	70	130
		EP132B-SD: Dibenzo(a,h)anthracene	53-70-3	25 µg/kg	91.2	70	130
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	25 µg/kg	71.7	70	130
		EP132B-SD: Coronene	191-07-1	25 µg/kg	102	70	130
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1334927)							
ES1008252-005	MOF 09 0.5-1.0	EP132B-SD: Naphthalene	91-20-3	25 µg/kg	77.0	70	130
		EP132B-SD: 2-Methylnaphthalene	91-57-6	25 µg/kg	94.2	70	130
		EP132B-SD: Acenaphthylene	208-96-8	25 µg/kg	113	70	130
		EP132B-SD: Acenaphthene	83-32-9	25 µg/kg	101	70	130
		EP132B-SD: Fluorene	86-73-7	25 µg/kg	112	70	130
		EP132B-SD: Phenanthrene	85-01-8	25 µg/kg	116	70	130
		EP132B-SD: Anthracene	120-12-7	25 µg/kg	75.5	70	130
		EP132B-SD: Fluoranthene	206-44-0	25 µg/kg	97.8	70	130
		EP132B-SD: Pyrene	129-00-0	25 µg/kg	83.0	70	130
		EP132B-SD: Benz(a)anthracene	56-55-3	25 µg/kg	104	70	130
		EP132B-SD: Chrysene	218-01-9	25 µg/kg	92.9	70	130
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	25 µg/kg	100	70	130
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	25 µg/kg	100	70	130
		EP132B-SD: Benzo(e)pyrene	192-97-2	25 µg/kg	83.5	70	130



Sub-Matrix: SOIL

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1334927) - continued			
ES1008252-005	MOF 09 0.5-1.0	EP132B-SD: Benzo(a)pyrene	50-32-8	25 µg/kg	110	70	130
		EP132B-SD: Perylene	198-55-0	25 µg/kg	128	70	130
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	25 µg/kg	98.4	70	130
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	25 µg/kg	109	70	130
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	25 µg/kg	106	70	130
		EP132B-SD: Coronene	191-07-1	25 µg/kg	119	70	130



## Environmental Division

### INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: <b>ES1008252</b>	Page	: 1 of 12
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Sydney
Contact	: MS VIVIAN SETO	Contact	: Charlie Pierce
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Project	: NAGD - Asia Pacific LNG	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 05-MAY-2010
C-O-C number	: ----	Issue Date	: 27-MAY-2010
Sampler	: ----		
Order number	: ----	No. of samples received	: 18
Quote number	: BN/187/10	No. of samples analysed	: 18

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

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers



## Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content								
Soil Glass Jar - Unpreserved	29-APR-2010	----	----	----	05-MAY-2010	06-MAY-2010	✓	
MOF 08 - 0-0.5, MOF 08 - 1.0-2.0, MOF 09 - 0.5-1.0, MOF 07 - 0-0.5, T9 - 0-0.5, MOF 05 - 0-0.5, MOF 05 - 1.0-1.2, MOF 01 - 0.5-1.0, MOF 04 - 0-0.5,								MOF 08 - 0.5-1.0, MOF 09 - 0-0.5, MOF 09 - 1.0-2.0, MOF 07 - 0.5-1.0, T10 - 0-0.5, MOF 05 - 0.5-1.0, MOF 01 - 0-0.5, MOF 01 - 1.0-2.0, MOF 04 - 0.5-1.0
EA150: Particle Sizing								
Snap Lock Bag	29-APR-2010	---	---	----	17-MAY-2010	26-OCT-2010	✓	
MOF 08 - 0-0.5, MOF 09 - 0-0.5, MOF 07 - 0-0.5, MOF 05 - 0-0.5, MOF 05 - 1.0-1.2, MOF 01 - 0.5-1.0, MOF 04 - 0-0.5,								MOF 08 - 0.5-1.0, MOF 09 - 0.5-1.0, MOF 07 - 0.5-1.0, MOF 05 - 0.5-1.0, MOF 01 - 0-0.5, MOF 01 - 1.0-2.0, MOF 04 - 0.5-1.0
EA150: Soil Classification based on Particle Size								
Snap Lock Bag	29-APR-2010	---	---	----	17-MAY-2010	26-OCT-2010	✓	
MOF 08 - 0-0.5, MOF 09 - 0-0.5, MOF 07 - 0-0.5, MOF 05 - 0-0.5, MOF 05 - 1.0-1.2, MOF 01 - 0.5-1.0, MOF 04 - 0-0.5,								MOF 08 - 0.5-1.0, MOF 09 - 0.5-1.0, MOF 07 - 0.5-1.0, MOF 05 - 0.5-1.0, MOF 01 - 0-0.5, MOF 01 - 1.0-2.0, MOF 04 - 0.5-1.0



Matrix: **SOIL**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005-SD: Total Metals in Sediments by ICP-AES								
Soil Glass Jar - Unpreserved MOF 08 - 0-0.5, MOF 08 - 1.0-2.0, MOF 09 - 0.5-1.0, MOF 07 - 0-0.5,	MOF 08 - 0.5-1.0, MOF 09 - 0-0.5, MOF 09 - 1.0-2.0, MOF 07 - 0.5-1.0	29-APR-2010	05-MAY-2010	27-MAY-2010	✓	06-MAY-2010	26-OCT-2010	✓
Soil Glass Jar - Unpreserved T9 - 0-0.5, MOF 05 - 0-0.5, MOF 05 - 1.0-1.2, MOF 01 - 0.5-1.0, MOF 04 - 0-0.5,	T10 - 0-0.5, MOF 05 - 0.5-1.0, MOF 01 - 0-0.5, MOF 01 - 1.0-2.0, MOF 04 - 0.5-1.0	29-APR-2010	09-MAY-2010	27-MAY-2010	✓	10-MAY-2010	26-OCT-2010	✓
EG020-SD: Total Metals in Sediments by ICPMS								
Soil Glass Jar - Unpreserved MOF 08 - 0-0.5, MOF 08 - 1.0-2.0, MOF 09 - 0.5-1.0, MOF 07 - 0-0.5,	MOF 08 - 0.5-1.0, MOF 09 - 0-0.5, MOF 09 - 1.0-2.0, MOF 07 - 0.5-1.0	29-APR-2010	05-MAY-2010	27-MAY-2010	✓	06-MAY-2010	26-OCT-2010	✓
Soil Glass Jar - Unpreserved T9 - 0-0.5, MOF 05 - 0-0.5, MOF 05 - 1.0-1.2, MOF 01 - 0.5-1.0, MOF 04 - 0-0.5,	T10 - 0-0.5, MOF 05 - 0.5-1.0, MOF 01 - 0-0.5, MOF 01 - 1.0-2.0, MOF 04 - 0.5-1.0	29-APR-2010	09-MAY-2010	27-MAY-2010	✓	10-MAY-2010	26-OCT-2010	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved MOF 08 - 0-0.5, MOF 08 - 1.0-2.0, MOF 09 - 0.5-1.0, MOF 07 - 0-0.5,	MOF 08 - 0.5-1.0, MOF 09 - 0-0.5, MOF 09 - 1.0-2.0, MOF 07 - 0.5-1.0	29-APR-2010	05-MAY-2010	27-MAY-2010	✓	06-MAY-2010	27-MAY-2010	✓
Soil Glass Jar - Unpreserved T9 - 0-0.5, MOF 05 - 0-0.5, MOF 05 - 1.0-1.2, MOF 01 - 0.5-1.0, MOF 04 - 0-0.5,	T10 - 0-0.5, MOF 05 - 0.5-1.0, MOF 01 - 0-0.5, MOF 01 - 1.0-2.0, MOF 04 - 0.5-1.0	29-APR-2010	09-MAY-2010	27-MAY-2010	✓	11-MAY-2010	27-MAY-2010	✓
EK055: Ammonia as N								
Soil Glass Jar - Unpreserved MOF 08 - 0-0.5, MOF 08 - 1.0-2.0, MOF 01 - 0.5-1.0,	MOF 08 - 0.5-1.0, MOF 01 - 0-0.5, MOF 01 - 1.0-2.0	29-APR-2010	----	----	----	12-MAY-2010	26-OCT-2010	✓



Matrix: **SOIL**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK057G: Nitrite as N by Discrete Analyser								
Soil Glass Jar - Unpreserved		29-APR-2010	11-MAY-2010	26-OCT-2010	✓	11-MAY-2010	26-OCT-2010	✓
MOF 08 - 0-0.5,	MOF 08 - 0.5-1.0,							
MOF 08 - 1.0-2.0,	MOF 01 - 0-0.5,							
MOF 01 - 0.5-1.0,	MOF 01 - 1.0-2.0							
EK059G: NOX as N by Discrete Analyser								
Soil Glass Jar - Unpreserved		29-APR-2010	11-MAY-2010	26-OCT-2010	✓	11-MAY-2010	26-OCT-2010	✓
MOF 08 - 0-0.5,	MOF 08 - 0.5-1.0,							
MOF 08 - 1.0-2.0,	MOF 01 - 0-0.5,							
MOF 01 - 0.5-1.0,	MOF 01 - 1.0-2.0							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Soil Glass Jar - Unpreserved		29-APR-2010	10-MAY-2010	26-OCT-2010	✓	10-MAY-2010	26-OCT-2010	✓
MOF 08 - 0-0.5,	MOF 08 - 0.5-1.0,							
MOF 08 - 1.0-2.0,	MOF 01 - 0-0.5,							
MOF 01 - 0.5-1.0,	MOF 01 - 1.0-2.0							
EK067G: Total Phosphorus as P by Discrete Analyser								
Soil Glass Jar - Unpreserved		29-APR-2010	10-MAY-2010	26-OCT-2010	✓	10-MAY-2010	26-OCT-2010	✓
MOF 08 - 0-0.5,	MOF 08 - 0.5-1.0,							
MOF 08 - 1.0-2.0,	MOF 01 - 0-0.5,							
MOF 01 - 0.5-1.0,	MOF 01 - 1.0-2.0							
EK071G: Reactive Phosphorus as P by discrete analyser								
Soil Glass Jar - Unpreserved		29-APR-2010	11-MAY-2010	26-OCT-2010	✓	11-MAY-2010	26-OCT-2010	✓
MOF 08 - 0-0.5,	MOF 08 - 0.5-1.0,							
MOF 08 - 1.0-2.0,	MOF 01 - 0-0.5,							
MOF 01 - 0.5-1.0,	MOF 01 - 1.0-2.0							
EP005: Total Organic Carbon (TOC)								
Pulp Bag		29-APR-2010	26-MAY-2010	27-MAY-2010	✓	26-MAY-2010	27-MAY-2010	✓
MOF 08 - 0-0.5,	MOF 08 - 0.5-1.0,							
MOF 08 - 1.0-2.0,	MOF 09 - 0-0.5,							
MOF 09 - 0.5-1.0,	MOF 09 - 1.0-2.0,							
MOF 07 - 0-0.5,	MOF 07 - 0.5-1.0,							
T9 - 0-0.5,	T10 - 0-0.5,							
MOF 05 - 0-0.5,	MOF 05 - 0.5-1.0,							
MOF 05 - 1.0-1.2,	MOF 01 - 0-0.5,							
MOF 01 - 0.5-1.0,	MOF 01 - 1.0-2.0,							
MOF 04 - 0-0.5,	MOF 04 - 0.5-1.0							



Matrix: **SOIL**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved								
MOF 08 - 0-0.5, MOF 08 - 1.0-2.0, MOF 01 - 0.5-1.0,	MOF 08 - 0.5-1.0, MOF 01 - 0-0.5, MOF 01 - 1.0-2.0	29-APR-2010	05-MAY-2010	13-MAY-2010	✓	06-MAY-2010	14-JUN-2010	✓
Soil Glass Jar - Unpreserved								
MOF 08 - 0-0.5, MOF 08 - 1.0-2.0, MOF 01 - 0.5-1.0,	MOF 08 - 0.5-1.0, MOF 01 - 0-0.5, MOF 01 - 1.0-2.0	29-APR-2010	05-MAY-2010	13-MAY-2010	✓	10-MAY-2010	13-MAY-2010	✓
EP080-SD: BTEX								
Soil Glass Jar - Unpreserved								
MOF 08 - 0-0.5, MOF 08 - 1.0-2.0, MOF 01 - 0.5-1.0,	MOF 08 - 0.5-1.0, MOF 01 - 0-0.5, MOF 01 - 1.0-2.0	29-APR-2010	05-MAY-2010	13-MAY-2010	✓	10-MAY-2010	13-MAY-2010	✓
EP090: Organotin Compounds								
Soil Glass Jar - Unpreserved								
MOF 08 - 0-0.5, MOF 08 - 1.0-2.0, MOF 09 - 0.5-1.0, MOF 07 - 0-0.5, T9 - 0-0.5, MOF 05 - 0-0.5, MOF 05 - 1.0-1.2, MOF 01 - 0.5-1.0, MOF 04 - 0-0.5,	MOF 08 - 0.5-1.0, MOF 09 - 0-0.5, MOF 09 - 1.0-2.0, MOF 07 - 0.5-1.0, T10 - 0-0.5, MOF 05 - 0.5-1.0, MOF 01 - 0-0.5, MOF 01 - 1.0-2.0, MOF 04 - 0.5-1.0	29-APR-2010	07-MAY-2010	13-MAY-2010	✓	10-MAY-2010	16-JUN-2010	✓
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Soil Glass Jar - Unpreserved								
MOF 08 - 0-0.5, MOF 08 - 1.0-2.0, MOF 01 - 0.5-1.0,	MOF 08 - 0.5-1.0, MOF 01 - 0-0.5, MOF 01 - 1.0-2.0	29-APR-2010	05-MAY-2010	13-MAY-2010	✓	12-MAY-2010	14-JUN-2010	✓
EP131A: Organochlorine Pesticides								
Soil Glass Jar - Unpreserved								
MOF 08 - 0-0.5, MOF 08 - 1.0-2.0, MOF 01 - 0.5-1.0,	MOF 08 - 0.5-1.0, MOF 01 - 0-0.5, MOF 01 - 1.0-2.0	29-APR-2010	05-MAY-2010	13-MAY-2010	✓	12-MAY-2010	14-JUN-2010	✓
EP131B: Polychlorinated Biphenyls (as Aroclors)								
Soil Glass Jar - Unpreserved								
MOF 08 - 0-0.5, MOF 08 - 1.0-2.0, MOF 01 - 0.5-1.0,	MOF 08 - 0.5-1.0, MOF 01 - 0-0.5, MOF 01 - 1.0-2.0	29-APR-2010	05-MAY-2010	13-MAY-2010	✓	12-MAY-2010	14-JUN-2010	✓



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP132B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved		29-APR-2010	05-MAY-2010	13-MAY-2010	✔	07-MAY-2010	14-JUN-2010	✔
MOF 08 - 0-0.5,	MOF 08 - 0.5-1.0,							
MOF 08 - 1.0-2.0,	MOF 09 - 0.5-1.0,							
MOF 09 - 1.0-2.0,	MOF 07 - 0-0.5,							
MOF 07 - 0.5-1.0,	T9 - 0-0.5,							
T10 - 0-0.5,	MOF 05 - 0-0.5,							
MOF 05 - 0.5-1.0,	MOF 05 - 1.0-1.2,							
MOF 01 - 0-0.5,	MOF 01 - 0.5-1.0,							
MOF 01 - 1.0-2.0,	MOF 04 - 0-0.5,							
MOF 04 - 0.5-1.0								
Soil Glass Jar - Unpreserved		29-APR-2010	05-MAY-2010	13-MAY-2010	✔	11-MAY-2010	14-JUN-2010	✔
MOF 09 - 0-0.5								



## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Buchi Ammonia - Low-Level in Sediment	EK055-SD	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Moisture Content	EA055-103	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Soluble by Discrete Analyser	EK057G	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	2	17	11.8	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	6	47	12.8	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	2	21	9.5	9.5	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Fe and Al in Sediments by ICPAES	EG005-SD	4	40	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	4	40	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	4	40	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Buchi Ammonia - Low-Level in Sediment	EK055-SD	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	1	17	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	3	47	6.4	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	1	21	4.8	4.8	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	2	40	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	2	40	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement



Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
TPH - Semivolatile Fraction	EP071-SD	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Buchi Ammonia - Low-Level in Sediment	EK055-SD	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	1	17	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	3	47	6.4	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	1	21	4.8	4.8	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Fe and Al in Sediments by ICPAES	EG005-SD	2	40	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	2	40	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	2	40	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Buchi Ammonia - Low-Level in Sediment	EK055-SD	1	20	5.0	5.0	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	16	6.3	5.0	✓	ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	1	16	6.3	5.0	✓	ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	16	6.3	5.0	✓	ALS QCS3 requirement
Organotin Analysis	EP090	1	17	5.9	5.0	✓	ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	3	47	6.4	5.0	✓	ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	16	6.3	5.0	✓	ALS QCS3 requirement
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	1	16	6.3	5.0	✓	ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	1	21	4.8	4.8	✓	ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	2	40	5.0	5.0	✓	ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	2	40	5.0	5.0	✓	ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	1	16	6.3	5.0	✓	ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	18	5.6	5.0	✓	ALS QCS3 requirement



## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055-103	SOIL	A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (1999) Schedule B(3) (Method 102)
Particle Size Analysis (Sieving)	EA150	SOIL	Particle Size Analysis by Sieving according to AS1289.3.6.1 - 1995
Particle Size Analysis by Hydrometer	EA150H	SOIL	Particle Size Analysis by Hydrometer according to AS1289.3.6.3 - 2003
Total Fe and Al in Sediments by ICPAES	EG005-SD	SOIL	(APHA 21st ed., 3120; USEPA SW 846 - 6010) (ICPAES) Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (1999) Schedule B(3). LORs per NODG
Total Metals in Sediments by ICPMS	EG020-SD	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector. Analyte list and LORs per NODG.
Total Mercury by FIMS (Low Level)	EG035T-LL	SOIL	AS 3550, APHA 21st ed., 3112 Hg - B (Flow-injection (SnCl <sub>2</sub> )(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl <sub>2</sub> which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3)
Buchi Ammonia - Low-Level in Sediment	EK055-SD	SOIL	APHA 21st ed., 4500 NH <sub>3</sub> +B&G, H Samples are steam distilled (Buchi) prior to analysis and quantified using titrimetric determination.
Nitrite as N - Soluble by Discrete Analyser	EK057G	SOIL	APHA 21st ed., 4500 NO <sub>3</sub> - B. Nitrite in a water extract is determined by direct colourimetry by Discrete Analyser.
Nitrate as N - Soluble by Discrete Analyser	EK058G	SOIL	APHA 21st ed., 4500 NO <sub>3</sub> --F. Nitrate in the 1:5 soil:water extract is reduced to nitrite by way of a cadmium reduction column followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results.
Nitrite and Nitrate as N (NO <sub>x</sub> )- Soluble by Discrete Analyser	EK059G	SOIL	APHA 21st ed., 4500 NO <sub>3</sub> - F. Combined oxidised Nitrogen (NO <sub>2</sub> +NO <sub>3</sub> ) in a water extract is determined by Cadmium Reduction, and direct colourimetry by Discrete Analyser.
TKN as N By Discrete Analyser	EK061G	SOIL	APHA 21st ed., 4500-Norg-D Soil samples are digested using Kjeldahl digestion followed by determination by Discrete Analyser.
Total Phosphorus By Discrete Analyser	EK067G	SOIL	APHA 21st ed., 4500 P-B&F This procedure involves sulfuric acid digestion and quantification using Discrete Analyser.
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	SOIL	APHA 21st ed., 4500 P-F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2



Analytical Methods	Method	Matrix	Method Descriptions
Total Organic Carbon	EP005	SOIL	In-house. Dried and pulverised sample is reacted with acid to remove inorganic Carbonates, then combusted in a LECO furnace in the presence of strong oxidants / catalysts. The evolved (Organic) Carbon (as CO <sub>2</sub> ) is automatically measured by infra-red detector.
TPH - Semivolatile Fraction	EP071-SD	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 504)
TPH Volatiles/BTEX in Sediments	EP080-SD	SOIL	(USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 501)
Organotin Analysis	EP090	SOIL	(USEPA SW 846 - 8270D) Prepared sample extracts are analysed by GC/MS coupled with high volume injection, and quantified against an established calibration curve.
Organophosphorus Pesticides (Ultra-trace)	EP130	SOIL	USEPA Method 3640 (GPC cleanup), 8141 (GC/FPD - Capillary Column) This technique is compliant with NEPM (1999) Schedule B(3) (Method 505)
Organochlorine Pesticides (Ultra-trace)	EP131A	SOIL	USEPA Method 3640 (GPC cleanup), 3620 (Florisil), 8081/8082 (GC/uECD/uECD) This technique is compliant with NEPM (1999) Schedule B(3) (Method 504)
PCB's (Ultra-trace)	EP131B	SOIL	USEPA Method 3640 (GPC cleanup), 3620 (Florisil), 8081/8082 (GC/uECD/uECD) This technique is compliant with NEPM (1999) Schedule B(3) (Method 504)
PAHs in Sediments by GCMS(SIM)	EP132B-SD	SOIL	8270 GCMS Capillary column, SIM mode using large volume programmed temperature vaporisation injection.
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	SOIL	APHA 21st ed., 4500 Norg- D; APHA 21st ed., 4500 P - H. Macro Kjeldahl digestion.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of distilled water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	USEPA 200.2 Mod. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (1999) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	* ORG16	SOIL	(USEPA SW 846 - 5030A) 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids/ Sample Cleanup	ORG17A-UTP	SOIL	In-house, Mechanical agitation (tumbler). 20g of sample, Na <sub>2</sub> SO <sub>4</sub> and surrogate are extracted with 150mL 1:1 DCM/Acetone by end over end tumble. Samples are extracted, concentrated (by KD) and exchanged into an appropriate solvent for GPC and florisil cleanup as required.
Tumbler Extraction of Solids for LVI (Non-concentrating)	ORG17D	SOIL	In house: 10g of sample, Na <sub>2</sub> SO <sub>4</sub> and surrogate are extracted with 50mL 1:1 DCM/Acetone by end over end tumbling. An aliquot is concentrated by nitrogen blowdown to a reduced volume for analysis if required.
Organotin Sample Preparation	ORG35	SOIL	In house. 20g sample is spiked with surrogate and leached in a methanol:acetic acid:UHP water mix and vacuum filtered. Reagents and solvents are added to the sample and the mixture tumbled. The butyltin compounds are simultaneously derivatised and extracted. The extract is further extracted with petroleum ether. The resultant extracts are combined and concentrated for analysis.



## Summary of Outliers

### Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

#### Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Duplicate (DUP) RPDs</b>							
EG005-SD: Total Metals in Sediments by ICP-AES	ES1008369-001	Anonymous	Aluminium	7429-90-5	20.2 %	0-20%	RPD exceeds LOR based limits
<b>Matrix Spike (MS) Recoveries</b>							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	ES1008041-001	Anonymous	Total Kjeldahl Nitrogen as N	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK067G: Total Phosphorus as P by Discrete Analyser	ES1008041-001	Anonymous	Total Phosphorus as P	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP131A: Organochlorine Pesticides	ES1008245-001	Anonymous	4,4'-DDD	72-54-8	24.5 %	42.5-141%	Recovery less than lower data quality objective
EP131A: Organochlorine Pesticides	ES1008245-001	Anonymous	4,4'-DDT	50-29-3	33.2 %	38-143%	Recovery less than lower data quality objective
EP131A: Organochlorine Pesticides	ES1008245-001	Anonymous	Dieldrin	60-57-1	33.9 %	43.2-134%	Recovery less than lower data quality objective
EP131A: Organochlorine Pesticides	ES1008245-001	Anonymous	beta-Endosulfan	33213-65-9	34.5 %	35.8-138%	Recovery less than lower data quality objective
EP131B: Polychlorinated Biphenyls (as Aroclors)	ES1008245-001	Anonymous	Aroclor 1254	11097-69-1	51.4 %	61.3-121%	Recovery less than lower data quality objective
EP132B: Polynuclear Aromatic Hydrocarbons	ES1008241-001	Anonymous	Benzo(k)fluoranthene	207-08-9	64.2 %	70-130%	Recovery less than lower data quality objective
EP132B: Polynuclear Aromatic Hydrocarbons	ES1008241-001	Anonymous	Benzo(e)pyrene	192-97-2	64.0 %	70-130%	Recovery less than lower data quality objective

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Laboratory Control outliers occur.

#### Regular Sample Surrogates

Sub-Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Samples Submitted</b>							
EP132T: Base/Neutral Extractable Surrogates	ES1008252-014	MOF 01 0-0.5	2-Fluorobiphenyl	321-60-8	120 %	30-115 %	Recovery greater than upper data quality objective
EP132T: Base/Neutral Extractable Surrogates	ES1008252-016	MOF 01 1.0-2.0	2-Fluorobiphenyl	321-60-8	116 %	30-115 %	Recovery greater than upper data quality objective



Sub-Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted - Continued							
EP132T: Base/Neutral Extractable Surrogates	ES1008252-003	MOF 08 1.0-2.0	2-Fluorobiphenyl	321-60-8	118 %	30-115 %	Recovery greater than upper data quality objective
EP132T: Base/Neutral Extractable Surrogates	ES1008252-009	T9 0-0.5	2-Fluorobiphenyl	321-60-8	120 %	30-115 %	Recovery greater than upper data quality objective

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- No Quality Control Sample Frequency Outliers exist.



## Environmental Division

### CERTIFICATE OF ANALYSIS

Work Order	: <b>ES1008494</b>	Page	: 1 of 13
Client	: <b>WORLEY PARSONS - INFRASTRUCTURE MWE</b>	Laboratory	: Environmental Division Sydney
Contact	: MS VIVIAN SETO	Contact	: Charlie Pierce
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: vivian.seto@worleyparsons.com	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 07 3319 3982	Telephone	: +61-2-8784 8555
Facsimile	: +61 07 3319 7791	Facsimile	: +61-2-8784 8500
Project	: NAGD - Asia Pacific LNG 301001-00752	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 05-MAY-2010
C-O-C number	: ----	Issue Date	: 25-MAY-2010
Sampler	: VSK	No. of samples received	: 8
Site	: GLADSTONE-APLNG DOWNSTREAM	No. of samples analysed	: 8
Quote number	: BN/187/10		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

### *Signatories*

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Organics
Ankit Joshi	Inorganic Chemist	Inorganics
Celine Conceicao	Spectroscopist	Inorganics
Dianne Blane	Laboratory Supervisor	Newcastle
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
Matt Frost	Organic Instrument Chemist	Organics
Sarah Ashworth	Organic Chemist	Organics

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## General Comments

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

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

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

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

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

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

LOR = Limit of reporting

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

- **EG020T: Poor precision was obtained for Manganese on sample ES1008369 #011 due to sample heterogeneity. Results have been confirmed by re-extraction and reanalysis.**
- **EK059G: LOR raised for NOx, Nitrite and Nitrate analysis on sample ID(EMB06 0.5-1.0) due to sample matrix.**
- **EK067G Spike failed for Total Phosphorus due to matrix interference (confirmed by re-analysis)**
- **EK071G: LOR raised for RP analysis on sample ID(EMB06 0.5-1.0) due to sample matrix.**
- **EP131A+B: Poor matrix spike recovery due to sample heterogeneity. Confirmed by re-extraction and re-analysis.**



## Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				BER03 0-0.5	T14 0-0.5	BER02 0-0.5	BER04 0-0.5	EMB06 0-0.5
				05-MAY-2010 17:08	05-MAY-2010 17:08	05-MAY-2010 17:08	05-MAY-2010 17:08	05-MAY-2010 17:08
Compound	CAS Number	LOR	Unit	ES1008494-001	ES1008494-002	ES1008494-003	ES1008494-004	ES1008494-005
<b>EA150: Particle Sizing</b>								
+75µm	----	1	%	33	----	41	95	6
+150µm	----	1	%	22	----	36	94	2
+300µm	----	1	%	13	----	35	86	1
+425µm	----	1	%	11	----	35	78	1
+600µm	----	1	%	10	----	34	70	<1
+1180µm	----	1	%	9	----	34	61	<1
+2.36mm	----	1	%	6	----	32	55	<1
+4.75mm	----	1	%	5	----	30	51	<1
+9.5mm	----	1	%	<1	----	16	42	<1
+19.0mm	----	1	%	<1	----	<1	29	<1
+37.5mm	----	1	%	<1	----	<1	<1	<1
+75.0mm	----	1	%	<1	----	<1	<1	<1
<b>EA055: Moisture Content</b>								
^ Moisture Content (dried @ 103°C)	----	1.0	%	41.8	40.5	46.2	25.6	56.0
<b>EA150: Soil Classification based on Particle Size</b>								
Clay (<2 µm)	----	1	%	37	----	27	4	56
Silt (2-60 µm)	----	1	%	28	----	32	<1	34
Sand (0.06-2.00 mm)	----	1	%	28	----	9	41	10
Gravel (>2mm)	----	1	%	7	----	32	55	<1
Cobbles (>6cm)	----	1	%	<1	----	<1	<1	<1
<b>EG005-SD: Total Metals in Sediments by ICP-AES</b>								
Aluminium	7429-90-5	50	mg/kg	18100	16200	19800	3000	26100
Iron	7439-89-6	50	mg/kg	32700	54300	36200	23200	36800
<b>EG020-SD: Total Metals in Sediments by ICPMS</b>								
Antimony	7440-36-0	0.50	mg/kg	<0.50	0.50	<0.50	<0.50	<0.50
Arsenic	7440-38-2	1.00	mg/kg	15.7	27.0	19.1	22.5	9.25
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	1.0	mg/kg	28.0	37.1	30.0	11.0	35.5
Copper	7440-50-8	1.0	mg/kg	18.9	18.2	22.0	4.2	29.2
Cobalt	7440-48-4	0.5	mg/kg	12.4	12.0	11.3	11.3	16.1
Lead	7439-92-1	1.0	mg/kg	8.7	12.6	9.3	3.7	11.0
Manganese	7439-96-5	10	mg/kg	161	155	133	419	195
Nickel	7440-02-0	1.0	mg/kg	13.6	12.1	13.7	4.4	19.6
Selenium	7782-49-2	0.1	mg/kg	0.7	0.9	1.0	0.4	0.9
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium	7440-62-2	2.0	mg/kg	65.2	133	67.9	59.4	75.6
Zinc	7440-66-6	1.0	mg/kg	41.9	35.0	38.0	16.3	63.2



## Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				BER03 0-0.5	T14 0-0.5	BER02 0-0.5	BER04 0-0.5	EMB06 0-0.5
				05-MAY-2010 17:08	05-MAY-2010 17:08	05-MAY-2010 17:08	05-MAY-2010 17:08	05-MAY-2010 17:08
Compound	CAS Number	LOR	Unit	ES1008494-001	ES1008494-002	ES1008494-003	ES1008494-004	ES1008494-005
<b>EG020-SD: Total Metals in Sediments by ICPMS - Continued</b>								
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
Mercury	7439-97-6	0.01	mg/kg	0.02	0.01	0.01	<0.01	0.02
<b>EK055: Ammonia as N</b>								
Ammonia as N	7664-41-7	1	mg/kg	----	----	----	----	<1
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N (Sol.)	----	0.1	mg/kg	----	----	----	----	<0.1
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	----	----	----	----	<0.1
<b>EK059G: NOX as N by Discrete Analyser</b>								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	----	----	----	----	<0.1
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	----	----	----	----	1080
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>								
Total Phosphorus as P	----	2	mg/kg	----	----	----	----	448
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>								
Reactive Phosphorus as P	----	0.1	mg/kg	----	----	----	----	1.1
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	0.02	%	0.76	0.68	0.85	0.14	0.84
<b>EP080-SD / EP071-SD: Total Petroleum Hydrocarbons</b>								
C6 - C9 Fraction	----	3	mg/kg	----	----	----	----	<3
C10 - C14 Fraction	----	3	mg/kg	----	----	----	----	<3
C15 - C28 Fraction	----	3	mg/kg	----	----	----	----	6
C29 - C36 Fraction	----	5	mg/kg	----	----	----	----	8
^ C10 - C36 Fraction (sum)	----	3	mg/kg	----	----	----	----	14
<b>EP080-SD: BTEX</b>								
Benzene	71-43-2	0.2	mg/kg	----	----	----	----	<0.2
Toluene	108-88-3	0.2	mg/kg	----	----	----	----	<0.2
Ethylbenzene	100-41-4	0.2	mg/kg	----	----	----	----	<0.2
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	----	----	----	----	<0.2
ortho-Xylene	95-47-6	0.2	mg/kg	----	----	----	----	<0.2
<b>EP090: Organotin Compounds</b>								
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	<0.5	<0.5	<0.5
<b>EP130A: Organophosphorus Pesticides (Ultra-trace)</b>								
Bromophos-ethyl	4824-78-6	10	µg/kg	----	----	----	----	<10
Carbophenothion	786-19-6	10	µg/kg	----	----	----	----	<10



## Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				BER03 0-0.5	T14 0-0.5	BER02 0-0.5	BER04 0-0.5	EMB06 0-0.5
				05-MAY-2010 17:08	05-MAY-2010 17:08	05-MAY-2010 17:08	05-MAY-2010 17:08	05-MAY-2010 17:08
Compound	CAS Number	LOR	Unit	ES1008494-001	ES1008494-002	ES1008494-003	ES1008494-004	ES1008494-005
<b>EP130A: Organophosphorus Pesticides (Ultra-trace) - Continued</b>								
Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	----	----	----	----	<10.0
Chlorfenvinphos (Z)	470-90-8	10	µg/kg	----	----	----	----	<10
Chlorpyrifos	2921-88-2	10	µg/kg	----	----	----	----	<10
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	----	----	----	----	<10
Demeton-S-methyl	919-86-8	10	µg/kg	----	----	----	----	<10
Diazinon	333-41-5	10	µg/kg	----	----	----	----	<10
Dichlorvos	62-73-7	10	µg/kg	----	----	----	----	<10
Dimethoate	60-51-5	10	µg/kg	----	----	----	----	<10
Ethion	563-12-2	10	µg/kg	----	----	----	----	<10
Fenamiphos	22224-92-6	10	µg/kg	----	----	----	----	<10
Fenthion	55-38-9	10	µg/kg	----	----	----	----	<10
Malathion	121-75-5	10	µg/kg	----	----	----	----	<10
Azinphos Methyl	86-50-0	10	µg/kg	----	----	----	----	<10
Monocrotophos	6923-22-4	10	µg/kg	----	----	----	----	<10
Parathion	56-38-2	10	µg/kg	----	----	----	----	<10
Parathion-methyl	298-00-0	10	µg/kg	----	----	----	----	<10
Pirimphos-ethyl	23505-41-1	10	µg/kg	----	----	----	----	<10
Prothiofos	34643-46-4	10	µg/kg	----	----	----	----	<10
<b>EP131A: Organochlorine Pesticides</b>								
Aldrin	309-00-2	0.50	µg/kg	----	----	----	----	<0.50
alpha-BHC	319-84-6	0.50	µg/kg	----	----	----	----	<0.50
beta-BHC	319-85-7	0.50	µg/kg	----	----	----	----	<0.50
delta-BHC	319-86-8	0.50	µg/kg	----	----	----	----	<0.50
4,4'-DDD	72-54-8	0.50	µg/kg	----	----	----	----	<0.50
4,4'-DDE	72-55-9	0.50	µg/kg	----	----	----	----	<0.50
4,4'-DDT	50-29-3	0.50	µg/kg	----	----	----	----	<0.50
^ DDT (total)	----	0.50	µg/kg	----	----	----	----	<0.50
Dieldrin	60-57-1	0.50	µg/kg	----	----	----	----	<0.50
alpha-Endosulfan	959-98-8	0.50	µg/kg	----	----	----	----	<0.50
beta-Endosulfan	33213-65-9	0.50	µg/kg	----	----	----	----	<0.50
Endosulfan sulfate	1031-07-8	0.50	µg/kg	----	----	----	----	<0.50
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	----	----	----	----	<0.50
Endrin	72-20-8	0.50	µg/kg	----	----	----	----	<0.50
Endrin aldehyde	7421-93-4	0.50	µg/kg	----	----	----	----	<0.50
Endrin ketone	53494-70-5	0.50	µg/kg	----	----	----	----	<0.50
Heptachlor	76-44-8	0.50	µg/kg	----	----	----	----	<0.50
Heptachlor epoxide	1024-57-3	0.50	µg/kg	----	----	----	----	<0.50



## Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				BER03 0-0.5	T14 0-0.5	BER02 0-0.5	BER04 0-0.5	EMB06 0-0.5
				05-MAY-2010 17:08	05-MAY-2010 17:08	05-MAY-2010 17:08	05-MAY-2010 17:08	05-MAY-2010 17:08
Compound	CAS Number	LOR	Unit	ES1008494-001	ES1008494-002	ES1008494-003	ES1008494-004	ES1008494-005
<b>EP131A: Organochlorine Pesticides - Continued</b>								
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	----	----	----	----	<0.50
gamma-BHC	58-89-9	0.25	µg/kg	----	----	----	----	<0.25
Methoxychlor	72-43-5	0.50	µg/kg	----	----	----	----	<0.50
cis-Chlordane	5103-71-9	0.25	µg/kg	----	----	----	----	<0.25
trans-Chlordane	5103-74-2	0.25	µg/kg	----	----	----	----	<0.25
^ Total Chlordane (sum)	----	0.25	µg/kg	----	----	----	----	<0.25
Oxychlordane	27304-13-8	0.50	µg/kg	----	----	----	----	<0.50
<b>EP131B: Polychlorinated Biphenyls (as Aroclors)</b>								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	----	----	----	----	<5.0
Aroclor 1016	12974-11-2	5.0	µg/kg	----	----	----	----	<5.0
Aroclor 1221	11104-28-2	5.0	µg/kg	----	----	----	----	<5.0
Aroclor 1232	11141-16-5	5.0	µg/kg	----	----	----	----	<5.0
Aroclor 1242	53469-21-9	5.0	µg/kg	----	----	----	----	<5.0
Aroclor 1248	12672-29-6	5.0	µg/kg	----	----	----	----	<5.0
Aroclor 1254	11097-69-1	5.0	µg/kg	----	----	----	----	<5.0
Aroclor 1260	11096-82-5	5.0	µg/kg	----	----	----	----	<5.0
<b>EP132B: Polynuclear Aromatic Hydrocarbons</b>								
Naphthalene	91-20-3	5	µg/kg	<5	<5	<5	<5	<5
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	<5	<5	<5
Acenaphthylene	208-96-8	4	µg/kg	<4	<4	<4	<4	<5
Acenaphthene	83-32-9	4	µg/kg	<4	<4	<4	<4	<5
Fluorene	86-73-7	4	µg/kg	<4	<4	<4	<4	<5
Phenanthrene	85-01-8	4	µg/kg	7	6	6	<4	11
Anthracene	120-12-7	4	µg/kg	<4	<4	<4	<4	<5
Fluoranthene	206-44-0	4	µg/kg	6	<4	<4	<4	10
Pyrene	129-00-0	4	µg/kg	5	<4	<4	<4	11
Benz(a)anthracene	56-55-3	4	µg/kg	4	<4	<4	<4	5
Chrysene	218-01-9	4	µg/kg	4	<4	<4	<4	6
Benzo(b)fluoranthene	205-99-2	4	µg/kg	5	<4	<4	<4	7
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	4	<4	<5
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	<4	<4	<5
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	<4	<4	5
Perylene	198-55-0	4	µg/kg	<4	<4	<4	<4	<5
Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	<4	<4	<5
Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	<4	<4	<5
Indeno(1,2,3-cd)pyrene	193-39-5	4	µg/kg	<4	<4	<4	<4	<5
Coronene	191-07-1	5	µg/kg	<5	<5	<5	<5	<5



## Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				<b>BER03 0-0.5</b>	<b>T14 0-0.5</b>	<b>BER02 0-0.5</b>	<b>BER04 0-0.5</b>	<b>EMB06 0-0.5</b>
				05-MAY-2010 17:08	05-MAY-2010 17:08	05-MAY-2010 17:08	05-MAY-2010 17:08	05-MAY-2010 17:08
<i>Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	<b>ES1008494-001</b>	<b>ES1008494-002</b>	<b>ES1008494-003</b>	<b>ES1008494-004</b>	<b>ES1008494-005</b>
<b>EP132B: Polynuclear Aromatic Hydrocarbons - Continued</b>								
<b>^ Sum of PAHs</b>	----	4	µg/kg	<b>31</b>	<b>6</b>	<b>10</b>	<b>&lt;4</b>	<b>55</b>
<b>EP080-SD: TPH(V)/BTEX Surrogates</b>								
<b>1,2-Dichloroethane-D4</b>	17060-07-0	0.1	%	----	----	----	----	<b>85.2</b>
<b>Toluene-D8</b>	2037-26-5	0.1	%	----	----	----	----	<b>91.1</b>
<b>4-Bromofluorobenzene</b>	460-00-4	0.1	%	----	----	----	----	<b>81.7</b>
<b>EP090S: Organotin Surrogate</b>								
<b>Tripropylin</b>	----	0.1	%	<b>81.0</b>	<b>99.3</b>	<b>91.0</b>	<b>96.5</b>	<b>94.3</b>
<b>EP130S: Organophosphorus Pesticide Surrogate</b>								
<b>DEF</b>	78-48-8	0.1	%	----	----	----	----	<b>59.8</b>
<b>EP131S: OC Pesticide Surrogate</b>								
<b>Dibromo-DDE</b>	21655-73-2	0.1	%	----	----	----	----	<b>60.2</b>
<b>EP131T: PCB Surrogate</b>								
<b>Decachlorobiphenyl</b>	2051-24-3	0.1	%	----	----	----	----	<b>74.6</b>
<b>EP132T: Base/Neutral Extractable Surrogates</b>								
<b>2-Fluorobiphenyl</b>	321-60-8	0.1	%	<b>118</b>	<b>104</b>	<b>101</b>	<b>110</b>	<b>107</b>
<b>Anthracene-d10</b>	1719-06-8	0.1	%	<b>118</b>	<b>85.5</b>	<b>118</b>	<b>115</b>	<b>113</b>
<b>4-Terphenyl-d14</b>	1718-51-0	0.1	%	<b>118</b>	<b>113</b>	<b>99.0</b>	<b>98.4</b>	<b>95.8</b>



## Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				EMB06 0.5-1.0	T3 0-0.5	TRIP BLANK	----	----
				05-MAY-2010 17:08	05-MAY-2010 17:08	23-APR-2010 17:08	----	----
Compound	CAS Number	LOR	Unit	ES1008494-006	ES1008494-007	ES1008494-008	----	----
<b>EA055: Moisture Content</b>								
^ Moisture Content (dried @ 103°C)	----	1.0	%	30.6	55.9	----	----	----
<b>EG005-SD: Total Metals in Sediments by ICP-AES</b>								
Aluminium	7429-90-5	50	mg/kg	20900	26900	----	----	----
Iron	7439-89-6	50	mg/kg	36800	36100	----	----	----
<b>EG020-SD: Total Metals in Sediments by ICPMS</b>								
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	----	----	----
Arsenic	7440-38-2	1.00	mg/kg	4.95	10.2	----	----	----
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	----	----	----
Chromium	7440-47-3	1.0	mg/kg	18.5	33.8	----	----	----
Copper	7440-50-8	1.0	mg/kg	44.7	28.9	----	----	----
Cobalt	7440-48-4	0.5	mg/kg	9.7	15.8	----	----	----
Lead	7439-92-1	1.0	mg/kg	10.5	10.8	----	----	----
Manganese	7439-96-5	10	mg/kg	75	175	----	----	----
Nickel	7440-02-0	1.0	mg/kg	12.6	19.0	----	----	----
Selenium	7782-49-2	0.1	mg/kg	1.2	0.9	----	----	----
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	----	----	----
Vanadium	7440-62-2	2.0	mg/kg	97.3	74.7	----	----	----
Zinc	7440-66-6	1.0	mg/kg	36.5	60.0	----	----	----
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
Mercury	7439-97-6	0.01	mg/kg	<0.01	0.02	----	----	----
<b>EK055: Ammonia as N</b>								
Ammonia as N	7664-41-7	1	mg/kg	<1	<1	----	----	----
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N (Sol.)	----	0.1	mg/kg	<1.0	<0.1	----	----	----
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	<1.0	<0.1	----	----	----
<b>EK059G: NOX as N by Discrete Analyser</b>								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<1.0	<0.1	----	----	----
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	220	920	----	----	----
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>								
Total Phosphorus as P	----	2	mg/kg	277	379	----	----	----
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>								
Reactive Phosphorus as P	----	0.1	mg/kg	<1.0	1.1	----	----	----
<b>EP005: Total Organic Carbon (TOC)</b>								



## Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				EMB06 0.5-1.0	T3 0-0.5	TRIP BLANK	----	----
				05-MAY-2010 17:08	05-MAY-2010 17:08	23-APR-2010 17:08	----	----
Compound	CAS Number	LOR	Unit	ES1008494-006	ES1008494-007	ES1008494-008	----	----
<b>EP005: Total Organic Carbon (TOC) - Continued</b>								
Total Organic Carbon	----	0.02	%	0.15	0.80	----	----	----
<b>EP080-SD / EP071-SD: Total Petroleum Hydrocarbons</b>								
C6 - C9 Fraction	----	3	mg/kg	<3	<3	<3	----	----
C10 - C14 Fraction	----	3	mg/kg	<3	<3	----	----	----
C15 - C28 Fraction	----	3	mg/kg	<3	11	----	----	----
C29 - C36 Fraction	----	5	mg/kg	<5	8	----	----	----
^ C10 - C36 Fraction (sum)	----	3	mg/kg	----	19	----	----	----
C10 - C36 Fraction (sum)	----	3	mg/kg	<3	----	----	----	----
<b>EP080-SD: BTEX</b>								
Benzene	71-43-2	0.2	mg/kg	----	<0.2	<0.2	----	----
Toluene	108-88-3	0.2	mg/kg	----	<0.2	<0.2	----	----
Ethylbenzene	100-41-4	0.2	mg/kg	----	<0.2	<0.2	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	----	<0.2	<0.2	----	----
ortho-Xylene	95-47-6	0.2	mg/kg	----	<0.2	<0.2	----	----
<b>EP090: Organotin Compounds</b>								
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	----	----	----
<b>EP130A: Organophosphorus Pesticides (Ultra-trace)</b>								
Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	----	----	----
Carbophenothion	786-19-6	10	µg/kg	<10	<10	----	----	----
Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	<10.0	<10.0	----	----	----
Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	<10	----	----	----
Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	----	----	----
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	----	----	----
Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	----	----	----
Diazinon	333-41-5	10	µg/kg	<10	<10	----	----	----
Dichlorvos	62-73-7	10	µg/kg	<10	<10	----	----	----
Dimethoate	60-51-5	10	µg/kg	<10	<10	----	----	----
Ethion	563-12-2	10	µg/kg	<10	<10	----	----	----
Fenamiphos	22224-92-6	10	µg/kg	<10	<10	----	----	----
Fenthion	55-38-9	10	µg/kg	<10	<10	----	----	----
Malathion	121-75-5	10	µg/kg	<10	<10	----	----	----
Azinphos Methyl	86-50-0	10	µg/kg	<10	<10	----	----	----
Monocrotophos	6923-22-4	10	µg/kg	<10	<10	----	----	----
Parathion	56-38-2	10	µg/kg	<10	<10	----	----	----
Parathion-methyl	298-00-0	10	µg/kg	<10	<10	----	----	----
Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	----	----	----
Prothiofos	34643-46-4	10	µg/kg	<10	<10	----	----	----



## Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				EMB06 0.5-1.0	T3 0-0.5	TRIP BLANK	----	----
				05-MAY-2010 17:08	05-MAY-2010 17:08	23-APR-2010 17:08	----	----
				ES1008494-006	ES1008494-007	ES1008494-008	----	----
Compound	CAS Number	LOR	Unit					
<b>EP131A: Organochlorine Pesticides</b>								
Aldrin	309-00-2	0.50	µg/kg	<0.50	<0.50	----	----	----
alpha-BHC	319-84-6	0.50	µg/kg	<0.50	<0.50	----	----	----
beta-BHC	319-85-7	0.50	µg/kg	<0.50	<0.50	----	----	----
delta-BHC	319-86-8	0.50	µg/kg	<0.50	<0.50	----	----	----
4,4'-DDD	72-54-8	0.50	µg/kg	<0.50	<0.50	----	----	----
4,4'-DDE	72-55-9	0.50	µg/kg	<0.50	<0.50	----	----	----
4,4'-DDT	50-29-3	0.50	µg/kg	<0.50	<0.50	----	----	----
^ DDT (total)	----	0.50	µg/kg	<0.50	<0.50	----	----	----
Dieldrin	60-57-1	0.50	µg/kg	<0.50	<0.50	----	----	----
alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	<0.50	----	----	----
beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	<0.50	----	----	----
Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	<0.50	----	----	----
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	<0.50	----	----	----
Endrin	72-20-8	0.50	µg/kg	<0.50	<0.50	----	----	----
Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	<0.50	----	----	----
Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	<0.50	----	----	----
Heptachlor	76-44-8	0.50	µg/kg	<0.50	<0.50	----	----	----
Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	<0.50	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	<0.50	----	----	----
gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	----	----	----
Methoxychlor	72-43-5	0.50	µg/kg	<0.50	<0.50	----	----	----
cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	----	----	----
trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	----	----	----
^ Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	----	----	----
Oxychlordane	27304-13-8	0.50	µg/kg	<0.50	<0.50	----	----	----
<b>EP131B: Polychlorinated Biphenyls (as Aroclors)</b>								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	<5.0	----	----	----
Aroclor 1016	12974-11-2	5.0	µg/kg	<5.0	<5.0	----	----	----
Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	<5.0	----	----	----
Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	<5.0	----	----	----
Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	<5.0	----	----	----
Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	<5.0	----	----	----
Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	<5.0	----	----	----
Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	<5.0	----	----	----
<b>EP132B: Polynuclear Aromatic Hydrocarbons</b>								
Naphthalene	91-20-3	5	µg/kg	<5	<5	----	----	----
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	----	----	----



## Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				EMB06 0.5-1.0	T3 0-0.5	TRIP BLANK	----	----
				05-MAY-2010 17:08	05-MAY-2010 17:08	23-APR-2010 17:08	----	----
Compound	CAS Number	LOR	Unit	ES1008494-006	ES1008494-007	ES1008494-008	----	----
<b>EP132B: Polynuclear Aromatic Hydrocarbons - Continued</b>								
Acenaphthylene	208-96-8	4	µg/kg	<4	<5	----	----	----
Acenaphthene	83-32-9	4	µg/kg	<4	<5	----	----	----
Fluorene	86-73-7	4	µg/kg	<4	<5	----	----	----
Phenanthrene	85-01-8	4	µg/kg	<4	11	----	----	----
Anthracene	120-12-7	4	µg/kg	<4	<5	----	----	----
Fluoranthene	206-44-0	4	µg/kg	<4	10	----	----	----
Pyrene	129-00-0	4	µg/kg	<4	9	----	----	----
Benz(a)anthracene	56-55-3	4	µg/kg	<4	6	----	----	----
Chrysene	218-01-9	4	µg/kg	<4	7	----	----	----
Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	8	----	----	----
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<5	----	----	----
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	5	----	----	----
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	6	----	----	----
Perylene	198-55-0	4	µg/kg	<4	6	----	----	----
Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<5	----	----	----
Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<5	----	----	----
Indeno(1,2,3,cd)pyrene	193-39-5	4	µg/kg	<4	<5	----	----	----
Coronene	191-07-1	5	µg/kg	<5	<5	----	----	----
^ Sum of PAHs	----	4	µg/kg	<4	68	----	----	----
<b>EP080-SD: TPH(V)/BTEX Surrogates</b>								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	113	105	117	----	----
Toluene-D8	2037-26-5	0.1	%	110	87.1	112	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	111	107	119	----	----
<b>EP090S: Organotin Surrogate</b>								
Tripopyltin	----	0.1	%	92.8	56.4	----	----	----
<b>EP130S: Organophosphorus Pesticide Surrogate</b>								
DEF	78-48-8	0.1	%	67.0	86.8	----	----	----
<b>EP131S: OC Pesticide Surrogate</b>								
Dibromo-DDE	21655-73-2	0.1	%	67.0	53.2	----	----	----
<b>EP131T: PCB Surrogate</b>								
Decachlorobiphenyl	2051-24-3	0.1	%	56.2	56.1	----	----	----
<b>EP132T: Base/Neutral Extractable Surrogates</b>								
2-Fluorobiphenyl	321-60-8	0.1	%	115	118	----	----	----
Anthracene-d10	1719-06-8	0.1	%	115	112	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	102	115	----	----	----



## Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP080-SD: TPH(V)/BTEX Surrogates</b>			
1,2-Dichloroethane-D4	17060-07-0	67	137
Toluene-D8	2037-26-5	74	134
4-Bromofluorobenzene	460-00-4	73	137
<b>EP090S: Organotin Surrogate</b>			
Tripopyltin	----	34	108
<b>EP130S: Organophosphorus Pesticide Surrogate</b>			
DEF	78-48-8	51.3	136.9
<b>EP131S: OC Pesticide Surrogate</b>			
Dibromo-DDE	21655-73-2	10	136
<b>EP131T: PCB Surrogate</b>			
Decachlorobiphenyl	2051-24-3	10	164
<b>EP132T: Base/Neutral Extractable Surrogates</b>			
2-Fluorobiphenyl	321-60-8	30	115
Anthracene-d10	1719-06-8	27	133
4-Terphenyl-d14	1718-51-0	18	137



## Environmental Division

### QUALITY CONTROL REPORT

Work Order	: <b>ES1008494</b>	Page	: 1 of 15
Client	: <b>WORLEY PARSONS - INFRASTRUCTURE MWE</b>	Laboratory	: Environmental Division Sydney
Contact	: MS VIVIAN SETO	Contact	: Charlie Pierce
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E-mail	: vivian.seto@worleyparsons.com	E-mail	: charlie.pierce@alsenviro.com
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Facsimile	: +61 07 3319 7791	Facsimile	: +61-2-8784 8500
Project	: NAGD - Asia Pacific LNG 301001-00752	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: GLADSTONE-APLNG DOWNSTREAM		
C-O-C number	: ----	Date Samples Received	: 05-MAY-2010
Sampler	: VSK	Issue Date	: 25-MAY-2010
Order number	: ----		
Quote number	: BN/187/10	No. of samples received	: 8
		No. of samples analysed	: 8

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

This Quality Control Report contains the following information:

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



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

### *Signatories*

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Organics
Ankit Joshi	Inorganic Chemist	Inorganics
Celine Conceicao	Spectroscopist	Inorganics
Dianne Blane	Laboratory Supervisor	Newcastle
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
Matt Frost	Organic Instrument Chemist	Organics
Sarah Ashworth	Organic Chemist	Organics



## General Comments

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

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

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

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

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



## Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (QC Lot: 1341410)									
EN1001062-001	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	41.9	42.7	1.8	0% - 20%
ES1008581-023	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	12.8	12.4	3.9	0% - 50%
EG005-SD: Total Metals in Sediments by ICP-AES (QC Lot: 1338286)									
ES1008369-011	Anonymous	EG005-SD: Aluminium	7429-90-5	50	mg/kg	2440	2890	16.8	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	8240	9290	12.0	0% - 20%
ES1008494-007	T3 0-0.5	EG005-SD: Aluminium	7429-90-5	50	mg/kg	26900	27900	3.5	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	36100	38300	5.8	0% - 20%
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 1338285)									
ES1008369-011	Anonymous	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.3	0.3	0.0	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	4.9	6.0	19.0	0% - 50%
		EG020-SD: Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	0.0	No Limit
		EG020-SD: Chromium	7440-47-3	1.0	mg/kg	6.6	7.5	12.3	No Limit
		EG020-SD: Copper	7440-50-8	1.0	mg/kg	3.4	3.9	14.7	No Limit
		EG020-SD: Lead	7439-92-1	1.0	mg/kg	2.4	2.1	11.5	No Limit
		EG020-SD: Nickel	7440-02-0	1.0	mg/kg	3.1	4.0	26.0	No Limit
		EG020-SD: Zinc	7440-66-6	1.0	mg/kg	7.2	8.8	19.8	No Limit
		EG020-SD: Arsenic	7440-38-2	1.00	mg/kg	9.66	7.31	27.6	No Limit
		EG020-SD: Manganese	7439-96-5	10	mg/kg	1220	811	# 40.5	0% - 20%
		EG020-SD: Vanadium	7440-62-2	2.0	mg/kg	20.4	22.5	10.0	0% - 50%
		ES1008494-007	T3 0-0.5	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1
EG020-SD: Selenium	7782-49-2			0.1	mg/kg	0.9	0.9	0.0	No Limit
EG020-SD: Silver	7440-22-4			0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EG020-SD: Cobalt	7440-48-4			0.5	mg/kg	15.8	14.7	7.2	0% - 20%
EG020-SD: Antimony	7440-36-0			0.50	mg/kg	<0.50	<0.50	0.0	No Limit
EG020-SD: Chromium	7440-47-3			1.0	mg/kg	33.8	34.2	1.2	0% - 20%
EG020-SD: Copper	7440-50-8			1.0	mg/kg	28.9	33.4	14.2	0% - 20%
EG020-SD: Lead	7439-92-1			1.0	mg/kg	10.8	11.5	5.8	0% - 50%
EG020-SD: Nickel	7440-02-0			1.0	mg/kg	19.0	18.6	2.3	0% - 50%
EG020-SD: Zinc	7440-66-6			1.0	mg/kg	60.0	64.2	6.7	0% - 20%
EG020-SD: Arsenic	7440-38-2			1.00	mg/kg	10.2	7.65	28.5	No Limit
EG020-SD: Manganese	7439-96-5			10	mg/kg	175	175	0.0	0% - 50%
EG020-SD: Vanadium	7440-62-2			2.0	mg/kg	74.7	79.7	6.5	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1338284)									



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1338284) - continued									
ES1008369-011	Anonymous	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	<0.01	0.0	No Limit
ES1008494-007	T3 0-0.5	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	0.02	0.02	0.0	No Limit
EK055: Ammonia as N (QC Lot: 1342140)									
ES1008369-007	Anonymous	EK055-SD: Ammonia as N	7664-41-7	1	mg/kg	<1	<1	0.0	No Limit
ES1008688-008	Anonymous	EK055-SD: Ammonia as N	7664-41-7	1	mg/kg	<1	<1	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1341591)									
ES1008369-003	Anonymous	EK057G: Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES1008494-007	T3 0-0.5	EK057G: Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EK059G: NOX as N by Discrete Analyser (QC Lot: 1341592)									
ES1008369-003	Anonymous	EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES1008494-007	T3 0-0.5	EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1338779)									
ES1008041-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	3080	2940	4.9	0% - 20%
ES1008245-009	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	220	360	47.2	0% - 50%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1338782)									
ES1008494-005	EMB06 0-0.5	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	1080	990	8.6	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1338781)									
ES1008494-005	EMB06 0-0.5	EK067G: Total Phosphorus as P	----	2	mg/kg	448	439	2.0	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1341593)									
ES1008369-003	Anonymous	EK071G: Reactive Phosphorus as P	----	0.1	mg/kg	0.2	0.6	86.2	No Limit
ES1008494-007	T3 0-0.5	EK071G: Reactive Phosphorus as P	----	0.1	mg/kg	1.1	1.1	0.0	0% - 50%
EP005: Total Organic Carbon (TOC) (QC Lot: 1342778)									
ES1008494-001	BER03 0-0.5	EP005: Total Organic Carbon	----	0.02	%	0.76	0.74	3.0	0% - 20%
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QC Lot: 1337042)									
ES1008494-005	EMB06 0-0.5	EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QC Lot: 1337055)									
ES1008494-005	EMB06 0-0.5	EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
		EP071-SD: C15 - C28 Fraction	----	3	mg/kg	6	10	48.3	No Limit
		EP071-SD: C29 - C36 Fraction	----	5	mg/kg	8	9	0.0	No Limit
EP080-SD: BTEX (QC Lot: 1337042)									
ES1008494-005	EMB06 0-0.5	EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: meta- & para-Xylene	108-38-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		106-42-3							
EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.0	No Limit		
EP090: Organotin Compounds (QC Lot: 1342587)									
ES1008369-010	Anonymous	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	0.0	No Limit



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP090: Organotin Compounds (QC Lot: 1342587) - continued									
ES1008494-007	T3 0-0.5	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	0.0	No Limit
EP130A: Organophosphorus Pesticides (Ultra-trace) (QC Lot: 1337049)									
ES1008494-005	EMB06 0-0.5	EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Carbophenothion	786-19-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Diazinon	333-41-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dichlorvos	62-73-7	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dimethoate	60-51-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Ethion	563-12-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Fenthion	55-38-9	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Malathion	121-75-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Azinphos Methyl	86-50-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion	56-38-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Prothiofos	34643-46-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	<10.0	<10.0	0.0	No Limit
EP131A: Organochlorine Pesticides (QC Lot: 1337050)									
ES1008494-005	EMB06 0-0.5	EP131A: gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Aldrin	309-00-2	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-BHC	319-84-6	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-BHC	319-85-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: delta-BHC	319-86-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4'-DDD	72-54-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4'-DDE	72-55-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4'-DDT	50-29-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: DDT (total)	----	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Dieldrin	60-57-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP131A: Organochlorine Pesticides (QC Lot: 1337050) - continued									
ES1008494-005	EMB06 0-0.5	EP131A: Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin	72-20-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor	76-44-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Methoxychlor	72-43-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
EP131B: Polychlorinated Biphenyls (as Aroclors) (QC Lot: 1337051)									
ES1008494-005	EMB06 0-0.5	EP131B: Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1016	12974-11-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1337054)									
ES1008494-005	EMB06 0-0.5	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	11	13	17.1	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	10	9	0.0	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	11	9	21.0	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	5	7	30.7	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	6	6	0.0	No Limit
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	7	8	17.0	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	5	<5	0.0	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	55	52	5.6	0% - 50%
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.0	No Limit



Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1337054) - continued</b>									
ES1008497-004	Anonymous	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	5	5	0.0	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	4	4	0.0	No Limit
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Dibenzo(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	9	9	0.0	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.0	No Limit



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

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG005-SD: Total Metals in Sediments by ICP-AES (QCLot: 1338286)								
EG005-SD: Aluminium	7429-90-5	50	mg/kg	<50	----	----	----	----
EG005-SD: Iron	7439-89-6	50	mg/kg	<50	----	----	----	----
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 1338285)								
EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	----	----	----	----
EG020-SD: Arsenic	7440-38-2	1.0	mg/kg	<1.00	13.1 mg/kg	109	70	130
EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	2.76 mg/kg	96.1	70	130
EG020-SD: Chromium	7440-47-3	1.0	mg/kg	<1.0	60.9 mg/kg	97.1	70	130
EG020-SD: Copper	7440-50-8	1.0	mg/kg	<1.0	54.7 mg/kg	96.0	70	130
EG020-SD: Cobalt	7440-48-4	10	mg/kg	<10.0	24.5 mg/kg	105	70	130
EG020-SD: Lead	7439-92-1	1.0	mg/kg	<1.0	54.8 mg/kg	90.0	70	130
EG020-SD: Manganese	7439-96-5	10	mg/kg	<10	136 mg/kg	93.1	70	130
EG020-SD: Nickel	7440-02-0	1.0	mg/kg	<1.0	55.2 mg/kg	102	70	130
EG020-SD: Selenium	7782-49-2	0.1	mg/kg	<0.1	----	----	----	----
EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	5.6 mg/kg	109	70	130
EG020-SD: Vanadium	7440-62-2	2	mg/kg	<2.0	50 mg/kg	101	70	130
EG020-SD: Zinc	7440-66-6	1.0	mg/kg	<1.0	104 mg/kg	97.1	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1338284)								
EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	0.090 mg/kg	87.5	74.2	126
EK055: Ammonia as N (QCLot: 1342140)								
EK055-SD: Ammonia as N	7664-41-7	1	mg/kg	<1	25 mg/kg	86.2	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1341591)								
EK057G: Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	4.8 mg/kg	99.3	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 1341592)								
EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	4.8 mg/kg	117	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1338779)								
EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	<20	1000 mg/kg	107	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1338782)								
EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	<20	1000 mg/kg	119	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1338781)								
EK067G: Total Phosphorus as P	----	2	mg/kg	<2	442 mg/kg	105	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1341593)								
EK071G: Reactive Phosphorus as P	----	0.1	mg/kg	<0.1	2.5 mg/kg	102	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 1342778)								



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP005: Total Organic Carbon (TOC) (QCLot: 1342778) - continued								
EP005: Total Organic Carbon	----	0.02	%	<0.02	100 %	99.8	70	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1337042)								
EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	26 mg/kg	121	68.4	128
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1337055)								
EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	5 mg/kg	113	75.2	116
EP071-SD: C15 - C28 Fraction	----	3	mg/kg	<3	5 mg/kg	86.0	75.3	113
EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	5 mg/kg	85.0	72.6	117
EP080-SD: BTEX (QCLot: 1337042)								
EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	81.2	67.5	125
EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	1 mg/kg	110	69	122
EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	1 mg/kg	112	65.3	126
EP080-SD: meta- & para-Xylene	108-38-3	0.2	mg/kg	<0.2	2 mg/kg	114	66.5	124
	106-42-3							
EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	1 mg/kg	98.6	66.7	123
EP090: Organotin Compounds (QCLot: 1342587)								
EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	1.25 µgSn/kg	98.0	19.5	129
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 1337049)								
EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	50 µg/kg	93.8	36.9	142
EP130: Carbophenothion	786-19-6	10	µg/kg	<10	50 µg/kg	76.9	0.5	157
EP130: Chlorfenvinphos (E)	470-90-6	10	µg/kg	<10.0	5 µg/kg	102	50.3	137
EP130: Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	50 µg/kg	104	55.9	152
EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	50 µg/kg	93.7	49	140
EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	50 µg/kg	83.3	28.1	142
EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	50 µg/kg	93.1	36.6	172
EP130: Diazinon	333-41-5	10	µg/kg	<10	50 µg/kg	98.2	37.2	148
EP130: Dichlorvos	62-73-7	10	µg/kg	<10	50 µg/kg	100	32.7	153
EP130: Dimethoate	60-51-5	10	µg/kg	<10	50 µg/kg	97.8	33.2	150
EP130: Ethion	563-12-2	10	µg/kg	<10	50 µg/kg	108	44	146
EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	50 µg/kg	62.8	3.08	162
EP130: Fenthion	55-38-9	10	µg/kg	<10	50 µg/kg	90.4	10.6	157
EP130: Malathion	121-75-5	10	µg/kg	<10	50 µg/kg	114	38.1	143
EP130: Azinphos Methyl	86-50-0	10	µg/kg	<10	50 µg/kg	85.5	8.13	159
EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	50 µg/kg	137	19.7	176
EP130: Parathion	56-38-2	10	µg/kg	<10	50 µg/kg	103	39.2	145
EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	50 µg/kg	86.9	23.5	152
EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	50 µg/kg	93.3	47.1	141
EP130: Prothiofos	34643-46-4	10	µg/kg	<10	50 µg/kg	104	36.1	148
EP131A: Organochlorine Pesticides (QCLot: 1337050)								



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP131A: Organochlorine Pesticides (QCLot: 1337050) - continued								
EP131A: Aldrin	309-00-2	0.5	µg/kg	<0.50	5 µg/kg	73.5	31.7	140
EP131A: alpha-BHC	319-84-6	0.5	µg/kg	<0.50	5 µg/kg	87.0	24.5	150
EP131A: beta-BHC	319-85-7	0.5	µg/kg	<0.50	5 µg/kg	102	36.9	139
EP131A: delta-BHC	319-86-8	0.5	µg/kg	<0.50	5 µg/kg	121	38.2	137
EP131A: 4,4'-DDD	72-54-8	0.5	µg/kg	<0.50	5 µg/kg	100	42.5	141
EP131A: 4,4'-DDE	72-55-9	0.5	µg/kg	<0.50	5 µg/kg	96.2	34.8	140
EP131A: 4,4'-DDT	50-29-3	0.5	µg/kg	<0.50	5 µg/kg	97.7	38	143
EP131A: DDT (total)	----	0.5	µg/kg	<0.50	----	----	----	----
EP131A: Dieldrin	60-57-1	0.5	µg/kg	<0.50	5 µg/kg	66.1	43.2	134
EP131A: alpha-Endosulfan	959-98-8	0.5	µg/kg	<0.50	5 µg/kg	86.8	23.7	139
EP131A: beta-Endosulfan	33213-65-9	0.5	µg/kg	<0.50	5 µg/kg	96.1	35.8	138
EP131A: Endosulfan sulfate	1031-07-8	0.5	µg/kg	<0.50	5 µg/kg	114	7.45	158
EP131A: Endosulfan (sum)	115-29-7	0.5	µg/kg	<0.50	----	----	----	----
EP131A: Endrin	72-20-8	0.5	µg/kg	<0.50	5 µg/kg	104	21.6	162
EP131A: Endrin aldehyde	7421-93-4	0.5	µg/kg	<0.50	5 µg/kg	63.9	19.3	131
EP131A: Endrin ketone	53494-70-5	0.5	µg/kg	<0.50	5 µg/kg	97.6	17.9	141
EP131A: Heptachlor	76-44-8	0.5	µg/kg	<0.50	5 µg/kg	111	31	153
EP131A: Heptachlor epoxide	1024-57-3	0.5	µg/kg	<0.50	5 µg/kg	86.1	34.3	138
EP131A: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/kg	<0.50	5 µg/kg	70.8	18.6	146
EP131A: gamma-BHC	58-89-9	0.5	µg/kg	<0.50	5 µg/kg	92.0	30.7	145
EP131A: Methoxychlor	72-43-5	0.5	µg/kg	<0.50	5 µg/kg	114	15	157
EP131A: cis-Chlordane	5103-71-9	0.5	µg/kg	<0.50	5 µg/kg	80.4	22.3	145
EP131A: trans-Chlordane	5103-74-2	0.5	µg/kg	<0.50	5 µg/kg	88.1	42.4	139
EP131A: Total Chlordane (sum)	----	0.5	µg/kg	<0.50	----	----	----	----
EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 1337051)								
EP131B: Total Polychlorinated biphenyls	----	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1016	12974-11-2	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1221	11104-28-2	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1232	11141-16-5	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1242	53469-21-9	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1248	12672-29-6	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1254	11097-69-1	5	µg/kg	<5.0	50 µg/kg	110	61.3	121
EP131B: Aroclor 1260	11096-82-5	5	µg/kg	<5.0	----	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1337054)								
EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	25 µg/kg	104	----	----
EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	25 µg/kg	102	----	----
EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	25 µg/kg	115	----	----
EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	25 µg/kg	97.1	----	----
EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	25 µg/kg	118	----	----



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low      High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1337054) - continued								
EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	25 µg/kg	93.2	----	----
EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	25 µg/kg	94.7	----	----
EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	25 µg/kg	116	----	----
EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	25 µg/kg	104	----	----
EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	25 µg/kg	110	----	----
EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	25 µg/kg	109	----	----
EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	25 µg/kg	107	----	----
EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	25 µg/kg	101	----	----
EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	25 µg/kg	87.6	----	----
EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	25 µg/kg	112	----	----
EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	25 µg/kg	114	----	----
EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	25 µg/kg	90.8	----	----
EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	25 µg/kg	84.6	----	----
EP132B-SD: Indeno(1,2,3,cd)pyrene	193-39-5	4	µg/kg	<4	25 µg/kg	81.1	----	----
EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	25 µg/kg	73.0	----	----
EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	----	----	----	----



## Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number				
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 1338285)							
ES1008369-012	Anonymous	EG020-SD: Arsenic	7440-38-2	50 mg/kg	104	70	130
		EG020-SD: Cadmium	7440-43-9	50 mg/kg	98.0	70	130
		EG020-SD: Chromium	7440-47-3	50 mg/kg	96.8	70	130
		EG020-SD: Copper	7440-50-8	250 mg/kg	87.2	70	130
		EG020-SD: Lead	7439-92-1	250 mg/kg	86.4	70	130
		EG020-SD: Nickel	7440-02-0	50 mg/kg	100	70	130
		EG020-SD: Zinc	7440-66-6	250 mg/kg	92.7	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1338284)							
ES1008369-011	Anonymous	EG035T-LL: Mercury	7439-97-6	0.50 mg/kg	83.9	70	130
EK055: Ammonia as N (QCLot: 1342140)							
ES1008369-007	Anonymous	EK055-SD: Ammonia as N	7664-41-7	25 mg/kg	83.4	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1341591)							
ES1008369-003	Anonymous	EK057G: Nitrite as N (Sol.)	----	3.0 mg/kg	99.2	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 1341592)							
ES1008369-003	Anonymous	EK059G: Nitrite + Nitrate as N (Sol.)	----	3.0 mg/kg	111	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1338779)							
ES1008041-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	500 mg/kg	# Not Determined	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1338782)							
ES1008494-005	EMB06 0-0.5	EK061G: Total Kjeldahl Nitrogen as N	----	500 mg/kg	89.4	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1338781)							
ES1008494-005	EMB06 0-0.5	EK067G: Total Phosphorus as P	----	100 mg/kg	# 48.0	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1341593)							
ES1008369-003	Anonymous	EK071G: Reactive Phosphorus as P	----	2.5 mg/kg	100	70	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1337042)							
ES1008494-005	EMB06 0-0.5	EP080-SD: C6 - C9 Fraction	----	26 mg/kg	116	70	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1337055)							
ES1008494-005	EMB06 0-0.5	EP071-SD: C10 - C14 Fraction	----	19.75 mg/kg	76.2	70	130
		EP071-SD: C15 - C28 Fraction	----	87.25 mg/kg	75.4	70	130
		EP071-SD: C29 - C36 Fraction	----	60 mg/kg	103	70	130
EP080-SD: BTEX (QCLot: 1337042)							
ES1008494-005	EMB06 0-0.5	EP080-SD: Benzene	71-43-2	2.5 mg/kg	110	70	130
		EP080-SD: Toluene	108-88-3	2.5 mg/kg	91.9	70	130



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number				
EP080-SD: BTEX (QCLot: 1337042) - continued							
ES1008494-005	EMB06 0-0.5	EP080-SD: Ethylbenzene	100-41-4	2.5 mg/kg	103	70	130
		EP080-SD: meta- & para-Xylene	108-38-3	2.5 mg/kg	89.3	70	130
		106-42-3					
		EP080-SD: ortho-Xylene	95-47-6	2.5 mg/kg	91.4	70	130
EP090: Organotin Compounds (QCLot: 1342587)							
ES1008369-011	Anonymous	EP090: Tributyltin	56573-85-4	1.25 µgSn/kg	108	20	130
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 1337049)							
ES1008494-005	EMB06 0-0.5	EP130: Bromophos-ethyl	4824-78-6	50 µg/kg	40.2	36.9	142
		EP130: Carbophenothion	786-19-6	50 µg/kg	51.6	0.5	157
		EP130: Chlorfenvinphos (E)	470-90-6	5 µg/kg	56.0	50.3	137
		EP130: Chlorfenvinphos (Z)	470-90-8	50 µg/kg	72.9	55.9	152
		EP130: Chlorpyrifos	2921-88-2	50 µg/kg	# 42.0	49	140
		EP130: Chlorpyrifos-methyl	5598-13-0	50 µg/kg	43.2	28.1	142
		EP130: Demeton-S-methyl	919-86-8	50 µg/kg	52.2	36.6	172
		EP130: Diazinon	333-41-5	50 µg/kg	49.4	37.2	148
		EP130: Dichlorvos	62-73-7	50 µg/kg	50.0	32.7	153
		EP130: Dimethoate	60-51-5	50 µg/kg	64.2	33.2	150
		EP130: Ethion	563-12-2	50 µg/kg	# 39.4	44	146
		EP130: Fenamiphos	22224-92-6	50 µg/kg	44.1	3.08	162
		EP130: Fenthion	55-38-9	50 µg/kg	42.6	10.6	157
		EP130: Malathion	121-75-5	50 µg/kg	62.5	38.1	143
		EP130: Azinphos Methyl	86-50-0	50 µg/kg	51.4	8.13	159
		EP130: Monocrotophos	6923-22-4	50 µg/kg	63.5	19.7	176
		EP130: Parathion	56-38-2	50 µg/kg	42.5	39.2	145
		EP130: Parathion-methyl	298-00-0	50 µg/kg	40.8	23.5	152
		EP130: Pirimphos-ethyl	23505-41-1	50 µg/kg	# 36.4	47.1	141
		EP130: Prothiofos	34643-46-4	50 µg/kg	43.7	36.1	148
EP131A: Organochlorine Pesticides (QCLot: 1337050)							
ES1008494-005	EMB06 0-0.5	EP131A: Aldrin	309-00-2	5 µg/kg	# 27.9	31.7	140
		EP131A: alpha-BHC	319-84-6	5 µg/kg	29.2	24.5	150
		EP131A: beta-BHC	319-85-7	5 µg/kg	# 30.2	36.9	139
		EP131A: delta-BHC	319-86-8	5 µg/kg	# 37.6	38.2	137
		EP131A: 4,4`-DDD	72-54-8	5 µg/kg	# 36.8	42.5	141
		EP131A: 4,4`-DDE	72-55-9	5 µg/kg	44.9	34.8	140
		EP131A: 4,4`-DDT	50-29-3	5 µg/kg	# 36.7	38	143
		EP131A: Dieldrin	60-57-1	5 µg/kg	# 39.5	43.2	134
		EP131A: alpha-Endosulfan	959-98-8	5 µg/kg	41.7	23.7	139
		EP131A: beta-Endosulfan	33213-65-9	5 µg/kg	41.2	35.8	138



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number				
EP131A: Organochlorine Pesticides (QCLot: 1337050) - continued							
ES1008494-005	EMB06 0-0.5	EP131A: Endosulfan sulfate	1031-07-8	5 µg/kg	46.6	7.45	158
		EP131A: Endrin	72-20-8	5 µg/kg	45.7	21.6	162
		EP131A: Endrin aldehyde	7421-93-4	5 µg/kg	43.2	19.3	131
		EP131A: Endrin ketone	53494-70-5	5 µg/kg	48.2	17.9	141
		EP131A: Heptachlor	76-44-8	5 µg/kg	37.6	31	153
		EP131A: Heptachlor epoxide	1024-57-3	5 µg/kg	# 32.1	34.3	138
		EP131A: Hexachlorobenzene (HCB)	118-74-1	5 µg/kg	34.2	18.6	146
		EP131A: gamma-BHC	58-89-9	5 µg/kg	34.0	30.7	145
		EP131A: Methoxychlor	72-43-5	5 µg/kg	57.3	15	157
		EP131A: cis-Chlordane	5103-71-9	5 µg/kg	27.7	22.3	145
		EP131A: trans-Chlordane	5103-74-2	5 µg/kg	# 36.9	42.4	139
EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 1337051)							
ES1008494-005	EMB06 0-0.5	EP131B: Aroclor 1254	11097-69-1	50 µg/kg	# 40.9	61.3	121
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1337054)							
ES1008494-005	EMB06 0-0.5	EP132B-SD: Naphthalene	91-20-3	25 µg/kg	89.0	70	130
		EP132B-SD: 2-Methylnaphthalene	91-57-6	25 µg/kg	105	70	130
		EP132B-SD: Acenaphthylene	208-96-8	25 µg/kg	98.8	70	130
		EP132B-SD: Acenaphthene	83-32-9	25 µg/kg	92.6	70	130
		EP132B-SD: Fluorene	86-73-7	25 µg/kg	84.6	70	130
		EP132B-SD: Phenanthrene	85-01-8	25 µg/kg	# 65.4	70	130
		EP132B-SD: Anthracene	120-12-7	25 µg/kg	106	70	130
		EP132B-SD: Fluoranthene	206-44-0	25 µg/kg	82.6	70	130
		EP132B-SD: Pyrene	129-00-0	25 µg/kg	76.0	70	130
		EP132B-SD: Benz(a)anthracene	56-55-3	25 µg/kg	92.9	70	130
		EP132B-SD: Chrysene	218-01-9	25 µg/kg	82.8	70	130
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	25 µg/kg	91.3	70	130
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	25 µg/kg	81.5	70	130
		EP132B-SD: Benzo(e)pyrene	192-97-2	25 µg/kg	71.2	70	130
		EP132B-SD: Benzo(a)pyrene	50-32-8	25 µg/kg	91.7	70	130
		EP132B-SD: Perylene	198-55-0	25 µg/kg	100	70	130
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	25 µg/kg	95.9	70	130
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	25 µg/kg	93.5	70	130
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	25 µg/kg	87.9	70	130
				EP132B-SD: Coronene	191-07-1	25 µg/kg	108



## Environmental Division

### INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: <b>ES1008494</b>	Page	: 1 of 10
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Sydney
Contact	: MS VIVIAN SETO	Contact	: Charlie Pierce
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Project	: NAGD - Asia Pacific LNG 301001-00752	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: GLADSTONE-APLNG DOWNSTREAM		
C-O-C number	: ----	Date Samples Received	: 05-MAY-2010
Sampler	: VSK	Issue Date	: 25-MAY-2010
Order number	: ----		
Quote number	: BN/187/10	No. of samples received	: 8
		No. of samples analysed	: 8

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

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers



## Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content								
Soil Glass Jar - Unpreserved BER03 - 0-0.5, BER02 - 0-0.5, EMB06 - 0-0.5, T3 - 0-0.5	T14 - 0-0.5, BER04 - 0-0.5, EMB06 - 0.5-1.0,	05-MAY-2010	----	----	----	12-MAY-2010	12-MAY-2010	✓
EA150: Particle Sizing								
Snap Lock Bag BER03 - 0-0.5, BER04 - 0-0.5,	BER02 - 0-0.5, EMB06 - 0-0.5	05-MAY-2010	---	---	----	20-MAY-2010	01-NOV-2010	✓
EA150: Soil Classification based on Particle Size								
Snap Lock Bag BER03 - 0-0.5, BER04 - 0-0.5,	BER02 - 0-0.5, EMB06 - 0-0.5	05-MAY-2010	---	---	----	20-MAY-2010	01-NOV-2010	✓
EG005-SD: Total Metals in Sediments by ICP-AES								
Soil Glass Jar - Unpreserved BER03 - 0-0.5, BER02 - 0-0.5, EMB06 - 0-0.5, T3 - 0-0.5	T14 - 0-0.5, BER04 - 0-0.5, EMB06 - 0.5-1.0,	05-MAY-2010	09-MAY-2010	02-JUN-2010	✓	10-MAY-2010	01-NOV-2010	✓
EG020-SD: Total Metals in Sediments by ICPMS								
Soil Glass Jar - Unpreserved BER03 - 0-0.5, BER02 - 0-0.5, EMB06 - 0-0.5, T3 - 0-0.5	T14 - 0-0.5, BER04 - 0-0.5, EMB06 - 0.5-1.0,	05-MAY-2010	09-MAY-2010	02-JUN-2010	✓	10-MAY-2010	01-NOV-2010	✓



Matrix: **SOIL**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved BER03 - 0-0.5, BER02 - 0-0.5, EMB06 - 0-0.5, T3 - 0-0.5	T14 - 0-0.5, BER04 - 0-0.5, EMB06 - 0.5-1.0,	05-MAY-2010	09-MAY-2010	02-JUN-2010	✓	11-MAY-2010	02-JUN-2010	✓
EK055: Ammonia as N								
Soil Glass Jar - Unpreserved EMB06 - 0-0.5, T3 - 0-0.5	EMB06 - 0.5-1.0,	05-MAY-2010	----	----	----	12-MAY-2010	01-NOV-2010	✓
EK057G: Nitrite as N by Discrete Analyser								
Soil Glass Jar - Unpreserved EMB06 - 0-0.5, T3 - 0-0.5	EMB06 - 0.5-1.0,	05-MAY-2010	12-MAY-2010	01-NOV-2010	✓	12-MAY-2010	01-NOV-2010	✓
EK059G: NOX as N by Discrete Analyser								
Soil Glass Jar - Unpreserved EMB06 - 0-0.5, T3 - 0-0.5	EMB06 - 0.5-1.0,	05-MAY-2010	12-MAY-2010	01-NOV-2010	✓	12-MAY-2010	01-NOV-2010	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Soil Glass Jar - Unpreserved EMB06 - 0-0.5, T3 - 0-0.5	EMB06 - 0.5-1.0,	05-MAY-2010	10-MAY-2010	01-NOV-2010	✓	10-MAY-2010	01-NOV-2010	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Soil Glass Jar - Unpreserved EMB06 - 0-0.5, T3 - 0-0.5	EMB06 - 0.5-1.0,	05-MAY-2010	10-MAY-2010	01-NOV-2010	✓	10-MAY-2010	01-NOV-2010	✓
EK071G: Reactive Phosphorus as P by discrete analyser								
Soil Glass Jar - Unpreserved EMB06 - 0-0.5, T3 - 0-0.5	EMB06 - 0.5-1.0,	05-MAY-2010	12-MAY-2010	01-NOV-2010	✓	12-MAY-2010	01-NOV-2010	✓
EP005: Total Organic Carbon (TOC)								
Pulp Bag BER03 - 0-0.5, BER02 - 0-0.5, EMB06 - 0-0.5, T3 - 0-0.5	T14 - 0-0.5, BER04 - 0-0.5, EMB06 - 0.5-1.0,	05-MAY-2010	12-MAY-2010	---	----	13-MAY-2010	02-JUN-2010	✓



Matrix: **SOIL**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved EMB06 - 0-0.5, T3 - 0-0.5	EMB06 - 0.5-1.0,	05-MAY-2010	07-MAY-2010	19-MAY-2010	✓	08-MAY-2010	19-MAY-2010	✓
Soil Glass Jar - Unpreserved EMB06 - 0-0.5, T3 - 0-0.5	EMB06 - 0.5-1.0,	05-MAY-2010	07-MAY-2010	19-MAY-2010	✓	11-MAY-2010	16-JUN-2010	✓
Soil Glass Jar - Unpreserved TRIP BLANK		23-APR-2010	07-MAY-2010	07-MAY-2010	✓	07-MAY-2010	07-MAY-2010	✓
EP080-SD: BTEX								
Soil Glass Jar - Unpreserved EMB06 - 0-0.5,	T3 - 0-0.5	05-MAY-2010	07-MAY-2010	19-MAY-2010	✓	08-MAY-2010	19-MAY-2010	✓
Soil Glass Jar - Unpreserved TRIP BLANK		23-APR-2010	07-MAY-2010	07-MAY-2010	✓	07-MAY-2010	07-MAY-2010	✓
EP090: Organotin Compounds								
Soil Glass Jar - Unpreserved BER03 - 0-0.5, BER02 - 0-0.5, EMB06 - 0-0.5, T3 - 0-0.5	T14 - 0-0.5, BER04 - 0-0.5, EMB06 - 0.5-1.0,	05-MAY-2010	12-MAY-2010	19-MAY-2010	✓	14-MAY-2010	21-JUN-2010	✓
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Soil Glass Jar - Unpreserved EMB06 - 0-0.5, T3 - 0-0.5	EMB06 - 0.5-1.0,	05-MAY-2010	07-MAY-2010	19-MAY-2010	✓	12-MAY-2010	16-JUN-2010	✓
EP131A: Organochlorine Pesticides								
Soil Glass Jar - Unpreserved EMB06 - 0-0.5, T3 - 0-0.5	EMB06 - 0.5-1.0,	05-MAY-2010	07-MAY-2010	19-MAY-2010	✓	12-MAY-2010	16-JUN-2010	✓
EP131B: Polychlorinated Biphenyls (as Aroclors)								
Soil Glass Jar - Unpreserved EMB06 - 0-0.5, T3 - 0-0.5	EMB06 - 0.5-1.0,	05-MAY-2010	07-MAY-2010	19-MAY-2010	✓	12-MAY-2010	16-JUN-2010	✓
EP132B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved BER03 - 0-0.5, BER02 - 0-0.5, EMB06 - 0-0.5, T3 - 0-0.5	T14 - 0-0.5, BER04 - 0-0.5, EMB06 - 0.5-1.0,	05-MAY-2010	07-MAY-2010	19-MAY-2010	✓	13-MAY-2010	16-JUN-2010	✓



## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Buchi Ammonia - Low-Level in Sediment	EK055-SD	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Moisture Content	EA055-103	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Soluble by Discrete Analyser	EK057G	2	14	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	1	7	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	7	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	2	14	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	7	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	2	14	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	3	25	12.0	9.5	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Fe and Al in Sediments by ICPAES	EG005-SD	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	7	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	1	5	20.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	1	7	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	8	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Buchi Ammonia - Low-Level in Sediment	EK055-SD	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	14	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	1	14	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	1	14	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	2	25	8.0	4.8	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	1	5	20.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement



Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
TPH - Semivolatile Fraction	EP071-SD	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	8	12.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Buchi Ammonia - Low-Level in Sediment	EK055-SD	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	14	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	1	14	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	1	14	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	2	25	8.0	4.8	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Fe and Al in Sediments by ICPAES	EG005-SD	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	1	5	20.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	8	12.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Buchi Ammonia - Low-Level in Sediment	EK055-SD	1	20	5.0	5.0	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	18	5.6	5.0	✓	ALS QCS3 requirement
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	14	7.1	5.0	✓	ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	1	7	14.3	5.0	✓	ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	7	14.3	5.0	✓	ALS QCS3 requirement
Organotin Analysis	EP090	1	18	5.6	5.0	✓	ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	1	14	7.1	5.0	✓	ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	7	14.3	5.0	✓	ALS QCS3 requirement
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	1	14	7.1	5.0	✓	ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	2	25	8.0	4.8	✓	ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	1	18	5.6	5.0	✓	ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	1	18	5.6	5.0	✓	ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	1	5	20.0	5.0	✓	ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	1	7	14.3	5.0	✓	ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	8	12.5	5.0	✓	ALS QCS3 requirement



## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055-103	SOIL	A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (1999) Schedule B(3) (Method 102)
Particle Size Analysis (Sieving)	EA150	SOIL	Particle Size Analysis by Sieving according to AS1289.3.6.1 - 1995
Particle Size Analysis by Hydrometer	EA150H	SOIL	Particle Size Analysis by Hydrometer according to AS1289.3.6.3 - 2003
Total Fe and Al in Sediments by ICPAES	EG005-SD	SOIL	(APHA 21st ed., 3120; USEPA SW 846 - 6010) (ICPAES) Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (1999) Schedule B(3). LORs per NODG
Total Metals in Sediments by ICPMS	EG020-SD	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector. Analyte list and LORs per NODG.
Total Mercury by FIMS (Low Level)	EG035T-LL	SOIL	AS 3550, APHA 21st ed., 3112 Hg - B (Flow-injection (SnCl <sub>2</sub> )(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl <sub>2</sub> which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3)
Buchi Ammonia - Low-Level in Sediment	EK055-SD	SOIL	APHA 21st ed., 4500 NH <sub>3</sub> +B&G, H Samples are steam distilled (Buchi) prior to analysis and quantified using titrimetric determination.
Nitrite as N - Soluble by Discrete Analyser	EK057G	SOIL	APHA 21st ed., 4500 NO <sub>3</sub> - B. Nitrite in a water extract is determined by direct colourimetry by Discrete Analyser.
Nitrate as N - Soluble by Discrete Analyser	EK058G	SOIL	APHA 21st ed., 4500 NO <sub>3</sub> --F. Nitrate in the 1:5 soil:water extract is reduced to nitrite by way of a cadmium reduction column followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results.
Nitrite and Nitrate as N (NO <sub>x</sub> )- Soluble by Discrete Analyser	EK059G	SOIL	APHA 21st ed., 4500 NO <sub>3</sub> - F. Combined oxidised Nitrogen (NO <sub>2</sub> +NO <sub>3</sub> ) in a water extract is determined by Cadmium Reduction, and direct colourimetry by Discrete Analyser.
TKN as N By Discrete Analyser	EK061G	SOIL	APHA 21st ed., 4500-Norg-D Soil samples are digested using Kjeldahl digestion followed by determination by Discrete Analyser.
Total Phosphorus By Discrete Analyser	EK067G	SOIL	APHA 21st ed., 4500 P-B&F This procedure involves sulfuric acid digestion and quantification using Discrete Analyser.
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	SOIL	APHA 21st ed., 4500 P-F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2



Analytical Methods	Method	Matrix	Method Descriptions
Total Organic Carbon	EP005	SOIL	In-house. Dried and pulverised sample is reacted with acid to remove inorganic Carbonates, then combusted in a LECO furnace in the presence of strong oxidants / catalysts. The evolved (Organic) Carbon (as CO <sub>2</sub> ) is automatically measured by infra-red detector.
TPH - Semivolatile Fraction	EP071-SD	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 504)
TPH Volatiles/BTEX in Sediments	EP080-SD	SOIL	(USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 501)
Organotin Analysis	EP090	SOIL	(USEPA SW 846 - 8270D) Prepared sample extracts are analysed by GC/MS coupled with high volume injection, and quantified against an established calibration curve.
Organophosphorus Pesticides (Ultra-trace)	EP130	SOIL	USEPA Method 3640 (GPC cleanup), 8141 (GC/FPD - Capillary Column) This technique is compliant with NEPM (1999) Schedule B(3) (Method 505)
Organochlorine Pesticides (Ultra-trace)	EP131A	SOIL	USEPA Method 3640 (GPC cleanup), 3620 (Florisil), 8081/8082 (GC/uECD/uECD) This technique is compliant with NEPM (1999) Schedule B(3) (Method 504)
PCB's (Ultra-trace)	EP131B	SOIL	USEPA Method 3640 (GPC cleanup), 3620 (Florisil), 8081/8082 (GC/uECD/uECD) This technique is compliant with NEPM (1999) Schedule B(3) (Method 504)
PAHs in Sediments by GCMS(SIM)	EP132B-SD	SOIL	8270 GCMS Capillary column, SIM mode using large volume programmed temperature vaporisation injection.
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	SOIL	APHA 21st ed., 4500 Norg- D; APHA 21st ed., 4500 P - H. Macro Kjeldahl digestion.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of distilled water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	USEPA 200.2 Mod. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (1999) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	* ORG16	SOIL	(USEPA SW 846 - 5030A) 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids/ Sample Cleanup	ORG17A-UTP	SOIL	In-house, Mechanical agitation (tumbler). 20g of sample, Na <sub>2</sub> SO <sub>4</sub> and surrogate are extracted with 150mL 1:1 DCM/Acetone by end over end tumble. Samples are extracted, concentrated (by KD) and exchanged into an appropriate solvent for GPC and florisil cleanup as required.
Tumbler Extraction of Solids for LVI (Non-concentrating)	ORG17D	SOIL	In house: 10g of sample, Na <sub>2</sub> SO <sub>4</sub> and surrogate are extracted with 50mL 1:1 DCM/Acetone by end over end tumbling. An aliquot is concentrated by nitrogen blowdown to a reduced volume for analysis if required.
Organotin Sample Preparation	ORG35	SOIL	In house. 20g sample is spiked with surrogate and leached in a methanol:acetic acid:UHP water mix and vacuum filtered. Reagents and solvents are added to the sample and the mixture tumbled. The butyltin compounds are simultaneously derivatised and extracted. The extract is further extracted with petroleum ether. The resultant extracts are combined and concentrated for analysis.



## Summary of Outliers

### Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

#### Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Duplicate (DUP) RPDs</b>							
EG020-SD: Total Metals in Sediments by ICPMS	ES1008369-011	Anonymous	Manganese	7439-96-5	40.5 %	0-20%	RPD exceeds LOR based limits
<b>Matrix Spike (MS) Recoveries</b>							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	ES1008041-001	Anonymous	Total Kjeldahl Nitrogen as N	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK067G: Total Phosphorus as P by Discrete Analyser	ES1008494-005	EMB06 0-0.5	Total Phosphorus as P	----	48.0 %	70-130%	Recovery less than lower data quality objective
EP130A: Organophosphorus Pesticides (Ultra-trace)	ES1008494-005	EMB06 0-0.5	Chlorpyrifos	2921-88-2	42.0 %	49-140%	Recovery less than lower data quality objective
EP130A: Organophosphorus Pesticides (Ultra-trace)	ES1008494-005	EMB06 0-0.5	Ethion	563-12-2	39.4 %	44-146%	Recovery less than lower data quality objective
EP130A: Organophosphorus Pesticides (Ultra-trace)	ES1008494-005	EMB06 0-0.5	Pirimphos-ethyl	23505-41-1	36.4 %	47.1-141%	Recovery less than lower data quality objective
EP131A: Organochlorine Pesticides	ES1008494-005	EMB06 0-0.5	Aldrin	309-00-2	27.9 %	31.7-140%	Recovery less than lower data quality objective
EP131A: Organochlorine Pesticides	ES1008494-005	EMB06 0-0.5	beta-BHC	319-85-7	30.2 %	36.9-139%	Recovery less than lower data quality objective
EP131A: Organochlorine Pesticides	ES1008494-005	EMB06 0-0.5	delta-BHC	319-86-8	37.6 %	38.2-137%	Recovery less than lower data quality objective
EP131A: Organochlorine Pesticides	ES1008494-005	EMB06 0-0.5	4,4'-DDD	72-54-8	36.8 %	42.5-141%	Recovery less than lower data quality objective
EP131A: Organochlorine Pesticides	ES1008494-005	EMB06 0-0.5	4,4'-DDT	50-29-3	36.7 %	38-143%	Recovery less than lower data quality objective
EP131A: Organochlorine Pesticides	ES1008494-005	EMB06 0-0.5	Dieldrin	60-57-1	39.5 %	43.2-134%	Recovery less than lower data quality objective
EP131A: Organochlorine Pesticides	ES1008494-005	EMB06 0-0.5	Heptachlor epoxide	1024-57-3	32.1 %	34.3-138%	Recovery less than lower data quality objective
EP131A: Organochlorine Pesticides	ES1008494-005	EMB06 0-0.5	trans-Chlordane	5103-74-2	36.9 %	42.4-139%	Recovery less than lower data quality objective
EP131B: Polychlorinated Biphenyls (as Aroclors)	ES1008494-005	EMB06 0-0.5	Aroclor 1254	11097-69-1	40.9 %	61.3-121%	Recovery less than lower data quality objective
EP132B: Polynuclear Aromatic Hydrocarbons	ES1008494-005	EMB06 0-0.5	Phenanthrene	85-01-8	65.4 %	70-130%	Recovery less than lower data quality objective



- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Laboratory Control outliers occur.

### Regular Sample Surrogates

Sub-Matrix: SOIL

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Samples Submitted</b>							
EP132T: Base/Neutral Extractable Surrogates	ES1008494-001	BER03 0-0.5	2-Fluorobiphenyl	321-60-8	118 %	30-115 %	Recovery greater than upper data quality objective
EP132T: Base/Neutral Extractable Surrogates	ES1008494-007	T3 0-0.5	2-Fluorobiphenyl	321-60-8	118 %	30-115 %	Recovery greater than upper data quality objective

### Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- No Analysis Holding Time Outliers exist.

### Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- No Quality Control Sample Frequency Outliers exist.



## Environmental Division

### CERTIFICATE OF ANALYSIS

Work Order	: <b>ES1008691</b>	Page	: 1 of 11
Client	: <b>WORLEY PARSONS - INFRASTRUCTURE MWE</b>	Laboratory	: Environmental Division Sydney
Contact	: MS VIVIAN SETO	Contact	: Charlie Pierce
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: vivian.seto@worleyparsons.com	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 07 3319 3982	Telephone	: +61-2-8784 8555
Facsimile	: +61 07 3319 7791	Facsimile	: +61-2-8784 8500
Project	: 301001-00752	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 11-MAY-2010
C-O-C number	: ----	Issue Date	: 26-MAY-2010
Sampler	: ----	No. of samples received	: 8
Site	: ----	No. of samples analysed	: 8
Quote number	: BN/187/10		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

### Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Organics
Ankit Joshi	Inorganic Chemist	Inorganics
Celine Conceicao	Spectroscopist	Inorganics
Dianne Blane	Laboratory Supervisor	Newcastle
Edwandy Fadjjar	Senior Organic Chemist	Organics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
Sanjeshni Jyoti Mala	Senior Chemist Volatile	Organics
Sarah Ashworth	Organic Chemist	Organics

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## General Comments

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

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

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

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

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

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

LOR = Limit of reporting

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

- **EG005 - SD: Poor precision was observed for Iron for ES1008688 #011 due to sample heterogeneity**
- **EP130: Poor matrix spike recoveries due to sample matrix effects.**



## Analytical Results

Sub-Matrix: **SEDIMENT**

Client sample ID

Client sampling date / time

				MOF 03 0-0.5	MOF 02 0-0.5	T5 0-0.5	T6 0-0.5	MOF 06 0-0.5
				06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008691-001	ES1008691-002	ES1008691-003	ES1008691-004	ES1008691-005
<b>EA150: Particle Sizing</b>								
+75µm	----	1	%	32	26	----	----	12
+150µm	----	1	%	24	19	----	----	7
+300µm	----	1	%	4	5	----	----	1
+425µm	----	1	%	3	5	----	----	<1
+600µm	----	1	%	2	4	----	----	<1
+1180µm	----	1	%	1	4	----	----	<1
+2.36mm	----	1	%	<1	3	----	----	<1
+4.75mm	----	1	%	<1	3	----	----	<1
+9.5mm	----	1	%	<1	<1	----	----	<1
+19.0mm	----	1	%	<1	<1	----	----	<1
+37.5mm	----	1	%	<1	<1	----	----	<1
+75.0mm	----	1	%	<1	<1	----	----	<1
<b>EA055: Moisture Content</b>								
^ Moisture Content (dried @ 103°C)	----	1.0	%	48.5	49.0	54.5	43.1	34.0
<b>EA150: Soil Classification based on Particle Size</b>								
Clay (<2 µm)	----	1	%	40	40	----	----	49
Silt (2-60 µm)	----	1	%	24	32	----	----	37
Sand (0.06-2.00 mm)	----	1	%	35	25	----	----	14
Gravel (>2mm)	----	1	%	1	3	----	----	<1
Cobbles (>6cm)	----	1	%	<1	<1	----	----	<1
<b>EG005-SD: Total Metals in Sediments by ICP-AES</b>								
Aluminium	7429-90-5	50	mg/kg	12900	15000	14300	13400	13600
Iron	7439-89-6	50	mg/kg	18800	20200	20800	17500	23500
<b>EG020-SD: Total Metals in Sediments by ICPMS</b>								
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Arsenic	7440-38-2	1.00	mg/kg	9.73	6.94	8.96	5.92	8.22
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	1.0	mg/kg	20.4	20.3	20.2	17.6	16.3
Copper	7440-50-8	1.0	mg/kg	23.7	23.8	21.5	22.2	18.9
Cobalt	7440-48-4	0.5	mg/kg	9.8	8.7	9.3	7.2	7.3
Lead	7439-92-1	1.0	mg/kg	7.2	7.8	7.8	7.2	7.9
Manganese	7439-96-5	10	mg/kg	250	168	262	190	122
Nickel	7440-02-0	1.0	mg/kg	10.6	9.6	10.7	8.1	9.0
Selenium	7782-49-2	0.1	mg/kg	0.7	0.8	0.7	0.6	0.5
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium	7440-62-2	2.0	mg/kg	49.8	60.8	54.4	54.1	50.9
Zinc	7440-66-6	1.0	mg/kg	34.6	34.0	35.4	29.8	32.9



## Analytical Results

Sub-Matrix: **SEDIMENT**

Client sample ID

Client sampling date / time

				MOF 03 0-0.5	MOF 02 0-0.5	T5 0-0.5	T6 0-0.5	MOF 06 0-0.5
				06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008691-001	ES1008691-002	ES1008691-003	ES1008691-004	ES1008691-005
<b>EG020-SD: Total Metals in Sediments by ICPMS - Continued</b>								
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
Mercury	7439-97-6	0.01	mg/kg	0.02	0.02	0.02	0.02	<0.01
<b>EK055: Ammonia as N</b>								
Ammonia as N	7664-41-7	1	mg/kg	----	<1	<1	<1	----
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N (Sol.)	----	0.1	mg/kg	----	<0.1	<0.1	<0.1	----
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
^ Nitrate as N (Sol.)	----	0.1	mg/kg	----	<0.1	<0.1	<0.1	----
<b>EK059G: NOX as N by Discrete Analyser</b>								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	----	<0.1	<0.1	<0.1	----
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	----	800	880	720	----
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>								
Total Phosphorus as P	----	2	mg/kg	----	241	288	207	----
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>								
Reactive Phosphorus as P	----	0.1	mg/kg	----	0.4	0.2	0.4	----
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	0.02	%	1.00	0.96	0.91	0.87	0.35
<b>EP080-SD / EP071-SD: Total Petroleum Hydrocarbons</b>								
C6 - C9 Fraction	----	3	mg/kg	----	<3	<3	<3	----
C10 - C14 Fraction	----	3	mg/kg	----	<3	<3	<3	----
C15 - C28 Fraction	----	3	mg/kg	----	9	10	8	----
C29 - C36 Fraction	----	5	mg/kg	----	11	14	12	----
^ C10 - C36 Fraction (sum)	----	3	mg/kg	----	20	24	20	----
<b>EP080-SD: BTEX</b>								
Benzene	71-43-2	0.2	mg/kg	----	<0.2	<0.2	<0.2	----
Toluene	108-88-3	0.2	mg/kg	----	<0.2	<0.2	<0.2	----
Ethylbenzene	100-41-4	0.2	mg/kg	----	<0.2	<0.2	<0.2	----
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	----	<0.2	<0.2	<0.2	----
ortho-Xylene	95-47-6	0.2	mg/kg	----	<0.2	<0.2	<0.2	----
<b>EP090: Organotin Compounds</b>								
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	<0.5	<0.5	<0.5
<b>EP130A: Organophosphorus Pesticides (Ultra-trace)</b>								
Bromophos-ethyl	4824-78-6	10	µg/kg	----	<10	<10	<10	----
Carbophenothion	786-19-6	10	µg/kg	----	<10	<10	<10	----



## Analytical Results

Sub-Matrix: **SEDIMENT**

Client sample ID

Client sampling date / time

				MOF 03 0-0.5	MOF 02 0-0.5	T5 0-0.5	T6 0-0.5	MOF 06 0-0.5
				06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008691-001	ES1008691-002	ES1008691-003	ES1008691-004	ES1008691-005
<b>EP130A: Organophosphorus Pesticides (Ultra-trace) - Continued</b>								
Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	----	<10.0	<10.0	<10.0	----
Chlorfenvinphos (Z)	470-90-8	10	µg/kg	----	<10	<10	<10	----
Chlorpyrifos	2921-88-2	10	µg/kg	----	<10	<10	<10	----
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	----	<10	<10	<10	----
Demeton-S-methyl	919-86-8	10	µg/kg	----	<10	<10	<10	----
Diazinon	333-41-5	10	µg/kg	----	<10	<10	<10	----
Dichlorvos	62-73-7	10	µg/kg	----	<10	<10	<10	----
Dimethoate	60-51-5	10	µg/kg	----	<10	<10	<10	----
Ethion	563-12-2	10	µg/kg	----	<10	<10	<10	----
Fenamiphos	22224-92-6	10	µg/kg	----	<10	<10	<10	----
Fenthion	55-38-9	10	µg/kg	----	<10	<10	<10	----
Malathion	121-75-5	10	µg/kg	----	<10	<10	<10	----
Azinphos Methyl	86-50-0	10	µg/kg	----	<10	<10	<10	----
Monocrotophos	6923-22-4	10	µg/kg	----	<10	<10	<10	----
Parathion	56-38-2	10	µg/kg	----	<10	<10	<10	----
Parathion-methyl	298-00-0	10	µg/kg	----	<10	<10	<10	----
Pirimphos-ethyl	23505-41-1	10	µg/kg	----	<10	<10	<10	----
Prothiofos	34643-46-4	10	µg/kg	----	<10	<10	<10	----
<b>EP131A: Organochlorine Pesticides</b>								
Aldrin	309-00-2	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
alpha-BHC	319-84-6	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
beta-BHC	319-85-7	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
delta-BHC	319-86-8	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
4.4`-DDD	72-54-8	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
4.4`-DDE	72-55-9	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
4.4`-DDT	50-29-3	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
^ DDT (total)	----	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
Dieldrin	60-57-1	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
alpha-Endosulfan	959-98-8	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
beta-Endosulfan	33213-65-9	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
Endosulfan sulfate	1031-07-8	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
Endrin	72-20-8	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
Endrin aldehyde	7421-93-4	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
Endrin ketone	53494-70-5	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
Heptachlor	76-44-8	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
Heptachlor epoxide	1024-57-3	0.50	µg/kg	----	<0.50	<0.50	<0.50	----



## Analytical Results

Sub-Matrix: SEDIMENT

Client sample ID

Client sampling date / time

				MOF 03 0-0.5	MOF 02 0-0.5	T5 0-0.5	T6 0-0.5	MOF 06 0-0.5
				06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008691-001	ES1008691-002	ES1008691-003	ES1008691-004	ES1008691-005
<b>EP131A: Organochlorine Pesticides - Continued</b>								
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
gamma-BHC	58-89-9	0.25	µg/kg	----	<0.25	<0.25	<0.25	----
Methoxychlor	72-43-5	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
cis-Chlordane	5103-71-9	0.25	µg/kg	----	<0.25	<0.25	<0.25	----
trans-Chlordane	5103-74-2	0.25	µg/kg	----	<0.25	<0.25	<0.25	----
^ Total Chlordane (sum)	----	0.25	µg/kg	----	<0.25	<0.25	<0.25	----
Oxychlordane	27304-13-8	0.50	µg/kg	----	<0.50	<0.50	<0.50	----
<b>EP131B: Polychlorinated Biphenyls (as Aroclors)</b>								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	----	<5.0	<5.0	<5.0	----
Aroclor 1016	12974-11-2	5.0	µg/kg	----	<5.0	<5.0	<5.0	----
Aroclor 1221	11104-28-2	5.0	µg/kg	----	<5.0	<5.0	<5.0	----
Aroclor 1232	11141-16-5	5.0	µg/kg	----	<5.0	<5.0	<5.0	----
Aroclor 1242	53469-21-9	5.0	µg/kg	----	<5.0	<5.0	<5.0	----
Aroclor 1248	12672-29-6	5.0	µg/kg	----	<5.0	<5.0	<5.0	----
Aroclor 1254	11097-69-1	5.0	µg/kg	----	<5.0	<5.0	<5.0	----
Aroclor 1260	11096-82-5	5.0	µg/kg	----	<5.0	<5.0	<5.0	----
<b>EP132B: Polynuclear Aromatic Hydrocarbons</b>								
Naphthalene	91-20-3	5	µg/kg	<5	<5	<5	<5	<5
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	<5	<5	<5
Acenaphthylene	208-96-8	4	µg/kg	<4	<4	<4	<4	<4
Acenaphthene	83-32-9	4	µg/kg	<4	<4	<4	<4	<4
Fluorene	86-73-7	4	µg/kg	<4	<4	<4	<4	<4
Phenanthrene	85-01-8	4	µg/kg	4	5	<4	<4	<4
Anthracene	120-12-7	4	µg/kg	<4	<4	<4	<4	<4
Fluoranthene	206-44-0	4	µg/kg	<4	6	<4	<4	<4
Pyrene	129-00-0	4	µg/kg	4	7	<4	<4	<4
Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	<4	<4	<4
Chrysene	218-01-9	4	µg/kg	<4	<4	<4	<4	<4
Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	<4	<4	<4
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	<4	<4	<4
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	<4	<4	<4
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	<4	<4	<4
Perylene	198-55-0	4	µg/kg	<4	<4	<4	<4	<4
Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	<4	<4	<4
Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	<4	<4	<4
Indeno(1,2,3-cd)pyrene	193-39-5	4	µg/kg	<4	<4	<4	<4	<4
Coronene	191-07-1	5	µg/kg	<5	<5	<5	<5	<5



## Analytical Results

Sub-Matrix: **SEDIMENT**

Client sample ID

Client sampling date / time

				MOF 03 0-0.5	MOF 02 0-0.5	T5 0-0.5	T6 0-0.5	MOF 06 0-0.5
				06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00
Compound	CAS Number	LOR	Unit	ES1008691-001	ES1008691-002	ES1008691-003	ES1008691-004	ES1008691-005
<b>EP132B: Polynuclear Aromatic Hydrocarbons - Continued</b>								
^ Sum of PAHs	----	4	µg/kg	8	18	<4	<4	<4
<b>EP080-SD: TPH(V)/BTEX Surrogates</b>								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	----	97.3	98.0	80.6	----
Toluene-D8	2037-26-5	0.1	%	----	110	99.2	82.1	----
4-Bromofluorobenzene	460-00-4	0.1	%	----	98.0	87.7	83.7	----
<b>EP090S: Organotin Surrogate</b>								
Tripopyltin	----	0.1	%	56.9	80.4	78.3	78.7	85.4
<b>EP130S: Organophosphorus Pesticide Surrogate</b>								
DEF	78-48-8	0.1	%	----	96.3	67.3	73.7	----
<b>EP131S: OC Pesticide Surrogate</b>								
Dibromo-DDE	21655-73-2	0.1	%	----	54.8	55.6	61.3	----
<b>EP131T: PCB Surrogate</b>								
Decachlorobiphenyl	2051-24-3	0.1	%	----	46.2	55.4	54.3	----
<b>EP132T: Base/Neutral Extractable Surrogates</b>								
2-Fluorobiphenyl	321-60-8	0.1	%	96.4	75.5	97.2	108	118
Anthracene-d10	1719-06-8	0.1	%	106	116	116	120	105
4-Terphenyl-d14	1718-51-0	0.1	%	119	118	112	119	115



## Analytical Results

Sub-Matrix: **SEDIMENT**

Client sample ID

Client sampling date / time

				<b>T7 0-0.5</b>	<b>T8 0-0.5</b>	<b>EMB 04 0-0.5</b>	----	----
				06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00	----	----
<i>Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	<b>ES1008691-006</b>	<b>ES1008691-007</b>	<b>ES1008691-008</b>	----	----
<b>EA150: Particle Sizing</b>								
+75µm	----	1	%	----	----	7	----	----
+150µm	----	1	%	----	----	3	----	----
+300µm	----	1	%	----	----	2	----	----
+425µm	----	1	%	----	----	2	----	----
+600µm	----	1	%	----	----	2	----	----
+1180µm	----	1	%	----	----	2	----	----
+2.36mm	----	1	%	----	----	1	----	----
+4.75mm	----	1	%	----	----	<1	----	----
+9.5mm	----	1	%	----	----	<1	----	----
+19.0mm	----	1	%	----	----	<1	----	----
+37.5mm	----	1	%	----	----	<1	----	----
+75.0mm	----	1	%	----	----	<1	----	----
<b>EA055: Moisture Content</b>								
^ Moisture Content (dried @ 103°C)	----	1.0	%	44.8	57.7	33.7	----	----
<b>EA150: Soil Classification based on Particle Size</b>								
Clay (<2 µm)	----	1	%	----	----	49	----	----
Silt (2-60 µm)	----	1	%	----	----	43	----	----
Sand (0.06-2.00 mm)	----	1	%	----	----	7	----	----
Gravel (>2mm)	----	1	%	----	----	1	----	----
Cobbles (>6cm)	----	1	%	----	----	<1	----	----
<b>EG005-SD: Total Metals in Sediments by ICP-AES</b>								
Aluminium	7429-90-5	50	mg/kg	14900	19900	15500	----	----
Iron	7439-89-6	50	mg/kg	25800	35700	23800	----	----
<b>EG020-SD: Total Metals in Sediments by ICPMS</b>								
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	----	----
Arsenic	7440-38-2	1.00	mg/kg	10.4	13.9	6.94	----	----
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
Chromium	7440-47-3	1.0	mg/kg	19.7	25.5	21.7	----	----
Copper	7440-50-8	1.0	mg/kg	22.0	36.2	19.3	----	----
Cobalt	7440-48-4	0.5	mg/kg	8.6	11.6	10.6	----	----
Lead	7439-92-1	1.0	mg/kg	8.3	11.6	7.8	----	----
Manganese	7439-96-5	10	mg/kg	156	166	127	----	----
Nickel	7440-02-0	1.0	mg/kg	11.1	14.7	11.7	----	----
Selenium	7782-49-2	0.1	mg/kg	0.7	1.0	0.5	----	----
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
Vanadium	7440-62-2	2.0	mg/kg	59.8	84.9	57.1	----	----
Zinc	7440-66-6	1.0	mg/kg	37.8	48.9	37.9	----	----



## Analytical Results

Sub-Matrix: **SEDIMENT**

Client sample ID

Client sampling date / time

				<b>T7 0-0.5</b>	<b>T8 0-0.5</b>	<b>EMB 04 0-0.5</b>	----	----
				06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00	----	----
<i>Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	<b>ES1008691-006</b>	<b>ES1008691-007</b>	<b>ES1008691-008</b>	----	----
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
Mercury	7439-97-6	0.01	mg/kg	<b>0.02</b>	<b>0.02</b>	<b>0.02</b>	----	----
<b>EP005: Total Organic Carbon (TOC)</b>								
Total Organic Carbon	----	0.02	%	<b>0.64</b>	<b>0.62</b>	<b>0.76</b>	----	----
<b>EP090: Organotin Compounds</b>								
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	<0.5	----	----
<b>EP132B: Polynuclear Aromatic Hydrocarbons</b>								
Naphthalene	91-20-3	5	µg/kg	<5	<5	<5	----	----
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	<5	----	----
Acenaphthylene	208-96-8	4	µg/kg	<4	<5	<4	----	----
Acenaphthene	83-32-9	4	µg/kg	<4	<5	<4	----	----
Fluorene	86-73-7	4	µg/kg	<4	<5	<4	----	----
Phenanthrene	85-01-8	4	µg/kg	<4	<5	<b>4</b>	----	----
Anthracene	120-12-7	4	µg/kg	<4	<5	<4	----	----
Fluoranthene	206-44-0	4	µg/kg	<4	<5	<4	----	----
Pyrene	129-00-0	4	µg/kg	<4	<5	<4	----	----
Benz(a)anthracene	56-55-3	4	µg/kg	<b>6</b>	<5	<4	----	----
Chrysene	218-01-9	4	µg/kg	<b>4</b>	<5	<4	----	----
Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<5	<4	----	----
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<5	<4	----	----
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<5	<4	----	----
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<5	<4	----	----
Perylene	198-55-0	4	µg/kg	<4	<5	<4	----	----
Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<5	<4	----	----
Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<5	<4	----	----
Indeno(1,2,3-cd)pyrene	193-39-5	4	µg/kg	<4	<5	<4	----	----
Coronene	191-07-1	5	µg/kg	<5	<5	<5	----	----
^ Sum of PAHs	----	4	µg/kg	<b>10</b>	<4	<b>4</b>	----	----
<b>EP090S: Organotin Surrogate</b>								
Tripropyltin	----	0.1	%	<b>91.3</b>	<b>41.8</b>	<b>68.1</b>	----	----
<b>EP132T: Base/Neutral Extractable Surrogates</b>								
2-Fluorobiphenyl	321-60-8	0.1	%	<b>76.5</b>	<b>106</b>	<b>103</b>	----	----
Anthracene-d10	1719-06-8	0.1	%	<b>94.0</b>	<b>117</b>	<b>121</b>	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	<b>105</b>	<b>97.8</b>	<b>119</b>	----	----



## Surrogate Control Limits

Sub-Matrix: <b>SEDIMENT</b>		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP080-SD: TPH(V)/BTEX Surrogates</b>			
1,2-Dichloroethane-D4	17060-07-0	67	137
Toluene-D8	2037-26-5	74	134
4-Bromofluorobenzene	460-00-4	73	137
<b>EP090S: Organotin Surrogate</b>			
Tripopyltin	----	34	108
<b>EP130S: Organophosphorus Pesticide Surrogate</b>			
DEF	78-48-8	51.3	136.9
<b>EP131S: OC Pesticide Surrogate</b>			
Dibromo-DDE	21655-73-2	10	136
<b>EP131T: PCB Surrogate</b>			
Decachlorobiphenyl	2051-24-3	10	164
<b>EP132T: Base/Neutral Extractable Surrogates</b>			
2-Fluorobiphenyl	321-60-8	30	115
Anthracene-d10	1719-06-8	27	133
4-Terphenyl-d14	1718-51-0	18	137



## Environmental Division

### QUALITY CONTROL REPORT

Work Order	: <b>ES1008691</b>	Page	: 1 of 17
Client	: <b>WORLEY PARSONS - INFRASTRUCTURE MWE</b>	Laboratory	: Environmental Division Sydney
Contact	: MS VIVIAN SETO	Contact	: Charlie Pierce
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: vivian.seto@worleyparsons.com	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 07 3319 3982	Telephone	: +61-2-8784 8555
Facsimile	: +61 07 3319 7791	Facsimile	: +61-2-8784 8500
Project	: 301001-00752	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 11-MAY-2010
C-O-C number	: ----	Issue Date	: 26-MAY-2010
Sampler	: ----		
Order number	: ----		
Quote number	: BN/187/10	No. of samples received	: 8
		No. of samples analysed	: 8

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

This Quality Control Report contains the following information:

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



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

### *Signatories*

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Organics
Ankit Joshi	Inorganic Chemist	Inorganics
Celine Conceicao	Spectroscopist	Inorganics
Dianne Blane	Laboratory Supervisor	Newcastle
Edwandy Fadjjar	Senior Organic Chemist	Organics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
Sanjeshni Jyoti Mala	Senior Chemist Volatile	Organics
Sarah Ashworth	Organic Chemist	Organics



## General Comments

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

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

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

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

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



## Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (QC Lot: 1342648)									
EM1004966-001	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	10.4	7.5	31.9	No Limit
ES1008613-029	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	23.0	22.3	3.3	0% - 20%
EA055: Moisture Content (QC Lot: 1342649)									
ES1008691-002	MOF 02 0-0.5	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	49.0	45.1	8.4	0% - 20%
EG005-SD: Total Metals in Sediments by ICP-AES (QC Lot: 1346680)									
ES1008688-011	Anonymous	EG005-SD: Aluminium	7429-90-5	50	mg/kg	16400	17000	3.8	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	22100	17700	# 22.3	0% - 20%
ES1008688-021	Anonymous	EG005-SD: Aluminium	7429-90-5	50	mg/kg	17800	17600	1.0	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	26800	25900	3.2	0% - 20%
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 1346679)									
ES1008688-011	Anonymous	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.9	1.1	14.9	0% - 50%
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	0.2	0.1	0.0	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	11.0	9.2	17.8	0% - 50%
		EG020-SD: Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	0.0	No Limit
		EG020-SD: Chromium	7440-47-3	1.0	mg/kg	17.0	15.0	12.1	0% - 50%
		EG020-SD: Copper	7440-50-8	1.0	mg/kg	43.9	53.0	18.8	0% - 20%
		EG020-SD: Lead	7439-92-1	1.0	mg/kg	9.6	11.3	16.6	0% - 50%
		EG020-SD: Nickel	7440-02-0	1.0	mg/kg	11.2	10.3	8.4	0% - 50%
		EG020-SD: Zinc	7440-66-6	1.0	mg/kg	30.9	33.5	8.0	0% - 20%
		EG020-SD: Arsenic	7440-38-2	1.00	mg/kg	5.35	3.88	31.8	No Limit
		EG020-SD: Manganese	7439-96-5	10	mg/kg	198	189	4.6	0% - 50%
		EG020-SD: Vanadium	7440-62-2	2.0	mg/kg	64.5	60.5	6.4	0% - 20%
		ES1008688-021	Anonymous	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1
EG020-SD: Selenium	7782-49-2			0.1	mg/kg	0.6	0.7	16.1	No Limit
EG020-SD: Silver	7440-22-4			0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EG020-SD: Cobalt	7440-48-4			0.5	mg/kg	14.2	13.7	3.7	0% - 20%
EG020-SD: Antimony	7440-36-0			0.50	mg/kg	<0.50	<0.50	0.0	No Limit
EG020-SD: Chromium	7440-47-3			1.0	mg/kg	27.5	27.9	1.4	0% - 20%
EG020-SD: Copper	7440-50-8			1.0	mg/kg	27.7	27.8	0.4	0% - 20%
EG020-SD: Lead	7439-92-1			1.0	mg/kg	9.6	9.9	2.8	No Limit
EG020-SD: Nickel	7440-02-0			1.0	mg/kg	13.3	13.0	2.6	0% - 50%
EG020-SD: Zinc	7440-66-6			1.0	mg/kg	42.8	42.4	1.0	0% - 20%
EG020-SD: Arsenic	7440-38-2			1.00	mg/kg	10.4	10.6	1.6	0% - 50%
EG020-SD: Manganese	7439-96-5			10	mg/kg	368	361	1.9	0% - 20%



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 1346679) - continued									
ES1008688-021	Anonymous	EG020-SD: Vanadium	7440-62-2	2.0	mg/kg	59.5	58.1	2.4	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1346678)									
ES1008688-011	Anonymous	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	0.02	0.01	0.0	No Limit
ES1008688-021	Anonymous	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	0.02	0.02	0.0	No Limit
EK055: Ammonia as N (QC Lot: 1342141)									
ES1008691-002	MOF 02 0-0.5	EK055-SD: Ammonia as N	7664-41-7	1	mg/kg	<1	<1	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1346963)									
ES1008688-008	Anonymous	EK057G: Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES1008688-021	Anonymous	EK057G: Nitrite as N (Sol.)	----	0.1	mg/kg	<1.0	<0.1	164	No Limit
EK059G: NOX as N by Discrete Analyser (QC Lot: 1346964)									
ES1008688-008	Anonymous	EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES1008691-002	MOF 02 0-0.5	EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1351690)									
ES1008688-008	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	690	690	0.0	0% - 20%
ES1008688-021	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	700	830	16.7	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1351691)									
ES1008688-008	Anonymous	EK067G: Total Phosphorus as P	----	2	mg/kg	206	222	7.6	0% - 20%
ES1008688-021	Anonymous	EK067G: Total Phosphorus as P	----	2	mg/kg	175	178	1.5	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1346965)									
ES1008688-008	Anonymous	EK071G: Reactive Phosphorus as P	----	0.1	mg/kg	0.9	0.9	0.0	No Limit
ES1008688-020	Anonymous	EK071G: Reactive Phosphorus as P	----	0.1	mg/kg	1.5	1.6	0.0	0% - 50%
EP005: Total Organic Carbon (TOC) (QC Lot: 1347534)									
ES1008691-001	MOF 03 0-0.5	EP005: Total Organic Carbon	----	0.02	%	1.00	0.97	2.5	0% - 20%
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QC Lot: 1340369)									
ES1008688-008	Anonymous	EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
ES1008691-002	MOF 02 0-0.5	EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QC Lot: 1340733)									
ES1008688-011	Anonymous	EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
		EP071-SD: C15 - C28 Fraction	----	3	mg/kg	3	4	0.0	No Limit
		EP071-SD: C29 - C36 Fraction	----	5	mg/kg	6	<5	0.0	No Limit
EP080-SD: BTEX (QC Lot: 1340369)									
ES1008688-008	Anonymous	EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: meta- & para-Xylene	108-38-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
			106-42-3						
	EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.0	No Limit	
ES1008691-002	MOF 02 0-0.5	EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit



Sub-Matrix: <b>SOIL</b>				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080-SD: BTEX (QC Lot: 1340369) - continued									
ES1008691-002	MOF 02 0-0.5	EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP090: Organotin Compounds (QC Lot: 1345349)									
ES1008682-001	Anonymous	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	0.0	No Limit
ES1008688-001	Anonymous	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	0.0	No Limit
EP130A: Organophosphorus Pesticides (Ultra-trace) (QC Lot: 1340739)									
ES1008688-008	Anonymous	EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Carbophenothion	786-19-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Diazinon	333-41-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dichlorvos	62-73-7	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dimethoate	60-51-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Ethion	563-12-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Fenthion	55-38-9	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Malathion	121-75-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Azinphos Methyl	86-50-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion	56-38-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Prothiofos	34643-46-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	<10.0	<10.0	0.0	No Limit
ES1008691-002	MOF 02 0-0.5	EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Carbophenothion	786-19-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Diazinon	333-41-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dichlorvos	62-73-7	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dimethoate	60-51-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Ethion	563-12-2	10	µg/kg	<10	<10	0.0	No Limit



Sub-Matrix: <b>SOIL</b>				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP130A: Organophosphorus Pesticides (Ultra-trace) (QC Lot: 1340739) - continued</b>									
ES1008691-002	MOF 02 0-0.5	EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Fenthion	55-38-9	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Malathion	121-75-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Azinphos Methyl	86-50-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion	56-38-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Prothiofos	34643-46-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	<10.0	<10.0	0.0	No Limit
<b>EP131A: Organochlorine Pesticides (QC Lot: 1340740)</b>									
ES1008688-008	Anonymous	EP131A: gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Aldrin	309-00-2	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-BHC	319-84-6	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-BHC	319-85-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: delta-BHC	319-86-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4'-DDD	72-54-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4'-DDE	72-55-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4'-DDT	50-29-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: DDT (total)	----	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Dieldrin	60-57-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin	72-20-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor	76-44-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Methoxychlor	72-43-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
ES1008691-002	MOF 02 0-0.5	EP131A: gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP131A: Organochlorine Pesticides (QC Lot: 1340740) - continued									
ES1008691-002	MOF 02 0-0.5	EP131A: Aldrin	309-00-2	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-BHC	319-84-6	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-BHC	319-85-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: delta-BHC	319-86-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4' -DDD	72-54-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4' -DDE	72-55-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4,4' -DDT	50-29-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: DDT (total)	----	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Dieldrin	60-57-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin	72-20-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor	76-44-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Methoxychlor	72-43-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
EP131B: Polychlorinated Biphenyls (as Aroclors) (QC Lot: 1340741)									
ES1008688-008	Anonymous	EP131B: Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1016	12974-11-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
ES1008691-002	MOF 02 0-0.5	EP131B: Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1016	12974-11-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
EP131B: Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit		
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1340732)									
ES1008688-011	Anonymous	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.0	No Limit



Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1340732) - continued</b>									
ES1008688-011	Anonymous	EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.0	No Limit
ES1008688-021	Anonymous	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.0	No Limit



Sub-Matrix: <b>SOIL</b>				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1340732) - continued									
ES1008688-021	Anonymous	EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.0	No Limit



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

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG005-SD: Total Metals in Sediments by ICP-AES (QCLot: 1346680)								
EG005-SD: Aluminium	7429-90-5	50	mg/kg	<50	----	----	----	----
EG005-SD: Iron	7439-89-6	50	mg/kg	<50	----	----	----	----
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 1346679)								
EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	----	----	----	----
EG020-SD: Arsenic	7440-38-2	1.0	mg/kg	<1.00	13.1 mg/kg	104	70	130
EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	2.76 mg/kg	99.4	70	130
EG020-SD: Chromium	7440-47-3	1.0	mg/kg	<1.0	60.9 mg/kg	105	70	130
EG020-SD: Copper	7440-50-8	1.0	mg/kg	<1.0	54.7 mg/kg	102	70	130
EG020-SD: Cobalt	7440-48-4	10	mg/kg	<10.0	24.5 mg/kg	106	70	130
EG020-SD: Lead	7439-92-1	1.0	mg/kg	<1.0	54.8 mg/kg	93.7	70	130
EG020-SD: Manganese	7439-96-5	10	mg/kg	<10	136 mg/kg	99.1	70	130
EG020-SD: Nickel	7440-02-0	1.0	mg/kg	<1.0	55.2 mg/kg	104	70	130
EG020-SD: Selenium	7782-49-2	0.1	mg/kg	<0.1	----	----	----	----
EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	5.6 mg/kg	123	70	130
EG020-SD: Vanadium	7440-62-2	2	mg/kg	<2.0	50 mg/kg	99.3	70	130
EG020-SD: Zinc	7440-66-6	1.0	mg/kg	<1.0	104 mg/kg	101	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1346678)								
EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	0.090 mg/kg	86.5	74.2	126
EK055: Ammonia as N (QCLot: 1342141)								
EK055-SD: Ammonia as N	7664-41-7	1	mg/kg	<1	25 mg/kg	86.2	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1346963)								
EK057G: Nitrite as N (Sol.)	----	0.1	mg/kg	<0.1	4.8 mg/kg	106	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 1346964)								
EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	4.8 mg/kg	115	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1351690)								
EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	<20	1000 mg/kg	102	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1351691)								
EK067G: Total Phosphorus as P	----	2	mg/kg	<2	442 mg/kg	101	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1346965)								
EK071G: Reactive Phosphorus as P	----	0.1	mg/kg	<0.1	2.5 mg/kg	102	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 1347534)								
EP005: Total Organic Carbon	----	0.02	%	<0.02	100 %	100	70	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1340369)								



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1340369) - continued								
EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	26 mg/kg	104	68.4	128
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1340733)								
EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	5 mg/kg	83.0	75.2	116
EP071-SD: C15 - C28 Fraction	----	3	mg/kg	<3	5 mg/kg	95.0	75.3	113
EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	5 mg/kg	85.0	72.6	117
EP080-SD: BTEX (QCLot: 1340369)								
EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	101	67.5	125
EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	1 mg/kg	99.6	69	122
EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	1 mg/kg	98.0	65.3	126
EP080-SD: meta- & para-Xylene	108-38-3	0.2	mg/kg	<0.2	2 mg/kg	98.8	66.5	124
	106-42-3							
EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	1 mg/kg	103	66.7	123
EP090: Organotin Compounds (QCLot: 1345349)								
EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	1.25 µgSn/kg	117	19.5	129
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 1340739)								
EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	50 µg/kg	79.2	36.9	142
EP130: Carbophenothion	786-19-6	10	µg/kg	<10	50 µg/kg	19.2	0.5	157
EP130: Chlorfenvinphos (E)	470-90-6	10	µg/kg	<10.0	5 µg/kg	101	50.3	137
EP130: Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	50 µg/kg	106	55.9	152
EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	50 µg/kg	75.3	49	140
EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	50 µg/kg	93.3	28.1	142
EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	50 µg/kg	44.9	36.6	172
EP130: Diazinon	333-41-5	10	µg/kg	<10	50 µg/kg	70.3	37.2	148
EP130: Dichlorvos	62-73-7	10	µg/kg	<10	50 µg/kg	65.7	32.7	153
EP130: Dimethoate	60-51-5	10	µg/kg	<10	50 µg/kg	83.5	33.2	150
EP130: Ethion	563-12-2	10	µg/kg	<10	50 µg/kg	59.7	44	146
EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	50 µg/kg	85.4	3.08	162
EP130: Fenthion	55-38-9	10	µg/kg	<10	50 µg/kg	80.4	10.6	157
EP130: Malathion	121-75-5	10	µg/kg	<10	50 µg/kg	113	38.1	143
EP130: Azinphos Methyl	86-50-0	10	µg/kg	<10	50 µg/kg	64.2	8.13	159
EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	50 µg/kg	118	19.7	176
EP130: Parathion	56-38-2	10	µg/kg	<10	50 µg/kg	88.8	39.2	145
EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	50 µg/kg	117	23.5	152
EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	50 µg/kg	66.1	47.1	141
EP130: Prothiofos	34643-46-4	10	µg/kg	<10	50 µg/kg	81.9	36.1	148
EP131A: Organochlorine Pesticides (QCLot: 1340740)								
EP131A: Aldrin	309-00-2	0.5	µg/kg	<0.50	5 µg/kg	63.4	31.7	140
EP131A: alpha-BHC	319-84-6	0.5	µg/kg	<0.50	5 µg/kg	77.9	24.5	150



Sub-Matrix: **SOIL**

Sub-Matrix: <b>SOIL</b>				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
Method: Compound	CAS Number	LOR	Unit	Result				
EP131A: Organochlorine Pesticides (QCLot: 1340740) - continued								
EP131A: beta-BHC	319-85-7	0.5	µg/kg	<0.50	5 µg/kg	78.3	36.9	139
EP131A: delta-BHC	319-86-8	0.5	µg/kg	<0.50	5 µg/kg	88.5	38.2	137
EP131A: 4,4'-DDD	72-54-8	0.5	µg/kg	<0.50	5 µg/kg	73.7	42.5	141
EP131A: 4,4'-DDE	72-55-9	0.5	µg/kg	<0.50	5 µg/kg	83.3	34.8	140
EP131A: 4,4'-DDT	50-29-3	0.5	µg/kg	<0.50	5 µg/kg	63.7	38	143
EP131A: DDT (total)	----	0.5	µg/kg	<0.50	----	----	----	----
EP131A: Dieldrin	60-57-1	0.5	µg/kg	<0.50	5 µg/kg	58.6	43.2	134
EP131A: alpha-Endosulfan	959-98-8	0.5	µg/kg	<0.50	5 µg/kg	74.8	23.7	139
EP131A: beta-Endosulfan	33213-65-9	0.5	µg/kg	<0.50	5 µg/kg	68.1	35.8	138
EP131A: Endosulfan sulfate	1031-07-8	0.5	µg/kg	<0.50	5 µg/kg	86.6	7.45	158
EP131A: Endosulfan (sum)	115-29-7	0.5	µg/kg	<0.50	----	----	----	----
EP131A: Endrin	72-20-8	0.5	µg/kg	<0.50	5 µg/kg	85.1	21.6	162
EP131A: Endrin aldehyde	7421-93-4	0.5	µg/kg	<0.50	5 µg/kg	74.1	19.3	131
EP131A: Endrin ketone	53494-70-5	0.5	µg/kg	<0.50	5 µg/kg	86.0	17.9	141
EP131A: Heptachlor	76-44-8	0.5	µg/kg	<0.50	5 µg/kg	63.1	31	153
EP131A: Heptachlor epoxide	1024-57-3	0.5	µg/kg	<0.50	5 µg/kg	68.0	34.3	138
EP131A: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/kg	<0.50	5 µg/kg	67.4	18.6	146
EP131A: gamma-BHC	58-89-9	0.5	µg/kg	<0.50	5 µg/kg	70.6	30.7	145
EP131A: Methoxychlor	72-43-5	0.5	µg/kg	<0.50	5 µg/kg	87.7	15	157
EP131A: cis-Chlordane	5103-71-9	0.5	µg/kg	<0.50	5 µg/kg	56.3	22.3	145
EP131A: trans-Chlordane	5103-74-2	0.5	µg/kg	<0.50	5 µg/kg	70.5	42.4	139
EP131A: Total Chlordane (sum)	----	0.5	µg/kg	<0.50	----	----	----	----
EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 1340741)								
EP131B: Total Polychlorinated biphenyls	----	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1016	12974-11-2	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1221	11104-28-2	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1232	11141-16-5	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1242	53469-21-9	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1248	12672-29-6	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1254	11097-69-1	5	µg/kg	<5.0	50 µg/kg	81.6	61.3	121
EP131B: Aroclor 1260	11096-82-5	5	µg/kg	<5.0	----	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1340732)								
EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	25 µg/kg	108	----	----
EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	25 µg/kg	113	----	----
EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	25 µg/kg	113	----	----
EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	25 µg/kg	121	----	----
EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	25 µg/kg	115	----	----
EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	25 µg/kg	111	----	----
EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	25 µg/kg	113	----	----



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1340732) - continued								
EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	25 µg/kg	110	----	----
EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	25 µg/kg	108	----	----
EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	25 µg/kg	112	----	----
EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	25 µg/kg	91.0	----	----
EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	25 µg/kg	113	----	----
EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	25 µg/kg	96.4	----	----
EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	25 µg/kg	116	----	----
EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	25 µg/kg	119	----	----
EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	25 µg/kg	112	----	----
EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	25 µg/kg	114	----	----
EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	25 µg/kg	111	----	----
EP132B-SD: Indeno(1,2,3.cd)pyrene	193-39-5	4	µg/kg	<4	25 µg/kg	108	----	----
EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	25 µg/kg	83.4	----	----
EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	----	----	----	----



## Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%) MS	Recovery Limits (%) LowHigh	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number				
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 1346679)							
ES1008688-012	Anonymous	EG020-SD: Arsenic	7440-38-2	50 mg/kg	104	70	130
		EG020-SD: Cadmium	7440-43-9	50 mg/kg	100	70	130
		EG020-SD: Chromium	7440-47-3	50 mg/kg	106	70	130
		EG020-SD: Copper	7440-50-8	250 mg/kg	91.4	70	130
		EG020-SD: Lead	7439-92-1	250 mg/kg	91.9	70	130
		EG020-SD: Nickel	7440-02-0	50 mg/kg	105	70	130
		EG020-SD: Zinc	7440-66-6	250 mg/kg	99.3	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1346678)							
ES1008688-011	Anonymous	EG035T-LL: Mercury	7439-97-6	0.50 mg/kg	79.8	70	130
EK055: Ammonia as N (QCLot: 1342141)							
ES1008691-002	MOF 02 0-0.5	EK055-SD: Ammonia as N	7664-41-7	25 mg/kg	78.4	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1346963)							
ES1008688-008	Anonymous	EK057G: Nitrite as N (Sol.)	----	3.0 mg/kg	104	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 1346964)							
ES1008688-008	Anonymous	EK059G: Nitrite + Nitrate as N (Sol.)	----	3.0 mg/kg	91.8	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1351690)							
ES1008688-008	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	500 mg/kg	98.4	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1351691)							
ES1008688-008	Anonymous	EK067G: Total Phosphorus as P	----	100 mg/kg	118	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1346965)							
ES1008688-008	Anonymous	EK071G: Reactive Phosphorus as P	----	2.5 mg/kg	99.4	70	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1340369)							
ES1008688-008	Anonymous	EP080-SD: C6 - C9 Fraction	----	25 mg/kg	81.4	70	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1340733)							
ES1008688-011	Anonymous	EP071-SD: C10 - C14 Fraction	----	19.75 mg/kg	75.9	70	130
		EP071-SD: C15 - C28 Fraction	----	87.25 mg/kg	86.8	70	130
		EP071-SD: C29 - C36 Fraction	----	60 mg/kg	100	70	130
EP080-SD: BTEX (QCLot: 1340369)							
ES1008688-008	Anonymous	EP080-SD: Benzene	71-43-2	2.5 mg/kg	78.0	70	130
		EP080-SD: Toluene	108-88-3	2.5 mg/kg	83.6	70	130
		EP080-SD: Ethylbenzene	100-41-4	2.5 mg/kg	85.8	70	130
		EP080-SD: meta- & para-Xylene	108-38-3	2.5 mg/kg	83.7	70	130
			106-42-3				



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number				
EP080-SD: BTEX (QCLot: 1340369) - continued							
ES1008688-008	Anonymous	EP080-SD: ortho-Xylene	95-47-6	2.5 mg/kg	90.3	70	130
EP090: Organotin Compounds (QCLot: 1345349)							
ES1008682-002	Anonymous	EP090: Tributyltin	56573-85-4	1.25 µgSn/kg	83.1	20	130
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 1340739)							
ES1008688-008	Anonymous	EP130: Bromophos-ethyl	4824-78-6	50 µg/kg	48.1	36.9	142
		EP130: Carbophenothion	786-19-6	50 µg/kg	50.4	0.5	157
		EP130: Chlorfenvinphos (E)	470-90-6	5 µg/kg	51.4	50.3	137
		EP130: Chlorfenvinphos (Z)	470-90-8	50 µg/kg	# 50.8	55.9	152
		EP130: Chlorpyrifos	2921-88-2	50 µg/kg	# 45.5	49	140
		EP130: Chlorpyrifos-methyl	5598-13-0	50 µg/kg	45.5	28.1	142
		EP130: Demeton-S-methyl	919-86-8	50 µg/kg	38.1	36.6	172
		EP130: Diazinon	333-41-5	50 µg/kg	42.2	37.2	148
		EP130: Dichlorvos	62-73-7	50 µg/kg	43.1	32.7	153
		EP130: Dimethoate	60-51-5	50 µg/kg	38.9	33.2	150
		EP130: Ethion	563-12-2	50 µg/kg	54.3	44	146
		EP130: Fenamiphos	22224-92-6	50 µg/kg	59.4	3.08	162
		EP130: Fenthion	55-38-9	50 µg/kg	40.9	10.6	157
		EP130: Malathion	121-75-5	50 µg/kg	56.4	38.1	143
		EP130: Azinphos Methyl	86-50-0	50 µg/kg	54.8	8.13	159
		EP130: Monocrotophos	6923-22-4	50 µg/kg	46.3	19.7	176
		EP130: Parathion	56-38-2	50 µg/kg	46.0	39.2	145
		EP130: Parathion-methyl	298-00-0	50 µg/kg	45.3	23.5	152
		EP130: Pirimphos-ethyl	23505-41-1	50 µg/kg	# 40.1	47.1	141
		EP130: Prothiofos	34643-46-4	50 µg/kg	50.2	36.1	148
EP131A: Organochlorine Pesticides (QCLot: 1340740)							
ES1008688-008	Anonymous	EP131A: Aldrin	309-00-2	5 µg/kg	46.8	31.7	140
		EP131A: alpha-BHC	319-84-6	5 µg/kg	44.0	24.5	150
		EP131A: beta-BHC	319-85-7	5 µg/kg	50.8	36.9	139
		EP131A: delta-BHC	319-86-8	5 µg/kg	41.1	38.2	137
		EP131A: 4,4`-DDD	72-54-8	5 µg/kg	70.3	42.5	141
		EP131A: 4,4`-DDE	72-55-9	5 µg/kg	84.0	34.8	140
		EP131A: 4,4`-DDT	50-29-3	5 µg/kg	50.2	38	143
		EP131A: Dieldrin	60-57-1	5 µg/kg	79.4	43.2	134
		EP131A: alpha-Endosulfan	959-98-8	5 µg/kg	83.1	23.7	139
		EP131A: beta-Endosulfan	33213-65-9	5 µg/kg	70.1	35.8	138
		EP131A: Endosulfan sulfate	1031-07-8	5 µg/kg	70.2	7.45	158
		EP131A: Endrin	72-20-8	5 µg/kg	79.8	21.6	162
		EP131A: Endrin aldehyde	7421-93-4	5 µg/kg	66.4	19.3	131



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number				
EP131A: Organochlorine Pesticides (QCLot: 1340740) - continued							
ES1008688-008	Anonymous	EP131A: Endrin ketone	53494-70-5	5 µg/kg	69.3	17.9	141
		EP131A: Heptachlor	76-44-8	5 µg/kg	47.7	31	153
		EP131A: Heptachlor epoxide	1024-57-3	5 µg/kg	105	34.3	138
		EP131A: Hexachlorobenzene (HCB)	118-74-1	5 µg/kg	59.9	18.6	146
		EP131A: gamma-BHC	58-89-9	5 µg/kg	57.4	30.7	145
		EP131A: Methoxychlor	72-43-5	5 µg/kg	89.6	15	157
		EP131A: cis-Chlordane	5103-71-9	5 µg/kg	77.4	22.3	145
		EP131A: trans-Chlordane	5103-74-2	5 µg/kg	58.8	42.4	139
EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 1340741)							
ES1008688-008	Anonymous	EP131B: Aroclor 1254	11097-69-1	50 µg/kg	81.7	61.3	121
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1340732)							
ES1008688-011	Anonymous	EP132B-SD: Naphthalene	91-20-3	25 µg/kg	90.8	70	130
		EP132B-SD: 2-Methylnaphthalene	91-57-6	25 µg/kg	107	70	130
		EP132B-SD: Acenaphthylene	208-96-8	25 µg/kg	112	70	130
		EP132B-SD: Acenaphthene	83-32-9	25 µg/kg	111	70	130
		EP132B-SD: Fluorene	86-73-7	25 µg/kg	111	70	130
		EP132B-SD: Phenanthrene	85-01-8	25 µg/kg	95.3	70	130
		EP132B-SD: Anthracene	120-12-7	25 µg/kg	101	70	130
		EP132B-SD: Fluoranthene	206-44-0	25 µg/kg	102	70	130
		EP132B-SD: Pyrene	129-00-0	25 µg/kg	102	70	130
		EP132B-SD: Benz(a)anthracene	56-55-3	25 µg/kg	110	70	130
		EP132B-SD: Chrysene	218-01-9	25 µg/kg	102	70	130
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	25 µg/kg	83.2	70	130
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	25 µg/kg	84.0	70	130
		EP132B-SD: Benzo(e)pyrene	192-97-2	25 µg/kg	81.6	70	130
		EP132B-SD: Benzo(a)pyrene	50-32-8	25 µg/kg	87.1	70	130
		EP132B-SD: Perylene	198-55-0	25 µg/kg	104	70	130
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	25 µg/kg	77.6	70	130
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	25 µg/kg	90.9	70	130
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	25 µg/kg	82.7	70	130
		EP132B-SD: Coronene	191-07-1	25 µg/kg	81.2	70	130



## Environmental Division

### INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: <b>ES1008691</b>	Page	: 1 of 9
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Sydney
Contact	: MS VIVIAN SETO	Contact	: Charlie Pierce
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Facsimile	: +61 07 3319 7791	Facsimile	: +61-2-8784 8500
Project	: 301001-00752	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 11-MAY-2010
C-O-C number	: ----	Issue Date	: 26-MAY-2010
Sampler	: ----		
Order number	: ----	No. of samples received	: 8
Quote number	: BN/187/10	No. of samples analysed	: 8

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

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers



## Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content								
Soil Glass Jar - Unpreserved MOF 03 - 0-0.5, T5 - 0-0.5, MOF 06 - 0-0.5, T8 - 0-0.5,	MOF 02 - 0-0.5, T6 - 0-0.5, T7 - 0-0.5, EMB 04 - 0-0.5	06-MAY-2010	----	----	----	12-MAY-2010	13-MAY-2010	✓
EA150: Particle Sizing								
Snap Lock Bag MOF 03 - 0-0.5, MOF 06 - 0-0.5,	MOF 02 - 0-0.5, EMB 04 - 0-0.5	06-MAY-2010	---	---	----	21-MAY-2010	02-NOV-2010	✓
EA150: Soil Classification based on Particle Size								
Snap Lock Bag MOF 03 - 0-0.5, MOF 06 - 0-0.5,	MOF 02 - 0-0.5, EMB 04 - 0-0.5	06-MAY-2010	---	---	----	21-MAY-2010	02-NOV-2010	✓
EG005-SD: Total Metals in Sediments by ICP-AES								
Soil Glass Jar - Unpreserved MOF 03 - 0-0.5, T5 - 0-0.5, MOF 06 - 0-0.5, T8 - 0-0.5,	MOF 02 - 0-0.5, T6 - 0-0.5, T7 - 0-0.5, EMB 04 - 0-0.5	06-MAY-2010	15-MAY-2010	03-JUN-2010	✓	17-MAY-2010	02-NOV-2010	✓
EG020-SD: Total Metals in Sediments by ICPMS								
Soil Glass Jar - Unpreserved MOF 03 - 0-0.5, T5 - 0-0.5, MOF 06 - 0-0.5, T8 - 0-0.5,	MOF 02 - 0-0.5, T6 - 0-0.5, T7 - 0-0.5, EMB 04 - 0-0.5	06-MAY-2010	15-MAY-2010	03-JUN-2010	✓	17-MAY-2010	02-NOV-2010	✓



Matrix: **SOIL**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved MOF 03 - 0-0.5, T5 - 0-0.5, MOF 06 - 0-0.5, T8 - 0-0.5,	MOF 02 - 0-0.5, T6 - 0-0.5, T7 - 0-0.5, EMB 04 - 0-0.5	06-MAY-2010	15-MAY-2010	03-JUN-2010	✓	24-MAY-2010	03-JUN-2010	✓
EK055: Ammonia as N								
Soil Glass Jar - Unpreserved MOF 02 - 0-0.5, T6 - 0-0.5	T5 - 0-0.5,	06-MAY-2010	----	----	----	12-MAY-2010	02-NOV-2010	✓
EK057G: Nitrite as N by Discrete Analyser								
Soil Glass Jar - Unpreserved MOF 02 - 0-0.5, T6 - 0-0.5	T5 - 0-0.5,	06-MAY-2010	17-MAY-2010	02-NOV-2010	✓	17-MAY-2010	02-NOV-2010	✓
EK059G: NOX as N by Discrete Analyser								
Soil Glass Jar - Unpreserved MOF 02 - 0-0.5, T6 - 0-0.5	T5 - 0-0.5,	06-MAY-2010	17-MAY-2010	02-NOV-2010	✓	17-MAY-2010	02-NOV-2010	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Soil Glass Jar - Unpreserved MOF 02 - 0-0.5, T6 - 0-0.5	T5 - 0-0.5,	06-MAY-2010	20-MAY-2010	02-NOV-2010	✓	20-MAY-2010	02-NOV-2010	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Soil Glass Jar - Unpreserved MOF 02 - 0-0.5, T6 - 0-0.5	T5 - 0-0.5,	06-MAY-2010	20-MAY-2010	02-NOV-2010	✓	20-MAY-2010	02-NOV-2010	✓
EK071G: Reactive Phosphorus as P by discrete analyser								
Soil Glass Jar - Unpreserved MOF 02 - 0-0.5, T6 - 0-0.5	T5 - 0-0.5,	06-MAY-2010	17-MAY-2010	02-NOV-2010	✓	17-MAY-2010	02-NOV-2010	✓
EP005: Total Organic Carbon (TOC)								
Pulp Bag MOF 03 - 0-0.5, T5 - 0-0.5, MOF 06 - 0-0.5, T8 - 0-0.5,	MOF 02 - 0-0.5, T6 - 0-0.5, T7 - 0-0.5, EMB 04 - 0-0.5	06-MAY-2010	17-MAY-2010	---	----	17-MAY-2010	03-JUN-2010	✓



Matrix: **SOIL**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved MOF 02 - 0-0.5, T6 - 0-0.5	T5 - 0-0.5,	06-MAY-2010	11-MAY-2010	20-MAY-2010	✓	11-MAY-2010	20-MAY-2010	✓
Soil Glass Jar - Unpreserved MOF 02 - 0-0.5, T6 - 0-0.5	T5 - 0-0.5,	06-MAY-2010	12-MAY-2010	20-MAY-2010	✓	14-MAY-2010	21-JUN-2010	✓
EP080-SD: BTEX								
Soil Glass Jar - Unpreserved MOF 02 - 0-0.5, T6 - 0-0.5	T5 - 0-0.5,	06-MAY-2010	11-MAY-2010	20-MAY-2010	✓	11-MAY-2010	20-MAY-2010	✓
EP090: Organotin Compounds								
Soil Glass Jar - Unpreserved MOF 03 - 0-0.5, T5 - 0-0.5, MOF 06 - 0-0.5, T8 - 0-0.5,	MOF 02 - 0-0.5, T6 - 0-0.5, T7 - 0-0.5, EMB 04 - 0-0.5	06-MAY-2010	14-MAY-2010	20-MAY-2010	✓	17-MAY-2010	23-JUN-2010	✓
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Soil Glass Jar - Unpreserved MOF 02 - 0-0.5, T6 - 0-0.5	T5 - 0-0.5,	06-MAY-2010	12-MAY-2010	20-MAY-2010	✓	14-MAY-2010	21-JUN-2010	✓
EP131A: Organochlorine Pesticides								
Soil Glass Jar - Unpreserved MOF 02 - 0-0.5, T6 - 0-0.5	T5 - 0-0.5,	06-MAY-2010	12-MAY-2010	20-MAY-2010	✓	14-MAY-2010	21-JUN-2010	✓
EP131B: Polychlorinated Biphenyls (as Aroclors)								
Soil Glass Jar - Unpreserved MOF 02 - 0-0.5, T6 - 0-0.5	T5 - 0-0.5,	06-MAY-2010	12-MAY-2010	20-MAY-2010	✓	14-MAY-2010	21-JUN-2010	✓
EP132B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved MOF 03 - 0-0.5, T5 - 0-0.5, MOF 06 - 0-0.5, T8 - 0-0.5,	MOF 02 - 0-0.5, T6 - 0-0.5, T7 - 0-0.5, EMB 04 - 0-0.5	06-MAY-2010	12-MAY-2010	20-MAY-2010	✓	14-MAY-2010	21-JUN-2010	✓



## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Buchi Ammonia - Low-Level in Sediment	EK055-SD	1	3	33.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Moisture Content	EA055-103	3	28	10.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Soluble by Discrete Analyser	EK057G	2	13	15.4	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	2	13	15.4	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	2	13	15.4	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	2	13	15.4	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	2	13	15.4	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	2	21	9.5	9.5	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Fe and Al in Sediments by ICPAES	EG005-SD	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	8	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	1	10	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	2	14	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Buchi Ammonia - Low-Level in Sediment	EK055-SD	1	3	33.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	1	21	4.8	4.8	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	8	12.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement



Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
TPH - Semivolatile Fraction	EP071-SD	1	10	10.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	14	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Buchi Ammonia - Low-Level in Sediment	EK055-SD	1	3	33.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	1	21	4.8	4.8	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Fe and Al in Sediments by ICPAES	EG005-SD	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	8	12.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	1	10	10.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	14	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Buchi Ammonia - Low-Level in Sediment	EK055-SD	1	3	33.3	5.0	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	13	7.7	5.0	✓	ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	1	13	7.7	5.0	✓	ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	13	7.7	5.0	✓	ALS QCS3 requirement
Organotin Analysis	EP090	1	19	5.3	5.0	✓	ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	1	19	5.3	5.0	✓	ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	13	7.7	5.0	✓	ALS QCS3 requirement
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	1	13	7.7	5.0	✓	ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	1	21	4.8	4.8	✓	ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	1	19	5.3	5.0	✓	ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	1	19	5.3	5.0	✓	ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	1	10	10.0	5.0	✓	ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	14	7.1	5.0	✓	ALS QCS3 requirement



## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055-103	SOIL	A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (1999) Schedule B(3) (Method 102)
Particle Size Analysis (Sieving)	EA150	SOIL	Particle Size Analysis by Sieving according to AS1289.3.6.1 - 1995
Particle Size Analysis by Hydrometer	EA150H	SOIL	Particle Size Analysis by Hydrometer according to AS1289.3.6.3 - 2003
Total Fe and Al in Sediments by ICPAES	EG005-SD	SOIL	(APHA 21st ed., 3120; USEPA SW 846 - 6010) (ICPAES) Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (1999) Schedule B(3). LORs per NODG
Total Metals in Sediments by ICPMS	EG020-SD	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector. Analyte list and LORs per NODG.
Total Mercury by FIMS (Low Level)	EG035T-LL	SOIL	AS 3550, APHA 21st ed., 3112 Hg - B (Flow-injection (SnCl <sub>2</sub> )(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl <sub>2</sub> which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3)
Buchi Ammonia - Low-Level in Sediment	EK055-SD	SOIL	APHA 21st ed., 4500 NH <sub>3</sub> +B&G, H Samples are steam distilled (Buchi) prior to analysis and quantified using titrimetric determination.
Nitrite as N - Soluble by Discrete Analyser	EK057G	SOIL	APHA 21st ed., 4500 NO <sub>3</sub> - B. Nitrite in a water extract is determined by direct colourimetry by Discrete Analyser.
Nitrate as N - Soluble by Discrete Analyser	EK058G	SOIL	APHA 21st ed., 4500 NO <sub>3</sub> --F. Nitrate in the 1:5 soil:water extract is reduced to nitrite by way of a cadmium reduction column followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results.
Nitrite and Nitrate as N (NO <sub>x</sub> )- Soluble by Discrete Analyser	EK059G	SOIL	APHA 21st ed., 4500 NO <sub>3</sub> - F. Combined oxidised Nitrogen (NO <sub>2</sub> +NO <sub>3</sub> ) in a water extract is determined by Cadmium Reduction, and direct colourimetry by Discrete Analyser.
TKN as N By Discrete Analyser	EK061G	SOIL	APHA 21st ed., 4500-Norg-D Soil samples are digested using Kjeldahl digestion followed by determination by Discrete Analyser.
Total Phosphorus By Discrete Analyser	EK067G	SOIL	APHA 21st ed., 4500 P-B&F This procedure involves sulfuric acid digestion and quantification using Discrete Analyser.
Reactive Phosphorus as P-Soluble By Discrete Analyser	EK071G	SOIL	APHA 21st ed., 4500 P-F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2



Analytical Methods	Method	Matrix	Method Descriptions
Total Organic Carbon	EP005	SOIL	In-house. Dried and pulverised sample is reacted with acid to remove inorganic Carbonates, then combusted in a LECO furnace in the presence of strong oxidants / catalysts. The evolved (Organic) Carbon (as CO <sub>2</sub> ) is automatically measured by infra-red detector.
TPH - Semivolatile Fraction	EP071-SD	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 504)
TPH Volatiles/BTEX in Sediments	EP080-SD	SOIL	(USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 501)
Organotin Analysis	EP090	SOIL	(USEPA SW 846 - 8270D) Prepared sample extracts are analysed by GC/MS coupled with high volume injection, and quantified against an established calibration curve.
Organophosphorus Pesticides (Ultra-trace)	EP130	SOIL	USEPA Method 3640 (GPC cleanup), 8141 (GC/FPD - Capillary Column) This technique is compliant with NEPM (1999) Schedule B(3) (Method 505)
Organochlorine Pesticides (Ultra-trace)	EP131A	SOIL	USEPA Method 3640 (GPC cleanup), 3620 (Florisil), 8081/8082 (GC/uECD/uECD) This technique is compliant with NEPM (1999) Schedule B(3) (Method 504)
PCB's (Ultra-trace)	EP131B	SOIL	USEPA Method 3640 (GPC cleanup), 3620 (Florisil), 8081/8082 (GC/uECD/uECD) This technique is compliant with NEPM (1999) Schedule B(3) (Method 504)
PAHs in Sediments by GCMS(SIM)	EP132B-SD	SOIL	8270 GCMS Capillary column, SIM mode using large volume programmed temperature vaporisation injection.
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	SOIL	APHA 21st ed., 4500 Norg- D; APHA 21st ed., 4500 P - H. Macro Kjeldahl digestion.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of distilled water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	USEPA 200.2 Mod. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (1999) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	* ORG16	SOIL	(USEPA SW 846 - 5030A) 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids/ Sample Cleanup	ORG17A-UTP	SOIL	In-house, Mechanical agitation (tumbler). 20g of sample, Na <sub>2</sub> SO <sub>4</sub> and surrogate are extracted with 150mL 1:1 DCM/Acetone by end over end tumble. Samples are extracted, concentrated (by KD) and exchanged into an appropriate solvent for GPC and florisil cleanup as required.
Tumbler Extraction of Solids for LVI (Non-concentrating)	ORG17D	SOIL	In house: 10g of sample, Na <sub>2</sub> SO <sub>4</sub> and surrogate are extracted with 50mL 1:1 DCM/Acetone by end over end tumbling. An aliquot is concentrated by nitrogen blowdown to a reduced volume for analysis if required.
Organotin Sample Preparation	ORG35	SOIL	In house. 20g sample is spiked with surrogate and leached in a methanol:acetic acid:UHP water mix and vacuum filtered. Reagents and solvents are added to the sample and the mixture tumbled. The butyltin compounds are simultaneously derivatised and extracted. The extract is further extracted with petroleum ether. The resultant extracts are combined and concentrated for analysis.



## Summary of Outliers

### Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

#### Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Duplicate (DUP) RPDs</b>							
EG005-SD: Total Metals in Sediments by ICP-AES	ES1008688-011	Anonymous	Iron	7439-89-6	22.3 %	0-20%	RPD exceeds LOR based limits
<b>Matrix Spike (MS) Recoveries</b>							
EP130A: Organophosphorus Pesticides (Ultra-trace)	ES1008688-008	Anonymous	Chlorfenvinphos (Z)	470-90-8	50.8 %	55.9-152%	Recovery less than lower data quality objective
EP130A: Organophosphorus Pesticides (Ultra-trace)	ES1008688-008	Anonymous	Chlorpyrifos	2921-88-2	45.5 %	49-140%	Recovery less than lower data quality objective
EP130A: Organophosphorus Pesticides (Ultra-trace)	ES1008688-008	Anonymous	Pirimphos-ethyl	23505-41-1	40.1 %	47.1-141%	Recovery less than lower data quality objective

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Laboratory Control outliers occur.

#### Regular Sample Surrogates

Sub-Matrix: **SEDIMENT**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Samples Submitted</b>							
EP132T: Base/Neutral Extractable Surrogates	ES1008691-005	MOF 06 0-0.5	2-Fluorobiphenyl	321-60-8	118 %	30-115 %	Recovery greater than upper data quality objective

### Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- No Analysis Holding Time Outliers exist.

### Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- No Quality Control Sample Frequency Outliers exist.

## **Appendix 4 Secondary Laboratory Reports (AAA)**



## REPORT OF ANALYSIS

**Laboratory Reference:** A10/1567

**Client:** WorleyParsons Services Pty Ltd  
Level 3, 60 Albert Street  
Brisbane QLD 4000

**Contact:** Tom Koskela

**Order No:**  
**Project:** Proj 31001-00752 APLNG Downstream  
**Sample Type:** Sediment  
**No. of Samples:** 1  
**Date Received:** 6/05/2010  
**Date Completed:** 28/05/2010

---

### Laboratory Contact Details:

**Client Services Manager:** Lilian Wong  
**Technical Enquiries:** Andrew Bradbury  
**Telephone:** +61 7 3268 1228  
**Fax:** +61 7 3268 1238  
**Email:** brisbane@advancedanalytical.com.au  
andrew.bradbury@advancedanalytical.com.au

---

### Attached Results Approved By:

**Ian Eckhard**  
Technical Director

### Comments:

All samples tested as submitted by client. All attached results have been checked and approved for release. This is the Final Report and supersedes any reports previously issued with this batch number. This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. This document shall not be reproduced, except in full.



NATA Accredited Laboratory  
Accreditation No: 15109

Issue Date: 28 May 2010

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**Batch Number:** A10/1567  
**Project Reference:** Proj 31001-00752 APLNG Downstream

<b>Laboratory Reference:</b>	-	-	/1
<b>Client Reference:</b>	-	-	<b>T12 0-0.5m</b>
<b>Date Sampled:</b>	-	-	<b>30/04/2010</b>
<b>Analysis Description</b>	<b>Method</b>	<b>Units</b>	
<b>Moisture Content</b>			
Moisture Content	04-004	%	29.1
<b>Trace Elements</b>			
Silver	04-001	mg/kg	<0.1
Arsenic	04-001	mg/kg	24
Cadmium	04-001	mg/kg	0.18
Chromium	04-001	mg/kg	23
Copper	04-001	mg/kg	19
Iron	04-001	mg/kg	33,000
Mercury	04-002	mg/kg	0.04
Manganese	04-001	mg/kg	630
Nickel	04-001	mg/kg	13
Phosphorus	04-001	mg/kg	310
Lead	04-001	mg/kg	13
Antimony	04-001	mg/kg	<0.5
Vanadium	04-001	mg/kg	66
Zinc	04-001	mg/kg	61
<b>BTEX</b>			
Benzene	04-021	mg/kg	<0.20
Toluene	04-021	mg/kg	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20
m+p xylenes	04-021	mg/kg	<0.40
o-xylene	04-021	mg/kg	<0.20
Total BTEX	04-021	mg/kg	<1.2
Surrogate 1 Recovery	04-021	%	80
Surrogate 2 Recovery	04-021	%	80
Surrogate 3 Recovery	04-021	%	85
Date Extracted	04-021	-	10/05/2010
Date Analysed	04-021	-	11/05/2010
<b>Total Petroleum Hydrocarbons</b>			
TPH C6-C9	04-021	mg/kg	<10
TPH C10-14	04-020	mg/kg	<10

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**Batch Number:** A10/1567  
**Project Reference:** Proj 31001-00752 APLNG Downstream

<b>Laboratory Reference:</b>	-	-	/1
<b>Client Reference:</b>	-	-	<b>T12 0-0.5m</b>
<b>Date Sampled:</b>	-	-	<b>30/04/2010</b>
<b>Analysis Description</b>	<b>Method</b>	<b>Units</b>	
TPH C15-28	04-020	mg/kg	<50
TPH C29-36	04-020	mg/kg	<50
Surrogate Recovery	04-020	%	97
Date Extracted	04-020	-	11/05/2010
Date Analysed	04-020	-	12/05/2010
<b>Poly Aromatic Hydrocarbons</b>			
Naphthalene	04-022	µg/kg	<5
1-Methylnaphthalene	04-022	µg/kg	<5
2-Methylnaphthalene	04-022	µg/kg	<5
Acenaphthylene	04-022	µg/kg	<5
Acenaphthene	04-022	µg/kg	<5
Fluorene	04-022	µg/kg	<5
Phenanthrene	04-022	µg/kg	<5
Anthracene	04-022	µg/kg	<5
Fluoranthene	04-022	µg/kg	<5
Pyrene	04-022	µg/kg	<5
Benz(a)anthracene	04-022	µg/kg	<5
Chrysene	04-022	µg/kg	<5
Benzo(b)&(k)fluoranthene	04-022	µg/kg	<10
Benzo(a)pyrene	04-022	µg/kg	<5
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	<5
Dibenz(a,h)anthracene	04-022	µg/kg	<5
Benzo(g,h,i)perylene	04-022	µg/kg	<5
Coronene	04-022	µg/kg	<10
Benzo(e)pyrene	04-022	µg/kg	<5
Perylene	04-022	µg/kg	<5
Total PAHs (as above)	04-022	µg/kg	<100
Surrogate 1 Recovery	04-022	%	80
Surrogate 2 Recovery	04-022	%	86
Surrogate 3 Recovery	04-022	%	97
Date Extracted	04-022	-	12/05/2010
Date Analysed	04-022	-	12/05/2010
<b>Organochlorine Pesticides</b>			

Issue Date: 28 May 2010

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**Batch Number:** A10/1567  
**Project Reference:** Proj 31001-00752 APLNG Downstream

<b>Laboratory Reference:</b>	-	-	/1
<b>Client Reference:</b>	-	-	<b>T12 0-0.5m</b>
<b>Date Sampled:</b>	-	-	<b>30/04/2010</b>
<b>Analysis Description</b>	<b>Method</b>	<b>Units</b>	
Aldrin	04-023	µg/kg	<1.0
<i>alpha</i> -BHC	04-023	µg/kg	<1.0
<i>beta</i> -BHC	04-023	µg/kg	<1.0
<i>gamma</i> -BHC (Lindane)	04-023	µg/kg	<1.0
<i>delta</i> -BHC	04-023	µg/kg	<1.0
<i>cis</i> -Chlordane	04-023	µg/kg	<1.0
<i>trans</i> -Chlordane	04-023	µg/kg	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	<1.0
<i>p,p'</i> -DDE	04-023	µg/kg	<1.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0
Dieldrin	04-023	µg/kg	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0
Endrin	04-023	µg/kg	<1.0
Endrin ketone	04-023	µg/kg	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0
Heptachlor	04-023	µg/kg	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0
Hexachlorobenzene	04-023	µg/kg	<1.0
Methoxychlor	04-023	µg/kg	<1.0
Oxychlordane	04-023	µg/kg	<1.0
Surrogate Recovery	04-023	%	79
Date Extracted	04-023	-	12/05/2010
Date Analysed	04-023	-	12/05/2010
<b>Organophosphate Pesticides</b>			
Dichlorvos	04-024	µg/kg	<20
Demeton-S-methyl	04-024	µg/kg	<20
Dimethoate	04-024	µg/kg	<20
Diazinon	04-024	µg/kg	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20
Parathion-methyl	04-024	µg/kg	<20
Pirimiphos-methyl	04-024	µg/kg	<20

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**Batch Number:** A10/1567  
**Project Reference:** Proj 31001-00752 APLNG Downstream

<b>Laboratory Reference:</b>	-	-	/1
<b>Client Reference:</b>	-	-	<b>T12 0-0.5m</b>
<b>Date Sampled:</b>	-	-	<b>30/04/2010</b>
<b>Analysis Description</b>	<b>Method</b>	<b>Units</b>	
Fenitrothion	04-024	µg/kg	<20
Malathion	04-024	µg/kg	<20
Chlorpyrifos	04-024	µg/kg	<20
Fenthion	04-024	µg/kg	<20
Parathion	04-024	µg/kg	<20
Chlorfenvinphos	04-024	µg/kg	<20
Bromophos-ethyl	04-024	µg/kg	<20
Methidathion	04-024	µg/kg	<20
Fenamiphos	04-024	µg/kg	<20
Prothiofos	04-024	µg/kg	<20
Ethion	04-024	µg/kg	<20
Carbophenothion	04-024	µg/kg	<20
Phosalone	04-024	µg/kg	<20
Azinphos-methyl	04-024	µg/kg	<20
Surrogate Recovery	04-024	%	91
Date Extracted	04-024	-	12/05/2010
Date Analysed	04-024	-	12/05/2010
<b>Polychlorinated Biphenyls</b>			
Mono-PCB congeners	04-029	µg/kg	<5.0
Di-PCB congeners	04-029	µg/kg	<5.0
Tri-PCB congeners	04-029	µg/kg	<5.0
Tetra-PCB congeners	04-029	µg/kg	<5.0
Penta-PCB congeners	04-029	µg/kg	<5.0
Hexa-PCB congeners	04-029	µg/kg	<5.0
Hepta-PCB congeners	04-029	µg/kg	<5.0
Octa-PCB congeners	04-029	µg/kg	<5.0
Nona-PCB congeners	04-029	µg/kg	<5.0
Deca-PCB congeners	04-029	µg/kg	<5.0
Total PCB congeners	04-029	µg/kg	<5.0
Surrogate 1 Recovery	04-029	%	103
Surrogate 2 Recovery	04-029	%	103
Date Extracted	04-029	-	12/05/2010
Date Analysed	04-029	-	12/05/2010

Issue Date: 28 May 2010

**Advanced Analytical Australia Pty Ltd**  
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**Batch Number:** A10/1567  
**Project Reference:** Proj 31001-00752 APLNG Downstream

<b>Laboratory Reference:</b>	-	-	/1
<b>Client Reference:</b>	-	-	<b>T12 0-0.5m</b>
<b>Date Sampled:</b>	-	-	<b>30/04/2010</b>
<b>Analysis Description</b>	<b>Method</b>	<b>Units</b>	
<b>Organotins</b>			
Monobutyl tin	04-026	µgSn/kg	<0.50
Dibutyl tin	04-026	µgSn/kg	<0.50
Tributyl tin	04-026	µgSn/kg	<0.50
Surrogate 1 Recovery	04-026	%	81
Date Extracted	04-026	-	13/05/2010
Date Analysed	04-026	-	13/05/2010
<b>Subcontract Analysis</b>			
Total Organic Carbon	SUB	%	0.52
Nitrate as N	SUB	mg/kg	<0.1
Nitrite as N	SUB	mg/kg	<0.1
Total Kjeldahl Nitrogen	SUB	mg/kg	28
Total Nitrogen	SUB	mg/kg	28
Phosphate as P	SUB	mg/kg	<0.1
Total Ammonia as N	SUB	mg/kg	3.5

Method	Method Description
04-004	Moisture by gravimetric, %
04-001	Metals by ICP-OES, mg/kg
04-002	Mercury by CVAAS, mg/kg
04-021	TPH C6-9 & BTEX by P&T GCMS, mg/kg
04-020	TPH by GC-FID, mg/kg
04-022	Low level PAHs & Phenols by GCMS, µg/kg
04-023	Low level OC Pesticides by GCMS, µg/kg
04-024	OP Pesticides by GCMS, µg/kg
04-029	PCBS (as congeners) by GCMS, µg/kg
04-026	Organotins by GCMS, µgSn/kg
SUB	Subcontracted Analyses

#### Result Comments

[<] Less than

[INS] Insufficient sample for this test

[NA] Test not required

Solid sample results are reported on a dry weight basis.

Subcontracted analysis was performed by Sydney Analytical Laboratories (NATA Number 1884); reference SAL report number SAL22819.

# - Spike recovery for Fe could not be accurately determined due to a significant background analyte concentration.

# Monobutyltin spike recovery could not be determined due to matrix interferences.



**Batch Number:** A10/1567  
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## QUALITY ASSURANCE REPORT

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Silver	mg/kg	<0.1	[NT]	[NT]	A10/1430/01	100%
Arsenic	mg/kg	<0.4	[NT]	[NT]	A10/1430/01	102%
Cadmium	mg/kg	<0.1	[NT]	[NT]	A10/1430/01	103%
Chromium	mg/kg	<0.1	[NT]	[NT]	A10/1430/01	101%
Copper	mg/kg	<0.1	[NT]	[NT]	A10/1430/01	98%
Iron	mg/kg	<5	[NT]	[NT]	A10/1430/01	#
Mercury	mg/kg	<0.01	[NT]	[NT]	A10/1430/01	99%
Manganese	mg/kg	<0.5	[NT]	[NT]	A10/1430/01	106%
Nickel	mg/kg	<0.1	[NT]	[NT]	A10/1430/01	96%
Phosphorus	mg/kg	<1	[NT]	[NT]	A10/1430/01	105%
Lead	mg/kg	<0.5	[NT]	[NT]	A10/1430/01	94%
Antimony	mg/kg	<0.5	[NT]	[NT]	A10/1430/01	93%
Vanadium	mg/kg	<0.1	[NT]	[NT]	A10/1430/01	103%
Zinc	mg/kg	<0.5	[NT]	[NT]	A10/1430/01	99%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	mg/kg	<0.20	[NT]	[NT]	External	83%
Toluene	mg/kg	<0.20	[NT]	[NT]	External	84%
Ethyl Benzene	mg/kg	<0.20	[NT]	[NT]	External	82%
m+p xylenes	mg/kg	<0.40	[NT]	[NT]	External	81%
o-xylene	mg/kg	<0.20	[NT]	[NT]	External	85%
Total BTEX	mg/kg	<1.2	[NT]	[NT]	External	N/A
Surrogate 1 Recovery	%	99	[NT]	[NT]	External	83%
Surrogate 2 Recovery	%	98	[NT]	[NT]	External	80%
Surrogate 3 Recovery	%	100	[NT]	[NT]	External	85%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
TPH C6-C9	mg/kg	<10	[NT]	[NT]	External	83%
TPH C10-14	mg/kg	<10	[NT]	[NT]	External	81%
TPH C15-28	mg/kg	<50	[NT]	[NT]	External	87%
TPH C29-36	mg/kg	<50	[NT]	[NT]	External	87%
Surrogate Recovery	%	101	[NT]	[NT]	External	91%



**Batch Number:** A10/1567  
**Project Reference:** Proj 31001-00752 APLNG Downstream

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Naphthalene	µg/kg	<5	[NT]	[NT]	External	90%
1-Methylnaphthalene	µg/kg	<5	[NT]	[NT]	External	92%
2-Methylnaphthalene	µg/kg	<5	[NT]	[NT]	External	90%
Acenaphthylene	µg/kg	<5	[NT]	[NT]	External	102%
Acenaphthene	µg/kg	<5	[NT]	[NT]	External	103%
Fluorene	µg/kg	<5	[NT]	[NT]	External	103%
Phenanthrene	µg/kg	<5	[NT]	[NT]	External	103%
Anthracene	µg/kg	<5	[NT]	[NT]	External	96%
Fluoranthene	µg/kg	<5	[NT]	[NT]	External	103%
Pyrene	µg/kg	<5	[NT]	[NT]	External	103%
Benz(a)anthracene	µg/kg	<5	[NT]	[NT]	External	111%
Chrysene	µg/kg	<5	[NT]	[NT]	External	100%
Benzo(b)&(k)fluoranthene	µg/kg	<10	[NT]	[NT]	External	108%
Benzo(a)pyrene	µg/kg	<5	[NT]	[NT]	External	103%
Indeno(1,2,3-cd)pyrene	µg/kg	<5	[NT]	[NT]	External	130%
Dibenz(a,h)anthracene	µg/kg	<5	[NT]	[NT]	External	125%
Benzo(g,h,i)perylene	µg/kg	<5	[NT]	[NT]	External	106%
Coronene	µg/kg	<10	[NT]	[NT]	External	121%
Benzo(e)pyrene	µg/kg	<5	[NT]	[NT]	External	110%
Perylene	µg/kg	<5	[NT]	[NT]	External	97%
Total PAHs (as above)	µg/kg	<100	[NT]	[NT]	External	N/A
Surrogate 1 Recovery	%	82	[NT]	[NT]	External	97%
Surrogate 2 Recovery	%	96	[NT]	[NT]	External	95%
Surrogate 3 Recovery	%	113	[NT]	[NT]	External	96%



**Batch Number:** A10/1567  
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TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Aldrin	µg/kg	<1.0	[NT]	[NT]	External	86%
<i>alpha</i> -BHC	µg/kg	<1.0	[NT]	[NT]	External	88%
<i>beta</i> -BHC	µg/kg	<1.0	[NT]	[NT]	External	87%
<i>gamma</i> -BHC (Lindane)	µg/kg	<1.0	[NT]	[NT]	External	88%
<i>delta</i> -BHC	µg/kg	<1.0	[NT]	[NT]	External	83%
<i>cis</i> -Chlordane	µg/kg	<1.0	[NT]	[NT]	External	87%
<i>trans</i> -Chlordane	µg/kg	<1.0	[NT]	[NT]	External	87%
<i>p,p'</i> -DDD	µg/kg	<1.0	[NT]	[NT]	External	91%
<i>p,p'</i> -DDE	µg/kg	<1.0	[NT]	[NT]	External	88%
<i>p,p'</i> -DDT	µg/kg	<1.0	[NT]	[NT]	External	92%
Dieldrin	µg/kg	<1.0	[NT]	[NT]	External	89%
<i>alpha</i> -Endosulfan	µg/kg	<1.0	[NT]	[NT]	External	90%
<i>beta</i> -Endosulfan	µg/kg	<1.0	[NT]	[NT]	External	88%
Endosulfan Sulphate	µg/kg	<1.0	[NT]	[NT]	External	87%
Endrin	µg/kg	<1.0	[NT]	[NT]	External	97%
Endrin ketone	µg/kg	<1.0	[NT]	[NT]	External	89%
Endrin aldehyde	µg/kg	<1.0	[NT]	[NT]	External	25%
Heptachlor	µg/kg	<1.0	[NT]	[NT]	External	90%
Heptachlor epoxide	µg/kg	<1.0	[NT]	[NT]	External	76%
Hexachlorobenzene	µg/kg	<1.0	[NT]	[NT]	External	82%
Methoxychlor	µg/kg	<1.0	[NT]	[NT]	External	94%
Oxychlordane	µg/kg	<1.0	[NT]	[NT]	External	90%
Surrogate Recovery	%	99	[NT]	[NT]	External	83%



**Batch Number:** A10/1567  
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TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Dichlorvos	µg/kg	<20	[NT]	[NT]	External	85%
Demeton-S-methyl	µg/kg	<20	[NT]	[NT]	External	96%
Dimethoate	µg/kg	<20	[NT]	[NT]	External	97%
Diazinon	µg/kg	<20	[NT]	[NT]	External	90%
Chlorpyrifos-methyl	µg/kg	<20	[NT]	[NT]	External	90%
Parathion-methyl	µg/kg	<20	[NT]	[NT]	External	96%
Pirimiphos-methyl	µg/kg	<20	[NT]	[NT]	External	91%
Fenitrothion	µg/kg	<20	[NT]	[NT]	External	92%
Malathion	µg/kg	<20	[NT]	[NT]	External	96%
Chlorpyrifos	µg/kg	<20	[NT]	[NT]	External	89%
Fenthion	µg/kg	<20	[NT]	[NT]	External	88%
Parathion	µg/kg	<20	[NT]	[NT]	External	94%
Chlorfenvinphos	µg/kg	<20	[NT]	[NT]	External	103%
Bromophos-ethyl	µg/kg	<20	[NT]	[NT]	External	91%
Methidathion	µg/kg	<20	[NT]	[NT]	External	95%
Fenamiphos	µg/kg	<20	[NT]	[NT]	External	119%
Prothiofos	µg/kg	<20	[NT]	[NT]	External	96%
Ethion	µg/kg	<20	[NT]	[NT]	External	115%
Carbophenothion	µg/kg	<20	[NT]	[NT]	External	100%
Phosalone	µg/kg	<20	[NT]	[NT]	External	102%
Azinphos-methyl	µg/kg	<20	[NT]	[NT]	External	103%
Surrogate Recovery	%	108	[NT]	[NT]	External	91%



**Batch Number:** A10/1567  
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TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Mono-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	111%
Di-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	114%
Tri-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	104%
Tetra-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	102%
Penta-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	99%
Hexa-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	91%
Hepta-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	92%
Octa-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	93%
Nona-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	91%
Deca-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	89%
Total PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	N/A
Surrogate 1 Recovery	%	101	[NT]	[NT]	External	104%
Surrogate 2 Recovery	%	97	[NT]	[NT]	External	98%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Monobutyl tin	µgSn/kg	<0.50	A10/1567-1	<0.50    <0.50	A10/1567-1	#
Dibutyl tin	µgSn/kg	<0.50	A10/1567-1	<0.50    <0.50	A10/1567-1	65%
Tributyl tin	µgSn/kg	<0.50	A10/1567-1	<0.50    <0.50	A10/1567-1	66%
Surrogate 1 Recovery	%	97	A10/1567-1	81    92    RPD: 13	A10/1567-1	82%

TEST	UNITS	Blank
Total Organic Carbon	%	<0.02
Nitrate as N	mg/kg	<0.1
Nitrite as N	mg/kg	<0.1
Total Kjeldahl Nitrogen	mg/kg	<20
Total Nitrogen	mg/kg	<20
Phosphate as P	mg/kg	<0.1
Total Ammonia as N	mg/kg	<0.1

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	mg/kg	[NT]	[NT]	[NT]	A10/1567-1	98%
Toluene	mg/kg	[NT]	[NT]	[NT]	A10/1567-1	104%
Ethyl Benzene	mg/kg	[NT]	[NT]	[NT]	A10/1567-1	100%
m+p xylenes	mg/kg	[NT]	[NT]	[NT]	A10/1567-1	103%
o-xylene	mg/kg	[NT]	[NT]	[NT]	A10/1567-1	104%
Total BTEX	mg/kg	[NT]	[NT]	[NT]	A10/1567-1	N/A
Surrogate 1 Recovery	%	[NT]	[NT]	[NT]	A10/1567-1	101%
Surrogate 2 Recovery	%	[NT]	[NT]	[NT]	A10/1567-1	102%
Surrogate 3 Recovery	%	[NT]	[NT]	[NT]	A10/1567-1	108%



**Batch Number:** A10/1567  
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TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Naphthalene	µg/kg	[NT]	[NT]	[NT]	External	90%
1-Methylnaphthalene	µg/kg	[NT]	[NT]	[NT]	External	99%
2-Methylnaphthalene	µg/kg	[NT]	[NT]	[NT]	External	98%
Acenaphthylene	µg/kg	[NT]	[NT]	[NT]	External	88%
Acenaphthene	µg/kg	[NT]	[NT]	[NT]	External	90%
Fluorene	µg/kg	[NT]	[NT]	[NT]	External	91%
Phenanthrene	µg/kg	[NT]	[NT]	[NT]	External	91%
Anthracene	µg/kg	[NT]	[NT]	[NT]	External	85%
Fluoranthene	µg/kg	[NT]	[NT]	[NT]	External	91%
Pyrene	µg/kg	[NT]	[NT]	[NT]	External	91%
Benz(a)anthracene	µg/kg	[NT]	[NT]	[NT]	External	96%
Chrysene	µg/kg	[NT]	[NT]	[NT]	External	86%
Benzo(b)&(k)fluoranthene	µg/kg	[NT]	[NT]	[NT]	External	97%
Benzo(a)pyrene	µg/kg	[NT]	[NT]	[NT]	External	91%
Indeno(1,2,3-cd)pyrene	µg/kg	[NT]	[NT]	[NT]	External	108%
Dibenz(a,h)anthracene	µg/kg	[NT]	[NT]	[NT]	External	102%
Benzo(g,h,i)perylene	µg/kg	[NT]	[NT]	[NT]	External	94%
Coronene	µg/kg	[NT]	[NT]	[NT]	External	100%
Benzo(e)pyrene	µg/kg	[NT]	[NT]	[NT]	External	100%
Perylene	µg/kg	[NT]	[NT]	[NT]	External	85%
Total PAHs (as above)	µg/kg	[NT]	[NT]	[NT]	External	N/A
Surrogate 1 Recovery	%	[NT]	[NT]	[NT]	External	84%
Surrogate 2 Recovery	%	[NT]	[NT]	[NT]	External	83%
Surrogate 3 Recovery	%	[NT]	[NT]	[NT]	External	85%



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TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Aldrin	µg/kg	[NT]	[NT]	[NT]	External	79%
<i>alpha</i> -BHC	µg/kg	[NT]	[NT]	[NT]	External	79%
<i>beta</i> -BHC	µg/kg	[NT]	[NT]	[NT]	External	80%
<i>gamma</i> -BHC (Lindane)	µg/kg	[NT]	[NT]	[NT]	External	80%
<i>delta</i> -BHC	µg/kg	[NT]	[NT]	[NT]	External	76%
<i>cis</i> -Chlordane	µg/kg	[NT]	[NT]	[NT]	External	79%
<i>trans</i> -Chlordane	µg/kg	[NT]	[NT]	[NT]	External	79%
<i>p,p'</i> -DDD	µg/kg	[NT]	[NT]	[NT]	External	83%
<i>p,p'</i> -DDE	µg/kg	[NT]	[NT]	[NT]	External	80%
<i>p,p'</i> -DDT	µg/kg	[NT]	[NT]	[NT]	External	84%
Dieldrin	µg/kg	[NT]	[NT]	[NT]	External	80%
<i>alpha</i> -Endosulfan	µg/kg	[NT]	[NT]	[NT]	External	81%
<i>beta</i> -Endosulfan	µg/kg	[NT]	[NT]	[NT]	External	79%
Endosulfan Sulphate	µg/kg	[NT]	[NT]	[NT]	External	79%
Endrin	µg/kg	[NT]	[NT]	[NT]	External	87%
Endrin ketone	µg/kg	[NT]	[NT]	[NT]	External	81%
Endrin aldehyde	µg/kg	[NT]	[NT]	[NT]	External	88%
Heptachlor	µg/kg	[NT]	[NT]	[NT]	External	82%
Heptachlor epoxide	µg/kg	[NT]	[NT]	[NT]	External	69%
Hexachlorobenzene	µg/kg	[NT]	[NT]	[NT]	External	74%
Methoxychlor	µg/kg	[NT]	[NT]	[NT]	External	85%
Oxychlordane	µg/kg	[NT]	[NT]	[NT]	External	82%
Surrogate Recovery	%	[NT]	[NT]	[NT]	External	75%



**Batch Number:** A10/1567  
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TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Dichlorvos	µg/kg	[NT]	[NT]	[NT]	External	89%
Demeton-S-methyl	µg/kg	[NT]	[NT]	[NT]	External	86%
Dimethoate	µg/kg	[NT]	[NT]	[NT]	External	89%
Diazinon	µg/kg	[NT]	[NT]	[NT]	External	84%
Chlorpyrifos-methyl	µg/kg	[NT]	[NT]	[NT]	External	82%
Parathion-methyl	µg/kg	[NT]	[NT]	[NT]	External	87%
Pirimiphos-methyl	µg/kg	[NT]	[NT]	[NT]	External	85%
Fenitrothion	µg/kg	[NT]	[NT]	[NT]	External	84%
Malathion	µg/kg	[NT]	[NT]	[NT]	External	87%
Chlorpyrifos	µg/kg	[NT]	[NT]	[NT]	External	82%
Fenthion	µg/kg	[NT]	[NT]	[NT]	External	82%
Parathion	µg/kg	[NT]	[NT]	[NT]	External	86%
Chlorfenvinphos	µg/kg	[NT]	[NT]	[NT]	External	88%
Bromophos-ethyl	µg/kg	[NT]	[NT]	[NT]	External	82%
Methidathion	µg/kg	[NT]	[NT]	[NT]	External	83%
Fenamiphos	µg/kg	[NT]	[NT]	[NT]	External	107%
Prothiofos	µg/kg	[NT]	[NT]	[NT]	External	86%
Ethion	µg/kg	[NT]	[NT]	[NT]	External	105%
Carbophenothion	µg/kg	[NT]	[NT]	[NT]	External	90%
Phosalone	µg/kg	[NT]	[NT]	[NT]	External	93%
Azinphos-methyl	µg/kg	[NT]	[NT]	[NT]	External	92%
Surrogate Recovery	%	[NT]	[NT]	[NT]	External	81%



**Batch Number:** A10/1567  
**Project Reference:** Proj 31001-00752 APLNG Downstream

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Mono-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	96%
Di-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	100%
Tri-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	92%
Tetra-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	92%
Penta-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	92%
Hexa-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	91%
Hepta-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	92%
Octa-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	93%
Nona-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	91%
Deca-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	89%
Total PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	N/A
Surrogate 1 Recovery	%	[NT]	[NT]	[NT]	External	90%
Surrogate 2 Recovery	%	[NT]	[NT]	[NT]	External	88%



**Batch Number:** A10/1567  
**Project Reference:** Proj 31001-00752 APLNG Downstream

**Comments:**

RPD = Relative Percent Deviation

[NT] = Not Tested

[N/A] = Not Applicable

'#' = Spike recovery data could not be calculated due to high levels of contaminants

Acceptable replicate reproducibility limit or RPD:	Results < 10 times LOR: no limits
	Results >10 times LOR: 0% - 50%
Acceptable matrix spike & LCS recovery limits:	Trace elements 70-130%
	Organic analyses 50-150%
	SVOC & speciated phenols 10-140%
	Surrogates 10-140%

When levels outside these limits are obtained, an investigation into the cause of the deviation is performed before the batch is accepted or rejected, and results are released.



## REPORT OF ANALYSIS

**Laboratory Reference:** A10/1567

**Client:** WorleyParsons Services Pty Ltd  
Level 3, 60 Albert Street  
Brisbane QLD 4000

**Contact:** Tom Koskela

**Order No:**  
**Project:** Proj 31001-00752 APLNG Downstream  
**Sample Type:** Sediment  
**No. of Samples:** 1  
**Date Received:** 6/05/2010  
**Date Completed:** 28/05/2010

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### **Laboratory Contact Details:**

**Client Services Manager:** Lilian Wong  
**Technical Enquiries:** Andrew Bradbury  
**Telephone:** +61 7 3268 1228  
**Fax:** +61 7 3268 1238  
**Email:** brisbane@advancedanalytical.com.au  
andrew.bradbury@advancedanalytical.com.au

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### **Attached Results Approved By:**

**Ian Eckhard**  
**Technical Director**

### **Comments:**

All samples tested as submitted by client. All attached results have been checked and approved for release. This is the Final Report and supersedes any reports previously issued with this batch number. This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. This document shall not be reproduced, except in full.



NATA Accredited Laboratory  
Accreditation No: 15109

Issue Date: 28 May 2010

**Advanced Analytical Australia Pty Ltd**  
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**Batch Number:** A10/1567  
**Project Reference:** Proj 31001-00752 APLNG Downstream

<b>Laboratory Reference:</b>	-	-	/1
<b>Client Reference:</b>	-	-	<b>T12 0-0.5m</b>
<b>Date Sampled:</b>	-	-	<b>30/04/2010</b>
<b>Analysis Description</b>	<b>Method</b>	<b>Units</b>	
<b>Moisture Content</b>			
Moisture Content	04-004	%	29.1
<b>Trace Elements</b>			
Silver	04-001	mg/kg	<0.1
Arsenic	04-001	mg/kg	24
Cadmium	04-001	mg/kg	0.18
Chromium	04-001	mg/kg	23
Copper	04-001	mg/kg	19
Iron	04-001	mg/kg	33,000
Mercury	04-002	mg/kg	0.04
Manganese	04-001	mg/kg	630
Nickel	04-001	mg/kg	13
Phosphorus	04-001	mg/kg	310
Lead	04-001	mg/kg	13
Antimony	04-001	mg/kg	<0.5
Vanadium	04-001	mg/kg	66
Zinc	04-001	mg/kg	61
<b>BTEX</b>			
Benzene	04-021	mg/kg	<0.20
Toluene	04-021	mg/kg	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20
m+p xylenes	04-021	mg/kg	<0.40
o-xylene	04-021	mg/kg	<0.20
Total BTEX	04-021	mg/kg	<1.2
Surrogate 1 Recovery	04-021	%	80
Surrogate 2 Recovery	04-021	%	80
Surrogate 3 Recovery	04-021	%	85
Date Extracted	04-021	-	10/05/2010
Date Analysed	04-021	-	11/05/2010
<b>Total Petroleum Hydrocarbons</b>			
TPH C6-C9	04-021	mg/kg	<10
TPH C10-14	04-020	mg/kg	<10

Issue Date: 28 May 2010

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<b>Laboratory Reference:</b>	-	-	/1
<b>Client Reference:</b>	-	-	<b>T12 0-0.5m</b>
<b>Date Sampled:</b>	-	-	<b>30/04/2010</b>
<b>Analysis Description</b>	<b>Method</b>	<b>Units</b>	
TPH C15-28	04-020	mg/kg	<50
TPH C29-36	04-020	mg/kg	<50
Surrogate Recovery	04-020	%	97
Date Extracted	04-020	-	11/05/2010
Date Analysed	04-020	-	12/05/2010
<b>Poly Aromatic Hydrocarbons</b>			
Naphthalene	04-022	µg/kg	<5
1-Methylnaphthalene	04-022	µg/kg	<5
2-Methylnaphthalene	04-022	µg/kg	<5
Acenaphthylene	04-022	µg/kg	<5
Acenaphthene	04-022	µg/kg	<5
Fluorene	04-022	µg/kg	<5
Phenanthrene	04-022	µg/kg	<5
Anthracene	04-022	µg/kg	<5
Fluoranthene	04-022	µg/kg	<5
Pyrene	04-022	µg/kg	<5
Benz(a)anthracene	04-022	µg/kg	<5
Chrysene	04-022	µg/kg	<5
Benzo(b)&(k)fluoranthene	04-022	µg/kg	<10
Benzo(a)pyrene	04-022	µg/kg	<5
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	<5
Dibenz(a,h)anthracene	04-022	µg/kg	<5
Benzo(g,h,i)perylene	04-022	µg/kg	<5
Coronene	04-022	µg/kg	<10
Benzo(e)pyrene	04-022	µg/kg	<5
Perylene	04-022	µg/kg	<5
Total PAHs (as above)	04-022	µg/kg	<100
Surrogate 1 Recovery	04-022	%	80
Surrogate 2 Recovery	04-022	%	86
Surrogate 3 Recovery	04-022	%	97
Date Extracted	04-022	-	12/05/2010
Date Analysed	04-022	-	12/05/2010
<b>Organochlorine Pesticides</b>			

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**Project Reference:** Proj 31001-00752 APLNG Downstream

<b>Laboratory Reference:</b>	-	-	/1
<b>Client Reference:</b>	-	-	<b>T12 0-0.5m</b>
<b>Date Sampled:</b>	-	-	<b>30/04/2010</b>
<b>Analysis Description</b>	<b>Method</b>	<b>Units</b>	
Aldrin	04-023	µg/kg	<1.0
<i>alpha</i> -BHC	04-023	µg/kg	<1.0
<i>beta</i> -BHC	04-023	µg/kg	<1.0
<i>gamma</i> -BHC (Lindane)	04-023	µg/kg	<1.0
<i>delta</i> -BHC	04-023	µg/kg	<1.0
<i>cis</i> -Chlordane	04-023	µg/kg	<1.0
<i>trans</i> -Chlordane	04-023	µg/kg	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	<1.0
<i>p,p'</i> -DDE	04-023	µg/kg	<1.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0
Dieldrin	04-023	µg/kg	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0
Endrin	04-023	µg/kg	<1.0
Endrin ketone	04-023	µg/kg	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0
Heptachlor	04-023	µg/kg	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0
Hexachlorobenzene	04-023	µg/kg	<1.0
Methoxychlor	04-023	µg/kg	<1.0
Oxychlordane	04-023	µg/kg	<1.0
Surrogate Recovery	04-023	%	79
Date Extracted	04-023	-	12/05/2010
Date Analysed	04-023	-	12/05/2010
<b>Organophosphate Pesticides</b>			
Dichlorvos	04-024	µg/kg	<20
Demeton-S-methyl	04-024	µg/kg	<20
Dimethoate	04-024	µg/kg	<20
Diazinon	04-024	µg/kg	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20
Parathion-methyl	04-024	µg/kg	<20
Pirimiphos-methyl	04-024	µg/kg	<20

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<b>Laboratory Reference:</b>	-	-	/1
<b>Client Reference:</b>	-	-	<b>T12 0-0.5m</b>
<b>Date Sampled:</b>	-	-	<b>30/04/2010</b>
<b>Analysis Description</b>	<b>Method</b>	<b>Units</b>	
Fenitrothion	04-024	µg/kg	<20
Malathion	04-024	µg/kg	<20
Chlorpyrifos	04-024	µg/kg	<20
Fenthion	04-024	µg/kg	<20
Parathion	04-024	µg/kg	<20
Chlorfenvinphos	04-024	µg/kg	<20
Bromophos-ethyl	04-024	µg/kg	<20
Methidathion	04-024	µg/kg	<20
Fenamiphos	04-024	µg/kg	<20
Prothiofos	04-024	µg/kg	<20
Ethion	04-024	µg/kg	<20
Carbophenothion	04-024	µg/kg	<20
Phosalone	04-024	µg/kg	<20
Azinphos-methyl	04-024	µg/kg	<20
Surrogate Recovery	04-024	%	91
Date Extracted	04-024	-	12/05/2010
Date Analysed	04-024	-	12/05/2010
<b>Polychlorinated Biphenyls</b>			
Mono-PCB congeners	04-029	µg/kg	<5.0
Di-PCB congeners	04-029	µg/kg	<5.0
Tri-PCB congeners	04-029	µg/kg	<5.0
Tetra-PCB congeners	04-029	µg/kg	<5.0
Penta-PCB congeners	04-029	µg/kg	<5.0
Hexa-PCB congeners	04-029	µg/kg	<5.0
Hepta-PCB congeners	04-029	µg/kg	<5.0
Octa-PCB congeners	04-029	µg/kg	<5.0
Nona-PCB congeners	04-029	µg/kg	<5.0
Deca-PCB congeners	04-029	µg/kg	<5.0
Total PCB congeners	04-029	µg/kg	<5.0
Surrogate 1 Recovery	04-029	%	103
Surrogate 2 Recovery	04-029	%	103
Date Extracted	04-029	-	12/05/2010
Date Analysed	04-029	-	12/05/2010

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<b>Laboratory Reference:</b>	-	-	/1
<b>Client Reference:</b>	-	-	<b>T12 0-0.5m</b>
<b>Date Sampled:</b>	-	-	<b>30/04/2010</b>
<b>Analysis Description</b>	<b>Method</b>	<b>Units</b>	
<b>Organotins</b>			
Monobutyl tin	04-026	µgSn/kg	<0.50
Dibutyl tin	04-026	µgSn/kg	<0.50
Tributyl tin	04-026	µgSn/kg	<0.50
Surrogate 1 Recovery	04-026	%	81
Date Extracted	04-026	-	13/05/2010
Date Analysed	04-026	-	13/05/2010
<b>Subcontract Analysis</b>			
Total Organic Carbon	SUB	%	0.52
Nitrate as N	SUB	mg/kg	<0.1
Nitrite as N	SUB	mg/kg	<0.1
Total Kjeldahl Nitrogen	SUB	mg/kg	28
Total Nitrogen	SUB	mg/kg	28
Phosphate as P	SUB	mg/kg	<0.1
Total Ammonia as N	SUB	mg/kg	3.5

Method	Method Description
04-004	Moisture by gravimetric, %
04-001	Metals by ICP-OES, mg/kg
04-002	Mercury by CVAAS, mg/kg
04-021	TPH C6-9 & BTEX by P&T GCMS, mg/kg
04-020	TPH by GC-FID, mg/kg
04-022	Low level PAHs & Phenols by GCMS, µg/kg
04-023	Low level OC Pesticides by GCMS, µg/kg
04-024	OP Pesticides by GCMS, µg/kg
04-029	PCBS (as congeners) by GCMS, µg/kg
04-026	Organotins by GCMS, µgSn/kg
SUB	Subcontracted Analyses

#### Result Comments

[<] Less than

[INS] Insufficient sample for this test

[NA] Test not required

Solid sample results are reported on a dry weight basis.

Subcontracted analysis was performed by Sydney Analytical Laboratories (NATA Number 1884); reference SAL report number SAL22819.

# - Spike recovery for Fe could not be accurately determined due to a significant background analyte concentration.

# Monobutyltin spike recovery could not be determined due to matrix interferences.



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## QUALITY ASSURANCE REPORT

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Silver	mg/kg	<0.1	[NT]	[NT]	A10/1430/01	100%
Arsenic	mg/kg	<0.4	[NT]	[NT]	A10/1430/01	102%
Cadmium	mg/kg	<0.1	[NT]	[NT]	A10/1430/01	103%
Chromium	mg/kg	<0.1	[NT]	[NT]	A10/1430/01	101%
Copper	mg/kg	<0.1	[NT]	[NT]	A10/1430/01	98%
Iron	mg/kg	<5	[NT]	[NT]	A10/1430/01	#
Mercury	mg/kg	<0.01	[NT]	[NT]	A10/1430/01	99%
Manganese	mg/kg	<0.5	[NT]	[NT]	A10/1430/01	106%
Nickel	mg/kg	<0.1	[NT]	[NT]	A10/1430/01	96%
Phosphorus	mg/kg	<1	[NT]	[NT]	A10/1430/01	105%
Lead	mg/kg	<0.5	[NT]	[NT]	A10/1430/01	94%
Antimony	mg/kg	<0.5	[NT]	[NT]	A10/1430/01	93%
Vanadium	mg/kg	<0.1	[NT]	[NT]	A10/1430/01	103%
Zinc	mg/kg	<0.5	[NT]	[NT]	A10/1430/01	99%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	mg/kg	<0.20	[NT]	[NT]	External	83%
Toluene	mg/kg	<0.20	[NT]	[NT]	External	84%
Ethyl Benzene	mg/kg	<0.20	[NT]	[NT]	External	82%
m+p xylenes	mg/kg	<0.40	[NT]	[NT]	External	81%
o-xylene	mg/kg	<0.20	[NT]	[NT]	External	85%
Total BTEX	mg/kg	<1.2	[NT]	[NT]	External	N/A
Surrogate 1 Recovery	%	99	[NT]	[NT]	External	83%
Surrogate 2 Recovery	%	98	[NT]	[NT]	External	80%
Surrogate 3 Recovery	%	100	[NT]	[NT]	External	85%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
TPH C6-C9	mg/kg	<10	[NT]	[NT]	External	83%
TPH C10-14	mg/kg	<10	[NT]	[NT]	External	81%
TPH C15-28	mg/kg	<50	[NT]	[NT]	External	87%
TPH C29-36	mg/kg	<50	[NT]	[NT]	External	87%
Surrogate Recovery	%	101	[NT]	[NT]	External	91%



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TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Naphthalene	µg/kg	<5	[NT]	[NT]	External	90%
1-Methylnaphthalene	µg/kg	<5	[NT]	[NT]	External	92%
2-Methylnaphthalene	µg/kg	<5	[NT]	[NT]	External	90%
Acenaphthylene	µg/kg	<5	[NT]	[NT]	External	102%
Acenaphthene	µg/kg	<5	[NT]	[NT]	External	103%
Fluorene	µg/kg	<5	[NT]	[NT]	External	103%
Phenanthrene	µg/kg	<5	[NT]	[NT]	External	103%
Anthracene	µg/kg	<5	[NT]	[NT]	External	96%
Fluoranthene	µg/kg	<5	[NT]	[NT]	External	103%
Pyrene	µg/kg	<5	[NT]	[NT]	External	103%
Benz(a)anthracene	µg/kg	<5	[NT]	[NT]	External	111%
Chrysene	µg/kg	<5	[NT]	[NT]	External	100%
Benzo(b)&(k)fluoranthene	µg/kg	<10	[NT]	[NT]	External	108%
Benzo(a)pyrene	µg/kg	<5	[NT]	[NT]	External	103%
Indeno(1,2,3-cd)pyrene	µg/kg	<5	[NT]	[NT]	External	130%
Dibenz(a,h)anthracene	µg/kg	<5	[NT]	[NT]	External	125%
Benzo(g,h,i)perylene	µg/kg	<5	[NT]	[NT]	External	106%
Coronene	µg/kg	<10	[NT]	[NT]	External	121%
Benzo(e)pyrene	µg/kg	<5	[NT]	[NT]	External	110%
Perylene	µg/kg	<5	[NT]	[NT]	External	97%
Total PAHs (as above)	µg/kg	<100	[NT]	[NT]	External	N/A
Surrogate 1 Recovery	%	82	[NT]	[NT]	External	97%
Surrogate 2 Recovery	%	96	[NT]	[NT]	External	95%
Surrogate 3 Recovery	%	113	[NT]	[NT]	External	96%



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TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Aldrin	µg/kg	<1.0	[NT]	[NT]	External	86%
<i>alpha</i> -BHC	µg/kg	<1.0	[NT]	[NT]	External	88%
<i>beta</i> -BHC	µg/kg	<1.0	[NT]	[NT]	External	87%
<i>gamma</i> -BHC (Lindane)	µg/kg	<1.0	[NT]	[NT]	External	88%
<i>delta</i> -BHC	µg/kg	<1.0	[NT]	[NT]	External	83%
<i>cis</i> -Chlordane	µg/kg	<1.0	[NT]	[NT]	External	87%
<i>trans</i> -Chlordane	µg/kg	<1.0	[NT]	[NT]	External	87%
<i>p,p'</i> -DDD	µg/kg	<1.0	[NT]	[NT]	External	91%
<i>p,p'</i> -DDE	µg/kg	<1.0	[NT]	[NT]	External	88%
<i>p,p'</i> -DDT	µg/kg	<1.0	[NT]	[NT]	External	92%
Dieldrin	µg/kg	<1.0	[NT]	[NT]	External	89%
<i>alpha</i> -Endosulfan	µg/kg	<1.0	[NT]	[NT]	External	90%
<i>beta</i> -Endosulfan	µg/kg	<1.0	[NT]	[NT]	External	88%
Endosulfan Sulphate	µg/kg	<1.0	[NT]	[NT]	External	87%
Endrin	µg/kg	<1.0	[NT]	[NT]	External	97%
Endrin ketone	µg/kg	<1.0	[NT]	[NT]	External	89%
Endrin aldehyde	µg/kg	<1.0	[NT]	[NT]	External	25%
Heptachlor	µg/kg	<1.0	[NT]	[NT]	External	90%
Heptachlor epoxide	µg/kg	<1.0	[NT]	[NT]	External	76%
Hexachlorobenzene	µg/kg	<1.0	[NT]	[NT]	External	82%
Methoxychlor	µg/kg	<1.0	[NT]	[NT]	External	94%
Oxychlordane	µg/kg	<1.0	[NT]	[NT]	External	90%
Surrogate Recovery	%	99	[NT]	[NT]	External	83%



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TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Dichlorvos	µg/kg	<20	[NT]	[NT]	External	85%
Demeton-S-methyl	µg/kg	<20	[NT]	[NT]	External	96%
Dimethoate	µg/kg	<20	[NT]	[NT]	External	97%
Diazinon	µg/kg	<20	[NT]	[NT]	External	90%
Chlorpyrifos-methyl	µg/kg	<20	[NT]	[NT]	External	90%
Parathion-methyl	µg/kg	<20	[NT]	[NT]	External	96%
Pirimiphos-methyl	µg/kg	<20	[NT]	[NT]	External	91%
Fenitrothion	µg/kg	<20	[NT]	[NT]	External	92%
Malathion	µg/kg	<20	[NT]	[NT]	External	96%
Chlorpyrifos	µg/kg	<20	[NT]	[NT]	External	89%
Fenthion	µg/kg	<20	[NT]	[NT]	External	88%
Parathion	µg/kg	<20	[NT]	[NT]	External	94%
Chlorfenvinphos	µg/kg	<20	[NT]	[NT]	External	103%
Bromophos-ethyl	µg/kg	<20	[NT]	[NT]	External	91%
Methidathion	µg/kg	<20	[NT]	[NT]	External	95%
Fenamiphos	µg/kg	<20	[NT]	[NT]	External	119%
Prothiofos	µg/kg	<20	[NT]	[NT]	External	96%
Ethion	µg/kg	<20	[NT]	[NT]	External	115%
Carbophenothion	µg/kg	<20	[NT]	[NT]	External	100%
Phosalone	µg/kg	<20	[NT]	[NT]	External	102%
Azinphos-methyl	µg/kg	<20	[NT]	[NT]	External	103%
Surrogate Recovery	%	108	[NT]	[NT]	External	91%



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TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Mono-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	111%
Di-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	114%
Tri-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	104%
Tetra-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	102%
Penta-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	99%
Hexa-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	91%
Hepta-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	92%
Octa-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	93%
Nona-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	91%
Deca-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	89%
Total PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	N/A
Surrogate 1 Recovery	%	101	[NT]	[NT]	External	104%
Surrogate 2 Recovery	%	97	[NT]	[NT]	External	98%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Monobutyl tin	µgSn/kg	<0.50	A10/1567-1	<0.50    <0.50	A10/1567-1	#
Dibutyl tin	µgSn/kg	<0.50	A10/1567-1	<0.50    <0.50	A10/1567-1	65%
Tributyl tin	µgSn/kg	<0.50	A10/1567-1	<0.50    <0.50	A10/1567-1	66%
Surrogate 1 Recovery	%	97	A10/1567-1	81    92    RPD: 13	A10/1567-1	82%

TEST	UNITS	Blank
Total Organic Carbon	%	<0.02
Nitrate as N	mg/kg	<0.1
Nitrite as N	mg/kg	<0.1
Total Kjeldahl Nitrogen	mg/kg	<20
Total Nitrogen	mg/kg	<20
Phosphate as P	mg/kg	<0.1
Total Ammonia as N	mg/kg	<0.1

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	mg/kg	[NT]	[NT]	[NT]	A10/1567-1	98%
Toluene	mg/kg	[NT]	[NT]	[NT]	A10/1567-1	104%
Ethyl Benzene	mg/kg	[NT]	[NT]	[NT]	A10/1567-1	100%
m+p xylenes	mg/kg	[NT]	[NT]	[NT]	A10/1567-1	103%
o-xylene	mg/kg	[NT]	[NT]	[NT]	A10/1567-1	104%
Total BTEX	mg/kg	[NT]	[NT]	[NT]	A10/1567-1	N/A
Surrogate 1 Recovery	%	[NT]	[NT]	[NT]	A10/1567-1	101%
Surrogate 2 Recovery	%	[NT]	[NT]	[NT]	A10/1567-1	102%
Surrogate 3 Recovery	%	[NT]	[NT]	[NT]	A10/1567-1	108%



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TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Naphthalene	µg/kg	[NT]	[NT]	[NT]	External	90%
1-Methylnaphthalene	µg/kg	[NT]	[NT]	[NT]	External	99%
2-Methylnaphthalene	µg/kg	[NT]	[NT]	[NT]	External	98%
Acenaphthylene	µg/kg	[NT]	[NT]	[NT]	External	88%
Acenaphthene	µg/kg	[NT]	[NT]	[NT]	External	90%
Fluorene	µg/kg	[NT]	[NT]	[NT]	External	91%
Phenanthrene	µg/kg	[NT]	[NT]	[NT]	External	91%
Anthracene	µg/kg	[NT]	[NT]	[NT]	External	85%
Fluoranthene	µg/kg	[NT]	[NT]	[NT]	External	91%
Pyrene	µg/kg	[NT]	[NT]	[NT]	External	91%
Benz(a)anthracene	µg/kg	[NT]	[NT]	[NT]	External	96%
Chrysene	µg/kg	[NT]	[NT]	[NT]	External	86%
Benzo(b)&(k)fluoranthene	µg/kg	[NT]	[NT]	[NT]	External	97%
Benzo(a)pyrene	µg/kg	[NT]	[NT]	[NT]	External	91%
Indeno(1,2,3-cd)pyrene	µg/kg	[NT]	[NT]	[NT]	External	108%
Dibenz(a,h)anthracene	µg/kg	[NT]	[NT]	[NT]	External	102%
Benzo(g,h,i)perylene	µg/kg	[NT]	[NT]	[NT]	External	94%
Coronene	µg/kg	[NT]	[NT]	[NT]	External	100%
Benzo(e)pyrene	µg/kg	[NT]	[NT]	[NT]	External	100%
Perylene	µg/kg	[NT]	[NT]	[NT]	External	85%
Total PAHs (as above)	µg/kg	[NT]	[NT]	[NT]	External	N/A
Surrogate 1 Recovery	%	[NT]	[NT]	[NT]	External	84%
Surrogate 2 Recovery	%	[NT]	[NT]	[NT]	External	83%
Surrogate 3 Recovery	%	[NT]	[NT]	[NT]	External	85%



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TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Aldrin	µg/kg	[NT]	[NT]	[NT]	External	79%
<i>alpha</i> -BHC	µg/kg	[NT]	[NT]	[NT]	External	79%
<i>beta</i> -BHC	µg/kg	[NT]	[NT]	[NT]	External	80%
<i>gamma</i> -BHC (Lindane)	µg/kg	[NT]	[NT]	[NT]	External	80%
<i>delta</i> -BHC	µg/kg	[NT]	[NT]	[NT]	External	76%
<i>cis</i> -Chlordane	µg/kg	[NT]	[NT]	[NT]	External	79%
<i>trans</i> -Chlordane	µg/kg	[NT]	[NT]	[NT]	External	79%
<i>p,p'</i> -DDD	µg/kg	[NT]	[NT]	[NT]	External	83%
<i>p,p'</i> -DDE	µg/kg	[NT]	[NT]	[NT]	External	80%
<i>p,p'</i> -DDT	µg/kg	[NT]	[NT]	[NT]	External	84%
Dieldrin	µg/kg	[NT]	[NT]	[NT]	External	80%
<i>alpha</i> -Endosulfan	µg/kg	[NT]	[NT]	[NT]	External	81%
<i>beta</i> -Endosulfan	µg/kg	[NT]	[NT]	[NT]	External	79%
Endosulfan Sulphate	µg/kg	[NT]	[NT]	[NT]	External	79%
Endrin	µg/kg	[NT]	[NT]	[NT]	External	87%
Endrin ketone	µg/kg	[NT]	[NT]	[NT]	External	81%
Endrin aldehyde	µg/kg	[NT]	[NT]	[NT]	External	88%
Heptachlor	µg/kg	[NT]	[NT]	[NT]	External	82%
Heptachlor epoxide	µg/kg	[NT]	[NT]	[NT]	External	69%
Hexachlorobenzene	µg/kg	[NT]	[NT]	[NT]	External	74%
Methoxychlor	µg/kg	[NT]	[NT]	[NT]	External	85%
Oxychlordane	µg/kg	[NT]	[NT]	[NT]	External	82%
Surrogate Recovery	%	[NT]	[NT]	[NT]	External	75%



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TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Dichlorvos	µg/kg	[NT]	[NT]	[NT]	External	89%
Demeton-S-methyl	µg/kg	[NT]	[NT]	[NT]	External	86%
Dimethoate	µg/kg	[NT]	[NT]	[NT]	External	89%
Diazinon	µg/kg	[NT]	[NT]	[NT]	External	84%
Chlorpyrifos-methyl	µg/kg	[NT]	[NT]	[NT]	External	82%
Parathion-methyl	µg/kg	[NT]	[NT]	[NT]	External	87%
Pirimiphos-methyl	µg/kg	[NT]	[NT]	[NT]	External	85%
Fenitrothion	µg/kg	[NT]	[NT]	[NT]	External	84%
Malathion	µg/kg	[NT]	[NT]	[NT]	External	87%
Chlorpyrifos	µg/kg	[NT]	[NT]	[NT]	External	82%
Fenthion	µg/kg	[NT]	[NT]	[NT]	External	82%
Parathion	µg/kg	[NT]	[NT]	[NT]	External	86%
Chlorfenvinphos	µg/kg	[NT]	[NT]	[NT]	External	88%
Bromophos-ethyl	µg/kg	[NT]	[NT]	[NT]	External	82%
Methidathion	µg/kg	[NT]	[NT]	[NT]	External	83%
Fenamiphos	µg/kg	[NT]	[NT]	[NT]	External	107%
Prothiofos	µg/kg	[NT]	[NT]	[NT]	External	86%
Ethion	µg/kg	[NT]	[NT]	[NT]	External	105%
Carbophenothion	µg/kg	[NT]	[NT]	[NT]	External	90%
Phosalone	µg/kg	[NT]	[NT]	[NT]	External	93%
Azinphos-methyl	µg/kg	[NT]	[NT]	[NT]	External	92%
Surrogate Recovery	%	[NT]	[NT]	[NT]	External	81%



**Batch Number:** A10/1567  
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TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Mono-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	96%
Di-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	100%
Tri-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	92%
Tetra-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	92%
Penta-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	92%
Hexa-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	91%
Hepta-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	92%
Octa-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	93%
Nona-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	91%
Deca-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	89%
Total PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	N/A
Surrogate 1 Recovery	%	[NT]	[NT]	[NT]	External	90%
Surrogate 2 Recovery	%	[NT]	[NT]	[NT]	External	88%



**Batch Number:** A10/1567  
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**Comments:**

RPD = Relative Percent Deviation

[NT] = Not Tested

[N/A] = Not Applicable

'#' = Spike recovery data could not be calculated due to high levels of contaminants

Acceptable replicate reproducibility limit or RPD: Results < 10 times LOR: no limits

Results >10 times LOR: 0% - 50%

Acceptable matrix spike & LCS recovery limits: Trace elements 70-130%

Organic analyses 50-150%

SVOC & speciated phenols 10-140%

Surrogates 10-140%

When levels outside these limits are obtained, an investigation into the cause of the deviation is performed before the batch is accepted or rejected, and results are released.