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REPORT

LIMITED ENVIRONMENTAL SITE ASSESSMENT SERVICE STATION 39-45 TWEED COAST ROAD, CABARITA, NSW

Prepared for:

STOCKWELL

March 2008

Ref N°: 6056/04

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1.0 INTRODUCTION

Stockwell Developments engaged **GeoEnvironmental Consultants** to undertake a limited environmental assessment of the existing service station and adjoining buildings located at 39-45 Tweed Coast Road, Cabarita, NSW.

The subject site forms part of a proposed commercial redevelopment on the south west side of Tweed Coast Road and includes the Cabarita Beach House Motel, the Cabarita Beach Service Station and the Bogangar Newsagency. The site location and layout is shown on Drawing Nos. 1 and 2.

The assessment has been conducted in accordance with requirements of the NSW EPA *Guidelines for Assessing Service Station Sites*, December 1994. Previous environmental work has been reviewed and considered during this assessment.

1.1 Objectives

The objective of the limited environmental assessment is to assess whether or not significant contamination exists as a result of service station activities. Soil beneath concrete slabs under each of the three site buildings was also assessed.

2.0 SCOPE OF WORK

The following scope of work was completed:

- Site inspection and underground services identification;
- Drilling of three (3) solid stem auger boreholes on 18th December 2007 designated as Borehole Nos. CB1 to CB3 and installation of one groundwater monitoring well in CB1;
- Collection of soil samples from CB1 to CB3 and from under slab locations US1 to US6 for geological description and laboratory analysis;
- Selection of soil samples from boreholes for laboratory analysis for total petroleum hydrocarbons (TPH), benzene, toluene, ethyl benzene and xylene (BTEX) compounds, and lead (Pb)
- Selection of soil samples from under slab locations for analysis of metals arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), nickel (Ni), lead (Pb), zinc (Zn) and organochlorine and organophosphate (OC/OP) pesticides;
- Gauging of Monitoring Well No. CB1 and two other un-named, existing monitoring wells and collection of four groundwater samples designated as

- WS1 (from CB1), WS2 and WS3 and field duplicate DUP1 and laboratory analysis for TPH, BTEX and lead;
- Analysis of two soil samples for leachable As, Cu, Pb and Zn using the acidified toxicity characteristic leachate procedure (TCLP) test; and
- Data analysis and reporting.

3.0 BACKGROUND INFORMATION

3.1 Site Identification

The site is located on the south-west side of Tweed Coast Road and includes:

- Cabarita Beach House Motel on Lot 20 in DP31218;
- Cabarita Beach Service Station on Lots 21 and 22 in DP31218; and
- Bogangar Newsagency on Lot 23 in DP31218.

The motel is located at the north end of the three properties with a ramp leading down from street level to the lower site area. The service station occupies the central part of the site with three underground fuel storage tanks (USTs) and bowsers in the street level forecourt area. A ramp leads down to the lower south western site area that is approximately 3m lower. The Bogangar Newsagency is in the southern building that is elevated on stumps.

The following report was reviewed:

Preliminary Contamination Assessment for Cabarita Service Station, Lot 22 on DP31208, The Coast Road, Cabarita Beach by Border-Tech Geotechnical Engineering Services, Ref: BT14292, February 2005.

The report included a review of site history details and the results of drilling and sample collection from eight locations BH1 to BH8. TPH, BTEX and Pb concentrations in five samples collected from boreholes BH1 to BH3 located to the south and north of the USTs were below adopted regulatory criteria. TPH, BTEX and metal concentrations in four surface soil samples collected from the lower site area were below adopted regulatory criteria. There was no groundwater sampling conducted.

While inspecting the site on 18th December 2007, evidence of previously completed environmental assessment work was identified. Evidence included the resealed borehole drill locations of Border-Tech's BH1, BH2 and BH3 drilled in 2005. There were also two existing groundwater monitoring wells that service station staff advised were installed earlier in 2007. There were also two other resealed borehole locations that were apparently drilled at the time of monitoring well installation. There was no information available on the drilling activities that had occurred or any environmental data. The 50mm PVC monitoring wells under roadbox covers were inspected and were in good condition and suitable for groundwater sample collection. The two monitoring well and two borehole locations are shown on Drawing No. 2.

There was also evidence of old boreholes in close proximity to BH1 and BH2 for which no information was available.

4.0 SAMPLING AND ANALYSIS PROGRAM

4.1 Sampling Rationale

The sampling rationale was based on results of the site inspection, location of existing groundwater monitoring wells and review of available data. The subject site area has been assessed by drilling on 18th December 2007 as follows:

- Borehole No. **CB1** was located on the lower service station area to the south of the USTs and building. The borehole/well was positioned to assess potential contamination from oil drums in the area and potential migration in a southerly direction away from the higher USTs and bowser area. Groundwater was encountered at approximately 2.7m depth and a groundwater monitoring well was installed;
- Borehole No. **CB2** was located on the upper forecourt area in a safe location just east of the southern UST and bowser area. The borehole was positioned to assess potential contaminant migration in an easterly direction. CB2 was drilled to 6.0m depth;
- Borehole No. **CB3** was located on the lower service station area near the southern corner of the service station building to assess the area of an existing pit, possibly an interceptor pit. CB3 was drilled to 4.5m depth, nearly 2.0m below the observed groundwater level;
- **US1, US2 and US4** were located under accessible parts of the ground level slab of the service station building and adjacent concrete ramp. Samples were collected by hand tools immediately beneath the concrete; and
- **US3** was collected beneath the ground level concrete slab under the Bogangar Newsagency and **US5** and **US6** were collected beneath the ground level concrete slabs under the motel building.

The sampling locations were selected based on site observations, potential contaminant sources and likely contaminant migration directions. The upper level existing monitoring well was located in a good position to assess potential contaminant migration in an easterly direction away from the USTs. The lower level existing monitoring well was located in a good position to assess potential contaminant migration in a westerly direction away from the USTs. The location of the three completed monitoring wells provided good coverage to assess groundwater conditions and potential groundwater contamination. The sampling locations are shown on Drawing No. 2.

4.2 Sampling Methodology

Sampling locations were selected after considering the objectives, access restrictions and safety issues such as underground and overhead utilities and traffic control. Work was conducted under an Australian Institute of Petroleum (AIP) Work Clearance Form signed by the service station manager and under a specific Site Safety Plan.

Subsurface investigations were conducted using a 4WD mounted geotechnical drill rig equipped with solid stem augers and supplied and operated by Soil Surveys. The 50mm PVC monitoring well was installed directly into the approximate 100mm diameter borehole at CB1 as soon as the augers were removed.

Groundwater samples were collected in accordance with standard **GeoEnvironmental Consultants** procedures that are detailed in Appendix C. The new monitoring well at CB1 was developed by bailing approximately five well volumes with a disposable bailer. The two existing wells were gauged and lightly bailed prior to sampling as recharge rates were not known. A disposable bailer dedicated to each well was used to collect water samples.

4.3 Results of Field Sampling

4.3.1 Soil

The geological profile at each sampling location was described in detail and borehole logs for Borehole Nos. CB1 to CB3 are presented in Appendix A. Hydrocarbon odour and staining occurrence has been noted on the drill logs. Field observations were used to select soil samples for laboratory analysis. Soil was classified in accordance with the Unified Soil Classification System (USCS) and group symbols are shown on each borehole log.

The observed soil profile on the lower service station area was typically comprised of a thin layer of reworked site sand or sand fill overlying sand and silty sand. On the upper service station area there was approximately 2.7m of fill material overlying natural sand and silty sand. The fill was comprised of mixed layers of sand and gravel with rocks and rubble in some layers.

The observed soil in each of the six under slab sampling locations was typically dry silt and/or sand with no evidence of rubble, staining or odours.

4.3.2 Groundwater

Groundwater was initially encountered at approximately 2.7m below ground level in the lower part of the service station site and at about 6.0m deep in the upper service station area.

Top of Casing (TOC) elevations were approximated based on nearby spot height survey data relative to the Australian Height Datum (AHD). TOC elevations, depth to groundwater gauging data and groundwater elevations relative to AHD are presented in Table No. 5.

It is evident from the gauging and survey data that the groundwater flow direction is in an easterly to south easterly direction towards the Tweed Coast Road. The existing monitoring well to the east of the USTs and Borehole No. CB2 are in good positions to identify contaminant migration away from the USTs and bowser area.

4.4 Analysis Rationale

All soil sample glass containers were transported to the laboratory to be either analysed or held for possible future analyses in accordance with instructions included on the Chain of Custody form.

Soil samples were designated by **GeoEnvironmental Consultants** unique project number (6056/04) followed by a number which corresponded to the sample location i.e. Sample No. 6056/04/CB1.1 relates to the first sample collected from Borehole No. CB1. US1 to US6

relate to the six under slab surface samples collected beneath buildings. The top and bottom depths of each sampling interval are shown on the borehole drill logs in Appendix A and specified in Table Nos. 1 to 4. Groundwater samples were designated by the project number (6056/04) followed by a sample number i.e. Sample No 6056/04/WS1.

Upon completion of fieldwork, soil samples were selected for laboratory analysis on the basis of visual assessment and professional judgment, odour and changes in lithology. The rationale for sample analysis selection at each sampling location was as follows:

- **Sample No. CB1.1** was selected to assess potential contamination in surface soil where oil drums had been stored and there was evidence of surficial hydrocarbon staining. **CB1.2** was selected to assess natural sand just beneath the observed staining to help define the vertical extent of any contamination that may be present. **CB1.5** was selected to assess potential soil contamination at the water table, sourced from either storage in the area or the USTs located to the north;
- **Sample Nos. CB2.1, CB2.4, CB2.5 and CB2.7** were selected to assess potential contamination in shallow fill sourced from bowzers and pipework and in natural sand beneath the base level of the USTs where any loss from the USTs would potentially migrate; and
- **Sample Nos. CB3.1 and CB3.2** were selected to assess potential contamination in surface soil near the existing pit. **CB1.5** was selected to assess potential soil contamination at the water table sourced from either the nearby pit, storage in nearby areas or from the USTs located to the north east.

4.5 Analytical Program

A total of eleven (11) soil samples collected on 18th December 2007 from Borehole Nos. CB1 to CB3 were selected for laboratory analysis of TPH, BTEX compounds and total lead. One duplicate sample DUP1, a field duplicate of CB3.2 was included in the above analyses. Six (6) under slab samples were analysed for a suite of seven metals including As, Cd, Cr, Cu, Ni, Pb and Zn, and OC/OP pesticides.

Four (4) groundwater samples collected on 18th December including one duplicate were analysed for TPH and BTEX compounds and dissolved lead with filtration performed in the laboratory upon sample receipt within 24 hours after collection. Soil and groundwater analyses were performed by Amdel who are National Association of Testing Authorities (NATA) registered for the analyses performed.

4.6 Assessment Criteria

4.6.1 Soil

Adopted assessment criteria are as follows:

- **Total Metals:** The National Environment Protection (*Assessment of Site Contamination*) Measure (NEPM) 1999, Schedule B(1) *Guideline on the Investigation Levels for Soil and Groundwater* provides Ecological Investigation Levels (EILs) and

Health-based Investigation Levels (HILs). The EIL levels and HIL levels for a commercial/industrial exposure setting (Setting "F") are as follows:

	EIL	HIL(F)
- Arsenic	20 mg/kg	500 mg/kg
- Cadmium	3 mg/kg	100 mg/kg
- Chromium	400 mg/kg	60%
- Copper	100 mg/kg	5,000 mg/kg
- Nickel	60 mg/kg	3,000 mg/kg
- Lead	300 mg/kg	1,500 mg/kg
- Zinc	200 mg/kg	35,000 mg/kg

NEPM criteria are shown on Table 2.

- **Total Petroleum Hydrocarbons (TPH) and BTEX Compounds:** The NSW Environment Protection Authority (EPA) published *Guidelines for Assessing Service Station Sites, December 1994*. The guideline provides the following threshold concentrations for sensitive land use.

- TPH	C ₆ -C ₉	65 mg/kg dry wt
- TPH	C ₁₀ -C ₄₀	1000 mg/kg dry wt
- Benzene		1 mg/kg dry wt
- Toluene		1.4 mg/kg dry wt
- Ethyl benzene		3.1 mg/kg dry wt
- Total xylenes		14 mg/kg dry wt

- **OC/OP Pesticides:** The National Environment Protection (*Assessment of Site Contamination*) Measure (NEPM) 1999, Schedule B(1) *Guideline on the Investigation Levels for Soil and Groundwater* provides Health-based Investigation Levels (HILs) for selected OC pesticides. Pesticide criteria for commercial/industrial settings include aldrin plus dieldrin (50 mg/kg), chlordane (250 mg/kg), DDT and derivatives (1000 mg/kg) and heptachlor (50 mg/kg);
- **Leachable Metals:** The NSW EPA *Environmental Guidelines: Assessment, Classification & Management of Liquid and Non-liquid Wastes (1999)* details a process for assessment and classification of liquid and non-liquid waste. The objective is to classify waste as Inert, Solid, Industrial or Hazardous based on comparison of total and/or leachable (TCLP) concentrations with established values.

4.6.2 Groundwater

For the purpose of evaluating groundwater quality the following guidelines have been referenced:

1. Australian and New Zealand Environment and Conservation Council (ANZECC), Australian Water Quality Guidelines for Fresh and Marine Waters (November 1992), Protection of Aquatic Ecosystems:

Lead:

1 to 5 µg/L

TPH and BTEX Compounds:

– Alkanes	C ₆ -C ₃₆	Not Established
– Monocyclic aromatics	Benzene	300 µg/L
	Toluene	300 µg/L
	Ethyl Benzene	140 µg/L
	Xylene	Not Established

2. NSW Environment Protection Authority (EPA), *Guidelines for Assessing Service Station Sites* 1994, Table 4, Threshold concentrations – waters (Protection of aquatic ecosystems):

Lead: 1 to 5 µg/L

TPH and BTEX Compounds:

– Alkanes	C ₆ -C ₉	10,000 µg/L ^a
	C ₁₀ -C ₃₆	10,000 µg/L ^a
– Monocyclic aromatics	Benzene	300 µg/L
	Toluene	300 µg/L
	Ethyl Benzene	140 µg/L
	Xylene	380 µg/L ^b

3. National Environment Protection Measure (NEPM), *Guideline on the Investigation Levels for Soil and Groundwater*, December 1999, Schedule B(1), Table 5-B, Groundwater Investigation Levels (GILs):

Lead: 1 to 5 µg/L

TPH and BTEX Compounds:

– Alkanes	C ₆ -C ₃₆	Not Established
– Monocyclic aromatics	Benzene	300 µg/L
	Toluene	300 µg/L
	Ethyl Benzene	Not Established
	Xylene	Not Established

4. ANZECC, Australian and New Zealand Guidelines for Fresh and Marine Water Quality (October 2000), Trigger Values for Freshwater, level of protection 95% of species:

Lead: 3.4 µg/L

TPH and BTEX Compounds:

– Alkanes	C ₆ -C ₃₆	Not Established
– Monocyclic aromatics	Benzene	950 µg/L
	Toluene	ID ^c
	Ethyl Benzene	ID
	Xylene	550 µg/L ^d

^a Information needed to select threshold concentrations is incomplete. NSW guidelines indicate that discharges should be visually free of oil and grease. Experience has demonstrated that this criterion is equivalent to an oil and grease concentration of approximately 10 mg/L (10,000 µg/L).

^b Netherlands 1994 Maximum Permissible Concentration for total xylenes.

^c ID = insufficient data to derive a reliable trigger value.

^d Sum of ortho-xylene (350 µg/L) and para-xylene (200 µg/L)

It should be noted that use of surface water guidelines is considered very conservative, as these guidelines are applicable to the receiving water and not to groundwater. Contaminant concentrations detected in groundwater at the site will typically reduce during migration to receiving waters and through dilution within the receiving waters.

4.7 Laboratory Analytical Results

4.7.1 Soil

Laboratory results for all soil samples analysed are presented in Table Nos. 1 to 3. Full laboratory reports including Chain of Custody documentation are included in Appendix B.

Soil samples with analyte concentrations above adopted assessment criteria include:

- **Sample No. CB1.1** with TPH C₁₅-C₂₈ and C₂₉-C₃₆ carbon chain length concentrations of 3800 mg/kg and 5400 mg/kg respectively and a total lead concentration of 930 mg/kg. The sample was collected at 0.00-0.20m depth in sand and sandy fill in the lower service station area where oil staining and odours were noted. The detected concentrations are above the adopted criteria of 1000 mg/kg for the full C₁₀-C₃₆ carbon chain length range and 300 mg/kg for total lead;
- **Sample No. US1** with an arsenic concentration of 29 mg/kg. The sample was collected at 0.00-0.10m depth beneath concrete under the service station building. The detected concentration is above the adopted ecological criteria of 20 mg/kg and below the commercial/industrial criteria of 500 mg/kg;
- **Sample No. US2** with arsenic, copper, lead and zinc concentrations of 25, 2400, 840 and 470 mg/kg respectively. The sample was collected at 0.00-0.10m depth beneath concrete under the service station building and near the plumbers store door. The detected concentrations are above the adopted ecological criteria and below commercial/industrial criteria;

Leachability testing using the acidified TCLP test returned leachable lead concentrations for Sample Nos. CB1.1 and US2 of 0.56 and 1.6 mg/L respectively. The results indicate that soil from these areas would be classified as Solid Waste for offsite soil disposal purposes.

All other TPH, BTEX, metal and OC/OP pesticide concentrations in soil were below adopted criteria.

4.7.2 Groundwater

Laboratory results for groundwater Sample Nos. WS1 to WS3 are presented in Table No. 4. Full laboratory reports including Chain of Custody documentation are included in Appendix B.

TPH and BTEX compounds were detected in groundwater sample WS1 collected from CB1 but at concentrations below adopted criteria. TPH and BTEX compound concentrations in Samples WS2 and WS3 were below the laboratories practical quantitation limit and adopted criteria. All dissolved lead concentrations were below the laboratories practical quantitation limit and adopted criteria.

5.0 QUALITY ASSURANCE

All soil samples collected during this assessment were collected in accordance with the Quality Assurance and Quality Control Procedures outlined in Appendix C.

Laboratory QA procedures are described in Appendix C and results reported in the Amdel Quality Reports included in Appendix B.

The organic and inorganic data reported for this assessment can be considered to be of sufficient quality to enable valid assessment of site conditions and to achieve the project objectives.

6.0 CONCLUSIONS

GeoEnvironmental Consultants conclude on the basis of the completed scope of work that the site is underlain by natural sand and silty sand under the lower western part. The eastern part is raised by approximately 3m to street level with approximately 2.7m depth of mixed fill behind retaining walls. The depth to groundwater beneath the lower western site area is approximately 2.7m. Groundwater flow direction is interpreted to be in an easterly to south easterly direction based on gauging of three monitoring wells.

There is no evidence of significant soil contamination in the UST tank and bowser area of the upper Service Station forecourt. Being an operational service station there is potential for localized contamination around bowser bases and within UST tank pits that may not have been intersected by the completed investigation.

Evidence of significant shallow soil contamination was identified in the lower site area assessed by Borehole No. CB1. TPH in the longer C₁₅ to C₃₆ carbon chain length ranges, indicative of oil or grease and total lead was identified in the top 0.2m. The total lead concentration was below adopted criteria for commercial/industrial land use. Results for a sample collected at 0.3 to 0.5m depth were low, indicating that the identified contamination is a localized surface occurrence related to the storage and spillage of petroleum products and workshop wastes in the area.

Sample collection and analysis from under slab areas identified low level arsenic concentrations beneath the service station building. Copper, lead and zinc were identified at concentrations above environmental criteria and below commercial/industrial criteria at one location under the service station building. The identified metals may be the result of wash from plumbing activities outside the plumbers store and/or from the nearby in ground pit. Lead was sufficiently leachable under acidified TCLP testing to confirm that shallow soil from the areas assessed by Borehole No. CB1 and US2 would be classified as solid waste for offsite soil disposal purposes. There was no significant contamination identified under the motel or newsagency buildings.

Sample collection and analysis of groundwater from three monitoring wells confirmed that there is no indication of significant groundwater contamination.

7.0 LIMITATIONS OF REPORT

GeoEnvironmental Consultants have prepared this report in accordance with generally accepted consulting practice. No warranty, expressed or implied, is made as to the results included in this report. The report has not been prepared for the use by parties other than Stockwell, their authorised third parties, local government authorities and the EPA. It may not contain sufficient information for the purposes of other parties or for other uses.

To the best of our knowledge, information contained in this report is accurate at the date of issue. However, subsurface conditions, including contaminant concentrations, are subject to change in a limited time. In addition, as this investigation has been limited in extent and depth and there are always some variations in subsurface conditions across a site, it is unlikely that the measurements and values obtained by sampling and analysis during this program will represent the extremes of conditions, which exist within the site.

for **GeoEnvironmental Consultants Pty Ltd**

A handwritten signature in black ink, appearing to read 'M. Tisdall', is written over a horizontal line.

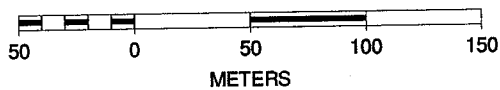
Michael Tisdall BSc. PGDipSc.

DRAWINGS

Enlighten Map



SCALE 1 : 3,106



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The information contained on this document remains valid for 30 days only from the date of supply.



LEGEND



Soil Sampling Locations and Nos.

CB1 to CB3 by GeoEnvironmental, 18 December 2007

US1 to US6 Under Slab Sampling, 18 December 2007



Soil Sampling Locations and Nos.

BH1 to BH8 by Border-Tech February 2005



Existing Monitoring Well

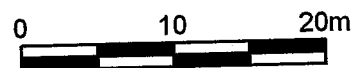
Installed by others in early 2007



Evidence of previous drilled boreholes

(WS1)

WS1 to WS3 Water Samples by GeoEnvironmental, 18 December 2007



N

SCALE: 1:500

JOB No. 6056/04

DRAWN: MWT

CHECKED: MWT

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CLIENT: STOCKWELL

SITE LAYOUT & SAMPLING LOCATIONS
39-45 TWEED COAST ROAD, CABARITA, NSW

DATE:

JAN 08

DRAWING No.

2

TABLES

TABLE 1

SOIL ANALYTICAL RESULTS - TPH, BTEX, LEAD
39-45 TWEED COAST ROAD, CABARITA, NSW.

Samples collected 18th December 2007

Page 1 of 1

SAMPLE No.	DEPTH (m)	TPH C6 - C9	TPH C10-C14	TPH C15-C28	TPH C29-C36	B	T	E	X	LEAD
CB1.1	0.00-0.10	<5	62	3800	5400	<0.2	<1	<1	<3	930
CB1.2	0.30-0.50	<5	<10	<20	23	<0.2	<1	<1	<3	<5
CB1.5	2.80-3.00	<5	<10	24	50	<0.2	<1	<1	<3	<5
CB2.1	0.00-0.20	<5	<10	<20	28	<0.2	<1	<1	<3	9
CB2.4	1.80-2.00	<5	<10	<20	<20	<0.2	<1	<1	<3	12
CB2.5	2.80-3.00	<5	<10	<20	<20	<0.2	<1	<1	<3	8.1
CB2.7	5.80-6.00	<5	<10	<20	<20	<0.2	<1	<1	<3	<5
CB3.1	0.00-0.20	<5	<10	<20	40	<0.2	<1	<1	<3	14
CB3.2	0.30-0.50	<5	<10	<20	<20	<0.2	<1	<1	<3	9
CB3.5	2.80-3.00	<5	<10	<20	<20	<0.2	<1	<1	<3	<5
DUP1	Dup of CB3.2	<5	<10	32	46	<0.2	<1	<1	<3	20
PQL		5	10	20	20	0.2	1	1	3	5
NSW Service Station Thresholds		65	1000	1	1.4	3.1	14	300		

- All results are in mg/kg, dry unit weight basis, unless otherwise stated
- TPH = total petroleum hydrocarbons, B = benzene, T = toluene, E = ethyl benzene, X = meta, para and ortho xylene.
- Bold Results** - denotes concentration above NSW Guidelines for Assessing Service Stations Thresholds.
- NA = Not Analysed, NE = Not Established, PQL = Practical Quantitation Limit
- Complete analytical results from Amdel are attached.

Prepared by:..... Checked by:.....

TABLE 2

SOIL ANALYTICAL RESULTS - METALS, OC PESTICIDES
39-45 TWEED COAST ROAD, CABARITA, NSW

Samples collected 18th December 2007

Page 1 of 1

SAMPLE No. 6056/04	DEPTH (m)	Moisture Content %	As	Cd	Cr	Cu	Ni	Pb	Zn	TOTAL OC	TOTAL OP
US1	0.00-0.10	3	29	<1	5	71	2	15	36	<0.5	<0.5
US2	0.00-0.10	3	25	2.6	13	2400	12	840	470	<0.5	<0.5
US3	0.00-0.10	2	4.1	<1	<2	5.3	<2	13	37	0.8	<0.5
US4	0.00-0.10	4	6.2	<1	2	22	<2	7.9	6	<0.5	<0.5
US5	0.00-0.10	1	<3	<1	2.4	1.3	<2	<5	4.7	<0.5	<0.5
US6	0.00-0.10	3	<3	<1	2.8	5.5	<2	9.4	4.7	0.8	<0.5
Practical Quantitation Limit											
			3	1	2	1	2	5	2	0.5	0.5
Ecological Investigation Levels											
			20	3	400	100	60	600	200	NE	NE
Health-based Investigation Level "F"											
			500	100	60%	5000	3000	1500	35000	50	NE

Notes:

1. All results are in mg/kg, dry unit weight basis, unless otherwise stated
2. As = arsenic, Cd = cadmium, Cr = chromium, Cu = copper, Ni = nickel, Pb = lead, Zn = zinc, OC = organochlorine, OP = organophosphate pesticides
3. **Bold Results** - denotes concentration above Ecological Investigation Level (EIL), (NEPM, 1999).
4. **Bold Results** - denotes concentration above Health-based Investigation level for a commercial/industrial exposure setting, (Exposure Setting "F") (NEPM, 1999)
5. * HIL(F) levels for individual OC pesticides include 50 mg/kg for aldrin + dieldrin, 250mg/kg for chlordane, 1000 mg/kg for DDT and derivatives, and 50 kg/kg for heptachlor.
6. ND = Not detected, na = Not Analysed, NE = Not Established, LOR = Level of Reporting, NR = Not reported
7. Complete analytical results from Amdel are attached.

TABLE 3
SOIL ANALYTICAL RESULTS - TCLP METALS
39-45 TWEED COAST ROAD, CABARITA, NSW
Samples collected 18th December 2007

SAMPLE No. 6056/04	DEPTH (m)	Arsenic	Copper	Lead	Zinc
CB1.1	0.00-0.10	<0.05	1.3	0.56	2.1
US2	0.00-0.10	<0.05	18	1.6	14
Laboratory Level of Reporting			0.1	0.1	0.1
NSW EPA - CT 1		10 mg/kg	NE	10 mg/kg	NE
- CT 2		100 mg/kg	NE	100 mg/kg	NE
- CT 3		400 mg/kg	NE	400 mg/kg	NE
- SCC1		500 mg/kg	NE	1500 mg/kg	NE
- SCC2		500 mg/kg	NE	1500 mg/kg	NE
- SCC3		2000 mg/kg	NE	6000 mg/kg	NE
- TCLP 1		0.5	NE	0.5	NE
- TCLP 2		5	NE	5	NE
- TCLP 3		20	NE	20	NE

1. All results are in mg/L, unless otherwise stated
2. NE = Not Established
3. CT = Contaminant threshold values, without doing the leaching test
4. SCC = specific contaminant concentration
5. TCLP = Toxicity Characteristics Leaching Procedure
6. **Bold Results** - denotes concentration above NSW EPA Leachable Concentration TCLP1 criteria for Inert Waste
7. **Bold Results** - denotes concentration above NSW EPA Leachable Concentration TCLP2 criteria for Solid Waste
8. **(Bold Results)** - denotes concentration above NSW EPA Leachable Concentration TCLP3 criteria for Industrial Waste
9. Complete analytical results from Amdel are attached.

Prepared by:.....Checked by:.....

TABLE 4
GROUNDWATER ANALYTICAL RESULTS - TPH, BTEX, LEAD
39-45 TWEED COAST ROAD, CABARITA, NSW

Samples collected 18th December 2007

Page 1 of 1

SAMPLE No.	Benzene	Toluene	Ethyl benzene	Xylene	Total BTEX	TPH C6 - C9	TPH C10-C14	TPH C15-C28	TPH C29-C36	LEAD
WS1	<0.5	39	<1	<3	39	38	<40	124	106	<1
WS2	<0.5	<1	<1	<3	<5.5	<20	<40	<100	<100	<1
WS3	<0.5	<1	<1	<3	<5.5	<20	<40	<100	<100	<1
DUP1	<0.5	<1	<1	<3	<5.5	<20	<40	<100	<100	<1
PQL	0.5	1	1	3	5.5	20	40	100	100	1
ANZECC 1992	300	300	140	NE	NE	NE	NE	NE	NE	1 to 5
NSW EPA 1994	300	300	140	380*	NE	10,000		10,000		1 to 5
NEPM 1999	300	300	NE	NE	NE	NE	NE	NE	NE	1 to 5
DUTCH	30	1000	150	70	NE	NE		600		75
ANZECC 2000	950	ID	ID	550	NE	NE	NE	NE	NE	3.4

- All results are in ug/l.
- DUP1 is a Field Duplicate of WS3.
- ANZECC 1992 = Australian & New Zealand Environment & Conservation Council, Australian Water Quality Guidelines for Fresh and Marine Waters, November 1992: (Protection of Aquatic Ecosystems)
- NSW EPA 1994 = Guidelines for Assessing Service Station Sites, December 1994: Table 4 Threshold concentrations - waters (Protection of aquatic ecosystems)
- NEPM 1999 = National Environment Protection Measure, Guideline on the Investigation Levels for Soil & Groundwater, December 1999: Schedule B(1), Table 5-B Groundwater Investigation Levels
- DUTCH = Dutch Intervention Level 1994
- ANZECC 2000 = Australian & New Zealand Guidelines for Fresh and Marine Water Quality, October 2000: Table 3.4.1 (Trigger Values for Freshwater, Level of Protection 95% of species).
- Bold Results** - denotes concentrations above ANZECC, NSW EPA or NEPM criteria
- ID = Insufficient Data to derive a reliable trigger value, NE = Not Established, * from Netherlands 1994, Maximum Permissible Concentration for total xylenes
- Complete analytical results from Amdel are attached.

APPENDICES

APPENDIX A
BOREHOLE DRILL LOGS

CHECKED BY: MWT

COMMENTS,
TEST RESULTS,
GROUNDWATER,
ETC

- Base of well 4.6m bgs due to 0.7m collapse.
- 50mm Class 18 PVC
- 3.0m screen, 0.5mm slotted
- Blank to 1.25m above ground (no roadbox cover)
- Geofabric sock and 2-3mm graded washed sand sand pack
- 300mm bentonite seal above screen level
- Bailer developed, turbid dark brown water, no HC odour.

Fax: 07 3367 2377

CHECKED BY: MWT

COMMENTS,
TEST RESULTS,
GROUNDWATER,
ETC

CB2.7

No HC odour or staining
Sample selected for analysis.
Becoming wet at base,
collapsing sand.
Groundwater just present.

R.L. Surface: ~7.43
R.L. Datum: AHD

Job No. 6056/04
Figure No: A2

ENVIRONMENTAL LOG		BOREHOLE No. CB3		SHEET 1 of 1		
PROJECT: SERVICE STATION LOCATION: 39-45 TWEED COAST ROAD, CABARITA, NSW BOREHOLE LOCATION: Refer Drawing				DATE COMMENCED: 18-12-07 DATE COMPLETED: 18-12-07 SUPERVISED BY: MWT CHECKED BY: MWT		
SOIL DESCRIPTION		USCS Symbol	Depth in Meters	Sample Nos. 6056/04	PID Readings (ppm) NIL	COMMENTS, TEST RESULTS, GROUNDWATER, ETC
<u>SOIL TYPE:</u> plasticity or particle characteristics, colour, secondary & minor components, moisture and consistency or relative density						
<u>FILL:</u> Sand, Gravel, road base, rocky brown, moist, loose		GM	-	CB3.1		No HC odour or staining. Sample selected for analysis
<u>SAND:</u> Gray to brown, moist, loose		SW	0.40	CB3.2 DUP1		No HC odour Sample selected for analysis
<u>SAND:</u> pale gray, slightly moist, loose		SW	1.0	CB3.3		No HC odour or staining
<u>SILTY SAND:</u> dark chocolate brown, loose, medium grained, very moist.		SM	2.0	CB3.4		No HC odour or staining "Coffee Rock" ?
<u>SAND:</u> gray, slightly moist, loose		SW	3.0	CB3.5		Wet at 2.7m No HC odour or staining Sample selected for analysis
<u>Borehole No. CB3 terminated at 4.5m depth,.</u>			4.0	CB3.6		No HC odour or staining Groundwater present.
Drilling Method: Soil Surveys, Solid Stem geotechnical rig					R.L. Surface: ~4.26 R.L. Datum: AHD	
GeoEnvironmental Consultants Pty Ltd <i>Specialising in the Earth and what's built on it</i> 129 Outlook Crescent, Bardon, QLD 4065 Phone: 07 3367 2266 Fax: 07 3367 2377					ACN 079 083 640 Job No. 6056/04 Figure No: A3	

APPENDIX B
LABORATORY REPORTS AND CHAIN OF CUSTODY FORMS



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Accreditation Number: 14356



Certificate of Analysis

GeoEnvironmental Consultants
129 Outlook Crescent
BARDON QLD 4065
Australia

Attention: Michael Tisdall

Project 07ENBR0028043
Client Reference 6056/4
CABARITA
Order Number 6056/4
Received Date 20/12/2007 08:00:00 AM

Customer Sample ID		CB1.1	CB1.2	CB1.5
Amdel Sample Number		776819	776820	776823
Date Sampled		18/12/2007	18/12/2007	18/12/2007
VOC				
Test/Reference	PQL Unit			
1100 BTEX & (C6-C9) in Soil by P&T				
Benzene	0.2 mg/kg	<0.2	<0.2	<0.2
Ethylbenzene	1 mg/kg	<1	<1	<1
Meta- & Para- Xylene	2 mg/kg	<2	<2	<2
Ortho-Xylene	1 mg/kg	<1	<1	<1
Toluene	1 mg/kg	-	<1	<1
Total Xylenes	3 mg/kg	-	<3	<3
C6-C9 Fraction	5 mg/kg	-	<5	<5
4-Bromofluorobenzene - Surrogate	- %	-	94	89
Toluene	1 mg/kg	<1	-	-
Total Xylenes	3 mg/kg	<3	-	-
C6-C9 Fraction	5 mg/kg	<5	-	-
4-Bromofluorobenzene - Surrogate	- %	99	-	-
SVOC				
Test/Reference	PQL Unit			
2000 TPH (C10 - C36) in Soil by GC				
C10-C14 Fraction	10 mg/kg	62	<10	<10
C15-C28 Fraction	20 mg/kg	3800	<20	24
C29-C36 Fraction	20 mg/kg	5400	23	50
Metals				
Test/Reference	PQL Unit			
3200 Total Metals in Soil by ICP/AES				
Lead	5 mg/kg	930	<5	<5
Miscellaneous				
Test/Reference	PQL Unit			
5000 Moisture Content				
% Moisture	1 %	11	3	9
Customer Sample ID		CB2.1	CB2.4	CB2.5
Amdel Sample Number		776825	776828	776829
Date Sampled		18/12/2007	18/12/2007	18/12/2007
VOC				
Test/Reference	PQL Unit			



Customer Sample ID			CB2.1	CB2.4	CB2.5
Amdel Sample Number			776825	776828	776829
Date Sampled			18/12/2007	18/12/2007	18/12/2007
VOC					
Test/Reference	PQL	Unit			
1100 BTEX & (C6-C9) in Soil by P&T					
Benzene	0.2	mg/kg	<0.2	<0.2	<0.2
Ethylbenzene	1	mg/kg	<1	<1	<1
Meta- & Para- Xylene	2	mg/kg	<2	<2	<2
Ortho-Xylene	1	mg/kg	<1	<1	<1
Toluene	1	mg/kg	<1	<1	<1
Total Xylenes	3	mg/kg	<3	<3	<3
C6-C9 Fraction	5	mg/kg	<5	<5	<5
4-Bromofluorobenzene - Surrogate	-	%	91	96	93
SVOC					
Test/Reference	PQL	Unit			
2000 TPH (C10 - C36) in Soil by GC					
C10-C14 Fraction	10	mg/kg	<10	<10	<10
C15-C28 Fraction	20	mg/kg	<20	<20	<20
C29-C36 Fraction	20	mg/kg	28	<20	<20
Metals					
Test/Reference	PQL	Unit			
3200 Total Metals in Soil by ICP/AES					
Lead	5	mg/kg	9.0	12	8.1
Miscellaneous					
Test/Reference	PQL	Unit			
5000 Moisture Content					
% Moisture	1	%	5	14	9

Customer Sample ID			CB2.7	CB3.1	CB3.2
Amdel Sample Number			776831	776832	776833
Date Sampled			18/12/2007	18/12/2007	18/12/2007
VOC					
Test/Reference	PQL	Unit			
1100 BTEX & (C6-C9) in Soil by P&T					
Benzene	0.2	mg/kg	<0.2	<0.2	<0.2
Ethylbenzene	1	mg/kg	<1	<1	<1
Meta- & Para- Xylene	2	mg/kg	<2	<2	<2
Ortho-Xylene	1	mg/kg	<1	<1	<1
Toluene	1	mg/kg	<1	<1	<1
Total Xylenes	3	mg/kg	<3	<3	<3
C6-C9 Fraction	5	mg/kg	<5	<5	<5
4-Bromofluorobenzene - Surrogate	-	%	97	93	93
SVOC					
Test/Reference	PQL	Unit			
2000 TPH (C10 - C36) in Soil by GC					
C10-C14 Fraction	10	mg/kg	<10	<10	<10
C15-C28 Fraction	20	mg/kg	<20	<20	<20
C29-C36 Fraction	20	mg/kg	<20	40	<20
Metals					
Test/Reference	PQL	Unit			

Customer Sample ID			CB2.7	CB3.1	CB3.2
Amdel Sample Number			776831	776832	776833
Date Sampled			18/12/2007	18/12/2007	18/12/2007
Metals					
Test/Reference	PQL	Unit			
3200 Total Metals in Soil by ICP/AES					
Lead	5	mg/kg	<5	14	9.0
Miscellaneous					
Test/Reference	PQL	Unit			
5000 Moisture Content					
% Moisture	1	%	5	5	5

Customer Sample ID		CB3.5	DUP1	US1
Amdel Sample Number		776836	776838	776839
Date Sampled		18/12/2007	18/12/2007	18/12/2007
VOC				
Test/Reference	PQL	Unit		
1100 BTEX &(C6-C9) in Soil by P&T				
Benzene	0.2	mg/kg	<0.2	-
Ethylbenzene	1	mg/kg	<1	-
Meta- & Para- Xylene	2	mg/kg	<2	-
Ortho-Xylene	1	mg/kg	<1	-
Toluene	1	mg/kg	<1	-
Total Xylenes	3	mg/kg	<3	-
C6-C9 Fraction	5	mg/kg	<5	-
4-Bromofluorobenzene - Surrogate	-	%	99	92
SVOC				
Test/Reference	PQL	Unit		

2300 OC Pesticides in Soil by GC-MS					
a-BHC	0.5	mg/kg	-	-	<0.5
a-Chlordane	0.5	mg/kg	-	-	<0.5
a-Endosulfan	0.5	mg/kg	-	-	<0.5
Aldrin	0.5	mg/kg	-	-	<0.5
b-BHC	0.5	mg/kg	-	-	<0.5
b-Endosulfan	0.5	mg/kg	-	-	<0.5
d-BHC	0.5	mg/kg	-	-	<0.5
DDD	0.5	mg/kg	-	-	<0.5
DDE	0.5	mg/kg	-	-	<0.5
DDT	0.5	mg/kg	-	-	<0.5
Dieldrin	0.5	mg/kg	-	-	<0.5
Endosulfan sulfate	0.5	mg/kg	-	-	<0.5
Endrin	0.5	mg/kg	-	-	<0.5
Endrin Aldehyde	0.5	mg/kg	-	-	<0.5
g-BHC	0.5	mg/kg	-	-	<0.5
g-Chlordane	0.5	mg/kg	-	-	<0.5
Heptachlor	0.5	mg/kg	-	-	<0.5
Heptachlor epoxide	0.5	mg/kg	-	-	<0.5
Hexachlorobenzene (HCB)	0.5	mg/kg	-	-	<0.5
Methoxychlor	0.5	mg/kg	-	-	<0.5
Oxychlordane	0.5	mg/kg	-	-	<0.5
2,4,5,6-tetrachloro-m-xylene - Surrogate	-	%	-	-	100



Customer Sample ID	CB3.5	DUP1	US1
Amdel Sample Number	776836	776838	776839
Date Sampled	18/12/2007	18/12/2007	18/12/2007

SVOC

Test/Reference	PQL	Unit			
Chlorpyrifos	0.5	mg/kg	-	-	<0.5
Chlorpyrifos Methyl	0.5	mg/kg	-	-	<0.5
Diazinon	0.5	mg/kg	-	-	<0.5
Ethion	0.5	mg/kg	-	-	<0.5
Fenitrothion	0.5	mg/kg	-	-	<0.5
Fenthion	0.5	mg/kg	-	-	<0.5
Malathion	0.5	mg/kg	-	-	<0.5
Methyl Parathion	0.5	mg/kg	-	-	<0.5
Parathion	0.5	mg/kg	-	-	<0.5
Ronnel	0.5	mg/kg	-	-	<0.5
Triphenyl Phosphate - Surrogate	1	%	-	-	128
2000 TPH (C10 - C36) in Soil by GC					
C10-C14 Fraction	10	mg/kg	<10	<10	-
C15-C28 Fraction	20	mg/kg	<20	32	-
C29-C36 Fraction	20	mg/kg	<20	46	-

Metals

Test/Reference	PQL	Unit			
3200 Total Metals in Soil by ICP/AES					
Arsenic	3	mg/kg	-	-	29
Cadmium	1	mg/kg	-	-	<1
Chromium	2	mg/kg	-	-	5.0
Copper	1	mg/kg	-	-	71
Lead	5	mg/kg	<5	20	15
Nickel	2	mg/kg	-	-	2.2
Zinc	2	mg/kg	-	-	36

Miscellaneous

Test/Reference	PQL	Unit			
5000 Moisture Content					
% Moisture	1	%	11	13	3

Customer Sample ID	US2	US3	US4
Amdel Sample Number	776840	776841	776842
Date Sampled	18/12/2007	18/12/2007	18/12/2007

SVOC

Test/Reference	PQL	Unit			
2300 OC Pesticides in Soil by GC-MS					
a-BHC	0.5	mg/kg	<0.5	<0.5	<0.5
a-Chlordane	0.5	mg/kg	<0.5	<0.5	<0.5
a-Endosulfan	0.5	mg/kg	<0.5	<0.5	<0.5
Aldrin	0.5	mg/kg	<0.5	<0.5	<0.5
b-BHC	0.5	mg/kg	<0.5	<0.5	<0.5
b-Endosulfan	0.5	mg/kg	<0.5	<0.5	<0.5
d-BHC	0.5	mg/kg	<0.5	<0.5	<0.5
DDD	0.5	mg/kg	<0.5	<0.5	<0.5
DDE	0.5	mg/kg	<0.5	<0.5	<0.5
DDT	0.5	mg/kg	<0.5	<0.5	<0.5



Customer Sample ID	US2	US3	US4
Amdel Sample Number	776840	776841	776842
Date Sampled	18/12/2007	18/12/2007	18/12/2007

SVOC

Test/Reference	PQL	Unit	US2	US3	US4
Dieldrin	0.5	mg/kg	<0.5	0.8	<0.5
Endosulfan sulfate	0.5	mg/kg	<0.5	<0.5	<0.5
Endrin	0.5	mg/kg	<0.5	<0.5	<0.5
Endrin Aldehyde	0.5	mg/kg	<0.5	<0.5	<0.5
g-BHC	0.5	mg/kg	<0.5	<0.5	<0.5
g-Chlordane	0.5	mg/kg	<0.5	<0.5	<0.5
Heptachlor	0.5	mg/kg	<0.5	<0.5	<0.5
Heptachlor epoxide	0.5	mg/kg	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	0.5	mg/kg	<0.5	<0.5	<0.5
Methoxychlor	0.5	mg/kg	<0.5	<0.5	<0.5
Oxychlordane	0.5	mg/kg	<0.5	<0.5	<0.5
2,4,5,6-tetrachloro-m-xylene - Surrogate	-	%	96	103	107

2400 OP Pesticides in Soil by GCMS

Test/Reference	PQL	Unit	US2	US3	US4
Chlorpyrifos	0.5	mg/kg	<0.5	<0.5	<0.5
Chlorpyrifos Methyl	0.5	mg/kg	<0.5	<0.5	<0.5
Diazinon	0.5	mg/kg	<0.5	<0.5	<0.5
Ethion	0.5	mg/kg	<0.5	<0.5	<0.5
Fenitrothion	0.5	mg/kg	<0.5	<0.5	<0.5
Fenthion	0.5	mg/kg	<0.5	<0.5	<0.5
Malathion	0.5	mg/kg	<0.5	<0.5	<0.5
Methyl Parathion	0.5	mg/kg	<0.5	<0.5	<0.5
Parathion	0.5	mg/kg	<0.5	<0.5	<0.5
Ronnel	0.5	mg/kg	<0.5	<0.5	<0.5
Triphenyl Phosphate - Surrogate	1	%	Q09 141	120	107

Metals

Test/Reference	PQL	Unit	US2	US3	US4
3200 Total Metals in Soil by ICP/AES					
Arsenic	3	mg/kg	25	4.1	6.2
Cadmium	1	mg/kg	2.6	<1	<1
Chromium	2	mg/kg	13	<2	2.0
Copper	1	mg/kg	2400	5.3	22
Lead	5	mg/kg	840	13	7.9
Nickel	2	mg/kg	12	<2	<2
Zinc	2	mg/kg	470	37	5.8

Miscellaneous

Test/Reference	PQL	Unit	US2	US3	US4
5000 Moisture Content					
% Moisture	1	%	3	2	4

Customer Sample ID	US5	US6	WS1
Amdel Sample Number	776843	776844	776845
Date Sampled	18/12/2007	18/12/2007	18/12/2007

VOC

Test/Reference	PQL	Unit	US5	US6	WS1
1200 BTEX & (C6-C9) in Water by P&T					
Benzene	0.5	µg/L	-	-	<0.5

Customer Sample ID		US5	US6	WS1
Amdel Sample Number		776843	776844	776845
Date Sampled		18/12/2007	18/12/2007	18/12/2007
VOC				
Test/Reference	PQL	Unit		
Ethylbenzene	1	µg/L	-	<1
Meta- & Para- Xylene	2	µg/L	-	<2
Ortho-Xylene	1	µg/L	-	<1
Toluene	1	µg/L	-	39
Total Xylenes	3	µg/L	-	<3
C6-C9 Fraction	20	µg/L	-	38
4-Bromofluorobenzene - Surrogate	-	%	-	103
SVOC				
Test/Reference	PQL	Unit		
2300 OC Pesticides in Soil by GC-MS				
a-BHC	0.5	mg/kg	<0.5	-
a-Chlordane	0.5	mg/kg	<0.5	0.8
a-Endosulfan	0.5	mg/kg	<0.5	<0.5
Aldrin	0.5	mg/kg	<0.5	<0.5
b-BHC	0.5	mg/kg	<0.5	<0.5
b-Endosulfan	0.5	mg/kg	<0.5	<0.5
d-BHC	0.5	mg/kg	<0.5	<0.5
DDD	0.5	mg/kg	<0.5	<0.5
DDE	0.5	mg/kg	<0.5	<0.5
DDT	0.5	mg/kg	<0.5	<0.5
Dieldrin	0.5	mg/kg	<0.5	<0.5
Endosulfan sulfate	0.5	mg/kg	<0.5	<0.5
Endrin	0.5	mg/kg	<0.5	<0.5
Endrin Aldehyde	0.5	mg/kg	<0.5	<0.5
g-BHC	0.5	mg/kg	<0.5	<0.5
g-Chlordane	0.5	mg/kg	<0.5	<0.5
Heptachlor	0.5	mg/kg	<0.5	<0.5
Heptachlor epoxide	0.5	mg/kg	<0.5	<0.5
Hexachlorobenzene (HCB)	0.5	mg/kg	<0.5	<0.5
Methoxychlor	0.5	mg/kg	<0.5	<0.5
Oxychlordane	0.5	mg/kg	<0.5	<0.5
2,4,5,6-tetrachloro-m-xylene - Surrogate	-	%	97	95
2400 OP Pesticides in Soil by GCMS				
Chlorpyrifos	0.5	mg/kg	<0.5	<0.5
Chlorpyrifos Methyl	0.5	mg/kg	<0.5	<0.5
Diazinon	0.5	mg/kg	<0.5	<0.5
Ethion	0.5	mg/kg	<0.5	<0.5
Fenitrothion	0.5	mg/kg	<0.5	<0.5
Fenthion	0.5	mg/kg	<0.5	<0.5
Malathion	0.5	mg/kg	<0.5	<0.5
Methyl Parathion	0.5	mg/kg	<0.5	<0.5
Parathion	0.5	mg/kg	<0.5	<0.5
Ronnel	0.5	mg/kg	<0.5	<0.5
Triphenyl Phosphate - Surrogate	1	%	87	81
2000 TPH (C10 - C36) in Water by GC				
C10-C14 Fraction	40	µg/L	-	<40
C15-C28 Fraction	100	µg/L	-	124
C29-C36 Fraction	100	µg/L	-	106
Metals				



Customer Sample ID	US5	US6	WS1
Amdel Sample Number	776843	776844	776845
Date Sampled	18/12/2007	18/12/2007	18/12/2007

Metals

Test/Reference	PQL	Unit			
3300 Dissolved Metals in Water by GFAAS					
Lead	1	µg/L	-	-	<1
3200 Total Metals in Soil by ICP/AES					
Arsenic	3	mg/kg	<3	<3	-
Cadmium	1	mg/kg	<1	<1	-
Chromium	2	mg/kg	2.4	2.8	-
Copper	1	mg/kg	1.3	5.5	-
Lead	5	mg/kg	<5	9.4	-
Nickel	2	mg/kg	<2	<2	-
Zinc	2	mg/kg	4.7	4.7	-

Miscellaneous

Test/Reference	PQL	Unit			
5000 Moisture Content					
% Moisture	1	%	1	3	-

Customer Sample ID	WS2	WS3	DUP1
Amdel Sample Number	776846	776847	776848
Date Sampled	18/12/2007	18/12/2007	18/12/2007

VOC

Test/Reference	PQL	Unit			
1200 BTEX & (C6-C9) in Water by P&T					
Benzene	0.5	µg/L	<0.5	<0.5	<0.5
Ethylbenzene	1	µg/L	<1	<1	<1
Meta- & Para- Xylene	2	µg/L	<2	<2	<2
Ortho-Xylene	1	µg/L	<1	<1	<1
Toluene	1	µg/L	<1	<1	<1
Total Xylenes	3	µg/L	<3	<3	<3
C6-C9 Fraction	20	µg/L	<20	<20	<20
4-Bromofluorobenzene - Surrogate	-	%	102	104	99

SVOC

Test/Reference	PQL	Unit			
2000 TPH (C10 - C36) in Water by GC					
C10-C14 Fraction	40	µg/L	<40	<40	<40
C15-C28 Fraction	100	µg/L	<100	<100	<100
C29-C36 Fraction	100	µg/L	<100	<100	<100

Metals

Test/Reference	PQL	Unit			
3300 Dissolved Metals in Water by GFAAS					
Lead	1	µg/L	<1	<1	<1



Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Extracted	Analysed
1100 BTEX &(C6-C9) in Soil by P&T	24/12/2007	28/12/2007
1200 BTEX & (C6-C9) in Water by P&T	21/12/2007	24/12/2007
2000 TPH (C10 - C36) in Soil by GC	27/12/2007	02/01/2008
2000 TPH (C10 - C36) in Water by GC	24/12/2007	28/12/2007
2300 OC Pesticides in Soil by GC-MS	27/12/2007	31/12/2007
2400 OP Pesticides in Soil by GCMS	27/12/2007	31/12/2007
3200 Total Metals in Soil by ICP/AES	27/12/2007	31/12/2007
3300 Dissolved Metals in Water by GFAAS	31/12/2007	02/01/2008
5000 Moisture Content	24/12/2007	27/12/2007

Amdel Internal Quality Control Review

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. Proficiency Trial results are available on request.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spike or surrogate recoveries.
5. Test samples duplicated or spiked, are for this job only and are identified in the following QC report.
6. SVOC analyses on waters are performed on homogenized, unfiltered sample, unless noted otherwise.
7. When individual results are qualified in the body of a report, refer to the qualifier descriptions that follow.
8. The 'Sum of PAHs' result in the body of the report is the sum of any positive results and PQLs of other non-detected results.
9. Sampled Dates quoted in this report are those listed on the COC or sample jars; if no sample dates are noted, the date the samples are received at the laboratory have been used
10. Matrix Spike recoveries are calculated on an 'As Received' basis; the parent sample result is moisture corrected after the %recovery is determined

Holding Times

Please refer to 'Sampling and Preservation Chart for Soils & Waters' for holding times. (Amdel form AS-FOR-ADM-020)

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

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

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

Quality Control Results

Laboratory: EN_METALS

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
780495 [Method Blank]							
3300 Dissolved Metals in Water by GFAAS							
Arsenic	µg/L	<1			< 1	T	
Cadmium	µg/L	<0.1			< 0.1	T	
Lead	µg/L	<1			< 1	T	
Selenium	µg/L	<1			< 1	T	
781012 [Method Blank]							
3200 Total Metals in Soil by ICP/AES							
Arsenic	mg/kg	<3			< 3	T	
Barium	mg/kg	<5			< 5	T	
Beryllium	mg/kg	<5			< 5	T	
Cadmium	mg/kg	<1			< 1	T	
Chromium	mg/kg	<2			< 2	T	
Cobalt	mg/kg	<5			< 5	T	
Copper	mg/kg	<1			< 1	T	
Lead	mg/kg	<5			< 5	T	
Manganese	mg/kg	<5			< 5	T	
Nickel	mg/kg	<2			< 2	T	
Selenium	mg/kg	<5			< 5	T	
Tin	mg/kg	<5			< 5	T	
Vanadium	mg/kg	<5			< 5	T	
Zinc	mg/kg	<2			< 2	T	

Laboratory: EN_METALS

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
781164 [Method Blank]							
3200 Total Metals in Soil by ICP/AES							
Arsenic	mg/kg	<3			< 3	T	Q15
Cadmium	mg/kg	<1			< 1	T	Q15
Chromium	mg/kg	<2			< 2	T	Q15
Copper	mg/kg	<1			< 1	T	Q15
Lead	mg/kg	<5			< 5	T	Q15
Nickel	mg/kg	<2			< 2	T	Q15
Zinc	mg/kg	<2			< 2	T	Q15
780497 [Laboratory Control Sample]							
3300 Dissolved Metals in Water by GFAAS			Expected Value	Percent Recovery			
Arsenic	µg/L	11	10.0	106	80-120 %	T	
Cadmium	µg/L	2.1	2.0	105	80-120 %	T	
Lead	µg/L	11	10.0	110	80-120 %	T	
Selenium	µg/L	12	10.0	120	80-120 %	T	
781013 [Laboratory Control Sample]							
3200 Total Metals in Soil by ICP/AES			Expected Value	Percent Recovery			
Arsenic	mg/kg	50	50.0	101	70-130 %	T	
Barium	mg/kg	53	50.0	107	70-130 %	T	
Beryllium	mg/kg	52	50.0	104	70-130 %	T	
Cadmium	mg/kg	51	50.0	102	70-130 %	T	
Chromium	mg/kg	51	50.0	101	70-130 %	T	
Cobalt	mg/kg	52	50.0	103	70-130 %	T	
Copper	mg/kg	52	50.0	103	70-130 %	T	
Lead	mg/kg	51	50.0	102	70-130 %	T	
Manganese	mg/kg	52	50.0	104	70-130 %	T	
Nickel	mg/kg	51	50.0	103	70-130 %	T	
Selenium	mg/kg	48	50.0	97	70-130 %	T	
Tin	mg/kg	53	50.0	106	70-130 %	T	
Vanadium	mg/kg	52	50.0	105	70-130 %	T	
Zinc	mg/kg	52	50.0	104	70-130 %	T	
781165 [Laboratory Control Sample]							
3200 Total Metals in Soil by ICP/AES			Expected Value	Percent Recovery			
Arsenic	mg/kg	50	50.0	100	70-130 %	T	
Cadmium	mg/kg	49	50.0	99	70-130 %	T	
Chromium	mg/kg	51	50.0	102	70-130 %	T	
Copper	mg/kg	51	50.0	102	70-130 %	T	
Lead	mg/kg	49	50.0	97	70-130 %	T	
Nickel	mg/kg	52	50.0	104	70-130 %	T	
Zinc	mg/kg	51	50.0	102	70-130 %	T	
777513 [Duplicate of 776828]							
3200 Total Metals in Soil by ICP/AES			Result 2	RPD			
LeadDB	mg/kg	14	12	18	0-30 %	T	
777514 [Duplicate of 776829]							
3200 Total Metals in Soil by ICP/AES			Result 2	RPD			
LeadDB	mg/kg	13	8.1	50	0-30 %	F	Q15
777520 [Spike of 776836]							
3200 Total Metals in Soil by ICP/AES			Spike Value	Percent Recovery			
Lead	mg/kg	49	50.0	97	70-130 %	T	

Laboratory: EN_SVOC

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
780525 [Method Blank]							
2000 TPH (C10 - C36) in Water by GC							
C10-C14 Fraction	µg/L	<40			< 40	T	
C15-C28 Fraction	µg/L	<100			< 100	T	
C29-C36 Fraction	µg/L	<100			< 100	T	

Laboratory: EN_SVOC

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
781061 [Method Blank]							
2000 TPH (C10 - C36) in Soil by GC							
C10-C14 Fraction	mg/kg	<10			< 10	T	
C15-C28 Fraction	mg/kg	<20			< 20	T	
C29-C36 Fraction	mg/kg	<20			< 20	T	
2300 OC Pesticides in Soil by GC-MS							
a-BHC	mg/kg	<0.5			< 0.5	T	
a-Chlordane	mg/kg	<0.5			< 0.5	T	
a-Endosulfan	mg/kg	<0.5			< 0.5	T	
Aldrin	mg/kg	<0.5			< 0.5	T	
b-BHC	mg/kg	<0.5			< 0.5	T	
b-Endosulfan	mg/kg	<0.5			< 0.5	T	
d-BHC	mg/kg	<0.5			< 0.5	T	
DDD	mg/kg	<0.5			< 0.5	T	
DDE	mg/kg	<0.5			< 0.5	T	
DDT	mg/kg	<0.5			< 0.5	T	
Dieldrin	mg/kg	<0.5			< 0.5	T	
Endosulfan sulfate	mg/kg	<0.5			< 0.5	T	
Endrin	mg/kg	<0.5			< 0.5	T	
Endrin Aldehyde	mg/kg	<0.5			< 0.5	T	
g-BHC	mg/kg	<0.5			< 0.5	T	
g-Chlordane	mg/kg	<0.5			< 0.5	T	
Heptachlor	mg/kg	<0.5			< 0.5	T	
Heptachlor epoxide	mg/kg	<0.5			< 0.5	T	
Hexachlorobenzene (HCB)	mg/kg	<0.5			< 0.5	T	
Methoxychlor	mg/kg	<0.5			< 0.5	T	
Oxychlordane	mg/kg	<0.5			< 0.5	T	
2,4,5,6-tetrachloro-m-xylene-SURROGATE	%	101			70-130 %	T	
2400 OP Pesticides in Soil by GCMS							
Chlorpyrifos	mg/kg	<0.5			< 0.5	T	
Chlorpyrifos Methyl	mg/kg	<0.5			< 0.5	T	
Diazinon	mg/kg	<0.5			< 0.5	T	
Ethion	mg/kg	<0.5			< 0.5	T	
Fenitrothion	mg/kg	<0.5			< 0.5	T	
Fenthion	mg/kg	<0.5			< 0.5	T	
Malathion	mg/kg	<0.5			< 0.5	T	
Methyl Parathion	mg/kg	<0.5			< 0.5	T	
Parathion	mg/kg	<0.5			< 0.5	T	
Ronnel	mg/kg	<0.5			< 0.5	T	
Triphenyl Phosphate - OPP SURROGATE	%	94			70-130 %	T	

Laboratory: EN_SVOC

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
781070 [Method Blank]							
2300 OC Pesticides in Soil by GC-MS							
a-BHC	mg/kg	<0.5			< 0.5	T	
a-Chlordane	mg/kg	<0.5			< 0.5	T	
a-Endosulfan	mg/kg	<0.5			< 0.5	T	
Aldrin	mg/kg	<0.5			< 0.5	T	
b-BHC	mg/kg	<0.5			< 0.5	T	
b-Endosulfan	mg/kg	<0.5			< 0.5	T	
d-BHC	mg/kg	<0.5			< 0.5	T	
DDD	mg/kg	<0.5			< 0.5	T	
DDE	mg/kg	<0.5			< 0.5	T	
DDT	mg/kg	<0.5			< 0.5	T	
Dieldrin	mg/kg	<0.5			< 0.5	T	
Endosulfan sulfate	mg/kg	<0.5			< 0.5	T	
Endrin	mg/kg	<0.5			< 0.5	T	
Endrin Aldehyde	mg/kg	<0.5			< 0.5	T	
g-BHC	mg/kg	<0.5			< 0.5	T	
g-Chlordane	mg/kg	<0.5			< 0.5	T	
Heptachlor	mg/kg	<0.5			< 0.5	T	
Heptachlor epoxide	mg/kg	<0.5			< 0.5	T	
Hexachlorobenzene (HCB)	mg/kg	<0.5			< 0.5	T	
Methoxychlor	mg/kg	<0.5			< 0.5	T	
Oxychlordane	mg/kg	<0.5			< 0.5	T	
2,4,5,6-tetrachloro-m-xylene-SURROGATE	%	98			70-130 %	T	
2400 OP Pesticides in Soil by GCMS							
Chlorpyrifos	mg/kg	<0.5			< 0.5	T	
Chlorpyrifos Methyl	mg/kg	<0.5			< 0.5	T	
Diazinon	mg/kg	<0.5			< 0.5	T	
Ethion	mg/kg	<0.5			< 0.5	T	
Fenitrothion	mg/kg	<0.5			< 0.5	T	
Fenthion	mg/kg	<0.5			< 0.5	T	
Malathion	mg/kg	<0.5			< 0.5	T	
Methyl Parathion	mg/kg	<0.5			< 0.5	T	
Parathion	mg/kg	<0.5			< 0.5	T	
Ronnel	mg/kg	<0.5			< 0.5	T	
Triphenyl Phosphate - OPP SURROGATE	%	74			70-130 %	T	
780527 [Laboratory Control Sample]							
2000 TPH (C10 - C36) in Water by GC			Expected Value	Percent Recovery			
C10-C14 Fraction	µg/L	190	200.0	93	70-130 %	T	
C15-C28 Fraction	µg/L	182	200.0	91	70-130 %	T	
C29-C36 Fraction	µg/L	186	200.0	93	70-130 %	T	
781062 [Laboratory Control Sample]							
2000 TPH (C10 - C36) in Soil by GC			Expected Value	Percent Recovery			
C10-C14 Fraction	mg/kg	130	125.0	107	70-130 %	T	
C15-C28 Fraction	mg/kg	130	125.0	107	70-130 %	T	
C29-C36 Fraction	mg/kg	140	125.0	115	70-130 %	T	

Laboratory: EN_SVOC

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
781063 [Laboratory Control Sample]							
2300 OC Pesticides in Soil by GC-MS			Expected Value	Percent Recovery			
a-BHC	mg/kg	2.3	2.0	115	70-130 %	T	
a-Chlordane	mg/kg	2.2	2.0	109	70-130 %	T	
a-Endosulfan	mg/kg	2.2	2.0	108	70-130 %	T	
Aldrin	mg/kg	2.2	2.0	109	70-130 %	T	
b-BHC	mg/kg	2.4	2.0	120	70-130 %	T	
b-Endosulfan	mg/kg	2.4	2.0	122	70-130 %	T	
d-BHC	mg/kg	2.1	2.0	103	70-130 %	T	
DDD	mg/kg	2.4	2.0	120	70-130 %	T	
DDE	mg/kg	2.3	2.0	116	70-130 %	T	
DDT	mg/kg	2.3	2.0	116	70-130 %	T	
Dieldrin	mg/kg	2.2	2.0	111	70-130 %	T	
Endosulfan sulfate	mg/kg	2.5	2.0	124	70-130 %	T	
Endrin	mg/kg	2.5	2.0	124	70-130 %	T	
Endrin Aldehyde	mg/kg	2.3	2.0	114	70-130 %	T	
g-BHC	mg/kg	2.3	2.0	114	70-130 %	T	
g-Chlordane	mg/kg	2.3	2.0	117	70-130 %	T	
Heptachlor	mg/kg	2.1	2.0	103	70-130 %	T	
Heptachlor epoxide	mg/kg	2.0	2.0	102	70-130 %	T	
Methoxychlor	mg/kg	2.5	2.0	124	70-130 %	T	
2400 OP Pesticides in Soil by GCMS			Expected Value	Percent Recovery			
Chlorpyrifos	mg/kg	2.1	2.0	104	70-130 %	T	
Chlorpyrifos Methyl	mg/kg	1.9	2.0	93	70-130 %	T	
Diazinon	mg/kg	2.2	2.0	110	70-130 %	T	
Ethion	mg/kg	2.3	2.0	116	70-130 %	T	
Fenitrothion	mg/kg	1.7	2.0	83	70-130 %	T	
Fenthion	mg/kg	2.1	2.0	103	70-130 %	T	
Malathion	mg/kg	2.0	2.0	100	70-130 %	T	
Methyl Parathion	mg/kg	1.4	2.0	72	70-130 %	T	
Parathion	mg/kg	1.9	2.0	94	70-130 %	T	
Ronnel	mg/kg	2.0	2.0	98	70-130 %	T	
Triphenyl Phosphate - OPP SURROGATE	%	115	N/A	N/A	70-130 %	T	

Laboratory: EN_SVOC

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
781072 [Laboratory Control Sample]							
2300 OC Pesticides in Soil by GC-MS			Expected Value	Percent Recovery			
a-BHC	mg/kg	2.0	2.0	102	70-130 %	T	
a-Chlordane	mg/kg	1.9	2.0	97	70-130 %	T	
a-Endosulfan	mg/kg	1.8	2.0	91	70-130 %	T	
Aldrin	mg/kg	1.9	2.0	95	70-130 %	T	
b-BHC	mg/kg	2.4	2.0	118	70-130 %	T	
b-Endosulfan	mg/kg	2.1	2.0	103	70-130 %	T	
d-BHC	mg/kg	1.8	2.0	88	70-130 %	T	
DDD	mg/kg	1.9	2.0	96	70-130 %	T	
DDE	mg/kg	1.9	2.0	96	70-130 %	T	
DDT	mg/kg	1.8	2.0	92	70-130 %	T	
Dieldrin	mg/kg	2.0	2.0	98	70-130 %	T	
Endosulfan sulfate	mg/kg	2.0	2.0	99	70-130 %	T	
Endrin	mg/kg	2.0	2.0	101	70-130 %	T	
Endrin Aldehyde	mg/kg	1.9	2.0	93	70-130 %	T	
g-BHC	mg/kg	1.9	2.0	94	70-130 %	T	
g-Chlordane	mg/kg	2.0	2.0	99	70-130 %	T	
Heptachlor	mg/kg	1.9	2.0	93	70-130 %	T	
Heptachlor epoxide	mg/kg	1.7	2.0	84	70-130 %	T	
Methoxychlor	mg/kg	2.0	2.0	100	70-130 %	T	
2400 OP Pesticides in Soil by GCMS			Expected Value	Percent Recovery			
Chlorpyrifos	mg/kg	1.8	2.0	92	70-130 %	T	
Chlorpyrifos Methyl	mg/kg	1.6	2.0	82	70-130 %	T	
Diazinon	mg/kg	1.8	2.0	88	70-130 %	T	
Ethion	mg/kg	1.9	2.0	95	70-130 %	T	
Fenitrothion	mg/kg	1.7	2.0	85	70-130 %	T	
Fenthion	mg/kg	1.8	2.0	92	70-130 %	T	
Malathion	mg/kg	1.7	2.0	84	70-130 %	T	
Methyl Parathion	mg/kg	1.6	2.0	82	70-130 %	T	
Parathion	mg/kg	1.7	2.0	87	70-130 %	T	
Ronnel	mg/kg	1.7	2.0	86	70-130 %	T	
777515 [Duplicate of 776840]							
2300 OC Pesticides in Soil by GC-MS			Result 2	RPD			
a-BHCDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
a-ChlordaneDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
a-EndosulfanDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
AldrinDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
b-BHCDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
b-EndosulfanDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
d-BHCDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
DDDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
DEDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
DDTDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
DieldrinDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
Endosulfan sulfateDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
Endrin AldehydeDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
EndrinDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
g-BHCDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
g-ChlordaneDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
Heptachlor epoxideDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
HeptachlorDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
Hexachlorobenzene (HCB)DB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
MethoxychlorDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
OxychlordaneDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	

Laboratory: EN_SVOC

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
777516 [Duplicate of 776840]							
2400 OP Pesticides in Soil by GCMS			Result 2	RPD			
Chlorpyrifos MethylDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
ChlorpyrifosDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
DiazinonDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
EthionDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
FenitrothionDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
FenthionDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
MalathionDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
Methyl ParathionDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
ParathionDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
RonnelDB	mg/kg	<0.5	<0.5	<1	0-30 %	T	
Triphenyl Phosphate - OPP SURROGATE	%	156	N/A	N/A	70-130 %	F	Q09
777517 [Duplicate of 776828]							
2000 TPH (C10 - C36) in Soil by GC			Result 2	RPD			
C10-C14 FractionDB	mg/kg	<10	<10	<1	0-30 %	T	
C15-C28 FractionDB	mg/kg	<20	<20	<1	0-30 %	T	
C29-C36 FractionDB	mg/kg	<20	<20	<1	0-30 %	T	
777518 [Duplicate of 776829]							
2000 TPH (C10 - C36) in Soil by GC			Result 2	RPD			
C10-C14 FractionDB	mg/kg	<10	<10	<1	0-30 %	T	
C15-C28 FractionDB	mg/kg	<20	<20	<1	0-30 %	T	
C29-C36 FractionDB	mg/kg	<20	<20	<1	0-30 %	T	
777521 [Spike of 776844]							
2300 OC Pesticides in Soil by GC-MS			Spike Value	Percent Recovery			
a-BHC	mg/kg	2.0	2.0	101	70-130 %	T	
a-Chlordane	mg/kg	3.2	2.0	125	70-130 %	T	
a-Endosulfan	mg/kg	2.0	2.0	101	70-130 %	T	
Aldrin	mg/kg	1.9	2.0	93	70-130 %	T	
b-BHC	mg/kg	2.4	2.0	118	70-130 %	T	
b-Endosulfan	mg/kg	2.3	2.0	113	70-130 %	T	
d-BHC	mg/kg	1.8	2.0	91	70-130 %	T	
DDD	mg/kg	2.0	2.0	102	70-130 %	T	
DDE	mg/kg	2.1	2.0	106	70-130 %	T	
DDT	mg/kg	1.9	2.0	94	70-130 %	T	
Dieldrin	mg/kg	2.2	2.0	110	70-130 %	T	
Endosulfan sulfate	mg/kg	1.9	2.0	95	70-130 %	T	
Endrin	mg/kg	2.1	2.0	106	70-130 %	T	
Endrin Aldehyde	mg/kg	1.8	2.0	91	70-130 %	T	
g-BHC	mg/kg	1.9	2.0	95	70-130 %	T	
g-Chlordane	mg/kg	2.2	2.0	112	70-130 %	T	
Heptachlor	mg/kg	2.0	2.0	98	70-130 %	T	
Heptachlor epoxide	mg/kg	1.8	2.0	86	70-130 %	T	
Methoxychlor	mg/kg	2.0	2.0	98	70-130 %	T	
777522 [Spike of 776844]							
2400 OP Pesticides in Soil by GCMS			Spike Value	Percent Recovery			
Chlorpyrifos	mg/kg	1.8	2.0	92	70-130 %	T	
Chlorpyrifos Methyl	mg/kg	1.6	2.0	82	70-130 %	T	
Diazinon	mg/kg	1.8	2.0	88	70-130 %	T	
Ethion	mg/kg	1.8	2.0	90	70-130 %	T	
Fenitrothion	mg/kg	1.6	2.0	80	70-130 %	T	
Fenthion	mg/kg	1.8	2.0	89	70-130 %	T	
Malathion	mg/kg	1.6	2.0	80	70-130 %	T	
Methyl Parathion	mg/kg	1.5	2.0	77	70-130 %	T	
Parathion	mg/kg	1.8	2.0	88	70-130 %	T	
Ronnel	mg/kg	1.7	2.0	87	70-130 %	T	

Laboratory: EN_SVOC

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
777523 [Spike of 776836]							
2000 TPH (C10 - C36) in Soil by GC			Spike Value	Percent Recovery			
C10-C14 Fraction	mg/kg	120	125.0	95	70-130 %	T	
C15-C28 Fraction	mg/kg	120	125.0	98	70-130 %	T	
C29-C36 Fraction	mg/kg	120	125.0	95	70-130 %	T	

Laboratory: EN_VOC

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
779908 [Method Blank]							
1200 BTEX & (C6-C9) in Water by P&T							
Benzene	µg/L	<0.5			< 0.5	T	
C6-C9 Fraction	µg/L	<20			< 20	T	
Ethylbenzene	µg/L	<1			< 1	T	
Meta- & Para- Xylene	µg/L	<2			< 2	T	
Ortho-Xylene	µg/L	<1			< 1	T	
Toluene	µg/L	<1			< 1	T	
Total Xylenes	µg/L	<3			< 3	T	
4-Bromofluorobenzene - Surrogate	%	101			70-130 %	T	
781051 [Method Blank]							
1100 BTEX & (C6-C9) in Soil by P&T							
Benzene	mg/kg	<0.2			< 0.2	T	
C6-C9 Fraction	mg/kg	<5			< 5	T	
Ethylbenzene	mg/kg	<1			< 1	T	
Meta- & Para- Xylene	mg/kg	<2			< 2	T	
Ortho-Xylene	mg/kg	<1			< 1	T	
Toluene	mg/kg	<1			< 1	T	
4-Bromofluorobenzene - Surrogate	%	90			70-130 %	T	
779909 [Laboratory Control Sample]							
1200 BTEX & (C6-C9) in Water by P&T			Expected Value	Percent Recovery			
Benzene	µg/L	9.0	10.0	90	70-130 %	T	
C6-C9 Fraction	µg/L	130	140.0	90	70-130 %	T	
Ethylbenzene	µg/L	8.6	10.0	86	70-130 %	T	
Meta- & Para- Xylene	µg/L	19	20.0	94	70-130 %	T	
Ortho-Xylene	µg/L	8.9	10.0	89	70-130 %	T	
Toluene	µg/L	8.8	10.0	88	70-130 %	T	
781052 [Laboratory Control Sample]							
1100 BTEX & (C6-C9) in Soil by P&T			Expected Value	Percent Recovery			
Benzene	mg/kg	4.7	5.0	93	70-130 %	T	
C6-C9 Fraction	mg/kg	48	50.0	96	70-130 %	T	
Ethylbenzene	mg/kg	4.7	5.0	94	70-130 %	T	
Meta- & Para- Xylene	mg/kg	9.0	10.0	90	70-130 %	T	
Ortho-Xylene	mg/kg	4.4	5.0	87	70-130 %	T	
Toluene	mg/kg	4.7	5.0	93	70-130 %	T	
777511 [Duplicate of 776828]							
1100 BTEX & (C6-C9) in Soil by P&T			Result 2	RPD			
BenzeneDB	mg/kg	<0.2	<0.2	<1	0-30 %	T	
C6-C9 FractionDB	mg/kg	<5	<5	<1	0-30 %	T	
EthylbenzeneDB	mg/kg	<1	<1	<1	0-30 %	T	
Meta- & Para- XyleneDB	mg/kg	<2	<2	<1	0-30 %	T	
Ortho-XyleneDB	mg/kg	<1	<1	<1	0-30 %	T	
777512 [Duplicate of 776829]							
1100 BTEX & (C6-C9) in Soil by P&T			Result 2	RPD			
BenzeneDB	mg/kg	<0.2	<0.2	<1	0-30 %	T	
C6-C9 FractionDB	mg/kg	<5	<5	<1	0-30 %	T	
EthylbenzeneDB	mg/kg	<1	<1	<1	0-30 %	T	
Meta- & Para- XyleneDB	mg/kg	<2	<2	<1	0-30 %	T	
Ortho-XyleneDB	mg/kg	<1	<1	<1	0-30 %	T	
TolueneDB	mg/kg	<1	<1	<1	0-30 %	T	

Laboratory: EN_VOC

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
777519 [Spike of 776836]							
1100 BTEX & (C6-C9) in Soil by P&T			Spike Value	Percent Recovery			
Benzene	mg/kg	4.2	5.0	83	70-130 %	T	
C6-C9 Fraction	mg/kg	42	50.0	84	70-130 %	T	
Ethylbenzene	mg/kg	4.2	5.0	84	70-130 %	T	
Meta- & Para- Xylene	mg/kg	8.6	10.0	86	70-130 %	T	
Ortho-Xylene	mg/kg	4.1	5.0	82	70-130 %	T	
Toluene	mg/kg	4.3	5.0	85	70-130 %	T	

Project Comments

Comments

Lab filtration/acidification required for Dissolved Metals in Water

Sample Integrity

Custody Seals Intact (if used)	Yes
Attempt to Chill was evident	Yes
Samples correctly preserved	No
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	Yes
Samples received within Holding Time	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code Description

Q09 The Surrogate recovery is outside of the recommended acceptance criteria due to matrix interference. Acceptance Criteria were met for all other QC

Q15 The RPD reported passes Amdel's Acceptance Criteria as stipulated in AS-POL-002. The Criteria displayed in this report are for results >10 x PQL; the results of this sample are < 10 x PQL

Authorised By

Elizabeth Button
Michael Mowle

Senior Analyst - Environmental
Team Leader - Environmental

Accreditation Number: 14356
Accreditation Number: 14356

Laboratory Manager

Michael Mowle

Team Leader - Environmental



Final Report

- Indicates Not Requested

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

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The samples were not collected by Amdel staff.

From: 129 Outlook Crescent Bardon QLD 4065 Contact: MICHAEL TISDALL Ph: 3367 2266 Fax: 3367 2377 Email: mtisdall@bigpond.com Project Manager: Michael Tisdall				To: AMDEL Contact: Ph: Fax: 07EN620028043 Turnaround Time: STANDARD								
Site Name: CABARITA Location Code: Project/Order No.: 6056/4				Analyses Requested Comments								
Lab No.	Sample ID	Date Collected	Sample Type		Preservation Method	No. of Containers			TPH/BTEX	metals	Pb	HOLD
			Soil	Water		Ice	Acid	None				
776819	CB1.1	18-12-7	✓			✓					✓	
↓ 20	CB1.2					✓					✓	
—	CB1.3											✓
—	CB1.4											✓
776823	CB1.5										✓	
—	CB1.6											✓
776825	CB2.1										✓	
—	CB2.2											✓
—	CB2.3											✓
776828	CB2.4										✓	
↓ 29	CB2.5										✓	
—	CB2.6											✓
776831	CB2.7										✓	
↓ 32	CB3.1										✓	
↓ 33	CB3.2										✓	
—	CB3.3											✓
—	CB3.4											✓
776836	CB3.5										✓	
—	CB3.6											✓
776838	DUP1										✓	
Relinquished by: <i>Michael Tisdall</i> Date: 19-12-7 Time: 2.00				Courted by: ASAP #2849 Date: 19-12-7 Time: 3.00pm				Received by: <i>[Signature]</i> Date: 19/12/07 Time: 1630				

From: 129 Outlook Crescent Bardon QLD 4065 Contact: MICHAEL TISDALL Ph: 3367 2266 Fax: 3367 2377 Email: mtisdall@bigpond.com		To: AMDEL Contact: Ph: Fax:	
Project Manager: Michael Tisdall		Project/Order No.: 6056/4	
Site Name: CABARITA Location Code:		Turnaround Time.:	
Relinquished by: <i>Mtisdall</i>		Received by: <i>Mtisdall</i>	
Date: 18-12-7 Time: 2:00		Date: 19-12-7 Time: 3:00	
Couriered by: ASAP #2849		Date: 19-12-7 Time: 3:00	
Sample ID		No. of Containers	
Date Collected		Preservation Method	
Sample Type		Ice	
Soil		Acid	
Water		None	
TPH/BTEX		Glass	
metals PL		Plastic	
metals *		TPH/BTEX	
Comments		Analyses Requested	
776839 US1 18-12-7 ✓		✓	
40 US2 ✓		✓	
41 US3 ✓		✓	
42 US4 ✓		✓	
43 US5 ✓		✓	
44 US6 ✓		✓	
776845 WS1 18-12-7 3pm. ✓		✓	
46 WS2 ✓		✓	
47 WS3 ✓		✓	
48 DUP1 ✓		✓	
* As, Cd, Cr, Cu, Ni, Pb, Zn		* As, Cd, Cr, Cu, Ni, Pb, Zn	
NOTE: Not field filtered. Filter at lab.		NOTE: Not field filtered. Filter at lab.	

Sample Receipt Advice



Customer Service - 1300 552 389

Client Name: GeoEnvironmental Consultants
Attention: Michael Tisdall
Client Reference number: 6056/4
CABARITA

Date Received: 20 December 2007
Due Date: 31 December 2007
Turnaround: Standard

Amdel Reference number: 07ENBR0028043

Your Amdel Contact: David Bates
+61 7 3902 4600

If you have any queries regarding turnaround and sample progress, technical queries or wish to make changes please contact the laboratory immediately.

Job Information

Project Comments

Comments Lab filtration/acidification required for Dissolved Metals in Water

Sample Integrity

Attempt to Chill was evident	Yes
Samples correctly preserved	No
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No
Custody Seals Intact (if used)	Yes

Analysis Requested

Analysis Requested	Method Code	Number Of Samples
BTEX &(C6-C9) in Soil by P&T	1100	11
BTEX & (C6-C9) in Water by P&T	1200	4
Dissolved Metals in Water by GFAAS	3300	4
Total Metals in Soil by ICP/AES	3200	17
Moisture Content	5000	17
OC Pesticides in Soil by GC-MS	2300	6
OP Pesticides in Soil by GCMS	2400	6
PH (C10 - C36) in Soil by GC	2000	11
TPH (C10 - C36) in Water by GC	2000	4

Note

- Turnaround time starts when samples are received at the Laboratory
- For samples received after 4pm, turnaround time starts the next working day
- For samples received on the last day of holding time, notification of testing requirements must be given at least 6 hours prior to the sample receipt deadlines; Should the laboratory not receive the information in the required timeframe a suitably qualified results may still be reported.
- Surcharges may apply for 24 and 48 hour turnaround.
- Water samples will be discarded after 4 weeks unless notified.
- Soil samples are chilled for 1 month and will be discarded after 3 months unless notified.
- UNLESS ADVISED OTHERWISE - Sample analysis will commence regardless of integrity issues and / or non-conformance and these will be recorded on the final report.
- Samples submitted for Micro analysis on a Friday may incur a \$150 surcharge and / or be analysed outside holding time (24 Hour Holding Time).

Logged in by : Jane Walker

Date : Thu 20 December 2007



This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025
Accreditation Number: 14356



GeoEnvironmental Consultants
129 Outlook Cresnet
BARDON QLD 4065
Australia

Attention: Michael Tisdall

Project 08ENBR0000373
Client Reference 6056/4
CABARITA
Order Number 6056/4
Received Date 07/01/2008 02:26:00 PM

Customer Sample ID	CB1.1	US2
Amdel Sample Number	790883	790884
Date Sampled	18/12/2007	18/12/2007

Metals				
Test/Reference	PQL	Unit		
3200 Metals in Leachate by ICP-AES				
Arsenic	50	µg/L	<50	<50
Copper	50	µg/L	1300	18000
Lead	50	µg/L	560	1600
Zinc	50	µg/L	2100	14000

Miscellaneous				
Test/Reference	PQL	Unit		
5700 TCLP - Acidic Buffer				
pH of Extraction Fluid	0.1	pH	5.0	5.0
pH Leachate - Initial	0.1	pH	6.9	8.3
pH Leachate - Final	0.1	pH	5.0	5.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Extracted	Analysed
3200 Metals in Leachate by ICP-AES	08/01/2008	10/01/2008
5700 TCLP - Acidic Buffer		09/01/2008

Amdel Internal Quality Control Review

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. Proficiency Trial results are available on request.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spike or surrogate recoveries.
5. Test samples duplicated or spiked, are for this job only and are identified in the following QC report.
6. SVOC analyses on waters are performed on homogenized, unfiltered sample, unless noted otherwise.
7. When individual results are qualified in the body of a report, refer to the qualifier descriptions that follow.
8. The 'Sum of PAHs' result in the body of the report is the sum of any positive results and PQLs of other non-detected results.
9. Sampled Dates quoted in this report are those listed on the COC or sample jars; if no sample dates are noted, the date the samples are received at the laboratory have been used
10. Matrix Spike recoveries are calculated on an 'As Received' basis; the parent sample result is moisture corrected after the %recovery is determined

Holding Times

Please refer to 'Sampling and Preservation Chart for Soils & Waters' for holding times. (Amdel form AS-FOR-ADM-020)

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

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

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

Quality Control Results

Laboratory: EN_METALS

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes
793816 [Method Blank]							
3200 Metals in Leachate by ICP-AES							
Arsenic	µg/L	<50			< 50	T	
Copper	µg/L	<50			< 50	T	
Lead	µg/L	<50			< 50	T	
Zinc	µg/L	<50			< 50	T	
793817 [Laboratory Control Sample]							
3200 Metals in Leachate by ICP-AES							
			Expected Value	Percent Recovery			
Arsenic	µg/L	1100	1000.0	108	80-120 %	T	
Copper	µg/L	1000	1000.0	104	80-120 %	T	
Lead	µg/L	960	1000.0	96	80-120 %	T	
Zinc	µg/L	1100	1000.0	108	80-120 %	T	

Sample Integrity

Custody Seals Intact (if used)	Yes
Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No



Authorised By

Elizabeth Button

Senior Analyst - Environmental

Accreditation Number: 14356

Laboratory Manager

Michael Mowle

Team Leader - Environmental

Final Report

- Indicates Not Requested

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

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The samples were not collected by Amdel staff.

28/12/2001 01:39 FAX

COPY

Geo Environmental Consultants

From: 129 Outlook Crescent
Bardon QLD 4065

Contact: MICHAEL TISDALL
Ph: 3367 2266 Fax: 3367 2377
Email: mtisdall@bigpond.com

Project Manager: Michael Tisdall

Chain of Custody

No.: 6056/4

To: AMDEZ

Contact:

Ph:

19 DEC 2007

Fax: 07ENGB20028093

Turnaround Time: STANDARD

Lab No.	Sample ID	Date Collected	Sample Type		Preservation Method			No. of Containers			Analyses Requested	Comments	
			Soil	Water	Ice	Acid	None	Glass	Plastic	TPH/ BTEX			metals
776819	CB1.1	18-12-7	✓		✓				1				
↓ 20	CB1.2												
—	CB1.3												
—	CB1.4												
776823	CB1.5												
—	CB1.6												
776825	CB2.1												
—	CB2.2												
—	CB2.3												
776828	CB2.4												
↓ 29	CB2.5												
—	CB2.6												
776831	CB2.7												
↓ 32	CB3.1												
↓ 33	CB3.2												
—	CB3.3												
—	CB3.4												
776836	CB3.5												
—	CB3.6												
776838	DUP1												

Relinquished by: *Michael Tisdall*

Date: 19-12-7
Time: 2:00

Courted by: ASAP #2849

Date: 1912-7
Time: 3:00pm

Received by: *Michael Tisdall*

Date: 19/12/07
Time: 1630

Sample Receipt Advice



Customer Service - 1300 552 389

Client Name: GeoEnvironmental Consultants
Attention: Michael Tisdall
Client Reference number: 6056/4
CABARITA

Date Received: 7 January 2008
Due Date: 14 January 2008
Turnaround: Standard

Amdel Reference number: 08ENBR0000373

Your Amdel Contact: David Bates
+61 7 3902 4600

If you have any queries regarding turnaround and sample progress, technical queries or wish to make changes please contact the laboratory immediately.

Job Information

Sample Integrity

Attempt to Chill was evident	Yes
Samples correctly preserved	Yes
Organic samples had Teflon liners	Yes
Samples received with Zero Headspace	Yes
Samples received within Holding Time	Yes
Some samples have been subcontracted	No
Custody Seals Intact (if used)	Yes

Analysis Requested

Analysis Requested	Method Code	Number Of Samples
Metals in Leachate by ICP-AES	3200	2
TCLP - Acidic Buffer	5700	2

Note

- Turnaround time starts when samples are received at the Laboratory
- For samples received after 4pm, turnaround time starts the next working day
- For samples received on the last day of holding time, notification of testing requirements must be given at least 6 hours prior to the sample receipt deadlines; Should the laboratory not receive the information in the required timeframe a suitably qualified results may still be reported.
- Surcharges may apply for 24 and 48 hour turnaround.
- Water samples will be discarded after 4 weeks unless notified.
- Soil samples are chilled for 1 month and will be discarded after 3 months unless notified.
- UNLESS ADVISED OTHERWISE - Sample analysis will commence regardless of integrity issues and / or non-conformance and these will be recorded on the final report.
- Samples submitted for Micro analysis on a Friday may incur a \$150 surcharge and / or be analysed outside holding time (24 Hour Holding Time).

Logged in by : Jane Walker

Date : Mon 7 January 2008

APPENDIX C
QUALITY ASSURANCE PROCEDURES

APPENDIX C

QUALITY ASSURANCE

The following procedures were utilized to ensure the integrity of the data collected during the assessment.

Sample Collection and Containers

All samples were collected by a **GeoEnvironmental Consultants** engineer or scientist specifically trained in hazardous waste field investigation techniques and health and safety procedures.

Soil sample collection included:

- Utilization of pre-cleaned solid stem augers. The drill rig utilizes inert non-hydrocarbon based greases and lubricants in areas that may come into contact with soil;
- Sample collection equipment is inspected by the **GeoEnvironmental Consultants** engineer / scientist prior to commencement of fieldwork to ensure equipment cleanliness and adequacy. Mechanical equipment is inspected for oil leaks or other potential sources of cross contamination.
- Transfer of the disturbed auger sample to the engineer/scientist on pre-cleaned PVC sections. Sample handling is conducted in a work area that is wiped clean for each sampling event and kept clear of mess and potential cross contamination sources;
- Selection by the engineer/scientist of depth(s) to be sampled;
- The engineer/scientist wears a new pair of disposable nitrile gloves for each sample collection event;
- Immediate transfer of soil by gloved hand and/or decontaminated sampling equipment to pre-labelled, 250 ml laboratory supplied glass jars with Teflon lid inserts. Jars are filled to ensure sufficient sample is provided for laboratory purposes. The container lip is cleaned if necessary before firmly screwing on the container lid. A clean lip is required to ensure that the Teflon lid insert is not damaged and that volatile and semi-volatile compounds do not escape from the container prior to analysis;

Groundwater sample collection included:

- Gauging depth to water (DTW) in each monitoring well prior to development using decontaminated equipment;
- Utilization of one-use, disposable bailers for each individual monitoring well. New bailer cord is used for each well. The disposable bailers were also used for well development;
- Sample collection equipment is inspected by the **GeoEnvironmental Consultants** engineer / scientist prior to commencement of fieldwork to ensure equipment cleanliness and adequacy;
- The engineer/scientist wears a new pair of disposable nitrile gloves for each sample collection event; and
- Immediate transfer of water from the bailer to pre-labelled, 250 ml laboratory supplied glass jars with Teflon lid inserts. The containers for laboratory analysis are filled to form a meniscus with no headspace. The container lid is then firmly sealed.

Decontamination

Soil Sampling.

All field sampling equipment was decontaminated prior to use and between samples to prevent cross contamination. Equipment included trowels, bowls, knives etc used by the engineer/scientist to transfer the sample to containers. Decontamination of equipment involved the following processes:

- Scrub in clean potable water to remove gross contamination;
- Scrub in a solution of Extran MA03, (phosphate free alkaline cleaner) in clean potable and/or deionised water;
- Rinse in clean potable and/or deionised water; and
- Air dry.

Between boreholes the solid stem augers are removed to a designated cleaning area and cleaned using water spray.

Groundwater Sampling.

The pre wrapped disposable bailer was rinsed with demineralized water prior to well development. For this project there was no requirement to further decontaminate sampling equipment as the disposable bailer was used to transfer samples directly into laboratory prepared containers.

Field Records and Sample Identification

Good, accurate documentation and record keeping at the time of fieldwork performance is considered critical for project success. Detailed field notes are recorded both on drill log sheets and field note books. Records include but are not limited to:

- Name and address of site;
- Identification of field personnel
- Identification of sampling locations
- Date of sample collection
- Method of sample collection
- Depths of sample collection
- Description of soil samples, including USCS Classification and odour
- Depth of first groundwater occurrence
- Depth of static groundwater elevation
- Depth to bottom of borehole, screen/casing
- Number and volume of samples collected
- Survey data as applicable

All samples are identified with a unique sample number, the project number and date of collection. Sample identification details are also recorded on the drill log sheets and Chain of Custody documents.

Field Testing

Headspace field screening was not conducted as it was determined that soil samples would be collected from the known dry soil profile above shallow groundwater.

Sample Transport

All samples to be transported to the laboratory were packed securely in an Esky containing ice. Samples were transported under Chain of Custody procedures from the site to the laboratory. More samples were sent to the laboratory than selected for initial analysis. The laboratory was requested to hold samples for subsequent analysis, if required, or future disposal.

Sample receipt advice from the laboratory indicated whether all sample containers arrived intact. The laboratory also advises if there are any irregularities between sample containers / numbers supplied and Chain of Custody requests.

Instrument Calibration

Instruments used to conduct the field investigations were all calibrated in accordance with the manufacturers recommended procedures, if required.

QUALITY CONTROL

In order to assess the accuracy and precision of the analytical data obtained, the following quality control samples are collected:

Field Duplicates

Field duplicates are a second sample taken from the same position as the first (or a split sample). One field duplicate is typically collected for each 10 (or fewer) samples. A lesser duplicate to field sample ratio may be acceptable under certain site conditions such as consistent lack of contamination and consistent ground conditions.

The field duplicate is analysed to check for consistency of laboratory performance and the variability of the contaminants in the sample. Field duplicate results are used to assess the precision of the whole process including sampling, sample preservation and analysis.

Equipment (Rinsate) Blanks

Equipment blanks are deionised water solutions that are transported to the site, opened in the field, and poured over or through the sample collection device, collected in a sample container, and returned to the laboratory. Equipment blanks are used to check the cleanliness of the sampling device and to confirm the quality of field decontamination procedures.

One equipment blank is typically collected per sampling day event. Use of new disposable bailers for each well negated the need for equipment blanks.

Field Blanks

Field blanks are deionised water that is taken to the sampling site and poured into the sample container prior to sample collection. The sample container remains open throughout the collection of samples and is then sealed and returned to the laboratory with the other samples.

Field blanks are typically collected when requested by the client or when warranted by specific site conditions and/or contaminants of concern. Field blanks perform a similar function to ***Trip Blanks***, which are pre-prepared samples used to measure the incidental or accidental contamination of samples by volatile organic compounds (VOCs) during transport, field work and storage. Trip blanks are usually prepared by the laboratory using containers which are filled with VOC free water. These pre-prepared samples are then handled in the same manner as regular VOC sample collection containers.

Matrix Spike Samples

Matrix spikes are samples prepared in the laboratory by spiking an aliquot of a field sample with known concentrations of specific analytes. The matrix spike is then analysed and the results are used to assess the effects of the sample matrix on the accuracy of the analyses.

Accuracy is assessed by calculation of *percent recovery*, where:

$$\text{Percent recovery (PR)} = X/T \times 100\%$$

Where X = the observed value of measurement
 T = "true" value

Typical acceptable spike recoveries as follows:

- 70 – 130 % for metals, BTEX and TPH C₆-C₉.
- 50 – 150 % for TPH C₁₀-C₃₆.

Laboratory Control samples

Laboratory Control Samples (or Quality Control Check Samples) are samples prepared within the laboratory by spiking an aliquot of an appropriate clean matrix reagent with known concentrations of specific analytes. The check sample is then analysed and the results are used to assess the laboratory performance on sample preservation and analysis procedure.

Accuracy is assessed by calculation of *percent recovery*, where:

$$\text{Percent recovery (PR)} = X/T \times 100\%$$

Where X = the observed value of measurement
 T = "true" value

Relative Percentage Difference (RPD)

The relative percentage difference or RPD of each set of duplicate samples is calculated to assess overall precision, where:

$$\text{RPD} = \frac{(D1 - D2)}{(D1 + D2)/2} \times 100\%$$

where D1 = Sample concentration
 D2 = Duplicate sample concentration

RPDs for the Cabarita project were acceptable although only low concentrations were detected.