

UNITED RUBBER (Aust.) Pty Ltd
81-85 Christie Street, St Marys

Contaminated Site Assessment

5 August 1998

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Contaminated Site Assessment
81 – 85 Christie Street, St Marys***

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1.0 Executive Summary

1.0 EXECUTIVE SUMMARY

Earth Air Water Consulting and Monitoring Pty Limited were engaged by United Rubber (Aust.) Pty Ltd to undertake a contaminated site assessment of their rubber manufacturing plant and surrounding areas located at 81-85 Christie Street, St Marys NSW. The objective of this study was to investigate the extent of contamination (if any) for due diligence purposes.

The scope of work involved the supervision of drilling and collection of samples on site, the engagement of a NATA registered laboratory to perform the analyses and the preparation of a contaminated site report.

The tables of results (Tables 2 & 3) can be seen in the result section of this report. These results indicate that the rear portion of the property, where shot blasting activities have taken place, has limited lead and tin contamination.

Lead contamination occurred at locations 3, 4 and 6 which represent a small portion of the site and overall have little impact on the site as a whole. These contamination levels are limited to the surface material and could be removed if required.

Tin contamination occurred at locations 2, 3, 4, 5, 6, 8 and 12. Tin contamination has been removed from the current EPA NSW guidelines entitled "Draft Guidelines for the NSW Site Auditor Scheme" and as such would indicate a reduction of concern for tin contamination. The surface material could also be removed if required.

Localised total petroleum hydrocarbon contamination occurred in the front portion of the site at locations 11 and 15, immediately surrounding the edge of the storage area concrete slab. These levels were slightly above the guideline levels and will recover naturally if

further contamination is eliminated through improved housekeeping in this area.

Other areas showed no contamination at this stage of the investigation. Areas underneath the concrete slabs on site were not investigated.

2.0 Scope Of Work

2.0 SCOPE OF WORK

Earth Air Water Consulting and Monitoring Pty Limited (EAW) were engaged by United Rubber (Aust.) Pty Ltd to undertake a site contamination assessment of their rubber manufacturing plant and surrounding grounds located at 81-85 Christie Street, St Marys NSW. The scope of work for this project was as follows:

- Supervise drilling on site, log boreholes and collect soil samples in accordance with EPA NSW guidelines for contaminated sites;
- Engage NATA registered laboratories to undertake the analyses of the soil samples;
- Review analytical results and prepare a contaminated site assessment in accordance with EPA NSW guideline (1997) entitled “Guidelines for Consultants Reporting on Contaminated Sites”.

3.0 Site Identification and History

3.0 SITE IDENTIFICATION AND HISTORY

The site is identified as Lot 132, 81 – 85 Christie Street, St Marys NSW and is located as shown on Figure 1. The current site plan is shown in Figure 2.

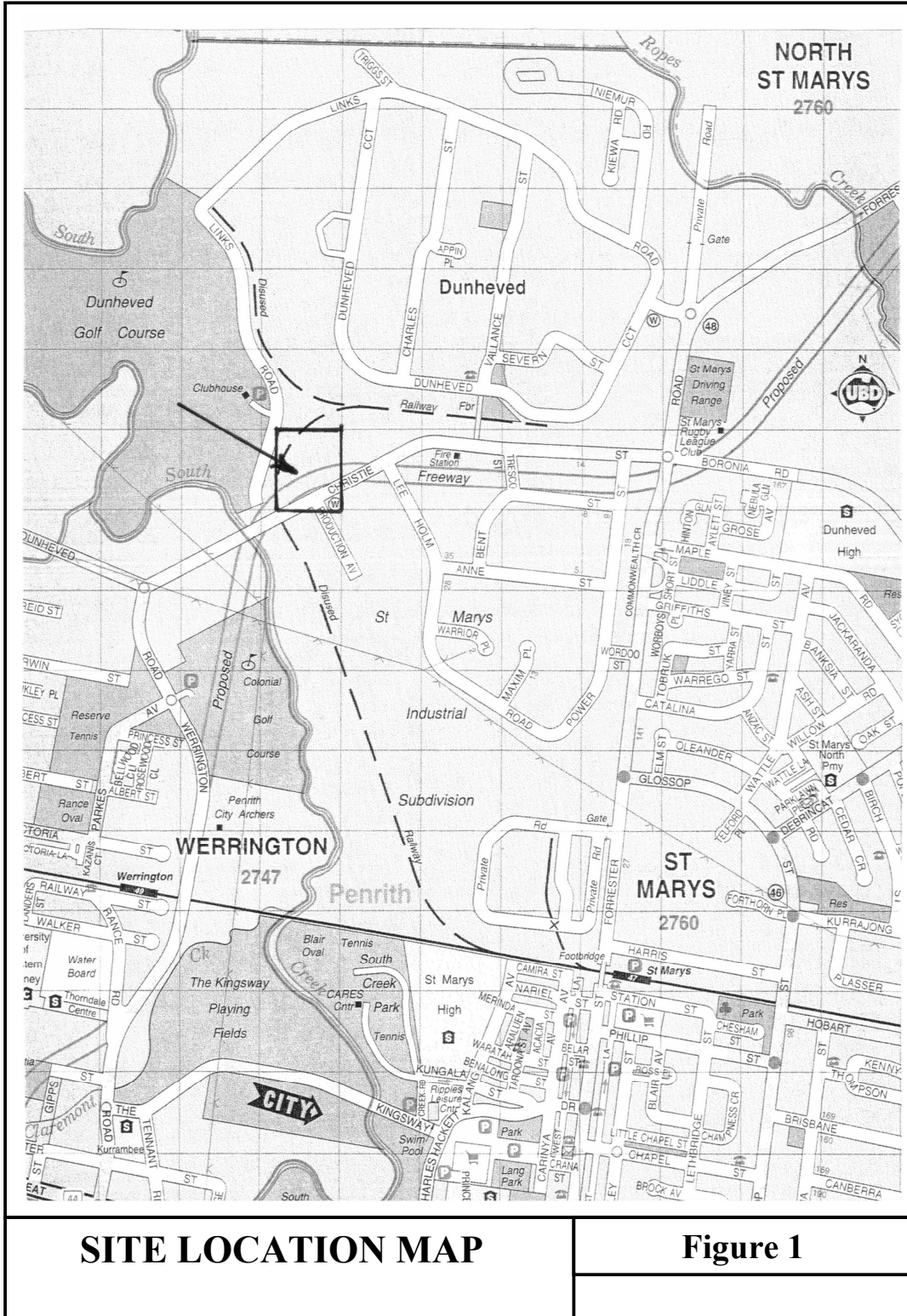
The site is presently zoned heavy industrial and has been so since pre World War II. The site is presently used as a rubber manufacturing plant. There are two factories on the site – one new and one older building.

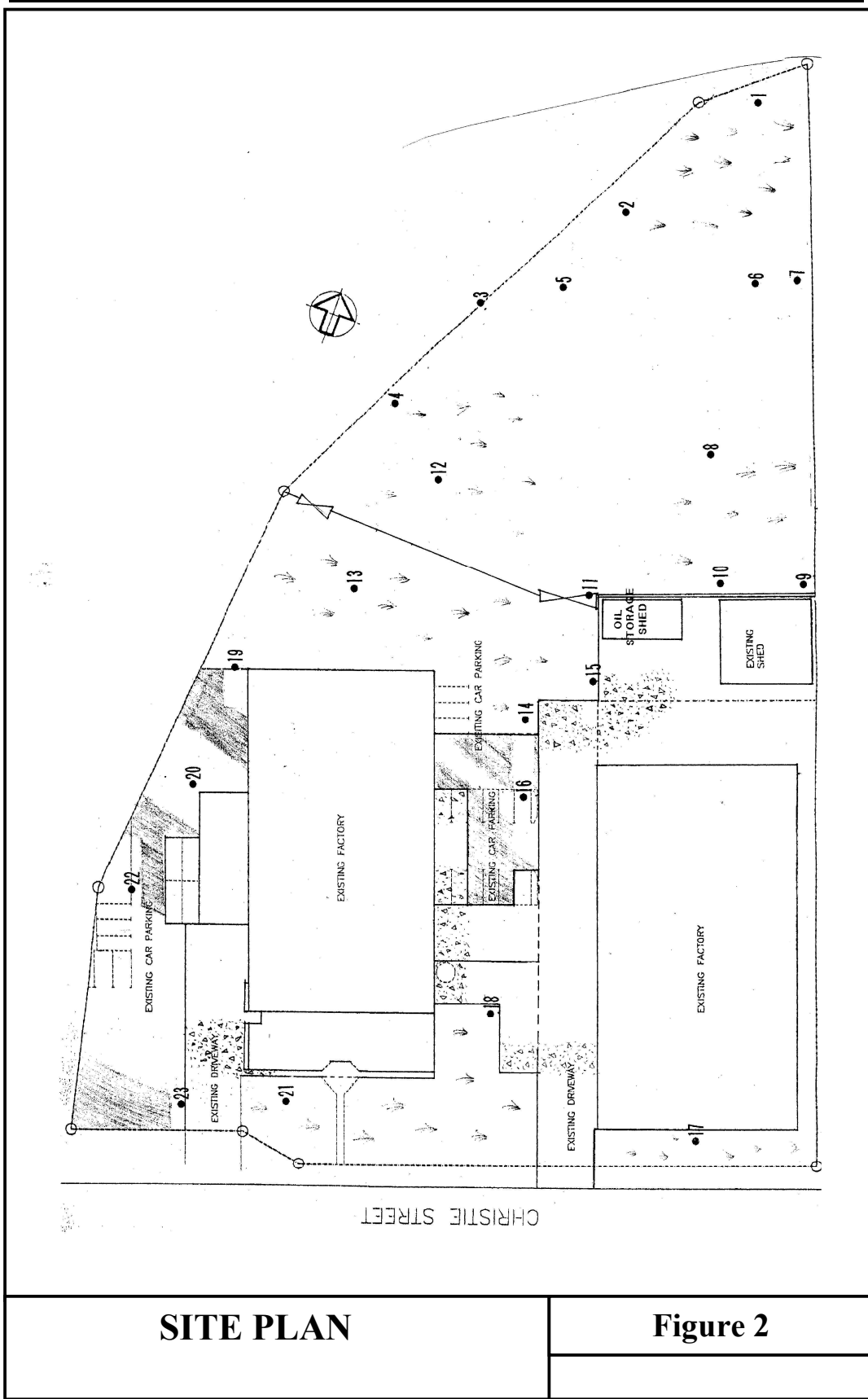
The building referred to as the “old building” was previously owned by the Department of Defence and had been in use since before WWII. It was used for the manufacturing and maintenance of military equipment. This building burnt down in 1990 and has since been re-built, using the floor slab and foundations from the original building in the new building’s structure. The newer building is located on the western side of the site and was built in 1988.

Chemicals and lubricants are stored in two storage areas at the rear of the main buildings. The chemicals are mainly in pellet or solid form and lubricants are in viscous/liquid form.

One aboveground storage tank containing liquid nitrogen is located on the site.

Raw rubber is imported from overseas and at this plant, it is mixed with various quantities of oils, carbon black and minerals to give the final rubber products the required service characteristics and in service performance. Products from this plant tend to be special application components such as pipe sealing rings, rubber rollers and other moulded components.





SITE PLAN

Figure 2

4.0 Site Condition and Surrounding Environment

4.0 SITE CONDITION AND SURROUNDING ENVIRONMENT

The site is approximately 1.2 Ha in size and is generally flat. The main plant area (concrete and asphalt areas) is fenced with wire cyclone fencing approximately 2.4 m in height. The vacant area behind the buildings, which is used for storage, has no boundary fencing.

The entire site has been raised approximately 1.5 m above the flood plain level. This fill consists of sandstone and riverbed rocks. A clay fill material is also present on the site in a limited capacity and is located at the rear of the newer building.

The presence of drums and waste material (wood) is visible on site. There is a distinct odour on site from the rubber making process. Buildings and roads are all in a satisfactory condition.

A disused railway line is located to the northwest and west of the site, a concrete supply company uses the property to the north of the site. The general area has a number of light industrial activities such as metal recycling depot, engineering shops and transport facilities.

South Creek runs parallel to the southwest boundary of the property at a distance of approximately 100 m.

5.0 Geology and Hydrogeology

5.0 GEOLOGY AND HYDROGEOLOGY

Examination of the 1:250,000 geological series sheet for Sydney numbered S1 56-5 shows that the general geology for the site to be shale with some sandstone beds of the Liverpool Sub-Group of the Wianamatta Group.

Test pit logs indicate that the majority of the site is covered with a crushed sandstone and riverbed rock fill, which is 1.0 to 1.5 m in depth in places. Beneath this fill are clays and sandy clays consistent with clays derived from the weathered shales described in the general local geology above. A clay fill also exists at the rear of the property.

The erosion, deposition and re-direction of South Creek may have affected parts of the site.

Groundwater was not encountered in any of the investigation holes drilled. It can be assumed that both hydrology and hydrogeology will be influenced by the proximity of South Creek. While site stormwater is generally piped to the creek through local authority systems, groundwater flow direction is likely to be north to north west towards South Creek.

6.0 Field/Sampling Methodology

6.0 FIELD/SAMPLING METHODOLOGY

Sampling Methods

Sampling methodology followed the EPA NSW Guidelines (1995) entitled “Contaminated Sites – Sampling Design Guidelines”.

The sampling pattern and density was selected as per the above-mentioned guidelines. The site area was approximately 1.2 Ha in size, therefore twenty three (23) sample locations were selected.

The twenty three (23) locations selected for this investigation are located as shown on Figure 1. Nine (9) samples were collected from an area which is currently used as a storage area, a further fourteen (14) samples were collected from areas surrounding the plant and chemical and oil storage areas. Sampling locations numbered 9, 10, 11 and 15 were identified as potential “hot spots” as they all surrounded the oil and chemical storage areas.

The sampling profile at all locations was as follows: 0.0 – 0.2 m depth, 0.2 – 0.5 m depth, and from approximately 1.0 m. The deep samples (i.e. from 1.0 m) were held over for analysis and would have only been used in the event that the upper level samples indicated any significant contamination.

The sampling schedule and analytical suite was as follows:

Sample ID	Location	Depth (m)	Analysis
98860001	1	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860002	1	0.3-0.5	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860003	2	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860004	3	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860005	3	0.2-0.5	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860006	3	0-0.2 Dup.	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860007	4	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860009	4	0.5-0.65	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860010	5	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860011	5	0.3-0.4	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860012	6	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860013	7	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860014	8	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860015	7&8	Comp.0.3-0.5	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860016	9	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn, TPH, BTEX
98860017	9	0.4-0.5	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn, TPH, BTEX
98860018	10	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn, TPH, BTEX
98860019	10	0.4-0.6	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn, TPH, BTEX
98860020	11	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn, TPH, BTEX
98860021	11	0.2-0.4	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn, TPH, BTEX
98860022	12	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860023	13	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860024	12&13	Comp. 0.2-0.5	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860025	14	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860026	14	0.2-0.5	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860027	15	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn, TPH, BTEX
98860028	15	0-0.2 Dup.	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn, TPH, BTEX
98860029	15	0.2-0.5	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn, TPH, BTEX
98860030	16	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860031	17	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860032	18	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860033	16&18	Comp 0.2-0.5	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860034	16&18	Comp. 0.2-0.5Dup.	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860035	18	0-0.2 Dup.	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860036	19	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860037	20	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860038	19&20	Comp. 0.3-0.5	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860039	21	0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860040	21	0.2-0.5	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860041	22	0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860042	22	0.2-0.5	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860043	23	0-0.2	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn
98860044	23	0.2-0.5	As, Cd, Cr(tot), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn

A minimum of 10% of samples were duplicated for QA/QC purposes. These samples were assigned sample ID numbers within the same sequence as other samples from that particular location, but not consecutive to its original.

6.2 Field Methodology

The sampling equipment and device used to collect the soil samples was a Dingo with 100 mm diameter augur attachment, which drilled boreholes to depths of approximately 1.0 m. Soil samples were collected from the depths stated in the sampling schedule and placed into clean solvent washed glass jars with teflon lined lids. The soil profiles were logged at each location where possible.

All materials and equipment used to collect the samples were washed and cleaned with a wire brush after each sample had been collected so as to avoid cross contamination of the samples. Samples were stored in a hardcased cooler at a temperature of approximately 4° C and transported to the laboratories.

The test pit logs are located in Appendix A. Sample chain of custody sheets and field blank results are located in Appendix B.

7.0 Laboratory QA/QC

7.0 LABORATORY QA/QC

The laboratories selected by Earth Air Water Consulting and Monitoring Pty Limited to perform the analyses on the soil and groundwater samples were Sydney Analytical Laboratories (SAL) at Seven Hills, and LabMark Pty Ltd at Asquith. Each laboratory carried out the following analytical tests:

SAL: Soil –As, Cd, Cr (total), Cu, Hg, Mn, Ni, Pb, Sb, Sn, Zn

LabMark: Soil – Total Petroleum Hydrocarbon (TPH) and
Benzene Toluene Ethylbenzene and Xylene (BTEX);

Both laboratories are NATA registered to conduct the required analytical tests and are regularly used by Earth Air Water Consulting and Monitoring Pty Limited. To ensure that quality systems are being followed and the reliability of results is maintained, a periodical quality check is carried out by Earth Air Water.

Recent tests with duplicated samples submitted by EAW and the laboratories' internal QA/QC protocol ensures reliability of results. Approximately 10% of the samples submitted in this study were duplicates and are indicated in the results following.

Laboratory analytical methods, QA/QC checks are noted and form part of the laboratory report included in the result section of the report. Sample holding times and conditions conform to the accepted best practices for soil and water sampling.

8.0 Basis For Assessment Criteria

8.0 BASIS FOR ASSESSMENT CRITERIA

The assessment criteria used in this assessment of analytical results are the investigation levels for Commercial/Industrial sites from the EPA NSW's draft guidelines (1998) entitled "Draft Guidelines for the NSW Site Auditor Scheme". As tin (Sn), antimony (Sb), TPH and BTEX are not covered by this guideline, the following guidelines have also been consulted to assess the results:

- Australian and New Zealand Environment and Conservation Council (ANZECC) Soil Quality Guidelines (1992) – Level B Investigation Guidance Values; and
- Dutch (1983, ANZECC 1990) Guidelines – Level B Indicative value for further investigation and Level C Indicative Value for clean-up.

The assessment criteria investigation levels are as follows:

Table 1: Assessment Criteria - Investigation Levels

Guideline	Substance	Commercial/Industrial
EPA NSW NSW Site Auditor Scheme	Arsenic (total), As	500
	Cadmium, Cd	100
	Chromium (VI), Cr	500
	Copper, Cu	5000
	Lead, Pb	1500
	Manganese, Mn	7500
	Mercury, Hg	75
	Nickel, Ni	3000
	Zinc	35000
ANZECC Level B	Antimony, Sb	20
	Tin, Sn	50
Dutch Level B	Mineral Oils, C17- >	1000
Dutch Level C	Mineral Oils, C17- >	5000

9.0 Results

9.0 RESULTS

Table 2: Summary of Analytical Results - Metals

Sample ID	Location	Depth (m)	Elements										
			As	Cd	Cr(tot)	Cu	Hg	Mn	Ni	Pb	Sb	Sn	Zn
98860001	1	0-0.2	55	1.0	22	130	0.025	380	20	140	1.5	5	2000
98860002	1	0.3-0.5	8	<0.5	10	9	<0.005	180	14	17	<0.5	<1	85
98860003	2	0-0.2	125	3.0	70	720	0.030	1150	36	820	3.0	62	1.5%
98860004	3	0-0.2	180	3.5	94	1200	0.110	2200	44	1490	2.5	100	2.5%
98860005	3	0.2-0.5	175	3.5	96	1220	0.100	2250	40	1520	2.5	110	2.4%
98860006	3	0-0.2 Dup.	46	4.5	34	560	0.085	1060	23	650	2.5	44	1.2%
98860007	4	0-0.2	250	3.0	80	1160	0.025	2500	33	1530	2.5	96	2.3%
98860009	4	0.5-0.65	27	1.0	29	230	0.020	590	28	250	1.0	10	3810
98860010	5	0-0.2	8.5	1.0	32	290	0.015	480	24	310	1.5	48	4300
98860011	5	0.3-0.4	34	2.0	48	590	0.020	680	31	550	1.5	73	7900
98860012	6	0-0.2	32	3.0	140	950	0.020	710	43	1590	3.5	160	1.8%
98860013	7	0-0.2	10	0.5	19	62	0.005	120	14	110	1.0	22	1200
98860014	8	0-0.2	270	3.0	90	1220	0.015	860	60	1260	9.0	105	1.7%
98860015	7&8	Comp.0.3-0.5	9.5	2.5	41	330	0.015	260	24	490	1.5	58	5200
98860016	9	0-0.2	7.5	1.0	39	160	0.010	120	21	320	0.5	26	2260
98860017	9	0.4-0.5	4.5	1.0	26	73	0.010	150	21	110	<0.5	9	850
98860018	10	0-0.2	5.5	0.5	17	79	0.010	180	17	90	<0.5	10	850
98860019	10	0.4-0.6	5.5	<0.5	15	14	0.010	120	18	24	<0.5	<1	75
98860020	11	0-0.2	7	1.0	22	100	0.010	180	17	150	<0.5	19	1390
98860021	11	0.2-0.4	6	0.5	17	74	0.010	220	16	95	<0.5	13	980
98860022	12	0-0.2	19	1.5	37	380	0.035	310	25	400	1.5	58	4260
98860023	13	0-0.2	5.5	<0.5	11	30	0.040	350	21	26	0.5	4	150
98860024	12&13	Comp. 0.2-0.5	32	<0.5	25	96	0.035	240	20	96	1.0	11	660
98860025	14	0-0.2	8	0.5	53	290	0.040	440	75	99	1.0	13	950
98860026	14	0.2-0.5	5.5	<0.5	18	66	0.025	340	23	50	0.5	3	290
98860027	15	0-0.2	7	1.0	56	230	0.070	570	78	200	0.5	15	2700
98860028	15	0-0.2 Dup.	6.5	1.0	56	250	0.070	580	83	200	0.5	18	2640
98860029	15	0.2-0.5	6	0.5	40	210	0.015	370	40	290	1.0	36	2860
98860030	16	0-0.2	5	0.5	57	90	0.025	390	65	130	0.5	14	1190
98860031	17	0-0.2	3.5	<0.5	6.5	13	0.010	160	9	15	<0.5	<1	60
98860032	18	0-0.2	4.5	<0.5	22	54	0.025	280	25	52	<0.5	5	430
98860033	16&18	Comp 0.2-0.5	4	<0.5	18	79	0.045	290	16	59	<0.5	7	290
98860034	16&18	Comp. 0.2-0.5Dup.	4.5	<0.5	16	70	0.045	320	20	70	<0.5	8	280
98860035	18	0-0.2 Dup.	5	0.5	13	80	0.025	230	16	54	<0.5	6	470
98860036	19	0-0.2	3.5	<0.5	23	45	0.020	320	41	35	<0.5	3	280
98860037	20	0-0.2	3	<0.5	7	3.5	0.015	350	4.5	7	<0.5	<1	26
98860038	19&20	Comp. 0.3-0.5	4	<0.5	18	38	0.025	240	24	34	<0.5	4	230

Table 2 (cont.): Summary of Analytical Results – Metals

Sample ID	Location	Depth (m)	Elements										
			As	Cd	Cr(tot)	Cu	Hg	Mn	Ni	Pb	Sb	Sn	Zn
98860039	21	0.2	3.5	<0.5	11	19	0.015	280	11	30	<0.5	2	100
98860040	21	0.2-0.5	3	<0.5	15	12	0.010	130	7.5	16	<0.5	<1	48
98860041	22	0.2	4	<0.5	12	33	0.015	440	25	18	<0.5	2	80
98860042	22	0.2-0.5	4.5	<0.5	10	15	0.015	190	10	18	<0.5	<1	90
98860043	23	0-0.2	5.5	<0.5	20	44	0.025	450	24	24	<0.5	2	100
98860044	23	0.2-0.5	6	<0.5	27	29	0.020	420	20	57	<0.5	2	160
Assessment Criteria			500	100	500	5000	75	7500	3000	1500	20	50	35000

Table 3: Summary of Analytical Results – Organics

Sample ID	Location	Depth (m)	Elements									
			BTEX					TPH				
			Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	C6-C9	C10-C14	C15-C28	C29-C36	Total TPH
98860016	9	0-0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
98860017	9	0.4-0.5	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
98860018	10	0-0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
98860019	10	0.4-0.6	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
98860020	11	0-0.2	nd	nd	nd	nd	nd	nd	nd	700	470	1170
98860021	11	0.2-0.4	nd	nd	nd	nd	nd	nd	nd	110	nd	110
98860027	15	0-0.2	nd	nd	nd	nd	nd	nd	nd	710	530	1240
98860028	15	0-0.2 Dup.	nd	1.5	nd	nd	1.5	nd	nd	730	670	1400
98860029	15	0.2-0.5	nd	nd	nd	nd	nd	nd	nd	670	150	820
Assessment Criteria 1										1000		
Assessment Criteria 2										5000		

10.0 Site Characterisation

10.0 SITE CHARACTERISATION

Generally the site has limited lead and tin contamination in the rear portion where shot blasting activities have taken place. Three lead results at locations 3, 4 and 6 showed contamination at 1520, 1530, and 1590 mg/kg respectively. Guideline levels are set at 1500 mg/kg. These results are between 1.3% and 6% over the guideline value. They represent a small portion of the site and overall have little impact on the site as a whole should the present use continue. As the 0.2 – 0.5 metre depth sample is well within the guidelines, contamination is limited to surface material and could be removed if required.

Tin is no longer included in the “Draft Guidelines for the NSW Site Auditor Scheme”. The assessment criteria selected for this study being the ANZECC Level B guidelines, 50 mg/kg. Samples collected from locations 2, 3, 4, 5, 6, 8 and 12 exceeded the selected guideline. The occurrence of tin may be associated with the shot blasting activities. In reviewing samples 98860004 and 98860006 (the duplicate), tin ranged between 44 and 100 mg/kg. The variation is either related to the degree of mixing or to concentration in a particular component of the sample such as the volume of shot blasting grit in the sample. Significantly the elevated tin levels are from areas where shot blasting fines are on the surface of the sampled areas. With the deletion of tin from the more recent criteria, there appears to be a reduction of concern with tin contamination. The surface material could be removed if required.

Total petroleum hydrocarbon (TPH) contamination was limited to the 0 – 0.2 metre depth interval at locations 11 and 15. These sample locations were located near the lower edge of the oil storage area slab. Contamination levels are only just above the selected guidelines and are localised to a small area where some runoff of rainwater has occurred along the slab edge. These areas will recover naturally if further contamination is eliminated through improved “housekeeping”

in this area. One or two lightly contaminated TPH, areas were noted on site and these appear to be limited to transport and equipment leakage.

It is unlikely that the soil contaminants identified on site will have any impact on the groundwater in this area. TPH contamination will reduce due to natural bacterial activity in the soil.

10.0 Conclusions and Recommendations

11.0 CONCLUSIONS AND RECOMMENDATIONS

The findings of this report are:

- The front portion of the site has only TPH contamination near the edge of the slab in the storage area;
- The rear portion of the site has limited tin and lead contamination, probably associated with shot blasting activities;
- The depth of contamination was limited to the upper 0 – 0.2 m;
- Contamination at the rear portion could be removed but recontamination will occur with continued shot blasting activities. Fencing of this area would secure the site with advantages to the occupants including reducing public access to the shot blasting debris;
- The TPH contaminated area will remediate naturally, but improved housekeeping in this area will reduce re-contamination;
- Other areas did not show contamination and at this stage of investigation cannot identify a need to carry out investigations under the concrete slabs. The fill areas identified confirm the site anecdotal information provided on site by senior staff

The areas underneath the concrete slabs was not investigated.

Appendix A: Test Pit Logs

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP1						
Client: UNITED RUBBER (Aust.) PTY LTD						Co-ords: E						
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW						N						
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L.: m						
						Logged by: KLG						
						Date: 15/7/98 Time:						
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est.	Weathering	
		0.00			Brown Topsoil							
	1	0.20			Sandy Clay - light brown with some sandstone & riverbed fragments to 20 mm.							
		0.40			Sandy Clay - light brown with some gravel/riverbed fragments to 15 mm, fine sand							
	2	0.60			Hole terminated at 0.5 m							Concrete encountered at 0.5 m
		0.80										
		1.00										
		1.20										
		1.40										
		1.60										
		1.80										
		2.00										

Notes and Comments:

1 Sample collected at 0-0.2 m

2 Sample collected at 0.3-0.5 m

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP2						
Client: UNITED RUBBER (Aust.) PTY LTD						Co-ords: E						
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW						N						
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L.: m						
						Logged by: KLG						
						Date: 15/7/98 Time:						
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est.	Weathering	
	1				Sand - Old sandblasting sand, black, riverbed fragment fill							
		0.20			Hole terminated at 0.1 m							Concrete encountered at 0.1 m
		0.40										
		0.60										
		0.80										
		1.00										
		1.20										
		1.40										
		1.60										
		1.80										
		2.00										
<p>Notes and Comments:</p> <p style="margin-left: 20px;">1 Sample collected at 0-0.1 m</p>												

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP3						
Client: UNITED RUBBER (Aust.) PTY LTD					Co-ords: E							
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW					N							
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L: m						
						Logged by: KLG						
						Date: 15/7/98 Time:						
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est.	Weathering	
		1	0.20		Black Sandy Topsoil							
		2	0.40		Silty Clay - dark brown with some sand particles and weathered shale							
		3	0.60		Sandy Clay - grey with a limestone (cement) smell, also some extremely weathered sandstone and shale fragments							
		1.00	1.00		Hole terminated at 1.0 m							
		1.20										
		1.40										
		1.60										
		1.80										
		2.00										

Notes and Comments:

- 1 Sample collected at 0-0.2 m
- 2 Sample collected at 0.2-0.5 m
- 3 Sample collected at 0.5-1.0 m

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP4						
Client: UNITED RUBBER (Aust.) PTY LTD						Co-ords: E						
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW						N						
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L.: m						
						Logged by: KLG						
						Date: 15/7/98 Time:						
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est.	Weathering	
		0.20			Black Sandy Topsoil - very light brown/grey shale fragments, some yellow clay particles							
		0.40			Sandy Clay - Very light brown/grey, some sandstone fragments to 10 mm, few blue metal and shale fragments also							
		0.60			Clay - light brown with sand particles, some quartz particles to 5 mm and weathered sandstone							Quartz particles come from crushed rock fill
		0.80			Hole terminated at 0.65 m							
		1.00										
		1.20										
		1.40										
		1.60										
		1.80										
		2.00										
Notes and Comments: 1 Sample collected at 0-0.2 m 2 Sample collected at 0.2-0.5 m 3 Sample collected at 0.5-0.65 m												

<h1 style="margin: 0;">Geotechnical Log</h1>						TEST PIT No TP5						
Client: UNITED RUBBER (Aust.) PTY LTD						Co-ords: E						
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW						N						
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L.: m						
						Logged by: KLG						
						Date: 15/7/98 Time:						
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est.	Weathering	
		1			Sandy Clay - light brown/grey with some blue metal/quartz (riverbed) fragments to 20mm							
		2			Silty Sand - medium grey with riverbed fill to 15 mm.							
		3			Silty Sand - dark brown/grey, some clay							
		3			Hole terminated at 0.80 m							
		1.00										
		1.20										
		1.40										
		1.60										
		1.80										
		2.00										

Notes and Comments:

- 1 Sample collected at 0-0.2 m
- 2 Sample collected at 0.3-0.4 m
- 3 Sample collected at 0.5-0.8 m

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP6						
Client: UNITED RUBBER (Aust.) PTY LTD						Co-ords: E						
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW						N						
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L.: m						
						Logged by: KLG						
						Date: 15/7/98 Time:						
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est	Weathering	
	1	0.20			Sand - Black, very fine, sandblasting sand							Concrete at 0.3 m
		0.40			Hole terminated at 0.30 m							
		0.60										
		0.80										
		1.00										
		1.20										
		1.40										
		1.60										
		1.80										
		2.00										
Notes and Comments: 1 Sample collected at 0-0.2 m												

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP7						
Client: UNITED RUBBER (Aust.) PTY LTD					Co-ords: E							
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW					N							
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L.: m						
						Logged by: KLG						
						Date: 15/7/98 Time:						
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est	Weathering	
		1 0.20			Sand - Light brown/yellowish, some riverbed fragments size range 2 - 30 mm.							
		2 0.40										
		0.60			Hole terminated at 0.50 m on concrete							
		0.80										
		1.00										
		1.20										
		1.40										
		1.60										
		1.80										
		2.00										
Notes and Comments: 1 Sample collected at 0-0.2 m 2 Sample collected at 0.2-0.5 m												

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP10						
Client: UNITED RUBBER (Aust.) PTY LTD						Co-ords: E						
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW						N						
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L.: m						
						Logged by: KLG						
						Date: 15/7/98 Time:						
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est	Weathering	
		1			Sand -Yellow, crushed rock fragments							
		2			Sandy Clay - light grey, some some crushed shale and riverbed (rock) fill fragments							
		3			Silty Clay - brown, moist with some crushed rock fragments							
		1.00			Hole terminated at 1.0 m							
		1.20										
		1.40										
		1.60										
		1.80										
		2.00										

Notes and Comments:

1 Sample collected at 0-0.2 m
 2 Sample collected at 0.2-0.6 m
 3 Sample collected at 1.0 m

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP11						
Client: UNITED RUBBER (Aust.) PTY LTD						Co-ords: E						
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW						N						
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L.: m						
						Logged by: KLG						
						Date: 15/7/98 Time: 11:02						
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est.	Weathering	
		1			Sand - Yellow with crushed rock fragments							
		2			Silty Sand - light brown with some crushed rock fragments							
		0.60			Hole terminated at 0.4 m							
		0.80										
		1.00										
		1.20										
		1.40										
		1.60										
		1.80										
		2.00										
<p>Notes and Comments:</p> <ul style="list-style-type: none"> 1 Sample collected at 0-0.2 m 2 Sample collected at 0.2-0.6 m 3 Sample collected at 1.0 m 												

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP12						
Client: UNITED RUBBER (Aust.) PTY LTD					Co-ords: E							
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW					N							
Excavation Method: Drill				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L.: m						
					Logged by: WJN		Date: 15/7/98					
					Time: 12:00							
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est.	Weathering	
		1			Fill - Dark brown clay							
		2			Fill - Light brown clay							
		3			Fill - Light brown clay, some gravel to 19 mm							
		1.00			Hole terminated at 1.0 m							
		1.20										
		1.40										
		1.60										
		1.80										
		2.00										

Notes and Comments:

1 Sample collected at 0-0.2 m
 2 Sample collected at 0.2-0.5 m
 3 Sample collected at 1.0 m

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP13						
Client: UNITED RUBBER (Aust.) PTY LTD						Co-ords: E						
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW						N						
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L.: m						
						Logged by: WJN						
						Date: 15/7/98 Time: 12:05						
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est.	Weathering	
		1			Fill - Dark brown clay, with grey and some red mottling							
		2			Fill - Brown clay, occasional gravel							
		3			Hole terminated at 1.0 m							
		1.20										
		1.40										
		1.60										
		1.80										
		2.00										

Notes and Comments:

- 1 Sample collected at 0-0.2 m
- 2 Sample collected at 0.2-0.5 m
- 3 Sample collected at 0.8-0.9 m

Known Fill Area

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP14						
Client: UNITED RUBBER (Aust.) PTY LTD						Co-ords: E						
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW						N						
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L.: m						
						Logged by: KLG						
						Date: 15/7/98 Time: 12:20						
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est.	Weathering	
		1			Fill - Brown clay, aggregate and crushed rock fragments to 25 mm							
		2			Clay - Light brown, crushed sandstone fragments, fairly well graded (2-30 mm)							
		3			Silty Clay - Dark brown, soft, with some sand particles							
		3			Hole terminated at 1.0 m							
		1.20										
		1.40										
		1.60										
		1.80										
		2.00										
Notes and Comments: 1 Sample collected at 0-0.2 m 2 Sample collected at 0.4-0.5 m 3 Sample collected at 0.8-1.0 m												

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP15						
Client: UNITED RUBBER (Aust.) PTY LTD						Co-ords: E						
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW						N						
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L.: m						
						Logged by: KLG						
						Date: 15/7/98 Time: 12:20						
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est.	Weathering	
		1			Fill - Black, sandy soil with crushed rock fragments							
		2			Sandy Clay - Mottled light grey brown, some crushed rock and shale							
		3			Hole terminated at 0.6 m on concrete.							
		1.00										
		1.20										
		1.40										
		1.60										
		1.80										
		2.00										

Notes and Comments:

1 Sample collected at 0-0.2 m and duplicated

2 Sample collected at 0.4-0.5 m

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP16						
Client: UNITED RUBBER (Aust.) PTY LTD						Co-ords: E						
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW						N						
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L.: m						
						Logged by: KLG						
						Date: 15/7/98 Time: 12:45						
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est.	Weathering	
		1			Sandy Clay - Mottled dark brown/black, blue metal and crushed sandstone fragments							
		2			Silty Clay - Brown, some crushed rock fragments							
		3			Silty Clay - Dark brown, soft maybe estuarine							
		3			Hole terminated at 1.0 m							
		1.20										
		1.40										
		1.60										
		1.80										
		2.00										

Notes and Comments:

- 1 Sample collected at 0-0.2 m and duplicated
- 2 Sample collected at 0.2-0.5 m
- 3 Sample collected at 1.0 m

<h1 style="margin: 0;">Geotechnical Log</h1>						TEST PIT No TP17					
Client: UNITED RUBBER (Aust.) PTY LTD					Co-ords: E						
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW					N						
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:					
Equipment Type: Dingo				Dimensions:		R.L: m					
						Logged by: KLG					
						Date: 15/7/98 Time: 12:55					
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock		Remarks
						Moisture	Consistency	Density	Friability	Strength Est.	
	1	0.20			Topsoil - Dark brown/black, loamy						
		0.40			Hole terminated at 0.3 m on concrete						
		0.60									
		0.80									
		1.00									
		1.20									
		1.40									
		1.60									
		1.80									
		2.00									
Notes and Comments: 1 Sample collected at 0-0.2 m											

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP18						
Client: UNITED RUBBER (Aust.) PTY LTD					Co-ords: E							
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW					N							
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L.: m						
						Logged by: KLG						
						Date: 15/7/98 Time: 13:10						
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est.	Weathering	
		0.20	1		Topsoil - Brown, silty topsoil, loamy							
		0.40	2		Silty Clay - Brown, with few crushed blue metal and sandstone fragments							
		0.60	3		Sandstone - Crushed sandstone rocks/fragments							
		0.80			Hole terminated at 0.65 m							
		1.00										
		1.20										
		1.40										
		1.60										
		1.80										
		2.00										

Notes and Comments:

1 Sample collected at 0-0.2 m
 2 Sample collected at 0.2-0.5 m
 3 Sample collected at 0.65 m

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP19						
Client: UNITED RUBBER (Aust.) PTY LTD					Co-ords: E							
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW					N							
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L.: m						
						Logged by: KLG						
						Date: 15/7/98 Time: 13:30						
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est.	Weathering	
		0.20			Fill - Brown, sandy soil with crushed rock (2-20 mm)							
		0.40			Clay - Light brown/red with some sand and crushed rock fragments							
		0.60			Silty Clay - Brown silty clay							
		0.80										
		1.00										
		1.20			Hole terminated at 1.0 m							
		1.40										
		1.60										
		1.80										
		2.00										

Notes and Comments:

- 1 Sample collected at 0-0.2 m
- 2 Sample collected at 0.2-0.5 m
- 3 Sample collected at 1.0 m

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP20					
Client: UNITED RUBBER (Aust.) PTY LTD						Co-ords: E					
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW						N					
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:					
Equipment Type: Dingo				Dimensions:		R.L.: m					
						Logged by: WJN					
						Date: 15/7/98 Time: 13:45					
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil		Rock			Remarks
						Moisture	Consistency Density	Friability	Strength Est	Weathering	
		1			Fill - Brownish grey sandstone Crushed sandstone fill						
		2			Fill - As above becoming brown at 0.5 m and with clay particles						
		3			Silty Clay - Soft grey, with wood particles and remnant roots (old level)						
		1.00			Hole terminated at 1.0 m						
		1.20									
		1.40									
		1.60									
		1.80									
		2.00									

Notes and Comments:

1 Sample collected at 0-0.2 m
 2 Sample collected at 0.2-0.5 m
 3 Sample collected at 1.0 m

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP21						
Client: UNITED RUBBER (Aust.) PTY LTD						Co-ords: E						
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW						N						
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L.: m						
						Logged by: KLG						
						Date: 15/7/98 Time: 13:55						
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est	Weathering	
		1			Sandy Clay - Brown, some crushed sandstone fragments							
		2			Clay - Light brown/reddish with some brown silty particles							
		3			Silty Clay - Brown							
		1.00			Hole terminated at 1.0 m							
		1.20										
		1.40										
		1.60										
		1.80										
		2.00										

Notes and Comments:

1 Sample collected at 0-0.2 m
 2 Sample collected at 0.2-0.5 m
 3 Sample collected at 1.0 m

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP22						
Client: UNITED RUBBER (Aust.) PTY LTD						Co-ords: E						
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW						N						
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L.: m						
						Logged by: KLG						
						Date: 15/7/98 Time: 14:12						
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est	Weathering	
		1	0.20		Fill - Sandy soil with some crushed sandstone fragments							
		2	0.40		Sandy Clay - Light brown, with few sandstone fragments							
		3	0.60		Clay - Red/brown, with sand particles							
		1.00	1.00		Hole terminated at 1.0 m							
		1.20										
		1.40										
		1.60										
		1.80										
		2.00										

Notes and Comments:

- 1 Sample collected at 0-0.2 m
- 2 Sample collected at 0.2-0.5 m
- 3 Sample collected at 1.0 m

<h2 style="margin: 0;">Geotechnical Log</h2>						TEST PIT No TP23						
Client: UNITED RUBBER (Aust.) PTY LTD					Co-ords: E							
Project: Contaminated Site Assessment - 81-85 Christie St, St Marys NSW					N							
Excavation Method: Drill - Auger				Date Drilled: 15/7/98		Bearing: Dip:						
Equipment Type: Dingo				Dimensions:		R.L: m						
						Logged by: KLG						
						Date: 15/7/98 Time: 14:24						
Water	Samples/Tests	Depth (m)	Graphic Log	Soil Classification	Material Description	Soil			Rock			Remarks
						Moisture	Consistency	Density	Friability	Strength Est.	Weathering	
	1	0.20			Fill - Light grey sandy shale with crushed rock (well graded)							
	2	0.40			Silty Clay - Grey/brownish with some crushed shale fragments							
	3	0.60			Silty Clay - Light brown with few shale particles							
		1.00			Hole terminated at 1.0 m							
		1.20										
		1.40										
		1.60										
		1.80										
		2.00										

Notes and Comments:

- 1 Sample collected at 0-0.2 m
- 2 Sample collected at 0.2-0.5 m
- 3 Sample collected at 1.0 m

Appendix B: Laboratory Reports

**SYDNEY
ANALYTICAL
LABORATORIES**

Page 1 of 8

Office:
PO BOX 48
ERMINGTON NSW 2115

Laboratory:
1/4 ABBOTT ROAD
SEVEN HILLS NSW 2147
Telephone: (02) 9838 8903
Fax: (02) 9838 8919
A.C.N. 003 614 695
NATA Reg. 1884

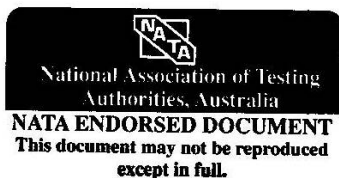
ANALYTICAL REPORT for:

EARTH AIR WATER CONSULTING & MONITORING

PO BOX 233
EMU PLAINS 2750

ATTN: WARREN NEWELL

JOB NO: SAL6853
CLIENT ORDER: 86
DATE RECEIVED: 21/07/98
DATE COMPLETED: 27/07/98
TYPE OF SAMPLES: SOILS
NO OF SAMPLES: 43



.....
Issued on 29/07/98
Lance Smith
(Chief Chemist)

**SYDNEY
ANALYTICAL
LABORATORIES**

ANALYTICAL REPORT

JOB NO: SAL6853
CLIENT ORDER: 86

SAMPLES	Cu mg/kg	Pb mg/kg	Zn mg/kg	Cd mg/kg	Cr mg/kg	Ni mg/kg
1 98860001	130	140	2000	1.0	22	20
2 98860002	9.0	17	85	<0.5	10	14
3 98860003	720	820	1.5%	3.0	70	36
4 98860004	1200	1490	2.5%	3.5	94	44
5 98860005	1220	1520	2.4%	3.5	96	40
6 98860006	560	650	1.2%	4.5	54	23
7 98860007	1160	1530	2.3%	3.0	80	33
8 98860009	230	250	3810	1.0	29	28
9 98860010	290	310	4300	1.0	32	24
10 98860011	590	550	7900	2.0	48	31
11 98860012	950	1590	1.8%	3.0	140	43
12 98860013	62	110	1200	0.5	19	14
13 98860014	1220	1260	1.7%	3.0	90	60
14 98860015	330	490	5200	2.5	41	24
15 98860016	160	320	2260	1.0	39	21
16 98860017	73	110	850	1.0	26	21
17 98860018	79	90	850	0.5	17	17
18 98860019	14	24	75	<0.5	15	18
19 98860020	100	150	1390	1.0	22	17
20 98860021	74	95	980	0.5	17	16
21 98860022	380	400	4260	1.5	37	25
22 98860023	30	26	150	<0.5	11	21
23 98860024	96	96	660	<0.5	25	20
24 98860025	290	99	950	0.5	53	75
25 98860026	66	50	290	<0.5	18	23
26 98860027	230	200	2700	1.0	56	78
27 98860028	250	200	2640	1.0	56	83
28 98860029	210	290	2860	0.5	40	40
29 98860030	90	130	1190	0.5	57	65
30 98860031	13	15	60	<0.5	6.5	9.0
31 98860032	54	52	430	<0.5	22	25
32 98860033	79	59	290	<0.5	18	16
33 98860034	70	70	280	<0.5	16	20
34 98860035	80	54	470	0.5	13	16
35 98860036	45	35	280	<0.5	23	41
36 98860037	3.5	7.0	26	<0.5	7.0	4.5
37 98860038	38	34	230	<0.5	18	24
38 98860039	19	30	100	<0.5	11	11
39 98860040	12	16	48	<0.5	15	7.5
40 98860041	33	18	80	<0.5	12	25
MDL	0.5	0.5	0.5	0.5	0.5	0.5
Method Code	M1	M1	M1	M1	M1	M1
Preparation	P3	P3	P3	P3	P3	P3

**SYDNEY
ANALYTICAL
LABORATORIES**

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ANALYTICAL REPORT

JOB NO: SAL6853
CLIENT ORDER: 86

SAMPLES	Cu mg/kg	Pb mg/kg	Zn mg/kg	Cd mg/kg	Cr mg/kg	Ni mg/kg
41 98860042	15	18	90	<0.5	10	10
42 98860043	44	24	100	<0.5	20	24
43 98860044	29	57	160	<0.5	27	20
DUPLICATES:						
20 98860021	78	100	1000	0.5	15	15
40 98860041	31	17	75	<0.5	10	28
BCSS-1/1	19	22	110	<0.5	83	51
BCSS-1/2	17	23	115	<0.5	90	54
BLANK/1	<0.5	<0.5	1.5	<0.5	<0.5	<0.5
BLANK/2	<0.5	<0.5	1.5	<0.5	<0.5	<0.5
MDL	0.5	0.5	0.5	0.5	0.5	0.5
Method Code	M1	M1	M1	M1	M1	M1
Preparation	P3	P3	P3	P3	P3	P3

**SYDNEY
ANALYTICAL
LABORATORIES**

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ANALYTICAL REPORT

JOB NO: SAL6853
CLIENT ORDER: 86

SAMPLES	Mn mg/kg	Sn mg/kg	Sb mg/kg	As mg/kg	Hg mg/kg
1 98860001	380	5	1.5	55	0.025
2 98860002	180	<1	<0.5	8.0	<0.005
3 98860003	1150	62	3.0	125	0.030
4 98860004	2200	100	2.5	180	0.11
5 98860005	2250	110	2.5	175	0.10
6 98860006	1060	44	2.5	46	0.085
7 98860007	2500	96	2.5	250	0.025
8 98860009	590	10	1.0	27	0.020
9 98860010	480	48	1.5	8.5	0.015
10 98860011	680	73	1.5	34	0.020
11 98860012	710	160	3.5	32	0.020
12 98860013	120	22	1.0	10	0.005
13 98860014	860	105	9.0	270	0.015
14 98860015	260	58	1.5	9.5	0.015
15 98860016	120	26	0.5	7.5	0.010
16 98860017	150	9	<0.5	4.5	0.010
17 98860018	180	10	<0.5	5.5	0.010
18 98860019	120	<1	<0.5	5.5	0.010
19 98860020	180	19	<0.5	7.0	0.010
20 98860021	220	13	<0.5	6.0	0.010
21 98860022	310	58	1.5	19	0.035
22 98860023	350	4	0.5	5.5	0.040
23 98860024	240	11	1.0	32	0.035
24 98860025	440	13	1.0	8.0	0.040
25 98860026	340	3	0.5	5.5	0.025
26 98860027	570	15	0.5	7.0	0.070
27 98860028	580	18	0.5	6.5	0.070
28 98860029	370	36	1.0	6.0	0.015
29 98860030	390	14	0.5	5.0	0.025
30 98860031	160	<1	<0.5	3.5	0.010
31 98860032	280	5	<0.5	4.5	0.025
32 98860033	290	7	<0.5	4.0	0.045
33 98860034	320	8	<0.5	4.5	0.045
34 98860035	230	6	<0.5	5.0	0.025
35 98860036	320	3	<0.5	3.5	0.020
36 98860037	350	<1	<0.5	3.0	0.015
37 98860038	240	4	<0.5	4.0	0.025
38 98860039	280	2	<0.5	3.5	0.015
39 98860040	130	<1	<0.5	3.0	0.010
40 98860041	440	2	<0.5	4.0	0.015
MDL	0.5	1	0.5	0.5	0.005
Method Code	M1	M4	M7	M7	M3
Preparation	P3	P3	P3	P3	P1

**SYDNEY
ANALYTICAL
LABORATORIES**

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ANALYTICAL REPORT

JOB NO: SAL6853
CLIENT ORDER: 86

SAMPLES	Mn mg/kg	Sn mg/kg	Sb mg/kg	As mg/kg	Hg mg/kg
41 98860042	190	<1	<0.5	4.5	0.015
42 98860043	450	2	<0.5	5.5	0.025
43 98860044	420	2	<0.5	6.0	0.020
DUPLICATES:					
20 98860021	220	11	<0.5	6.5	0.010
40 98860041	425	1	<0.5	4.5	0.020
BCSS-1/1	200	2	0.5	10	0.12
BCSS-1/2	220	1	0.5	13	0.13
BLANK/1	<0.5	<1	<0.5	<0.5	<0.005
BLANK/2	<0.5	<1	<0.5	<0.5	<0.005
MDL	0.5	1	0.5	0.5	0.005
Method Code	M1	M4	M7	M7	M3
Preparation	P3	P3	P3	P3	P1

RESULTS ON DRY BASIS

**SYDNEY
ANALYTICAL
LABORATORIES**

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LABORATORY DUPLICATE REPORT

JOB NO: SAL6853
CLIENT ORDER: 86

Sample Number	Analyte	Units	MDL	Sample Result	Duplicate Result	%RPD
98860021	Copper	mg/kg	0.5	74	78	5
98860041	Copper	mg/kg	0.5	33	31	6
98860021	Lead	mg/kg	0.5	95	100	5
98860041	Lead	mg/kg	0.5	18	17	6
98860021	Zinc	mg/kg	0.5	980	1000	2
98860041	Zinc	mg/kg	0.5	80	75	6
98860021	Cadmium	mg/kg	0.5	0.5	0.5	0
98860041	Cadmium	mg/kg	0.5	<0.5	<0.5	0
98860021	Chromium	mg/kg	0.5	17	15	13
98860041	Chromium	mg/kg	0.5	12	10	18
98860021	Nickel	mg/kg	0.5	16	15	6
98860041	Nickel	mg/kg	0.5	25	28	11
98860021	Manganese	mg/kg	0.5	220	220	0
98860041	Manganese	mg/kg	0.5	440	425	3
98860021	Tin	mg/kg	1	13	11	17
98860041	Tin	mg/kg	1	2	1	50
98860021	Antimony	mg/kg	0.5	<0.5	<0.5	0
98860041	Antimony	mg/kg	0.5	<0.5	<0.5	0
98860021	Arsenic	mg/kg	0.5	6.0	6.5	8
98860041	Arsenic	mg/kg	0.5	4.0	4.5	12
98860021	Mercury	mg/kg	0.005	0.010	0.010	0
98860041	Mercury	mg/kg	0.005	0.015	0.020	28

Acceptance criteria:

RPD <50% for low level (<20xMDL)
RPD <30% for medium level (20-100xMDL)
RPD <15% for high level (>100xMDL)
No limit applies at <2xMDL

MDL = Method Detection Limit

All results are within the acceptance criteria

**SYDNEY
ANALYTICAL
LABORATORIES**

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CERTIFIED REFERENCE MATERIAL

JOB NO: SAL6853
CLIENT ORDER: 86

CRM Number	Analyte	Units	CRM Result	Certified Value	%Recovery	Acceptance Criteria %
BCSS-1/1	Copper	mg/kg	19	18.5	103	90-115
BCSS-1/2	Copper	mg/kg	17	18.5	92	90-115
BCSS-1/1	Lead	mg/kg	22	22.7	97	90-110
BCSS-1/2	Lead	mg/kg	23	22.7	101	90-110
BCSS-1/1	Zinc	mg/kg	110	119	92	90-110
BCSS-1/2	Zinc	mg/kg	115	119	97	90-110
BCSS-1/1	Cadmium	mg/kg	<0.5	0.25	-	-
BCSS-1/2	Cadmium	mg/kg	<0.5	0.25	-	-
BCSS-1/1	Chromium	mg/kg	83	123	67	60-80
BCSS-1/2	Chromium	mg/kg	90	123	73	60-80
BCSS-1/1	Nickel	mg/kg	51	55.3	92	90-110
BCSS-1/2	Nickel	mg/kg	54	55.3	98	90-110
BCSS-1/1	Manganese	mg/kg	200	229	87	85-100
BCSS-1/2	Manganese	mg/kg	220	229	96	85-100
BCSS-1/1	Tin	mg/kg	2	1.9	105	50-110
BCSS-1/2	Tin	mg/kg	1	1.9	53	50-110
BCSS-1/1	Antimony	mg/kg	0.5	0.59	85	80-120
BCSS-1/2	Antimony	mg/kg	0.5	0.59	85	80-120
BCSS-1/1	Arsenic	mg/kg	10	11.1	90	90-120
BCSS-1/2	Arsenic	mg/kg	13	11.1	117	90-120
BCSS-1/1	Mercury	mg/kg	0.12	0.129	93	85-110
BCSS-1/2	Mercury	mg/kg	0.13	0.129	101	85-110

All results are within the acceptance criteria

Note: The hot acid digest does not always determine 'total' metals. Refractory elements such as Iron and Aluminium and some base metals (particularly Chromium) show lower recoveries depending on their form within the sample matrix. Silicates and oxides are normally less soluble than elements in metallic or salt forms. The acceptance criteria for this reference material is based on histories of analyte recoveries using the nitric acid based digestion procedures.

**SYDNEY
ANALYTICAL
LABORATORIES**

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ANALYTICAL REPORT

**JOB NO: SAL6853
CLIENT ORDER: 86**

METHODS OF PREPARATION AND ANALYSIS

The tests contained in this report have been carried out on the samples as received by the laboratory.

- P3 Sample dried, jaw crushed and sieved at 2mm
- P1 Analysis performed on sample as received
- M1 Base Metal - Digestion Method 3050 (HNO₃/H₂O₂)
Element determined by APHA 3111B (Flame AAS)
- M4 Refractory Element - Digestion Method 3050 (HNO₃/H₂O₂)
Element determined by APHA 3111D (Flame AAS)
- M7 Hydride Element - Digestion Method 7061 (HNO₃/H₂SO₄)
Element determined by APHA 3114B (Hydride Generation AAS)
- M3 Mercury - Digestion Method 7471 (HNO₃/HCl)
Determined by APHA 3112B (Cold Vapour AAS)

A preliminary report was faxed on 27/07/98



Certificate Of Analysis

This report replaces any preliminary reports previously issued.

LabMark Report No: 980205

Page: 1 of 2

Client name : Earth Air Water Consulting & Monitoring
Project Manager : Warren Newell
Client Reference : Job No. 86
Chain of Custody : na
Sample Matrix : soil

Date Received: 17/07/98
Date Extracted: 20/07/98
Date Reported: 24/07/98
Due Date: 28/07/98


BTEX	Method E002	9886 0016	9886 0017	9886 0018	9886 0019	9886 0020	9886 0021	9886 0027
Lab No.	--	1826	1827	1828	1829	1830	1831	1832
Purge + Trap	EQL							
Benzene	0.2	nd	nd	nd	nd	nd	nd	nd
Toluene	0.5	nd	nd	nd	nd	nd	nd	nd
Ethylbenzene	0.5	nd	nd	nd	nd	nd	nd	nd
Total Xylenes	1	nd	nd	nd	nd	nd	nd	nd
Total BTEX	--	--	--	--	--	--	--	--
Surr Recovery	(%)	80%	78%	87%	85%	85%	87%	84%

VTPH & TPH (C6-C36)	Method E003&E006	9886 0016	9886 0017	9886 0018	9886 0019	9886 0020	9886 0021	9886 0027
Lab No.	--	1826	1827	1828	1829	1830	1831	1832
Purge + Trap C6-C9	EQL 10	nd	nd	nd	nd	nd	nd	nd
C10-C14	50	nd	nd	nd	nd	nd	nd	nd
C15-C28	100	nd	nd	nd	nd	700	110	710
C29-C36	100	nd	nd	nd	nd	470	nd	530
Total TPH	--	--	--	--	--	1170	110	1240

Comments: Samples analysed as received.

EQL: Estimated Quantitation Limit
nd: Less than EQL
--: Not applicable
snr: Samples not received

Results: mg/kg (ppm) dry weight unless specified
dup: Duplicate Analysis Result
ms: Matrix Spike % Recovery
lcs: Laboratory Control Sample


Ivan Povolny B.Sc. M.R.A.C.I.
Authorising Chemist



This laboratory is accredited by the National Association of Testing Authorities, Australia. The tests reported herein have been performed in accordance with its terms of accreditation. This document shall not be reproduced except in full.

No. 13542

LabMark PTY LIMITED ACN 079 798 397 ■ Unit 12, 18 Leighton Place, Asquith NSW ■ PO Box 641, Hornsby NSW 1630
Telephone: (02) 9476 6533 ■ Fax: (02) 9476 8219 ■ e-mail: labmark@ozemail.com.au

Form QS0012, Rev. 3 : Date Issued 26/03/1998



Certificate of Analysis

This report replaces any preliminary reports previously issued.

LabMark Report No: **980205**

Page: 2 of 2

Client name : Earth Air Water Consulting & Monitoring
 Project Manager : Warren Newell
 Client Reference : Job No. 86
 Chain of Custody : na
 Sample Matrix : soil

Date Received: 17/07/98
 Date Extracted: 20/07/98
 Date Reported: 23/07/98
 Due Date: 28/07/98


BTEX	Method E002	9886 0028	9886 0029	9886 0016	9886 0016	--		
Lab No.	--	1870	1871	1826dup	1826ms	mb		
Purge + Trap	EQL							
Benzene	0.2	nd	nd	nd	105%	nd		
Toluene	0.5	1.5	nd	nd	117%	nd		
Ethylbenzene	0.5	nd	nd	nd	110%	nd		
Total Xylenes	1	nd	nd	nd	104%	nd		
Total BTEX	--	1.5	--	--	--	--		
Surr Recovery	(%)	81%	77%	74%	90%	89%		

VTPH & TPH (C6-C36)	Method E003&E006	9886 0028	9886 0029	9886 0016	9886 0016	--		
Lab No.	--	1870	1871	1826dup	1826ms	mb		
Purge + Trap	EQL							
C6-C9	10	nd	nd	nd	102%	nd		
C10-C14	50	nd	nd	nd	96%	nd		
C15-C28	100	730	670	nd	--	nd		
C29-C36	100	670	150	nd	--	nd		
Total TPH	--	1400	820	--	--	--		

Comments: Samples analysed as received.

EQL: Estimated Quantitation Limit
 nd: Less than EQL
 -: Not applicable
 snr: Samples not received
 mb: Matrix Blank

Results: mg/kg (ppm) dry weight unless specified
 dup: Duplicate Analysis Result
 ms: Matrix Spike % Recovery
 lcs: Laboratory Control Sample


 Ivan Povolny B.Sc. M.R.A.C.I.
 Authorising Chemist



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Form Q50012, Rev.3 - Date Issued 26/03/1998