C. M. Jewell & Associates Pty Ltd
Water and Environmental Management
A.C.N. 056 283 295

SITE AUDIT STATEMENT

Schedule 1, Form 2 (Contaminated Land Management Regulation 1998)

Site Auditor (accredited under Contaminated Land Management Act 1997):

Name: Christopher M. Jewell *Phone:* 02) 4759 3251
Company: C. M. Jewell & Associates Pty Ltd *Fax:* 02) 4759 3257
Address: 1/13 Kalinda Road, *Accred. No:* 9810
Bullaburra NSW 2784

Site Audit Statement No.: SA183

Site Details:

Address: 100-120 King Street
RANDWICK NSW *Postcode*: 2031
Lot and DP Number: Lot 202 in DP879576
Local Government Area: Randwick City Council

Site audit requested by:

Name: Mr David Freeman
Company: Sir Moses Montefiore Jewish Home
Address: 120 High Street
HUNTERS HILL NSW *Postcode:* 2110
Phone: 02 9879 2715 *Fax:* 02 9871 2700
Name of contact person (if different from above):

Consultancy who conducted the site investigations and/or remediation:

URS Australia Pty Ltd

Titles of reports reviewed:
Supplementary Sampling and Analysis Plan – Lot 202, King Street, Randwick. Letter/Report dated 12 June 2002, prepared by URS Australia Pty Ltd.

Data Assessment Report - Lot 202, King St, Randwick. Report No. 51072-001-R001G dated 20 September 2002, prepared by URS Australia Pty Ltd.

Other information reviewed:
Regional topographical and geological mapping.

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Site Audit Statement No.: SA183

Summary Site Audit Report

Title: Site Audit – 110-120 King Street, Randwick (Sir Moses Montefiore Jewish Home)

Date: 30 September 2002

I have completed a site audit (as defined in the Contaminated Land Management Act 1997) and reviewed the reports and information referred to above with due regard to relevant laws and guidelines. I certify that the site (tick **all** appropriate boxes):

~~**(a) is suitable for the following use(s):**~~

☐ ~~residential, including substantial vegetable garden and poultry;~~

☐ ~~residential, including substantial vegetable garden excluding poultry;~~

☐ ~~residential with accessible soil, including garden (minimal home grown produce contributing less than 10% fruit and vegetable intake) excluding poultry;~~

☐ ~~residential with minimal opportunity for soil access, including units;~~

☐ ~~daycare centre, preschool, primary school;~~

☐ ~~secondary school;~~

☐ ~~park, recreational open space, playing field;~~

☐ ~~commercial/industrial use;~~

☐ ~~other (please specify):~~

(b) is not suitable for any beneficial use due to risk of harm from contamination:

☑ (comments):

This audit was carried out for the purpose of determining:

(1) the nature and extend of any contamination of the land,

(2) the nature and extent of the investigation or remediation,

(3) what investigation or remediation remains necessary before the land is suitable for residential use with minimal opportunity for soil access.

It has been determined that parts of the site were potentially contaminated by:

- heavy metals,
- total petroleum hydrocarbons (TPH),
- benzene, toluene, ethyl benzene and xylenes (BTEX),
- polycyclic aromatic hydrocarbons (PAH), and
- asbestos-containing materials (ACM)

as a result of its previous use as a bus depot and subsequent demolition work.

Remediation and validation of the site has previously been carried out, but it has been determined that this work was not performed and documented in a manner that meets current standards.

Investigations carried out by URS in 2002 were adequate and appropriate. These investigations have established that some residual contamination (or recontamination) by petroleum hydrocarbons is present in part of the site and that both soil and groundwater are impacted, to the extent that remediation is required before the site will be suitable for residential use.

It is considered that the remedial strategy proposed by URS is appropriate for the site. It is therefore recommended that:

(1) A formal remedial action plan (RAP) be prepared.

(2) The RAP should include procedures for:

- Excavation of hydrocarbon-contaminated soil
- On-site treatment by land farming
- Validation sampling and analysis
- Groundwater monitoring
- Contingency groundwater remediation and validation.

3) The RAP be reviewed and approved by an Auditor. That approval should be given in letter form.

4) A validation report be prepared.

5) A further site audit be carried out and a new site audit statement issued.

Subject to successful implementation of these recommendations, it is considered that the site can be rendered suitable for residential use with minimal opportunity for soil access.

This Site Audit Statement should be used in conjunction with the attached Summary Site Audit Report which contains important supporting information.

I am accredited by the NSW Environment Protection Authority under the *Contaminated Land Management Act 1997* as a Site Auditor

Accreditation Number: 9810

C. M. Jewell & Associates Pty Ltd
Water and Environmental Management
A.C.N. 056 283 295

Site Audit Statement No.: SA183

I certify that:

(a) I have personally examined and am familiar with the information contained in this statement, including the reports and information referred to in this statement, and

(b) this statement is, to the best of my knowledge, true, accurate and complete, and

(c) on the basis of my inquiries made to those individuals immediately responsible for making the reports, and obtaining the information referred to in this statement, those reports and that information are, to the best of my knowledge, true, accurate and complete.

I am aware that there are penalties for wilfully submitting false, inaccurate or incomplete information.

Signed: _____ Date: 30 September 2002

Report No. J0807.3

SITE AUDIT
110-120 KING STREET, RANDWICK
(SIR MOSES MONTEFIORE JEWISH HOME)

for

SIR MOSES MONTEFIORE JEWISH HOME

September 2002

Controlled Copy No. 4

C.M. Jewell & Associates Pty Ltd

A.C.N. 056 283 295 A.B.N. 54 056 283 295

Water and Environmental Management

1/13 Kalinda Road, Bullaburra, NSW 2784, Australia
P.O. Box 10, Wentworth Falls, NSW 2782
Phone: (02) 4759 3251 Fax: (02) 4759 3257
Email: postie@cm-jewell.com.au

My Ref: J0807.3 CMJ:mp
30 September 2002

Sir Moses Montefiore Jewish Home
120 High Street
HUNTERS HILL NSW 2110

Attention: Mr David Freeman

Dear Mr Freeman,

RE: Site Audit - 100-120 King Street, Randwick (Sir Moses Montefiore Jewish Home)

As requested, I have carried out a Statutory Site Audit of the above land; my Site Audit Report is attached to this letter.

Further remediation and validation of the site are required, as set out in the attached report and in the conditions on the Site Audit Statement.

As required by the Contaminated Land Management Act 1997, I have sent copies of the Site Audit Statement to Randwick City Council and the EPA. As a courtesy, copies of the report have also been provided to Randwick City Council and URS Australia Limited.

If you have any questions please do not hesitate to contact me on (02) 4759 3251.

For and on behalf of
C. M. JEWELL & ASSOCIATES PTY LTD

CHRIS JEWELL

Distribution
Sir Moses Montefiore Jewish Home (Controlled Copy No. 1)
URS Australia Limited (Controlled Copy No. 2)
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File (Original)

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Data Assessment Report - Lot 202, King St, Randwick. Report No. 51072-001-R001G dated 20 September 2002, prepared by URS Australia Pty Ltd.

LIST OF ABBREVIATIONS

Measures

µg/L	micrograms per litre
km	kilometre
L	litre
m	metre
m^2	square metre
mg/kg	milligrams per kilogram
mm	millimetre

General

AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AST	above-ground storage tank
CLM Act	Contaminated Land Management Act
CMJA	C. M. Jewell & Associates Pty Ltd
DA	development application
DLWC	Department of Land and Water Conservation
DP	deposited plan
DQO	data quality objectives
EPA	Environment Protection Authority
ESA	Environmental Site Assessment
HDPE	high-density polyethylene
NATA	National Association of Testing Authorities
NEPM	National Environment Protection Measure
PID	photoionisation detector
PQL	practical quantitation limit
PSH	phase-separated hydrocarbons
QA	quality assurance
QC	quality control
RAP	remediation action plan
RL	relative level
RPD	relative percentage difference
TCLP	Toxicity Characteristic Leaching Procedure
UCL	upper confidence limit
UST	underground storage tank

Analytes - Organic

BaP	benzo(a)pyrene
BTEX	benzene, toluene, ethyl benzene, xylene
OCP	organochlorine pesticides
OPP	organophosphorus pesticides
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
SVOC	semivolatile organic compounds
TPH	total petroleum hydrocarbons
VHC	volatile halogenated compounds
VOC	volatile organic compounds

Analytes - Inorganic

As	arsenic
Cd	cadmium
Cr	chromium
Cu	copper
Fe	iron
Hg	mercury
Mn	manganese
Ni	nickel
Pb	lead
Zn	zinc

1.0 INTRODUCTION

1.1 Background

This Site Audit Report relates to the land located at 100-120 King Street, Randwick, in New South Wales.

Specifically, the Site Audit relates to the validation work completed by URS Australia Limited (URS) on behalf of Sir Moses Montefiore Jewish Home (and as described in URS's report dated 20 September 2002).

The Site Audit which this report describes was requested by Mr David Freeman of Sir Moses Montefiore Jewish Home on 27 May 2002. The Audit was required by Randwick City Council to assist in fulfilling Council's obligations under Clause 7 of the State Environmental Planning Policy No. 55 (SEPP55) prior to considering a development application, submitted to Council on 3 June 2002 in respect of the site. The Site Audit is thus a Statutory Site Audit under the provisions of Part 4 of the Contaminated Land Management Act 1997.

The audit was conducted for the purpose of determining:

(i) the nature and extent of any contamination of the land,

(ii) the nature and extent of the investigation or remediation,

(iii) what investigation or remediation remains necessary before the land is suitable for any specified use or range of uses.

The Site Audit Report has been prepared in accordance with the guidelines issued by the NSW Environment Protection Authority (EPA) (*Guidelines for the NSW Site Auditor Scheme*, 1998). It has been prepared by Christopher Jewell, who is a Site Auditor accredited under the NSW Contaminated Land Management Act 1997.

1.2 Involvement of Auditor

The Auditor became involved in this project at the start of URS's current involvement, and has had appropriate input into the scope and planning of that phase of assessment. He had no involvement in previous work.

The Auditor has visited the site on two occasions. A compliance checklist has been completed and is held on file.

1.3 Scope and Structure of Review Report

Section 2 of this report sets out basic identification and location information concerning the site, and briefly describes the site's topography, geology and hydrogeological setting. An indication of the site's history and an outline of the proposed future use and the associated assessment criteria are also provided.

Section 3 sets out a summary of those data from previous environmental assessments that have been assessed as useable in the current assessment.

Section 4 provides a summary of the supplementary investigations undertaken by URS. The completed proposed remedial works are also discussed within this section.

Section 5 of this report presents an audit of the completeness and adequacy of the environmental assessments which have been completed. The audit was carried out against the criteria established by the NSW EPA publication, *Guidelines for the NSW Site Auditor Scheme* (1998), but also incorporates the reviewer's own judgement; reference has been made to other guideline publications issued or endorsed by the NSW EPA, including *Guidelines for Consultants Reporting on Contaminated Sites* (1997), *Guidelines for Assessing Service Station Sites* (1994), *Sampling Design Guidelines* (1995) and the National Environmental Protection (Assessment of Site Contamination) Measure (1999), as appropriate.

Section 6 of this report sets out the Auditor's conclusions with regard to the current condition of the land at the site and its suitability for the intended use.

Throughout this report, extensive use has been made of the site assessment report prepared by URS; sections of those reports have been adopted for use in this report.

1.4 Limitations and Intellectual Property Matters

This report has been prepared by C. M. Jewell & Associates Pty Ltd for the use of the client and local government agency identified in Section 1.1, for the specific purpose described in that section.

The work has been carried out, and this report prepared, utilising the standards of skill and care normally expected of a site auditor practising in New South Wales under the requirements of the Contaminated Land Management Act 1997. The level of confidence of the conclusions reached is governed, as in all such work, by the scope of the investigation carried out and by the availability and quality of the data. The Auditor has satisfied himself that the available data are adequate to support the conclusions he has reached, and comply with the minimum requirements indicated in the guideline documents specified for the NSW Site Auditor Scheme. Where limitations or uncertainties in conclusions are known, they are identified in this report. However, no liability can be accepted for failure to identify conditions or issues which arise in the future and which could not reasonably have been assessed or predicted using the site information and analytical data available for review.

Data collected by others have, of necessity, been used to support the conclusions of this report. Those data have been subjected to reasonable scrutiny but have essentially, and necessarily, been used in good faith. Liability cannot be accepted for errors in data collected by others where such errors could not have been detected by reasonable scrutiny of the data and supporting information supplied to or requested by the Auditor.

This report, any original data contained in the report, and its findings and conclusions remain the intellectual property of C. M. Jewell & Associates Pty Ltd. A licence to use the report for the specific purpose identified in Section 1.1 is granted to the persons identified in that section on the condition of receipt of full payment for the services involved in the preparation of the report.

It is recommended that this report should not be used by other persons or for other purposes than those identified in Section 1.1 without prior reference to the Auditor. The report should not be reproduced except in full and with the permission of C. M. Jewell & Associates Pty Ltd.

2.0 SITE INFORMATION

2.1 Site Identification and Location

The site is located at 100-120 King Street, Randwick, New South Wales. The site location is shown on Figure 1. Australian Map Grid Zone 56H co-ordinates of the centre of the site are approximately 33700E 6246650N. At the date of this report, the site was owned by the Honorary Board of Management of the Sir Moses Montefiore Jewish Home.

The site lies within Randwick City Council local government area and is currently zoned 2B and 2C. The site is identified as Lot 202 in DP879576, in the Parish of Alexandria, County of Cumberland.

The site is rectangular in shape, with dimensions of approximately 165 metres north–south by 178 metres east–west, and has an area of approximately 29,350 m^2.

An indication of the site's layout is provided on Figure 2.

2.2 Site Setting

The site is located in a predominantly residential area, bounded as outlined below.

To the north

The site is bounded to the north by Govett Lane. Residential properties are located on the northern side of Govett Lane

To the east

The site is bounded to the east by Dangar Street. Residential properties are located to the east of Dangar Street.

To the south

King Street bounds the site to the south. The Moriah Daycare facility adjoins the south-west portion of the site. Residential properties are located across King Street.

To the west

Lot 201, which together with Lot 202 was the former location of the Randwick Bus Depot, adjoins the western boundary of the site. A NSW State Transit Authority bus depot is located to the west of Lot 201.

2.3 Topography and Surface Hydrology

URS describes the topography as follows.

> The ground gently slopes in a general westerly direction across the site, except at a point in the eastern third of the site where the ground drops more sharply at a constructed cutting. This cutting was constructed historically to improve the access for the bus depot operations. In places this cutting has been reinforced by the placement of a concrete retaining wall. This effectively divides the site into a higher eastern section and a lower western section.
>
> ...a number of stockpiles exist on site, some of which are up to 4 m high. The estimated volume of the stockpiled material is approximately 9,000 m^3. The largest of these stockpiles extends from half way along the King Street boundary towards the centre of the site and is comprised primarily of building rubble and sandy soil, with some areas of sandstone rubble.

In the northwestern section of the site there is a large excavated area, which was undertaken as part of the previous investigations and partial remediation of the site. The excavation is approximately 100 m in length running east to west and up to 40 m in width. The elevation of the base of the excavation is between 37 and 38 mAHD. Three brick buildings remain on the site and are located in the northeast corner of the site.

Concrete slabs cover some areas of the site. These are predominantly in the area to the north and west of the excavation, and in the eastern section of the site.

Given that most the site has been cleared of pavement and the surface soils are typically sandy, it is expected that rainfall will infiltrate the surface soils directly or via runoff from the pavement. Prolonged heavy rainfall may cause saturation of the surface soils and percolation of rainwater into the groundwater system.

2.4 Geology

Reference to the 1:100,000-scale Sydney Geological Sheet (9130, Edition 1, 1983) indicates that the site is situated on the Holocene sediments of the Botany Basin. The sediments are variable in thickness, ranging up to 35 metres, although thickness is commonly of the order of 15 metres in the north of the basin. The sediments predominantly consist of well-sorted quartz sands interbedded with minor clay, peat and ironstone lenses. Most of the formation overlies the eroded bedrock surface of the Triassic Hawkesbury Sandstone, although moderately to highly weathered horizons of Ashfield Shale have been observed to underlie the Botany Sands in the north and west of the basin.

Reference to the Sydney 1:100,000 Soils Landscape Series Sheet (9130) indicates that the site is underlain by aeolian soil of the Newport soil landscape. The typical characteristics are shallow (less than 0.5 metre) well sorted siliceous sands overlying moderately deep (less than 1.5 metres) buried soils including yellow podzolic soils, with sandy topsoils on crests and gentle slopes. Deep podzols are found on steep slopes, lower slopes, and in depressions. Limitations of this soil landscape group include very high soil erosion hazard, localised steep slopes, non-cohesive topsoil, and very low soil fertility.

Intrusive investigations indicated that fill from 0.1 metre up to several metres thick overlies most the site. URS described the fill as being of a similar type to the underlying natural material.

2.5 Hydrogeology

The Quaternary alluvial, estuarine and, in places, aeolian sediments are known locally as the Botany Sands. The Botany Sands host an unconfined aquifer that has in the past been used extensively for water supply purposes. The aquifer is still used for industrial and irrigation purposes.

Groundwater movement within the Botany Sands occurs via primary porosity (i.e. intergranular flow). The hydraulic conductivity of the cleaner sands ranges up to 30 metres per day (m/d), with 10-15 m/d more typical for the clayey and peaty sands in the area. Yields obtained from the Botany Sands are generally moderate to high, usually of the order of 10 litres per second (L/s), although yields of up to 35 L/s have been obtained from the aquifer for industrial purposes.

The groundwater in the Botany Basin is considered to be of good and generally potable quality. It has a low salinity, typically less than 200 milligrams per litre (mg/L), although higher concentrations of up to 4000 mg/L occur. The pH of the water is generally low, usually of the order of 5.0 to 6.0 pH units, allowing for the enhanced solubility of most metals, including iron, in the aquifer.

Intrusive investigations at the site indicated that groundwater was at depths of less than 3 metres. It was assessed that the hydraulic gradient at the site was towards the west although in the Botany Aquifer the hydraulic gradient is generally towards the south-west.

The nearest receptors of the groundwater flowing from the site are likely to be irrigation wells located at Randwick Racecourse. At its closest point Randwick Racecourse is located approximately 330 metres south-west of the site

2.6 Site History

URS provided the following site history.

> The former Randwick Bus Depot has been the subject of several site contamination investigations conducted between 1991 and 1998 by both Sinclair Knight and Dames & Moore (D&M).
>
> A detailed site historical study was conducted by Doring (1990)....The historical data provided in the Doring study indicates that the eastern portion of the original depot, including both Lots 201 and 202, was used for tram and bus services mechanical (workshops, depot) throughout its life. The study indicated that the area initially commenced operations as a tramway workshop and depot in 1881.
>
> Critical uses of the site not known to have occurred on either Lot 201 or Lot 202, which have occurred in other areas of the depot (the western portion of original depot property where the present day STA bus depot exists), as reported by Doring, included:
>
> - A foundry;
> - Munitions and arms manufacturing during WWII; and
> - Electrical substations.

2.7 Contaminants of Concern

On the basis of the site history and previous environmental investigations undertaken at the site, potential contaminant groups of concern are identified as:

- heavy metals;
- monocyclic aromatic hydrocarbons, particularly benzene, toluene, ethyl benzene, and xylenes (BTEX);
- total petroleum hydrocarbons (TPH); and
- polycyclic aromatic hydrocarbons (PAH).

The individual compounds that make up these contaminant groups are listed in Appendix A.

Given the age of the buildings that had been located on the site, it was considered that asbestos is also a contaminant of concern.

2.8 Proposed Development

It is proposed that the site be redeveloped for an aged care facility.

2.9 Assessment Criteria

2.9.1 Adopted Criteria

The investigation criteria proposed by URS are the lower of those guideline levels set out in Columns 2 and 5 of the table: 'Soil Investigation Levels for Urban Redevelopment Sites in NSW', in the NSW EPA's *Guidelines for the NSW Site Auditor Scheme* (1998).

Criteria derived from Column 2 are health-based soil investigation levels for residential settings where there is minimal opportunity for soil access, originally developed by Imray and Langley in 1996, and currently reissued as Imray and Langley (1999): *Health-Based Soil Investigation Levels*, National Environment Protection (Assessment of Site Contamination) Measure (the NEPM), Schedule B, Guideline 7A. These soil investigation levels are also listed in Column D of Table 5-A, Schedule B(1) of the NEPM.

Criteria derived from Column 5 are provisional phytotoxicity-based investigation levels, and are identical to the Interim Urban Ecological Investigation Levels listed in Table 5-A, Schedule B(1) of the NEPM.

Criteria for TPH and BTEX are those published in the NSW EPA's *Guidelines for Assessing Service Station Sites* (1994) and listed in its Table 3 – 'Threshold Concentrations for Sensitive Land Use – Soils'.

These criteria are listed in Table 1.

TABLE 1
Assessment Criteria – Soils
(mg/kg)

Analyte	*EPA Column 2** (NEPM Column D) Residential with Minimal Access to Soil	*EPA Column 5** (NEPM Interim Urban Ecological) Phytotoxicity-based Criteria††	Sensitive Land Use – Soils†
Arsenic	400	20	-
Cadmium	80	3	-
Chromium (III)	48%	400	-
Copper	4000	100	-
Lead	1200	600	-
Mercury (inorganic)	60	1[5]	-
Nickel	2400	60	-
Zinc	28,000	200	-
Aldrin + Dieldrin	40	-	
Chlordane	200	-	-
DDT + DDD + DDE	800	-	-
Heptachlor	40	-	-
PAH	80	-	-
Benzo(a)pyrene	4	-	-
PCB	40	-	-
TPH C_6-C_9	-	-	65
TPH C_{10}-C_{40}	-	-	1000
TPH C_{16}-C_{35} aromatics‡‡	360	-	-
TPH C_{16}-C_{35} aliphatics	22,400	-	-
TPH >C_{35} aliphatics	224,000	-	-
Benzene	-	-	1
Toluene	-	-	1.4‡/130§
Ethyl benzene	-	-	3.1‖/50¶
Total xylenes	-	-	14**/25¶

Notes: * NSW EPA (1998)

†† Interim EILs for the urban setting are based on considerations of phytotoxicity, ANZECC B levels, and soil survey data from urban residential properties in four Australian capital cities.

‡‡ The carbon number is an 'equivalent carbon number' based on a method that standardises according to boiling point. It is a method used by some analytical laboratories to report carbon numbers for chemicals evaluated on a boiling point GC column.

† and notes below: NSW EPA (1994)

‡ The toluene threshold concentration is the Netherlands MPC to protect terrestrial organisms in soil. This value is obtained by applying a US EPA assessment factor to terrestrial chronic No Observed Effect Concentration (NOEC) data. The MPC is an 'indicative' value (Van de Plassche et al. 1993; Van de Plassche & Bockting 1993).

§ Human health and ecologically based protection level for toluene. The threshold concentration presented here is the Netherlands intervention value for the protection of terrestrial organisms. Other considerations such as odours and the protection of groundwater may require a lower remediation criterion.

‖ The ethyl benzene threshold concentration is the Netherlands MPC for the protection of terrestrial organisms in soil. No terrestrial ecotoxicological data could be found for use in the Netherlands criteria derivation. Therefore, equilibrium partitioning has been applied to the MPC for water to obtain estimates of the MPC for soil. The MPC for water has been derived from aquatic ecotoxicological data (Van de Plassche et al. 1993; Van de Plassche & Bockting 1993).

¶ Human health based protection level for ethyl benzene or total xylenes as shown. The threshold concentration presented here is the Netherlands intervention value. Other considerations such as odours and the protection of groundwater may require a lower remediation criterion.

** The xylene threshold concentration is the Netherlands MPC for the protection of terrestrial organisms in soil. No terrestrial ecotoxicological data could be found for use in the Netherlands criteria derivation. Therefore, equilibrium partitioning has been applied to the MPC for water to obtain an estimate of the MPC for soil. The MPC for water has been derived from aquatic ecotoxicological data. The concentration shown applies to total xylenes and is based on the arithmetic average of the individual xylene MPCs (Van de Plassche et al. 1993; Van de Plassche & Bockting 1993).

2.9.2 Auditor's Comments

The suggested criteria are considered appropriate for the site and the proposed use.

3.0 SUMMARY OF PREVIOUS INVESTIGATIONS

The site forms part of a property which operated as a tram and bus depot from 1881 until the 1980s. The western portion of this property houses the current Randwick NSW State Transit Authority Bus Depot. Excerpts from URS's Data Assessment Report for the site are provided below, and include a brief summary of previous investigations undertaken on the site as part of investigations of the property. As indicated below, some data from previous investigations have been used to complement data recently obtained by URS to complete an environmental assessment of the site.

> In 1997, STA required subdivision of the greater property area into Lots 201 and 202 in preparation for future divestment. The subdivision required the demolition of buildings which straddled the boundary of Lot 201 and Lot 202. As the demolition works appeared to have been conducted in an uncontrolled manner Lot 202 required Post Demolition Validation in 1998 to assess if the demolition works had not adversely impacted the environmental condition of the site. The 1998 assessment was completed prior to the enactments of various sections of the *Contaminated Land Management Act, 1997*. In particular the works did not result in a Site Audit Statement (SAS) being prepared by an Independent Site Auditor which is a key requirement in the DA approvals process for Randwick City Council.
>
> The objective of the assessment is to combine the results of recent investigations (July, August and September 2002) and historic investigations (1995 and 1998) in order to characterise the site condition for review by the site Auditor and preparation of a SAS.
>
> The former Randwick Bus Depot has been the subject of several site contamination investigations conducted between 1991 and 1998 by both Sinclair Knight (SKM) and Dames & Moore (D&M) as outlined below:
>
> - Sinclair Knight Partners (SKP, 1991) Preliminary Geotechnical and Environmental Investigation of the State Transit Authority's Randwick Bus Depot;
> - Dames & Moore (D&M, 1991) Feasibility/Design Study for a Site Remediation Program at the Randwick Bus Depot;
> - D&M (1992) EPA Compliance Report, Site Remediation Program: Phase I, Randwick Bus Depot;
> - D&M (1994) EPA Compliance Report, Initial Site Validation Program, Randwick Bus Depot;
> - D&M (1995) EPA Compliance Report, Final Site Validation Program, Randwick Bus Depot; and
> - D&M (1998) EPA Compliance Report Post Demolition Site Validation Program Lot 202 King and Dangar Streets Randwick.

A detailed review of the historical files and reports was completed to establish the extent of data which could be considered suitable for the purposes of validation reporting. Data was considered useable if the appropriate level of field and laboratory QA/QC was undertaken in accordance with current NSW EPA Guidelines and where data had continued to be relevant following the uncontrolled demolitions undertaken at the time of the decommissioning of the Depot. The uncontrolled demolition rendered some of the data unusable from a materials tracking perspective.

Appropriate data, relevant to the current site conditions, was extracted from each of these reports in order to undertake this assessment....Other data has been rejected as not being suitable for site validation reporting.

Acceptable data from the sampling at the site (1991-1998) have been reviewed as part of the assessment process in April 2002. URS assessed the data for its suitability for inclusion in the final site validation of Lot 202 with respect to the current Auditor Guidelines. Several of the data were found to be invalid for reasons such as lack of laboratory certificates and laboratory quality assurance/quality control (QA/QC). This resulted in all data prior to and including 1994 as being identified as invalid for validation and issue of a SAS.

The summary table below outlines the analytes and numbers of acceptable historical data (1991 – 1998) considered suitable by URS for use in the final site validation.

Analytes	Number of Retained Historic Samples
Heavy Metals	30
TPH/BTEX	54
TPH only	7
PAHs	10

Summary tables for data collected during the 1995 and 1998 works and considered suitable for validation purposes are provided in Appendix C.

URS's sampling strategy is outlined below.

The NSW EPA Sampling Design Guidelines (1994) state that for a site of this size (2.93 hectares), approximately 40 sample locations is optimum for analysing and defining the site for a specific landuse and reducing the possibility of the occurrence of contamination 'hotspots'. Based on the selected contaminants of concern and the locations of accepted historic samples, URS recommended that supplementary site assessment be undertaken for asbestos, metals, TPH/BTEX and PAHs. Although over 54 historical samples for TPH/BTEX could be retained, the samples are concentrated in localised areas associated with excavations. The intention of the supplementary works was to enable a spread of the sample locations across the site...

URS devised a sampling and analysis plan (URS 12 June 2002) for supplementary works at Lot 202 based on the data gaps listed above and submitted the plan to the Site Auditor for approval commensurate with current NSW EPA Auditor Guidelines.

The number of sampling locations for the supplementary works at Lot 202 has been devised using an approximate 40 m grid pattern with a total of an additional 25 sample locations as outlined in the Sampling and Analysis Plan (12 June 2002). Samples collected at each location were analysed for different sets of contaminants of concern. For example, only 15 of the locations required samples for PAHs and 10 locations for heavy metals. The background to this is that some of the historical data is considered valid in particular areas (for particular analytes) and the supplementary program fulfilled the existing data gaps for each contaminant of concern. The

locations were chosen on the basis of where sampling and analysis for particular analytes had not been completed historically. The extent of supplementary sampling was minimised to a level required to meet the Site Auditor's Guidelines and submitted to the Site Auditor for comment prior to commencing the fieldwork.

3.1 Auditor's Comments

The Auditor reviewed the Supplementary Sampling and Analytical Plan developed by URS and suggested some minor modifications to URS in a facsimile dated 26 June 2002. A copy of this facsimile is provided in Appendix B.

4.0 ADDITIONAL SITE ASSESSMENT AND PROPOSED REMEDIAL WORKS

4.1 Initial Supplementary Works, July 2002

4.1.1 Soil Sampling and Analysis

The initial supplementary works carried out by URS included:

- the excavation of twenty-eight test pits (identified as TP1 to TP28) across the site on a grid pattern with an approximate spacing of 40 metres;
- analysis for PAHs for samples collected from seventeen sample locations;
- analysis for heavy metals for samples collected from fourteen sample locations;
- analysis for TPH and BTEX for samples collected from fourteen sample locations; and
- analysis for asbestos for samples collected from twelve sample locations.

The sampling and analysis schedule for initial supplementary sampling is summarised in Table 2, whilst the sampling locations are shown on Figure 2.

TABLE 2
Soil Sampling and Analysis Schedule – July 2002

Sample	Heavy Metals	TPH	BTEX	PAH	Asbestos
TP01/0.3-0.5					✓
TP01/1.3-1.5		✓	✓		
TP02/0.2-0.4	✓			✓	
TP03/0.3-0.5		✓	✓		✓
TP04/0.3-0.5	✓			✓	
TP04/1.3-1.5	✓			✓	
TP5/0.3-0.5					✓
TP5/1.3-1.5	✓			✓	
TP6/1.3-1.5		✓	✓	✓	
TP07/0.3-0.5				✓	
TP8/0.3-0.5	✓			✓	
TP8/1.3-1.5	✓	✓	✓		
TP09/0.3-0.5					✓
TP9/1.3-1.5		✓	✓		
TP10/0.3-0.5				✓	
TP11/0.3-0.5					✓
TP12/0.3-0.5	✓			✓	
TP13/0.2-0.4					✓
TP14/0.3-0.5	✓	✓	✓	✓	
TP14/1.3-1.5	✓	✓	✓	✓	
TP14/2.4-2.6		✓	✓		
TP15/0.3-0.5	✓	✓	✓	✓	
TP15/1.3-1.5	✓	✓	✓	✓	
TP16/0.2-0.4	✓			✓	
TP17/0.3-0.5					✓
TP18/0.3-0.5	✓	✓	✓	✓	
TP19/0.3-0.5					✓
TP20/0.3-0.5	✓			✓	✓
TP21/0.3-0.5		✓	✓	✓	✓
TP22/0.3-0.5	✓	✓	✓		✓
TP22/1.3-1.5	✓	✓	✓		✓
TP23/0.3-0.5					✓
TP23/1.3-1.5	✓	✓	✓	✓	
TP24/0.3-0.5		✓	✓		
TP25/0.5-0.7	✓	✓	✓	✓	
TP25/1.3-1.5	✓	✓	✓	✓	
TP26/0.3-0.5	✓	✓	✓	✓	
TP26/1.3-1.5	✓	✓	✓	✓	
TP26/2.9-3.0		✓	✓		
TP27/0.3-0.5					✓
TP28/0.3-0.5					✓

The results of laboratory analysis indicated that the concentrations of contaminants of concern were within the assessment criteria except for the following:

- lead (1880 mg/kg) in sample TP02/0.2-0.4; and
- TPH C_{10}-C_{36} (1716 mg/kg) in sample TP25/1.3-1.5.

Furthermore, asbestos was not detected in any of the samples.

4.1.2 Stockpile Assessment

URS's summary of the stockpile assessment follows.

> In addition to the assessment of insitu materials, investigation of the stockpiles on the site was also required to determine their suitability to remain on site for use as fill. Survey results have indicated that the total volume of the stockpiles is approximately 9000 m^3. To achieve the stockpile assessment URS undertook the following scope of work:
>
> - Site inspection to establish those stockpiles requiring sampling. Stockpiles which were comprised of concrete and or brick rubble are not considered to require assessment. Stockpiles comprising soils were identified for assessment.
> - Division of those stockpiles requiring assessment by an excavator into zones of approximately 300 m^3 for individual assessment.

Ten stockpiles (identified as SP1 to SP7, and SP9 to SP11) were identified as comprising predominantly sandy soil. SP2 was identified as a concrete rubble stockpile but was also sampled. Samples were collected from these stockpiles as described below and analysed for heavy metals, TPH, BTEX, and PAH.

> Samples were collected from stockpiles containing predominantly soil. One composite sample (3 point) from each approximate 300 m^3 was collected. Stockpiles SP2, SP8, SP12, SP13, SP14, SP15, SP16, SP18 and SP19 consist of concrete slabs or brick (SP15 only) will be recycled and either retained on site or taken off site for recycling.

The results of laboratory analysis indicated that the concentrations of contaminants of concern were within the assessment criteria.

The stockpile samples were also submitted to a laboratory to determine whether any asbestos fibres were present in the samples. Asbestos (chrysotile) was only found in the sample from stockpile SP1. URS stated:

> The stockpile was resampled and 4 representative samples were collected across the 300 m^3. One sample was collected from each quadrant of the 300 m^3. Each of these samples returned a non-detect result for asbestos. No asbestos cement fragments were identified in SP1.

4.1.3 Asbestos Survey

URS described the asbestos survey as follows:

> The asbestos assessment followed the approach outlined in the ACLCA Code of Practice (draft February 2002). Sampling was undertaken by test pits such that observations of any suspect potential AC materials can be made. The sampling program was extended by a walk-over inspection of the whole site by an asbestos specialist. An outcome of the walk-over inspection was the inclusion of a further 2 test pits (TP27 and TP28) in a location where some demolition material had been spread, adjacent to the eastern boundary of the site.
>
> An asbestos survey was conducted by Hibbs & Associates Pty Ltd (Hibbs) on 19 and 20 July 2002. To assist with the survey Hibbs divided the site into assessment zones. The survey identified the following issues:

- Fragments of bonded asbestos cement sheeting were noted at various locations around the site including within the assessment zones No. 1, 4, 5 ....
- Some demolition rubble mixed with soil was spread across the eastern area of the site (grid location A3 – A5) adjacent to the site boundary. Cement bonded asbestos fragment were observed in this material.

Figure 3 shows the asbestos assessment zones, together with the areas where positive identification was made of asbestos-containing materials. A copy of the summarised results of the asbestos survey is included in Appendix C.

4.2 Soil and Groundwater Sampling, August 2002

4.2.1 Soil Sampling

Twenty-four boreholes (identified as BH01 to BH24) were drilled and sampled to delineate the TPH contamination found in the soil samples collected from test pits in July 2002. The boreholes were drilled within and around the large excavated area on the site which was a result of previous partial remediation of the site. The samples submitted for analysis are summarised in Table 3. A copy of the summarised laboratory results is provided in Appendix C; sample locations are shown on Figure 2.

TABLE 3
Analysis Schedule – August 2002

Sample	Analyte
BH1/2.3-2.5	TPH/BTEX
BH2/2.5-2.7	
BH3/1.0-1.2	
BH3/3.0-3.2	
BH4/3.2-3.4	
BH5/1.8-2.0	
BH8/3.7-3.9	
BH9/2.0-2.2	
BH10/1.0-1.2	
BH11/1.0-1.2	
BH12/2.2-2.3	
BH13/0.8-1.3	
BH14/2.0-2.2	
BH15/1.3-1.5	
BH16/1.0-1.2	
BH17/0.4-0.7	
BH18/3.3-3.5	
BH20/2.0-2.2	
BH21/1.8	
BH22/2.5-2.7	
BH23/1.3-1.5	
BH24/0.8-1.0	

The results of laboratory analysis indicated that the concentrations of TPH and BTEX were within the assessment criteria for all samples, except for the following:

- TPH C_{10}-C_{36} (4134 mg/kg) in sample BH2/2.5-2.7;
- TPH C_{10}-C_{36} (4751 mg/kg) in sample BH5/1.8-2.0;
- TPH C_{10}-C_{36} (1774 mg/kg) in sample BH14/2.0-2.2;

- TPH C_{10}-C_{36} (1320 mg/kg) in sample BH15/1.3-1.5;
- TPH C_{10}-C_{36} (13,227 mg/kg) in sample BH18/3.3-3.5; and
- TPH C_{10}-C_{36} (1129 mg/kg) in sample BH20/2.0-2.2.

TPH C_{10}-C_{36} concentrations also exceeded the assessment criterion in samples DUP09 (3524 mg/kg TPH C_{10}-C_{36}) and DUP10 (5833 mg/kg TPH C_{10}-C_{36}), which were duplicate samples of BH2/2.5-2.7. Sample DUP07 (10,795 mg/kg TPH C_{10}-C_{36}), a duplicate of sample BH5/1.8-2.0, also contained TPH C_{10}-C_{36} at a concentration exceeding the assessment criterion.

The TPH (C_{10}-C_{36}) concentrations exceeding the assessment criterion were found in soil samples collected from boreholes located in the western and southern end of the pit area. Furthermore, these soil samples were collected from close to or at the depth of the water table. URS noted that the analytical results were consistent with olfactory indications of contamination noted in the field.

URS also noted that:

> No observations of impact (i.e odour) were made in the boreholes completed just beyond the northern boundary of the pit (BH3, BH4, BH7 and BH8). The analytical results of the soil samples supported these observations with TPH concentrations below the laboratory detection limit. Further towards the middle and eastern end of the pit, soil samples were found to be above the laboratory limit of detection but below the guideline value of 1000mg/kg.

4.2.2 Groundwater Sampling

Boreholes BH03, BH05, BH12, and BH18 were completed as groundwater monitoring bores and identified as MW2, MW3, MW4, and MW1, respectively. Monitoring bores MW1 (BH18) and MW2 (BH03) were installed downgradient of the pit, while the other two bores were installed within the pit. Monitoring bore MW3 (BH05) was installed close to the location of test pit TP25, whilst MW4 (BH12) was installed in the eastern upgradient end of the pit. Groundwater was sampled from these boreholes and submitted for analysis for TPH and BTEX. A copy of the summarised laboratory results is provided in Appendix C. The locations of test pits completed as groundwater monitoring bores are shown on Figure 2.

The results of analysis indicated BTEX concentrations were below the limit of reporting for all samples. The TPH concentrations in the sample collected from MW2 was below the limit of reporting, whilst the TPH concentrations in the remaining bores were relatively high, as follows:

- TPH C_6-C_9 (43 µg/L) and TPH C_{10}-C_{36} (72,333 µg/L) in sample MW1;
- TPH C_6-C_9 (39 µg/L) and TPH C_{10}-C_{36} (28,659 µg/L) in sample MW3; and
- TPH C_6-C_9 (<20 µg/L) and TPH C_{10}-C_{36} (25,887 µg/L) in sample MW4.

Furthermore sample DUP19, a duplicate sample of MW1, also contained high concentrations of TPH (132 µg/L TPH C_6-C_9 and 115,182 µg/L TPH C_{10}-C_{36}).

4.3 Soil Sampling, September 2002

A further fourteen test pits (identified as TP100 to TP113) were excavated in September 2002 to further delineate the TPH contamination in the vicinity of the pit. At least one sample from each of the pits was submitted for laboratory analysis for TPH. The samples submitted for analysis had generally been collected from a depth of between 3 and 4 metres, the approximate depth at

which the TPH contamination was found in the August 2002 sampling. A copy of the summarised laboratory data is included in Appendix C, whilst sampling locations are shown on Figure 2.

The results of laboratory analysis indicated that the concentrations of TPH for all samples were within the assessment criteria and less than the limit of reporting.

4.4 Discussion of Results

URS prepared summary statistics of the assessment analytical data for the site. The results are tabulated in Table 4 below.

TABLE 4
Summary of Statistics of Assessment Data
(mg/Kg)

Analyte	PQL	Set	Min.	Max.	Mean	C.V.	95% UCL*
Inorganics							
Sulphate	10	11	11	1140	152	2.2	595†
Arsenic	1-5	44	<1	7	1.20	1.2	1.6
Cadmium	1-5	44	<1	<1	0.5	0.0	0.5
Copper	1-5	44	<1	228	20	2.0	71†
Nickel	1-5	44	<1	11	1.5	1.1	1.9
Lead	1-5	77	1	1880	86	2.7	290†
Zinc	1-5	44	<1	433	59	1.7	484†
Chromium	1-5	44	1	11	2.3	0.9	2.8
Mercury	0.1	44	<1	<1	0.074	1.0	0.1
Cyanide	1	11	<1	1	0.50	0.0	0.5
Organics							
TPH C_6-C_9 Pit Areas	2	84	1	19	4.8	0.7	5.4
TPH C_{10}-C_{36} Pit Areas	250	84	110	13200	550	2.9	492†
TPH C_6-C_9 Balance of Site	2	34	1	5	3.8	0.5	4.4
TPH C_{10}-C_{36} Balance of Site	250	34	110	900	155	1.1	203
PAH	0.05-0.1	66	0.6	40	6.7	1.1	8.2
Benzo(a)Pyrene	0.05	54	<0.1	3.7	0.56	1.3	0.6†
Benzene	0.2	121	<0.2	<0.2	0.28	1	0.3
Toluene	0.2	121	<0.2	<0.2	0.28	1	0.3
Ethyl benzene	0.2	121	<0.2	<0.2	0.28	1	0.3
Xylenes	0.2	121	<0.2	1.5	0.77	1	0.9

Notes: PQL laboratory practical quantitation limit
Set number of samples in data set
Min. minimum concentration
Max. maximum concentration
Mean arithmetic mean
C.V. coefficient of variation
* 95 per cent upper confidence limit on the mean is calculated via procedure D (NSW EPA, 1995) unless otherwise indicated.
† Procedure G (NSW EPA, 1995) was used to calculate the 95 per cent upper confidence limit on the mean due to the lognormal distribution of the dataset.

URS provided the following discussion of results.

Based on all the available information from the retained historical data (1991-1998) and the 2002 data the following applies:

- All heavy metal analysis reported concentrations below the NEPM HIL D with the exception of a lead sample at TP02. The concentration however is not greater than 250% of the guideline and is therefore not identified as a contamination 'hot spot' in accordance with the NEPM guidelines.
- All samples analysed for OC/OPs, VHCs, cyanide, sulphates and phenols were either below the relevant criteria or below the level of reporting by the laboratory.
- Several samples selected for PAH analysis reported low concentrations of PAHs, however, there were no exceedences of NEPM HIL D for either total PAH or benzo(a)pyrene.
- The investigations were able to establish the general trend for the location of TPH impact within the site. Borehole samples taken from inside the main pit on site such as BH2, BH5, BH14, BH15 and BH20 and one location at the western end outside the pit, BH18, all indicated TPH concentrations in excess of the relevant guidelines. The western end of the main pit appears to be the key area of TPH impacted material.
- No observations of impact (i.e. odour) were made in the boreholes completed just beyond the northern boundary of the pit (BH3, BH4, BH7 and BH8). Similarly, the analytical results of the soil samples supported these observations in that the results were below the laboratory detection limit. As such, it is considered that the extent of any source and/or impact has been established in this area. Further towards the middle and eastern end of the pit, soil samples were found to be odorous and above the laboratory limit of detection but below the guideline value of 1000 mg/kg.
- TPH results outside of the pit at the western end reported concentrations below the limit of reporting by the laboratory. The absence of concentrations of TPH does not correspond to the presence of hydrocarbon odour during investigations. The laboratory had been requested to reanalyse a percentage of the samples to confirm the TPH results.
- Samples analysed for TPH/BTEX or only TPH indicate several samples below the relevant guidelines and/or below the level of reporting from the laboratory.

URS consider that removal of asbestos cement fragments can be undertaken by hand picking followed by inspection by a suitably qualified asbestos consultant, most likely Hibbs and Associates.

On the basis of the limited presence of asbestos fibres in SP1 (1 sample returned positive detection out of a total of 5 samples), it is considered reasonable to retain the stockpile on site as backfill. As a precautionary measure the stockpile should be placed beneath building slabs and/or pavements and that suitable control and contingency measures are taken to minimise dust generation during the relocation of the stockpile.

The groundwater results indicated TPH to be present in three wells (MW1, MW3 and MW4), however MW2 reported concentrations below the limit of reporting by the laboratory. This indicates that the TPH contaminated water is present within the main pit and flowing...in a westerly direction out of the pit. The results for MW2 and the analyses and observations made during the soil investigations, has shown no evidence of TPH contamination to the north of the pit.

4.5 Remedial Action Strategy

The remedial works proposed by URS are outlined in the following sections.

4.5.1 Remediation Objectives

The remediation objectives are to reduce the concentrations of hydrocarbon contaminants (TPH) in the soil and groundwater to levels that are acceptable for the proposed land use and are protective of human health and the environment in line with NSW EPA guidelines. This will also remove the ongoing source of groundwater contamination.

4.5.2 Remediation Area

The main area requiring remediation is the western end of the depression where TPH concentrations generally exceed 1000 mg/kg....A further small area at the eastern end of the depression (in the vicinity of BH 12) also requires remediation to remove a suspected source of groundwater contamination. The total combined area is approximately 1,000 m^2.

Petroleum hydrocarbon contamination at the site is expected to concentrate in the soil zone close to the water table level, which has fluctuated over a range of perhaps 0.5 m. The average thickness of material requiring remediation is estimated at approximately 3 m (including 0.5 to 1 m of contaminated material below the water table). The indicated volume of soil requiring remediation is therefore about 3,000 m^3.

A further area at the eastern end of the depression, may require some remediation to address odour issues and eliminate sources of groundwater contamination.

4.5.3 Proposed Soil Remediation Program

URS proposes to excavate the contaminated soils to approximately 0.5 to 1 metre below the water table and landfarm the soils on site with the addition of nutrients and regular tilling for a period of three to four months. The rate of progress of remediation will be assessed after one month, to determine whether to proceed with landfarming or dispose of the material to landfill.

4.5.4 Proposed Groundwater Remediation Program

The primary strategy for groundwater remediation will be to remove the source of the contamination via the soil remediation program. Groundwater within the remedial excavation pit will be sampled to determine the concentrations of contaminants prior to determining a suitable method of removing and disposing of the groundwater.

Should the proposed remediation technique prove to be ineffective or too slow, alternative options for remediation may be recommended. These may include removal of more additional soil, in-situ bioremediation, or in-situ chemical oxidation.

4.6 URS's Conclusions

URS concluded the following:

Based on the results from all investigations 1991-2002 the majority of the site is suitable for residential development in accordance with the exposure setting relevant to NEPM Level D. Based on the 2002 TPH results, however, a portion of the site is currently unsuitable for residential development. It will be therefore be necessary to conduct some remediation works to address soil and groundwater contamination within and surrounding the main pit area.

URS consider that the remediation works can be completed using routine methodologies and, following completion of the works, the entire site will be able to be validated for medium density residential land use.

4.6.1 Auditor's Comments

The Auditor has reviewed the report concerned and considers that the course of action proposed by URS is appropriate.

5.0 COMPLETENESS AND ADEQUACY OF INVESTIGATION

5.1 Initial Sampling Strategy

The confirmation sampling strategy adopted by URS is considered appropriate.

5.2 Sampling Procedures

The sampling procedures adopted by URS, as outlined in the assessment report, have been reviewed. These procedures are considered to comply with general industry standards and to be adequate to ensure the integrity of the data set used to assess contamination and validate remediation on this site.

5.3 Quality Assurance/Quality Control

The quality assurance and quality control procedures adopted by URS, as outlined in the assessment report, have been reviewed. These procedures are considered to comply with general industry standards and to be adequate to ensure the integrity of the data set used to assess contamination and validate remediation on this site.

A review of the laboratory QC results presented in the assessment report has also been undertaken. A copy of the QC portion of the auditing checklist has been provided in Appendix D.

The QA/QC criteria examined in this review included:

- Precision
- Accuracy
- Sensitivity
- Representativeness
- Comparability
- Completeness
- Holding times
- Blanks

It was noted that URS did not obtain equipment (rinsate) blanks. URS provided an explanation of its procedure with regard to blanks.

The Auditor considers that the overall quality of data and their presentation are of an adequate standard to support the conclusions he has reached.

5.4 Groundwater Issues

Groundwater issues remain to be addressed in a remedial action plan.

5.5 Aesthetic Issues

Aesthetic issues remain to be addressed in a remedial action plan.

5.6 Chemical Mixtures

The Auditor does not consider that the potential for chemical mixtures is an issue of concern on this site.

5.7 Reporting Standards

Although minor inconsistencies were identified in the assessment report, the assessment report generally complies with the NSW EPA's *Guidelines for Consultants Reporting on Contaminated Sites* (1997).

6.0 CONCLUSIONS

This audit was carried out for the purpose of determining:

(1) the nature and extend of any contamination of the land,

(2) the nature and extent of the investigation or remediation,

(3) what investigation or remediation remains necessary before the land is suitable for residential use with minimal opportunity for soil access.

It has been determined that parts of the site were potentially contaminated by:

- heavy metals,
- total petroleum hydrocarbons (TPH),
- benzene, toluene, ethyl benzene and xylenes (BTEX),
- polycyclic aromatic hydrocarbons (PAH), and
- asbestos-containing materials (ACM)

as a result of its previous use as a bus depot and subsequent demolition work.

Remediation and validation of the site have previously been carried out, but it has been determined that this work was not performed and documented in a manner that meets current standards.

Investigations carried out by URS in 2002 were adequate and appropriate. These investigations have established that some residual contamination (or recontamination) by petroleum hydrocarbons is present in part of the site and that both soil and groundwater are impacted, to the extent that remediation is required before the site will be suitable for residential use.

It is considered that the remedial strategy proposed by URS is appropriate for the site. It is therefore recommended that:

(1) A formal remedial action plan (RAP) be prepared.

(2) The RAP should include procedures for:

- Excavation of hydrocarbon-contaminated soil
- On-site treatment by land farming
- Validation sampling and analysis

- Groundwater monitoring
- Contingency groundwater remediation and validation.

3) The RAP be reviewed and approved by an Auditor. That approval should be given in letter form.
4) A validation report be prepared.
5) A further site audit be carried out and a new site audit statement issued.

Subject to successful implementation of these recommendations, it is considered that the site can be rendered suitable for residential use with minimal opportunity for soil access.

The Site Audit Statement should be used in conjunction with this Summary Site Audit Report which contains important supporting information.

REFERENCES

Australian and New Zealand Environment and Conservation Council/Agriculture and Resource Management Council of Australia and New Zealand (2000): *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* National Water Quality Management Strategy.

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C.M. Jewell & Associates Pty Ltd
Water and Environmental Management
ACN 056 283 295

IMPORTANT INFORMATION about your ENVIRONMENTAL SITE ASSESSMENT

These notes have been prepared by C.M. Jewell & Associates using guidelines prepared by the National Ground Water Association (NGWA) and other sources. They are offered to help you in the interpretation of your Environmental Site Assessment (ESA) reports.

REASONS FOR CONDUCTING AN ESA

ESAs are typically, though not exclusively, carried out in the following circumstances:

- as pre-acquisition assessments, on behalf of either purchaser or vendor, when a property is to be sold;
- as pre-development assessments, when a property or area of land is to be redeveloped or have its use changed - for example, from a factory to a residential subdivision - as a requirement for development approval;
- as pre-development assessments of greenfield sites, to establish "baseline" conditions and assess environmental, geological, hydrological constraints to the development of, for example, a landfill; and
- as audits of the environmental effects of an ongoing operation.

Each of these circumstances requires a specific approach to the assessment of soil and groundwater contamination. In all cases, however, the objective is to identify and if possible quantify the risks which unrecognised contamination poses to the proposed activity. Such risks may be financial (for example, clean-up costs or limitations on site use), or physical (for example, health risks to site users or the public).

THE LIMITATIONS OF AN ESA

Although the information provided by an ESA can reduce exposure to such risks, no ESA, however diligently carried out, can eliminate them. Even a rigorous professional assessment may fail to detect all contamination on a site. Contaminants may be present in areas that were not surveyed or sampled, or may migrate to areas which showed no signs of contamination when sampled.

The extent of sampling and subsequent analysis of soils is necessarily limited, and is generally targeted towards areas where contamination is considered to be most likely, based on the knowledge of the site history and visual observation. This approach maximises the probability of identifying contaminants; however, it may not identify contamination which occurs in unexpected locations or from unexpected sources.

Further, soil, rock and aquifer conditions are often variable, resulting in non-homogenous contaminant distributions across a site. Contaminant concentrations are identified at chosen sample locations; however, conditions between sample locations can only be inferred on the basis of the estimated geological and hydrogeological conditions and the nature and extent of identified contamination. Boundaries between zones of variable contamination are often indistinct, and must be interpreted based on available information and the application of professional judgement. The accuracy with which subsurface conditions can be characterised depends on the frequency and methods of sampling and the uniformity of subsurface conditions and is therefore limited by the scope of works undertaken.

ESA "FINDINGS" ARE PROFESSIONAL ESTIMATES

Site assessment identifies actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists who then render an opinion about overall subsurface conditions, the nature and extent of contamination, its likely impact on the proposed development and appropriate remediation measures. Statistical tools may be used to assist in such assessment, but the validity of conclusions depends entirely on the degree to which the original data reflects site conditions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions.

Nothing can be done to prevent the unanticipated, but steps can be taken to help minimise its impact. For this reason, owners should retain the services of their consultants through the development stage, to identify variances, to conduct additional tests which may be

needed, and to recommend solutions to problems encountered on site.

SUBSURFACE CONDITIONS CAN CHANGE

Subsurface conditions are changed by natural processes and the activity of man. Because an ESA report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on an ESA report whose adequacy may have been affected by time. Speak with the consultant to learn if additional tests are advisable.

ESA SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS

Every study and ESA report is prepared in response to a specific Brief to meet the specific needs of specific individuals. A report prepared for a consulting civil engineer may not be adequate for a construction contractor, or even some other consulting civil engineer. A report should not be used by other persons for any purpose, or by the client for a different purpose. No individual other than the client should apply a report even apparently for its intended purpose without first conferring with the consultant. No person should apply a report for any purpose other than that originally contemplated without first conferring with the consultant.

AN ESA REPORT IS BASED ON A UNIQUE SET OF PROJECT SPECIFIC FACTORS

Your environmental report should not be used:

- when the nature of the proposed development is changed - for example, if a residential development is proposed instead of a commercial one;
- when the size or configuration of the proposed development is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership; or
- for application to an adjacent site.

To help avoid costly problems, refer to your consultant to determine how any factors which have changed subsequent to the date of the report may affect its recommendations.

AN ESA REPORT IS SUBJECT TO MISINTERPRETATION

Costly problems can occur when design professionals develop their plans based on misinterpretations of an ESA. To help avoid these problems, the environmental consultant should be retained to work with appropriate design professionals to explain relevant findings and to review the adequacy of their plans and specifications relative to contamination issues.

LOGS SHOULD NOT BE SEPARATED FROM THE GEOLOGICAL REPORT

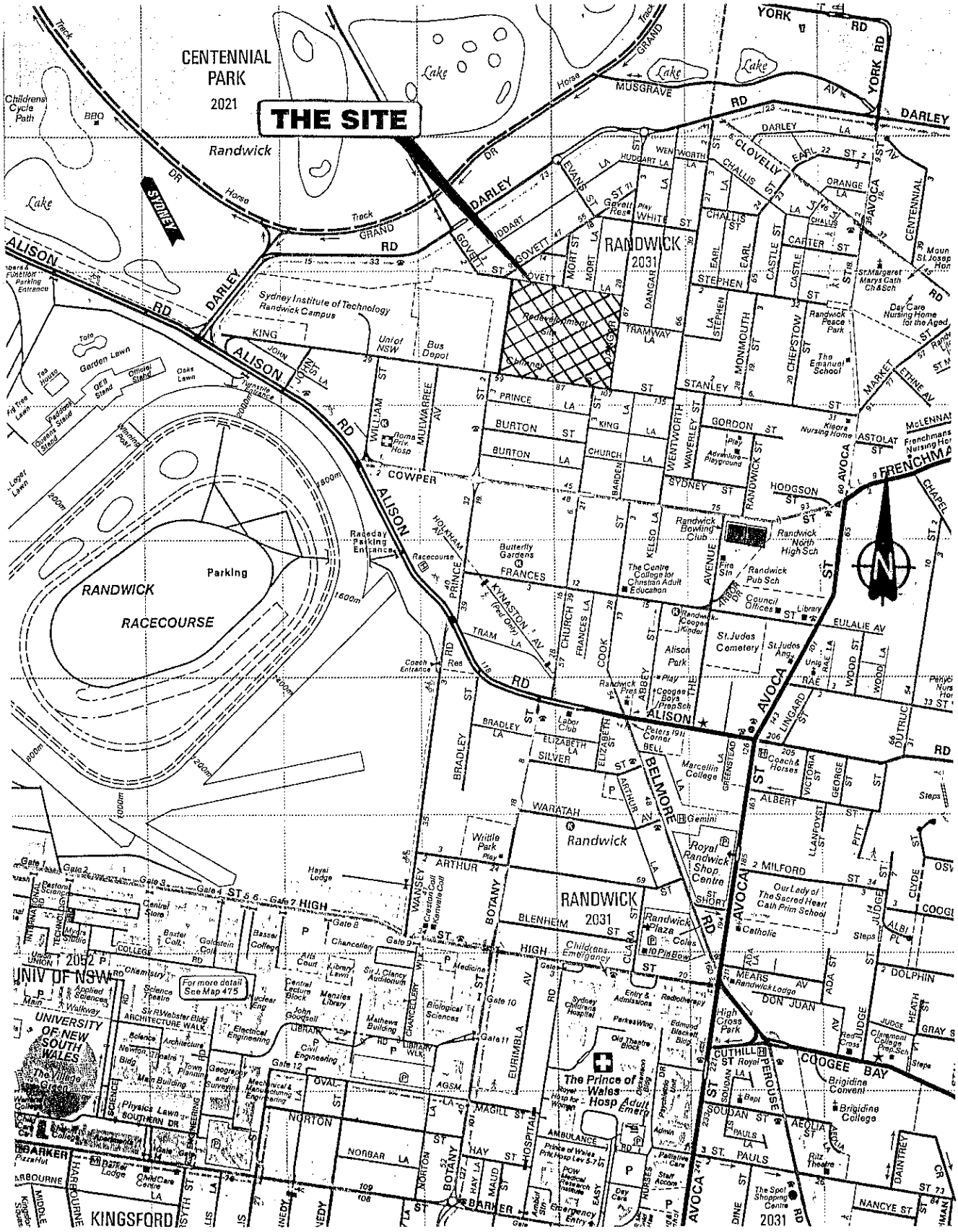
Final borehole or test pit logs are developed by environmental scientists, engineers or geologists based upon their interpretation of field logs (assembled by site personnel) and laboratory evaluation of field samples. Only final logs are customarily included in our reports. These logs should not under any circumstances be redrawn for inclusion in site remediation or other design drawings, because drafters may commit errors or omissions in the transfer process. Although photographic reproduction eliminates this problem, it does nothing to minimise the possibility of contractors misinterpreting the logs during bid preparation. When this occurs, delays, disputes and unanticipated costs are the all-too-frequent result.

To reduce the likelihood of borehole log misinterpretation, the complete report must be available to persons or organisations involved in the project, such as contractors, for their use. Those who do not provide such access may proceed under the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing all the available information to persons and organisations such as contractors helps prevent costly construction problems and the adversarial attitudes which may aggravate them to disproportionate scale.

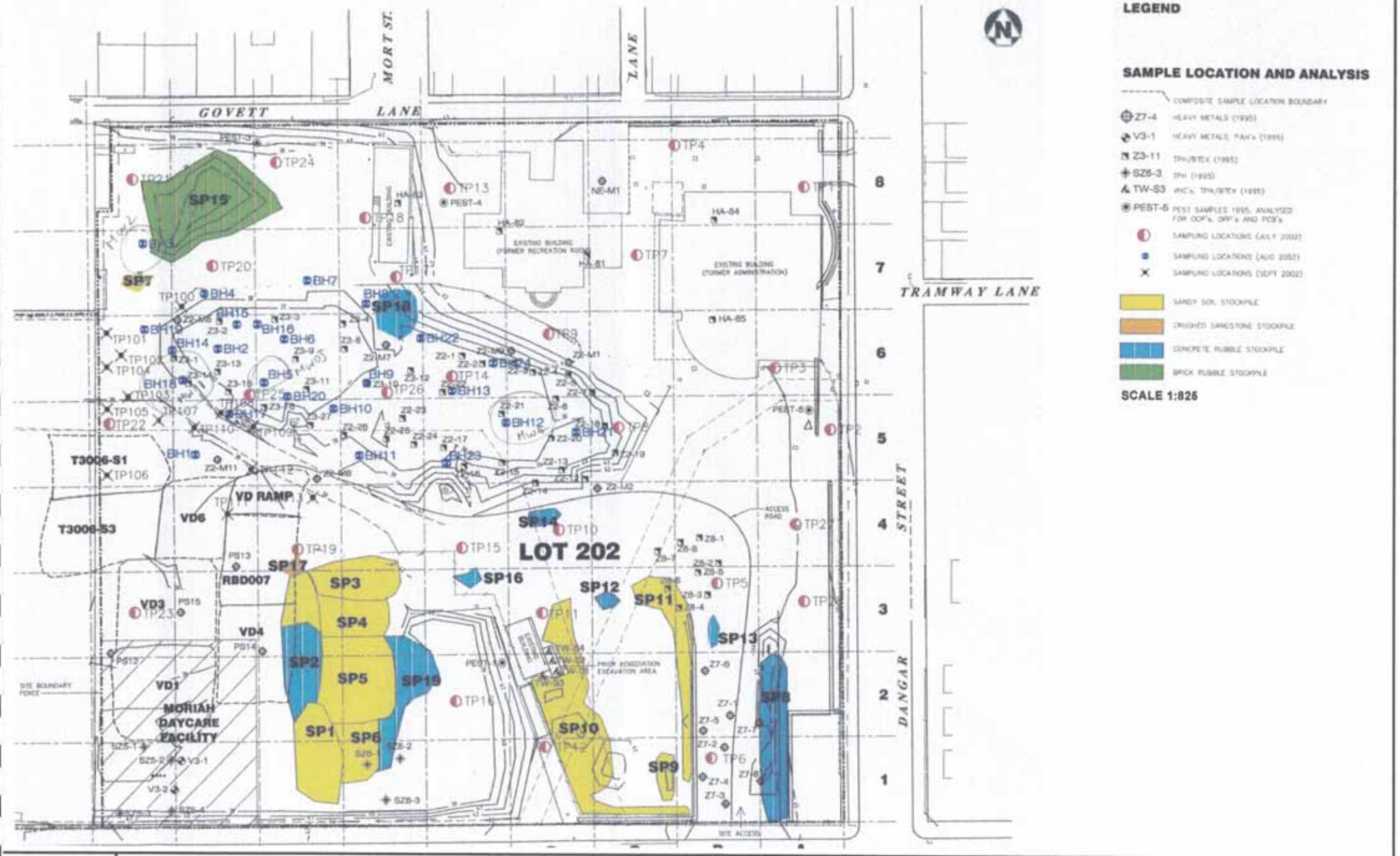
READ RESPONSIBILITY CLAUSES CLOSELY

Because an ESA is based extensively on judgement and opinion, it is necessarily less exact than design documents produced by other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, model clauses have been developed for use in written transmittals. These are not exculpatory clauses designed to foist liabilities onto some other party. Rather, they are definitive clauses which identify where your consultant's responsibilities begin and end. Their use helps all parties involved recognise their individual responsibilities and take appropriate action.

Some of these definitive clauses are likely to appear in your ESA report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.



J0807	Site Audit – Sir Moses Montefiore Jewish Home, Randwick	
Site Location and Setting	Document: J0807.3 Rev: 1 Date: 30/09/2002 Author: JDM	**Figure 1**



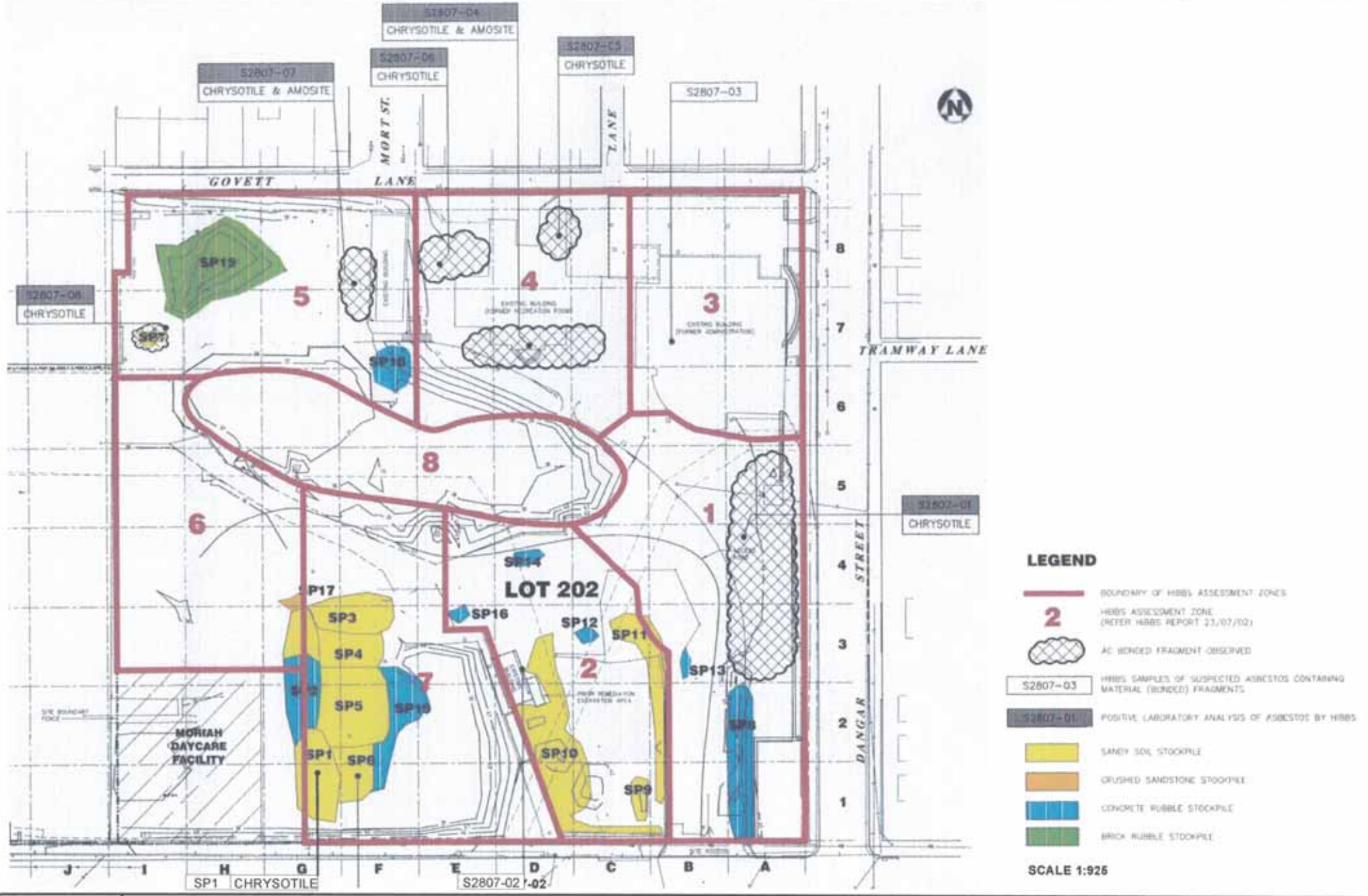
J0807 Site Audit - Sir Moses Montefiore Jewish Home, Randwick

Site Layout and Sampling Locations

abstracted from URS Report Project No:51072-001

Document: J0807.3
Rev: 1
Date: 26/9/2002
Author: JDM

Figure 2



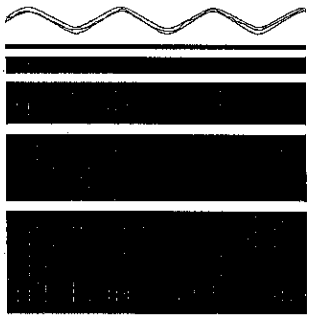
J0807 Site Audit - Sir Moses Montefiore Jewish Home, Randwick

Asbestos Assessment Zones

abstracted from URS Report Project No:51072-001

Document: J0807.3
Rev: 1
Date: 23/9/2002
Author: JDM

Figure 3



APPENDIX A

Contaminant Groups

Individual Species Making up Contaminant Groups

POLYCYCLIC AROMATIC HYDROCARBONS

Naphthalene
Acenaphthylene
Acenaphthene
Fluorene
Phenanthrene
Anthracene
Fluoranthene
Pyrene
Benz(a)anthracene
Chrysene
Benzo(b) & (k) fluoranthene
Benzo(a)pyrene
Indeno(1,2,3-cd)pyrene
Dibenz(a,h)anthracene
Benzo(g,h,i)perylene

TOTAL PETROLEUM HYDROCARBONS

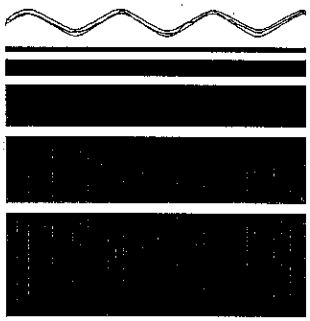
C_6 - C_9 Fraction
C_{10} - C_{14} Fraction
C_{15} - C_{28} Fraction
C_{29} - C_{36} Fraction

MONOCYCLIC AROMATIC HYDROCARBONS

Benzene
Toluene
Ethylbenzene
meta- & para-Xylene
ortho-Xylene

HEAVY METALS

Arsenic (As)
Cadmium (Cd)
Chromium (Cr)
Copper (Cu)
Lead (Pb)
Mercury (Hg)
Nickel (Ni)
Zinc (Zn)



APPENDIX B

Communications with the Auditor

C. M. Jewell & Associates Pty Ltd
Water and Environmental Management
A.B.N. 54 056 283 295

fax transmission

FAXED 7006

P.O. Box 10, Wentworth Falls, NSW 2782, Australia
1/13 Kalinda Road, Bullaburra, NSW 2784, Australia

Phone (02) 4759 3251 **Email postie@cm-jewell.com.au** **Fax (02) 4759 3257**
(International +61 247 59 3251) **(International +61 247 59 3257)**

Ref: J0807.2	Date: 26 June 2002	Time: 12:02
To: URS		c.c. McLachlan Lister
Attention: Fran Mitchell		Attention: Simon Magri
Fax No. 8925 5555	From: Chris Jewell	Fax No. 9241 1898
Original to follow: No		Total pages including cover: 1

Subject: **Supplementary Sampling and Analytical Plan, Lot 202 King Street, Randwick**

Fran,

Further to our telephone conversation today, I confirm that I have reviewed your supplementary sampling and analytical plan and am generally happy with the approach that you have proposed.

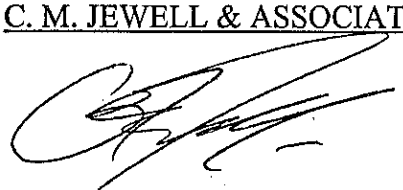
There are two areas where some modification is appropriate. These are:

1) Comparability of data sets. Unless you are sure that you can demonstrate consistency of sampling and analytical methodology, allowing the original and supplementary data sets to be combined, then it would be worthwhile including some overlap sampling to allow a direct comparison.

2) Asbestos. I would like you to follow the approach to asbestos assessment outlined in the ACLCA Code of Practice (February 2002 draft), taking into account the comments in enHealth's review of that document. I note that you intend to sample from test pits, and concur with that approach. I would like to see your sampling program supplemented, and placed in context, by a walk-over inspection of the whole site by an asbestos specialist.

I don't think that either of these suggestions will result in significant extra costs or delays, and should help ensure that we end up with a validation data set with which we are all comfortable.

For and on behalf of
C. M. JEWELL & ASSOCIATES PTY LTD



CHRIS JEWELL

C. M. Jewell & Associates Pty Ltd
Water and Environmental Management
A.B.N. 54 056 283 295

fax transmission

FAXED 7511

P.O. Box 10, Wentworth Falls, NSW 2782, Australia
1/13 Kalinda Road, Bullaburra, NSW 2784, Australia

Phone (02) 4759 3251 **Email postie@cm-jewell.com.au** **Fax (02) 4759 3257**
(International +61 247 59 3251) **(International +61 247 59 3257)**

Ref: J0807.4	Date: 27 September, 2002	Time: 12:04
To: URS		c.c. McLachlan Lister
Attention: Fran Mitchell		Attention: Simon Magri
Fax No. 8925 5555	From: Chris Jewell	Fax No. 9241 1898
Original to follow: No		Total pages including cover: 2

Subject: **Lot 202 King Street, Randwick**

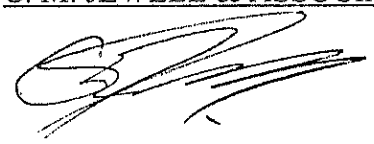
Fran,

I have carried out a review of your Data Assessment Report. I have some comments and have noted several issues which require clarification. These are as follows:

1. Could you please explain samples T3006-S1 and S3 and the VD series samples from 1998. Are these discrete samples, or area composites, or ?
2. Please indicate in which part of the site the 1998 samples RBD001, RBD002, and RBD003 are located.
3. Please identify what stockpile sample SP11-9 represents.
4. URS' report indicates that three samples were composited to produce a stockpile sample. Stockpile samples were analysed for BTEX, although composite samples are not suitable for analysis of volatiles. Please comment.
5. It appears that the results of analysis of stockpile samples have not been assessed against modified assessment criteria to take into account the effect of compositing. Please comment.
6. Figure 2 in your report identifies the location of a former trade waste pit. Please comment.
7. The TPH concentration for sample SZ-54 in Table 1 should be 700 mg/kg. This sample is located in the south-west corner of the site. Please comment on the likely source of the TPH in this sample.
8. The TPH concentrations for samples Z2-1 to Z2-6 in Table 1 are not consistent with the laboratory reports. The TPH concentration for these samples should be not detected.
9. It appears as though no wash blanks were collected during the course of the soil and groundwater sampling. Please comment.
10. Please provide a statistical summary of the data used to assess the site.

11. In the 1998 laboratory reports provided there are samples named SP2 and SP3. What do these samples represent? Do these samples relate to current stockpile numbers?

For and on behalf of
C. M. JEWELL & ASSOCIATES PTY LTD



CHRIS JEWELL

URS

Fax Transmittal

To: Chris Jewell

Company: CM Jewell & Associates

Facsimile: 4759 3257

From: Fran Mitchell

cc: Tim Greenaway (9241 1898)

Date: 30 September 2002

Page 1 of 5

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JDM

Special Instructions: ☐ Confidential ☐ Urgent ☐ Please Reply ☐ For Your Information ☐ For Follow-up

Subject: **Lot 202 King St - Response to Auditors Queries (fax 27/9/02)** URS Project No: 51072-001

Message: Chris

Thank you for the comments from your review of the Data Assessment Report (20 September 2002) for Lot 202 King St, Randwick site. Please find the following responses:

1. Could you please explain samples T3006-S1 and S3 and the VD series samples from 1998. Are these discrete samples, or area composites, or?

Samples T3006-S1, T3006-S3 and VD1, VD3, VD4, VD6 and VD RAMP were collected during 1998 as area composite samples.

2. Please indicate in which part of the site the 1998 samples RBD001, RBD002, and RBD003 are located.

Samples RBD001, RBD002, RBD003 were collected beyond the southern face of the main pit excavation in grid location F5 to G5. These samples were discrete samples collected from the approximate 30m length illustrated in the attached figure.

URS Australia Pty Ltd (ABN 46 000 691 690)
Level 3, 116 Miller Street
North Sydney, NSW 2060 Australia
Tel: 61 2 8925 5500
Fax: 61 2 8925 5555

URS

Fax Transmittal

3. Please identify what stockpile sample SP11-9 represents.

Sample SP11-9 was a composite sample, composited from the individual stockpiles SP9, SP10 and SP11. Each of these stockpiles consist of sandy soil and the total volume is approximately 100 m^3, less than the nominal sampling frequency of 300m^3.

4. URS' report indicates that three samples were composited to produce a stockpile sample. Stockpile samples were analysed for BTEX, although composite samples are not suitable for analysis of volatiles. Please comment.

It is agreed that composite samples are typically not suitable for volatile analyses.

BTEX has been selected as a contaminant of concern for the site in general from the past site use as bus refuelling depot. BTEX results have been less than the laboratory limit of detection for the extent of residual, in-situ samples for both the historical sampling and the more recent sampling. Notwithstanding the absence of BTEX in the residual samples, it was not considered that BTEX would be a contaminant of concern for the stockpiles due to the amount of material rehandling which would have occurred in the excavation and replacement of these materials.

5. It appears that the results of analysis of stockpile samples have not been assessed against modified assessment criteria to take into account the effect of compositing. Please comment.

The composite samples collected were composited from 3-point sub-samples. URS consider that when sampling a stockpile it is not appropriate to divide the guideline value by the number of sub-samples used to prepare the composite. The purpose of collecting a composite sample from a stockpile is to ensure collection of a representative sample that provides an indication of the average concentration of the stockpile at an appropriate sampling density.

Nonetheless, URS has reviewed the data against the revised guideline value (divided by 3). The outcome is that the composite sample from SP1 exceeds the revised guideline value for TPH (C10-C36). The analytical result for SP1 was 400mg/kg in comparison with the revised guideline value of 333 mg/kg (1000 mg/kg divided by 3). This result does not exceed the revised guideline value by more than 250%.

6. Figure 2 in your report identifies the location of a former trade waste pit. Please comment.

The former trade waste pit illustrated on the drawing (Figure 2, Data Assessment Report, 20 September 2002) in the north-western corner of the site is a derelict pit associated with the former bus depot operations. The condition of the pit and its underlying surface shall be assessed during the remediation program planned for this vicinity of the site.

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7.	**The TPH concentrations for sample SZ-54 in Table 1 should be 700 mg/kg. This sample is located in the south-west corner of the site. Please comment on the likely source of the TPH in this sample.**

Sample SZ-54 was collected as a discrete sample from a remedial excavation (known as Zone 5) undertaken in 1995. The analytical result is 700 mg/kg (Amdel laboratory certificate No. 9502353) and the non-detect result reported in Table 1 (Data Assessment Report, 20 September 2002) is an error in the data compilation.

The excavation was completed following a site investigation program completed in 1994 where an isolated area of TPH impact was identified. The source of this TPH impact was considered to be associated with waste fuels and/or oils from a former workshop building. The 'Zone 5' excavation was undertaken beyond the western end of the footprint of a former workshop building. The building footprint was located in grid H1 through to E1, aligned in a east-west direction, approximately 60m long by 20m wide.

During the course of the excavation in 1995, observations of impact were limited. The excavation continued beyond the extent of any visual impact observations and was extended in depth to bedrock at a depth of 3.5m.

8.	**The TPH concentrations for samples Z2-1 to Z2-6 in Table 1 are not consistent with the laboratory reports. The TPH concentration for these samples should be not detected.**

Agreed. This is a data entry error from the data compilation. The correct analytical results for these samples are presented in Amdel laboratory certificate No. 9505659.

9.	**It appears as though no wash blanks were collected during the course of the soil and groundwater sampling. Please comment.**

Rinsate blanks have not been collected as part of the recent groundwater sampling as URS used single use disposable bailers for purging and sampling. Rinsate blanks have not been collected for recent soil sampling. Soil rinsate blanks can provide an indication of the potential for cross contamination of soil samples from sampling equipment. However, the data collected cannot be interpreted in any meaningful way an as such URS do not normally collect rinsate blanks for soil. Should cross contamination occur, then this could result in a false positive being reported and therefore it would, if it occurred, overestimate not underestimate the extent of contamination. However, if it did occur the rinsate blanks do not provide any information that could be used to estimate that magnitude or extent of cross contamination. It is for this reason no rinsate blanks for soils were collected.

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10. Please provide a statistical summary of the data used to assess the site.

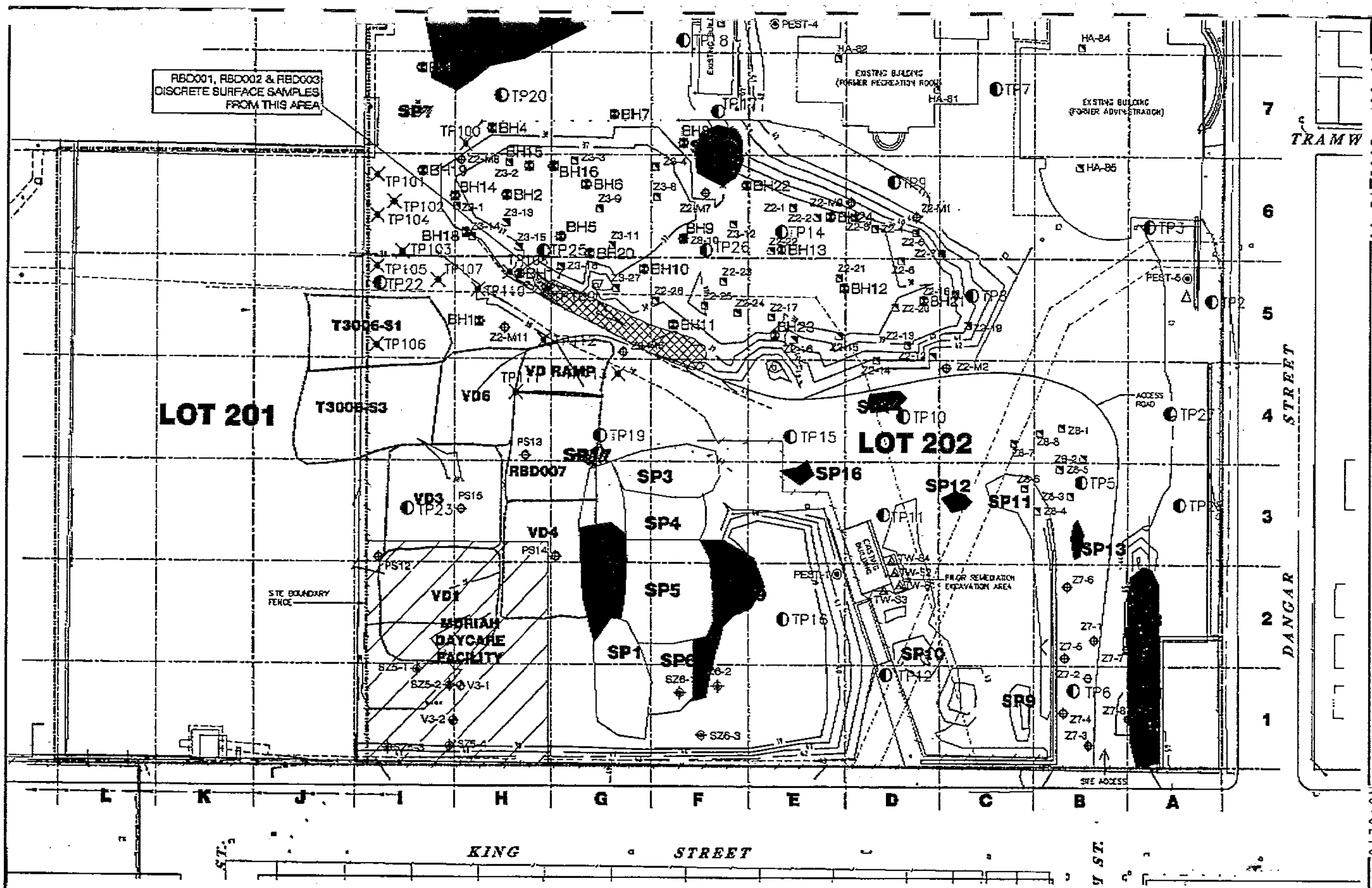
This statistical summary will follow this fascimile later today.

Should you require any further information to assist with your review of the report, please do not hesitate to contact either of the undersigned.

Regards,
URS Australia Pty Ltd

Fran Mitchell
Project Manager

Dr Martin Howell
Project Director



NOTES: (1) BOUNDARY OF MORIAH DAYCARE NOT SURVEYED
(2) SURVEY DATA SOURCED FROM PROUST & GARDNER SURVEY (01/07/99) REF 19987/DET – SOME SITE EXCAVATIONS COMPLETED SINCE FIELD SURVEY AND AS SUCH, SURVEY IS APPROXIMATE ONLY.

CLIENT: SIR MOSES MONTEFIORE JEWISH HOME	TITLE: UPDATED SAMPLING LOCATION PLAN
PROJECT: DATA ASSESSMENT REPORT, LOT 202 KING STREET RANDWICK	
DESIGNED: RM; DRAWN: JT; DATE: 18/08/02; APPROVED: ; DATE: ; STATUS: DRAFT	PROJECT: 81073-001; CAD FILE: 025.DWG; REVISION: A
URS	FIGURE 1

URS

Fax Transmittal

8700
30.9.02
J0807
CMJ
JR

To: Chris Jewell
Company: CM Jewell & Associates
Facsimile: 4759 3257
From: Fran Mitchell
cc: Tim Greenaway (9241 1898)
Date: 30 September 2002
Page 1 of 6

Special Instructions: ☐ Confidential ☐ Urgent ☐ Please Reply ☐ For Your Information ☐ For Follow-up

Subject: **Lot 202 King St - Response to Auditors Queries (fax 27/9/02)** URS Project No: 51072-001

Message: Chris

Further to our fax of earlier today, please find following the response to your Question No. 11:

11. In the 1998 laboratory reports provided there are samples named SP2 and SP3. What do these samples represent? Do these samples relate to current stockpile numbers.

These sample numbers do not relate to the current stockpile numbering system. Site records from 1998 suggest that the material from former SP2 and SP3 was disposed off-site. However, this could not be confirmed for validation purposes and as such, a decision was made to sample and analyse the stockpiles located presently on-site.

Should you require any further information to assist with your review of the report, please do not hesitate to contact either of the undersigned.

Regards,
URS Australia Pty Ltd

Fran Mitchell
Project Manager

Dr Martin Howell
Project Director

URS Australia Pty Ltd (ABN 46 000 691 690)
Level 3, 116 Miller Street
North Sydney, NSW 2060 Australia
Tel: 61 2 8925 5500
Fax: 61 2 8925 5555

URS

Fax Transmittal

To: Chris Jewell

Company: CM Jewell & Associates

Facsimile: 4759 3257

From: Fran Mitchell

cc: Tim Greenaway (9241 1898)

Date: 30 September 2002

Page 1 of 6

Special Instructions: ☐ Confidential ☐ Urgent ☐ Please Reply ☐ For Your Information ☐ For Follow-up

Subject: **Lot 202 King St - Response to Auditors Queries (fax 27/9/02)** URS Project No: 51072-001

Message: Chris

Further to our fax of earlier today, please find following a summary of the statistical assessment of the data compiled as part of the characterisation of Lot 202 King St, Randwick.

10. Please provide a statistical summary of the data used to assess the site.

Statistical analyses have been completed for the residual data sets for the site. Statistics for PAHs and inorganics have been completed across the site as a whole. Statistics for TPH have been divided into those sampling locations associated with the main pit area and those sampling locations associated with the balance of the site. The two separate data sets for TPH are presented in the attached tables.

The attached summary table provides a summary of the statistical analysis. The assessment illustrates that a number of sample results exceed more than 250% of the guideline value for TPH (C9-C36). The area represented by these samples falls within the extent of the footprint proposed for remediation, as referred to in Section 6 of the Data Assessment Report.

URS Australia Pty Ltd (ABN 46 000 691 690)
Level 3, 116 Miller Street
North Sydney, NSW 2060 Australia
Tel: 61 2 8925 5500
Fax: 61 2 8925 5555

URS

Fax Transmittal

Should you require any further information to assist with your review of the report, please do not hesitate to contact either of the undersigned.

Regards,
URS Australia Pty Ltd

Fran Mitchell
Project Manager

Dr Martin Howell
Project Director

TPH Statistical Summary
Residual Data Set
Lot 202 King St Randwick

	Investigation Level[1]		Analytical Results				Statistical Analysis					
Analyte	Mean	Maximum Concentration for Single Sample[2]	PQL[3]	Number Analysed	Maximum	Minimum	Distribution Type[4]	Mean	Median	CV	Std Deviation	95%UCL
Inorganics												
Sulfate - Soluble	2000	5000	10	11	1140	11	Log-Normal	152.455	32	2.2	333	593.6
Arsenic - Total	400	1000	1 - 5	44	7	<1	Normal	1.205	0.5	1.2	1.4	1.6
Cadmium - Total	80	200	1 - 5	44	<1	<1	Normal	0.500	<1	0.0	0.0	0.5
Copper - Total	4000	10000	1 - 5	44	229	<1	Log-Normal	20.273	5.5	2.0	40.3	71.2
Nickel - Total	2400	6000	1 - 5	44	11	<1	Normal	1.511	1	1.1	1.7	1.9
Lead - Total	1200	3000	1 - 5	77	1880	1	Log-Normal	85.571	30	2.7	231.2	288.7
Zinc - Total	28000	70000	1 - 5	44	433	<1	Log-Normal	59.045	23	1.7	100.5	484.4
Total Chromium	400	1000	1 - 5	44	11	1	Normal	2.284	2	0.9	2.0	2.8
Mercury	60	150	0.1	44	<1	<1	Normal	0.074	<1	1.0	0.1	0.1
Total Cyanide	1000	2500	1	11	1	<1	Normal	0.500	0.5	0.0	0.0	0.5
Organics												
TPH C_6-C_9 - Pit Area	65	162.5	2	84	19	1	Normal	4.8	5	0.7	3.4	5.4
TPH C_{10}-C_{36} - Pit Area	1000	2500	250	84	13227	110	Log-Normal	551.9	125	2.9	1580.4	492.2
TPH C_6-C_9 - Balance of Site	65	162.5	2	34	5	1	Normal	3.8	5	0.5	1.8	4.4
TPH C_{10}-C_{36} - Balance of Site	1000	2500	250	34	900	110	Normal	155	110	1.1	165.7	203.2
PAH(total)	20	50	0.05 - 0.1	66	40.05	0.6	Normal	6.717	4	1.1	7.4	8.2
Benzo(a)pyrene	2	5	0.05	54	3.70	<0.1	Log-Normal	0.556	0.25	1.3	0.7	0.6
Benzene	1	2.5	0.2	121	<0.2	<0.2	Normal	0.275	<0.2	1	0	0.3
Toluene	1.4	3.5	0.2	121	<0.2	<0.2	Normal	0.275	<0.2	1	0	0.3
Ethylbenzene	3.1	7.8	0.2	121	<0.2	<0.2	Normal	0.275	<0.2	1	0	0.3
Xylenes	14	35	0.2	121	1.5	<0.2	Normal	0.769	0.2	1	1	0.9

1: NEPM HIL - Level D and NSW EPA Service Station Guidelines

2: Maximum allowable concentration for a single sample

3: Laboratory Practical Quantification Limit (or Limit of Reporting)

4: Normal - 95% upper confidence limit (UCL) of the arithmetic average concentration, Log Normal - 95% UCL of the average concentration for a lognormal distribution

Ref : Sampling Design Guidelines, 1995

Prepared by: (URS)

Checked by: (URS)

TPH Analytical Data
(mg/kg)
Main Pit Area

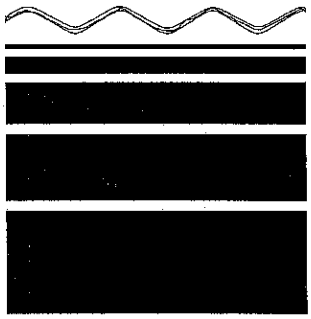
	TPH (C6-C9)	TPH (C10-36)
Units	mg/kg	mg/kg
SAMPLE		
BH8_3.7-3.9	10	125
BH17_0.4-0.7	10	125
BH1_2.3-2.5	10	125
BH3_1.0-1.2	10	125
BH3_3.0-3.2	10	125
BH20_2.0-2.2	10	1129
BH10_1.0-1.2	10	816
BH11_1.0-1.2	10	707
BH12_2.2-2.3	10	465
BH21_1.7	10	125
BH22_2.5-2.7	10	642
BH13_0.8-1.3	10	130
BH9_2.0-2.2	10	445
BH2_2.5-2.7	10	4134
BH14_2.0-2.2	10	1375
BH15_1.3-1.5	10	1320
BH16_1.0-1.2	10	795
BH5_1.8-2.0	10	4751
BH18_3.3-3.5	13	13227
BH4_3.2-3.4	1	125
BH23_1.3-1.5	1	134
BH24_0.8-1.0	1	606
TP100 2.0-2.2	1	125
TP101 3.0-3.2	1	125
TP102 1.0-1.2	1	125
TP103 3.5-3.7	1	125
TP104 1.0-1.2	1	125
TP104 3.5-3.7	1	125
TP105 3.0-3.2	1	125
TP106 3.0-3.2	1	125
TP107 3.5-3.7	1	125
TP108 3.5-3.7	1	125
TP109 3.0-3.2	1	125
TP110 3.0-3.2	1	125
TP111 2.0-2.2	1	125
TP112 3.0-3.2	1	125
TP113 2.0-2.2	1	125
TP113 3.0-3.2	1	125
TP22_0.3-0.5	1	125
TP22_1.3-1.5	1	125
TP25_1.3-1.5	1	1175
TP26_1.3-1.5	1	839
TP14_1.3-1.5	1	643
TP25_0.5-0.7	1	448
TP26_0.3-0.5	1	169
TP26_2.9-3.0	1	953
TP14_0.3-0.5	1	125
TP14_2.4-2.6	1	770
Z2-1	5	110

TPH Analytical Data
(mg/kg)
Main Pit Area

	TPH (C6-C9)	TPH (C10-36)
Units	mg/kg	mg/kg
SAMPLE		
Z2-2	5	110
Z2-3	5	110
Z2-4	5	110
Z2-5	5	110
Z2-6	5	110
Z2-7	5	110
Z2-12	5	110
Z2-13	5	110
Z2-14	5	110
Z2-15	5	110
Z2-16	5	110
Z2-17	5	110
Z2-18	5	110
Z2-19	5	110
Z2-20	5	110
Z2-21	5	110
Z2-22	5	510
Z2-23	5	110
Z2-24	5	110
Z2-25	5	110
Z2-26	5	110
Z2-27	5	110
Z3-1	5	110
Z3-2	5	110
Z3-3	5	110
Z3-4	5	110
Z3-8	5	1300
Z3-9	5	400
Z3-10	5	360
Z3-11	5	110
Z3-12	5	110
Z3-13	5	520
Z3-14	5	110
Z3-15	5	110
Z3-16	5	110

TPH Analytical Data (mg/kg) Balance of Site

	TPH (C6-C9)	TPH (C10-36)
Units	mg/kg	mg/kg
SAMPLE		
TW-S1	5	110
TW-S2	5	110
TW-S3	5	110
TW-S4	5	110
Z8-1	5	110
Z8-2	5	110
Z8-3	5	110
Z8-4	5	110
Z8-5	5	110
Z8-6	5	110
Z8-7	5	110
Z8-8	5	110
SZ-61	5	110
SZ-62	5	900
SZ-63	6	110
SZ-51	5	110
SZ-52	5	110
SZ-53	6	110
SZ-54	5	700
HA81	5	110
HA82	5	110
HA83	5	110
HA84	5	110
HA85	5	110
TP15_0.3-0.5	1	125
TP15_1.3-1.5	1	125
TP24_0.3-0.5	1	125
TP23_1.3-1.5	1	125
TP21_0.3-0.5	1	125
TP01_1.3-1.5	1	125
TP03_0.3-0.5	1	125
TP09_1.3-1.5	1	125
TP6_1.3-1.5	1	125
TP8_1.3-1.5	1	125



APPENDIX C

Information Relied Upon by the Auditor

TABLE 1 - 1995 Historical Data

COC ID	Sample Depth	Laboratory	Batch	Date of Sampling	Pb mg/kg	TPH mg/kg	BTEX mg/kg	PAH mg/kg	Benzo(a) mg/kg	OC/OPs mg/kg	PCBs mg/kg	VHCs mg/kg
				Guideline/HIL 'D'	1200	1000		80	4			
V3-1	0-0.15	AGAL	N95/035203	1995	11	–	–	<LOR	<LOR	–	–	–
V3-2	0-0.15	AGAL	N95/035204	1995	120	–	–	6.3	0.5	–	–	–
		Enviromet	9506041									
Z2-M1	0-0.15	Enviromet	9505153	1995	5	–	–	–	–	–	–	–
Z2-M2	0-0.15	Enviromet	9505153	1995	77	–	–	–	–	–	–	–
Z2-M6	0-0.15	Enviromet	9505196	1995	41	–	–	–	–	–	–	–
Z2-M7	0-0.15	Enviromet	9506018	1995	4	–	–	–	–	–	–	–
Z2-M8	0-0.15	Enviromet	9506018	1995	9	–	–	–	–	–	–	–
Z2-M9	0-0.15	Enviromet	9506018	1995	14	–	–	–	–	–	–	–
Z2-M11	0-0.15	Enviromet	9506025	1995	<LOR	–	–	–	–	–	–	–
NE-M1	0-0.15	Enviromet	9506018	1995	83	–	–	–	–	–	–	–
Z7-1	0-0.5	Enviromet	9505153	1995	<LOR	–	–	–	–	–	–	–
Z7-2	0-0.5	Enviromet	9505153	1995	<LOR	–	–	–	–	–	–	–
Z7-3	0-0.5	Enviromet	9505153	1995	<LOR	–	–	–	–	–	–	–
Z7-4	0-0.5	Enviromet	9505153	1995	6	–	–	–	–	–	–	–
Z7-5	0-0.5	Enviromet	9505153	1995	<LOR	–	–	–	–	–	–	–
Z7-6	0-0.15	Enviromet	9505153	1995	6	–	–	–	–	–	–	–
		AGAL	N95/031688									
Z7-7	0-0.15	Enviromet	9505153	1995	<LOR	–	–	–	–	–	–	–
Z7-8	0-0.15	Enviromet	9505153	1995	5	–	–	–	–	–	–	–
PS-12	0.15-0.3	Enviromet	9506025	1995	15	–	–	–	–	–	–	–
PS-13	0.15-0.3	Enviromet	9506025	1995	<LOR	–	–	–	–	–	–	–
PS-14	0.15-0.3	Enviromet	9506025	1995	<LOR	–	–	–	–	–	–	–
PS-15	0.15-0.3	Enviromet	9506025	1995	14	–	–	–	–	–	–	–
Pest-1	0-0.15	Amdel	9505849	1995	–	–	–	–	–	ND	ND	–
Pest-3	0-0.15	Amdel	9505849	1995	–	–	–	–	–	ND	ND	–
Pest-4	0-0.15	Amdel	9505849	1995	–	–	–	–	–	ND	ND	–
Pest-5	0-0.15	Amdel	9505849	1995	–	–	–	–	–	ND	ND	–
TW-S1	0-1.5	Amdel	9505849	1995	–	ND	ND	–	–	–	–	ND
TW-S2	0-1.5	Amdel	9505849	1995	–	ND	ND	–	–	–	–	ND
TW-S3	0-1.5	Amdel	9505849	1995	–	ND	ND	–	–	–	–	ND
TW-S4	0-1.5	Amdel	9505849	1995	–	ND	ND	–	–	–	–	ND
Z8-1	2.7-2.9	Amdel	9505802	1995	–	ND	ND	–	–	–	–	–
Z8-2	2.7-2.9	Amdel	9505802	1995	–	ND	ND	–	–	–	–	–
Z8-3	2.7-2.9	Amdel	9505802	1995	–	ND	ND	–	–	–	–	–
Z8-4	2.7-2.9	Amdel	9505802	1995	–	ND	ND	–	–	–	–	–
Z8-5	5.5-5.7	Amdel	9505815	1995	–	ND	ND	–	–	–	–	–
Z8-6	2.7-2.9	Amdel	9505802	1995	–	ND	ND	–	–	–	–	–
		AGAL	N95/032612									
Z8-7	2.7-2.9	Amdel	9505815	1995	–	ND	ND	–	–	–	–	–
Z8-8	2.7-2.9	Amdel	9505815	1995	–	ND	ND	–	–	–	–	–
SZ-61	1.0-1.2	Amdel	9502353	1995	–	ND	–	–	–	–	–	–
SZ-62	0.5-0.7	Amdel	9502353	1995	–	900	–	–	–	–	–	–

Prepared By RSM
Checked By Dodz

TABLE 1 - 1995 Historical Data

COC ID	Sample Depth	Laboratory	Batch	Date of Sampling	Pb mg/kg	TPH mg/kg	BTEX mg/kg	PAH mg/kg	Benzo(a) mg/kg	OC/OPs mg/kg	PCBs mg/kg	VHCs mg/kg
			Guideline/HIL 'D'		1200	1000		80	4			
SZ-63	0.5-0.7	Amdel	9502353	1995	–	ND	–	–	–	–	–	–
SZ-51	1.5-1.7	Amdel	9502353	1995	–	ND	–	–	–	–	–	–
SZ-52	3.0-3.2	Amdel	9502353	1995	–	ND	–	–	–	–	–	–
SZ-53	1.5-1.7	Amdel	9502353	1995	–	ND	–	–	–	–	–	–
SZ-54	1.5-1.7	Amdel	9502353	1995	–	ND 700	–	–	–	–	–	–
Z2-1	2.2-2.4	Amdel	9505659	1995	–	8 ND	ND	–	–	–	–	–
Z2-2	2.2-2.4	Amdel	9505659	1995	–	4 ND	ND	–	–	–	–	–
Z2-3	2.2-2.4	Amdel	9505659	1995	–	4 ND	ND	–	–	–	–	–
Z2-4	2.2-2.4	Amdel	9505659	1995	–	14 ND	ND	–	–	–	–	–
Z2-5	2.2-2.4	Amdel	9505659	1995	–	18 ND	ND	–	–	–	–	–
Z2-6	4.5-4.7	Amdel	9505659	1995	–	7 ND	ND	–	–	–	–	–
Z2-7	2.2-2.4	Amdel	9505727	1995	–	ND	ND	–	–	–	–	–
Z2-12	2.2-2.4	Amdel	9505668	1995	–	ND	ND	–	–	–	–	–
Z2-13	2.2-2.4	Amdel	9505668	1995	–	ND	ND	–	–	–	–	–
Z2-14	2.2-2.4	Amdel	9505668	1995	–	ND	ND	–	–	–	–	–
Z2-15	2.2-2.4	Amdel	9505668	1995	–	ND	ND	–	–	–	–	–
Z2-16	2.2-2.4	Amdel	9505668	1995	–	ND	ND	–	–	–	–	–
Z2-17	2.2-2.4	Amdel	9505668	1995	–	ND	ND	–	–	–	–	–
Z2-18	2.2-2.4	Amdel	9505727	1995	–	ND	ND	–	–	–	–	–
Z2-19	2.2-2.4	Amdel	9505727	1995	–	ND	ND	–	–	–	–	–
Z2-20	4.5-4.7	Amdel	9505777	1995	–	ND	ND	–	–	–	–	–
Z2-21	4.5-4.7	Amdel	9505777	1995	–	ND	ND	–	–	–	–	–
Z2-22	4.5-4.7	Amdel	9505777	1995	–	510	ND	–	–	–	–	–
Z2-23	4.5-4.7	Amdel	9505777	1995	–	ND	ND	–	–	–	–	–
Z2-24	2.2-2.4	Amdel	9505777	1995	–	ND	ND	–	–	–	–	–
Z2-25	2.2-2.4	Amdel	9505777	1995	–	ND	ND	–	–	–	–	–
Z2-26	2.2-2.4	Amdel	9505777	1995	–	ND	ND	–	–	–	–	–
Z2-27	2.2-2.4	Amdel	9505815	1995	–	ND	ND	–	–	–	–	–
		AGAL	N95/032613									
Z3-1	1.5-1.7	Amdel	9503656	1995	–	ND	ND	–	–	–	–	–
Z3-2	1.5-1.7	Amdel	9503656	1995	–	ND	ND	–	–	–	–	–
Z3-3	1.5-1.7	Amdel	9503656	1995	–	ND	ND	–	–	–	–	–
Z3-4	1.5-1.7	Amdel	9503656	1995	–	ND	ND	–	–	–	–	–
Z3-8	3.0-3.2	Amdel	9505802	1995	–	1300	ND	–	–	–	–	–
Z3-9	3.0-3.2	Amdel	9505802	1995	–	400	ND	–	–	–	–	–
Z3-10	3.0-3.2	Amdel	9505802	1995	–	360	ND	–	–	–	–	–
Z3-11	3.0-3.2	Amdel	9505802	1995	–	ND	ND	–	–	–	–	–
Z3-12	3.0-3.2	Amdel	9505849	1995	–	ND	ND	–	–	–	–	–
	3.0-3.2	AGAL	N95/032831									
Z3-13	3.0-3.2	Amdel	9505802	1995	–	520	ND	–	–	–	–	–
Z3-14	1.5-1.7	Amdel	9505802	1995	–	ND	ND	–	–	–	–	–
Z3-15	3.0-3.2	Amdel	9505802	1995	–	ND	ND	–	–	–	–	–
Z3-16	1.5-1.7	Amdel	9505802	1995	–	ND	ND	–	–	–	–	–
HA81	0.8-1.0	Amdel	9503299		–	ND	ND	–	–	–	–	–
HA82	0.8-1.0	Amdel	9503299		–	ND	ND	–	–	–	–	–
HA83	0.8-1.0	Amdel	9503299		–	ND	ND	–	–	–	–	–

Prepared By RSM
Checked By Dd 2

TABLE 1 - 1995 Historical Data

COC ID	Sample Depth	Laboratory	Batch	Date of Sampling	Pb mg/kg	TPH mg/kg	BTEX mg/kg	PAH mg/kg	Benzo(a) mg/kg	OC/OPs mg/kg	PCBs mg/kg	VHCs mg/kg
			Guideline/HIL 'D'		1200	1000		80	4			
HA84	0.8-1.0	Amdel	9503388		--	ND	ND	--	--	--	--	--
HA85	0.8-1.0	Amdel	9503299		--	ND	ND	--	--	--	--	--

NOTES
(1) ND denotes not detected
(2) '-' denotes not analysed
(3) <LOR denotes less than laboratory limit of reporting

Prepared By RSM
Checked By Dod2

TABLE 2 - 1998 Historical Data

COC ID	Sample Depth	Laboratory	Batch	Date of Sampling	Pb mg/kg	TPH mg/kg	BTEX mg/kg	PAH mg/kg	Benzo(a) mg/kg	OC/OPs mg/kg	PCBs mg/kg	VHCs mg/kg	Cyanide mg/kg	Sulphate mg/kg	Phenols mg/kg
			Guideline/HIL 'D'		1200	1000		80	4				1000	2000	
RBD001	0-0.15	ALS	ES10697	2-06-98	40	--	--	12.85	1	--	--	--	ND	1140	ND
RBD002	0-0.15	ALS	ES10697	2-06-98	105	--	--	16.45	1.3	--	--	--	ND	119	ND
RBD003	0-0.15	ALS	ES10697	2-06-98	175	--	--	40.05	3.3	--	--	--	ND	205	ND
T3006-S1	0-0.15	ALS	ES11195	30-06-98	84	--	--	<LOR	<LOR	--	--	--	ND	32	ND
T3006-S3	0-0.15	ALS	ES11195	30-06-98	140	--	--	7.5	<LOR	--	--	--	ND	21	ND
VD1	0-0.15	ALS	ES11357	15-07-98	33	--	--	<LOR	<LOR	--	--	--	ND	11	ND
VD3	0-0.15	ALS	ES11357	15-07-98	159	--	--	8.85	0.5	--	--	--	ND	21	ND
VD4	0-0.15	ALS	ES11357	15-07-98	196	--	--	21.2	1.3	--	--	--	ND	32	ND
VD6	0-0.15	ALS	ES11357	15-07-98	26	--	--	<LOR	<LOR	--	--	--	ND	37	ND
RBD007	0-0.15	ALS	ES11304	8-07-98	232	--	--	6.3	<LOR	--	--	--	ND	44	ND
VD-Ramp	0-0.15	ALS	ES11357	15-07-98	4	--	--	<LOR	<LOR	--	--	--	ND	15	ND

NOTES
(1) ND denotes not detected
(2) '-' denotes not analysed
(3) <LOR denotes less than laboratory limit of reporting

Prepared By RSM
Checked By Dod 2

TABLE 3 - 2002 Residual Inorganic Analytical Data

(concentrations in mg/kg)

	Health Investigation Levels			Sample ID	TP25_1.3-1.5	TP26_1.3-1.5	TP14_1.3-1.5	DUP01	TP25_0.5-0.7	TP26_0.3-0.5	TP14_0.3-0.5	TP18_0.3-0.5	DUP02
				Batch Number	ES34682-0	ES34682-0	ES34682-0	ES34682-0	ES34735-0	ES34735-0	ES34735-0	ES34735-0	ES34736-0
	NEPM HIL 'A'	NEPM HIL 'D'	NEPM HIL 'E'	LOR									
Arsenic	100	400	200	1	1	2	2	1	1	1	<LOR	<LOR	<LOR
Cadmium	20	80	40	1	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Chromium	100	400	200	1	3	3	2	2	3	2	2	5	2
Copper	1000	4000	2000	1	75	17	8	9	69	9	6	1	<LOR
Nickel	600	2400	600	1	2	1	1	2	2	2	1	2	2
Lead	300	1200	600	1	113	164	59	55	79	67	39	39	2
Zinc	7000	28000	14000	1	33	58	26	28	26	31	15	9	5
Mercury	15	60	30	0.1	0.1	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR

NOTES
(1) <LOR denotes less than the laboratory limit of reporting
(2) N/A denotes not analysed

Prepared By IAP
Checked by Tods

TABLE 3 - 2002 Residual Inorganic Analytical Data

(concentrations in mg/kg)

	Health Investigation Levels			Sample ID	TP15_0.3-0.5	TP15_1.3-1.5	DUP04	TP20_0.3-0.5	TP22_0.3-0.5	TP22_1.3-1.5	TP23_1.3-1.5	DUP03	TP16_0.2-0.4
				Batch Number	ES34736-0	ES34736-0	ES34736-0	ES34736-0	ES34736-0	ES34736-0	ES34736-0	EB47571-0	ES34741-0
	NEPM HIL 'A'	NEPM HIL 'D'	NEPM HIL 'E'	LOR									
Arsenic	100	400	200	1	<LOR	2	<LOR	<LOR	<LOR	<LOR	<LOR	7	2
Cadmium	20	80	40	1	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Chromium	100	400	200	1	1	4	1	<LOR	2	1	1	2	3
Copper	1000	4000	2000	1	5	<LOR	4	<LOR	3	<LOR	<LOR	1	85
Nickel	600	2400	600	1	<LOR	2	1	<LOR	1	2	<LOR	2	3
Lead	300	1200	600	1	30	5	28	2	50	2	1	2	88
Zinc	7000	28000	14000	1	23	1	16	<LOR	15	<LOR	<LOR	4	218
Mercury	15	60	30	0.1	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR

NOTES
(1) <LOR denotes less than the laboratory limit of reporting
(2) N/A denotes not analysed

Prepared By IAP
Checked by DdZ

TABLE 3 - 2002 Residual Inorganic Analytical Data

(concentrations in mg/kg)

	Health Investigation Levels			Sample ID	TP02_0.2-0.4	TP04_0.3-0.5	TP04_1.3-1.5	DUP06	TP5_1.3-1.5	DUP10	TP12_0.3-0.5	TP8_0.3-0.5	TP8_1.3-1.5
				Batch Number	ES34741-0	ES34741-0	ES34741-0	ES34741-0	ES34741-0	ES34741-0	ES34741-0	ES34761-0	ES34761-0
	NEPM HIL 'A'	NEPM HIL 'D'	NEPM HIL 'E'	LOR									
Arsenic	100	400	200	1	2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Cadmium	20	80	40	1	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Chromium	100	400	200	1	7	1	<LOR	<LOR	<LOR	<LOR	1	<LOR	<LOR
Copper	1000	4000	2000	1	74	4	<LOR	<LOR	<LOR	<LOR	7	1	<LOR
Nickel	600	2400	600	1	2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Lead	300	1200	600	1	1880	17	<LOR	<LOR	1	2	44	3	<LOR
Zinc	7000	28000	14000	1	433	99	<LOR	<LOR	<LOR	<LOR	45	6	<LOR
Mercury	15	60	30	0.1	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR

NOTES
(1) <LOR denotes less than the laboratory limit of reporting
(2) N/A denotes not analysed

Prepared By IAP
Checked by Dad2

TABLE 3 - 2002 Residual Inorganic Analytical Data

(concentrations in mg/kg)

	Health Investigation Levels			Sample ID	DUP12	DUP13	DUP14
				Batch Number	ES34761-0	ES34761-0	ES34761-0
	NEPM HIL 'A'	NEPM HIL 'D'	NEPM HIL 'E'	LOR			
Arsenic	100	400	200	1	<LOR	<LOR	<LOR
Cadmium	20	80	40	1	<LOR	<LOR	<LOR
Chromium	100	400	200	1	<LOR	<LOR	<LOR
Copper	1000	4000	2000	1	<LOR	<LOR	<LOR
Nickel	600	2400	600	1	<LOR	<LOR	<LOR
Lead	300	1200	600	1	2	<LOR	<LOR
Zinc	7000	28000	14000	1	4	1	<LOR
Mercury	15	60	30	0.1	<LOR	<LOR	<LOR

NOTES
(1) <LOR denotes less than the laboratory limit of reporting
(2) N/A denotes not analysed

Prepared By IAP
Checked by Pod 2

TABLE 4 - 2002 Residual TPH/BTEX Analytical Data

(concentrations in mg/kg)

	Guideline	Sample ID	TP25_1.3-1.5	TP26_1.3-1.5	TP14_1.3-1.5	DUP01	TP25_0.5-0.7	TP26_0.3-0.5	TP26_2.9-3.0	TP14_0.3-0.5	TP14_2.4-2.6	TP18_0.3-0.5
		Batch Number	ES34682-1	ES34682-1	ES34682-1	ES34682-1	ES34735-1	ES34735-1	ES34735-1	ES34735-1	ES34735-1	ES34736-1
		LOR										
C6 - C9 Fraction	65	2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	N/A
C10 - C14 Fraction		50	254	113	142	116	<LOR	<LOR	259	<LOR	159	N/A
C15 - C28 Fraction		100	1110	564	501	583	316	169	694	<LOR	611	N/A
C29 - C36 Fraction		100	352	162	<LOR	134	132	<LOR	<LOR	<LOR	<LOR	N/A
C10-C36 Total	1000		1716	839	643	833	448	169	953	<LOR	770	<LOR
Benzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	N/A
Toluene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	N/A
Chlorobenzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	N/A
Ethylbenzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	N/A
meta- & para-Xylene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	N/A
ortho-Xylene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	N/A

NOTES
(1) <LOR denotes less than the laboratory limit of reporting
(2) N/A denotes not analysed

Prepared By IAP
Checked by DdJ

TABLE 4 - 2002 Residual TPH/BTEX Analytical Data

(concentrations in mg/kg)

	Guideline	Sample ID	DUP02	TP15_0.3-0.5	TP15_1.3-1.5	DUP04	TP24_0.3-0.5	TP22_0.3-0.5	TP22_1.3-1.5	TP23_1.3-1.5	TP21_0.3-0.5	DUP03
		Batch Number	ES34736-1	ES34736-1	ES34736-1	ES34736-1	ES34736-1	ES34736-1	ES34736-1	ES34736-1	ES34736-1	EB47571-1
		LOR										
C6 - C9 Fraction	65	2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
C10 - C14 Fraction		50	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
C15 - C28 Fraction		100	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
C29 - C36 Fraction		100	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
C10-C36 Total	1000		<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Benzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Toluene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Chlorobenzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Ethylbenzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
meta- & para-Xylene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
ortho-Xylene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR

NOTES
(1) <LOR denotes less than the laboratory limit of reporting
(2) N/A denotes not analysed

Prepared By TAP
Checked by Dd2

TABLE 4 - 2002 Residual TPH/BTEX Analytical Data

(concentrations in mg/kg)

	Guideline	Sample ID	TP01_1.3-1.5	TP03_0.3-0.5	TP09_1.3-1.5	DUP05	DUP07	TP6_1.3-1.5	TP8_1.3-1.5	DUP13	DUP14	BH8_3.7-3.9
		Batch Number	ES34741-1	ES34741-1	ES34741-1	ES34741-1	ES34741-1	ES34741-1	ES34761-1	ES34761-1	ES34761-1	ES35296-0
		LOR										
C6 - C9 Fraction	65	2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<20
C10 - C14 Fraction		50	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
C15 - C28 Fraction		100	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
C29 - C36 Fraction		100	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
C10-C36 Total	1000		<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Benzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Toluene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Chlorobenzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Ethylbenzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
meta- & para-Xylene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
ortho-Xylene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR

NOTES
(1) <LOR denotes less than the laboratory limit of reporting
(2) N/A denotes not analysed

Prepared By FAP
Checked by Dad2

TABLE 4 - 2002 Residual TPH/BTEX Analytical Data

(concentrations in mg/kg)

	Guideline	Sample ID	BH17_0.4-0.7	BH1_2.3-2.5	BH3_1.0-1.2	BH3_3.0-3.2	DUP06	BH20_2.0-2.2	BH10_1.0-1.2	DUP12	BH11_1.0-1.2	BH12_2.2-2.3
		Batch Number	ES35296-0	ES35296-0	ES35296-0	ES35296-0	ES35296-0	ES35296-0	ES35296-0	ES35296-0	ES35296-0	ES35296-0
		LOR										
C6 - C9 Fraction	65	2	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C10 - C14 Fraction		50	<LOR	<LOR	<LOR	<LOR	<LOR	305	196	193	125	137
C15 - C28 Fraction		100	<LOR	<LOR	<LOR	<LOR	<LOR	824	620	596	582	328
C29 - C36 Fraction		100	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
C10-C36 Total	1000		<LOR	<LOR	<LOR	<LOR	<LOR	1129	816	789	707	465
Benzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Toluene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Chlorobenzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Ethylbenzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
meta- & para-Xylene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
ortho-Xylene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR

NOTES
(1) <LOR denotes less than the laboratory limit of reporting
(2) N/A denotes not analysed

Prepared By IAP
Checked by DDJ2

TABLE 4 - 2002 Residual TPH/BTEX Analytical Data

(concentrations in mg/kg)

	Guideline	Sample ID	BH21_1.7	BH22_2.5-2.7	BH13_0.8-1.3	BH9_2.0-2.2	BH2_2.5-2.7	DUP09	DUP10	BH14_2.0-2.2	BH15_1.3-1.5	BH16_1.0-1.2
		Batch Number	ES35296-0	ES35296-0	ES35296-0	ES35296-0	ES35296-0	ES35296-0	ES35296-0	ES35296-0	ES35296-0	ES35296-0
		LOR										
C6 - C9 Fraction	65	2	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C10 - C14 Fraction		50	<LOR	140	<LOR	95	1170	930	1800	414	110	<LOR
C15 - C28 Fraction		100	<LOR	502	130	350	2810	2460	3820	1360	906	578
C29 - C36 Fraction		100	<LOR	<LOR	<LOR	<LOR	154	134	213	<LOR	304	217
C10-C36 Total	1000		<LOR	642	130	445	4134	3524	5833	1774	1320	795
Benzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Toluene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Chlorobenzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Ethylbenzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
meta- & para-Xylene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
ortho-Xylene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR

NOTES
(1) <LOR denotes less than the laboratory limit of reporting
(2) N/A denotes not analysed

Prepared By IAP
Checked by Dodge

TABLE 4 - 2002 Residual TPH/BTEX Analytical Data

(concentrations in mg/kg)

	Guideline	Sample ID	BH5_1.8-2.0	DUP07	BH18_3.3-3.5	BH4_3.2-3.4	BH23_1.3-1.5	BH24_0.8-1.0	TP100 2.0-2.2	TP101 3.0-3.2	TP102_1.0-1.2	TP103 3.5-3.7
		Batch Number	ES35296-0	ES35296-0	ES5298-0	ES5298-0	ES35293-0	ES35293-0	ES35360-0	ES35360-0	ES35360-0	ES35360-0
		LOR										
C6 - C9 Fraction	65	2	<20	<20	13	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
C10 - C14 Fraction		50	1550	3550	4240	<LOR	<LOR	94	<LOR	<LOR	<LOR	<LOR
C15 - C28 Fraction		100	3050	6910	8690	<LOR	134	512	<LOR	<LOR	<LOR	<LOR
C29 - C36 Fraction		100	151	335	284	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
C10-C36 Total	1000		4751	10795	13227	<LOR	134	606	<LOR	<LOR	<LOR	<LOR
Benzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	N/A	N/A	N/A	N/A
Toluene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	N/A	N/A	N/A	N/A
Chlorobenzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	N/A	N/A	N/A	N/A
Ethylbenzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	N/A	N/A	N/A	N/A
meta- & para-Xylene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	N/A	N/A	N/A	N/A
ortho-Xylene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	N/A	N/A	N/A	N/A

NOTES
(1) <LOR denotes less than the laboratory limit of reporting
(2) N/A denotes not analysed

Prepared By F AP
Checked by Dodz

TABLE 4 - 2002 Residual TPH/BTEX Analytical Data

(concentrations in mg/kg)

	Guideline	Sample ID	TP104 1.0-1.2	TP104 3.5-3.7	TP105 3.0-3.2	DUP103	TP106 3.0-3.2	TP107 3.5-3.7	TP108 3.5-3.7	TP109 3.0-3.2	DUP107	DUP108
		Batch Number	ES35360-0	ES35360-0	ES35360-0	ES35360-0	ES35360-0	ES35360-0	ES35360-0	ES35561-0	ES35561-0	ES35561-0
		LOR										
C6 - C9 Fraction	65	2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
C10 - C14 Fraction		50	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
C15 - C28 Fraction		100	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
C29 - C36 Fraction		100	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
C10-C36 Total	1000		<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Benzene		0.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Toluene		0.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chlorobenzene		0.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ethylbenzene		0.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
meta- & para-Xylene		0.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ortho-Xylene		0.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

NOTES
(1) <LOR denotes less than the laboratory limit of reporting
(2) N/A denotes not analysed

Prepared By IAP
Checked by DdJ2

TABLE 4 - 2002 Residual TPH/BTEX Analytical Data

(concentrations in mg/kg)

	Guideline	Sample ID	TP110 3.0-3.2	TP111 2.0-2.2	TP112 3.0-3.2	TP113 2.0-2.2	TP113 3.0-3.2
		Batch Number	ES35561-0	ES35561-0	ES35561-0	ES35561-0	ES35561-0
		LOR					
C6 - C9 Fraction	65	2	<LOR	<LOR	<LOR	<LOR	<LOR
C10 - C14 Fraction		50	<LOR	<LOR	<LOR	<LOR	<LOR
C15 - C28 Fraction		100	<LOR	<LOR	<LOR	<LOR	<LOR
C29 - C36 Fraction		100	<LOR	<LOR	<LOR	<LOR	<LOR
C10-C36 Total	1000		<LOR	<LOR	<LOR	<LOR	<LOR
Benzene		0.2	N/A	N/A	N/A	N/A	N/A
Toluene		0.2	N/A	N/A	N/A	N/A	N/A
Chlorobenzene		0.2	N/A	N/A	N/A	N/A	N/A
Ethylbenzene		0.2	N/A	N/A	N/A	N/A	N/A
meta- & para-Xylene		0.2	N/A	N/A	N/A	N/A	N/A
ortho-Xylene		0.2	N/A	N/A	N/A	N/A	N/A

NOTES
(1) <LOR denotes less than the laboratory limit of reporting
(2) N/A denotes not analysed

Prepared By IAP
Checked by Dodz

TABLE 5 - 2002 Residual PAH Analytical Data

(concentrations in mg/kg)

	Health Investigation Levels			Sample ID	TP25_1.3-1.5	TP26_1.3-1.5	TP14_1.3-1.5	DUP01	TP25_0.5-0.7	TP26_0.3-0.5	TP14_0.3-0.5	TP18_0.3-0.5	TP15_0.3-0.5	TP15_1.3-1.5
				Batch Numbe	ES34682-2	ES34682-2	ES34682-2	ES34682-2	ES34735-2	ES34735-2	ES34735-2	ES34735-2	ES34736-2	ES34736-2
	NEPM HIL 'A'	NEPM HIL 'D'	NEPM HIL 'E'	LOR										
Naphthalene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Acenaphthylene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Acenaphthene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Fluorene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Phenanthrene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Anthracene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Fluoranthene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Pyrene				0.5	<LOR	0.6	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Benz(a)anthracene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Chrysene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Benzo(b)fluoranthene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Benzo(k)fluoranthene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Benzo(a)pyrene	1	4	2	0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Indeno(1.2.3.cd)pyrene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Dibenz(a.h)anthracene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Benzo(g.h.i)perylene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Total	20	80	40		<LOR	0.6	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR

NOTES

(1) <LOR denotes less than the laboratory limit of reporting

(2) N/A denotes not analysed

Prepared By IAP

Checked by Dad 2

TABLE 5 - 2002 Residual PAH Analytical Data

(concentrations in mg/kg)

	Health Investigation Levels			Sample ID	DUP04	TP20_0.3-0.5	TP23_1.3-1.5	TP21_0.3-0.5	TP16_0.2-0.4	TP02_0.2-0.4	TP04_0.3-0.5	TP04_1.3-1.5	TP07_0.3-0.5	DUP06
				Batch Numbe	ES34736-2	ES34736-2	ES34736-2	ES34736-2	ES34741-2	ES34741-2	ES34741-2	ES34741-2	ES34741-2	ES34741-2
	NEPM HIL 'A'	NEPM HIL 'D'	NEPM HIL 'E'	LOR										
Naphthalene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Acenaphthylene				0.5	<LOR	<LOR	<LOR	<LOR	0.8	<LOR	<LOR	<LOR	<LOR	<LOR
Acenaphthene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Fluorene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Phenanthrene				0.5	<LOR	<LOR	<LOR	<LOR	2.8	<LOR	<LOR	<LOR	0.6	<LOR
Anthracene				0.5	<LOR	<LOR	<LOR	<LOR	1	<LOR	<LOR	<LOR	<LOR	<LOR
Fluoranthene				0.5	0.5	<LOR	<LOR	<LOR	6.2	1.2	<LOR	<LOR	1.1	<LOR
Pyrene				0.5	0.7	<LOR	<LOR	<LOR	7.1	1.6	<LOR	<LOR	1.3	<LOR
Benz(a)anthracene				0.5	<LOR	<LOR	<LOR	<LOR	3	0.6	<LOR	<LOR	<LOR	<LOR
Chrysene				0.5	<LOR	<LOR	<LOR	<LOR	3.7	0.9	<LOR	<LOR	0.6	<LOR
Benzo(b)fluoranthene				0.5	<LOR	<LOR	<LOR	<LOR	4	1.1	<LOR	<LOR	0.7	<LOR
Benzo(k)fluoranthene				0.5	<LOR	<LOR	<LOR	<LOR	2	0.6	<LOR	<LOR	<LOR	<LOR
Benzo(a)pyrene	1	4	2	0.5	<LOR	<LOR	<LOR	<LOR	3.7	0.9	<LOR	<LOR	0.6	<LOR
Indeno(1.2.3.cd)pyrene				0.5	<LOR	<LOR	<LOR	<LOR	2.1	0.6	<LOR	<LOR	<LOR	<LOR
Dibenz(a.h)anthracene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Benzo(g.h.i)perylene				0.5	<LOR	<LOR	<LOR	<LOR	2.3	0.7	<LOR	<LOR	<LOR	<LOR
Total	20	80	40		1.2	<LOR	<LOR	<LOR	38.7	8.2	<LOR	<LOR	4.9	<LOR

NOTES

(1) <LOR denotes less than the laboratory limit of reporting

(2) N/A denotes not analysed

Prepared By IAP

Checked by Dodz

TABLE 5 - 2002 Residual PAH Analytical Data

(concentrations in mg/kg)

	Health Investigation Levels			Sample ID	TP5_1.3-1.5	TP6_1.3-1.5	DUP10	DUP09	TP12_0.3-0.5	TP10_0.3-0.5	TP8_0.3-0.5	DUP12
				Batch Numbe	ES34741-2	ES34741-2	ES34741-2	ES34741-2	ES34741-2	ES34761-2	ES34761-2	ES34761-2
	NEPM HIL 'A'	NEPM HIL 'D'	NEPM HIL 'E'	LOR								
Naphthalene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Acenaphthylene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Acenaphthene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Fluorene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Phenanthrene				0.5	<LOR	<LOR	<LOR	0.7	<LOR	<LOR	<LOR	<LOR
Anthracene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Fluoranthene				0.5	<LOR	<LOR	<LOR	1.3	<LOR	<LOR	<LOR	<LOR
Pyrene				0.5	<LOR	<LOR	<LOR	1.6	<LOR	<LOR	<LOR	<LOR
Benz(a)anthracene				0.5	<LOR	<LOR	<LOR	0.5	<LOR	<LOR	<LOR	<LOR
Chrysene				0.5	<LOR	<LOR	<LOR	0.8	<LOR	<LOR	<LOR	<LOR
Benzo(b)fluoranthene				0.5	<LOR	<LOR	<LOR	0.9	<LOR	<LOR	<LOR	<LOR
Benzo(k)fluoranthene				0.5	<LOR	<LOR	<LOR	0.5	<LOR	<LOR	<LOR	<LOR
Benzo(a)pyrene	1	4	2	0.5	<LOR	<LOR	<LOR	0.8	<LOR	<LOR	<LOR	<LOR
Indeno(1.2.3.cd)pyrene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Dibenz(a.h)anthracene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Benzo(g.h.i)perylene				0.5	<LOR	<LOR	<LOR	0.6	<LOR	<LOR	<LOR	<LOR
Total	20	80	40		<LOR	<LOR	<LOR	7.7	<LOR	<LOR	<LOR	<LOR

NOTES

(1) <LOR denotes less than the laboratory limit of reporting

(2) N/A denotes not analysed

Prepared By IAP

Checked by DdZ

TABLE 6 - Residual Asbestos Analytical Data

	TP19_0.3-0.5	DUP02	TP17_0.3-0.5	TP20_0.3-0.5	TP22_0.3-0.5	TP22_1.3-1.5	TP23_0.3-0.5	TP21_0.3-0.5
	ES34736	ES34736	ES34736	ES34736	ES34736	ES34736	ES34736	ES34736
Sample Description	Mixture of sand, fragments of plaster and debris	Mixture of sand, fragments of plaster and debris	Mixture of sand, stones, fragments of plaster and bitumin and debris	Mixture of sand, stones, fragments of plaster and debris	Mixture of sand, sotnes and debris	Mixture od sand, stones, fragments of plaster and debris	Mixture of sand, stones, fragments of plaster and debris	Mixture of sand, stones and debris
Asbestos Result	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected

Prepared By IAP
Checked by Dod2

TABLE 6 - Residual Asbestos Analytical Data

	DUP03	TP23_0.3-0.5	TP01_0.3-0.5	TP03_0.3-0.5	TP09_0.3-0.5	TP09_0.3-0.5	TP13_0.2-0.4
	EB47571	ES34741	ES34741	ES34741	ES34741	ES34741	ES34741
Sample Description	Soil	Mixture of sand, stones, fragments of plaster and bitumin and debris	Mixture of sandy soil, stones, fragments of plaster and bitumin and debris	Mixture of sandy soil, stones, fragments of plaster and debris	Mixture of sandy soil, stones, plant matter, fragments of plaster and bitumin and debris	Mixture of sand, stones, framents of plaster and debris	Mixture of sandy soil, stones, fragments of plaster and bitumin and debris
Asbestos Result	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected

Prepared By IAP
Checked by Dod2

TABLE 6 - Residual Asbestos Analytical Data

	DUP07	DUP08	TP27_0.3-0.5	TP28_0.3-0.5	TP5_0.3-0.5	TP11_0.3-0.5
	ES34741	ES34741	ES34741	ES34741	ES34741	ES34761
Sample Description	Mixture of sandy soil, stones, fragments of plaster and bitumin and debris	Soil	Mixture of sand, stones, fragments of bitumin and debris	Mixture of sandy soil, stones, plant matter, fragments of plaster, brick and bitumin and debris	Mixture of sandy soil, stones, fragments of plaster and debris	Mixture of sand, stones and debris
Asbestos Result	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected

Prepared By IHP
Checked by Dalz

TABLE 7 - 2002 Stockpile Inorganic Analytical Data

(concentrations in mg/kg)

	Health Investigation Levels			Sample ID	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP11-9	SP10	DUP15	DUP17	DUP11	DUP16
				Batch	ES34762-0	ES34762-0	ES34762-0	ES34762-0	ES34762-0	ES34762-0	ES34762-0	ES34762-0	ES34762-0	ES34762-0	ES34762-0	EB47653-0	EB47654-0
	NEPM HIL 'A'	NEPM HIL 'D'	NEPM HIL 'E'	LOR													
Arsenic	100	400	200	1	7	<LOR	2	<LOR	2	2	<LOR	<LOR	<LOR	1	1	1	3
Cadmium	20	80	40	1	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<1	<1
Chromium	100	400	200	1	11	3	3	3	3	3	4	2	3	3	3	3	3
Copper	1000	4000	2000	1	229	28	28	4	16	12	78	6	9	12	19	13	53
Nickel	600	2400	600	1	11	3	2	1	2	1	2	1	1	1	2	1	3
Lead	300	1200	600	1	278	749	69	37	141	120	128	45	54	71	218	74	204
Zinc	7000	28000	14000	1	272	285	121	23	67	44	39	20	26	115	70	52	363
Mercury	15	60	30	0.1	0.2	<LOR	0.2	<LOR	<LOR	<LOR	0.1	<LOR	<LOR	0.2	0.1	<0.1	0.5

NOTES
(1) <LOR denotes less than the laboratory limit of reporting
(2) N/A denotes not analysed

Prepared By LnP
Checked By Dodz

TABLE 8 - 2002 Stockpile TPH/BTEX Analytical Data

(concentrations in mg/kg)

	Criteria	Sample ID	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP11-9	SP10	DUP15	DUP17	DUP08	DUP16
		Batch	ES34762-1	ES34762-1	ES34762-1	ES34762-1	ES34762-1	ES34762-1	ES34762-1	ES34762-1	ES34762-1	ES34762-1	ES34762-1	EB47653-1	EB47654-1
		LOR													
C6 - C9 Fraction	65	2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
C10 - C14 Fraction		50	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
C15 - C28 Fraction		100	232	<LOR	102	<LOR	<LOR	134	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	201
C29 - C36 Fraction		100	168	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
C10-C36 Total	1000		400	<LOR	102	<LOR	<LOR	134	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	201
Benzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<0.2	<0.2
Toluene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<0.2	<0.2
Chlorobenzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<0.2	<0.2
Ethylbenzene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<0.2	<0.2
meta- & para-Xylene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<0.2	<0.2
ortho-Xylene		0.2	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<0.2	<0.2
BTEX Total															

NOTES
(1) <LOR denotes less than the laboratory limit of reporting
(2) N/A denotes not analysed

Prepared By IAP
Checked By Dodz

TABLE 9 - 2002 Stockpile PAH Analytical Data

(concentrations in mg/kg)

	Health Investigation Levels			Sample ID	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP11-9
				Batch	ES34762-2	ES34762-2	ES34762-2	ES34762-2	ES34762-2	ES34762-2	ES34762-2	ES34762-2
	NEPM HIL 'A'	NEPM HIL 'D'	NEPM HIL 'E'	LOR								
Naphthalene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Acenaphthylene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Acenaphthene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Fluorene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Phenanthrene				0.5	1.4	<LOR	0.5	<LOR	<LOR	4.9	<LOR	<LOR
Anthracene				0.5	0.6	<LOR	<LOR	<LOR	<LOR	1.6	<LOR	<LOR
Fluoranthene				0.5	3.4	<LOR	1.2	<LOR	0.9	3.4	<LOR	<LOR
Pyrene				0.5	3.8	<LOR	1.4	<LOR	1	3.2	<LOR	<LOR
Benz(a)anthracene				0.5	1.7	<LOR	0.6	<LOR	0.5	1.5	<LOR	<LOR
Chrysene				0.5	2	<LOR	0.8	<LOR	0.6	1.6	<LOR	<LOR
Benzo(b)fluoranthene				0.5	3.1	<LOR	1.1	<LOR	0.8	1.7	<LOR	<LOR
Benzo(k)fluoranthene				0.5	1	<LOR	<LOR	<LOR	<LOR	0.6	<LOR	<LOR
Benzo(a)pyrene	1	4	2	0.5	2	<LOR	0.9	<LOR	0.6	1.1	<LOR	<LOR
Indeno(1.2.3.cd)pyrene				0.5	1.1	<LOR	0.6	<LOR	<LOR	<LOR	<LOR	<LOR
Dibenz(a.h)anthracene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR
Benzo(g.h.i)perylene				0.5	1.2	<LOR	0.5	<LOR	<LOR	<LOR	<LOR	<LOR
Total	20	80	40		21.3	<LOR	7.6	<LOR	4.4	19.6	<LOR	<LOR

NOTES
(1) <LOR denotes less than the laboratory limit of reporting
(2) N/A denotes not analysed

Prepared By FAP
Checked By Dwdz

TABLE 9 - 2002 Stockpile PAH Analytical Data

(concentrations in mg/kg)

	Health Investigation Levels			Sample ID	SP10	DUP15	DUP17	DUP11	DUP16
				Batch	ES34762-2	ES34762-2	ES34762-2	EB47653-2	EB47654-2
	NEPM HIL 'A'	NEPM HIL 'D'	NEPM HIL 'E'	LOR					
Naphthalene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR
Acenaphthylene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR
Acenaphthene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR
Fluorene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR
Phenanthrene				0.5	<LOR	<LOR	<LOR	<LOR	3.4
Anthracene				0.5	<LOR	<LOR	<LOR	<LOR	0.7
Fluoranthene				0.5	<LOR	0.7	<LOR	<LOR	3
Pyrene				0.5	<LOR	0.8	<LOR	<LOR	3.7
Benz(a)anthracene				0.5	<LOR	<LOR	<LOR	<LOR	1.5
Chrysene				0.5	<LOR	<LOR	<LOR	<LOR	1.6
Benzo(b)fluoranthene				0.5	<LOR	0.5	<LOR	<LOR	3
Benzo(k)fluoranthene				0.5	<LOR	<LOR	<LOR	<LOR	3
Benzo(a)pyrene	1	4	2	0.5	<LOR	<LOR	<LOR	<LOR	1.8
Indeno(1.2.3.cd)pyrene				0.5	<LOR	<LOR	<LOR	<LOR	1
Dibenz(a.h)anthracene				0.5	<LOR	<LOR	<LOR	<LOR	<LOR
Benzo(g.h.i)perylene				0.5	<LOR	<LOR	<LOR	<LOR	1.2
Total	20	80	40		<LOR	2	<LOR	<LOR	23.9

NOTES
(1) <LOR denotes less than the laboratory limit of reporting
(2) N/A denotes not analysed

Prepared By IAP
Checked By Dodz

TABLE 10 - 2002 Stockpile Asbestos Analytical Data

	DUP14	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP11-9
		ES34762	ES34762	ES34762	ES34762	ES34762	ES34762	ES34762	ES34762
Asbestos		Chrysotile	ND	ND	ND	ND	ND	ND	ND

NOTES
(1) NDdenotes not detected

Prepared By IAP
Checked By Dodz

TABLE 10 - 2002 Stockpile Asbestos Analytical Data

	SP10	DUP15	DUP17	DUP16	FD01	SP1A	SP1B	SP1C	SP1D
	ES34762	ES34762	ES34762	EB47654	ES34978	ES34978	ES34978	ES34978	ES34978
Asbestos	ND	ND	ND	ND	ND	ND	ND	ND	ND

NOTES
(1) NDdenc

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Prepared By IAP
Checked By Dodz

TABLE 11 - Groundwater Monitoring Summary

	Max	MW1	MW2	MW3	MW4	Dup19
TPH						
C6 - C9 Fraction	132	43	<20	39	<20	132
C10 - C14 Fraction	26800	17000	<50	5830	4250	26800
C15 - C28 Fraction	84800	53200	<100	21200	20700	84800
C29 - C36 Fraction	3450	2090	<50	1590	937	3450
C10-C36 Total	115182	72333	0	28659	25887	115182
BTEX						
Benzene	0	<1	<1	<1	<1	<1
Toluene	0	<2	<2	<2	<2	<2
Chlorobenzene	0	<2	<2	<2	<2	<2
Ethylbenzene	0	<2	<2	<2	<2	<2
meta- & para-Xylene	0	<2	<2	<2	<2	<2
ortho-Xylene	0	<2	<2	<2	<2	<2
BTEX Total	0	0	0	0	0	0
Water Parameters						
Date		9-10-02	9-10-02	9-10-02	9-10-02	-
pH	6.92	6.69	6.06	6.71	6.92	-
Temperature (deg. Cel	17.1	15.5	17.1	14.1	13.6	-
EC (uS/cm)	830	248	240	465	830	-
Redox Er (mV)	201	-53	201	30	-71	-
Eh (Er+230)	431	177	431	260	159	-
TDS (mg/L)	410	118.9	112	222	410	-
Dissolved Oxygen (mg/	5.77	2.13	5.77	4.99	2.54	-
Water Levels						
SWL (mBGS)	3.32	3.26	3.32	1.94	2.15	-
SWL (mAHD)	36.56	35.48	35.4	35.79	36.56	-
TOC (mAHD)	38.74	38.74	38.72	37.73	38.71	-

Prepared By RSM
Checked By Dod2

5.0 Inspection Findings

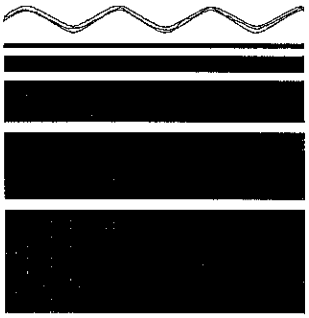
The following section details the site inspection findings of the site.

Table 1: Asbestos Inspection Findings of the Site – Lot 202, Former Randwick Bus Depot

Lot 202 of the former Randwick Bus Depot was divided into the eight (8) areas. The site plan contained in Appendix 2 shows the location of these areas.

AREA	DESCRIPTION OF AREA	ASBESTOS INSPECTION FINDINGS
Area 1	**SE Section of the site** – the eastern section of this area has long sparse to thick grasses. There is a large stockpile located in the SE corner, which comprises mostly large concrete pieces. The ground surface of the site access road to the south is predominately crushed building rubble material. The site access road to the north is covered with a concrete slab surface. Long, sparse to thick grasses restricted visual access to the area located near the mid western side.	Many small AC fragments were noted on the ground surface along the eastern side of this area (i.e. between coordinates A3 and A5) with light building rubble. Refer to Sample No. S2807-01 in Appendix 1.
Area 2	**Mid Southern Section of the site** – the area is predominately covered with a concrete ground slab. There are several small stockpiles, which appear to comprise mostly sandy soil and have a light grass cover and light vegetation. There is a small building located on the mid western side and appears to have been constructed post 1980.	No asbestos or AC fragments were noted on the ground surface and the surface of the stockpiles.
Area 3	**NE Section of the site** – there is a building, which occupies a large portion of this area. The ground surface of the area north of the building is predominately bitumen. Grass areas to the east and west of the building restricted visual access. The building in this area appears to have been constructed post 1980.	No asbestos or AC fragments were noted on the ground surface.
Area 4	**Mid Northern Section of the site** – there is a building, which occupies a large portion of this area. Long, thick grasses restricted visual access surrounding the building to the north, west and east. The ground surface of the area south of the building is predominately bitumen.	Several small AC fragments were noted on the concrete stairs and landing to the three southern entrances and also immediately south of this building (which has a bitumen ground surface). Refer to Sample No. S2807-04 in Appendix 1. Several small AC fragments were noted on the timber flooring in a localised area (i.e. NE corner) inside

AREA	DESCRIPTION OF AREA	ASBESTOS INSPECTION FINDINGS
		the building. Refer to Sample No. S2807-05 in Appendix 1. Note: These AC fragments were removed by Hibbs & Associates. 2 AC downpipe sections (with a total of 5 metres) were noted on the grassed area immediately NW of the building. Refer to Sample No. S2807-06 in Appendix 1. Note: The roof and eaves lining on the building in this area has been removed and is suspected to have been AC sheeting.
Area 5	**NW Section of the site** – concrete ground surface. A large stockpile located in the eastern section of this area comprises mostly bricks and large concrete pieces. A small stockpile in the far SW corner appears to be mostly sandy soil with a grass cover and light vegetation. There is a building located on the eastern side of this area. Long, thick grasses and low-height vegetation restricted visual access on the northern embankment.	At least 10 small AC fragments were noted on the surface of the small far SW stockpile (fringe SW corner of small stockpile only). Refer to Sample No. S2807-07/8 in Appendix 1. 3 small AC fragments were noted on the concrete ground immediately west of the building. Refer to Sample No. S2807-07 in Appendix 1. Note: The roof and eaves lining on the building in this area has been removed and is suspected to have been AC sheeting.
Area 6	**Mid Western Section of the site** – mostly earth ground surface with very light, sparse grass cover. The northern section is covered with a concrete ground slab. Part of a large stockpile, which is also present in Area 7 comprises mostly large concrete pieces, some large brick sections and sandy soil / earth material.	No asbestos or AC fragments were noted on the ground surface.
Area 7	**SW Section of the site** – several large stockpiles mostly comprising large concrete pieces, large brick sections, sandy soil / earth material and other construction materials (eg; rail lines sections, metal pipes). Concrete ground surface noted in the SW and SE corners of this area. Long, thick grasses and low-height vegetation restricted visual access particularly on the top portion of most stockpiles and the eastern embankment.	No asbestos or AC fragments were noted on the ground surface and the surface of the stockpiles.
Area 8	**Near the centre of the site** - large excavated area. Areas of long, thick grasses, reeds and low-height vegetation restricted visual access.	No asbestos or AC fragments were noted on the ground surface.



APPENDIX D

QA/QC Information

9.0 *QUALITY ASSURANCE/QUALITY CONTROL*

Yes	No (Comment below)

9.1 Is a QA/QC narrative included in the report?

9.2 Sample Handling

1) Are COC forms provided, dated and appropriately signed?	✓ ✓ *
2) Were the samples in proper custody between the field and the laboratory?	✓ Not sure *
3) Is documentation of sample preservation provided?	✓ △
4) Is documentation of sample condition on receipt provided?	✓ △
5) Were the samples properly and adequately preserved? *This includes keeping the samples chilled, where applicable.*	Don't know △
6) Were the samples received by the laboratory in good condition?	Don't know △
7) Were the sample holding times met?	✓
8) **Was sample handling adequate? Comment as necessary.**	Don't know △

COMMENTS:

* exceptions include COC's missing for Anadel 9503656 and Enviromt 9506018, 9505196, 9506041.

△ No information provided regarding condition of samples upon receipt.

10.0 LABORATORY

	Yes	No (Comment below)
1. Is the laboratory identified?		
2. Was a NATA registered laboratory used?	✓	
3. Did the laboratory perform the requested tests?	✓	*
4. Are laboratory methods identified?	✓	
5. Were all the laboratory methods adopted NATA endorsed?		
6. Are any non-standard methods adequately justified and validated?		
7. Were the appropriate test procedures followed?		
8. Are PQLs and MDLs for each analyte/matrix combination given?	✓	
9. Were the reporting limits satisfactory?	✓	
10. Was the NATA Seal on the reports?	✓	
11. Were the reports signed by an authorised person?	✓	
12. **Were laboratory reports satisfactory? Comment as required.**	✓	✡

COMMENTS:

* Unsure about whether VHC's were carried out for TW-S1, -S2, -S3, -S4, as page 6 of 6 is missing from Andel report 9505849

✡ exceptions are Andel reports 9505659 and 9505802 – where both had incorrectly placed the moisture data into the TPH C6-C36 total. This is particularly significant in the 9505802 report which mis-reported the C6-C36 totals into the C6-C9 field when C6-C9 was in fact ND. ⇒ sloppy reporting.

✡ Also, AGAL report 08078--133-366 dated 1/6/95 does not specify the units – assumed to be mg/kg.

11.0 FIELD QA/QC

1) Number of samples collected

Soil: 150 (includes duplicates).

Water: 3

2) Number of days of sampling:

Soil: 15

Water: 2

3) Number and type of QA/QC samples collected:

	SOIL			WATER		
	No.	Frequency	Criterion	No.	Frequency	Criterion
Field Duplicates	? See below.			0		
Trip Blanks	0			0		
Wash Blanks	? See below.			0		
Other (Field Blanks, Spiked Trip Blanks, etc.)	0			0		

4) Field Duplicates

	Control Limits		Yes	No (Comment Below)
a. Were an adequate number of field duplicates collected?				See below
b. Were RPDs within control limits?	Min	Max		
• Organics			✓	
• Metals/Inorganics				

COMMENTS:

Difficult to compile without having original reports. Intra lab duplicates appear to have been submitted to AGAT for metals and TPH/BTEX – repeatability was good. However URS notes that no field duplicates were submitted within the same laboratory as the primary samples –
Overall, the number of field duplicates appears to be low, i.e. less than 1 in 10.

5) Trip Blanks

Yes	No (Comment Below)
	✓

a. Were an adequate number of trip blanks collected?
b. Were the trip blanks free of contaminants?
(If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals.)

COMMENTS:

Probably not - but not likely to be an issue as heavy compounds are the issue on site, not volatiles.

6) Wash Blanks

Yes	No (Comment Below)
	✓

a. Were an adequate number of wash blanks collected?
b. Were the wash blanks free of contaminants?
(If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals.)
7) Overview: Was field QA/QC satisfactory? Comment as necessary.

COMMENTS:

Don't think so - (but don't have original report to go from) -

12.0 LABORATORY INTERNAL QUALITY CONTROL PROCEDURES

1) Type and Number of QA/QC Samples

	SOIL			WATER		
	No.	Frequency	Criterion	No.	Frequency	Criterion
Method Blanks/Reagent Blanks						
Matrix Spikes/Matrix Spike Duplicates						
Standard/Certified Reference Material Analysis	—	See	attached	—		
Laboratory Duplicates						
Surrogates						

	Control Limits Min	Control Limits Max	Yes	No (Comment Below)
2) Were the method blanks/reagent blanks free of contamination?			✓	
3) Were the spike recoveries within control limits?			✓	
Organics			✓	
Metals/Inorganic			✓	
4) Were the RPDs of the laboratory duplicates within control limits?			✓	
5) Were the surrogate recoveries within control limits?				
6) Were the origin and batch number of certified reference material stated?				N/A
7) Are all QC results provided?			✓	
8) **Was the overall standard of Laboratory QA/QC adequate? Comment below.**			✓	

COMMENTS:

- Amdel QA/QC good – though sometimes too few duplicates
- Enviromet QA/QC quality O.K. but no blanks carried out
- AGAL QA/QC quality O.K. but a bit too few —

Jun 7 [illegible] 15 [illegible] lab QA [illegible]

Lab	Report #	# samples	soil/water	# blanks	Comment	# spikes	Comment	# CRM	Comment	# lab. dupl.	Comment	# surrogates	Comment
Andel	9505777	7 TPH/BTEX	S	1	o.k.	2	o.k.	0	—	1	o.k.	0	—
Andel	9505802	16 TPH/BTEX	S	1	o.k clean, but too few	2	o.k.	0	—	1	o.k but too few	0	—
"	9505815	4 TPH/BTEX	S	1		2	o.k	0	—	0	lacking	0	—
		1 TPH/BTEX	W	1		2	o.k.	0	—	0			
"	9505849	5 OCP	S	1	O.K.	2	o.k.	0	—	0	lacking	0	—
		5 OPP		1		2	o.k.			0			
		5 PCB		1		0	—			0			
		8 TPH/BTEX		1		2	o.k.			1			
"	9502353	13 TPH	S	1	o.k.	2	o.k.	0	—	1	o.k.	0	—
"	9503299	9 TPH/BTEX	S	1	o.k.	2	o.k.	0	—	1	o.k.	0	—
"	9503388	1 TPH/BTEX	S	1	o.k	2	o.k	0	—	0	—	0	—
"	9503656	10 TPH/BTEX	S	1	o.k.	2	o.k.	0	—	1	o.k.	0	—
"	9505659	7 TPH/BTEX	S	1	o.k	2	o.k.	0	—	1	o.k.	0*	—
"	9505668	6 TPH/BTEX	S	1	o.k.	2	o.k	0	—	1	o.k.	0	—
"	9505727	10	S	1	o.k	2	o.k.	0	—	0	—	0	—
		2	W	1	o.k	2	o.k	0	—	0	—	0	—

[illegible] – 95 [illegible] – Lab QA/QC

page 2

Lab	Report #	# samples	Soil/water	# blanks	Comment	# Spikes	Comment	# CRM	Comment	# lab dupl.	Comment	# surrogates	Comment
Enviromet	9505153	11	S metals	0	—	0	—	1	o.k.	1	o.k.	0	—
"	9506018	5	S metals	0	—	0	—	0	—	1	o.k.	0	—
"	9505196	4	S metals	0	—	0	—	0	—	1	o.k.	0	—
"	9506025	7	S metals	0	—	0	—	0	—	1	o.k.	0	—
"	9506041	6	S metals	0	—	0	—	0	—	1	o.k.	0	—
AGAL	9/6/95	6	S metals + PAH	0 0	— —	1 0	o.k. —	1 0	o.k. —	0 0	— —	0 2	— o.k.
AGAL	1/6/95	1 4	S – metals S – TPH BTEX	1 0	o.k. —	1 1	o.k. o.k.	1 0	o.k. —	0 0	— —	0 1	— o.k.
AGAL	1/6/95	15 12 19	S – metals S – PAH S – TPH/BTEX	0	—	— — 2	— — o.k.	0	—	0	—	4	o.k.

13.0 DATA USABILITY

Are the field and laboratory analytical data provided of adequate quality for the purpose of this audit? Comment below as necessary.

Reasonable - except for lack of confirmation regarding condition of samples in transit, preservation and condition upon receipt by lab.

14.0 ASSESSMENT CRITERIA

	Required?	Present?	Adequate?	Comments
Assessment criteria discussed				
Assessment criteria appropriate				
Assessment criteria tabulated in text				
Assessment criteria provided as appendix				
Assessment criteria appropriately referenced				
Limitations of criteria stated and discussed				

14.1 Evaluating land-use suitability

	Yes	No	Comments
Has the consultant followed the decision process for assessing urban redevelopment sites (pp 28-29 of the Auditor guidelines) when assessing the suitability for a particular land use?			

14.2 Soil Investigation Levels (SILs)

Has the consultant used SILs?			
Have SILs been used appropriately and competently by the consultant?			
If SILs have not been used, has the consultant undertaken a site-specific risk assessment?			

14.3 Petroleum hydrocarbons

Has the consultant used the threshold values published in the *Guidelines for Assessing Service Station Sites 1994*?			
If the Service Station Guideline criteria have not been used, has the consultant undertaken a site specific risk assessment?			

9.0 *QUALITY ASSURANCE/QUALITY CONTROL*

Yes	No (Comment below)

9.1 Is a QA/QC narrative included in the report?

9.2 Sample Handling

1)	Are COC forms provided, dated and appropriately signed?	✓	
2)	Were the samples in proper custody between the field and the laboratory?	✓	
3)	Is documentation of sample preservation provided?	✓	
4)	Is documentation of sample condition on receipt provided?	✓	
5)	Were the samples properly and adequately preserved? *This includes keeping the samples chilled, where applicable.*	✓	
6)	Were the samples received by the laboratory in good condition?	✓	
7)	Were the sample holding times met?	✓	
8)	**Was sample handling adequate? Comment as necessary.**	✓	

COMMENTS:

10.0 LABORATORY

	Yes	No (Comment below)
1. Is the laboratory identified?		
2. Was a NATA registered laboratory used?	✓	
3. Did the laboratory perform the requested tests?	✓	
4. Are laboratory methods identified?	✓	
5. Were all the laboratory methods adopted NATA endorsed?	✓	
6. Are any non-standard methods adequately justified and validated?	N/A	
7. Were the appropriate test procedures followed?	✓	
8. Are PQLs and MDLs for each analyte/matrix combination given?	✓	
9. Were the reporting limits satisfactory?	✓	
10. Was the NATA Seal on the reports?	✓	
11. Were the reports signed by an authorised person?	✓	
12. **Were laboratory reports satisfactory? Comment as required.**	✓	

COMMENTS:

11.0 FIELD QA/QC

1) Number of samples collected
   Soil: 25
   Water: 0

2) Number of days of sampling:
   Soil: 5
   Water: 0

3) Number and type of QA/QC samples collected:

	SOIL			WATER		
	No.	Frequency	Criterion	No.	Frequency	Criterion
Field Duplicates	0?					
Trip Blanks	—	—	—		N/A	
Wash Blanks	0?					
Other (Field Blanks, Spiked Trip Blanks, etc.)	0?					

4) Field Duplicates

a. Were an adequate number of field duplicates collected?
b. Were RPDs within control limits?
   - Organics
   - Metals/Inorganics

Control Limits		Yes	No (Comment Below)
			✓ ⑧
Min	Max		

COMMENTS:

⑧ No field duplicates appears to have been collected — however this information is based on URS's assessment & the Auditor has not viewed the original reports containing these data.

5) Trip Blanks

Yes	No (Comment Below)
	✓

a. Were an adequate number of trip blanks collected?
b. Were the trip blanks free of contaminants?
(If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals.)

COMMENTS:

None collected - though not particularly relevant on this site due absence of contam. from volatiles.

6) Wash Blanks

Yes	No (Comment Below)
	✓

a. Were an adequate number of wash blanks collected?
b. Were the wash blanks free of contaminants?
(If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals.)
7) Overview: Was field QA/QC satisfactory? Comment as necessary.

COMMENTS:

None collected - inadequate -

12.0 LABORATORY INTERNAL QUALITY CONTROL PROCEDURES

1) Type and Number of QA/QC Samples

	SOIL			WATER		
	No.	Frequency	Criterion	No.	Frequency	Criterion
Method Blanks/Reagent Blanks						
Matrix Spikes/Matrix Spike Duplicates						
Standard/Certified Reference Material Analysis	See attached				N/A	
Laboratory Duplicates						
Surrogates						

	Control Limits		Yes	No (Comment Below)
	Min	Max		
2) Were the method blanks/reagent blanks free of contamination?			✓	
3) Were the spike recoveries within control limits?			✓	
Organics			✓	
Metals/Inorganic			✓	
4) Were the RPDs of the laboratory duplicates within control limits?			✓	
5) Were the surrogate recoveries within control limits?			✓	
6) Were the origin and batch number of certified reference material stated?				✓
7) Are all QC results provided?			✓	
8) **Was the overall standard of Laboratory QA/QC adequate? Comment below.**			✓	

COMMENTS:

Quality of ALS's QA/QC was good - though, quantity was a bit low - particularly = no blanks or lab. duplicates for BTEX, TPH, PAH and phenols.

[illegible] 1998 Data Lab QA/QC

Lab	report #	# smpls	soil/waters	# blanks	Comment	# spikes	comment	# CRM	Comment	# lab dupl.	Comment	# surrogates	Comment
ALS	ES 10697	3	5 — metals	1	o.k.	1	o.k.	0	o.k.	1	o.k.	0	o.k.
			cyanide	1		1		0		1		0	
			sulphate	1		1		0		1		0	
			BTEX/TPH	0	lacking	0		0		0	lacking	3	o.k.
			PAH/Phenols	0		0	o.k.	0		0		4/5	o.k.
ALS.	ES 11195	9	metals	1	o.k.	1	o.k.	0	o.k.	1	o.k.	0	o.k.
			cyanide	1		1				1			
			sulphate	1		1				1			
			BTEX/TPH	0	lacking	0	o.k.			0	lacking	3	o.k.
			PAH/Phenols	0		0				0		5/4	
		6	TCLP metals	1	o.k.	1	o.k.			1	o.k.		
			TCLP phenols	1		0				0	lacking	4	
ALS	ES11304	2	metals	1	o.k.	1	o.k.	0	o.k.	2	o.k.	0	o.k.
			cyanide	1		1		0		2		0	
			sulphate	1		1		0		2		0	
			BTEX/TPH	0	lacking	0	o.k.	0		0	lacking	3	o.k.
			PAH/phenols	0		0		0		0		5/4	
ALS	ES11357	11	metals	1	o.k.	1	o.k.	0	o.k.	1	o.k.	0	o.k.
			cyanide	1		1		0		1		0	
			sulphate	1		1		0		1		0	
			BTEX/TPH	0	lacking	0	o.k.	0		0	lacking	3	
			PAH/phenols	0		0		0		0		5/4	
		2	TCLP metals	1	o.k.	1		0		1	o.k.	0	
			TCLP phenols	1		0		0		0	lacking	4	

13.0 DATA USABILITY

Are the field and laboratory analytical data provided of adequate quality for the purpose of this audit? Comment below as necessary.

Data appears to be directly usable, with the reservation that no field duplicates or wash blanks were taken ⇒ hence reproducibility of data - heterogeneity/or homogeneity of soils & sampling equipment decontamination success cannot be conclusively establish

14.0 ASSESSMENT CRITERIA

	Required?	Present?	Adequate?	Comments
Assessment criteria discussed				
Assessment criteria appropriate				
Assessment criteria tabulated in text				
Assessment criteria provided as appendix				
Assessment criteria appropriately referenced				
Limitations of criteria stated and discussed				

14.1 Evaluating land-use suitability

	Yes	No	Comments
Has the consultant followed the decision process for assessing urban redevelopment sites (pp 28-29 of the Auditor guidelines) when assessing the suitability for a particular land use?			

14.2 Soil Investigation Levels (SILs)

Has the consultant used SILs?			
Have SILs been used appropriately and competently by the consultant?			
If SILs have not been used, has the consultant undertaken a site-specific risk assessment?			

14.3 Petroleum hydrocarbons

Has the consultant used the threshold values published in the *Guidelines for Assessing Service Station Sites 1994*?			
If the Service Station Guideline criteria have not been used, has the consultant undertaken a site specific risk assessment?			

9.0 QUALITY ASSURANCE/QUALITY CONTROL

	Yes	No (Comment below)
9.1 Is a QA/QC narrative included in the report?	✓	

9.2 Sample Handling

1) Are COC forms provided, dated and appropriately signed?	✓	
2) Were the samples in proper custody between the field and the laboratory?	✓	
3) Is documentation of sample preservation provided?	✓	
4) Is documentation of sample condition on receipt provided?	✓	
5) Were the samples properly and adequately preserved? *This includes keeping the samples chilled, where applicable.*	✓	
6) Were the samples received by the laboratory in good condition?	✓	
7) Were the sample holding times met?	✓	
8) Was sample handling adequate? Comment as necessary.	✓	

COMMENTS:

10.0 LABORATORY

	Yes	No (Comment below)
1. Is the laboratory identified?	✓	
2. Was a NATA registered laboratory used?	✓	
3. Did the laboratory perform the requested tests?	✓	
4. Are laboratory methods identified?	✓	
5. Were all the laboratory methods adopted NATA endorsed?	✓	
6. Are any non-standard methods adequately justified and validated?	N/A	
7. Were the appropriate test procedures followed?	✓	
8. Are PQLs and MDLs for each analyte/matrix combination given?	✓	
9. Were the reporting limits satisfactory?	✓	
10. Was the NATA Seal on the reports?	✓	
11. Were the reports signed by an authorised person?	✓	
12. **Were laboratory reports satisfactory? Comment as required.**	✓	

COMMENTS:

11.0 FIELD QA/QC

1) Number of samples collected Soil: SEE ATTACHED

Water: SUMMARY SHEETS.

2) Number of days of sampling: Soil: 4

Water: 1

3) Number and type of QA/QC samples collected:

	SOIL			WATER		
	No.	Frequency	Criterion	No.	Frequency	Criterion
Field Duplicates		>10%	10%		>10%	10%
Trip Blanks	0					
Wash Blanks	0					
Other (Field Blanks, Spiked Trip Blanks, etc.)						

4) Field Duplicates

	Control Limits		Yes	No (Comment Below)
a. Were an adequate number of field duplicates collected?			✓	
b. Were RPDs within control limits?	Min	Max		
• Organics	0	35%	✓	
• Metals/Inorganics				

COMMENTS:

4.5. RPD's generally within acceptable limits

5) Trip Blanks

Yes	No (Comment Below)
	✓

a. Were an adequate number of trip blanks collected?
b. Were the trip blanks free of contaminants?
(If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals.)

COMMENTS:

6) Wash Blanks

Yes	No (Comment Below)
	✓
✓	

a. Were an adequate number of wash blanks collected?
b. Were the wash blanks free of contaminants?
(If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals.)

7) Overview: Was field QA/QC satisfactory? Comment as necessary.

COMMENTS:

12.0 *LABORATORY INTERNAL QUALITY CONTROL PROCEDURES*

1) Type and Number of QA/QC Samples

For 2002 sampling.	SOIL			WATER		
	No.	Frequency	Criterion	No.	Frequency	Criterion
Method Blanks/Reagent Blanks		1 batch	1 batch		1 batch	1 batch
Matrix Spikes/Matrix Spike Duplicates	Adequate see attached sheets			0		
Standard/Certified Reference Material Analysis				2	33%	5%
Laboratory Duplicates				0		
Surrogates					100%	100%

	Control Limits		Yes	No (Comment Below)
	Min	Max		
2) Were the method blanks/reagent blanks free of contamination?			✓	
3) Were the spike recoveries within control limits?				
Organics	70%	130%	✓	
Metals/Inorganic	70%	130%	✓	
4) Were the RPDs of the laboratory duplicates within control limits?	-30%	+30%	✓*	
5) Were the surrogate recoveries within control limits?	70%	130%	✓	
6) Were the origin and batch number of certified reference material stated?				✓
7) Are all QC results provided?			✓	
8) Was the overall standard of Laboratory QA/QC adequate? Comment below.			✓	

COMMENTS:

* Except where noted on attached sheet.

13.0 DATA USABILITY

Are the field and laboratory analytical data provided of adequate quality for the purpose of this audit? Comment below as necessary.

Field & laboratory analytical data is adequate.

14.0 ASSESSMENT CRITERIA

	Required?	Present?	Adequate?	Comments
Assessment criteria discussed	✓	✓	✓	
Assessment criteria appropriate	✓	✓	✓	
Assessment criteria tabulated in text	X	X	X	Tabulated in summary tables.
Assessment criteria provided as appendix	X			
Assessment criteria appropriately referenced	✓	✓	✓	
Limitations of criteria stated and discussed				

14.1 Evaluating land-use suitability

Has the consultant followed the decision process for assessing urban redevelopment sites (pp 28-29 of the Auditor guidelines) when assessing the suitability for a particular land use?		Yes

LOT 202 KING ST RANDWICK

SOILS 2002 DATA

① 1 PAH compound low MS (61%) recovery
② RPD of 44% for DUP17 & lab dup for Lead. Pb <220 mg/kg

BATCH	Analyte	No. of Samples	Method Blank	Laboratory Duplicates No.	Laboratory Duplicates RPD's	LCS	SCS DCS	MS MSD		COC	Surrogates	Field Duplicate
ES34682	Metals	4	1 ✓	0		1 ✓		1 ✓		✓		1
Extracted 23.7.02 ✓	TPH	4	1 ✓	0			2 ✓	2 ✓		✓	✓	1
	BTEX	4	1 ✓	0			2 ✓	2 ✓		✓	✓	1
	PAH	4	1 ✓	0			2 ✓	2 ✓		✓	✓	1
ES34735	Metals	4	1 ✓	0		1 ✓		1 ✓		✓		0
Extracted 23.7.02 ✓	TPH	5	1 ✓	0			2 ✓	2 ✓		✓	✓	0
	BTEX	5	1 ✓	0			2 ✓	2 ✓		✓	✓	0
	PAH	4	1 ✓				2 ✓	2 ✓		✓	✓	0
ES34736	Metals	8	1 ✓	0		1 ✓		1 ✓		✓		2
Extracted 23.7.02 ✓	TPH	9	1 ✓	2	✓		2 ✓	2 ✓		✓	✓	2
	BTEX	9	1 ✓	2	✓		2 ✓	2 ✓		✓	✓	2
	PAH	6	1 ✓	2	✓		2 ✓ ①	2 ✓		✓	✓	1
ES34762 Stockpile Samples.	Metals	11	1 ✓	2	✓ ②	1 ✓		2 ✓		✓		2
Extracted 25.7.02 ✓	TPH	11	1 ✓	2	✓		2 ✓	2 ✓		✓	✓	2
	BTEX	11	1 ✓	2	✓		2 ✓	2 ✓		✓	✓	2
	PAH	11		2	✓		2 ✓	2 ✓		✓	✓	2
ES34741	Metals	8	1 ✓	0		1 ✓		1 ✓		✓		2
Extracted 24.7.02 ✓	TPH	6	1 ✓	0			2 ✓	2 ✓		✓	✓	2
	BTEX	6	1 ✓	0			2 ✓	2 ✓		✓	✓	2
	PAH	11	1 ✓	0			2 ② ✓	2 ✓		✓	✓	
ES34761	Metals	5	1 ✓	0		1 ✓		1 ✓				3
Extracted 25.7.02 ✓	TPH	3	1 ✓	0			2 ✓	2 ✓			✓	2
	BTEX	3	1 ✓	0			2 ✓	2 ✓			✓	2
	PAH	3	1 ✓	0			2 ✓	2 ✓ ①			✓	1
ES35293	TPH	2	1 ✓	0			2 ✓	2 ✓		✓	✓	0
Extracted 28.8.02	BTEX	2	1 ✓	0			2 ✓	2 ✓		✓	✓	0

LOT 202 KING ST RANDWICK

2002 DATA

* Analysis request for TP113 3.0-3.2 & DUP 110 No analysis results for DUP 110 supplied although results for TP113 2.0-2.2 provided.

GROUNDWATER.

BATCH	Analyte	No. of Samples	Method Blank	Laboratory Duplicates No.	Laboratory Duplicates RPD's	LCS	SCS DCS	MS MSD		COC	Surrogates	Field Duplicates
ES35294 batch for QC01 & QC02?	TPH	6	1 ✓	0			2 ✓			✓	✓	1
	BTEX	6	1 ✓	0			2 ✓			✓	✓	1
SOIL												
E 35296 collected 28.8.02	TPH	24	2 ✓	4	✓		4 ✓	4 ✓		✓	✓	6
	BTEX	24	2 ✓	4	✓		4 ✓	4 ✓		✓	✓	6
E 35298 collected 27.8.02	TPH	2	1 ✓	0			2 ✓	2 ✓		✓	✓	0
	BTEX	2 16	1 ✓	0			2 ✓	2 ✓		✓	✓	0
1 35560	TPH collected 10.9.02	11	1 ✓	2	✓		2 ✓	2 ✓		✓	✓	1
E835561	TPH	8 *	1 ✓	0			2 ✓	2 ✓		✓	✓	2
TOTALS												
SOILS	Metals	40	At	2 5%		6 15%		7 17%				>10% 10
	TPH	85	least one	10 11%			24 28%	24				>10% 18
	BTEX	66	per	8 12%			20 30%	20				>10% 14
	PAH	39	batch.	4 10%			12 30%	12				>10% 5
WATER	TPH	6	1	0			2 33%					
	BTEX	6	1	0			2 33%					