

# Baseline petroleum hydrocarbon content of marine water, shoreline sediment and intertidal biota at selected sites in the Kimberley bioregion, Western Australia

Marine Technical Report Series



# **Baseline petroleum hydrocarbon content of marine water, shoreline sediment and intertidal biota at selected sites in the Kimberley bioregion, Western Australia**

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Office of the Environmental Protection Authority  
Marine Technical Report Series  
Report MTR 3  
July 2010

## Recommended reference

McAlpine K.W., Sim C.B., Masini R.J. and Daly T. (2010). Baseline petroleum hydrocarbon content of marine water, shoreline sediment and intertidal biota at selected sites in the Kimberley bioregion, Western Australia. Marine Technical Report Series No. MTR3. Office of the Environmental Protection Authority, Perth, Western Australia.

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ISSN 1833-5497 (print) 1833-5500 (pdf)

July 2010

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## Acknowledgments

The authors acknowledge the generous assistance of Mr Tony Thiel the CEO of Paspaley Pearlery Company (PPCo) who provided the *M.V. Odin II*, its master and crew, tender vessels and all fuel and provisions for the survey. The authors specifically acknowledge Dr David Mills (Manager, Research and Development, PPCo) for initiating this collaboration, and Mr David Parker (Manager, Fleet Operations, PPCo), Mr Brett Smith (Master) and the crew of the *M.V. Odin II* for their assistance and contribution to the field program. This survey would not have been possible without the support of PPCo.

Specialist hydrocarbon chemistry advice and feedback provided to the authors by Dr Steve Fisher (WA Department of Water) and Dr Trevor Bastow (CSIRO Land and Water, Floreat, WA) is greatly appreciated. The authors also extend their special thanks to Dr Bastow for his chemical analysis of biota samples.

INPEX Browse Ltd and its joint venture participant Total EP Australia are thanked for releasing marine turtle survey information to the State for the purpose of informing oil spill preparedness for the Montara incident and the design of this survey.

The authors of this report were employees of the Department of Environment and Conservation (DEC) at the time of the field survey. The survey team is grateful for assistance of the DEC Broome District office and particularly for the support provided by District Manager Mr Alan Byrne.

## Abstract

In response to the risk posed by the Montara wellhead oil spill to Western Australian State coastal waters in the Kimberley bioregion, a survey was carried out to establish a quantitative baseline for petroleum hydrocarbons in seawater, shoreline sediments, intertidal filter feeders and cultured pearl oysters across the bioregion.

Sixteen shorelines on twelve mid- and inner-shelf Kimberley islands and two mainland promontories were surveyed between Camden Sound in the south and the Stewart Islands near Cape Londonderry in the northeast. Cultured pearl oysters were collected from four pearl farms between Kuri Bay and Cape Bougainville and floating surface 'scums' were also sampled opportunistically during the survey. The field component of the survey was conducted between 26 October 2009 and 1 November 2009.

Petroleum hydrocarbons were not detected in any of the water and shoreline sediment samples. Analyses of rock oyster and cultured pearl oyster tissue samples also showed no evidence of contamination by petrogenic hydrocarbons while oysters were *in situ*. Furthermore, chromatograms produced by analysis of oyster tissue samples could not be matched to a crude oil profile. In view of the spatial coverage of the survey and the consistency of results, it is probable that the findings of this survey are typical of natural background petroleum hydrocarbon conditions in the region.

This survey has established a baseline data set that will be of value to all stakeholders for assessing potential impacts of development and monitoring the environmental quality of the WA coastal waters section of the Kimberley bioregion in the future.

# 1. Introduction

Baseline environmental data are important for informing management decisions such as those associated with planning and activating responses to incidents that have potential to impact the environment. Marine oil spill response is an area of environmental management for which baseline environmental data are valuable, particularly where spills may threaten areas that support high value and/or poorly documented environmental assets.

## 1.1 The incident

The *West Atlas* mobile drilling unit and Montara wellhead platform were positioned over the Montara hydrocarbon field in an area of the Timor Sea under Northern Territory jurisdiction (12°40.33S 12°35E). On the morning of 21 August 2009 an uncontrolled release of hydrocarbons commenced at the Montara well head. The discharge was then more or less continuous for a period of just over 10 weeks until 'well kill' was declared on 3 November 2009. Initial estimates provided to the Australian Maritime Safety Authority (AMSA) by the well operator (PTTEP Australasia) were that 64 tons per day (400 barrels) of crude oil were being lost to the Timor Sea (AMSA 2010), though other information is available suggesting that hydrocarbons may have leaked from the wellhead platform at rates between 400 and 2,000 barrels per day (Howe 2010). Noting that the discharge rate estimates could not be confirmed at any time during the incident and remains unclear, it is thought that the actual discharge rate is unlikely to have been at the upper limit of the range mentioned above (from Howe 2010).

The escaping material was described as a light crude oil, with a pour point of ~27°C and high wax content. Along with the oil, natural gas was also leaking from the wellhead into the atmosphere. Over the course of the incident, a variety of different dispersants were applied to floating oil from aircraft or vessels. Approximately 844,000 litres (L) of oil-water product mixture were recovered and estimates are that some 493,000 L of this mixture was oil (AMSA 2010).

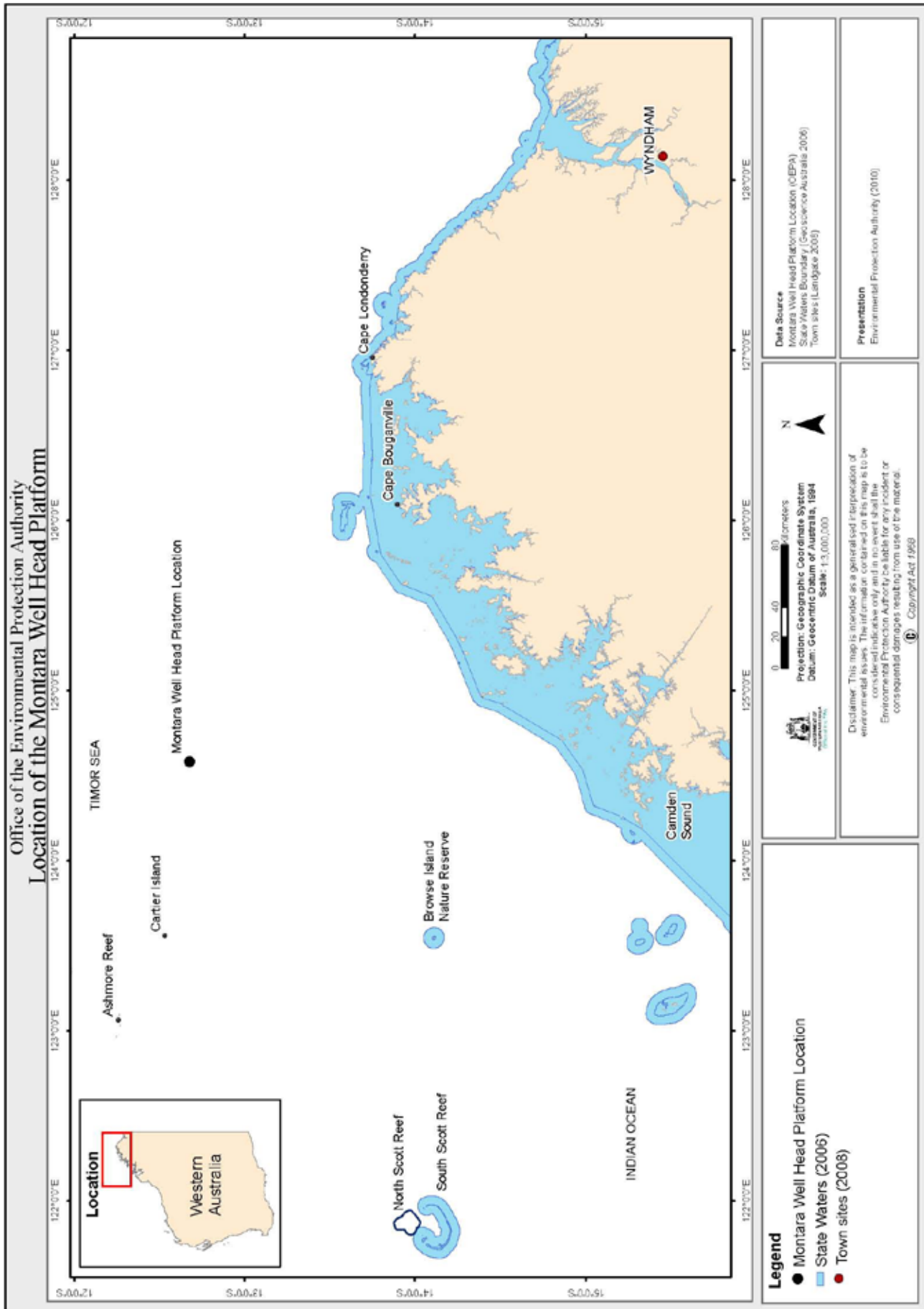
The *West Atlas* rig is approximately 175 kilometres (km) from the nearest Western Australian coastal waters boundary in the north Kimberley (Figure 1). Reports received during the incident indicated that floating oil and surface sheen were widely dispersed from the rig location.

## 1.2 The Kimberley marine environment

The Kimberley region is known for its high degree of ecological intactness (Halpern *et al.* 2008) and considerable biodiversity values. Some of the known marine values include diverse coral reefs, extensive mangrove communities and habitats critical to the life histories of listed wildlife such as sea turtles and humpback whales (Masini *et al.* 2009). These values are among the drivers of the State Government's commitment to develop a *Kimberley Science and Conservation Strategy*. While there is a growing knowledge base about some of these values, more detailed scientific understanding of the Kimberley's biodiversity and ecological processes is required for sound management of some issues.

The Kimberley presents some significant physical challenges for oil spill response. The region experiences a semidiurnal tidal regime, with daily tidal amplitude up to ~11 m during spring tides and ~3 m during some neap tides. Between Yampi Sound and the King Edward River estuary there are some 2581 mapped islands and a coastline length of approximately 12,850 km. The region is also very remote with little coastal infrastructure and few coastal access points.





**Figure 1: Map showing the location of the Montara wellhead, and the Kimberley mainland, offshore islands and associated Western Australian State coastal waters.**

### 1.3 Rationale and aims

Baseline hydrocarbon data for water, sediment and biota are particularly important for managing petroleum industry development and potential future incidents in an ecologically important region where there is significant prospectivity for oil and gas and natural hydrocarbon seeps are known to occur (Burns *et al.* 2010).

In view of the duration of the Montara spill incident, the estimated volume of hydrocarbons released to the sea and its observed and predicted dispersion trajectory, it was considered important to establish a quantitative baseline for petroleum hydrocarbons from which to determine the extent and severity of any impact that may occur in State coastal waters. In addition, while samples were collected for chemical analysis, shoreline assessment information was collected at each site to provide a basis for planning and executing an oil spill response strategy, if needed. The findings of shoreline assessments will be provided in a separate Office of the Environmental Protection Authority Technical Report.

A vessel-based survey was designed to address a number of critical issues that may arise during any incident response and clean-up that may be required. This baseline survey aims to provide baseline hydrocarbon data (i.e. concentration and chemical composition) for State coastal waters in the Kimberley bioregion that could be used as:

- the 'before' element of a before/after assessment of oil effects; and
- a basis for evaluating success of any clean-up.

## 2. Methods

### 2.1 Site selection

The Western Australian coastal waters section of the Kimberley bioregion (Commonwealth of Australia 2006, IMCRA V4.0) was the primary geographic focus of this survey. Site selection and coverage was informed by aerial observations of oil, interpretation of remote sensing data (e.g. Radarsat, Modis images from <http://rapidfire.sci.gsfc.nasa.gov/subsets/?subset=Australia1>), dedicated oil spill trajectory modelling and professional judgements about potential exposure of shorelines based on knowledge of water currents and prevailing/dominant wind patterns. Available information regarding the utilization of shorelines and nearshore habitats by marine wildlife such as turtles and birds was also considered.

Results from stochastic oil spill trajectory modelling using historic wind and ocean current forcings for the period of August to December indicated that oil could affect Kimberley islands and parts of the mainland coastline anywhere between Camden Sound in the south to Cape Londonderry in the north, and around to Cape Bernier in the north east (Asia Pacific ASA 2009). As it was not possible to determine where oil may contact the shore, if at all, the site selection aimed to provide broad coverage of sites across the Kimberley bioregion. As the survey area is very remote, factors including the time available to conduct the survey and other logistical issues (e.g. ability to access shorelines under various tidal regimes) were also important considerations for site selection.

Sixteen shorelines on twelve mid- and inner-shelf Kimberley islands and two coasts on mainland promontories were surveyed between Camden Sound in the south and the Stewart Islands near Cape Londonderry in the northeast. Site locations are shown in Figure 2 and Table 1 details the geographic coordinates for each survey site. In addition, pearl oyster (*Pinctada maxima*) tissue was sampled from Paspaley Pearling Company (PPCo) pearl farms in the vicinity of Kuri Bay, Cape Voltaire, Osborne Islands and Cape Bougainville (Figure 3).

## 2.2 Field sampling

The PPCo vessel *MV Odin II* (Figure 4) was used as a 'mothership' and platform from which small tender vessels were deployed to 'land' the survey team on selected shorelines. All vessel operations were conducted by PPCo staff.

*MV Odin II* departed Broome at 13:00 hours on 26 October 2009 and steamed direct to the southern-most site at Camden Sound. The vessel then made its way northeast over the following 4 days visiting the other survey sites. The schedule of dates and times that each site was visited is shown in Table 1. The field component of the survey concluded in Darwin on 1 November 2009.

The survey team comprised four members. Each member of the team was responsible carrying out specific tasks at each site that included:

- shoreline assessment and documentation, including compiling photographic records of shorelines;
- digging 0.5 m deep pits along beach strand lines for collection of sediment samples;
- collection and logging of sediment samples;
- collection, measurement and shucking of rock oysters; and
- collection of sea water samples.

Due to the number of sites visited and the distances between successive sites, the length of time available for surveying each site generally did not exceed one hour.

### 2.2.1 Shoreline assessment

At each site, a shoreline assessment form was completed and geo-tagged digital photographs were taken to record key features of the site. The shoreline assessment form was used to record key biophysical features of the site such as beach sediment type/texture, general geomorphic features, presence/absence and abundance of wildlife or evidence of their utilisation, size of rock oysters collected for chemical analysis and notes about site accessibility. Shoreline assessment will be the subject of a separate report and therefore will not be discussed further in this document.

**Table 1:** Survey sites, sample references, and dates and times of sampling.

Survey site	Sample reference	Date	Time	Latitude*	Longitude*
<b>Shoreline</b>					
Camden Sound	CS#	27-Oct-09	12:30	15° 22.115'	124° 18.184'
Keraudren Island	KI	28-Oct-09	06:20	13° 57.009'	124° 41.547'
South Maret - South	MIS	28-Oct-09	11:30	14° 27.030'	124° 58.960'
South Maret - Cormorant Beach	MINE	28-Oct-09	12:55	14° 26.120'	124° 59.521'
Prudhoe Island - north	PI	28-Oct-09	16:15	14° 24.888'	125° 15.672'
East Montalivet - southeast	MOI	29-Oct-09	06:30	14° 17.432'	125° 17.958'
Cape Voltaire	CV	29-Oct-09	09:45	14° 15.586'	125° 35.097'
Descartes Island (Institute Islands)	II	29-Oct-09	13:20	14° 09.378'	125° 39.573'
Cassini Island - east	CIE	29-Oct-09	16:20	13° 56.737'	125° 38.194'
Cassini Island - south	CIS	29-Oct-09	17:20	13° 57.337'	125° 38.049'
Low Rocks Nature Reserve	LR	30-Oct-09	10:00	13° 03.737'	125° 52.472'
Cape Bougainville (oysters)	CBE	30-Oct-09	13:20	13° 54.105'	126° 06.336'
Cape Bougainville (sediment)	CBE	30-Oct-09	14:00	13° 54.721'	126° 05.451'
Northern Eclipse Island	NEI	30-Oct-09	17:50	13° 52.531'	126° 18.900'
Troughton Island	TRI	31-Oct-09	07:30	13° 44.835'	126° 09.030'
Sir Graham Moore Island	SGMI	31-Oct-09	12:15	13° 52.087'	126° 30.909'
Stewart Islands	STI	31-Oct-09	17:45	13° 41.349'	126° 55.037'
<b>Cultured pearl oyster**</b>					
Kuri Bay	PG	27-Oct-09	17:30		
Cape Voltaire	CVL	29-Oct-09	12:00		
Osbourne Islands	OIPL	30-Oct-09	07:00		
Cape Bougainville	VBPL	30-Oct-09	15:00		

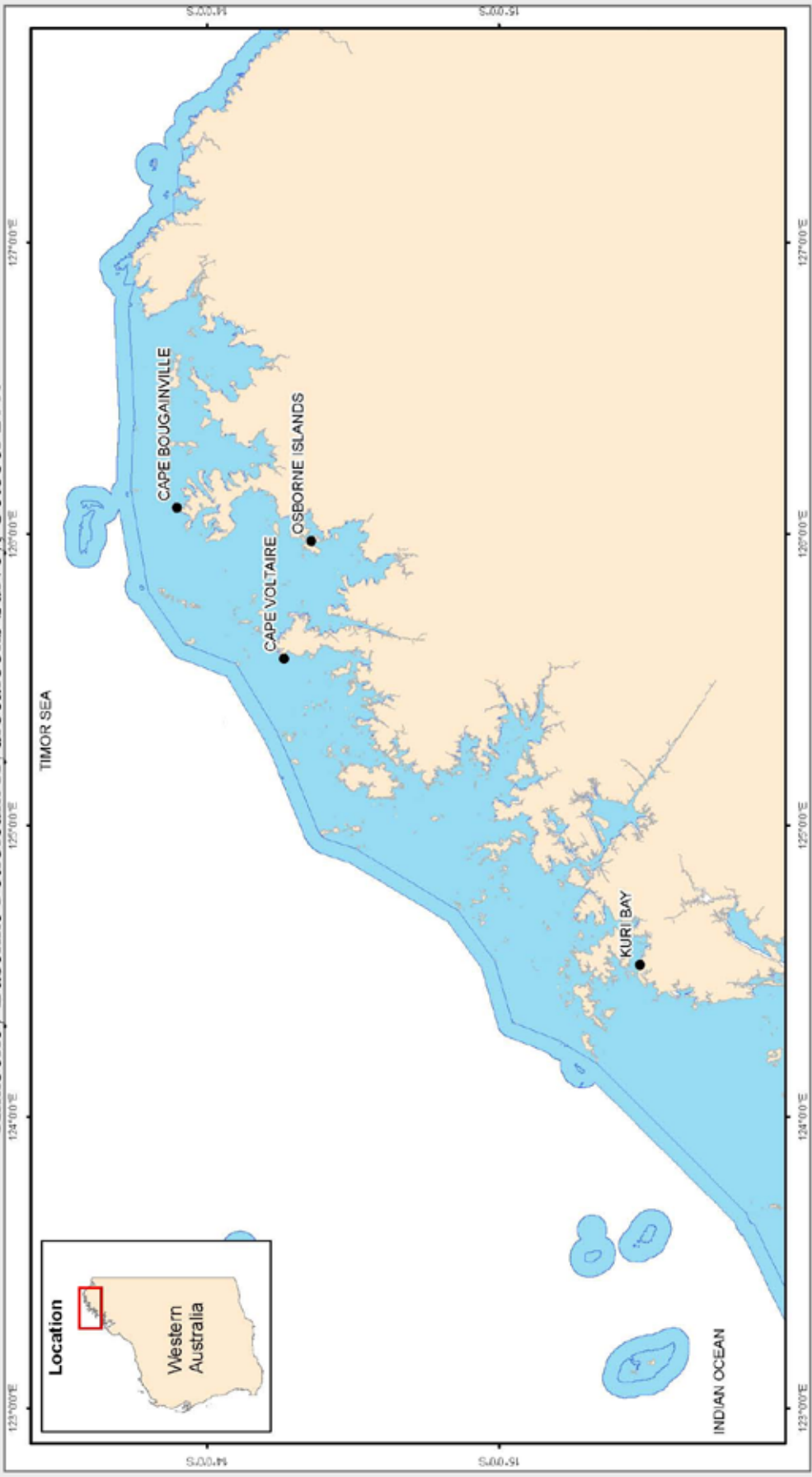
# The site reference "DI" is used in laboratory reports provided in the Appendices to this report to refer to the Camden Sound survey site

\* Coordinates in degrees and decimal minutes (datum = WGS84)

\*\* General localities only (see Figure 3)



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 Kimberley Baseline Petroleum Hydrocarbons Survey, October 2009



<p><b>Legend</b></p> <ul style="list-style-type: none"> <li>● General location of cultured pearl oyster samples</li> <li>■ State Waters (2006)</li> </ul>	<p><b>Data Source</b>                  Location of cultured pearl samples (OEPA, 2010)                  State Waters Boundary (Geoscience Australia 2006)</p> <p><b>Projection:</b> Geographic Coordinate System  <b>Datum:</b> Geocentric Datum of Australia, 1994  <b>Scale:</b> 1:2,000,000</p> <p>0 20 40 80 Kilometers N</p> <p><b>Disclaimer:</b> This map is intended as a generalised interpretation of environmental issues. The information contained on this map is to be considered indicative only and in no event shall the Environmental Protection Authority be liable for any incident or consequential damages resulting from use of the material.                  © Copyright Act 1968</p>	<p><b>Presentation</b>                  Environmental Protection Authority (2010)</p>
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Figure 3: General localities where cultured pearl oysters (*Pinctada maxima*) were sampled.

McAlpine *et al.* (2010). Baseline petroleum hydrocarbon content of marine water, shoreline sediment and intertidal biota at selected sites in the Kimberley bioregion, Western Australia

## 2.2.2 Seawater sampling

Clean sample containers for marine waters were supplied by the analytical laboratory. A 1 L amber glass bottle (for determination of total petroleum hydrocarbons) and two 44 mL zero-headspace clear glass vials (for determination of volatile hydrocarbons) were used at each water sample site.

Seawater was collected from approximately 200 mm below the surface and approximately 50 – 200 m offshore at each of the sites sampled. The sample was taken by reaching beyond the bow of a small vessel moving slowly up-current and into the wind and plunging the amber glass bottle below the surface and then removing the cap. Once full, the cap was replaced underwater and the bottle lifted back onto the vessel. Water from the amber bottle was then used to fill the two clear glass vials, the cap replaced, and then the sampling procedure repeated to top up the amber glass bottle. It was essential that the two clear glass vials contained no air bubbles to minimize volatilization of hydrocarbons, so care was taken to ensure the vials were filled to a positive meniscus with no bubbles and then the cap screwed on, squeezing out any excess water in the process. Nitrile rubber gloves were worn at all times when sampling. Samples were labelled and placed on ice in the dark immediately after collection and then transferred and stored in a 4°C refrigerator on the *MV Odin II* until the end of the survey trip. Samples were delivered to the analytical laboratory within 7 days of collection.



**Figure 4: MV Odin II was used as the platform for the baseline hydrocarbons survey.**

Surface 'scums' were sampled opportunistically at three locations to determine whether the observed floating material contained petroleum hydrocarbons. The locations where surface 'scum' samples were collected are shown in Figure 5 and geographic coordinates are provided in Table 2. Samples were collected and stored in a 250 mL clear glass jars and 1 L amber bottles. The sample was collected by forcing the container into the water upright and skimming as much surface scum as possible. This was concentrated further by inverting the sample container so the scum floated up and then loosening the lid to allow most of the underlying water to dribble out and then repeating the skimming procedure. Sample containers were labelled and stored in a 4°C refrigerator on the *MV Odin II* until the end of the survey trip and then delivered to the analytical laboratory within 4 days of collection.

**Table 2:** Locations, dates and times for surface 'scum' samples.

SITE	Notes	Date	Time	Latitude*	Longitude*
Surface scum 1	0.9nm off NE shore of Sir Graham Moore Island	31-Oct-09	14:15	13° 51.320'	126° 30.665'
Surface scum 2	Surface scum and sheen observed	31-Oct-09	15:38	13° 45.765'	126° 39.994'
Surface scum 3	Surface scum and sheen observed	31-Oct-09	16:24	13° 43.336'	126° 44.531'

### 2.2.3 Shoreline sediment sampling

Sampling shoreline sediments involved first identifying the high tide strand line. Holes were dug just below (seaward from) the strand line that were at least 500 mm deep, or to the depth of underlying beach rock (which ever was shallower), using a clean stainless steel spade. This position on the beach profile was selected to maximise the chances of encountering hydrocarbons (which are expected to accumulate near the strand line) while ensuring that sediments were sufficiently moist to maintain a near-vertical surface down the side of each hole without collapsing. Five of these holes were dug at even intervals along the length of each shoreline sampled. Before samples were taken, a 500 mm vertical face was scaped clean in each hole using the spade in a horizontal motion. This was done to minimize cross profile contamination caused by dragging any materials adhering to the spade down through the deeper profiles when digging.

For the purpose of sampling, the vertical face of each hole was divided into a 'surface' 100 mm horizon and a 'deeper' 100 – 500 mm horizon. In each hole, separate sub-samples were taken from each of the horizons. Sediment was collected directly into clean labelled 250 mL clear glass sample containers by scraping the lip of the container up the sediment horizon while wearing clean nitrile rubber gloves. Where coral rubble was a significant component of the sediment profile attempts were made to avoid or minimise the inclusion of large pieces of rubble in the sample. The 250 mL clear glass sample containers were supplied by the analytical laboratory.

The sample from each horizon comprised sub-samples taken from the equivalent horizon in each of the five holes. Sample containers were placed on ice in the dark immediately after each sub-sample was collected and then stored in a 4°C refrigerator on the MV Odin II after each site was surveyed until the end of the survey trip.

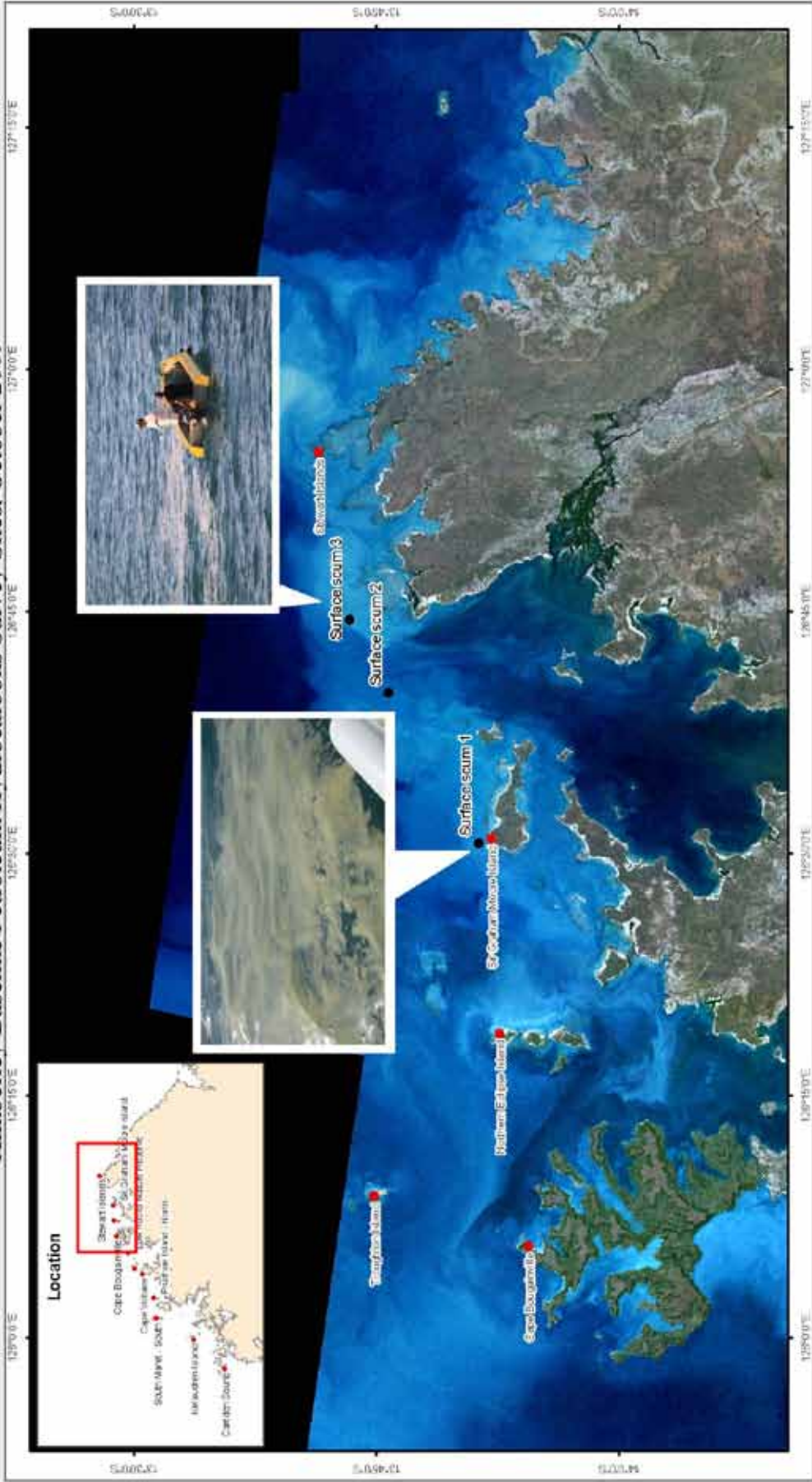
### 2.2.4 Rock and pearl oyster sampling

Sites were first surveyed to determine the presence of rock oysters on safely-accessible rocky intertidal substrates. Rock oysters (*Saccostrea cucullata*) were collected at all sites where natural populations were present and individuals were in sufficient number to comprise a tissue sample. Where present, rock oysters were either measured, opened, shucked on-site (using clean stainless steel instruments) and then all tissues placed directly into a clean 250 mL clear glass sample container or at some sites, individuals were removed whole from the substratum using a hammer and stainless steel blade and placed in a clean plastic bag on ice in the dark immediately after collection for processing (i.e. measurement, shucking and storage) on the survey vessel. In the latter case, sample processing commenced within 1.5 hours of oysters being collected. Each sample comprised approximately 50 g (wet weight) of oyster tissue, which generally consisted of tissue from at least 12 rock oysters. The 250 mL clear glass sample containers were supplied by the analytical laboratory.

Rock oysters were collected in the same general vicinity as shoreline sediments at all sites except Cape Bougainville (CBE). At this location, rock oysters were collected from a site approximately 1.2 km northeast of the beach where shoreline sediments were collected.



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**Kimberley Baseline Petroleum Hydrocarbons Survey Sites, October 2009**



<p><b>Legend</b></p> <ul style="list-style-type: none"> <li>● Locations of surface scum samples</li> <li>● Survey sites</li> </ul>	<p><b>Data Source</b>                  Locations of surface scum samples (O EPA, 2010)                  Survey Sites (O EPA, 2005)                  Inshore Landcat (2009)                  Photographic inserts by O EPA.</p>	<p><b>Presentation</b>                  Environmental Protection Authority (2010)</p>
<p><b>Disclaimer:</b> This map is intended as a generalised representation of environmental issues. The information contained on this map is to be considered and used only, and in no event shall the Environmental Protection Authority be liable for any incident or consequential damage resulting from use of the material.</p> <p>Copyright Act 1969</p>	<p><b>Projection:</b> Geographic Coordinate System                  Datum: Geocentric Datum of Australia, 1984                  Scale: 1:50,000</p> <p><b>North Arrow</b></p>	<p><b>Scale:</b> 1:50,000</p>

Figure 5: Locations of surface scum samples.

Pearl oyster (*P. maxima*) samples collected from PPCo pearl farms were supplied in eight-shell plastic coated mesh panels which had been suspended in the water column at a depth of approximately 3 m for approximately one year prior to sampling at each location, with the exception of Cape Voltaire where oysters were on-site for approximately two weeks before being sampled (D. Mills, pers. comm.). Pearl oysters were processed (measured, shucked and prepared for storage) onboard the survey vessel. Each pearl oyster sample of at least 50 g (wet weight) comprised half of the tissue from each of at least three individual oysters. Duplicate samples were taken from three of the four pearl farms.

For sampling hygiene purposes, all processing of oysters on board the survey vessel was undertaken on an aluminium foil-covered platform. All equipment used to collect oyster tissue samples was stainless steel and nitrile rubber gloves were worn at all times when handling oyster samples. Samples of rock and pearl oyster tissues were stored frozen at -20°C on the survey vessel before being transported to the laboratory. A chain of custody process was implemented for this survey.

## 2.3 Sample analysis

Summaries of the methods and procedures for preparing sample containers and analysing each selected set of contaminants are described in Appendix A.

All samples were unpreserved and the seawater samples were unfiltered. Field blanks and field duplicate samples were taken for approximately 10% of water, sediment and oyster samples.

The suite of petroleum hydrocarbons analysed in all samples, including field blanks and field duplicates, were Total Petroleum Hydrocarbons (in the following molecular weight range: C6 – C9, C10 – C14, C15 – C28 and C29 – C36), BTEX (Benzene, Toluene, Ethylbenzene and Xylenes) and the 16 polycyclic aromatic hydrocarbons (PAHs) designated as priority pollutants by the United States Environmental Protection Agency (naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(ah)anthracene and benzo(ghi)perylene).

Samples of surface water 'scums' were subject to Gas Chromatography-Mass Spectrometry (GC-MS) analysis by CSIRO Land and Water (Floreat, WA) and Geotechnical Services Pty Ltd. All other analyses listed above were undertaken by the National Measurement Institute using National Association of Testing Authorities (NATA) accredited analytical procedures. All samples were delivered to the laboratory within seven days of collection of the first sample. Water and sediment samples were analysed within seven days of being received by the analytical laboratory, while initial screening analyses on oyster samples (stored frozen) were conducted 29 days after delivery.

A subset of oyster tissue extracts that had been prepared by the National Measurement Institute for the initial screening analysis were transmitted to CSIRO Land and Water (Floreat, WA) for more sophisticated GC-MS analysis as well as analysis to separate organic components into aliphatics, aromatics and polar compounds (non-hydrocarbons such as aldehydes and alcohols) to confirm presence/absence of petroleum hydrocarbons.

# 3. Results

## 3.1 General Conditions

Weather conditions during the period 26 October to 31 October 2009 were generally sunny with light and variable cloud cover from 5 – 10% in the morning increasing later in the afternoon (Table 3). Winds were light (0 – 5 knots) and variable in the morning and generally freshening to 10 – 15 knots from the northwest most afternoons. A west-north-westerly swell was most

apparent on 26 and 27 October while the vessel was in transit to the first sampling site, but had moderated to ~0.25 m at the first sampling site. The swell continued to moderate as the vessel travelled north after 27 October and quickly became negligible.

**Table 3:** Weather and ocean swell observations.

Dates	Swell	Kuri Bay				Troughton Island			
		Min. Temp	Max. Temp	9am wind	3pm wind	Min. Temp	Max. Temp	9am wind	3pm wind
(October 2010)									
26th	WNW 1.0 m	25	33.5	NE @ 9	SW @ 15	28.2	33.6	WSW @ 15	WSW @ 26
27th	WNW, 0.5 m	25.5	33.1	SW @ 4	NW @ 19	28	33.6	WWNW @ 19	WNW @ 22
28th	WNW, 0.25 m	26.7	33.8	NW @ 9	SW @ 19	28.2	33.8	W @ 26	WNW @ 19
29th	negligible	26	33.2	SW @ 19	SW @ 9	28.1	33	W @ 17	NW @ 19
30th	negligible	26	33.2	NE @ 9	WNW @ 15	27.6	33.2	WNW @ 9	NW @ 17
31st	negligible	25.9	33.7	NE @ 9	NW @ 19	27.2	32.3	WNW @ 9	N @ 13

*Meteorological observations for Kuri Bay and Troughton Island sourced from <http://www.bom.gov.au/climate/dwo/IDCJDW0600.shtml>. Wind speeds are in km/hr. Temperatures are in °Celsius*

Conditions were very good for identifying patches of oil residues or oily sheens on the surface of the water as the vessel travelled through the Kimberley region. ‘Scums’ and ‘slicks’ were observed on the water surface in places. Surface ‘scums’ could generally be identified as being of algal (often considered to be blooms of the blue-green alga *Trichodesmium* sp), and not petroleum, origin based on the professional judgement of the survey team. Where the material composition of surface ‘scums’ observed along the vessel route could not be confirmed in the field samples were collected for later laboratory analysis. Results of the analyses are outlined in Section 3.3.

### 3.2 Seawater

The results of the petroleum hydrocarbon analyses of seawater samples are presented in Table 4. The associated laboratory report and quality assurance data are attached in Appendix B and provide confidence that the analyses are valid.

Petroleum hydrocarbons were not detected in any of the seawater samples, the field blank or the field duplicate. For BTEX compounds, the analytical limits of detection (LoD) were 1 – 2 µg/L, which are the same as the laboratory’s limits of reporting (LoRs) for these components. For poly aromatic hydrocarbons (PAH), the LoDs were 0.005 – 0.01 µg/L for individual components and for the different chain-length total petroleum hydrocarbon (TPH) components the LoD was 5 µg/L. The LoRs are presented in Table 4.

Marine water quality guideline trigger values from Chapter 3 of ANZECC & ARMCANZ (2000) were only available for two of the hydrocarbons analysed (benzene and naphthalene) and the LoR for these compounds were several orders of magnitude below the relevant guideline trigger value for a high level of ecological protection (99% species protection).

Low reliability trigger values are presented in Chapter 8 of ANZECC & ARMCANZ (2000) for anthracene, phenanthrene, fluoranthene, benzo(a)pyrene, toluene, xylenes and ethylbenzene. As ANZECC & ARMCANZ (2000) emphasises that low reliability trigger values should only

be used as indicative interim levels, they are provided in Table 4 for reference purposes only. Limits of detection and LoR for all analyses were lower than the most conservative low reliability trigger values shown in Table 4, with the exception of anthracene for which the LoR is equal to the 99% species protection low reliability trigger value of 0.01 µgL<sup>-1</sup>.

**Table 4:** Results of petroleum hydrocarbon analyses for seawater samples collected in the Kimberley bioregion, October 2009, and guideline trigger values (including low reliability values) for organic chemicals in marine waters from ANZECC & ARMCANZ (2000).

Units = µg/L, NG = No guideline value LoR = Limit of Reporting \* = low reliability values † = low reliability values for ortho-, meta- and para- isomers of xylene respectively

Sample reference	CS	MINE	CV	CIE	CIE (dupl)	CIE (blank)	TRI	STI	LOR	Guideline value		
										99%	95%	90%
<b>Poly Aromatic Hydrocarbons (PAHs)</b>												
Acenaphthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	NG	NG	NG
Acenaphthylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	NG	NG	NG
Anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01*	0.4*	1.5*
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	NG	NG	NG
Benzo(b)&(k)fluoranthene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	NG	NG	NG
Benzo(ghi)perylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	NG	NG	NG
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.1*	0.2*	0.4*
Chrysene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	NG	NG	NG
Dibenz(ah)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	NG	NG	NG
Fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	1*	1.4*	1.7*
Fluorene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	NG	NG	NG
Indeno(1,2,3-cd)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	NG	NG	NG
Naphthalene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	50	70	90
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.6*	2*	4*
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	NG	NG	NG
Total PAHs	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	0.16	NG	NG	NG
<b>BTEX</b>												
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1	500	700	900
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1	110*	180*	230*
Ethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1	NG	5*	NG
Xylene	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2	NG	350/75/ 200*†	NG
Total BTEX	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5	NG	NG	NG
<b>Total Petroleum Hydrocarbons (TPHs)</b>												
TPH C6 - C9	<25	<25	<25	<25	<25	<25	<25	<25	25	NG	NG	NG
TPH C10 - C14	<25	<25	<25	<25	<25	<25	<25	<25	25	NG	NG	NG
TPH C15 - C28	<100	<100	<100	<100	<100	<100	<100	<100	100	NG	NG	NG
TPH C29 - C36	<100	<100	<100	<100	<100	<100	<100	<100	100	NG	NG	NG
Total TPH	<250	<250	<250	<250	<250	<250	<250	<250	250	NG	NG	NG

### 3.3 Surface scums

Chromatographic data from GCMS analysis of surface 'scums' are shown in Appendix B3 and indicate that component constituents were consistent with natural biological material. There was no evidence of petroleum hydrocarbons in the analyses of the surface scums. The main peaks corresponded to phytanol and other biogenic compounds with some lower concentrations of higher molecular weight range hydrocarbons (C23-36) consisting of biogenic n-alkanes (waxes). Chromatograms obtained from all the surface scums were similar, but with different distribution of n-alkanes. (T. Bastow, pers. comm.).

### 3.4 Shoreline sediments

The results for the analysis of petroleum hydrocarbons in shoreline sediments at sites located along the Kimberley coast are presented in Table 5. The associated laboratory report and quality assurance data are attached in Appendix C and indicate that the analyses are valid.

There were no detectable concentrations of petroleum hydrocarbons in any shoreline sediment samples, field blanks or field duplicates. The analytical LoDs were less than the LoRs for each compound. For BTEX compounds in sediments, the analytical LoDs were 0.25 – 0.5 mg/kg for each component. The LoDs for individual PAH components in sediments were 0.005 – 0.01 mg/kg, and for the different chain-length TPH components the LoD was 5 mg/kg.

Interim sediment quality guidelines (ISQG-low) from ANZECC & ARMCANZ (2000) were available for twelve of the PAHs determined as well as for Total PAHs. ISQG-low values were all greater than the analytical LoDs and LoRs for these chemicals.

### 3.5 Oyster tissues

The results for the initial screening analysis for petroleum hydrocarbons in oyster tissue, from naturally occurring rock oyster and cultured pearl oyster, are presented in Table 6. The associated laboratory reports, including scaled chromatograms and quality assurance data are attached in Appendix D.

The concentrations of all petroleum hydrocarbons analysed were below the analytical LoR at all sites as well as the field blank and field duplicate. There are no ecological guidelines in ANZECC & ARMCANZ (2000) applicable to oyster tissue.

The initial screening analyses of oyster tissue consistently returned measurable concentrations of longer chain compounds that could potentially be hydrocarbons in the chain length ranges C15-C28 and C29-C36. The chromatograms for all oyster samples were very similar and suggested that the longer chain compounds were likely to be natural fatty acids and sterols. The traces did not suggest contamination by petroleum hydrocarbons. However, on the basis of independent expert advice (T. Bastow and S. Fisher, pers. comm.), a random sub-set of five of the sample extracts (including the field blank) were selected for more detailed analysis to confirm the identity of the longer chain compounds that were detected. Results from the more detailed GC-MS analyses of the five sample extracts, and the laboratory blank, indicated that the major components in the oyster tissue extracts were biogenic and were lipids (or artefacts of the lipids extracted from the oyster tissue in the analytical procedure) and other non-hydrocarbons, and that the field blank was similar to the laboratory blank (T. Bastow, pers. comm.). The major components were tentatively identified based on mass spectra library matches and were similar for each of the oyster tissue extracts analysed in more detail (Figure 6).

The concentrations of hydrocarbons in the oyster extracts were not significantly different from the laboratory blanks, suggesting that there was no *in situ* contamination of the oysters. The chromatograms obtained from the analyses of oyster tissue could not be matched to a crude oil profile.

**Table 5:** Results of petroleum hydrocarbon analyses for shoreline sediment samples collected in the Kimberley bioregion, October 2009, and the available National sediment quality guidelines (ISQG-low) from ANZECC & ARMCANZ (2000). Units = mg/kg dry wt; LoR = Limit of Reporting

Sample reference and sediment horizon (cm) in parentheses	CS (0-10)	CS (10-50)	KI (0-10)	KI (dupl) (0-10)	KI (10-50)	KI (dupl) (10-50)	KI (blank)	MIS (0-10)	MIS (10-50)	MINE (0-10)	MINE (10-50)	PI (0-10)	PI (10-50)	PI (blank)	MOI (0-10)	MOI (10-50)	CV (0-10)	CV (10-50)	II (0-10)	II (10-50)
<b>Poly Aromatic Hydrocarbons</b>																				
Acenaphthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b) & (k) fluoranthene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(ghi)perylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Naphthalene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total PAHs	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16
<b>BTEX</b>																				
Benzene	<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
Toluene	<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
Ethylbenzene	<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
Xylene	<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
Total BTEX	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
<b>Total Petroleum Hydrocarbons</b>																				
TPH C6 - C9	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
TPH C10 - C14	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15 - C28	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
TPH C29 - C36	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Total TPH	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275
<b>Miscellaneous</b>																				
Moisture (%)	1.9	2.9	3.3	2.6	4.2	3.7	-	2.5	3.5	2.6	3.3	3.1	4.2	-	5.0	4.6	5.0	5.5	4.7	4.7

Table 5: Continued

Sample reference and sediment horizon (cm) in parentheses	CIE (0-10)	CIE (10-50)	CIS (0-10)	CIS (10-50)	LR (0-10)	LR (10-50)	CBE (0-10)	CBE (dupl) (0-10)	CBE (10-50)	CBE (dupl) (10-50)	CBE (blank)	TRI (0-10)	TRI (10-50)	NEI (0-10)	NEI (10-50)	SGMI (0-10)	SGMI (10-50)	STI (0-10)	STI (10-50)	LOR	ISQG-low
<b>Poly Aromatic Hydrocarbons</b>																					
Acenaphthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.016
Acenaphthylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.044
Anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.085
Benz(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.261
Benzo(b)&(k)fluoranthene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	
Benzo(ghi)perylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.43
Chrysene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.384
Dibenz(ah)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.063
Fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.600
Fluorene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.019
Indeno(1,2,3-cd)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	
Naphthalene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.160
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.240
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.665
Total PAHs	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	0.16	4.00
<b>BTEX</b>																					
Benzene	<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	
Toluene	<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	
Ethylbenzene	<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	
Xylene	<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	
Total BTEX	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	2.5	
<b>Total Petroleum Hydrocarbons</b>																					
TPH C6 - C9	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	25	
TPH C10 - C14	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	50	
TPH C15 - C28	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	100	
TPH C29 - C36	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	100	
Total TPH	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	<275	275	
<b>Miscellaneous</b>																					
Moisture (%)	2.8	4.8	3.6	4.3	3.3	4.7	3.6	3.6	5.2	5.4	-	3.2	5.2	3.3	5.8	2.9	5.4	4.6	6.5	0.1	

McAlpine et al. (2010). Baseline petroleum hydrocarbon content of marine water, shoreline sediment and intertidal biota at selected sites in the Kimberley bioregion, Western Australia



**Table 6:** Results of petroleum hydrocarbon analyses for oyster tissue samples collected in the Kimberley bioregion, October 2009.

Units = mg/kg dry wt unless otherwise specified

SAMPLE REFERENCE	CS	PG	MIS	MIS DUP	MINE	PI	CV	CVL	CVL DUP	II	CIE	CIE BLANK	CIS	OIPL	OIPL DUP	CBE	VBPL	VBPL DUP	NEI	SGMI
<b>Poly Aromatic Hydrocarbons</b>																				
Naphthalene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benz(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)&(k)fluoranthene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(ghi)perylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
<b>BTEX</b>																				
Benzene	<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
Toluene	<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
Ethyl Benzene	<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
m, p - Xylene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
o - Xylene	<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
<b>Total Petroleum Hydrocarbons</b>																				
TPH C6 - C9	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
TPH C10 - C14	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15 - C28	680	490	1200	1200	1100	1000	1100	460	460	970	850	<100	910	550	570	1000	620	730	890	890
TPH C29 - C36	380	330	460	510	500	630	550	390	400	580	550	<100	580	410	410	560	600	610	580	580
<b>Miscellaneous</b>																				
Moisture (g/100g)	78.9	86.3	73.8	76.1	76.2		78.7	84.9	85.2	74.6	78.2		76.1	85.8	85.3	77.6	79.4	79.5	78.2	78.9
Fat (Soxhlet) (g/100g)	1.6	0.3	2.3	2.4	1.1		1.7	0.2	0.2	2.4	1.9		3.2	0.5	0.4	2.5	0.2	0.2	2	2.3
Surrogate semivolatile Rec. (%)	131	126	124	126	124	117	79	75	87	93	90	62	83	95	94	100	97	105	109	103
Surrogate volatile Rec (%)	102	107	106	106	109		108	108	114	111	111	105	114	115	115	103	113	116	118	120

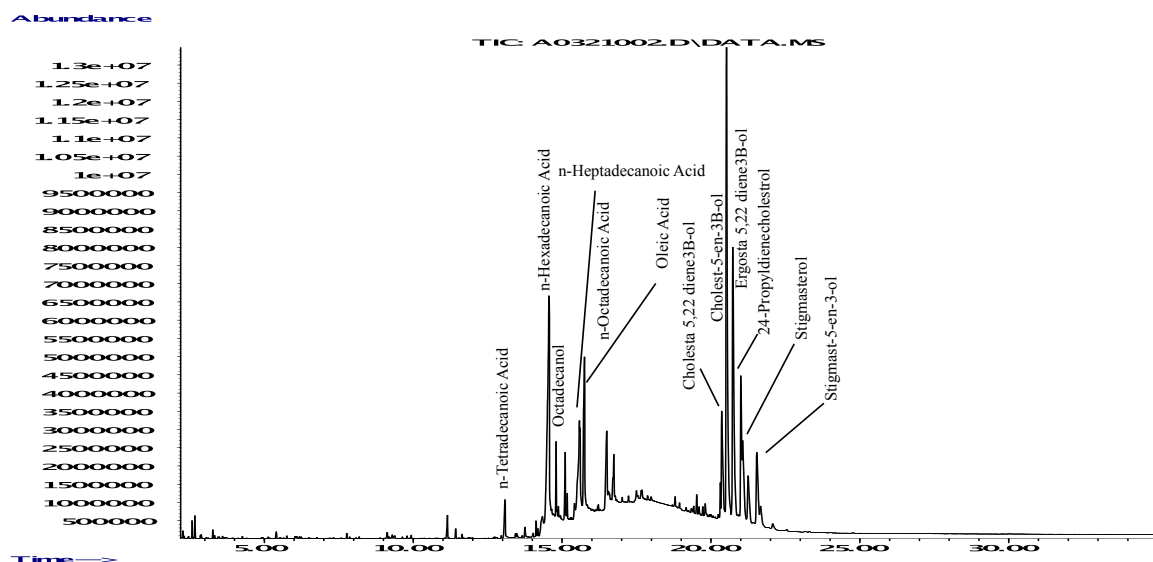


Figure 6: A typical GCMS chromatogram and tentative identifications of major components observed in oyster tissue extract from South Maret Island – south (MIS) based on mass spectra library matches.

## 4. General discussion and conclusions

Sixteen shorelines on twelve mid- and inner-shelf Kimberley islands and two mainland promontories were surveyed between Camden Sound in the south and the Stewart Islands near Cape Londonderry in the northeast. Cultured pearl oysters were collected from four pearl farms between Kuri Bay and Cape Bougainville and floating surface ‘scums’ were also sampled opportunistically during the survey. This study provides quantitative baseline data for the petroleum hydrocarbon content of sea water, shoreline sediments and intertidal filter-feeders and cultured pearl oysters at the selected sites in the WA coastal waters section of the Kimberley bioregion (IMCRA V4.0). These data also provide extensive and relatively even spatial coverage for the Kimberley.

Petroleum hydrocarbons were not detected in any of the water and shoreline sediment samples at concentrations above the analytical LoD. Analyses of rock oyster and cultured pearl oyster tissue samples also showed no evidence of *in situ* contamination of oysters by petrogenic hydrocarbons. Furthermore, chromatograms obtained from analyses of oyster tissue samples could not be matched to a crude oil profile.

The analytical LoDs for water samples were lower than the available guideline trigger values provided in ANZECC & ARMCANZ (2000) for the selected compounds. Furthermore, LoDs and LoRs were all lower than the most conservative low reliability trigger values for selected organic compounds provided in ANZECC & ARMCANZ (2000), with the exception of anthracene for which the LoR is equal to the low reliability value of  $0.01 \mu\text{gL}^{-1}$ . In relation to shoreline sediments, ISGQ-low values provided in ANZECC & ARMCANZ (2000) were all greater than the analytical LoDs and LoRs for these chemicals.

In view of the consistency of results and spatial coverage of the survey, it is probable that the findings of this survey are typical of natural background petroleum hydrocarbon conditions in the region. The findings also suggest that petroleum hydrocarbons released from natural seeps known from the Timor Sea (e.g. Burns *et al.* 2010) do not appear to have a readily-measurable chronic or residual effect on the quality of the Kimberley marine environment at the sites investigated here and that oil from the West Atlas oil spill was unlikely to have impacted the sites sampled at the time of this survey.

Baseline environmental data are fundamental for managing and evaluating effects of development pressures, including unplanned pollution incidents. While direct development-

related pressure on the WA coastal waters section of the Kimberley bioregion (IMCRA V4.0) is presently low, there is considerable existing and increasing petroleum-related development activity in adjacent offshore waters. The data collected during this survey will be of value to all stakeholders for assessing potential impacts of development and monitoring the environmental quality of the WA coastal waters section of the Kimberley bioregion in the future.

## 5. References

ANZECC & ARMCANZ (2000). *Australian and New Zealand guidelines for fresh and marine water quality*. National Water Quality Management Strategy No 4, Australian and New Zealand Environment and Conservation Council and Agricultural and Resource Management Council of Australia and New Zealand, Canberra, Australia.

Asia Pacific Applied Science Associates (2009). Stochastic modelling of the West Atlas oil spill, Version 5. Draft Report to the Australian Maritime Safety Authority. 29 September 2009.

Australian Maritime Safety Authority (2010). Major Oil Spill, Montara Well Head Platform. Cited from [http://www.amsa.gov.au/Marine\\_Environment\\_Protection/Major\\_Oil\\_Spills\\_in\\_Australia/Montara\\_Wellhead/index.asp](http://www.amsa.gov.au/Marine_Environment_Protection/Major_Oil_Spills_in_Australia/Montara_Wellhead/index.asp), on 23 April 2010.

Burns K.A., Brinkman D.L., Brunskill G.J., Logan G.A., Volk H., Wasmund K. and Zagorskis I. (2010). Fluxes and fate of petroleum hydrocarbons in the Timor Sea ecosystem with special reference to active natural hydrocarbon seepage. *Marine Chemistry* 118: 140–155

Commonwealth of Australia (2006). Integrated Marine and Coastal Regionalisation of Australia, Version 4.0 - Meso-scale Bioregions. Department of the Environment and Heritage, Canberra, Australia.

Halpern B.S., Walbridge S., Selkoe K.A., Kappel C.V., Micheli F., D'Agrosa C., Bruno J.F., Casey K.S., Ebert C., Fox H.E., Fujita R., Heinemann D., Lenihan H.S., Madin E.M.P., Perry M.T., Selig E.R., Spalding M., Steneck R. and Watson R. (2008). A global map of human impact on marine ecosystems. *Science* 319: 948-952

Howe T. (2010). Opening Statement, Council Assisting the Montara Commission of Inquiry, 15 March 2010. Cited from [http://www.montarainquiry.gov.au/downloads/Transcripts/Transcript%20Montara%20COI\\_Day%20001\\_15-Mar-2010.pdf](http://www.montarainquiry.gov.au/downloads/Transcripts/Transcript%20Montara%20COI_Day%20001_15-Mar-2010.pdf) on 12 April 2010

Masini R.J., Sim C.B. and Simpson C.J. (2009). Marine Environments. In: *Protecting the Kimberley: A synthesis of scientific knowledge to support conservation management in the Kimberley region of Western Australia*. Department of Environment and Conservation, May 2009, Perth, Western Australia.

# Appendix A: Method Summaries Provided by Laboratories

The following methods are for sample bottle preparation, sample collection, sample filtration and the specific chemical analyses.

## A.1 PREPARATION OF SAMPLE CONTAINERS

All sample containers used were supplied by the laboratory as it had received them from a supplier. The laboratory advised that testing of glass containers from the suppliers prior to this work found them to be free of organics.

## A.2 ANALYTICAL METHODS

The following method summaries have been provided by the analytical laboratories.

### A2.1 Seawater

METHOD SUMMARY	
NMI Method No & Issue No:	WL 203 Issue 9.0
Date of Issue:	23 May 2008
Analysis:	TOTAL PETROLEUM HYDROCARBONS (TPH C10-C36)
Matrix:	Water
LOR:	25, 100, 100, 250 ug/L
NATA Accredited:	Yes
PRINCIPLE OF METHOD:	
Water samples are extracted with dichloromethane by separatory funnel (USEPA Method 3510). Extracts are concentrated and where necessary diluted. Prepared extracts are injected into a GC where separation of individual components is achieved with a non-polar capillary column and detection by flame ionisation.	
EQUIPMENT USED	
GC with temperature programmable oven and fitted with a flame ionisation detector (FID), eg Varian 3800 GC with FID.	
ANY LIMITATIONS or KNOWN INTERFERENCES	
Interferent peaks suspected of being non TPH can be cleaned up using silica gel. As specified in APHA 5520 F (1995) the components after silica gel cleanup are defined as petroleum hydrocarbons.	
AMOUNT OF SAMPLE REQUIRED, CONTAINER TYPE, PRESERVATION and HOLDING TIME	
Samples should be collected in clean 1L amber glass containers with Teflon seals in screw-top lids. Samples should be refrigerated as soon as possible and extracted within 7 days.	
QUALITY ASSURANCE AND QUALITY CONTROL	
A blank water sample is spiked with known amounts of n-alkanes. The acceptability criteria for TPH recoveries (individual n-alkanes) are between 50-150%.	
A spiked recovery and a matrix spike are performed once every batch. A duplicate is performed once every ten samples. Duplicate relative percentage difference is to be within 60%.	

METHOD SUMMARY	
NMI Method No & Issue No:	WL 244 Issue 4.0
Date of Issue:	17 August 2003
Analysis:	Benzene, toluene, ethylbenzene, xylene and C6 - C9 total petroleum hydrocarbons (TPH)
Matrix:	Water
LOR:	1, 1, 1, 2 and 25 ug/L
NATA Accredited:	Yes
PRINCIPLE OF METHOD:	
<p>An inert gas (Helium) is bubbled through the water sample (5 mL) at a pre-determined rate. The volatile compounds are transferred from the aqueous phase to the vapour phase. The vapour is swept through a sorbent trap resulting in the trapping of the volatile compounds onto the sorbent material (Vocarb 3000). After purging is complete, the sorbent trap is rapidly heated and back flushed with inert gas to desorb the compound onto a gas chromatography column. The volatile compounds are separated on the GC column and detected using a Mass Selective Detector (MSD).</p> <p>Concentrations of BTEXs and C6-C9 are determined by comparison with standards using electronic integration.</p>	
EQUIPMENT USED	
GC with temperature programmable oven and fitted with a mass selective detector, eg HP 6890 GC with 5973 MSD	
ANY LIMITATIONS or KNOWN INTERFERENCES	
Samples containing very high amounts of petrol need diluting to reduce carryover of BTEXs and C6-C9 compounds on the system.	
AMOUNT OF SAMPLE REQUIRED, CONTAINER TYPE, PRESERVATION and HOLDING TIME	
Sample should be collected in a clean 40 mL glass container with Teflon seal and screw cap. Each sample should be collected in duplicate. Samples should be refrigerated as soon as possible.	
QUALITY ASSURANCE AND QUALITY CONTROL	
A blank water sample is spiked with known amounts of BTEXs and C8. The acceptability criteria for the recoveries are between 70-130%.	
A spiked recovery and a matrix spike are performed once every batch. A duplicate is performed once every ten samples. Duplicate relative percentage difference is to be within 60%.	

METHOD SUMMARY	
NMI Method No & Version No:	WL 207 v 7.0
Date of Issue:	08 June 2009
Analysis:	Polycyclic Aromatic Hydrocarbons (PAH) Using GC-MS
Matrix:	Water
LOR:	LOR is 0.2 µg/mL to 10 µg/mL
NATA Accredited:	Yes
PRINCIPLE OF METHOD:	
Water samples are extracted with dichloromethane and concentrated. The concentrate extracts are injected into GC where separation of individual components is achieved with a non polar capillary column and detection is by a mass selective detector (MSD).	
EQUIPMENT USED	
Gas Chromatograph- Mass Selective Detector System	
ANY LIMITATIONS or KNOWN INTERFERENCES	
High level of hydrocarbon contamination can interfere with adhering to the limits of reporting. The limits of reporting may have to be raised due to the need to dilute the extracts.	
AMOUNT OF SAMPLE REQUIRED, CONTAINER TYPE, PRESERVATION and HOLDING TIME	
Samples should be collected in securely sealed and clean glass container with teflon or aluminium seal and screw top lids. Samples should be refrigerated as soon as possible between 0°C – 4°C.	

## A2.2 Shoreline sediments

NMI WA METHOD SUMMARY	
Analysis:	Moisture and Loss on Ignition (LOI) by Gravimetric method
Matrix:	Soil
LOR:	0.1%
NATA Accredited:	Yes
NMI Method No & Issue No:	WL 170 v 6.0
PRINCIPLE OF METHOD:	
The air dried sample is placed in a heat resistant and corrosion resistant dish and dried at 105°C. The loss in weight represents the moisture content. The dried sample is then placed in a muffle furnace at 550 °C for 2 hours. The loss in weight represents "Loss on Ignition (LOI)".	
EQUIPMENT USED	
Drying oven controlled at 105°C. Muffle furnace controlled at 550 °C. Balance	

ANY LIMITATIONS or KNOWN INTERFERENCES
The soil samples may be crumbled to assist in drying prior to placing in the oven.
AMOUNT OF SAMPLE REQUIRED, CONTAINER TYPE, PRESERVATION and HOLDING TIME
100 g sample submitted in glass or plastic bottle depending on other analytes of interest. Store at 4°C for up to 7 days.

METHOD SUMMARY	
NMI Method No & Version No:	WL 206 v 6.0
Date of Issue:	23 September 2009
Analysis:	Polycyclic Aromatic Hydrocarbons (PAH) Using GC-MS
Matrix:	Soil
LOR:	LOR is 0.01-0.02 mg/kg in SIM/1-2mg/kg in full scan
NATA Accredited:	Yes

**PRINCIPLE OF METHOD:**  
 Soil samples are extracted with dichloromethane/acetone and injected into GC (USEPA Method 8270) where separation of individual components is achieved with a non polar capillary column and detection is by a mass selective detector (MSD) using electron impact-selective ion monitoring.

**EQUIPMENT USED**  
 Gas Chromatograph- Mass Selective Detector System.

**ANY LIMITATIONS or KNOWN INTERFERENCES**  
 High level of hydrocarbon contamination can interfere with adhering to the limits of reporting. The limits of reporting may have to be raised due to the need to dilute the extracts.

**AMOUNT OF SAMPLE REQUIRED, CONTAINER TYPE, PRESERVATION and HOLDING TIME**  
 Samples should be collected in securely sealed and clean glass container with teflon or aluminium seal and screw top lids. Samples should be refrigerated as soon as possible at 4°C.

**QUALITY ASSURANCE AND QUALITY CONTROL**  
 A blank soil sample is spiked with known amounts of PAHs. The acceptability criteria for PAH recoveries are as according to US EPA Method 8270B, revision 2, Nov 1990.  
 A spiked recovery and a matrix spike are performed once every batch. A duplicate is performed once every ten samples. Duplicate relative percentage difference is to be within 60%.

METHOD SUMMARY	
NMI Method No & Issue No:	WL 230 Issue 7.0
Date of Issue:	23 May 2008
Analysis:	BENZENE, TOLUENE, ETHYLBENZENE, XYLENES (BTEX) and TOTAL PETROLEUM HYDROCARBONS (TPH)
Matrix:	Soil
LOR:	1, 1, 1,2, 5 and 25, 50, 100, 100, 275 mg/kg
NATA Accredited:	Yes

PRINCIPLE OF METHOD:
Soil matrices are extracted with a 50% dichloromethane/ acetone solvent under sonication. Prepared extracts are injected into a GC where separation of individual components is achieved with a non-polar capillary column and detection is by flame ionisation.
EQUIPMENT USED
GC with temperature programmable oven and fitted with a flame ionisation detector (FID), eg Varian 3800 GC with FID.
ANY LIMITATIONS or KNOWN INTERFERENCES
This method does not normally include any cleanup procedure and hence any extracted compound capable of detection by flame ionisation and eluting within the C6 to C36 range on the capillary GC column will be considered as a petroleum hydrocarbon and included in the TPH result.
AMOUNT OF SAMPLE REQUIRED, CONTAINER TYPE, PRESERVATION and HOLDING TIME
Samples should be collected in clean glass containers with Teflon seals in screw-top lids. Samples should be refrigerated as soon as possible and extracted within 14 days.
Quality Assurance and Quality Control
A blank soil sample is spiked with known amounts of n-alkanes and BTEXs. The acceptability criteria for BTEX recoveries are between 70-130% and TPH recoveries (individual n-alkanes) are between 50-150%. A spiked recovery and a matrix spike are performed once every batch. A duplicate is performed once every ten samples. Duplicate relative percentage difference is to be within 60%.

## A2.3 Oyster tissues

Analysis Description	Fat Determination in meat and other foods by Soxhlet
Matrix / Matrices	Foods (Meats and Fish)
Reference Method(s)	AOAC International.16th Edition, 1995, Sections 920.39, 960.39 and 948.22.
Limit of Reporting (LOR)	0.2g/ 100g
NATA Accredited	Yes
Preparation & procedure	<p><b>Preparation</b></p> <p>Samples are homogenised as thoroughly as possible. Occasionally dilution with water may be used to improve homogenisation efficiency.</p> <p><b>Extraction:</b></p> <p>Approximately 5g of prepared sample is accurately weighed into a soxhlet thimble and a loose plug of fat free cotton wool is inserted into the top of the thimble. The thimble containing sample is then dried in an air oven for at least 6 hours at 102°C. The thimble is then placed into a soxhlet extraction apparatus. The apparatus is then inserted into the top of a pre-weighed erlenmeyer flask containing approx. 150ml of diethyl ether. The flask is heated on a boiling water bath. Extraction of fat by the diethyl ether occurs over a period of 16 hours.</p> <p><b>Determination:</b></p> <p>After 16 hours of extraction the apparatus is disassembled and all diethyl ether collected in the erlenmeyer flask. The ether is then evaporated from the flask on a water bath. Once all ether is visibly evaporated the erlenmeyer flask is placed in an air oven at 102°C for 1 hour.</p> <p>After 1 hour the flask is cooled under desiccation and weighed. This oven drying and weighing procedure is repeated until successive weighings agree to within 5mg.</p> <p>Calculation: % Fat = <math>\frac{(\text{Weight of flask})_{\text{final}} - (\text{Weight of flask})_{\text{initial}}}{\text{Weight of sample}} \times 100</math></p>
Comments, limitations or known interferences	Fat bound in complex matrices is usually only partially extracted using this technique.
Equipment used	<p>The method is, therefore, limited to matrices such as meat and fish.</p> <p>Non fat material, which is ether extractable, may be included in the determination.</p> <p>Convection oven calibrated at 102°C, desiccator Analytical balance capable of weighing to 0.001gram</p> <p>Erlenmeyer flasks, Soxhlet Extraction apparatus, Multi-place heated water bath, fume cupboard, diethyl ether, soxhlet thimble and cotton wool.</p>



QA Protocols per batch	1 Duplicate per batch, maximum batch size is 10 samples.
Mass of Sample required	5g per sample, depending on the fat content of the sample
Analysis Description	Moisture / Total Solids
Matrix / Matrices	Food
Reference Method(s)	AOAC 16th Ed. 934.06, 964.22, AS2300.1.1
Limit of Reporting (LOR)	0.2g/100g
NATA Accredited	Yes
Preparation & procedure	<p>Samples are homogenised.</p> <p>Moisture determination is made, according to sample matrix type, using either, sand and vacuum drying (Method A) or no sand and conventional drying (Method B).</p> <p><b>Method A (Using Sand);</b></p> <p>A moisture dish with sand, lid and glass rod is oven dried at 102oc and cooled before all dried components are weighed together to the nearest 0.1mg.</p> <p>2 to 5 gram of sample is weighed, to nearest 0.1mg, into the moisture dish. Water is added to the dish to aid mixing of the sample and sand. The moisture dish is placed on a steam bath until visible dryness of the sand/sample mix is achieved.</p> <p>The dish and components are placed in a vacuum oven and dried under vacuum (approx. 5kpa) at between 70 and 100oc, depending on sugar content of the sample. Drying time is a minimum of 4 hours depending on the sample matrix. After the required initial drying period the moisture dish and components are removed, cooled, re-weighed and returned for a further 1 hour drying. The weighing and drying process is repeated until constant weight is obtained.</p> <p><b>Calculation (Method A):</b></p> <p>Subtract the mass of the dish (plus components) from the mass of dried sample and dish (plus components). Divide the figure obtained by the sample mass and multiply by 100 to obtain a result as % moisture or g/100g.</p> <p><b>Method B (Without Sand);</b></p> <p>A moisture dish and lid is oven at 102oC dried and cooled. The dried components are weighed together to the nearest 0.1mg.</p> <p>A portion of sample (2 to 5 grams) is weighed, to nearest 0.1mg, into the dish.</p> <p>The sample in the dish is then placed in a conventional oven at 102oC for a minimum of 4 hours depending on the sample matrix.</p> <p>The dish and lid are then removed, cooled, re-weighed and returned for a further 1 hour drying. The weighing and drying process is repeated until a constant weight is obtained.</p> <p><b>Calculation (Method B):</b></p> <p>Subtract the mass of the dish (plus lid) from the mass of dried sample and dish (plus lid). Divide the figure obtained by the sample mass and multiply by 100 to obtain a result as % moisture or g/100g.</p>
Comments, limitations or known interferences	<p>These are internationally recognised techniques providing consistency and comparability with results obtained by laboratories worldwide. It is recognised that these techniques do not necessarily provide a true reflection of the total moisture contained in a sample.</p> <p>No real interferences in food samples.</p>
Equipment used	<p>Ovens – Vacuum and Conventional.</p> <p>Balances – Analytical – accurate to 0.1mg</p> <p>Moisture Dishes, sand and glass rods</p> <p>Steam bath</p>
QA Protocols per batch	<p>Flour control sample is determined each analysis batch.</p> <p>One duplicate analysis per batch – maximum batch size is 10 samples.</p>
Mass of Sample required	10g per sample, however more sample would be required for QA.

METHOD SUMMARY	
NMI Method No & Version No:	NGCMS_1111 v 2.4
Date of Issue:	February 2007
Analysis:	Polycyclic Aromatic Hydrocarbons (PAH) Using GC-MS
Matrix:	Biota
LOR:	LOR is 0.01-0.02 mg/kg
NATA Accredited:	Yes
PRINCIPLE OF METHOD:	
Homogenised biota samples are extracted with dichloromethane/acetone and the extracts cleaned up using gel permeation chromatography (GPC) followed by silica gel cleanup before injection into GC (USEPA Method 8270) where separation of individual components is achieved with a non polar capillary column and detection is by a mass selective detector (MSD) using electron impact-selective ion monitoring.	
EQUIPMENT USED	
Gas Chromatograph- Mass Selective Detector System	
ANY LIMITATIONS or KNOWN INTERFERENCES	
High level of hydrocarbon contamination can interfere with adhering to the limits of reporting. The limits of reporting may have to be raised due to the need to dilute the extracts.	
AMOUNT OF SAMPLE REQUIRED, CONTAINER TYPE, PRESERVATION and HOLDING TIME	
Samples should be collected in securely sealed and clean glass container with teflon or aluminium seal and screw top lid or plastic bags with seals. Samples should be frozen as soon as possible at – 20°C.	
QA / QC protocols used (eg: number of duplicates, spikes, matrix spikes, blanks etc per batch):	
QC: duplicate, matrix spike, matrix spike duplicate and blank per 20 samples	
Date this summary produced and by whom:	
LB 11/09	

METHOD SUMMARY	
Analysis description:	BTEX/C6-C9 (8260) Biota
Matrix:	Biota
NMI Method Code:	NGCMS 11.21
Reference Method(s):	USEPA 8260
LOR and units:	C6-C9, Benzene, Toluene, Ethylbenzene, Xylene: 25, 0.5, 0.5, 0.5, 1.0 mg/kg
NATA Accredited:	No
Method Title	
GCMS determination of USEPA 8260 compounds in Soil/Water/Biota using Electron Impact (EI) – Scan Technique	
Preparation & Procedure:	
Samples are extracted in methanol and an aliquot of this solution is mixed with organic free water and analysed by the Purge and Trap GCMS with mass spectrometric detection operating in the EI mode using full scan.	
Comments, limitations or known interferences:	
N/A	
Equipment used:	
Purge & Trap (Tekmar or OI), HP5975 GCMS set in SCAN mode	
Amount of sample required, container type, preservation and holding time:	
Biota: 120ml glass jar or sealed plastic bag, chilled to -20OC.	
QA / QC protocols used (eg: number of duplicates, spikes, matrix spikes, blanks etc per batch):	
QC: duplicate, matrix spike, matrix spike duplicate and blank per 20 samples	
Date this summary produced and by whom:	
LB 11/09	

METHOD SUMMARY	
Analysis description:	Petroleum Hydrocarbon in Biota
Matrix:	Biota
NMI Method Code:	NGCMS 11.12
Reference Method(s):	In-house
LOR and units:	C10-C14, C15-C28, C29-C36: 50, 100, 100 mg/kg
NATA Accredited:	No
Method Title	
GC determination of Petroleum Hydrocarbon in Soil/Water/Biota using flame ionisation detection (GC/FID).	
Preparation & Procedure:	
Homogenised biota samples are extracted with dichloromethane/acetone and the extracts cleaned up using gel permeation chromatography (GPC) followed by silica gel cleanup before injection into a GC with a non polar capillary column and quantified using flame ionisation detection.	
Comments, limitations or known interferences:	
Naturally occurring fatty acids may interfere with the quantification of petroleum hydrocarbons.	
Equipment used:	
GC/FID	
Amount of sample required, container type, preservation and holding time:	
Biota: 120ml glass jar or sealed plastic bag, chilled to -20OC.	
QA / QC protocols used (eg: number of duplicates, spikes, matrix spikes, blanks etc per batch):	
QC: duplicate, matrix spike, matrix spike duplicate and blank per 20 samples	
Date this summary produced and by whom:	
LB 11/09	

## A2.4 Surface scums

### Solvent Extraction of Solid Products

Solid products were finely crushed and extracted. The extract was then filtrated and passed through activated copper powder to remove elemental sulphur. The extractable organic matter (EOM) was collected by evaporation of the solvent by fractional distillation.

### Whole Extract or 'Hexane' Solubles GC-MS

Fluid samples and extracts (from solid products) were analysed by GC-MS in scan mode producing a chromatogram of the compounds present from C<sub>9</sub> to C<sub>36</sub>.

# Appendix B: Analytical results and quality control data for analyses of seawater samples

## B1 Analytical results - seawater and surface scums



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### REPORT OF ANALYSIS

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Report No. RN764789

Client	: DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983	Job No.	: DOEC01_W/091104_46
Attention	: Kevin McAlpine	Quote No.	: QT-01534
Project Name	: -	Order No.	: 025115
Your Client Services Manager	: David Lynch	Date Sampled	: 27-OCT-2009
		Date Received	: 3-NOV-2009
		Sampled By	: CLIENT
		Phone	: (08) 9368 8420

Lab Reg No.	Sample Ref	Sample Description
W09/025115	DI	West Atlas Oil Basline Survey WATER 27/10/09
W09/025116	MINE	West Atlas Oil Basline Survey WATER 28/10/09
W09/025117	CV	West Atlas Oil Basline Survey WATER 29/10/09

Lab Reg No.	Units	LOR	W09/025115 DI	W09/025116 MINE	W09/025117 CV	Method
Poly Aromatic Hydrocarbons						
Naphthalene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Acenaphthylene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Acenaphthene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Fluorene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Phenanthrene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Anthracene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Fluoranthene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Pyrene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Benz(a)anthracene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Chrysene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Benzo(b+k)fluoranthene	ug/L	0.02	< 0.02	< 0.02	< 0.02	WL207
Benzo(a)pyrene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Indeno(1,2,3,c,d)pyrene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Dibenz(a,h)anthracene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Benzo(g,h,i)perylene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Total PAH's (as above)	ug/L	0.16	< 0.16	< 0.16	< 0.16	WL207
BTEX						
Benzene	ug/L	1.0	< 1.0	< 1.0	< 1.0	WL244
Toluene	ug/L	1.0	< 1.0	< 1.0	< 1.0	WL244
Ethylbenzene	ug/L	1.0	< 1.0	< 1.0	< 1.0	WL244
Xylene	ug/L	2.0	< 2.0	< 2.0	< 2.0	WL244
Total BTEX	ug/L	5.0	< 5.0	< 5.0	< 5.0	WL244
Total Petroleum Hydrocarbons						
TPH C6 - C9	ug/L	25	< 25	< 25	< 25	WL244
TPH C10 - C14	ug/L	25	< 25	< 25	< 25	WL203
TPH C15 - C28	ug/L	100	< 100	< 100	< 100	WL203
TPH C29 - C36	ug/L	100	< 100	< 100	< 100	WL203
Total TPH	ug/L	250	< 250	< 250	< 250	WL203
Dates						
Date extracted			4-NOV-2009	4-NOV-2009	4-NOV-2009	

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REPORT OF ANALYSIS

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Report No. RN764789

Lab Reg No.			W09/025115	W09/025116	W09/025117	
Sample Reference	Units	LOR	DI	MINE	CV	Method
Dates						
Date analysed			5-NOV-2009	5-NOV-2009	5-NOV-2009	
Sample condition on receipt			COLD	COLD	COLD	



Leigh Boyd - Analyst  
Organics - WA  
Accreditation No. 2474

10-NOV-2009

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## REPORT OF ANALYSIS

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Report No. RN764789

Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_46 Quote No. : QT-01534 Order No. : 025115 Date Sampled : 29-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
--	---

Lab Reg No.	Sample Ref	Sample Description
W09/025118	CIE 1	West Atlas Oil Basline Survey WATER 29/10/09
W09/025119	CIE 2	West Atlas Oil Basline Survey WATER 29/10/09
W09/025120	CIE B	West Atlas Oil Basline Survey WATER 29/10/09

Lab Reg No.			W09/025118	W09/025119	W09/025120	
Sample Reference	Units	LOR	CIE 1	CIE 2	CIE B	Method
Poly Aromatic Hydrocarbons						
Naphthalene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Acenaphthylene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Acenaphthene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Fluorene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Phenanthrene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Anthracene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Fluoranthene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Pyrene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Benz(a)anthracene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Chrysene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Benzo(b+k)fluoranthene	ug/L	0.02	< 0.02	< 0.02	< 0.02	WL207
Benzo(a)pyrene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Indeno(1,2,3,c,d)pyrene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Dibenz(a,h)anthracene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Benzo(g,h,i)perylene	ug/L	0.01	< 0.01	< 0.01	< 0.01	WL207
Total PAH's (as above)	ug/L	0.16	< 0.16	< 0.16	< 0.16	WL207
BTEX						
Benzene	ug/L	1.0	< 1.0	< 1.0	< 1.0	WL244
Toluene	ug/L	1.0	< 1.0	< 1.0	< 1.0	WL244
Ethylbenzene	ug/L	1.0	< 1.0	< 1.0	< 1.0	WL244
Xylene	ug/L	2.0	< 2.0	< 2.0	< 2.0	WL244
Total BTEX	ug/L	5.0	< 5.0	< 5.0	< 5.0	WL244
Total Petroleum Hydrocarbons						
TPH C6 - C9	ug/L	25	< 25	< 25	< 25	WL244
TPH C10 - C14	ug/L	25	< 25	< 25	< 25	WL203
TPH C15 - C28	ug/L	100	< 100	< 100	< 100	WL203
TPH C29 - C36	ug/L	100	< 100	< 100	< 100	WL203
Total TPH	ug/L	250	< 250	< 250	< 250	WL203
Dates						
Date extracted			4-NOV-2009	4-NOV-2009	4-NOV-2009	

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## REPORT OF ANALYSIS

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Lab Reg No.			W09/025118	W09/025119	W09/025120	
Sample Reference			CIE 1	CIE 2	CIE B	
	Units	LOR				Method
Dates						
Date analysed			5-NOV-2009	5-NOV-2009	5-NOV-2009	
Sample condition on receipt			COLD	COLD	COLD	



Leigh Boyd - Analyst  
Organics - WA  
Accreditation No. 2474

10-NOV-2009

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## REPORT OF ANALYSIS

Page: 5 of 6  
Report No. RN764789

Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_46 Quote No. : QT-01534 Order No. : 025115 Date Sampled : 31-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
--	---

Lab Reg No.	Sample Ref	Sample Description
W09/025121	TRI	West Atlas Oil Baseline Survey WATER 31/10/09
W09/025122	STI	West Atlas Oil Baseline Survey WATER 31/10/09

Lab Reg No.			W09/025121	W09/025122		
Sample Reference	Units	LOR	TRI	STI		Method
<b>Poly Aromatic Hydrocarbons</b>						
Naphthalene	ug/L	0.01	< 0.01	< 0.01		WL207
Acenaphthylene	ug/L	0.01	< 0.01	< 0.01		WL207
Acenaphthene	ug/L	0.01	< 0.01	< 0.01		WL207
Fluorene	ug/L	0.01	< 0.01	< 0.01		WL207
Phenanthrene	ug/L	0.01	< 0.01	< 0.01		WL207
Anthracene	ug/L	0.01	< 0.01	< 0.01		WL207
Fluoranthene	ug/L	0.01	< 0.01	< 0.01		WL207
Pyrene	ug/L	0.01	< 0.01	< 0.01		WL207
Benz(a)anthracene	ug/L	0.01	< 0.01	< 0.01		WL207
Chrysene	ug/L	0.01	< 0.01	< 0.01		WL207
Benzo(b + k)fluoranthene	ug/L	0.02	< 0.02	< 0.02		WL207
Benzo(a)pyrene	ug/L	0.01	< 0.01	< 0.01		WL207
Indeno(1,2,3,c,d)pyrene	ug/L	0.01	< 0.01	< 0.01		WL207
Dibenz(a,h)anthracene	ug/L	0.01	< 0.01	< 0.01		WL207
Benzo(g,h,i)perylene	ug/L	0.01	< 0.01	< 0.01		WL207
Total PAH's (as above)	ug/L	0.16	< 0.16	< 0.16		WL207
<b>BTEX</b>						
Benzene	ug/L	1.0	< 1.0	< 1.0		WL244
Toluene	ug/L	1.0	< 1.0	< 1.0		WL244
Ethylbenzene	ug/L	1.0	< 1.0	< 1.0		WL244
Xylene	ug/L	2.0	< 2.0	< 2.0		WL244
Total BTEX	ug/L	5.0	< 5.0	< 5.0		WL244
<b>Total Petroleum Hydrocarbons</b>						
TPH C6 - C9	ug/L	25	< 25	< 25		WL244
TPH C10 - C14	ug/L	25	< 25	< 25		WL203
TPH C15 - C28	ug/L	100	< 100	< 100		WL203
TPH C29 - C36	ug/L	100	< 100	< 100		WL203
Total TPH	ug/L	250	< 250	< 250		WL203
<b>Dates</b>						
Date extracted			4-NOV-2009	4-NOV-2009		

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## REPORT OF ANALYSIS

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Lab Reg No.			W09/025121	W09/025122		
Sample Reference			TRI	STI		
	Units	LOR				Method
Dates						
Date analysed			5-NOV-2009	5-NOV-2009		
Sample condition on receipt			COLD	COLD		



Leigh Boyd - Analyst  
Organics - WA  
Accreditation No. 2474

10-NOV-2009

Unless notified to the contrary, the above samples will be disposed of one month from the reporting date.



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Results relate only to the sample(s) tested.

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## B2 – Quality assurance reports



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page 1 of 2

### ORGANIC QUALITY ASSURANCE REPORT

**NMI Job No:** DOEC01\_W/091104\_46

**Sample Matrix:** Liquid

Analyte	LOR ug/L	Blank ug/L	Recovery %
<b>BTEX</b>			
Benzene	1.0	<1.0	125%
Toluene	1.0	<1.0	110%
Ethylbenzene	1.0	<1.0	120%
Xylene	2.0	<2.0	116%
<b>TPH</b>			
TPH C6-C9	25	<25	-
TPH C10-C14	25	<25	94%
TPH C15-C28	100	<100	102%
TPH C29-C36	100	<100	95%

Acceptable Spike recovery    BTEX and TPH C6-C9    TPH C10 - C36  
70 - 130%                      50 - 150%  
Method used                      WL 244                      WL 203

RPD= Relative Percentage Difference.  
' - ' = Not Applicable.

**Signed:**

**Koon-Bay Ho**  
**Organic Chemistry**  
**10/11/2009**

**Date:**

**THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL**



## ORGANIC QUALITY ASSURANCE REPORT

NMI Job No: DOEC01\_W/091104\_46

Sample Matrix: Liquid

Analyte	LOR ug/L	Blank ug/L	Recovery %	Acceptable Spike Recovery %
<b>PAHs</b>				
Naphthalene	0.01	<0.01	107%	21 - 133
Acenaphthylene	0.01	<0.01	-	47 - 145
Acenaphthene	0.01	<0.01	-	33 - 145
Fluorene	0.01	<0.01	110%	59 - 121
Phenanthrene	0.01	<0.01	99%	54 - 120
Anthracene	0.01	<0.01	123%	27 - 133
Fluoranthene	0.01	<0.01	-	26 - 137
Pyrene	0.01	<0.01	-	52 - 115
Benz[a]anthracene	0.01	<0.01	101%	33 - 143
Chrysene	0.01	<0.01	113%	17 - 168
Benzo[b+k]fluoranthene	0.02	<0.02	-	11 - 162
Benzo[a]pyrene	0.01	<0.01	121%	17 - 163
Indeno[1,2,3-c,d]pyrene	0.01	<0.01	-	1 - 171
Dibenz[a,h]anthracene	0.01	<0.01	100%	1 - 227
Benzo[g,h,i]perylene	0.01	<0.01	-	1 - 219

Method used : WL207

Acceptable Spike recovery is as per EPA guidelines noted above.

Acceptable RPDs on duplicates is 60%

RPD = Relative Percentage Difference.

' - ' = Not Applicable.

Signed:

Koon-Bay Ho  
Organic Chemistry, WA

Date:

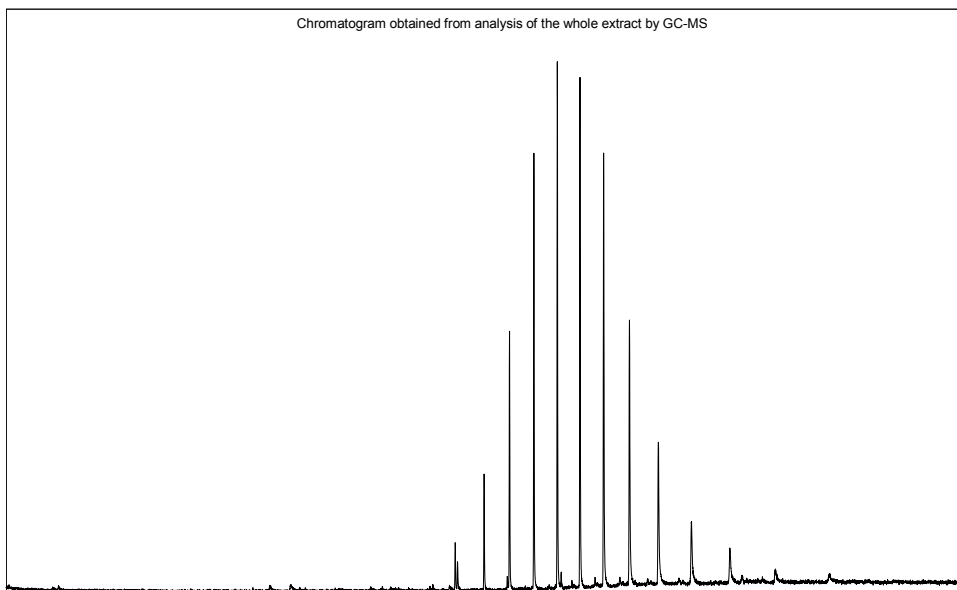
10/11/2009

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## B3 – Surface scums

Sample : DEC, SHEEN/SCUM SAMPLE, 31/10/09  
File ID : 397303X

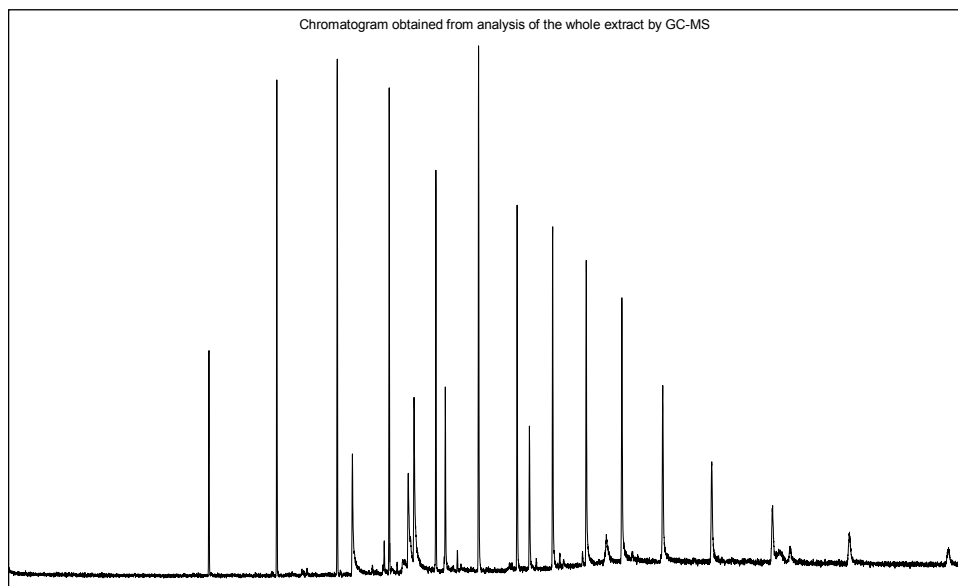
**GEOTECH**



GEOTECHNICAL SERVICES PTY LTD

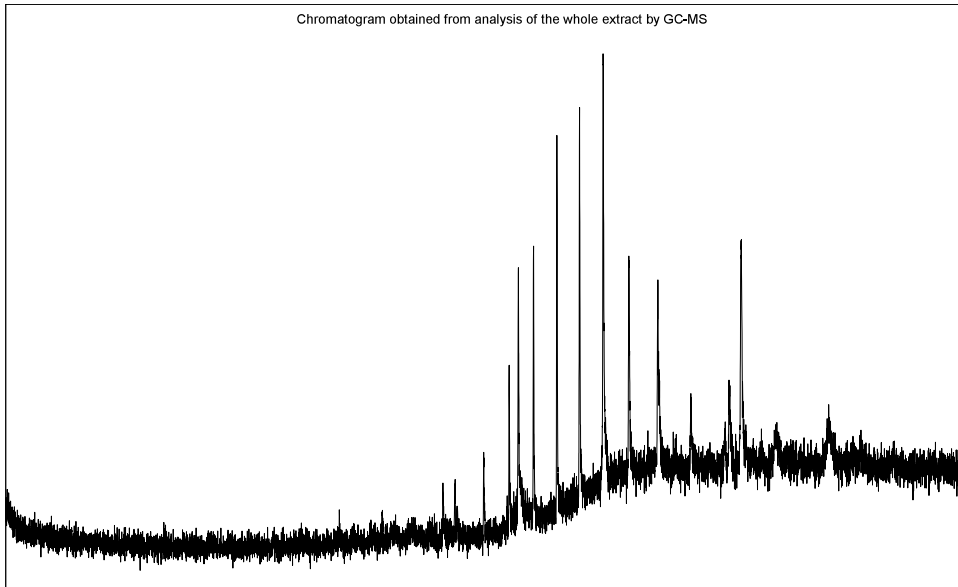
Sample : DEC, SHEEN/SCUM 2, 31/10/09  
File ID : 397301X

**GEOTECH**



GEOTECHNICAL SERVICES PTY LTD

Sample : DEC, SHEEN/SCUM SAMPLE 3, 31/10/09  
File ID : 397302X



GEOTECHNICAL SERVICES PTY LTD

# Appendix C: Analytical results and quality control data for analyses of shoreline sediment samples

## C.1 Analytical results, shoreline sediments



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### REPORT OF ANALYSIS

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Report No. RN764801

Client	: DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983	Job No.	: DOEC01_W/091104_47
Attention	: Kevin McAlpine	Quote No.	: QT-01575
Project Name	: -	Order No.	: 025123
Your Client Services Manager	: David Lynch	Date Sampled	: 27-OCT-2009
		Date Received	: 3-NOV-2009
		Sampled By	: CLIENT
		Phone	: (08) 9368 8420

Lab Reg No.	Sample Ref	Sample Description
W09/025123	DI 0-10	West Atlas Oil Baseline Survey SEDIMENT 27/10/09
W09/025124	DI 10-50	West Atlas Oil Baseline Survey SEDIMENT 27/10/09
W09/025125	KI 0-10	West Atlas Oil Baseline Survey SEDIMENT 28/10/09

Lab Reg No.			W09/025123	W09/025124	W09/025125	
Sample Reference	Units	LOR	DI 0-10	DI 10-50	KI 0-10	Method
<b>Poly Aromatic Hydrocarbons</b>						
Naphthalene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluorene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Phenanthrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluoranthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benz(a)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Chrysene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(b+k)fluoranthene	mg/kg	0.02	< 0.02	< 0.02	< 0.02	WL206
Benzo(a)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Indeno(1,2,3,c,d)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Dibenz(a,h)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(g,h,i)perylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Total PAH's (as above)	mg/kg	0.16	< 0.16	< 0.16	< 0.16	WL206
<b>BTEX</b>						
Benzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Toluene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Ethylbenzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Xylene	mg/kg	1.0	< 1.0	< 1.0	< 1.0	WL230
Total BTEX	mg/kg	2.5	< 2.5	< 2.5	< 2.5	WL230
<b>Miscellaneous</b>						
Moisture	%	0.1	1.9	2.9	3.3	WL170
<b>Total Petroleum Hydrocarbons</b>						
TPH C6 - C9	mg/kg	25	< 25	< 25	< 25	WL230

This report is issued in accordance with NATA's accreditation requirements  
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Lab Reg No.			W09/025123	W09/025124	W09/025125	
Sample Reference	Units	LOR	DI 0-10	DI 10-50	KI 0-10	Method
Total Petroleum Hydrocarbons						
TPH C10 - C14	mg/kg	50	< 50	< 50	< 50	WL230
TPH C15 - C28	mg/kg	100	< 100	< 100	< 100	WL230
TPH C29 - C36	mg/kg	100	< 100	< 100	< 100	WL230
Total TPH	mg/kg	275	< 275	< 275	< 275	WL230
Dates						
Date extracted			5-NOV-2009	5-NOV-2009	5-NOV-2009	
Date analysed			6-NOV-2009	6-NOV-2009	6-NOV-2009	
Sample condition on receipt			COLD	COLD	COLD	



Leigh Boyd - Analyst  
Organics - WA  
Accreditation No. 2474

10-NOV-2009

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Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_47 Quote No. : QT-01575 Order No. : 025123 Date Sampled : 28-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
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Lab Reg No.	Sample Ref	Sample Description
W09/025126	KI 10-50	West Atlas Oil Baseline Survey SEDIMENT 28/10/09
W09/025127	KI 0-10 DUP	West Atlas Oil Baseline Survey SEDIMENT 28/10/09
W09/025128	KI 10-50 DUP	West Atlas Oil Baseline Survey SEDIMENT 28/10/09

Lab Reg No.			W09/025126	W09/025127	W09/025128	
Sample Reference	Units	LOR	KI 10-50	KI 0-10 DUP	KI 10-50 DUP	Method
<b>Poly Aromatic Hydrocarbons</b>						
Naphthalene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluorene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Phenanthrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluoranthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benz(a)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Chrysene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(b + k)fluoranthene	mg/kg	0.02	< 0.02	< 0.02	< 0.02	WL206
Benzo(a)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Indeno(1,2,3,c,d)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Dibenz(a,h)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(g,h,i)perylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Total PAH's (as above)	mg/kg	0.16	< 0.16	< 0.16	< 0.16	WL206
<b>BTEX</b>						
Benzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Toluene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Ethylbenzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Xylene	mg/kg	1.0	< 1.0	< 1.0	< 1.0	WL230
Total BTEX	mg/kg	2.5	< 2.5	< 2.5	< 2.5	WL230
<b>Miscellaneous</b>						
Moisture	%	0.1	4.2	2.6	3.7	WL170
<b>Total Petroleum Hydrocarbons</b>						
TPH C6 - C9	mg/kg	25	< 25	< 25	< 25	WL230

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Lab Reg No.			W09/025126	W09/025127	W09/025128	
Sample Reference	Units	LOR	KI 10-50	KI 0-10 DUP	KI 10-50 DUP	Method
Total Petroleum Hydrocarbons						
TPH C10 - C14	mg/kg	50	< 50	< 50	< 50	WL230
TPH C15 - C28	mg/kg	100	< 100	< 100	< 100	WL230
TPH C29 - C36	mg/kg	100	< 100	< 100	< 100	WL230
Total TPH	mg/kg	275	< 275	< 275	< 275	WL230
Dates						
Date extracted			5-NOV-2009	5-NOV-2009	5-NOV-2009	
Date analysed			6-NOV-2009	6-NOV-2009	6-NOV-2009	
Sample condition on receipt			COLD	COLD	COLD	



Leigh Boyd - Analyst  
Organics - WA  
Accreditation No. 2474

10-NOV-2009

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Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_47 Quote No. : QT-01575 Order No. : 025123 Date Sampled : 28-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
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Lab Reg No.	Sample Ref	Sample Description
W09/025129	KI B	West Atlas Oil Baseline Survey SEDIMENT 28/10/09
W09/025130	MIS 0-10	West Atlas Oil Baseline Survey SEDIMENT 28/10/09
W09/025131	MIS 10-50	West Atlas Oil Baseline Survey SEDIMENT 28/10/09

Lab Reg No.			W09/025129	W09/025130	W09/025131	
Sample Reference	Units	LOR	KI B	MIS 0-10	MIS 10-50	Method
Poly Aromatic Hydrocarbons						
Naphthalene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluorene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Phenanthrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluoranthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benz(a)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Chrysene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(b+k)fluoranthene	mg/kg	0.02	< 0.02	< 0.02	< 0.02	WL206
Benzo(a)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Indeno(1,2,3,c,d)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Dibenz(a,h)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(g,h,i)perylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Total PAH's (as above)	mg/kg	0.16	< 0.16	< 0.16	< 0.16	WL206
BTEX						
Benzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Toluene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Ethylbenzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Xylene	mg/kg	1.0	< 1.0	< 1.0	< 1.0	WL230
Total BTEX	mg/kg	2.5	< 2.5	< 2.5	< 2.5	WL230
Miscellaneous						
Moisture	%	0.1	Not Tested	2.5	3.5	WL170
Total Petroleum Hydrocarbons						
TPH C6 - C9	mg/kg	25	< 25	< 25	< 25	WL230

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Lab Reg No.			W09/025129	W09/025130	W09/025131	
Sample Reference	Units	LOR	KI B	MIS 0-10	MIS 10-50	Method
Total Petroleum Hydrocarbons						
TPH C10 - C14	mg/kg	50	< 50	< 50	< 50	WL230
TPH C15 - C28	mg/kg	100	< 100	< 100	< 100	WL230
TPH C29 - C36	mg/kg	100	< 100	< 100	< 100	WL230
Total TPH	mg/kg	275	< 275	< 275	< 275	WL230
Dates						
Date extracted			5-NOV-2009	5-NOV-2009	5-NOV-2009	
Date analysed			6-NOV-2009	6-NOV-2009	6-NOV-2009	
Sample condition on receipt			COLD	COLD	COLD	



Leigh Boyd - Analyst  
Organics - WA  
Accreditation No. 2474

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Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_47 Quote No. : QT-01575 Order No. : 025123 Date Sampled : 28-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
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Lab Reg No.	Sample Ref	Sample Description
W09/025132	MINE 0-10	West Atlas Oil Baseline Survey SEDIMENT 28/10/09
W09/025133	MINE 10-50	West Atlas Oil Baseline Survey SEDIMENT 28/10/09
W09/025134	PI 0-10	West Atlas Oil Baseline Survey SEDIMENT 28/10/09

Lab Reg No.			W09/025132	W09/025133	W09/025134	
Sample Reference	Units	LOR	MINE 0-10	MINE 10-50	PI 0-10	Method
<b>Poly Aromatic Hydrocarbons</b>						
Naphthalene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluorene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Phenanthrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluoranthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benz(a)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Chrysene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(b+k)fluoranthene	mg/kg	0.02	< 0.02	< 0.02	< 0.02	WL206
Benzo(a)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Indeno(1,2,3,c,d)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Dibenz(a,h)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(g,h,i)perylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Total PAH's (as above)	mg/kg	0.16	< 0.16	< 0.16	< 0.16	WL206
<b>BTEX</b>						
Benzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Toluene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Ethylbenzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Xylene	mg/kg	1.0	< 1.0	< 1.0	< 1.0	WL230
Total BTEX	mg/kg	2.5	< 2.5	< 2.5	< 2.5	WL230
<b>Miscellaneous</b>						
Moisture	%	0.1	2.6	3.3	3.1	WL170
<b>Total Petroleum Hydrocarbons</b>						
TPH C6 - C9	mg/kg	25	< 25	< 25	< 25	WL230

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Lab Reg No.			W09/025132	W09/025133	W09/025134	
Sample Reference			MINE 0-10	MINE 10-50	PI 0-10	
	Units	LOR				Method
Total Petroleum Hydrocarbons						
TPH C10 - C14	mg/kg	50	< 50	< 50	< 50	WL230
TPH C15 - C28	mg/kg	100	< 100	< 100	< 100	WL230
TPH C29 - C36	mg/kg	100	< 100	< 100	< 100	WL230
Total TPH	mg/kg	275	< 275	< 275	< 275	WL230
Dates						
Date extracted			5-NOV-2009	5-NOV-2009	5-NOV-2009	
Date analysed			6-NOV-2009	6-NOV-2009	6-NOV-2009	
Sample condition on receipt			COLD	COLD	COLD	



Leigh Boyd - Analyst  
Organics - WA  
Accreditation No. 2474

10-NOV-2009

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Report No. RN764801

Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_47 Quote No. : QT-01575 Order No. : 025123 Date Sampled : 28-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
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Lab Reg No.	Sample Ref	Sample Description
W09/025135	PI 10-50	West Atlas Oil Baseline Survey SEDIMENT 28/10/09
W09/025136	PI B	West Atlas Oil Baseline Survey SEDIMENT 28/10/09
W09/025137	MOI 0-10	West Atlas Oil Baseline Survey SEDIMENT 29/10/09

Lab Reg No.			W09/025135	W09/025136	W09/025137	
Sample Reference	Units	LOR	PI 10-50	PI B	MOI 0-10	Method
<b>Poly Aromatic Hydrocarbons</b>						
Naphthalene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluorene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Phenanthrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluoranthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benz(a)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Chrysene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(b+k)fluoranthene	mg/kg	0.02	< 0.02	< 0.02	< 0.02	WL206
Benzo(a)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Indeno(1,2,3,c,d)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Dibenz(a,h)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(g,h,i)perylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Total PAH's (as above)	mg/kg	0.16	< 0.16	< 0.16	< 0.16	WL206
<b>BTEX</b>						
Benzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Toluene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Ethylbenzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Xylene	mg/kg	1.0	< 1.0	< 1.0	< 1.0	WL230
Total BTEX	mg/kg	2.5	< 2.5	< 2.5	< 2.5	WL230
<b>Miscellaneous</b>						
Moisture	%	0.1	4.2	Not Tested	5	WL170
<b>Total Petroleum Hydrocarbons</b>						
TPH C6 - C9	mg/kg	25	< 25	< 25	< 25	WL230

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Lab Reg No.			W09/O25135	W09/O25136	W09/O25137	
Sample Reference	Units	LOR	PI 10-50	PI B	MOI 0-10	Method
Total Petroleum Hydrocarbons						
TPH C10 - C14	mg/kg	50	< 50	< 50	< 50	WL230
TPH C15 - C28	mg/kg	100	< 100	< 100	< 100	WL230
TPH C29 - C36	mg/kg	100	< 100	< 100	< 100	WL230
Total TPH	mg/kg	275	< 275	< 275	< 275	WL230
Dates						
Date extracted			5-NOV-2009	5-NOV-2009	5-NOV-2009	
Date analysed			6-NOV-2009	6-NOV-2009	6-NOV-2009	
Sample condition on receipt			COLD	COLD	COLD	



Leigh Boyd - Analyst  
Organics - WA  
Accreditation No. 2474

10-NOV-2009

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Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_47 Quote No. : QT-01575 Order No. : 025123 Date Sampled : 29-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
--	---

Lab Reg No.	Sample Ref	Sample Description
W09/025138	MOI 10-50	West Atlas Oil Baseline Survey SEDIMENT 29/10/09
W09/025139	CV 0-10	West Atlas Oil Baseline Survey SEDIMENT 29/10/09
W09/025140	CV 10-50	West Atlas Oil Baseline Survey SEDIMENT 29/10/09

Lab Reg No.			W09/025138	W09/025139	W09/025140	
Sample Reference	Units	LOR	MOI 10-50	CV 0-10	CV 10-50	Method
Poly Aromatic Hydrocarbons						
Naphthalene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluorene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Phenanthrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluoranthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benz(a)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Chrysene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(b + k)fluoranthene	mg/kg	0.02	< 0.02	< 0.02	< 0.02	WL206
Benzo(a)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Indeno(1,2,3,c,d)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Dibenz(a,h)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(g,h,i)perylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Total PAH's (as above)	mg/kg	0.16	< 0.16	< 0.16	< 0.16	WL206
BTEX						
Benzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Toluene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Ethylbenzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Xylene	mg/kg	1.0	< 1.0	< 1.0	< 1.0	WL230
Total BTEX	mg/kg	2.5	< 2.5	< 2.5	< 2.5	WL230
Miscellaneous						
Moisture	%	0.1	4.6	5	5.5	WL170
Total Petroleum Hydrocarbons						
TPH C6 - C9	mg/kg	25	< 25	< 25	< 25	WL230

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Lab Reg No.			W09/025138	W09/025139	W09/025140	
Sample Reference	Units	LOR	MOI 10-50	CV 0-10	CV 10-50	Method
Total Petroleum Hydrocarbons						
TPH C10 - C14	mg/kg	50	< 50	< 50	< 50	WL230
TPH C15 - C28	mg/kg	100	< 100	< 100	< 100	WL230
TPH C29 - C36	mg/kg	100	< 100	< 100	< 100	WL230
Total TPH	mg/kg	275	< 275	< 275	< 275	WL230
Dates						
Date extracted			5-NOV-2009	5-NOV-2009	5-NOV-2009	
Date analysed			6-NOV-2009	6-NOV-2009	6-NOV-2009	
Sample condition on receipt			COLD	COLD	COLD	



Leigh Boyd - Analyst  
Organics - WA  
Accreditation No. 2474

10-NOV-2009

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Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_47 Quote No. : QT-01575 Order No. : 025123 Date Sampled : 29-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
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Lab Reg No.	Sample Ref	Sample Description
W09/025141	II 0-10	West Atlas Oil Baseline Survey SEDIMENT 29/10/09
W09/025142	II 10-50	West Atlas Oil Baseline Survey SEDIMENT 29/10/09
W09/025143	CIE 0-10	West Atlas Oil Baseline Survey SEDIMENT 29/10/09

Lab Reg No.			W09/025141	W09/025142	W09/025143	
Sample Reference	Units	LOR	II 0-10	II 10-50	CIE 0-10	Method
<b>Poly Aromatic Hydrocarbons</b>						
Naphthalene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluorene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Phenanthrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluoranthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benz(a)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Chrysene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(b + k)fluoranthene	mg/kg	0.02	< 0.02	< 0.02	< 0.02	WL206
Benzo(a)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Indeno(1,2,3,c,d)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Dibenz(a,h)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(g,h,i)perylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Total PAH's (as above)	mg/kg	0.16	< 0.16	< 0.16	< 0.16	WL206
<b>BTEX</b>						
Benzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Toluene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Ethylbenzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Xylene	mg/kg	1.0	< 1.0	< 1.0	< 1.0	WL230
Total BTEX	mg/kg	2.5	< 2.5	< 2.5	< 2.5	WL230
<b>Miscellaneous</b>						
Moisture	%	0.1	4.7	4.7	2.8	WL170
<b>Total Petroleum Hydrocarbons</b>						
TPH C6 - C9	mg/kg	25	< 25	< 25	< 25	WL230

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Lab Reg No.			W09/025141	W09/025142	W09/025143	
Sample Reference			II 0-10	II 10-50	CIE 0-10	
	Units	LOR				Method
Total Petroleum Hydrocarbons						
TPH C10 - C14	mg/kg	50	< 50	< 50	< 50	WL230
TPH C15 - C28	mg/kg	100	< 100	< 100	< 100	WL230
TPH C29 - C36	mg/kg	100	< 100	< 100	< 100	WL230
Total TPH	mg/kg	275	< 275	< 275	< 275	WL230
Dates						
Date extracted			5-NOV-2009	5-NOV-2009	5-NOV-2009	
Date analysed			6-NOV-2009	7-NOV-2009	7-NOV-2009	
Sample condition on receipt			COLD	COLD	COLD	



Leigh Boyd - Analyst  
Organics - WA  
Accreditation No. 2474

10-NOV-2009

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Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_47 Quote No. : QT-01575 Order No. : 025123 Date Sampled : 29-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
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Lab Reg No.	Sample Ref	Sample Description
W09/025144	CIE 10-50	West Atlas Oil Baseline Survey SEDIMENT 29/10/09
W09/025145	CIS 0-10	West Atlas Oil Baseline Survey SEDIMENT 29/10/09
W09/025146	CIS 10-50	West Atlas Oil Baseline Survey SEDIMENT 29/10/09

Lab Reg No.			W09/025144	W09/025145	W09/025146	
Sample Reference	Units	LOR	CIE 10-50	CIS 0-10	CIS 10-50	Method
<b>Poly Aromatic Hydrocarbons</b>						
Naphthalene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluorene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Phenanthrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluoranthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benz(a)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Chrysene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(b + k)fluoranthene	mg/kg	0.02	< 0.02	< 0.02	< 0.02	WL206
Benzo(a)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Indeno(1,2,3,c,d)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Dibenz(a,h)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(g,h,i)perylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Total PAH's (as above)	mg/kg	0.16	< 0.16	< 0.16	< 0.16	WL206
<b>BTEX</b>						
Benzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Toluene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Ethylbenzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Xylene	mg/kg	1.0	< 1.0	< 1.0	< 1.0	WL230
Total BTEX	mg/kg	2.5	< 2.5	< 2.5	< 2.5	WL230
<b>Miscellaneous</b>						
Moisture	%	0.1	4.8	3.6	4.3	WL170
<b>Total Petroleum Hydrocarbons</b>						
TPH C6 - C9	mg/kg	25	< 25	< 25	< 25	WL230

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Lab Reg No.			W09/025144	W09/025145	W09/025146	
Sample Reference			CIE 10-50	CIS 0-10	CIS 10-50	
	Units	LOR				Method
Total Petroleum Hydrocarbons						
TPH C10 - C14	mg/kg	50	< 50	< 50	< 50	WL230
TPH C15 - C28	mg/kg	100	< 100	< 100	< 100	WL230
TPH C29 - C36	mg/kg	100	< 100	< 100	< 100	WL230
Total TPH	mg/kg	275	< 275	< 275	< 275	WL230
Dates						
Date extracted			5-NOV-2009	5-NOV-2009	5-NOV-2009	
Date analysed			7-NOV-2009	7-NOV-2009	7-NOV-2009	
Sample condition on receipt			COLD	COLD	COLD	



Leigh Boyd - Analyst  
Organics - WA  
Accreditation No. 2474

10-NOV-2009

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Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_47 Quote No. : QT-01575 Order No. : 025123 Date Sampled : 30-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
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Lab Reg No.	Sample Ref	Sample Description
W09/025147	LR 0-10	West Atlas Oil Baseline Survey SEDIMENT 30/10/09
W09/025148	LR 10-50	West Atlas Oil Baseline Survey SEDIMENT 30/10/09
W09/025149	CBE 0-10	West Atlas Oil Baseline Survey SEDIMENT 30/10/09

Lab Reg No.			W09/025147	W09/025148	W09/025149	
Sample Reference	Units	LOR	LR 0-10	LR 10-50	CBE 0-10	Method
<b>Poly Aromatic Hydrocarbons</b>						
Naphthalene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluorene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Phenanthrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluoranthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benz(a)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Chrysene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(b + k)fluoranthene	mg/kg	0.02	< 0.02	< 0.02	< 0.02	WL206
Benzo(a)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Indeno(1,2,3,c,d)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Dibenz(a,h)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(g,h,i)perylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Total PAH's (as above)	mg/kg	0.16	< 0.16	< 0.16	< 0.16	WL206
<b>BTEX</b>						
Benzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Toluene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Ethylbenzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Xylene	mg/kg	1.0	< 1.0	< 1.0	< 1.0	WL230
Total BTEX	mg/kg	2.5	< 2.5	< 2.5	< 2.5	WL230
<b>Miscellaneous</b>						
Moisture	%	0.1	3.3	4.7	3.6	WL170
<b>Total Petroleum Hydrocarbons</b>						
TPH C6 - C9	mg/kg	25	< 25	< 25	< 25	WL230

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Lab Reg No.			W09/025147	W09/025148	W09/025149	
Sample Reference	Units	LOR	LR 0-10	LR 10-50	CBE 0-10	Method
Total Petroleum Hydrocarbons						
TPH C10 - C14	mg/kg	50	< 50	< 50	< 50	WL230
TPH C15 - C28	mg/kg	100	< 100	< 100	< 100	WL230
TPH C29 - C36	mg/kg	100	< 100	< 100	< 100	WL230
Total TPH	mg/kg	275	< 275	< 275	< 275	WL230
Dates						
Date extracted			5-NOV-2009	5-NOV-2009	5-NOV-2009	
Date analysed			7-NOV-2009	7-NOV-2009	7-NOV-2009	
Sample condition on receipt			COLD	COLD	COLD	



Leigh Boyd - Analyst  
Organics - WA  
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Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_47 Quote No. : QT-01575 Order No. : 025123 Date Sampled : 30-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
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Lab Reg No.	Sample Ref	Sample Description
W09/025150	CBE 10-50	West Atlas Oil Baseline Survey SEDIMENT 30/10/09
W09/025151	CBE 0-10 DUP	West Atlas Oil Baseline Survey SEDIMENT 30/10/09
W09/025152	CBE 10-50 DUP	West Atlas Oil Baseline Survey SEDIMENT 30/10/09

Lab Reg No.			W09/025150	W09/025151	W09/025152	
Sample Reference	Units	LOR	CBE 10-50	CBE 0-10 DUP	CBE 10-50 DU	Method
<b>Poly Aromatic Hydrocarbons</b>						
Naphthalene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluorene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Phenanthrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluoranthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benz(a)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Chrysene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(b + k)fluoranthene	mg/kg	0.02	< 0.02	< 0.02	< 0.02	WL206
Benzo(a)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Indeno(1,2,3,c,d)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Dibenz(a,h)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(g,h,i)perylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Total PAH's (as above)	mg/kg	0.16	< 0.16	< 0.16	< 0.16	WL206
<b>BTEX</b>						
Benzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Toluene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Ethylbenzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Xylene	mg/kg	1.0	< 1.0	< 1.0	< 1.0	WL230
Total BTEX	mg/kg	2.5	< 2.5	< 2.5	< 2.5	WL230
<b>Miscellaneous</b>						
Moisture	%	0.1	5.2	3.6	5.4	WL170
<b>Total Petroleum Hydrocarbons</b>						
TPH C6 - C9	mg/kg	25	< 25	< 25	< 25	WL230

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Lab Reg No.			W09/025150	W09/025151	W09/025152	
Sample Reference	Units	LOR	CBE 10-50	CBE 0-10 DUP	CBE 10-50 DU	Method
Total Petroleum Hydrocarbons						
TPH C10 - C14	mg/kg	50	< 50	< 50	< 50	WL230
TPH C15 - C28	mg/kg	100	< 100	< 100	< 100	WL230
TPH C29 - C36	mg/kg	100	< 100	< 100	< 100	WL230
Total TPH	mg/kg	275	< 275	< 275	< 275	WL230
Dates						
Date extracted			5-NOV-2009	5-NOV-2009	5-NOV-2009	
Date analysed			7-NOV-2009	7-NOV-2009	7-NOV-2009	
Sample condition on receipt			COLD	COLD	COLD	



Leigh Boyd - Analyst  
Organics - WA  
Accreditation No. 2474

10-NOV-2009

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Report No. RN764801

Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_47 Quote No. : QT-01575 Order No. : 025123 Date Sampled : 30-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
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Lab Reg No.	Sample Ref	Sample Description
W09/025153	CBE B	West Atlas Oil Baseline Survey SEDIMENT 30/10/09
W09/025154	TRI 0-10	West Atlas Oil Baseline Survey SEDIMENT 31/10/09
W09/025155	TRI 10-50	West Atlas Oil Baseline Survey SEDIMENT 31/10/09

Lab Reg No.			W09/025153	W09/025154	W09/025155	
Sample Reference	Units	LOR	CBE B	TRI 0-10	TRI 10-50	Method
<b>Poly Aromatic Hydrocarbons</b>						
Naphthalene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluorene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Phenanthrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluoranthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benz(a)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Chrysene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(b+k)fluoranthene	mg/kg	0.02	< 0.02	< 0.02	< 0.02	WL206
Benzo(a)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Indeno(1,2,3,c,d)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Dibenz(a,h)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(g,h,i)perylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Total PAH's (as above)	mg/kg	0.16	< 0.16	< 0.16	< 0.16	WL206
<b>BTEX</b>						
Benzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Toluene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Ethylbenzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Xylene	mg/kg	1.0	< 1.0	< 1.0	< 1.0	WL230
Total BTEX	mg/kg	2.5	< 2.5	< 2.5	< 2.5	WL230
<b>Miscellaneous</b>						
Moisture	%	0.1	Not Tested	3.2	5.2	WL170
<b>Total Petroleum Hydrocarbons</b>						
TPH C6 - C9	mg/kg	25	< 25	< 25	< 25	WL230

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## REPORT OF ANALYSIS

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Lab Reg No.			W09/025153	W09/025154	W09/025155	
Sample Reference	Units	LOR	CBE B	TRI 0-10	TRI 10-50	Method
Total Petroleum Hydrocarbons						
TPH C10 - C14	mg/kg	50	< 50	< 50	< 50	WL230
TPH C15 - C28	mg/kg	100	< 100	< 100	< 100	WL230
TPH C29 - C36	mg/kg	100	< 100	< 100	< 100	WL230
Total TPH	mg/kg	275	< 275	< 275	< 275	WL230
Dates						
Date extracted			5-NOV-2009	5-NOV-2009	5-NOV-2009	
Date analysed			7-NOV-2009	7-NOV-2009	7-NOV-2009	
Sample condition on receipt			COLD	COLD	COLD	



Leigh Boyd - Analyst  
Organics - WA  
Accreditation No. 2474

10-NOV-2009

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## REPORT OF ANALYSIS

Page: 23 of 28  
Report No. RN764801

Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOECO1_W/091104_47 Quote No. : QT-01575 Order No. : 025123 Date Sampled : 30-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
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Lab Reg No.	Sample Ref	Sample Description
W09/025156	NEI 0-10	West Atlas Oil Baseline Survey SEDIMENT 30/10/09
W09/025157	NEI 10-50	West Atlas Oil Baseline Survey SEDIMENT 30/10/09
W09/025158	SGMI 0-10	West Atlas Oil Baseline Survey SEDIMENT 31/10/09

Lab Reg No.			W09/025156	W09/025157	W09/025158	
Sample Reference	Units	LOR	NEI 0-10	NEI 10-50	SGMI 0-10	Method
<b>Poly Aromatic Hydrocarbons</b>						
Naphthalene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluorene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Phenanthrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluoranthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benz(a)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Chrysene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(b+k)fluoranthene	mg/kg	0.02	< 0.02	< 0.02	< 0.02	WL206
Benzo(a)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Indeno(1,2,3,c,d)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Dibenz(a,h)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(g,h,i)perylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Total PAH's (as above)	mg/kg	0.16	< 0.16	< 0.16	< 0.16	WL206
<b>BTEX</b>						
Benzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Toluene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Ethylbenzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Xylene	mg/kg	1.0	< 1.0	< 1.0	< 1.0	WL230
Total BTEX	mg/kg	2.5	< 2.5	< 2.5	< 2.5	WL230
<b>Miscellaneous</b>						
Moisture	%	0.1	3.3	5.8	2.9	WL170
<b>Total Petroleum Hydrocarbons</b>						
TPH C6 - C9	mg/kg	25	< 25	< 25	< 25	WL230

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Lab Reg No.			W09/025156	W09/025157	W09/025158	
Sample Reference	Units	LOR	NEI 0-10	NEI 10-50	SGMI 0-10	Method
Total Petroleum Hydrocarbons						
TPH C10 - C14	mg/kg	50	< 50	< 50	< 50	WL230
TPH C15 - C28	mg/kg	100	< 100	< 100	< 100	WL230
TPH C29 - C36	mg/kg	100	< 100	< 100	< 100	WL230
Total TPH	mg/kg	275	< 275	< 275	< 275	WL230
Dates						
Date extracted			5-NOV-2009	5-NOV-2009	5-NOV-2009	
Date analysed			7-NOV-2009	7-NOV-2009	7-NOV-2009	
Sample condition on receipt			COLD	COLD	COLD	



Leigh Boyd - Analyst  
Organics - WA  
Accreditation No. 2474

10-NOV-2009

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## REPORT OF ANALYSIS

Page: 25 of 28  
Report No. RN764801

Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_47 Quote No. : QT-01575 Order No. : 025123 Date Sampled : 30-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
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Lab Reg No.	Sample Ref	Sample Description
W09/025159	SGMI 10-50	West Atlas Oil Baseline Survey SEDIMENT 31/10/09
W09/025160	STI 0-10	West Atlas Oil Baseline Survey SEDIMENT 31/10/09
W09/025161	STI 10-50	West Atlas Oil Baseline Survey SEDIMENT 31/10/09

Lab Reg No.			W09/025159	W09/025160	W09/025161	
Sample Reference	Units	LOR	SGMI 10-50	STI 0-10	STI 10-50	Method
<b>Poly Aromatic Hydrocarbons</b>						
Naphthalene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Acenaphthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluorene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Phenanthrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Fluoranthene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benz(a)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Chrysene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(b+k)fluoranthene	mg/kg	0.02	< 0.02	< 0.02	< 0.02	WL206
Benzo(a)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Indeno(1,2,3,c,d)pyrene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Dibenz(a,h)anthracene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Benzo(g,h,i)perylene	mg/kg	0.01	< 0.01	< 0.01	< 0.01	WL206
Total PAH's (as above)	mg/kg	0.16	< 0.16	< 0.16	< 0.16	WL206
<b>BTEX</b>						
Benzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Toluene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Ethylbenzene	mg/kg	0.50	< 0.50	< 0.50	< 0.50	WL230
Xylene	mg/kg	1.0	< 1.0	< 1.0	< 1.0	WL230
Total BTEX	mg/kg	2.5	< 2.5	< 2.5	< 2.5	WL230
<b>Miscellaneous</b>						
Moisture	%	0.1	5.4	4.6	6.5	WL170
<b>Total Petroleum Hydrocarbons</b>						
TPH C6 - C9	mg/kg	25	< 25	< 25	< 25	WL230

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## REPORT OF ANALYSIS

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Lab Reg No.			W09/025159	W09/025160	W09/025161	
Sample Reference	Units	LOR	SGMI 10-50	STI 0-10	STI 10-50	Method
Total Petroleum Hydrocarbons						
TPH C10 - C14	mg/kg	50	< 50	< 50	< 50	WL230
TPH C15 - C28	mg/kg	100	< 100	< 100	< 100	WL230
TPH C29 - C36	mg/kg	100	< 100	< 100	< 100	WL230
Total TPH	mg/kg	275	< 275	< 275	< 275	WL230
Dates						
Date extracted			5-NOV-2009	5-NOV-2009	5-NOV-2009	
Date analysed			7-NOV-2009	7-NOV-2009	7-NOV-2009	
Sample condition on receipt			COLD	COLD	COLD	



Leigh Boyd - Analyst  
Organics - WA  
Accreditation No. 2474

10-NOV-2009

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## REPORT OF ANALYSIS

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Report No. RN764801

Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOECO1_W/091104_47 Quote No. : QT-01575 Order No. : 025123 Date Sampled : 29-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
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Lab Reg No.	Sample Ref	Sample Description
W09/025162	CIE Strained	West Atlas Oil Baseline Survey SEDIMENT 29/10/09

Lab Reg No.	Sample Reference	Units	LOR	W09/025162 CIE Strained	Method
<b>Poly Aromatic Hydrocarbons</b>					
Naphthalene	mg/kg	0.01	< 0.01		WL206
Acenaphthylene	mg/kg	0.01	< 0.01		WL206
Acenaphthene	mg/kg	0.01	< 0.01		WL206
Fluorene	mg/kg	0.01	< 0.01		WL206
Phenanthrene	mg/kg	0.01	< 0.01		WL206
Anthracene	mg/kg	0.01	< 0.01		WL206
Fluoranthene	mg/kg	0.01	< 0.01		WL206
Pyrene	mg/kg	0.01	< 0.01		WL206
Benz(a)anthracene	mg/kg	0.01	< 0.01		WL206
Chrysene	mg/kg	0.01	< 0.01		WL206
Benzo(b+k)fluoranthene	mg/kg	0.02	< 0.02		WL206
Benzo(a)pyrene	mg/kg	0.01	< 0.01		WL206
Indeno(1,2,3,c,d)pyrene	mg/kg	0.01	< 0.01		WL206
Dibenz(a,h)anthracene	mg/kg	0.01	< 0.01		WL206
Benzo(g,h,i)perylene	mg/kg	0.01	< 0.01		WL206
Total PAH's (as above)	mg/kg	0.16	< 0.16		WL206
<b>BTEX</b>					
Benzene	mg/kg	0.50	< 0.50		WL230
Toluene	mg/kg	0.50	< 0.50		WL230
Ethylbenzene	mg/kg	0.50	< 0.50		WL230
Xylene	mg/kg	1.0	< 1.0		WL230
Total BTEX	mg/kg	2.5	< 2.5		WL230
<b>Miscellaneous</b>					
Moisture	%	0.1	7.9		WL170
<b>Total Petroleum Hydrocarbons</b>					
TPH C6 - C9	mg/kg	25	< 25		WL230
TPH C10 - C14	mg/kg	50	< 50		WL230
TPH C15 - C28	mg/kg	100	< 100		WL230
TPH C29 - C36	mg/kg	100	< 100		WL230
Total TPH	mg/kg	275	< 275		WL230

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## REPORT OF ANALYSIS

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Lab Reg No.			W09/025162			
Sample Reference	Units	LOR	CIE Strained			Method
Dates						
Date extracted			5-NOV-2009			
Date analysed			7-NOV-2009			
Sample condition on receipt			COLD			



Leigh Boyd - Analyst  
Organics - WA  
Accreditation No. 2474

10-NOV-2009

All results (except moisture) are expressed on a dry weight basis. Unless notified to the contrary, the above samples will be disposed of one month from the reporting date.



This report is issued in accordance with NATA's accreditation requirements.  
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This report shall not be reproduced except in full.  
Results relate only to the sample(s) tested.

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## C.2 Quality assurance reports, shoreline sediments



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page 1 of 3

### ORGANIC QUALITY ASSURANCE REPORT

NMI Job No: DOEC01\_W/091104\_47

Sample Matrix: Solid

Analyte	LOR mg/kg	Blank mg/kg	Sample Duplicates		RPD %	Recovery %
			Sample mg/kg	Duplicate mg/kg		
<b>BTEX</b>			<b>W09/025130</b>			
Benzene	0.50	<0.50	<0.50	<0.50	-	102%
Toluene	0.50	<0.50	<0.50	<0.50	-	100%
Ethylbenzene	0.50	<0.50	<0.50	<0.50	-	93%
Xylene	1.0	<1.0	<1.0	<1.0	-	99%
<b>TPH</b>						
TPH C6-C9	25	<25	<25	<25	-	101%
TPH C10-C14	50	<50	<50	<50	-	106%
TPH C15-C28	100	<100	<100	<100	-	105%
TPH C29-C36	100	<100	<100	<100	-	107%

Analyte	Sample Duplicates			Sample Duplicates			Sample Duplicates		
	Sample mg/kg	Duplicate mg/kg	RPD %	Sample mg/kg	Duplicate mg/kg	RPD %	Sample mg/kg	Duplicate mg/kg	RPD %
<b>BTEX</b>	<b>W09/025140</b>			<b>W09/025150</b>			<b>W09/025160</b>		
Benzene	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-
Toluene	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-
Ethylbenzene	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-
Xylene	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-
<b>TPH</b>									
TPH C6-C9	<25	<25	-	<25	<25	-	<25	<25	-
TPH C10-C14	<50	<50	-	<50	<50	-	<50	<50	-
TPH C15-C28	<100	<100	-	<100	<100	-	<100	<100	-
TPH C29-C36	<100	<100	-	<100	<100	-	<100	<100	-

	BTEX and TPH C6-C9	TPH C10 - C36
Acceptable Spike Recovery	70 - 130%	50 - 150%
Acceptable Duplicate RPD	60%	60%
Method used	WL 230	WL 230

Results expressed in percentage (%) or mg/kg wherever appropriate on dry weight basis.

RPD = Relative Percentage Difference.

'-' = Not Applicable.

Signed:

**Koon-Bay Ho**  
**Organic Chemistry**

Date:

**10/11/2009**

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**ORGANIC QUALITY ASSURANCE REPORT**

NMI Job No: DOEC01\_W/091104\_47

Sample Matrix Solid

Analyte	LOR	Blank	Sample Duplicates			Recovery	Acceptable
			Sample	Duplicate	RPD		
	mg/kg	mg/kg	mg/kg	mg/kg	%	%	Recovery %
<b>PAHs</b>			<b>W09/025130</b>				
Naphthalene	0.01	<0.01	<0.01	<0.01	-	104%	21 - 133
Acenaphthylene	0.01	<0.01	<0.01	<0.01	-	-	47 - 145
Acenaphthene	0.01	<0.01	<0.01	<0.01	-	-	33 - 145
Fluorene	0.01	<0.01	<0.01	<0.01	-	113%	59 - 121
Phenanthrene	0.01	<0.01	<0.01	<0.01	-	93%	54 - 120
Anthracene	0.01	<0.01	<0.01	<0.01	-	103%	27 - 133
Fluoranthene	0.01	<0.01	<0.01	<0.01	-	-	26 - 137
Pyrene	0.01	<0.01	<0.01	<0.01	-	-	52 - 115
Benz[a]anthracene	0.01	<0.01	<0.01	<0.01	-	109%	33 - 143
Chrysene	0.01	<0.01	<0.01	<0.01	-	104%	17 - 168
Benzo[b+k]fluoranthene	0.02	<0.02	<0.02	<0.02	-	-	11 - 162
Benzo[a]pyrene	0.01	<0.01	<0.01	<0.01	-	113%	17 - 163
Indeno[1,2,3-c,d]pyrene	0.01	<0.01	<0.01	<0.01	-	-	1 - 171
Dibenz[a,h]anthracene	0.01	<0.01	<0.01	<0.01	-	125%	1 - 227
Benzo[g,h,i]perylene	0.01	<0.01	<0.01	<0.01	-	-	1 - 219

Analyte	Sample Duplicates			Sample Duplicates		
	Sample	Duplicate	RPD	Sample	Duplicate	RPD
	mg/kg	mg/kg	%	mg/kg	mg/kg	%
<b>PAHs</b>	<b>W09/025140</b>			<b>W09/025150</b>		
Naphthalene	<0.01	<0.01	-	<0.01	<0.01	-
Acenaphthylene	<0.01	<0.01	-	<0.01	<0.01	-
Acenaphthene	<0.01	<0.01	-	<0.01	<0.01	-
Fluorene	<0.01	<0.01	-	<0.01	<0.01	-
Phenanthrene	<0.01	<0.01	-	<0.01	<0.01	-
Anthracene	<0.01	<0.01	-	<0.01	<0.01	-
Fluoranthene	<0.01	<0.01	-	<0.01	<0.01	-
Pyrene	<0.01	<0.01	-	<0.01	<0.01	-
Benz[a]anthracene	<0.01	<0.01	-	<0.01	<0.01	-
Chrysene	<0.01	<0.01	-	<0.01	<0.01	-
Benzo[b+k]fluoranthene	<0.02	<0.02	-	<0.02	<0.02	-
Benzo[a]pyrene	<0.01	<0.01	-	<0.01	<0.01	-
Indeno[1,2,3-c,d]pyrene	<0.01	<0.01	-	<0.01	<0.01	-
Dibenz[a,h]anthracene	<0.01	<0.01	-	<0.01	<0.01	-
Benzo[g,h,i]perylene	<0.01	<0.01	-	<0.01	<0.01	-

Method used : WL206

Results expressed in percentage (%) or mg/kg wherever appropriate on dry weight basis.

Acceptable Spike recovery is as per EPA guidelines noted above.

Acceptable RPDs on duplicates is 60%

RPD = Relative Percentage Difference.

'-' = Not Applicable.

Signed:

Koon-Bay Ho  
Organic Chemistry, WA

Date:

10/11/2009

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### ORGANIC QUALITY ASSURANCE REPORT

NMI Job No: DOEC01\_W/091104\_47

Sample Matrix Solid

Analyte	LOR	Blank	Sample Duplicates		
	mg/kg	mg/kg	Sample mg/kg	Duplicate mg/kg	RPD %
<b>PAHs</b>			<b>W09/025160</b>		
Naphthalene	0.01	<0.01	<0.01	<0.01	-
Acenaphthylene	0.01	<0.01	<0.01	<0.01	-
Acenaphthene	0.01	<0.01	<0.01	<0.01	-
Fluorene	0.01	<0.01	<0.01	<0.01	-
Phenanthrene	0.01	<0.01	<0.01	<0.01	-
Anthracene	0.01	<0.01	<0.01	<0.01	-
Fluoranthene	0.01	<0.01	<0.01	<0.01	-
Pyrene	0.01	<0.01	<0.01	<0.01	-
Benz[a]anthracene	0.01	<0.01	<0.01	<0.01	-
Chrysene	0.01	<0.01	<0.01	<0.01	-
Benzo[b+k]fluoranthene	0.02	<0.02	<0.02	<0.02	-
Benzo[a]pyrene	0.01	<0.01	<0.01	<0.01	-
Indeno[1,2,3-c,d]pyrene	0.01	<0.01	<0.01	<0.01	-
Dibenz[a,h]anthracene	0.01	<0.01	<0.01	<0.01	-
Benzo[g,h,i]perylene	0.01	<0.01	<0.01	<0.01	-

Method used : WL206

Results expressed in percentage (%) or mg/kg wherever appropriate on dry weight basis.

Acceptable Spike recovery is as per EPA guidelines noted above.

Acceptable RPDs on duplicates is 60%

RPD = Relative Percentage Difference.

' - ' = Not Applicable.

Signed:

Koon-Bay Ho  
Organic Chemistry, WA

Date:

10/11/2009

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# Appendix D: Analytical results and quality control data for analyses of oyster samples

## D.1 Analytical results, oysters



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### REPORT OF ANALYSIS

Page: 1 of 15  
Report No. RN768875

Client	: DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983	Job No.	: DOEC01_W/091104_48
Attention	: Kevin McAlpine	Quote No.	: QT-01534
Project Name	: -	Order No.	: 025163
Your Client Services Manager	: David Lynch	Date Sampled	: 27-OCT-2009
		Date Received	: 3-NOV-2009
		Sampled By	: CLIENT
		Phone	: (08) 9368 8420

Lab Reg No.	Sample Ref	Sample Description
W09/025163	DI	West Atlas Oil Baseline Survey OYSTER FLESH 27/10/09
W09/025164	PG	West Atlas Oil Baseline Survey OYSTER FLESH 27/10/09
W09/025165	MIS	West Atlas Oil Baseline Survey OYSTER FLESH 28/10/09

Lab Reg No.	Units	LOR	W09/025163	W09/025164	W09/025165	Method
Sample Reference			DI	PG	MIS	
Poly Aromatic Hydrocarbons						
Naphthalene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Acenaphthylene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Acenaphthene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Fluorene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Phenanthrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Anthracene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Fluoranthene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Pyrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Benz(a)anthracene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Chrysene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg		< 0.02	< 0.02	< 0.02	NGCMS_1111
Benzo(a)pyrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Dibenz(ah)anthracene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Benzo(ghi)perylene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
BTEX						
Benzene	mg/kg		< 0.5	< 0.5	< 0.5	NGCMS_1121
Toluene	mg/kg		< 0.5	< 0.5	< 0.5	NGCMS_1121
Ethyl Benzene	mg/kg		< 0.5	< 0.5	< 0.5	NGCMS_1121
m, p - Xylene	mg/kg		< 1	< 1	< 1	NGCMS_1121
o - Xylene	mg/kg		< 0.5	< 0.5	< 0.5	NGCMS_1121
Total Petroleum Hydrocarbons						
TPH C6 - C9	mg/kg		< 25	< 25	< 25	NGCMS_1121
TPH C10 - C14	mg/kg		< 50	< 50	< 50	NGCMS_1112
TPH C15 - C28	mg/kg		680	490	1200	NGCMS_1112
TPH C29 - C36	mg/kg		380	330	460	NGCMS_1112

This report is issued in accordance with NATA's accreditation requirements  
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## REPORT OF ANALYSIS

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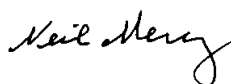
Lab Reg No.			W09/025163	W09/025164	W09/025165	
Sample Reference			DI	PG	MIS	
	Units	LOR				Method
Surrogate						
Surrogate semivolatiles Rec.	%		131	126	124	
Surrogate volatile Rec	%		102	107	106	
Dates						
Date extracted			10-NOV-2009	10-NOV-2009	10-NOV-2009	
Date analysed			12-NOV-2009	12-NOV-2009	12-NOV-2009	



Luke Baker, Analyst  
Organics - NSW  
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Lab Reg No.			W09/025163	W09/025164	W09/025165	
Sample Reference			DI	PG	MIS	
	Units	LOR				Method
Proximates						
Moisture	g/100g		78.9	86.3	73.8	VL298
Fat (Soxhlet)	g/100g		1.6	0.3	2.3	VL300



Neil Menz, Analyst  
Food Composition - Vic  
Accreditation No. 89

2-DEC-2009

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Report No. RN768875

Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_48 Quote No. : QT-01534 Order No. : 025163 Date Sampled : 28-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
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Lab Reg No.	Sample Ref	Sample Description
W09/025166	MIS DUP	West Atlas Oil Baseline Survey OYSTER FLESH 28/10/09
W09/025167	MINE	West Atlas Oil Baseline Survey OYSTER FLESH 28/10/09
W09/025168	PI	West Atlas Oil Baseline Survey OYSTER FLESH 28/10/09

Lab Reg No.			W09/025166	W09/025167	W09/025168	
Sample Reference	Units	LOR	MIS DUP	MINE	PI	Method
<b>Poly Aromatic Hydrocarbons</b>						
Naphthalene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Acenaphthylene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Acenaphthene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Fluorene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Phenanthrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Anthracene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Fluoranthene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Pyrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Benz(a)anthracene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Chrysene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg		< 0.02	< 0.02	< 0.02	NGCMS_1111
Benzo(a)pyrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Dibenz(ah)anthracene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Benzo(ghi)perylene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
<b>BTEX</b>						
Benzene	mg/kg		< 0.5	< 0.5	Not Tested	NGCMS_1121
Toluene	mg/kg		< 0.5	< 0.5	Not Tested	NGCMS_1121
Ethyl Benzene	mg/kg		< 0.5	< 0.5	Not Tested	NGCMS_1121
m, p - Xylene	mg/kg		< 1	< 1	Not Tested	NGCMS_1121
o - Xylene	mg/kg		< 0.5	< 0.5	Not Tested	NGCMS_1121
<b>Total Petroleum Hydrocarbons</b>						
TPH C6 - C9	mg/kg		< 25	< 25	Not Tested	NGCMS_1121
TPH C10 - C14	mg/kg		< 50	< 50	< 50	NGCMS_1112
TPH C15 - C28	mg/kg		1200	1100	1000	NGCMS_1112
TPH C29 - C36	mg/kg		510	500	630	NGCMS_1112

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Lab Reg No.			W09/025166	W09/025167	W09/025168	
Sample Reference			MIS DUP	MINE	PI	
	Units	LOR				Method
Surrogate						
Surrogate semivolatiles Rec.	%		126	124	117	
Surrogate volatile Rec	%		106	109	Not Tested	
Dates						
Date extracted			10-NOV-2009	10-NOV-2009	10-NOV-2009	
Date analysed			12-NOV-2009	12-NOV-2009	12-NOV-2009	

W09/025166

W09/025168

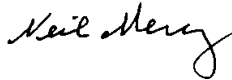
Insufficient mass of Sample W09/025168 was provided to undertake TPH C6-C9 and BTEX analysis.



Luke Baker, Analyst  
Organics - NSW  
Accreditation No. 198

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Lab Reg No.			W09/025166	W09/025167	W09/025168	
Sample Reference			MIS DUP	MINE	PI	
	Units	LOR				Method
Proximates						
Moisture	g/100g		76.1	76.2	Not Tested	VL298
Fat (Soxhlet)	g/100g		2.4	1.1	Not Tested	VL300



Neil Menz, Analyst  
Food Composition - Vic  
Accreditation No. 89

2-DEC-2009

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Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_48 Quote No. : QT-01534 Order No. : 025163 Date Sampled : 29-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
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Lab Reg No.	Sample Ref	Sample Description
W09/025169	CV	West Atlas Oil Baseline Survey OYSTER FLESH 29/10/09
W09/025170	CVL	West Atlas Oil Baseline Survey OYSTER FLESH 29/10/09
W09/025171	CVL DUP	West Atlas Oil Baseline Survey OYSTER FLESH 29/10/09

Lab Reg No.			W09/025169	W09/025170	W09/025171	
Sample Reference	Units	LOR	CV	CVL	CVL DUP	Method
<b>Poly Aromatic Hydrocarbons</b>						
Naphthalene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Acenaphthylene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Acenaphthene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Fluorene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Phenanthrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Anthracene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Fluoranthene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Pyrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Benz(a)anthracene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Chrysene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg		< 0.02	< 0.02	< 0.02	NGCMS_1111
Benzo(a)pyrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Dibenz(ah)anthracene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Benzo(ghi)perylene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
<b>BTEX</b>						
Benzene	mg/kg		< 0.5	< 0.5	< 0.5	NGCMS_1121
Toluene	mg/kg		< 0.5	< 0.5	< 0.5	NGCMS_1121
Ethyl Benzene	mg/kg		< 0.5	< 0.5	< 0.5	NGCMS_1121
m, p - Xylene	mg/kg		< 1	< 1	< 1	NGCMS_1121
o - Xylene	mg/kg		< 0.5	< 0.5	< 0.5	NGCMS_1121
<b>Total Petroleum Hydrocarbons</b>						
TPH C6 - C9	mg/kg		< 25	< 25	< 25	NGCMS_1121
TPH C10 - C14	mg/kg		< 50	< 50	< 50	NGCMS_1112
TPH C15 - C28	mg/kg		1100	490	460	NGCMS_1112
TPH C29 - C36	mg/kg		550	390	400	NGCMS_1112

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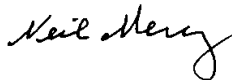
Lab Reg No.			W09/025169	W09/025170	W09/025171	
Sample Reference	Units	LOR	CV	CVL	CVL DUP	Method
Surrogate						
Surrogate semivolatile Rec.	%		79	75	87	
Surrogate volatile Rec	%		108	108	114	
Dates						
Date extracted			10-NOV-2009	10-NOV-2009	10-NOV-2009	
Date analysed			12-NOV-2009	12-NOV-2009	12-NOV-2009	



Luke Baker, Analyst  
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Lab Reg No.			W09/025169	W09/025170	W09/025171	
Sample Reference	Units	LOR	CV	CVL	CVL DUP	Method
Proximates						
Moisture	g/100g		78.7	84.9	85.2	VL298
Fat (Soxhlet)	g/100g		1.7	0.2	0.2	VL300



Neil Menz, Analyst  
Food Composition - Vic  
Accreditation No. 89

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Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_48 Quote No. : QT-01534 Order No. : 025163 Date Sampled : 29-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
--	---

Lab Reg No.	Sample Ref	Sample Description
W09/025172	II	West Atlas Oil Baseline Survey OYSTER FLESH 29/10/09
W09/025173	CIE	West Atlas Oil Baseline Survey OYSTER FLESH 29/10/09
W09/025174	CIE BLANK	West Atlas Oil Baseline Survey OYSTER FLESH 29/10/09

Lab Reg No.			W09/025172	W09/025173	W09/025174	
Sample Reference	Units	LOR	II	CIE	CIE BLANK	Method
<b>Poly Aromatic Hydrocarbons</b>						
Naphthalene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Acenaphthylene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Acenaphthene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Fluorene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Phenanthrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Anthracene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Fluoranthene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Pyrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Benz(a)anthracene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Chrysene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg		< 0.02	< 0.02	< 0.02	NGCMS_1111
Benzo(a)pyrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Dibenz(ah)anthracene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Benzo(ghi)perylene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
<b>BTEX</b>						
Benzene	mg/kg		< 0.5	< 0.5	< 0.5	NGCMS_1121
Toluene	mg/kg		< 0.5	< 0.5	< 0.5	NGCMS_1121
Ethyl Benzene	mg/kg		< 0.5	< 0.5	< 0.5	NGCMS_1121
m, p - Xylene	mg/kg		< 1	< 1	< 1	NGCMS_1121
o - Xylene	mg/kg		< 0.5	< 0.5	< 0.5	NGCMS_1121
<b>Total Petroleum Hydrocarbons</b>						
TPH C6 - C9	mg/kg		< 25	< 25	< 25	NGCMS_1121
TPH C10 - C14	mg/kg		< 50	< 50	< 50	NGCMS_1112
TPH C15 - C28	mg/kg		970	850	< 100	NGCMS_1112
TPH C29 - C36	mg/kg		580	550	< 100	NGCMS_1112

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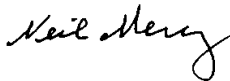
Lab Reg No.			W09/025172	W09/025173	W09/025174	
Sample Reference			II	CIE	CIE BLANK	
	Units	LOR				Method
Surrogate						
Surrogate semivolatile Rec.	%		93	90	62	
Surrogate volatile Rec	%		111	111	105	
Dates						
Date extracted			10-NOV-2009	10-NOV-2009	10-NOV-2009	
Date analysed			12-NOV-2009	12-NOV-2009	12-NOV-2009	



Luke Baker, Analyst  
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Lab Reg No.			W09/025172	W09/025173	W09/025174	
Sample Reference			II	CIE	CIE BLANK	
	Units	LOR				Method
Proximates						
Moisture	g/100g		74.6	78.2	Not Tested	VL298
Fat (Soxhlet)	g/100g		2.4	1.9	Not Tested	VL300



Neil Menz, Analyst  
Food Composition - Vic  
Accreditation No. 89

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Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_48 Quote No. : QT-01534 Order No. : 025163 Date Sampled : 29-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
--	---

Lab Reg No.	Sample Ref	Sample Description
W09/025175	CIS	West Atlas Oil Baseline Survey OYSTER FLESH 29/10/09
W09/025176	OIPL	West Atlas Oil Baseline Survey OYSTER FLESH 30/10/09
W09/025177	OIPL DUP	West Atlas Oil Baseline Survey OYSTER FLESH 30/10/09

Lab Reg No.	Sample Reference	Units	LOR	W09/025175	W09/025176	W09/025177	Method
				CIS	OIPL	OIPL DUP	
<b>Poly Aromatic Hydrocarbons</b>							
Naphthalene	mg/kg			< 0.01	< 0.01	< 0.01	NGCMS_1111
Acenaphthylene	mg/kg			< 0.01	< 0.01	< 0.01	NGCMS_1111
Acenaphthene	mg/kg			< 0.01	< 0.01	< 0.01	NGCMS_1111
Fluorene	mg/kg			< 0.01	< 0.01	< 0.01	NGCMS_1111
Phenanthrene	mg/kg			< 0.01	< 0.01	< 0.01	NGCMS_1111
Anthracene	mg/kg			< 0.01	< 0.01	< 0.01	NGCMS_1111
Fluoranthene	mg/kg			< 0.01	< 0.01	< 0.01	NGCMS_1111
Pyrene	mg/kg			< 0.01	< 0.01	< 0.01	NGCMS_1111
Benzo(a)anthracene	mg/kg			< 0.01	< 0.01	< 0.01	NGCMS_1111
Chrysene	mg/kg			< 0.01	< 0.01	< 0.01	NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg			< 0.02	< 0.02	< 0.02	NGCMS_1111
Benzo(a)pyrene	mg/kg			< 0.01	< 0.01	< 0.01	NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg			< 0.01	< 0.01	< 0.01	NGCMS_1111
Dibenz(ah)anthracene	mg/kg			< 0.01	< 0.01	< 0.01	NGCMS_1111
Benzo(ghi)perylene	mg/kg			< 0.01	< 0.01	< 0.01	NGCMS_1111
<b>BTEX</b>							
Benzene	mg/kg			< 0.5	< 0.5	< 0.5	NGCMS_1121
Toluene	mg/kg			< 0.5	< 0.5	< 0.5	NGCMS_1121
Ethyl Benzene	mg/kg			< 0.5	< 0.5	< 0.5	NGCMS_1121
m, p - Xylene	mg/kg			< 1	< 1	< 1	NGCMS_1121
o - Xylene	mg/kg			< 0.5	< 0.5	< 0.5	NGCMS_1121
<b>Total Petroleum Hydrocarbons</b>							
TPH C6 - C9	mg/kg			< 25	< 25	< 25	NGCMS_1121
TPH C10 - C14	mg/kg			< 50	< 50	< 50	NGCMS_1112
TPH C15 - C28	mg/kg			910	550	570	NGCMS_1112
TPH C29 - C36	mg/kg			580	410	410	NGCMS_1112

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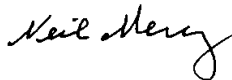
Lab Reg No.			W09/025175	W09/025176	W09/025177	
Sample Reference	Units	LOR	CIS	OIPL	OIPL DUP	Method
Surrogate						
Surrogate semivolatile Rec.	%		83	95	94	
Surrogate volatile Rec	%		114	115	115	
Dates						
Date extracted			10-NOV-2009	10-NOV-2009	10-NOV-2009	
Date analysed			12-NOV-2009	12-NOV-2009	12-NOV-2009	



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Lab Reg No.			W09/025175	W09/025176	W09/025177	
Sample Reference	Units	LOR	CIS	OIPL	OIPL DUP	Method
Proximates						
Moisture	g/100g		76.1	85.8	85.3	VL298
Fat (Soxhlet)	g/100g		3.2	0.5	0.4	VL300



Neil Menz, Analyst  
Food Composition - Vic  
Accreditation No. 89

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Report No. RN768875

Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_48 Quote No. : QT-01534 Order No. : 025163 Date Sampled : 30-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
--	---

Lab Reg No.	Sample Ref	Sample Description
W09/025178	CBE	West Atlas Oil Baseline Survey OYSTER FLESH 30/10/09
W09/025179	VBPL	West Atlas Oil Baseline Survey OYSTER FLESH 30/10/09
W09/025180	VBPL DUP	West Atlas Oil Baseline Survey OYSTER FLESH 30/10/09

Lab Reg No.			W09/025178	W09/025179	W09/025180	
Sample Reference	Units	LOR	CBE	VBPL	VBPL DUP	Method
<b>Poly Aromatic Hydrocarbons</b>						
Naphthalene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Acenaphthylene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Acenaphthene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Fluorene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Phenanthrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Anthracene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Fluoranthene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Pyrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Benz(a)anthracene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Chrysene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg		< 0.02	< 0.02	< 0.02	NGCMS_1111
Benzo(a)pyrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Dibenz(ah)anthracene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
Benzo(ghi)perylene	mg/kg		< 0.01	< 0.01	< 0.01	NGCMS_1111
<b>BTEX</b>						
Benzene	mg/kg		< 0.5	< 0.5	< 0.5	NGCMS_1121
Toluene	mg/kg		< 0.5	< 0.5	< 0.5	NGCMS_1121
Ethyl Benzene	mg/kg		< 0.5	< 0.5	< 0.5	NGCMS_1121
m, p - Xylene	mg/kg		< 1	< 1	< 1	NGCMS_1121
o - Xylene	mg/kg		< 0.5	< 0.5	< 0.5	NGCMS_1121
<b>Total Petroleum Hydrocarbons</b>						
TPH C6 - C9	mg/kg		< 25	< 25	< 25	NGCMS_1121
TPH C10 - C14	mg/kg		< 50	< 50	< 50	NGCMS_1112
TPH C15 - C28	mg/kg		1000	620	730	NGCMS_1112
TPH C29 - C36	mg/kg		560	600	610	NGCMS_1112

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## REPORT OF ANALYSIS

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Report No. RN768875

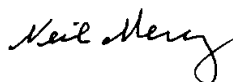
Lab Reg No.			W09/025178	W09/025179	W09/025180	
Sample Reference	Units	LOR	CBE	VBPL	VBPL DUP	Method
Surrogate						
Surrogate semivolatile Rec.	%		100	97	105	
Surrogate volatile Rec	%		103	113	116	
Dates						
Date extracted			10-NOV-2009	10-NOV-2009	10-NOV-2009	
Date analysed			12-NOV-2009	12-NOV-2009	12-NOV-2009	



Luke Baker, Analyst  
Organics - NSW  
Accreditation No. 198

2-DEC-2009

Lab Reg No.			W09/025178	W09/025179	W09/025180	
Sample Reference	Units	LOR	CBE	VBPL	VBPL DUP	Method
Proximates						
Moisture	g/100g		77.6	79.4	79.5	VL298
Fat (Soxhlet)	g/100g		2.5	0.2	0.2	VL300



Neil Menz, Analyst  
Food Composition - Vic  
Accreditation No. 89

2-DEC-2009

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National Measurement Institute

## REPORT OF ANALYSIS

Page: 13 of 15  
Report No. RN768875

Client : DEPARTMENT OF ENVIRONMENT AND CONSERVATION LOCKED BAG 104 BENTLEY DELIVERY CENTRE WA 6983 Attention : Kevin McAlpine Project Name : - Your Client Services Manager : David Lynch	Job No. : DOEC01_W/091104_48 Quote No. : QT-01534 Order No. : 025163 Date Sampled : 30-OCT-2009 Date Received : 3-NOV-2009 Sampled By : CLIENT Phone : (08) 9368 8420
--	---

Lab Reg No.	Sample Ref	Sample Description
W09/025181	NEI	West Atlas Oil Baseline Survey OYSTER FLESH 30/10/09
W09/025182	SGMI	West Atlas Oil Baseline Survey OYSTER FLESH 31/10/09

Lab Reg No.	Units	LOR	W09/025181 NEI	W09/025182 SGMI	Method
Poly Aromatic Hydrocarbons					
Naphthalene	mg/kg		< 0.01	< 0.01	NGCMS_1111
Acenaphthylene	mg/kg		< 0.01	< 0.01	NGCMS_1111
Acenaphthene	mg/kg		< 0.01	< 0.01	NGCMS_1111
Fluorene	mg/kg		< 0.01	< 0.01	NGCMS_1111
Phenanthrene	mg/kg		< 0.01	< 0.01	NGCMS_1111
Anthracene	mg/kg		< 0.01	< 0.01	NGCMS_1111
Fluoranthene	mg/kg		< 0.01	< 0.01	NGCMS_1111
Pyrene	mg/kg		< 0.01	< 0.01	NGCMS_1111
Benz(a)anthracene	mg/kg		< 0.01	< 0.01	NGCMS_1111
Chrysene	mg/kg		< 0.01	< 0.01	NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg		< 0.02	< 0.02	NGCMS_1111
Benzo(a)pyrene	mg/kg		< 0.01	< 0.01	NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg		< 0.01	< 0.01	NGCMS_1111
Dibenz(ah)anthracene	mg/kg		< 0.01	< 0.01	NGCMS_1111
Benzo(ghi)perylene	mg/kg		< 0.01	< 0.01	NGCMS_1111
BTEX					
Benzene	mg/kg		< 0.5	< 0.5	NGCMS_1121
Toluene	mg/kg		< 0.5	< 0.5	NGCMS_1121
Ethyl Benzene	mg/kg		< 0.5	< 0.5	NGCMS_1121
m, p - Xylene	mg/kg		< 1	< 1	NGCMS_1121
o - Xylene	mg/kg		< 0.5	< 0.5	NGCMS_1121
Total Petroleum Hydrocarbons					
TPH C6 - C9	mg/kg		< 25	< 25	NGCMS_1121
TPH C10 - C14	mg/kg		< 50	< 50	NGCMS_1121
TPH C15 - C28	mg/kg		890	890	NGCMS_1121
TPH C29 - C36	mg/kg		580	580	NGCMS_1121
Surrogate					
Surrogate semivolatiles Rec.	%		109	103	

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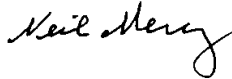
Lab Reg No.			W09/025181	W09/025182		
Sample Reference			NEI	SGMI		
	Units	LOR				Method
Surrogate						
Surrogate volatile Rec	%		118	120		
Dates						
Date extracted			10-NOV-2009	10-NOV-2009		
Date analysed			12-NOV-2009	12-NOV-2009		



Luke Baker, Analyst  
Organics - NSW  
Accreditation No. 198

2-DEC-2009

Lab Reg No.			W09/025181	W09/025182		
Sample Reference			NEI	SGMI		
	Units	LOR				Method
Proximates						
Moisture	g/100g		78.2	78.9		VL298
Fat (Soxhlet)	g/100g		2.0	2.3		VL300



Neil Menz, Analyst  
Food Composition - Vic  
Accreditation No. 89

2-DEC-2009

All results are expressed on as received wet weight basis.



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This report shall not be reproduced except in full.  
Results relate only to the sample(s) tested.

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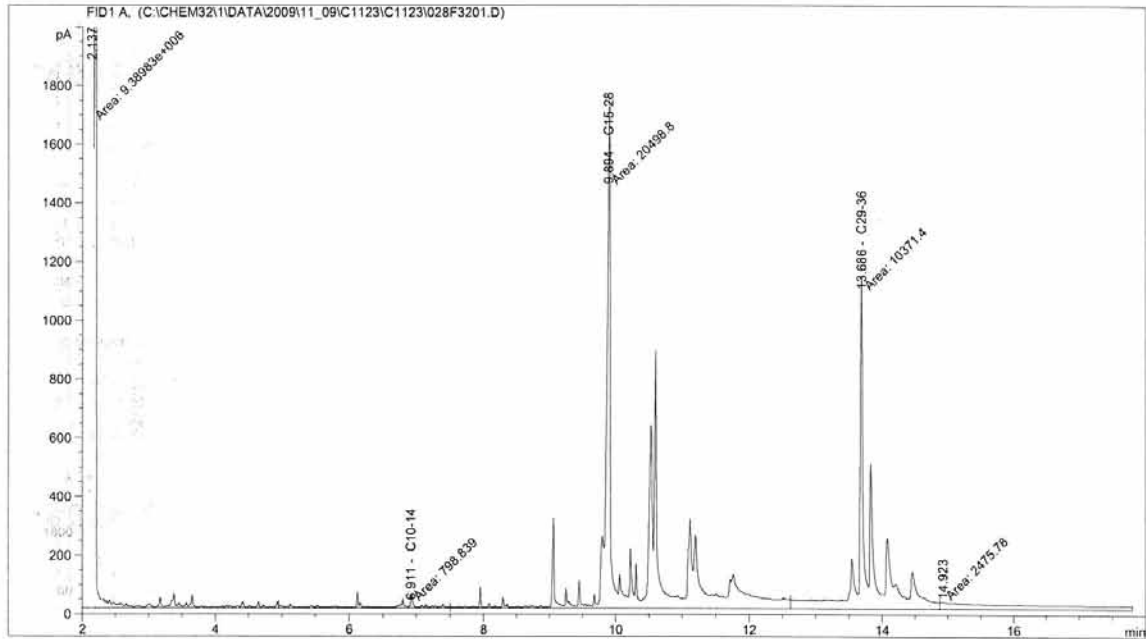
National Measurement Institute

## D.2 Oyster sample re-scaled chromatograms

Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\028F3201.D  
 Sample Name: W09\025163 Biota

```

=====
Acq. Operator   : hz                      Seq. Line : 32
Acq. Instrument : Instrument 1             Location  : Vial 28
Injection Date  : 11/24/2009 5:32:53 AM  Inj       : 1
                                           Inj Volume: 2 µl
Acq. Method    : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed   : 10/21/2009 9:06:05 AM by hz
Analysis Method: C:\CHEM32\1\METHODS\TPHRE_F.M
Last changed   : 12/10/2009 12:45:51 PM by hz
                (modified after loading)
Method Info    : Method for analysis of Total Petroleum Hydrocarbons
                Front Injector/Column Method
=====
  
```



### Area Percent Report

```

=====
Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.137	MF	0.2389	9.38983e6	99.63768	?
2	6.911	MF	1.2107	798.83893	0.00848	C10-14
3	9.894	FM	0.2384	2.04988e4	0.21752	C15-28
4	13.686	MF	0.1607	1.03714e4	0.11005	C29-36
5	14.923	FM	1.8327	2475.77734	0.02627	?

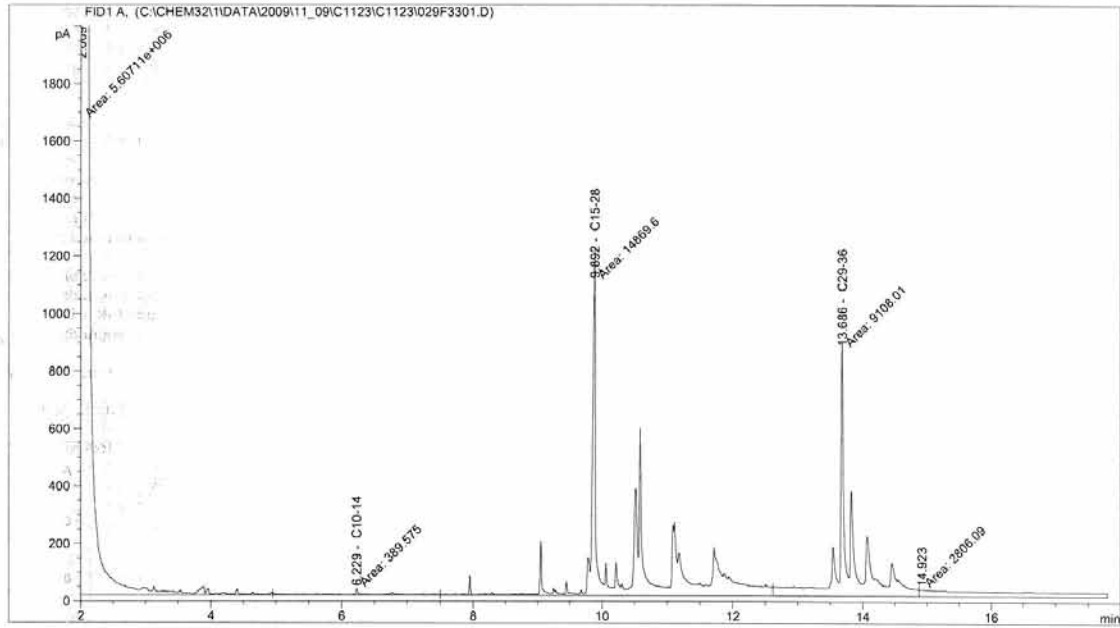
Totals : 9.42398e6

\*\*\* End of Report \*\*\*

Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\029F3301.D  
 Sample Name: W09/025164

```

=====
Acq. Operator   : hz                      Seq. Line :   33
Acq. Instrument : Instrument 1             Location  : Vial 29
Injection Date  : 11/24/2009 6:00:11 AM  Inj       :    1
                                           Inj Volume: 2 µl
Acq. Method     : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed    : 10/21/2009 9:06:05 AM by hz
Analysis Method : C:\CHEM32\1\METHODS\TPHRE_F.M
Last changed    : 12/10/2009 12:45:51 PM by hz
                 (modified after loading)
Method Info     : Method for analysis of Total Petroleum Hydrocarbons
                 Front Injector/Column Method
=====
  
```



=====  
 Area Percent Report  
 =====

```

Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.009	MF	0.1948	5.60711e6	99.51772	?
2	6.229	MF	0.3262	389.57541	0.00691	C10-14
3	9.892	FM	0.2271	1.48696e4	0.26391	C15-28
4	13.686	MF	0.1771	9108.01074	0.16165	C29-36
5	14.923	FM	2.0458	2806.09424	0.04980	?

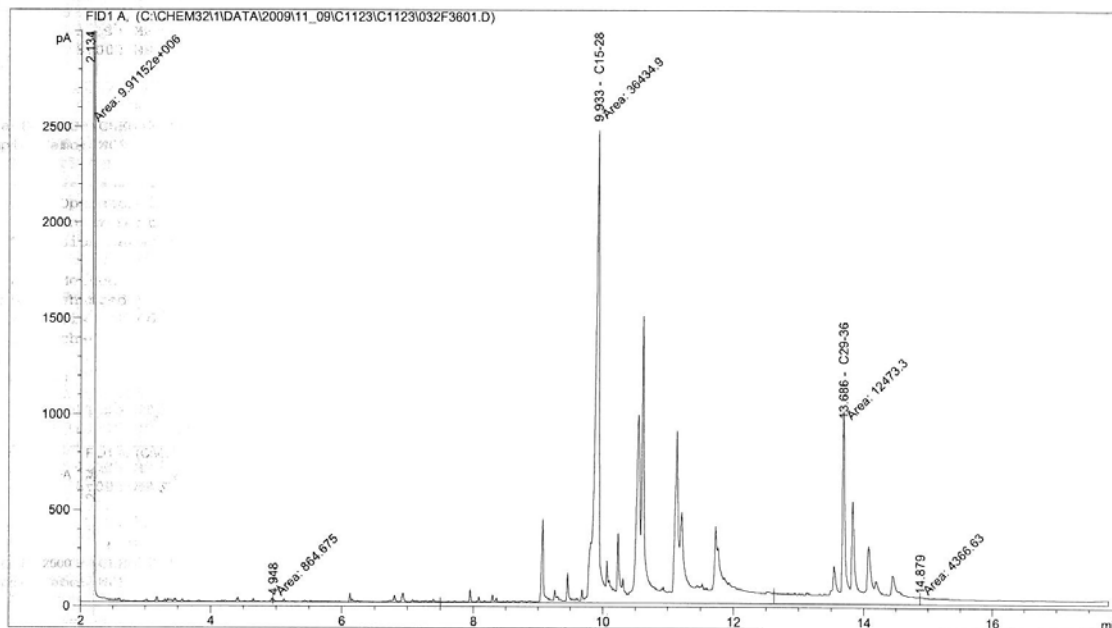
Totals : 5.63429e6

=====  
 \*\*\* End of Report \*\*\*

Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\032F3601.D  
 Sample Name: W09/025165

```

=====
Acq. Operator   : hz                               Seq. Line : 36
Acq. Instrument : Instrument 1                     Location  : Vial 32
Injection Date  : 11/24/2009 7:22:35 AM          Inj       : 1
                                                    Inj Volume: 2 µl
Acq. Method    : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed   : 10/21/2009 9:06:05 AM by hz
Analysis Method : C:\CHEM32\1\METHODS\TPHRE_F.M
Last changed   : 12/10/2009 12:49:27 PM by hz
                (modified after loading)
Method Info    : Method for analysis of Total Petroleum Hydrocarbons
                Front Injector/Column Method
=====
  
```



Area Percent Report

```

Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier    : 1.0000
Dilution      : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.134	MF	0.2493	9.91152e6	99.45674	?
2	4.948	MF	0.5951	864.67487	0.00868	?
3	5.000		0.0000	0.00000	0.00000	C10-14
4	9.933	FM	0.2418	3.64349e4	0.36560	C15-28
5	13.686	MF	0.4752	1.24733e4	0.12516	C29-36
6	14.879	FM	1.9443	4366.63135	0.04382	?

Totals : 9.96566e6

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

\*\*\* End of Report \*\*\*

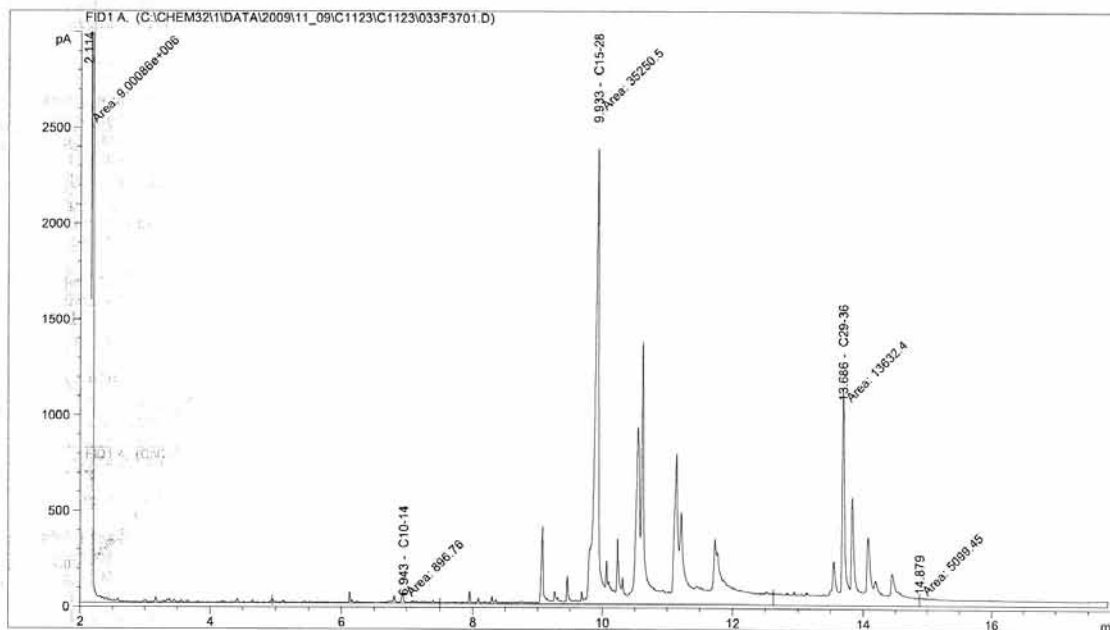
Instrument 1 12/10/2009 12:49:43 PM hz

Page 1 of 1

Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\033F3701.D  
 Sample Name: W09/025166

```

=====
Acq. Operator   : hz                               Seq. Line : 37
Acq. Instrument : Instrument 1                     Location  : Vial 33
Injection Date  : 11/24/2009 7:50:18 AM          Inj       : 1
                                                    Inj Volume: 2 µl
Acq. Method     : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed    : 10/21/2009 9:06:05 AM by hz
Analysis Method : C:\CHEM32\1\METHODS\TPHRE_F.M
Last changed    : 12/10/2009 12:49:27 PM by hz
                  (modified after loading)
Method Info     : Method for analysis of Total Petroleum Hydrocarbons
                  Front Injector/Column Method
=====
  
```



Area Percent Report

```

Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A.

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.114	MF	0.2729	9.00086e6	99.39399	?
2	6.943	MF	0.5094	896.75958	0.00990	C10-14
3	9.933	FM	0.2293	3.52505e4	0.38926	C15-28
4	13.686	MF	0.2171	1.36324e4	0.15054	C29-36
5	14.879	FM	2.0133	5099.45020	0.05631	?

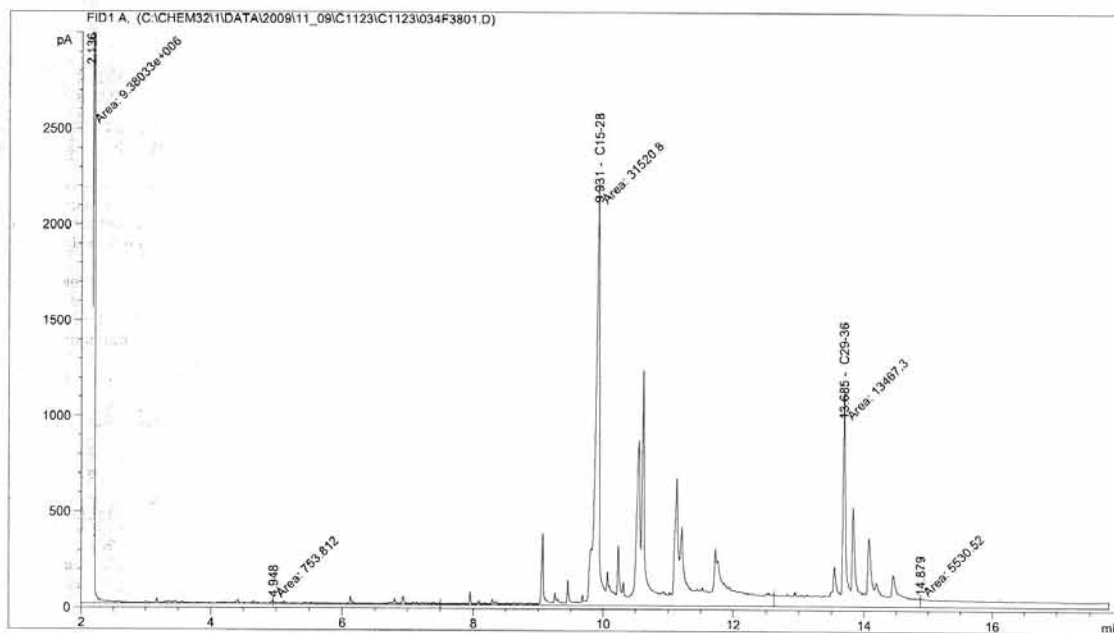
Totals : 9.05574e6

\*\*\* End of Report \*\*\*

Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\034F3801.D  
 Sample Name: W09/025167

```

=====
Acq. Operator   : hz                      Seq. Line : 38
Acq. Instrument : Instrument 1             Location  : Vial 34
Injection Date  : 11/24/2009 8:17:58 AM Inj       : 1
                                           Inj Volume: 2 µl
Acq. Method    : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed   : 10/21/2009 9:06:05 AM by hz
Analysis Method: C:\CHEM32\1\METHODS\TPHRE_F.M
Last changed   : 12/10/2009 12:49:27 PM by hz
                                           (modified after loading)
Method Info    : Method for analysis of Total Petroleum Hydrocarbons
                                           Front Injector/Column Method
=====
  
```



=====  
 Area Percent Report  
 =====

Sorted By : Signal  
 Calib. Data Modified : 6/5/2009 10:05:27 AM  
 Multiplier : 1.0000  
 Dilution : 1.0000  
 Do not use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.136	MF	0.2355	9.38033e6	99.45638	?
2	4.948	MF	0.5426	753.81226	0.00799	?
3	5.000		0.0000	0.00000	0.00000	C10-14
4	9.931	FM	0.2524	3.15208e4	0.33420	C15-28
5	13.685	MF	0.2344	1.34673e4	0.14279	C29-36
6	14.879	FM	2.1796	5530.52197	0.05864	?

Totals : 9.43160e6

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====  
 \*\*\* End of Report \*\*\*

Instrument 1 12/10/2009 12:50:34 PM hz

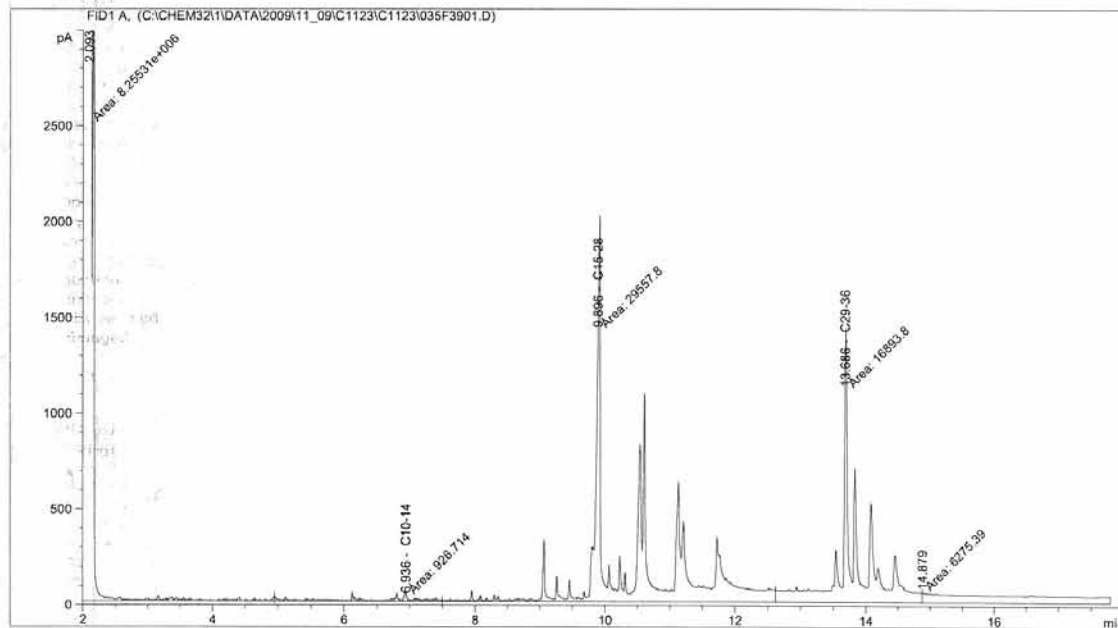
Page 1 of 1



Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\035F3901.D  
 Sample Name: W09/025168

```

=====
Acq. Operator   : hz                      Seq. Line : 39
Acq. Instrument : Instrument 1             Location  : Vial 35
Injection Date  : 11/24/2009 8:45:17 AM  Inj       : 1
                                           Inj Volume: 2 µl
Acq. Method    : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed   : 10/21/2009 9:06:05 AM by hz
Analysis Method: C:\CHEM32\1\METHODS\TPHRE_F.M
Last changed   : 12/10/2009 12:49:27 PM by hz
                (modified after loading)
Method Info    : Method for analysis of Total Petroleum Hydrocarbons
                Front Injector/Column Method
=====
  
```



Area Percent Report

```

=====
Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.093	MF	0.2292	8.25531e6	99.35427	?
2	6.936	MF	0.5251	926.71362	0.01115	C10-14
3	9.896	FM	0.3491	2.95578e4	0.35573	C15-28
4	13.686	MF	0.2549	1.68938e4	0.20332	C29-36
5	14.879	FM	2.1195	6275.39209	0.07553	?

Totals : 8.30897e6

\*\*\* End of Report \*\*\*

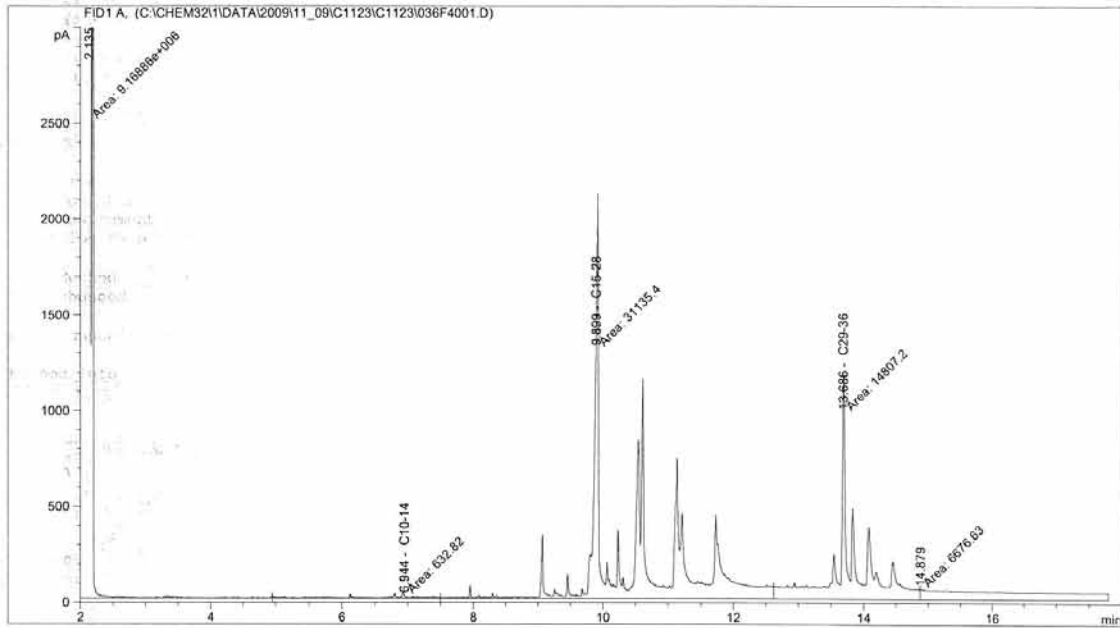
Instrument 1 12/10/2009 12:51:00 PM hz

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Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\036F4001.D  
 Sample Name: W09/025169

```

=====
Acq. Operator   : hz                      Seq. Line : 40
Acq. Instrument : Instrument 1             Location  : Vial 36
Injection Date  : 11/24/2009 9:12:59 AM  Inj       : 1
                                           Inj Volume: 2 ul
Acq. Method     : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed    : 10/21/2009 9:06:05 AM by hz
Analysis Method : C:\CHEM32\1\METHODS\TPHRE_F.M
Last changed    : 12/10/2009 12:49:27 PM by hz
                 (modified after loading)
Method Info     : Method for analysis of Total Petroleum Hydrocarbons
                 Front Injector/Column Method
=====
  
```



=====  
 Area Percent Report  
 =====

```

Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.135	MF	0.2320	9.16886e6	99.42256	?
2	6.944	MF	0.7179	632.82037	0.00686	C10-14
3	9.899	FM	0.3987	3.11354e4	0.33762	C15-28
4	13.686	MF	0.4752	1.48072e4	0.16056	C29-36
5	14.879	FM	2.1761	6676.63379	0.07240	?

Totals : 9.22211e6

=====  
 \*\*\* End of Report \*\*\*

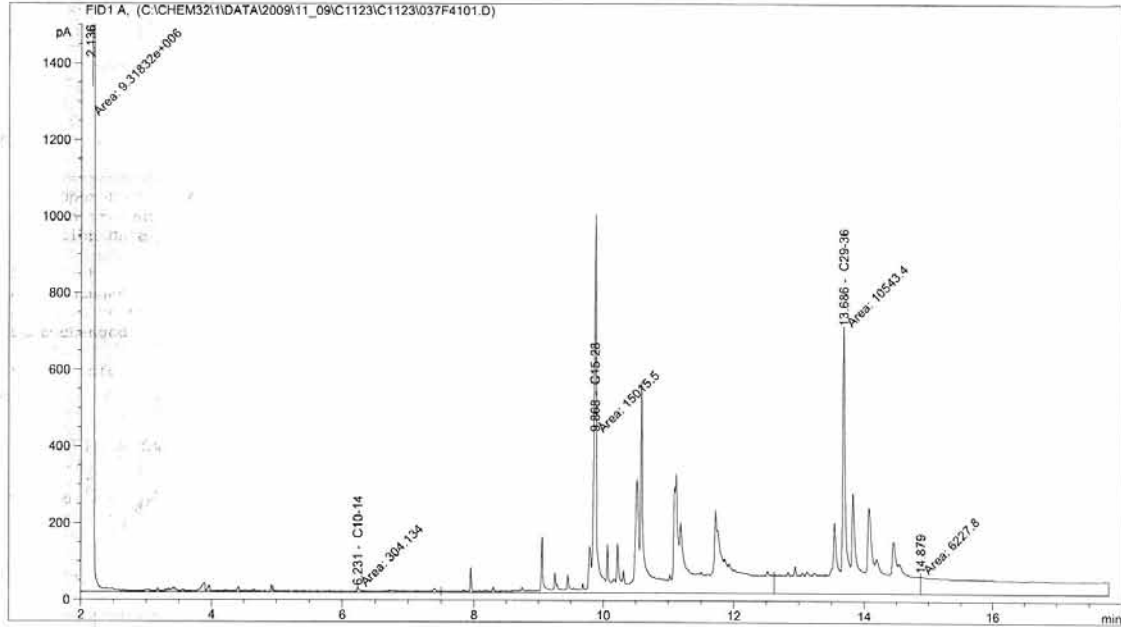
Instrument 1 12/10/2009 12:51:25 PM hz

Page 1 of 1

Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\037F4101.D  
 Sample Name: W09/025170

```

=====
Acq. Operator   : hz                      Seq. Line : 41
Acq. Instrument : Instrument 1             Location  : Vial 37
Injection Date  : 11/24/2009 9:40:41 AM   Inj       : 1
                                           Inj Volume: 2 µl
Acq. Method    : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed   : 10/21/2009 9:06:05 AM by hz
Analysis Method: C:\CHEM32\1\METHODS\TPHRE_F.M
Last changed   : 12/10/2009 12:52:02 PM by hz
                                           (modified after loading)
Method Info    : Method for analysis of Total Petroleum Hydrocarbons
                                           Front Injector/Column Method
=====
  
```



=====  
 Area Percent Report  
 =====

```

Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier    : 1.0000
Dilution      : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.136	MF	0.2353	9.31831e6	99.65680	?
2	6.231	MF	0.5281	304.13364	0.00325	C10-14
3	9.868	FM	0.6111	1.50155e4	0.16059	C15-28
4	13.686	MF	0.2554	1.05434e4	0.11276	C29-36
5	14.879	FM	2.3262	6227.80029	0.06660	?

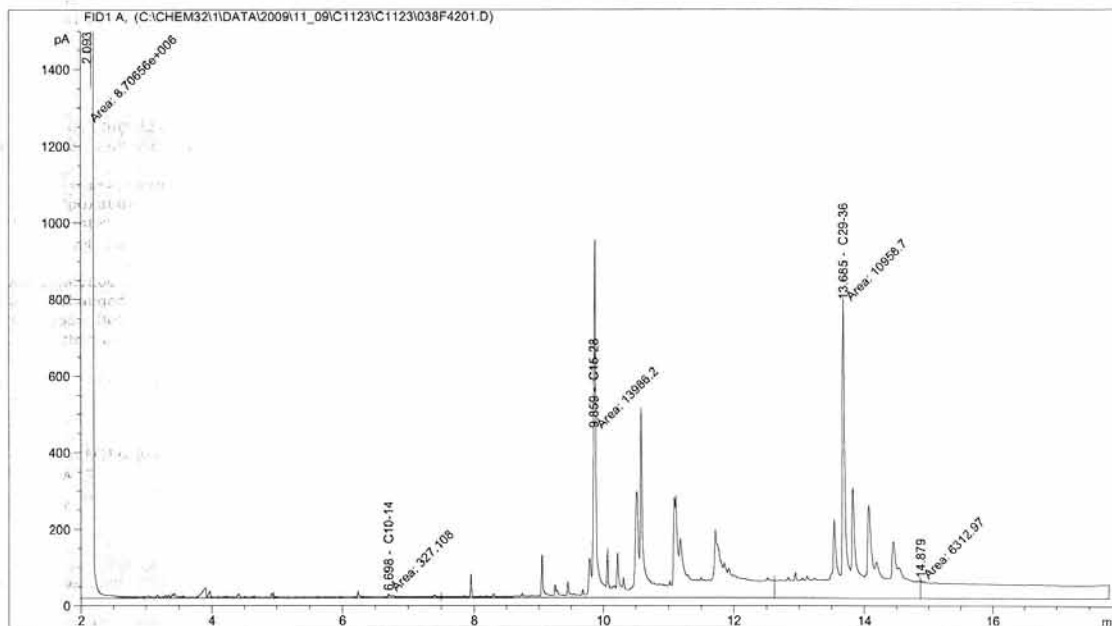
Totals : 9.35041e6

=====  
 \*\*\* End of Report \*\*\*

Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\038F4201.D  
 Sample Name: W09\025171

```

=====
Acq. Operator   : hz                      Seq. Line : 42
Acq. Instrument : Instrument 1             Location  : Vial 38
Injection Date  : 11/24/2009 10:08:08 AM Inj       : 1
                                           Inj Volume: 2 µl
Acq. Method    : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed   : 10/21/2009 9:06:05 AM by hz
Analysis Method: C:\CHEM32\1\METHODS\TPHRE_F.M
Last changed   : 12/10/2009 12:52:02 PM by hz
                                           (modified after loading)
Method Info    : Method for analysis of Total Petroleum Hydrocarbons
                                           Front Injector/Column Method
=====
  
```



Area Percent Report

```

=====
Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.093	MF	0.2336	8.70656e6	99.63854	?
2	6.698	MF	0.5905	327.10797	0.00374	C10-14
3	9.859	FM	0.5369	1.39862e4	0.16006	C15-28
4	13.685	MF	0.2376	1.09587e4	0.12541	C29-36
5	14.879	FM	2.3714	6312.96924	0.07225	?

Totals : 8.73815e6

\*\*\* End of Report \*\*\*

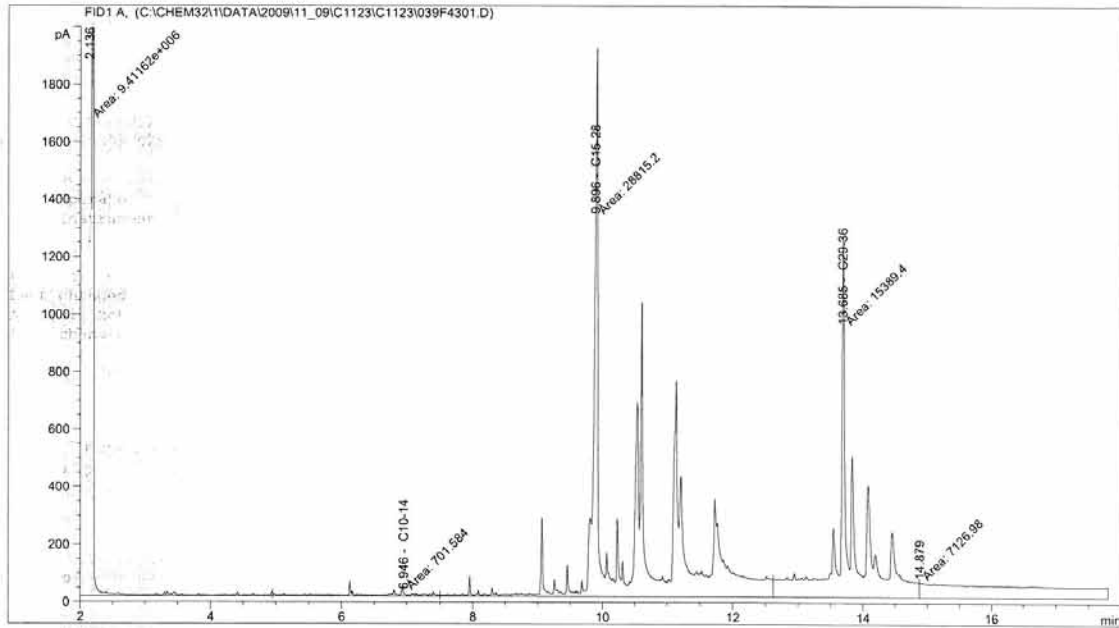
Instrument 1 12/10/2009 12:52:39 PM hz

Page 1 of 1

Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\039F4301.D  
 Sample Name: W09/025172

```

=====
Acq. Operator   : hz                      Seq. Line : 43
Acq. Instrument : Instrument 1             Location  : Vial 39
Injection Date  : 11/24/2009 10:35:49 AM Inj       : 1
                                           Inj Volume: 2 µl
Acq. Method     : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed    : 10/21/2009 9:06:05 AM by hz
Analysis Method : C:\CHEM32\1\METHODS\TPHRE_F.M
Last changed    : 12/10/2009 12:53:30 PM by hz
                 (modified after loading)
Method Info     : Method for analysis of Total Petroleum Hydrocarbons
                 Front Injector/Column Method
=====
  
```



Area Percent Report

```

=====
Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.136	MF	0.2394	9.41162e6	99.45018	?
2	6.946	MF	0.7502	701.58368	0.00741	C10-14
3	9.896	FM	0.3642	2.88152e4	0.30448	C15-28
4	13.685	MF	0.2741	1.53894e4	0.16262	C29-36
5	14.879	FM	2.3013	7126.97559	0.07531	?

Totals : 9.46365e6

\*\*\* End of Report \*\*\*

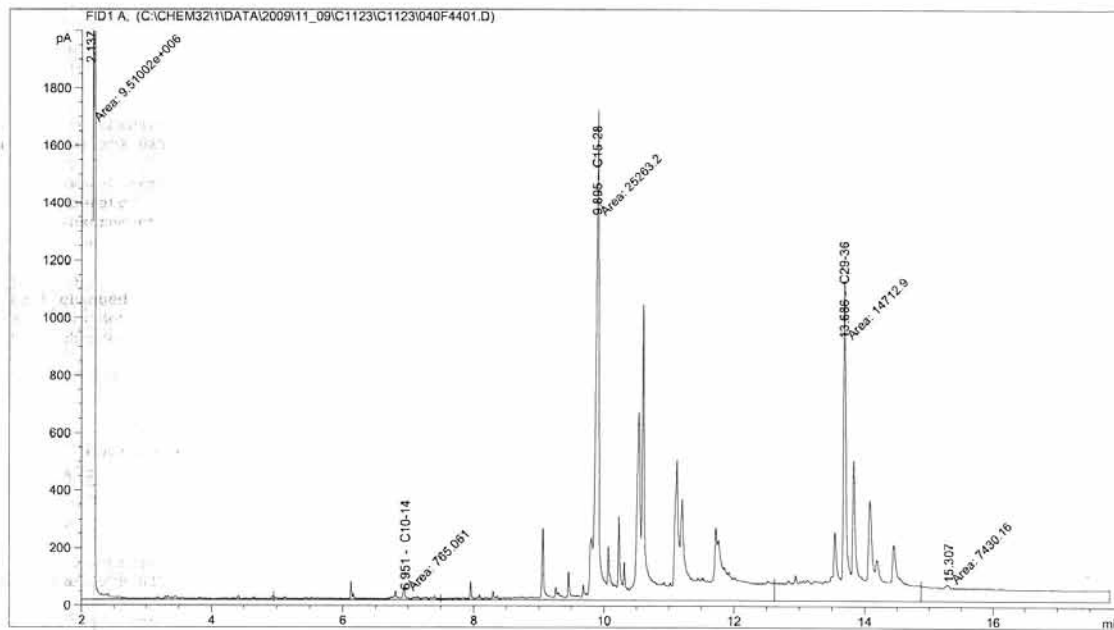
Instrument 1 12/10/2009 12:53:44 PM hz

Page 1 of 1

Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\040F4401.D  
 Sample Name: W09/025173

```

=====
Acq. Operator   : hz                      Seq. Line : 44
Acq. Instrument : Instrument 1             Location  : Vial 40
Injection Date  : 11/24/2009 11:03:09 AM Inj       : 1
                                           Inj Volume: 2 µl
Acq. Method    : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed   : 10/21/2009 9:06:05 AM by hz
Analysis Method: C:\CHEM32\1\METHODS\TPHRE_F.M
Last changed   : 12/10/2009 12:53:30 PM by hz
                (modified after loading)
Method Info    : Method for analysis of Total Petroleum Hydrocarbons
                Front Injector/Column Method
=====
  
```



=====  
 Area Percent Report  
 =====

```

Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier     : 1.0000
Dilution      : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.137	MF	0.2417	9.51002e6	99.49602	?
2	6.951	MF	0.4556	765.06110	0.00800	C10-14
3	9.895	FM	0.3174	2.52632e4	0.26431	C15-28
4	13.686	MF	0.2723	1.47129e4	0.15393	C29-36
5	15.307	FM	2.3039	7430.15723	0.07774	?
Totals :				9.55819e6		

=====  
 \*\*\* End of Report \*\*\*  
 =====

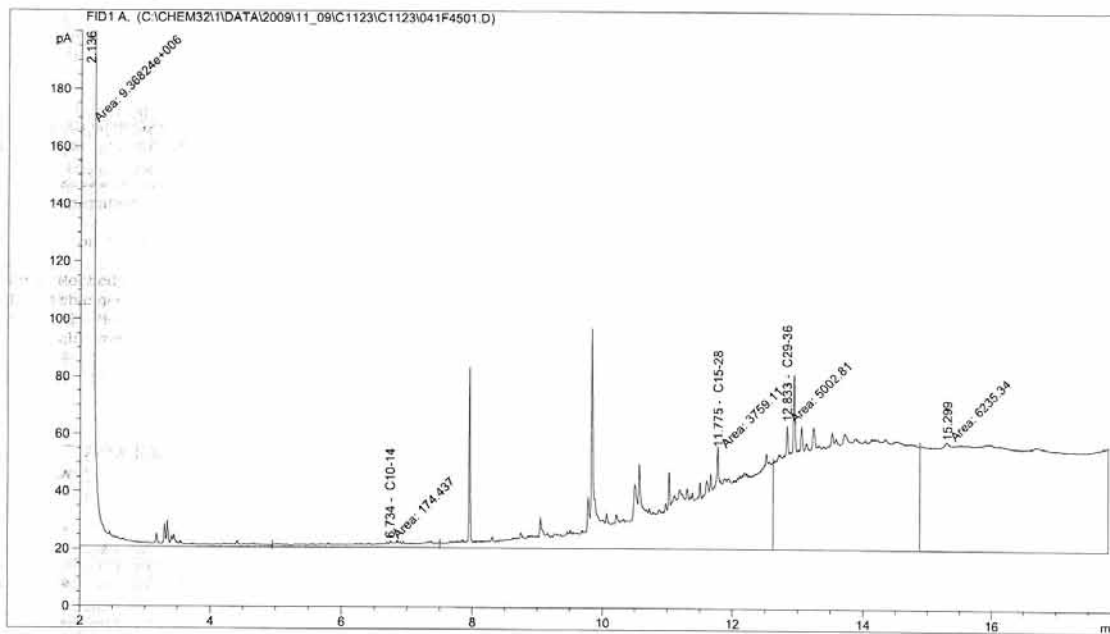
Instrument 1 12/10/2009 12:54:10 PM hz

Page 1 of 1

Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\041F4501.D  
 Sample Name: W09/025174

```

=====
Acq. Operator   : hz                               Seq. Line : 45
Acq. Instrument : Instrument 1                     Location  : Vial 41
Injection Date  : 11/24/2009 11:30:39 AM          Inj       : 1
                                                    Inj Volume: 2 µl
Acq. Method    : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed   : 10/21/2009 9:06:05 AM by hz
Analysis Method: C:\CHEM32\1\METHODS\TPHRE_F.M
Last changed   : 12/10/2009 12:54:34 PM by hz
                (modified after loading)
Method Info    : Method for analysis of Total Petroleum Hydrocarbons
                Front Injector/Column Method
=====
  
```



Area Percent Report

```

=====
Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
=====
  
```

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.136	MF	0.2359	9.36824e6	99.83831	?
2	6.734	MF	1.4378	174.43741	0.00186	C10-14
3	11.775	FM	1.8273	3759.10596	0.04006	C15-28
4	12.833	MF	1.9245	5002.80908	0.05332	C29-36
5	15.299	FM	2.7846	6235.33838	0.06645	?

Totals : 9.38341e6

\*\*\* End of Report \*\*\*

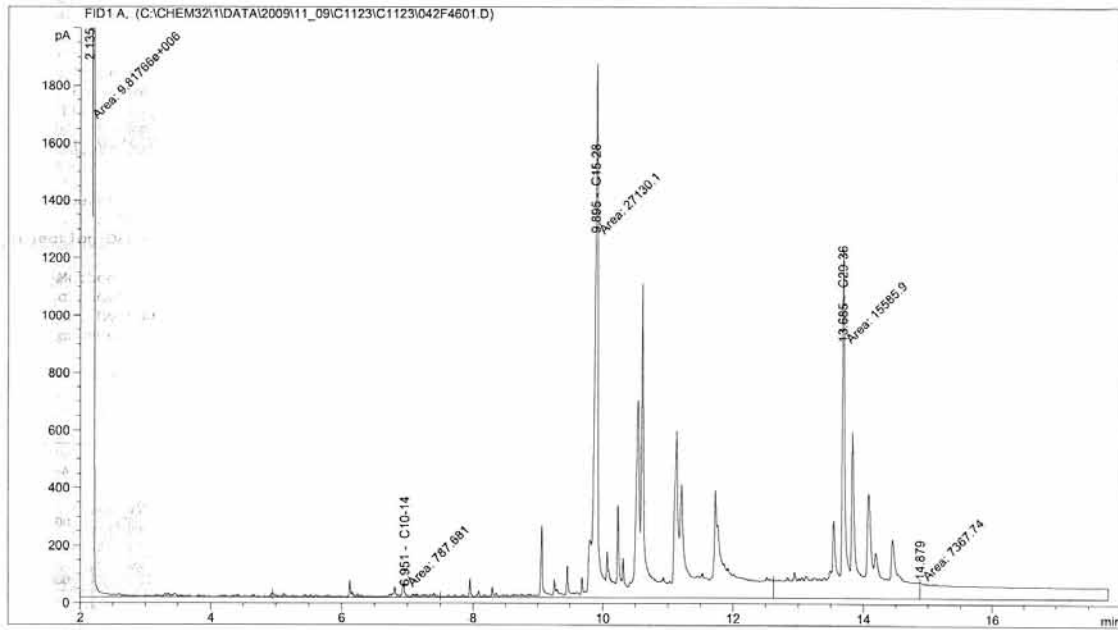
Instrument 1 12/10/2009 12:54:48 PM hz

Page 1 of 1

Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\042F4601.D  
 Sample Name: W09/025175

```

=====
Acq. Operator   : hz                      Seq. Line : 46
Acq. Instrument : Instrument 1             Location  : Vial 42
Injection Date  : 11/24/2009 11:58:12 AM Inj       : 1
                                           Inj Volume: 2 µl
Acq. Method     : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed    : 10/21/2009 9:06:05 AM by hz
Analysis Method : C:\CHEM32\1\METHODS\TPHRE_F.M
Last changed    : 12/10/2009 12:55:18 PM by hz
                 (modified after loading)
Method Info     : Method for analysis of Total Petroleum Hydrocarbons
                 Front Injector/Column Method
=====
  
```



```

=====
Area Percent Report
=====
Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A.

Peak RetTime Type Width Area Area Name
# [min] [min] [min] [pA*s] [%]
-----
1 2.135 MF 0.2438 9.81766e6 99.48451 ?
2 6.951 MF 0.3905 787.68109 0.00798 C10-14
3 9.895 FM 0.3604 2.71301e4 0.27491 C15-28
4 13.685 MF 0.2962 1.55859e4 0.15794 C29-36
5 14.879 FM 2.2681 7367.74268 0.07466 ?

Totals : 9.86853e6

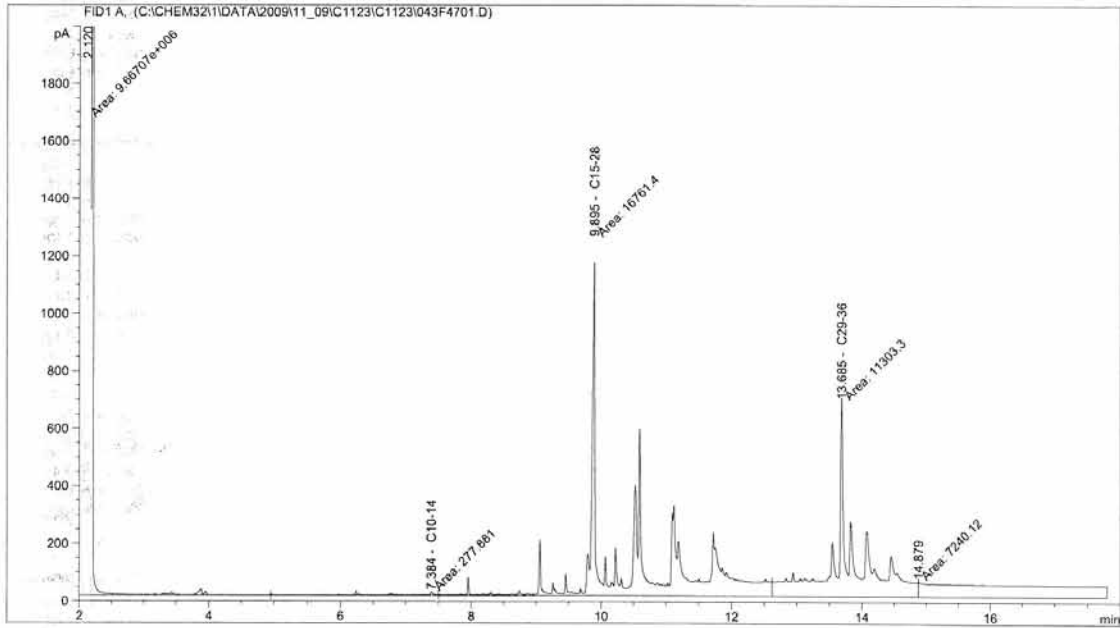
=====
*** End of Report ***
=====
  
```



Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\043F4701.D  
 Sample Name: w09/025176

```

=====
Acq. Operator   : hz                      Seq. Line : 47
Acq. Instrument : Instrument 1             Location  : Vial 43
Injection Date  : 11/24/2009 12:25:41 PM Inj       : 1
                                           Inj Volume: 2 µl
Acq. Method    : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed   : 10/21/2009 9:06:05 AM by hz
Analysis Method : C:\CHEM32\1\METHODS\TPHRE_F.M
Last changed   : 12/10/2009 12:55:18 PM by hz
                (modified after loading)
Method Info    : Method for analysis of Total Petroleum Hydrocarbons
                Front Injector/Column Method
=====
  
```



Area Percent Report

```

=====
Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.120	MF	0.2885	9.66707e6	99.63327	?
2	7.384	MF	0.5898	277.88062	0.00286	C10-14
3	9.895	FM	0.2255	1.67614e4	0.17275	C15-28
4	13.685	MF	0.2800	1.13033e4	0.11650	C29-36
5	14.879	FM	2.4706	7240.11621	0.07462	?

Totals : 9.70265e6

\*\*\* End of Report \*\*\*

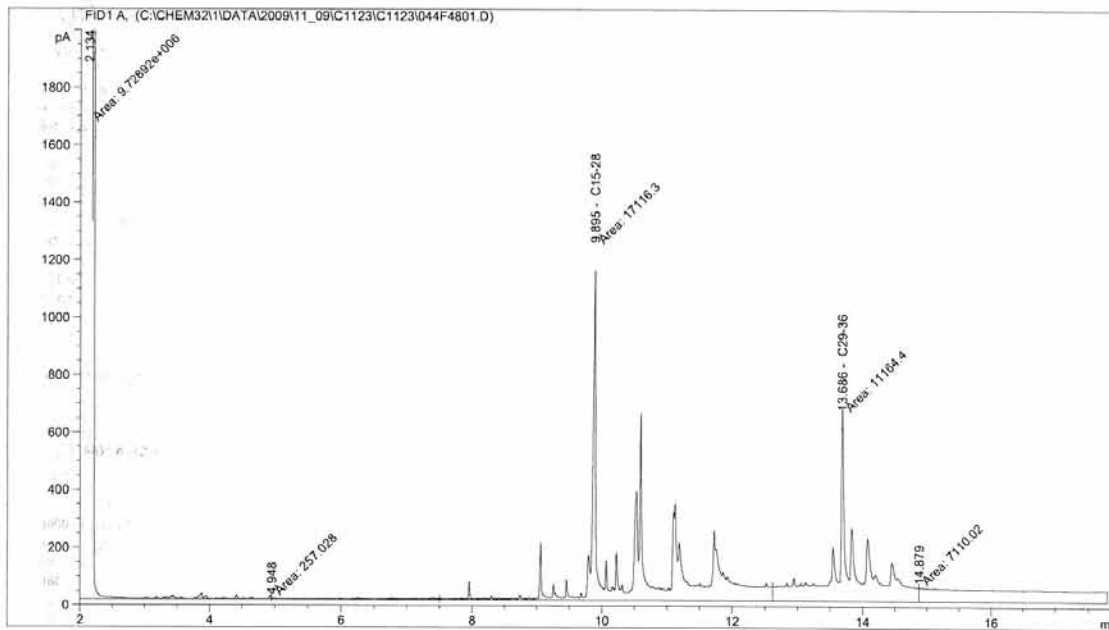
Instrument 1 12/10/2009 12:55:59 PM hz

Page 1 of 1

Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\044F4801.D  
 Sample Name: W09/025177

```

=====
Acq. Operator   : hz                               Seq. Line : 48
Acq. Instrument : Instrument 1                     Location  : Vial 44
Injection Date  : 11/24/2009 12:53:20 PM          Inj       : 1
                                                    Inj Volume: 2 µl
Acq. Method    : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed   : 10/21/2009 9:06:05 AM by hz
Analysis Method: C:\CHEM32\1\METHODS\TPHRE_F.M
Last changed   : 12/10/2009 12:55:18 PM by hz
                (modified after loading)
Method Info    : Method for analysis of Total Petroleum Hydrocarbons
                Front Injector/Column Method
=====
  
```



Area Percent Report

```

=====
Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier    : 1.0000
Dilution      : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
=====
  
```

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.134	MF	0.2495	9.72892e6	99.63493	?
2	4.948	MF	0.9103	257.02817	0.00263	?
3	5.000		0.0000	0.00000	0.00000	C10-14
4	9.895	FM	0.2321	1.71163e4	0.17529	C15-28
5	13.686	MP	0.2866	1.11644e4	0.11434	C29-36
6	14.879	FM	2.4313	7110.02490	0.07281	?

Totals : 9.76457e6

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

\*\*\* End of Report \*\*\*

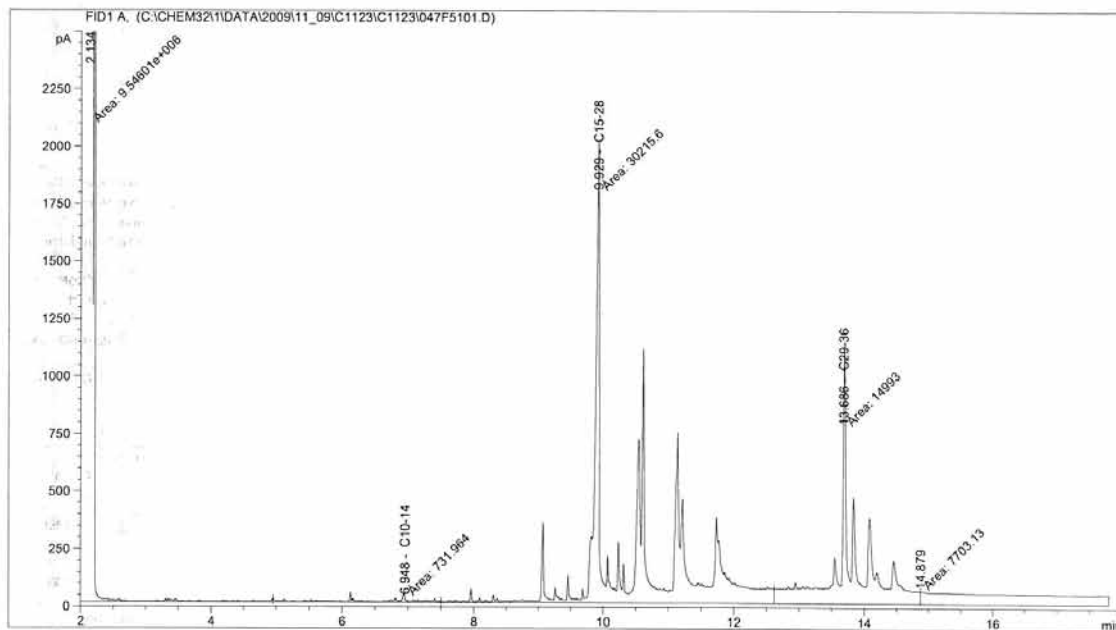
Instrument 1 12/10/2009 12:56:26 PM hz

Page 1 of 1

Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\047F5101.D  
 Sample Name: W09/025178

```

=====
Acq. Operator   : hz                               Seq. Line : 51
Acq. Instrument : Instrument 1                     Location  : Vial 47
Injection Date  : 11/24/2009 2:16:10 PM          Inj       : 1
                                                    Inj Volume: 2 µl
Acq. Method    : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed   : 10/21/2009 9:06:05 AM by hz
Analysis Method: C:\CHEM32\1\METHODS\TPHRE_F.M
Last changed   : 12/10/2009 12:57:50 PM by hz
                (modified after loading)
Method Info    : Method for analysis of Total Petroleum Hydrocarbons
                Front Injector/Column Method
=====
  
```



Area Percent Report

```

Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier    : 1.0000
Dilution      : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.134	MF	0.2460	9.54601e6	99.44119	?
2	6.948	MF	0.5006	731.96381	0.00762	C10-14
3	9.929	FM	0.2828	3.02156e4	0.31476	C15-28
4	13.686	MF	0.3276	1.49930e4	0.15618	C29-36
5	14.879	FM	2.4014	7703.13184	0.08024	?

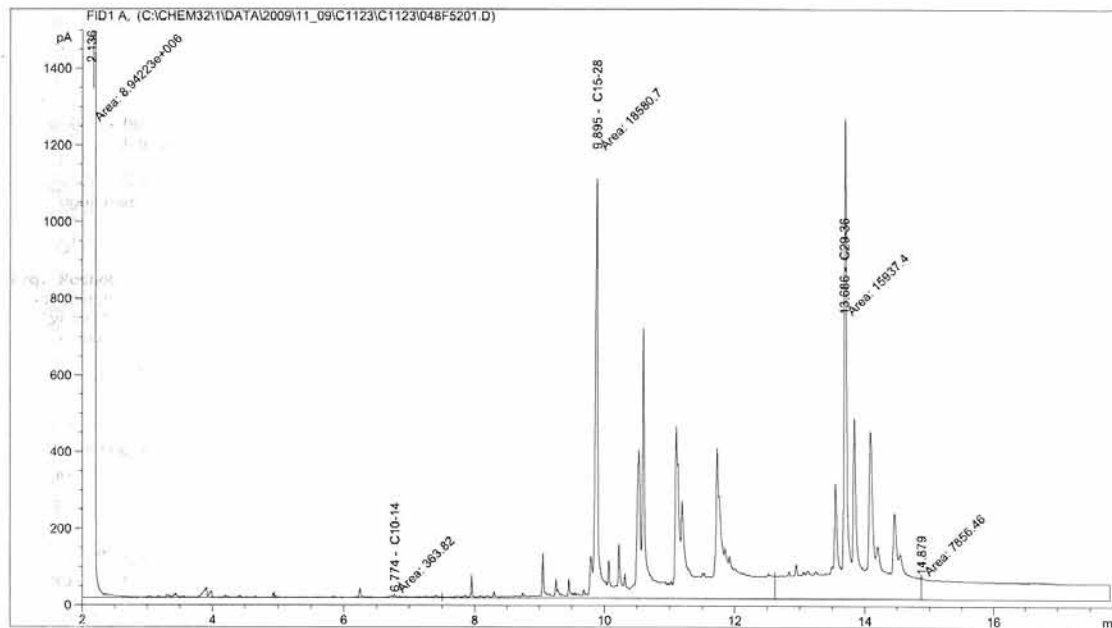
Totals : 9.59965e6

\*\*\* End of Report \*\*\*

Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\048F5201.D  
 Sample Name: W09/025179

```

=====
Acq. Operator   : hz                      Seq. Line : 52
Acq. Instrument : Instrument 1             Location  : Vial 48
Injection Date  : 11/24/2009 2:43:44 PM   Inj       : 1
                                           Inj Volume: 2 µl
Acq. Method     : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed    : 10/21/2009 9:06:05 AM by hz
Analysis Method : C:\CHEM32\1\METHODS\TPHRE_F.M
Last changed    : 12/10/2009 12:58:25 PM by hz
                 (modified after loading)
Method Info     : Method for analysis of Total Petroleum Hydrocarbons
                 Front Injector/Column Method
=====
  
```



=====  
 Area Percent Report  
 =====

```

Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.136	MF	0.2320	8.94223e6	99.52433	?
2	6.774	MF	0.9545	363.82016	0.00405	C10-14
3	9.895	FM	0.2664	1.85807e4	0.20680	C15-28
4	13.686	MF	0.3625	1.59374e4	0.17738	C29-36
5	14.879	FM	2.3796	7856.46094	0.08744	?

Totals : 8.98497e6

=====  
 \*\*\* End of Report \*\*\*  
 =====

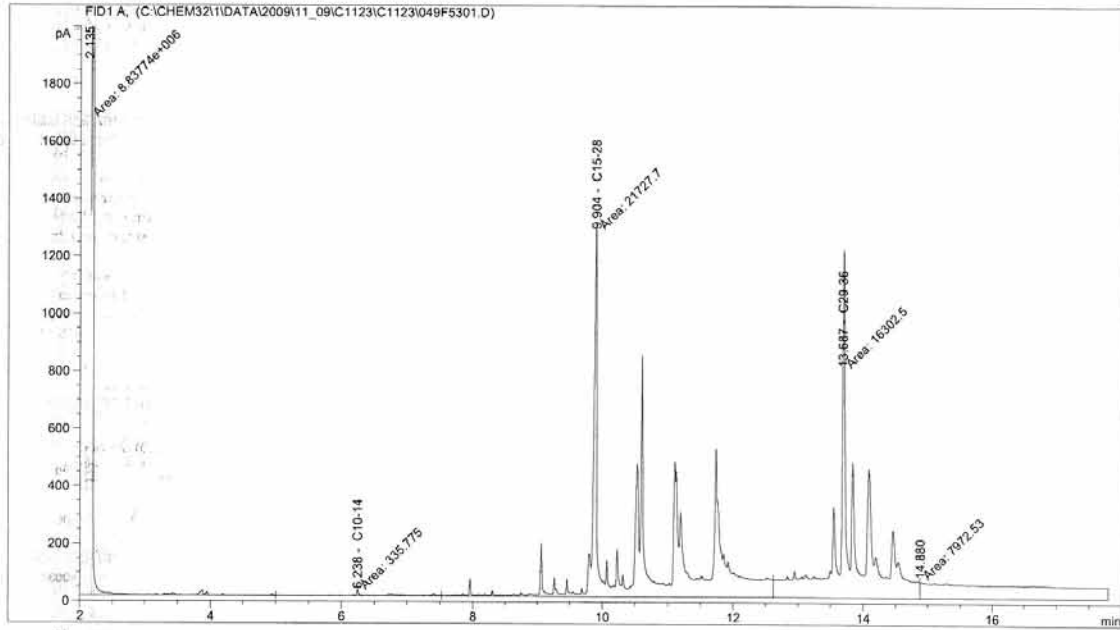
Instrument 1 12/10/2009 12:58:38 PM hz

Page 1 of 1

Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\049F5301.D  
 Sample Name: W09/025180

```

=====
Acq. Operator   : hz                      Seq. Line : 53
Acq. Instrument : Instrument 1             Location  : Vial 49
Injection Date  : 11/24/2009 3:11:19 PM Inj       : 1
                                           Inj Volume: 2 µl
Acq. Method     : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed    : 10/21/2009 9:06:05 AM by hz
Analysis Method : C:\CHEM32\1\METHODS\TPH_F.M
Last changed    : 12/10/2009 1:08:42 PM by hz
                 (modified after loading)
Method Info     : Method for analysis of Total Petroleum Hydrocarbons
                 Front Injector/Column Method
=====
  
```



=====  
 Area Percent Report  
 =====

```

Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.135	MF	0.2317	8.83774e6	99.47841	?
2	6.238	MF	0.4385	335.77487	0.00378	C10-14
3	9.904	MF	0.2858	2.17277e4	0.24457	C15-28
4	13.687	MF	0.3442	1.63025e4	0.18350	C29-36
5	14.880	FM	2.3565	7972.53271	0.08974	?

Totals : 8.88407e6

=====  
 \*\*\* End of Report \*\*\*

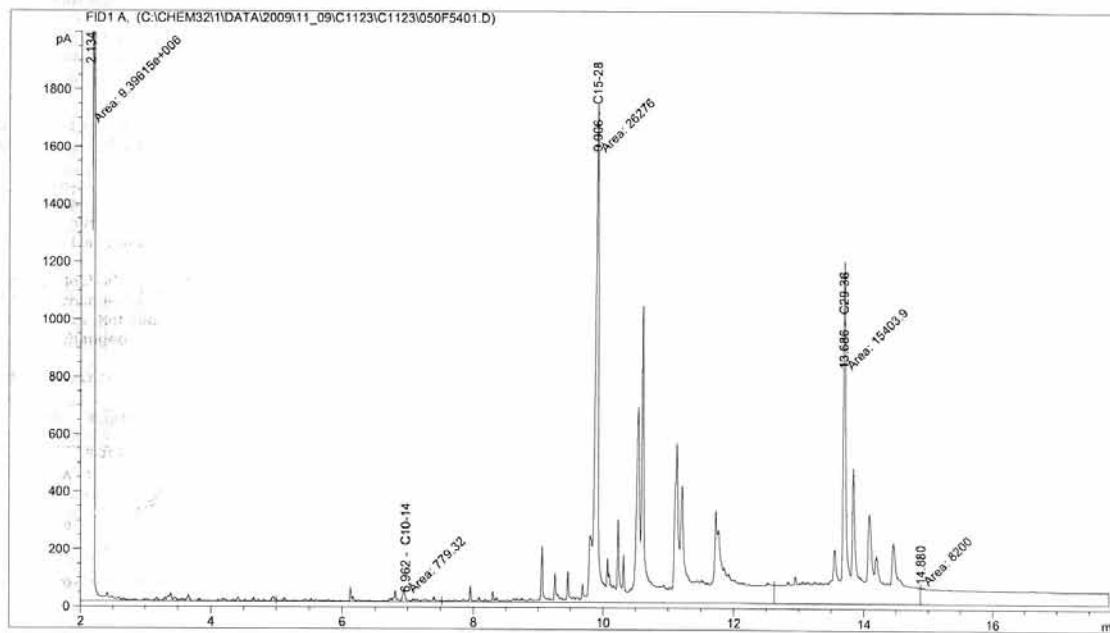
Instrument 1 12/10/2009 1:08:59 PM hz

Page 1 of 1

Data File C:\CHEM32\1\DATA\2009\11\_09\C1123\C1123\050F5401.D  
 Sample Name: W09/025181

```

=====
Acq. Operator   : hz                               Seq. Line : 54
Acq. Instrument : Instrument 1                       Location  : Vial 50
Injection Date  : 11/24/2009 3:38:40 PM            Inj       : 1
                                                    Inj Volume: 2 µl
Acq. Method    : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed   : 10/21/2009 9:06:05 AM by hz
Analysis Method: C:\CHEM32\1\METHODS\TPH_F.M
Last changed   : 12/10/2009 1:08:42 PM by hz
                (modified after loading)
Method Info    : Method for analysis of Total Petroleum Hydrocarbons
                Front Injector/Column Method
=====
  
```



=====  
 Area Percent Report  
 =====

```

Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.134	MF	0.2526	9.39615e6	99.46374	?
2	6.962	MF	1.0460	779.31982	0.00825	C10-14
3	9.906	MF	0.2814	2.62760e4	0.27815	C15-28
4	13.686	MF	0.3186	1.54039e4	0.16306	C29-36
5	14.880	FM	2.4204	8200.00488	0.08680	?

Totals : 9.44681e6

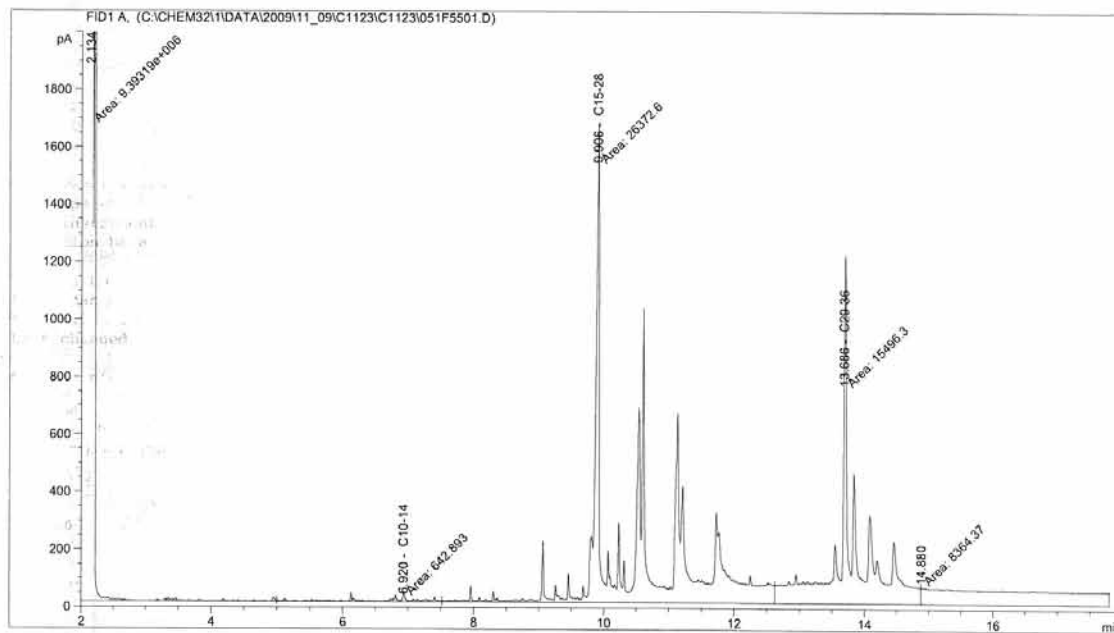
=====  
 \*\*\* End of Report \*\*\*  
 =====

Instrument 1 12/10/2009 1:09:26 PM hz

Page 1 of 1

```

=====
Acq. Operator   : hz                               Seq. Line : 55
Acq. Instrument : Instrument 1                       Location  : Vial 51
Injection Date  : 11/24/2009 4:06:32 PM            Inj       : 1
                                                    Inj Volume: 2 µl
Acq. Method    : C:\CHEM32\1\DATA\2009\11_09\C1123\C1123\TPH_F.M
Last changed   : 10/21/2009 9:06:05 AM by hz
Analysis Method: C:\CHEM32\1\METHODS\TPH_F.M
Last changed   : 12/10/2009 1:08:42 PM by hz
                (modified after loading)
Method Info    : Method for analysis of Total Petroleum Hydrocarbons
                Front Injector/Column Method
=====
  
```



Area Percent Report

```

Sorted By      : Signal
Calib. Data Modified : 6/5/2009 10:05:27 AM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A.

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	2.134	MF	0.2517	9.39319e6	99.46129	?
2	6.920	MF	1.0905	642.89252	0.00681	C10-14
3	9.906	MF	0.2897	2.63726e4	0.27925	C15-28
4	13.686	MF	0.3475	1.54963e4	0.16409	C29-36
5	14.880	FM	2.4534	8364.37207	0.08857	?

Totals : 9.44406e6

\*\*\* End of Report \*\*\*

## D.3 Quality assurance reports, oysters



**Australian Government**  
**National Measurement Institute**

### QUALITY ASSURANCE REPORT

**Client:** DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
**NMI QA Report No:** DOEC01\_W/091104\_48 **Sample Matrix:** Solid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		mg/kg	mg/kg	mg/kg	mg/kg	%	%	%
<b>Organics Section</b>								
<b>BTEX</b>								
				<b>W09/025173</b>				<b>W09/025173</b>
Benzene	NGCMS_1121	0.5	<0.5	<0.5	<0.5	-	105	78
Toluene	NGCMS_1121	0.5	<0.5	<0.5	<0.5	-	94	81
Ethyl Benzene	NGCMS_1121	0.5	<0.5	<0.5	<0.5	-	89	74
m, p - Xylene	NGCMS_1121	1	<1	<1	<1	-	93	81
o-Xylene	NGCMS_1121	0.5	<0.5	<0.5	<0.5	-	81	72
<b>TPH</b>								
				<b>W09/025173</b>				<b>W09/025173</b>
TPH C6-C9	NGCMS_1121	25	<25	<25	<25	-	73	92
				<b>W09/025177</b>				<b>W09/025177</b>
TPH C10-C14	NGCMS_1112	50	<50	<50	<50	-	84	56
TPH C15-C28	NGCMS_1112	100	<100	570	540	5.4	94	86
TPH C29-C36	NGCMS_1112	100	<100	410	400	2.5	-	-
<b>PAH</b>								
				<b>W09/025177</b>				<b>W09/025177</b>
Naphthalene	NGCMS_1111	0.01	<0.01	<0.01	<0.01	-	83	70
Acenaphthylene	NGCMS_1111	0.01	<0.01	<0.01	<0.01	-	-	-
Acenaphthene	NGCMS_1111	0.01	<0.01	<0.01	<0.01	-	-	-
Fluorene	NGCMS_1111	0.01	<0.01	<0.01	<0.01	-	91	95
Phenanthrene	NGCMS_1111	0.01	<0.01	<0.01	<0.01	-	93	95
Anthracene	NGCMS_1111	0.01	<0.01	<0.01	<0.01	-	-	-
Fluoranthene	NGCMS_1111	0.01	<0.01	<0.01	<0.01	-	-	-
Pyrene	NGCMS_1111	0.01	<0.01	<0.01	<0.01	-	-	-
Benz[a]anthracene	NGCMS_1111	0.01	<0.01	<0.01	<0.01	-	99	99
Chrysene	NGCMS_1111	0.01	<0.01	<0.01	<0.01	-	101	71
Benzo[b] & [k] fluoranthene	NGCMS_1111	0.02	<0.02	<0.02	<0.02	-	-	-
Benzo[a]pyrene	NGCMS_1111	0.01	<0.01	<0.01	<0.01	-	93	108
Indeno[1,2,3-cd]pyrene	NGCMS_1111	0.01	<0.01	<0.01	<0.01	-	-	-
Dibenz[ah]anthracene	NGCMS_1111	0.01	<0.01	<0.01	<0.01	-	114	123
Benzo[ghi]perylene	NGCMS_1111	0.01	<0.01	<0.01	<0.01	-	-	-
Surrogate Volatile Recovery		-	-	111	115	3.5	101	98
Surrogate Semivolatile Recovery		-	-	94	98	4.2	110	106

Results expressed in percentage (%) or mg/kg wherever appropriate  
Acceptable Spike recovery is 70-130% (BTEX and TPH C<sub>6</sub>-C<sub>9</sub>); 50-150% (PAH and TPH C10-C36)  
Acceptable RPDs on spikes and duplicates is 40%  
'NA' = Not Applicable.  
RPD= Relative Percentage Difference.  
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Signed:

Danny Slee  
Organics Manager, NMI-Pymble  
16/11/2009

Date:



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