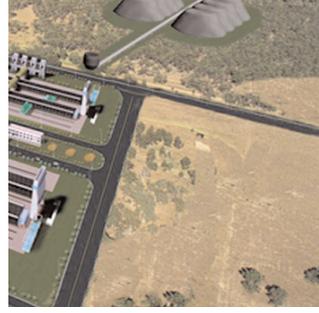
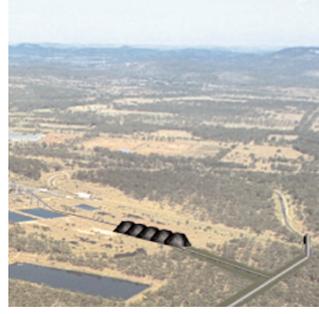
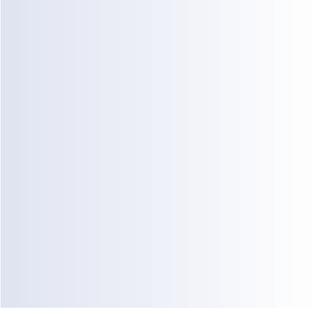


Appendix E Phase 1  
Contaminated Land  
Assessment



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## Appendix E Phase 1 Contaminated Land Assessment

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# Appendix E

## Phase 1 Contaminated Land Assessment

### 1.1 Introduction

This report details the results of a Preliminary Stage 1 Contaminated Land Assessment that was performed over the proposed Queensland Coke and Power Plant project site adjacent to Stanwell Power Station (SPS). This investigation follows the guidelines for a Stage 1 Preliminary Site Investigation as described in the “Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland” published by the Queensland Department of Environment, 1998 (now Environmental Protection Agency).

The following works were conducted:

- Development of a site history;
- Inspection of the site; and
- Implementation of a basic soil and analysis program.

### 1.2 Environmental Protection Agency Registers

The development site is made up of portions of a number of land parcels. These land parcels are listed in Table E.1 and shown in Figure 3.4. Table E.1 also shows the results of searches of the Queensland Environmental Protection Agency’s Environmental Management Register (EMR) and the Contaminated Land Register (CLR) for the lots in question, as well as surrounding land parcels. The EMR, pursuant to section 374 of the *Environmental Protection Act, 1994*, records land that has been used for a notifiable activity (i.e. a land use that may cause land contamination) as well as land that has been shown through investigation to be impacted by a hazardous contaminant. The CLR records land that, due to the presence of significant contamination, requires remediation to reduce health or environmental risk to acceptable levels.

**Table 1 Description of Lots and Results of Register Searches**

Lot Description	Proposed Works/Area	Owner	EMR	CLR
1/SP140242	Coke and power plant area.	Stanwell Corporation Ltd.	Not Included	Not Included
1/SP140243	Coke stockpiles.	Stanwell Corporation Ltd.	Included	Not Included
44/SP140243	Coal stockpiles, and area adjacent to the south and west of the project.	Stanwell Corporation Ltd.	Included	Not Included
214/P4047	Area adjacent to north of coke stockpile.	MacKay	Not Included	Not Included
218/P4047	Area adjacent to north of coke stockpile.	MacKay	Not Included	Not Included
2/RP614973	Area adjacent to north of coke stockpile.	Goldsworthy	Not Included	Not Included
1/RP886588	Area south-west of proposed coke and power plant.	Queensland Electricity Transmission Corporation	Included	Not Included

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## Phase 1 Contaminated Land Assessment

None of the Lots which either form part of the proposed development or are adjacent to the proposed development are listed on the Contaminated Land Register.

Several of the Lots on which the proposed development will be built are included on the Environmental Management Register. Lots 1/SP140243 and 44/SP140243 are included on the register as a notifiable activity for “Chemical Storage (other than petroleum products or oil)”. It is understood from discussions with the Environment Protection Agency (EPA) that this refers to quantities of caustic soda (NaOH) and sulphuric acid (H<sub>2</sub>SO<sub>4</sub>), which are used in relation to the operation of SPS. The Stanwell Power Station confirmed that these products were stored within the chemical store of the power station.

In addition, Lot 1/RP886588 is included on the register as a notifiable activity for “Chemical Storage (other than petroleum products or oil)”. The EPA further confirmed that the EMR entry for these lots was linked with the original single lot for SPS, which was then sub-divided into the current land parcels. No other inclusions are noted for the land parcels in the area of interest.

### 1.3 Site History

#### 1.3.1 Proposed Coke and Power Plant Area

The proposed coke and power plant is located on the western half of Lot 1/SP140242 and the south-eastern corner of Lot 1/SP140243. Discussion with the previous owner of the land prior to the AMC proposed development indicated that the site was used for cattle grazing and agriculture. No cattle dips were located on the land.

It is understood that the northern end of Lot 1/SP140242 previously formed part of the original Stanwell Town Schoolyard in or around the late 1800's.

The south-west corner of Lot 1/SP140242 was known to contain two compounds used by construction plant hire firms in the late 1980's, during the construction of the SPS. It is understood that these areas were used for the storage and maintenance of plant.

An area in the south-east of Lot 1/SP140242 was known to contain a silage pit at one time, however, this is outside the boundary of the proposed coke and power plant site and not included in the development area.

The AMC development proceeded to the stage in 2002 to clear a portion of Lots 1/SP140242 and 1/SP140243 to level for foundation work. In addition to the ground clearance and levelling, several steel frame structures were erected and plant, machinery and supplies were left across the cleared area.

A search of the Queensland Government's aerial photograph archive revealed that a series of photographs exists for the area of the proposed development, covering the periods of 1956 to 2004. The photographs indicate that from 1956 to 1979 the area of the proposed coke plant was undeveloped and used for agriculture. The north-western corner of this area had been cleared and a small dam was shown in that location on the 1979 photograph, along with several tracks leading to the dam.

# Appendix E

## Phase 1 Contaminated Land Assessment

The subsequent series of 1988 and 1995 photographs indicated no change to the proposed coke plant area, however, adjacent to the south west of this area, the construction of SPS is indicated, along with numerous cuts and ponds, and by 1995, the power station is shown as complete and operational.

The most recent series of photographs were taken in 2004 and revealed the proposed development area to have been cleared and levelled for the former AMC development and indicated several small dams, areas of cut, foundations, various pieces of equipment and stores on the cleared AMC site. The site layout shown on the aerial photographs was similar to the current site layout, which was confirmed by the site inspection of 4 April 2005.

### 1.3.2 Proposed Coal and Coke Stockpile Area

The proposed coal and coke stockpile areas cover all of Lot 1/SP140243 and an area in the north-western corner of Lot 44/SP140243.

Discussions relating to the AMC EIS development in 1998 with SCL revealed that four water storages associated with SPS were located on Lot 1/SP140243 and Lot 44/SP140243. These included: sewage plant evaporation ponds; northern construction water dam; sludge ponds; and northern stormwater dam. The southern corner of Lot 1/SP140243 is understood to overlap the corner of the sludge pond, while the northern construction dam now lies under the centre of the southern part of Lot1/SP140243. Both these storages are located on the project area. The sewage evaporation ponds and northern stormwater dam do not fall within the proposed development area, but lie adjacent to the west of the proposed coke and power plant.

The sludge ponds located on the project area on these lots contained mud from the cooling tower blowdown water treatment plant. They contained a polyelectrolyte coagulant (NALCO 9597, produced by Nalco Australia Pty. Ltd.) which was used to congeal the mud. The ponds were originally excavated in 1992/1993. It is understood that the coagulant is biodegradable and when dried, has been used for landscaping purposes on the SPS site, mainly around the administrative offices.

The northern construction dam was built in the late 1980's to provide water for the construction of SPS. According to Leighton Contractors, the dam was filled and levelled using material cut from elsewhere on site.

The northern portion of Lot 1/SP140243 is undeveloped and covered in bushland. The section of Lot 44/SP140243 that is proposed for the coal stockpile has been cleared, although it is not known when this occurred.

The Queensland Government's aerial photographs indicate that from 1956 to 1979 the areas of the proposed coal and coke stockpiles remained undeveloped and appeared to be used for grazing. A section in the north of this area had been cleared of trees.

The series of aerial photographs from 1979 show little significant change to this area, however, a track or fence line is shown adjacent to the north of the proposed coke stockpile area.

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## Phase 1 Contaminated Land Assessment

No significant change was noted on the area in the 1995 photographs, however, SPS was now shown to be operational. Various settling ponds were indicated to the south of the proposed stockpile areas.

The 2004 photographs revealed that little change had taken place over the proposed stockpile area, or in the immediate adjacent areas. These observations were confirmed by the site visit of 4 April 2005.

### **1.3.3 Areas Adjacent to Proposed Development**

To the north of the proposed development, Lots 218/P4047 and 214/P4047 are indicated to be residential properties from the entries in the Historical Title database.

Most of the infrastructure belonging to SPS is located on Lot 44/SP140243. The sewage plant evaporation ponds are located immediately adjacent to the west of the proposed coke and power plant and were built in the late 1980's to service the construction workers. These evaporation ponds are still in use for the treatment of sewage for the SPS workforce. The northern stormwater dam adjacent to the south-west of the proposed coke and power plant was constructed in the late 1980's with a capacity of 50 ML. This feature is still present and in use.

The eastern half of Lot 1/SP140242, adjacent to the east of the project site is undeveloped, but discussions during the site visit indicates that this area was used by the American military as a training area during World War II.

South of the project area, the land is undeveloped bushland.

The Queensland Government's aerial photograph archive revealed that over the period of 1956 to 2004 no significant change to the areas surrounding the proposed coke and power plant and associated stockpiles has been identified, with most of the surrounding areas being bushland, in some places cleared for grazing. Several residential buildings were shown in the area in 1956, mostly to the north-east of the proposed development. The number of buildings has increased slightly over the years.

## **1.4 Site Inspection**

### **1.4.1 Proposed Coal and Coke Stockpile Area**

The proposed coal and coke stockpile areas were inspected on 4 April 2005 by URS Australia personnel, where the following observations were made.

The area in the west of Lot 44/SP140243 where the proposed coal stockpiles are to be located is not currently in use by SPS, however the area has been cleared. The topography appears to have been raised approximately 3 to 5 m above the surrounding area in places, which suggests that fill material may have been used across the area to increase the elevation. It is believed from discussions with site staff that this material was excavated from the settlement ponds to the south.

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## Phase 1 Contaminated Land Assessment

The area adjacent to the south of the proposed coal stockpiles contained two coal stockpile settlement ponds which are believed to service the existing coal stockpile that belongs to SPS further to the south. It is expected that these ponds would naturally overflow in the area to the north, however, no record of these ponds overflowing was found.

The entire northern area of the proposed coke stockpile area (Lot 1/SP140243) was observed to be generally natural bush land. Tracks traverse the area, but are unsealed and limited. No infrastructure was present in this area and no disturbance of the surface was noted.

An area in the north of Lot 44/SP140243, adjacent to the southern margin of the coke stockpile, approximately in the centre of the SPS site, had been cleared and was identified as a drainage reclaim dam. The dam appeared to be lined and well maintained, with no evidence of contamination in the water.

Several other evaporation ponds were located on the east margin of Lot 44/SP140243, adjacent to the western boundary of the proposed coke and power plant. These are part of the sewage treatment plant which services SPS. Only one pond is active at any one time and overflow is contained by the four other ponds present. Sludge from these ponds is used, once evaporated, for landscaping purposes on site, although this has been restricted to generally around the office/reception areas.

### **1.4.2 Proposed Coke and Power Plant Area**

The proposed coke and power plant area was inspected on 4 April 2005 by URS Australia personnel, where the following observations were made.

An area in the centre of the proposed footprint of the plant contains much of the equipment and chemicals (cement aid) that have been brought on to site for the former AMC development. Former foundation slabs from the AMC plant works are present across this area, on which have been stored equipment and several drums of fuel as well as several drums of cement aid. In addition, a small diesel tank had been kept on a skid in this area. Interviews with the former AMC personnel revealed that an environmental management system was in place for the preparation work for the AMC project and that any spills that occurred were cleaned up promptly and detailed records kept.

To the north of this area, a small zone that was previously the construction workers mess area was present. This area is also known to contain buried cesspits/septic tanks. On the southern-most area of the proposed coke and power plant site, in an area where a large steel frame to support a building had been erected, additional drums of cement aid were noted to be stored on grated troughs.

An area adjacent to the western margin of the proposed project site on Lot 1/SP140242, adjacent to lot 1/SP140243, was noted to be collecting runoff from a mound of fill/cleared land material.

Several old farm buildings were present in the far northern area of the former AMC site. At least one of these appears to have been used for residential purposes, but is currently unoccupied.

Two settlement ponds are present to the north of the former mess area and form a likely receptor for all surface run off in this area.

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## Phase 1 Contaminated Land Assessment

No storage/maintenance areas were noted as described in the AMC EIS. No silage pit was found as described in the AMC EIS. An above ground storage tank that had been previously described in the AMC EIS was noted to be used for water and was found to be empty.

The area to the east of eastern boundary of the proposed coke and power plant, on the other side of Flagstaff Hill, was used as a training area for American soldiers during World War II, however it is understood that no ammunition or explosives were used in this area.

### 1.5 Soil Sampling and Laboratory Testing

Four soil samples were collected for laboratory testing at ALS Environmental (a NATA accredited laboratory) to provide background data on levels of metals, organochlorine and organophosphorus pesticides and selected organic compounds, including polynuclear aromatic hydrocarbons and petroleum hydrocarbons. These samples were collected from the surface at various locations across the site, which are shown on Figure 3.2a.

Sample AMC-ST1 was collected from soil the location of a former diesel tank. AMC-ST2 was collected from a hydrocarbon stained patch of soil nearby, both samples located in the area where most equipment has been stored from the former AMC development. Sample AMC-CH1 was collected from adjacent to stored drums of cement aid in the south of the former AMC site, while sample AMC-SPS1 was collected from the western boundary of the former AMC site, where erosion had transported soil from the SPS lot adjacent to the AMC development site.

Results of selected chemical analyses are presented in Tables E.2 and E.3 below and the full results are provided in Appendix 1 end of this report.

**Table 1.2 Laboratory Results for Metals**

Metals (mg/Kg)					
Parameter	Criteria	AMC-SPS1	AMC-ST1	AMC-CH1	AMC-ST2
Arsenic	20	6	6	6	5
Cadmium	3	<1	<1	<1	<1
Chromium	50	19	5	14	4
Copper	60	17	19	13	15
Lead	300	11	9	8	7
Nickel	60	9	7	8	6
Zinc	200	25	142	32	55
Mercury	1	<0.1	<0.1	<0.1	<0.1

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## Phase 1 Contaminated Land Assessment

**Table 1.3 Laboratory Results for Total Petroleum Hydrocarbons (TPH)**

Total Petroleum Hydrocarbons (TPH) (mg/Kg)					
Parameter	Criteria	AMC-SPS1	AMC-ST1	AMC-CH1	AMC-ST2
C <sub>6</sub> -C <sub>9</sub> Fraction	100	<2	<2	<2	<2
C <sub>10</sub> -C <sub>14</sub> Fraction	100	130	240	470	<50
C <sub>15</sub> -C <sub>28</sub> Fraction	1000	<100	3260	7270	<100
C <sub>28</sub> -C <sub>36</sub> Fraction	1000	<100	6060	450	<100

The other parameters that were analysed for comprised organochlorine pesticides, organophosphorus pesticides, polynuclear aromatic hydrocarbons and BTEX. The analysis showed no levels of these compounds in the soil above laboratory detection levels.

## 1.6 Significance of Analytical Results

### 1.6.1 Metals Analyses

Results of the metal analyses have been compared to criteria for environmental investigation thresholds, as set out in the “Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland” (Queensland Department of Environment, 1998). All of the reported results were below the environmental investigation thresholds.

### 1.6.2 Organics Analyses

Two samples (AMC-ST1 and AMC-CH1) collected from the previous AMC site indicated elevated levels of Total Petroleum Hydrocarbons (TPH) which were higher than the environmental threshold identified by the guidelines (Queensland Department of Environment, 1998). These samples were collected from areas that were suspected to have been impacted by spills historically from either fuel tanks or chemical stores. The high TPH values indicated by the results (Table E.3) would correlate with a spill of diesel or fuel oil in nature. In this case, it appears from a visual examination of the site surface that any spill will have been localised. The other samples collected across site represent background concentrations and are all below the relevant environmental investigation thresholds.

## 1.7 Conclusion

Despite several lots that are included in the area for proposed development being listed on the EMR, discussions with the EPA have indicated that the listing refers to the previous land parcel that SPS was

## Appendix E

# Phase 1 Contaminated Land Assessment

built on, and as such, none of the Lots on which the proposed coke and power plant or stockpiles are to be sited are affected by this entry.

Past land uses over the lots identified as being within the proposed development area or adjacent to the proposed development area do not appear to have resulted in soil contamination on a large scale. Background concentrations recorded from most soil samples indicate levels of selected metal and organic parameters to be below environmental investigation thresholds.

Two samples collected from areas where fuel and chemical have been stored on site have indicated TPH concentration to be higher than environmental investigation thresholds, indicating that several small spills have occurred on site. This concurs with the interview held with the site personnel at the time of the site visit. It is recommended that during construction phase of the development, an investigation of the areas around the spills is carried out.

The existence of several settlement ponds adjacent to the site on the SPS lots could be regarded as a potential source for contamination that may impact the development site. Should these ponds be earmarked for decommissioning or removal, an investigation should be carried out on the soil at the base of the ponds to determine the presence of any potential contaminants.

The former sludge ponds and northern construction water dam should be investigated prior to development in order to identify any potential contaminated material used in infilling the dam, as well as assessing the condition of the former sludge ponds.

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Phase 1 Contaminated Land Assessment

**Appendix 1 – Certificate of Analysis**

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## CERTIFICATE OF ANALYSIS

<b>Client</b> : URS AUSTRALIA PTY LTD (QLD)	<b>Laboratory</b> : ALS Environmental Brisbane	<b>Page</b> : 1 of 5
<b>Contact</b> : MR CHRIS MORRISON	<b>Contact</b> : Michael Heery	
<b>Address</b> : GPO BOX 302 BRISBANE QLD AUSTRALIA 4001	<b>Address</b> : 32 Shand Street Stafford QLD Australia 4053	<b>Work order</b> : <b>EB0503094</b>
<b>Project</b> : 42625626	<b>Quote number</b> : EN/392/02	<b>Date received</b> : 8 Apr 2005
<b>Order number</b> : - Not provided -		<b>Date issued</b> : 18 Apr 2005
<b>C-O-C number</b> : - Not provided -		
<b>Site</b> : - Not provided -		
<b>E-mail</b> : chris_morrison@urscorp.com	<b>E-mail</b> : Michael.Heery@alsenviro.com	<b>No. of samples</b>
<b>Telephone</b> : (07)3243-2111	<b>Telephone</b> : 61-7-32437222	<b>Received</b> : 4
<b>Facsimile</b> : (07)3243-2199	<b>Facsimile</b> : 61-7-32437259	<b>Analysed</b> : 4

This final report for the ALSE work order reference EB0503094 supersedes any previous reports with this reference.

Results apply to the samples as submitted. All pages of this report have been checked and approved for release.

This report contains the following information:

- 1 Analytical results for samples submitted
- 1 Surrogate control limits

### ALSE - QUALITY, SERVICE and TECHNOLOGY provided GLOBALLY



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Accredited for compliance with ISO/IEC 17025.

This document has been digitally signed by those names that appear on this report and are the authorised signatories. Digital signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

**Signatory**

Kim McCabe  
Mat Taylor

**Department**

Inorganics - NATA 818 (Brisbane)  
Organics - NATA 818 (Brisbane)

Client : URS AUSTRALIA PTY LTD (QLD)  
 Project : 42625626

Work Order : EB0503094  
 ALS Quote Reference : EN/392/02

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 Issue Date : 18 Apr 2005

When moisture determination has been performed, results are reported on a dry weight basis. When a reported 'less than' result is higher than the LOR, this may be due to primary sample extracts/digestion dilution and/or insufficient sample amount for analysis. Surrogate Recovery Limits are static and based on USEPA SW846 or ALS-QWI/EN38 (in the absence of specified USEPA limits).

Abbreviations: **CAS number** = Chemical Abstract Services number, **LOR** = Limit of Reporting. # Indicates a raised LOR, \* Indicates failed Surrogate Recoveries.

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for process purposes.

## Analytical Results

				Client Sample ID :	AMC-SPS1	AMC-ST1	AMC-CH1	AMC-ST2	
Sample Matrix Type / Description :					SOIL / SOLID	SOIL / SOLID	SOIL / SOLID	SOIL / SOLID	
Sample Date / Time :					4 Apr 2005 15:00	4 Apr 2005 15:00	4 Apr 2005 15:00	4 Apr 2005 15:00	
Laboratory Sample ID :					EB0503094-001	EB0503094-002	EB0503094-003	EB0503094-004	
Analyte	CAS number	LOR	Units						
<b>EA055: Moisture Content</b>									
Moisture Content (dried @ 103°C)		1.0	%	6.5	<1.0	5.6	<1.0		
<b>EG005T: Total Metals by ICP-AES</b>									
Arsenic	7440-38-2	5	mg/kg	6	6	6	5		
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1		
Chromium	7440-47-3	2	mg/kg	19	5	14	4		
Copper	7440-50-8	5	mg/kg	17	19	13	15		
Lead	7439-92-1	5	mg/kg	11	9	8	7		
Nickel	7440-02-0	2	mg/kg	9	7	8	6		
Zinc	7440-66-6	5	mg/kg	25	142	32	55		
<b>EG035T: Total Mercury by FIMS</b>									
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1		
<b>EP068A: Organochlorine Pesticides (OC)</b>									
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2		
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05		

Client : URS AUSTRALIA PTY LTD (QLD)  
 Project : 42625626

Work Order : EB0503094  
 ALS Quote Reference : EN/392/02

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## Analytical Results

				Client Sample ID :	AMC-SPS1	AMC-ST1	AMC-CH1	AMC-ST2	
				Sample Matrix Type / Description :	SOIL / SOLID	SOIL / SOLID	SOIL / SOLID	SOIL / SOLID	
				Sample Date / Time :	4 Apr 2005 15:00	4 Apr 2005 15:00	4 Apr 2005 15:00	4 Apr 2005 15:00	
				Laboratory Sample ID :	EB0503094-001	EB0503094-002	EB0503094-003	EB0503094-004	
Analyte	CAS number	LOR	Units						
<b>EP068A: Organochlorine Pesticides (OC)</b>									
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
<b>EP068B: Organophosphorus Pesticides (OP)</b>									
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Methyl Azinphos	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Indeno(1,2,3,cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	

Client : URS AUSTRALIA PTY LTD (QLD)  
 Project : 42625626

Work Order : EB0503094  
 ALS Quote Reference : EN/392/02

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## Analytical Results

				Client Sample ID :	AMC-SPS1	AMC-ST1	AMC-CH1	AMC-ST2	
				Sample Matrix Type / Description :	SOIL / SOLID	SOIL / SOLID	SOIL / SOLID	SOIL / SOLID	
				Sample Date / Time :	4 Apr 2005 15:00	4 Apr 2005 15:00	4 Apr 2005 15:00	4 Apr 2005 15:00	
				Laboratory Sample ID :	EB0503094-001	EB0503094-002	EB0503094-003	EB0503094-004	
Analyte	CAS number	LOR	Units						
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction		2	mg/kg	<2	<2	<2	<2	<2	
C10 - C14 Fraction		50	mg/kg	130	240	470	<50	<50	
C15 - C28 Fraction		100	mg/kg	<100	3260	7270	<100	<100	
C29 - C36 Fraction		100	mg/kg	<100	6060	450	<100	<100	
<b>EP080: BTEX</b>									
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
<b>EP068S: Organochlorine Pesticide Surrogate</b>									
Dibromo-DDE		0.1	%	81.4	93.3	93.5	92.1	92.1	
<b>EP068T: Organophosphorus Pesticide Surrogate</b>									
DEF	78-48-8	0.1	%	94.4	94.9	87.6	91.6	91.6	
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
2-Fluorophenol	367-12-4	0.1	%	98.8	97.5	100	85.7	85.7	
Phenol-d6	13127-88-3	0.1	%	97.7	71.2	85.5	81.0	81.0	
2-Chlorophenol-D4	93951-73-6	0.1	%	98.9	89.5	96.3	89.6	89.6	
2,4,6-Tribromophenol	118-79-6	0.1	%	93.9	84.3	96.2	94.7	94.7	
<b>EP075(SIM)T: PAH Surrogates</b>									
2-Fluorobiphenyl	321-60-8	0.1	%	96.8	101	99.0	95.4	95.4	
Anthracene-d10	1719-06-8	0.1	%	107	97.4	79.4	89.5	89.5	
4-Terphenyl-d14	1718-51-0	0.1	%	109	107	97.0	101	101	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	0.1	%	85.0	87.3	86.9	83.9	83.9	
Toluene-D8	2037-26-5	0.1	%	102	102	104	103	103	
4-Bromofluorobenzene	460-00-4	0.1	%	90.8	88.2	91.1	88.6	88.6	

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## Surrogate Control Limits

The analytical procedures used by ALS Environmental are based on established internationally-recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house procedure are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported herein. Reference methods from which ALSE methods are based are provided in parenthesis.

<i>Method name</i>		<i>Analyte name</i>	<i>Surrogate Control Limits</i>	
			<i>Lower Limit</i>	<i>Upper Limit</i>
<b>EP068: Pesticides by GCMS</b>				
EP068S: Organochlorine Pesticide Surrogate		Dibromo-DDE	10	136
EP068T: Organophosphorus Pesticide Surrogate		DEF	10	110
<b>EP075(SIM): PAH/Phenols (SIM)</b>				
EP075(SIM)S: Phenolic Compound Surrogates		2-Fluorophenol	25	121
		Phenol-d6	24	113
		2-Chlorophenol-D4	23	134
		2,4,6-Tribromophenol	19	122
EP075(SIM)T: PAH Surrogates		2-Fluorobiphenyl	30	115
		Anthracene-d10	27	133
		4-Terphenyl-d14	18	137
<b>EP080: TPH Volatiles/BTEX</b>				
EP080S: TPH(V)/BTEX Surrogates		1,2-Dichloroethane-D4	80	120
		Toluene-D8	81	117
		4-Bromofluorobenzene	74	121