ACT Government
Chief Minister, Treasury and Economic Development

Freedom of Information Publication Coversheet

The following information is provided pursuant to section 28 of the *Freedom of Information Act 2016*.

FOI Reference: CMTEDDFOI 2020-144

Information to be published	Status
1. Access application	Published
2. Decision notice	Published
3. Documents and schedule	Published
4. Additional information identified	No
5. Fees	Waived
6. Processing time (in working days)	35
7. Decision made by Ombudsman	N/A
8. Additional information identified by Ombudsman	N/A
9. Decision made by ACAT	N/A
10. Additional information identified by ACAT	N/A

To
FOI Coordinator, Information Access Team
Chief Minister Treasury and Economic Development Directorate
ACT Government
GPO Box 158
CANBERRA ACT 2601

Date
27.07.2020

Subject
Request for Information - Contamination Assessments and Environmental Audit Reports - Block 14 Section 38 Fyshwick and Block 11 Section 47 Fyshwick

Dear Sir/Madam

Lolita (ACT) No 1 Pty Ltd and Lolita (ACT) No 2 Pty ltd (the Lessees) are the Crown lessees of land described as Block 11 & 12 Section 38 Fyshwick. This is an application for access to information made on behalf of those entities pursuant to Part 5 Division 5.1 Section 30 of the *Freedom of Information Act 2016* (the FOI Act).

Background
Block 11 & 12 Section 38 Fyshwick are currently included on the ACT Register of Contaminated Sites. Information previously provided indicates that the potential contamination is not limited to Blocks 11 & 12 Section 38 Fyshick and may extend on adjacent land. Our environmental consultant and environmental auditor have identified previous reports commissioned by the ACT Government for that adjacent land being Block 14 Section 38 Fyshwick and Block 11 Section 47 Fyshwick. We seek access to those reports as our environmental consultant and environmental auditor have informed us that access to those reports will assist in undertaking a thorough environmental assessment and subsequent validation of our site.

Location of Information
In response to initial enquiries we have been advised that the reports are not available via a public register. We understand from email advice of 20 July 2020 that the relevant reports are held in hard copy by the ACT Environment Protection Authority (EPA). However, previous requests for access have proven fruitless and consequently we have had to have recourse to the FOI Act.

Information Requested
The requested information comprises the following.

In respect of Block 14 Section 38 Fyshwick:

- *Site Audit Report Proposed East Lake Development ACT* dated 15 July 2011 by Ms Rebeka Hall of WSP Environmental Pty Ltd.

In respect of Block 11 Section 47 Fyshwick:

- *"Underground Fuel Storage Tank Removal and Excavation Validation, Commonwealth Railyards, Kingston, ACT"*, 12 March 2002 by PPK Environmental & Infrastructure P/L";
- *"Addendum Report: Environmental Site Investigations and Site Remedial Works Canberra Railway Station Yards and Rail Corridor"*, 16 August 2001 by PPK Environmental & Infrastructure P/L";
- *"Addendum Report: Environmental Site Investigations and Site Remedial Works Canberra Railway Station Yards and Rail Corridor"*, 16 March 2001 by PPK Environmental & Infrastructure P/L";
- "*Report on Further Soil and Groundwater Investigations Canberra Railway Station and Rail Corridor*", 14 January 1999 by PPK Environmental & Infrastructure P/L";

[redacted]

- *"Report on Further Soil and Groundwater Investigations Canberra Railway Station and Rail Corridor"*, 17 December 1999 by PPK Environmental & Infrastructure P/L;
- "*Phase II Environmental Site Assessment, Canberra Railway Station and Rail Corridor*", 12 November 1998 by PPK Environmental & Infrastructure P/L;
- *"Environmental Audit of the Australian National Facilities, Canberra Railway Station Yards and Rail Corridor"*, 16 March 1998 by PPK Environmental & Infrastructure P/L.

Notices and Communications

Any communications and/or notices issued pursuant to this request for information should be in writing and may be sent to [redacted] or via post to;

[redacted]

Your earliest possible response is requested.

Yours sincerely

[redacted]

[redacted]

ACT Government
Chief Minister, Treasury and Economic Development

Our ref: CMTEDDFOI 2020-144

[redacted]

via email: [redacted]

Dear [redacted]

FREEDOM OF INFORMATION REQUEST

I refer to your application under section 30 of the *Freedom of Information Act 2016* (the Act), received by the Chief Minister, Treasury and Economic Development Directorate (CMTEDD) on 27 July 2020, in which you sought access to:

In respect of Block 14 Section 38 Fyshwick:

- Site Audit Report Proposed East Lake Development ACT dated 15 July 2011 by Ms Rebeka Hall of WSP Environmental Pty Ltd.

In respect of Block 11 Section 47 Fyshwick:

- "Underground Fuel Storage Tank Removal and Excavation Validation, Commonwealth Railyards, Kingston, ACT", 12 March 2002 by PPK Environmental & Infrastructure P/L";
- "Addendum Report: Environmental Site Investigations and Site Remedial Works Canberra Railway Station Yards and Rail Corridor", 16 August 2001 by PPK Environmental & Infrastructure P/L";
- "Addendum Report: Environmental Site Investigations and Site Remedial Works Canberra Railway Station Yards and Rail Corridor'', 16 March 2001 by PPK Environmental & Infrastructure P/L";
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- "Report on Further Environmental Site Investigations and Site Remedial Works Canberra Railway Station Yards and Rail Corridor'', 17 December 1999 by PPK Environmental & Infrastructure P/L;
- "Phase II Environmental Site Assessment, Canberra Railway Station and Rail Corridor'', 12 November 1998 by PPK Environmental & Infrastructure P/L;
- "Environmental Audit of the Australian National Facilities, Canberra Railway Station Yards and Rail Corridor", 16 March 1998 by PPK Environmental & Infrastructure P/L.

Authority

As an appointed Information Officer under section 18 of the Act, I am authorised to make a decision on access or amendment to government information in the possession or control of CMTEDD.

Timeframes

In accordance with section 40 of the Act, CMTEDD was required to provide a decision on your access application by 24 August 2020 however, following on from third party consultations, the due date is now 14 September 2020.

Decision on access

Searches were completed for relevant documents and eight documents were identified that fall within the scope of your request.

I have included as **Attachment A** to this decision the schedule of relevant documents. This provides a description of the documents that fall within the scope of your request and the access decision for each of the documents.

I have decided to grant access in full to four documents under section 26(1) of the *Territory Records Act 2004* and partial access to three documents under the *Freedom of Information Act 2016*. I have decided to refuse access to one document under section 43(1)(d) and section 45(f) of the Act because the information you are seeking has already been provided to you.

My access decisions are detailed further in the following statement of reasons and the documents released to you are provided as **Attachment B** to this letter.

In accordance with section 54(2) of the Act a statement of reasons outlining my decisions is below.

Statement of Reasons

In reaching my access decisions, I have taken the following into account:

- the Act;
- the content of the documents that fall within the scope of your request;
- the *Territory Records Act 2002*.

Exemption claimed

Four documents identified as within scope are over 20 years old and are subject to access provisions under section 26 of the *Territory Records Act 2002*. Section 26 states that:

(1) A record of an agency is open to public access under this Act on the next Canberra Day after the end of 20 years after the record, or the original of which it is a copy, came into existence.

(2) A person is entitled to access under this Act to a record of an agency that is open to public access.

I have considered these four documents and have decided that these records are able to be released to you in full.

My reasons for deciding not to grant access to the identified document are as follows:

Section 43(1)(d) states:

(1) A respondent may refuse to deal with an access application wholly or in part only if—
(d) the government information is already available to the applicant (see section 45).

Section 45(f) states:

For section 43(1)(d), government information is already available to the applicant only if the information—
(f) has otherwise previously been given to the applicant.

Information that would, on balance, be contrary to the public interest to disclose under the test set out in section 17 of the Act

Public Interest

The Act has a presumption in favour of disclosure. As a decision maker I am required to decide where, on balance, public interests lies. As part of this process I must consider factors favouring disclosure and non-disclosure.

In *Hogan v Hinch* (2011) 243 CLR 506, [31] French CJ stated that when 'used in a statute, the term [public interest] derives its content from "the subject matter and the scope and purpose" of the enactment in which it appears'. Section 17(1) of the Act sets out the test, to be applied to determine whether disclosure of information would be contrary to the public interest. These factors are found in subsection 17(2) and Schedule 2 of the Act.

Taking into consideration the information contained in the documents found to be within the scope of your request, I have identified that the following public interest factors are relevant to determine if release of the information contained within these documents is within the 'public interest'.

Factors favouring disclosure in the public interest:

(a) disclosure of the information could reasonably be expected to do any of the following:

(xi) reveal environmental or health risks or measures relating to public health and safety.

Having considered the factors identified as relevant in this matter, I consider that release of information contained in these documents may contribute to revealing environmental or health risks or measures by allowing you to have a record of the documents associated with your access request. However, when considering this finding against the factors favouring non-disclosure, I am satisfied that the protection of an individual's right to privacy, especially in the course of their employment, is a significant factor as the parties involved have provided their personal information for the purposes of completing contracted reporting which, in my opinion, outweighs the benefit which may be derived from releasing the personal information of the individual's involved in this matter. These

individuals are entitled to expect that the personal information they have supplied as part of this process will be dealt with in a manner that protects their privacy.

Factors favouring nondisclosure in the public interest:

(a) disclosure of the information could reasonably be expected to do any of the following:

(ii) prejudice the protection of an individual's right to privacy or any other right under the Human Rights Act 2004;

(xi) prejudice trade secrets, business affairs or research of an agency or person.

I have also considered the impact of disclosing information which relates to business affairs. In the case of *Re Mangan and The Treasury* [2005] AATA 898 the term 'business affairs' was interpreted as meaning 'the totality of the money-making affairs of an organisation or undertaking as distinct from its private or internal affairs'. Schedule 2 section 2.2(a)(xi) allows for government information to be withheld from release if disclosure of the information could reasonably be expected to prejudice the trade secrets, business affairs or research of an agency or person.

In addition to the above factors a third party has stated that the reports in question were "*for the benefit of the Client and no other party*". The reports further state that: "*Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters*".

Charges

Pursuant to *Freedom of Information (Fees) Determination 2017 (No 2)* processing charges are applicable for this request because the total number of pages to be released to you exceeds the charging threshold of 50 pages. However, the charges have been waived in accordance with section 107 (2)(e) of the Act.

Online publishing – Disclosure Log

Under section 28 of the Act, CMTEDD maintains an online record of access applications called a disclosure log. Your original access application, my decision and documents released to you in response to your access application will be published on the CMTEDD disclosure log 3 days after the date of my decision. Your personal contact details will not be published.

You may view CMTEDD disclosure log at https://www.cmtedd.act.gov.au/functions/foi/disclosure-log-2020.

Ombudsman Review

My decision on your access request is a reviewable decision as identified in Schedule 3 of the Act. You have the right to seek Ombudsman review of this outcome under section 73 of the Act within 20 working days from the day that my decision is published in CMTEDD disclosure log, or a longer period allowed by the Ombudsman.

We recommend using this form *Applying for an Ombudsman Review* to ensure you provide all of the required information. Alternatively, you may write to the Ombudsman at:

The ACT Ombudsman
GPO Box 442
CANBERRA ACT 2601

Via email: actfoi@ombudsman.gov.au

ACT Civil and Administrative Tribunal (ACAT) Review

Under section 84 of the Act, if a decision is made under section 82(1) on an Ombudsman review, you may apply to the ACAT for review of the Ombudsman decision. Further information may be obtained from the ACAT at:

ACT Civil and Administrative Tribunal
Level 4, 1 Moore St
GPO Box 370
Canberra City ACT 2601
Telephone: (02) 6207 1740
http://www.acat.act.gov.au/

Should you have any queries in relation to your request please contact me by telephone on 6207 7754 or email CMTEDDFOI@act.gov.au.

Yours sincerely,

Philip Dachs
Information Officer
Information Access Team
Chief Minister, Treasury and Economic Development Directorate

14 September 2020

ACT Government
Chief Minister, Treasury and Economic Development

FREEDOM OF INFORMATION REQUEST SCHEDULE

WHAT ARE THE PARAMETERS OF THE REQUEST	Reference NO.
Environmental reports for Block 14 Section 38 Fyshwick and Block 11 Section 47 Fyshwick	CMTEDDFOI 2020-144

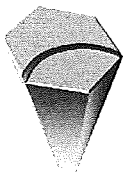
Ref No	Page number	Description	Date	Status	Reason for Exemption	Online Release Status
1	1-95	"Underground Fuel Storage Tank Removal and Excavation Validation, Commonwealth Railyards, Kingston, ACT", 12 March 2002 by PPK Environmental & Infrastructure P/L"	12-Mar-2002	Partial release	Sch 2 s2.2 (a)(ii)	Yes
2	96-196	DRAFT - "Addendum Report: Environmental Site Investigations and Site Remedial Works Canberra Railway Station Yards and Rail Corridor", 16 August 2001 by PPK Environmental & Infrastructure P/L"	16-Aug-2001	Partial release	Sch 2 s2.2 (a)(ii) Sch 2 s2.2 (a)(xi)	Yes
3	197-300	"Addendum Report: Environmental Site Investigations and Site Remedial Works Canberra Railway Station Yards and Rail Corridor", 16 August 2001 by PPK Environmental & Infrastructure P/L"	16-Aug-2001	Partial release	Sch 2 s2.2 (a)(ii) Sch 2 s2.2 (a)(xi)	Yes
4	301-597	"Report on Further Soil and Groundwater Investigations Canberra Railway Station and Rail Corridor", 14 January 1999 by PPK Environmental & Infrastructure P/L"	14-Jan-1999	Full release	N/A	Yes
5	598-1099	"Report on Further Environmental Site Investigations and Site Remedial Works Canberra Railway Station Yards and Rail Corridor", 17 December 1999 by PPK Environmental & Infrastructure P/L	17-Dec-1999	Full release	N/A	Yes
6	1100-1506	"Phase II Environmental Site Assessment, Canberra Railway Station and Rail Corridor", 12 November 1998 by PPK Environmental & Infrastructure P/L	12-Nov-1998	Full release	N/A	Yes
7	1507-1582	"Environmental Audit of the Australian National Facilities, Canberra Railway Station Yards and Rail Corridor", 16 March 1998 by PPK Environmental & Infrastructure P/L	16-Mar-1998	Full release	N/A	Yes
8		Site Audit Report Proposed East Lake Development ACT dated 15 July 2011 by Ms Rebeka Hall of WSP Environmental Pty Ltd	15-Jul-2011	Exempt	Section 43(1)(d) Section 45(f)	Yes

Total No of Docs
8

Rec 21/3/02 m
Spare copy on File.

Underground Fuel Storage Tank Removal and Excavation Validation, Commonwealth Railyards, Kingston, ACT

Indec Consulting



THE INSTITUTION OF ENGINEERS AUSTRALIA
SOUTH AUSTRALIA DIVISION
2001 ENGINEERING EXCELLENCE AWARD WINNER

12 March 2002
27L311E
02-0082-01

PPK
Environment&Infrastructure

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Parsons Brinckerhoff Companies

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THE INSTITUTION OF ENGINEERS AUSTRALIA
SOUTH AUSTRALIA DIVISION
2001 ENGINEERING EXCELLENCE AWARD WINNER

Our Reference 27L311E/PHW/cc

12 March 2002

Mr Colin Denton
INDEC Consulting
300 Flinders Street
ADELAIDE SA 5000

Dear **Colin**

Underground Fuel Storage Tank Removal and Excavation Validation, Commonwealth Railyards, Kingston, ACT

PPK is pleased to provide our report on the above works at the Canberra Railyards. Two copies have been sent direct to Environment ACT as required by the Development Application Approval.

The report documents the removal of three disused fuel underground storage tanks and the reinstatement of the area to the appropriate NSW/ACT standards.

Yours faithfully

Schedule 2.2(a)(ii)

Stuart Glenn
Principal, Environmental Division
PPK E&I Pty Limited

Document ID: 27L311E 02-0082-01	Revision Status: B
Title: Underground Storage Tank (UST) and Site Validation, Former Commonwealth Railyards, Kingston, ACT.	Job Number: 27L311E
Client: Indec Consulting	Date of Issue: March 2002
Release Status (draft, final copy) Final	Report Number: 02-0082-01

	Authority Level	Name	Signature	Date
Prepared by	4	Grant Sainsbery	Schedule 2.2(a)(ii)	12.3.02
Reviewed by	3	Greg Watkins/ Peter Woods		12.03.02 14.03.02
Approved by	3	Stuart Glenn		14/3/02

Dispatch Method	Date	Reference	Comments
Hand			
Courier			
Post			
Other			

DISTRIBUTION				
Organisation	Attention	No. of copies	Comment	Project Manager*
Indec Consulting	Colin Denton	3		PHW 19.3.02
PPK Adelaide	Peter Woods	2	Plus library copy	PHW "
Environment ACT	Daniel Walters	2		PHW "
PPK Sydney	Greg Watkins	1		PHW "

- to be initialled and dated by the PM on issue of the documents

Bound copy viewed & authorised for use .. Schedule 2.2(a)(ii) (Signature)

Contents

List of Tables

List of Figures

Appendices

Glossary

AST	Above ground storage tank.
ANZECC	Australian & New Zealand Environment & Conservation Council.
Apparent thickness	Apparent thickness is the thickness of PSH that can be measured in monitoring wells. The 'true' thickness of PSH on the groundwater is considerably less than the apparent thickness due to capillary forces in the soils. The ration of apparent to true varies with soil type from approximately equal in gravels to up 10 times the true thickness in clay soils.
B[a]P	Benzo [a] Pyrene (a PAH compound).
BTEX	Benzene, Toluene, Ethyl Benzene, Xylenes.
C_6-C_9	Light hydrocarbon chain groups (for example, petrol).
C_{10}-C_{14}	Medium hydrocarbon chain groups (for example, kerosene).
C_{15}-C_{28}	Heavy hydrocarbon chain groups (for example, diesel).
C_{29}-C_{36}	Heavy hydrocarbon chain groups (for example, lube oil).
Eh	Redox potential measured in mV.
EPA	Environment Protection Authority.
KL	Kilolitre (1,000 litres).
< 1, < 100	Less than the PQL, that is, less than 1 or 100 units.
LEL	Lower explosion limit. The lower limit (of vapour and oxygen) that explosive vapours may occur for a particular compound (also see UEL).
LOQ	Limit of quantitation (also see LOR or PQL) – of chemical concentrations attainable from laboratory analysis.
LOR	Limit of Reporting.
mg/kg	Milligram per kilogram (or part per million) – equal to.
mg/L	Milligram per litre (or part per million).
ND (nd)	Not detected above the LOQ or PQL.
NHMRC	National Health & Medical Research Council.
PAH	Polycyclic Aromatic Hydrocarbon.
%RPD	Relative percent difference.
PID	Photoionisation detector.
ppb	Part per billion.
ppm	Part per million.
PQL	Practical Quantitation Limit (of chemical concentration).
PSH	Phase Separated Hydrocarbons, liquid petroleum products usually detected on the groundwater table. Also know as Free Product or Separate Phase (also see apparent thickness).
TDS	Total dissolved solids, a measure of salinity.
TPH	Total Petroleum Hydrocarbons.
TRH	Total Recoverable Hydrocarbons.
µg/L	Microgram per litre (or part per billion).
µS/cm	MicroSiemens per centimetre a measure of conductivity and salinity.
UCL	Upper confidence limit of data set.
UEL	Upper explosion limit. The upper limit that explosive vapours may occur for a particular compound (also see LEL).
UST	Underground Storage Tank.
VHC	Volatile Halogenated Compound.
VOC	Volatile Organic Compound.

Executive Summary

In December 2001, PPK Environment & Infrastructure (PPK) was commissioned by Indec Consulting (Indec) to supervise the removal of three underground fuel storage tanks (USTs) and undertake soil validation sampling of the resulting excavation, at the land currently leased by William Edmunds at the Canberra Railway Yards, Kingston, ACT.

This report provides details of the UST removal and site validation works undertaken on 17 and 18 December 2001. Three USTs were located in a single tank pit with existing fuel infrastructure (bowser, pipework etc) in close proximity. The UST removal, associated excavation and UST destruction were completed by John F Taylor and Sons Pty Ltd.

The remaining tank pit area was then excavated to produce a clean void. The soil was stockpiled adjacent to the tank pit void and sampled for classification while the walls and base of the tank pit was sampled for validation. All samples were analysed for TPH, BTEX, PAHs and lead.

Sample results for both the excavation validation and stockpile material were determined to be less than the site validation criteria, thus the stockpile material was reinstated into the excavation. Additional fill material was imported to the site to make up the excavation void and comprised of "hardcore" gravel and sand/soil mix (top soil). The top soil was sampled and analysed; and both fill types were deemed suitable for use on site.

In summary, PPK concludes that the excavations and stockpiled soils have been appropriately validated. The criteria to which the area has been validated are the NSW EPA sensitive land use criteria specified in the NSW EPA Guidelines for Assessing Service Station Sites (1994). The results also meet the NEHF Residential "A" and Commercial/Industrial "F" Criteria found in the NSW EPA Guidelines for the NSW Site Auditor Scheme (1998). Therefore, this portion of the site is considered from an environmental and human health perspective to be suitable for either commercial/industrial or residential land use.

1. Introduction

In December 2001, PPK Environment & Infrastructure (PPK) was commissioned by Indec Consulting (Indec) to undertake supervision of the removal of three underground storage tanks (USTs) and associated infrastructure at Canberra Railway Yards (Block 2 Section 47 – Fyshwick) located off Newcastle Street, Kingston, ACT (*Figure 1*).

The USTs were used as part of a refuelling facility for railway vehicles and equipment located on the site. The USTs were located within a single tank pit with bowsers located adjacent.

The objectives of the site works were to:

- remove the USTs and associated fuel related infrastructure;
- excavate tank pit backfill sands and stockpile;
- validate the walls and base of the tank pit excavation;
- assess the stockpiled material to determine either appropriate re-use or disposal options; and
- reinstate the area.

John F Taylor and Sons Pty Ltd (JFT) was the contractor appointed to complete the excavation of the USTs, their destruction and subsequent refurbishment of the site. JFT are appropriately qualified and licensed to undertake these works.

1.1 Site History and Previous Investigations

The Canberra Railway Yards have been extensively used for rail activity since the early 1900s and provided facilities for rail storage, maintenance and refuelling. The site also contained a landfill, which was predominantly used for the disposal of commercial and domestic refuse. These activities have resulted in numerous impacts to the soils and groundwater at the site.

A series of extensive environmental assessments were conducted on the site by PPK between 1998 and 2000, which resulted in a program of remediation. The investigations have included:

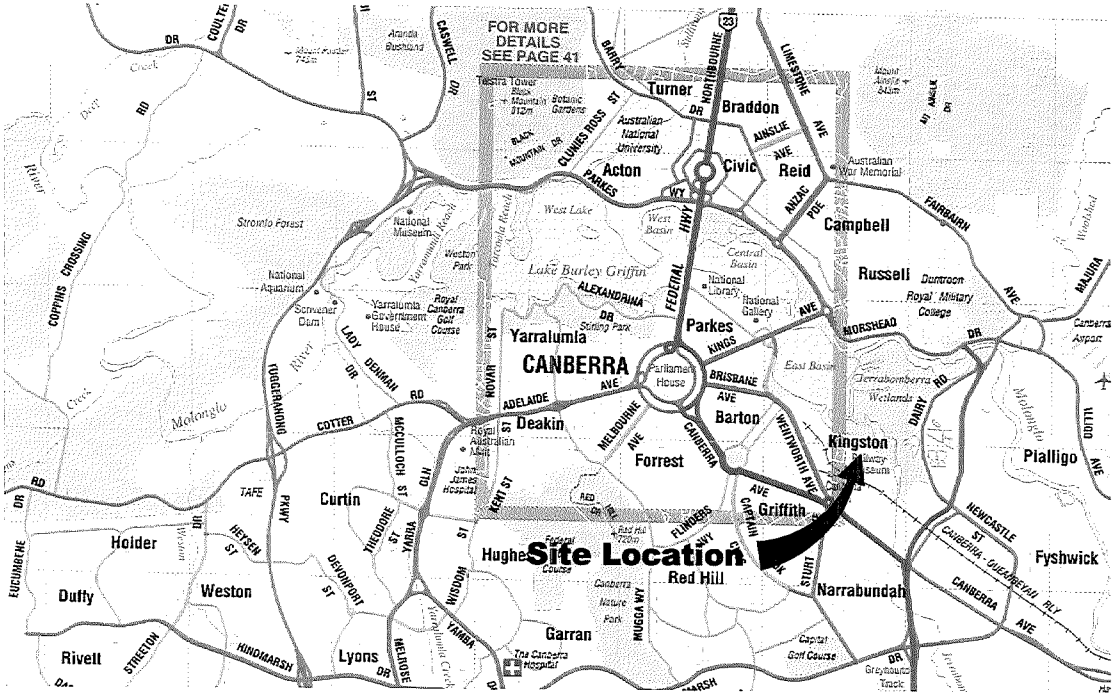
- Phase 1 Environmental Audit of the Australian National Facilities Canberra Railway Station Yards and Rail Corridor Report (PPK document number 98-182) in March 1998;

- Phase 2 Environmental Site Assessment Canberra Railway Station Yards and Rail Corridor (PPK document number 98-845) in November 1998;

- Phase 2B Further Soil and Groundwater Investigation, undertaken by PPK and reported in the PPK document Report on Further Soil and Groundwater Investigations Canberra Railway Station Yards and Rail Corridor' (PPK document number 99-0885-00) in December 1999; and

Client: Indec Consulting
Project: UST Removal and Excavation Validation
Location: Kingston, ACT

PPK
Environment&Infrastructure



1000 0 1000 2000 3000 4000 5000 Metres

Scale 1: 100,000

Site Locality

Figure 1

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- Addendum Report: Environmental Site Investigations and Site Remedial Works Canberra Railway Station Yards and Rail Corridor (PPK Document No. 01-0078-01 dated February 2001).

During the above investigations three USTs were discovered adjacent to an area of the site leased by William Edmunds for the storage of plumbing supplies. The removal of these USTs is the subject of this report.

2. Scope of Works

The scope of work undertaken for this project included:

- prepare a project safety plan (HASP) to identify all the foreseeable hazards associated with the site works and measures to be employed to reduce or remove the associated risks;
- excavate, remove and dispose of the three USTs and associated fuel dispensing infrastructure;
- excavate and stockpile backfill material from beneath the former bowser area and from within the tank pit;
- sample excavation walls and base and soil stockpile for validation and characterisation;
- analyse samples for Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethyl Benzene and Total Xylenes (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs) and Lead;
- barricade the excavations in a secure manner for the duration of site works;
- implement all necessary environmental safeguards during the course of the works;
- reinstate the site to a safe condition; and
- produce a report detailing the results of the site works, validation sampling and conclusions.

3. Background Information

3.1 Site Description

The address of the property is Newcastle Street, Kingston, ACT, with the railway corridor extending to the east through Queanbeyan in New South Wales.

The site is located in a mixed residential, industrial and commercial area and is bounded by Newcastle Street and Mildura Street to the north and west of the site respectively. Some residential buildings are located adjacent to the site to the north. The Jerrabomberra Creek borders the site to the northeast, and commercial and light industrial premises border the site to the south. The Jerrabomberra Creek crosses the site to the southeast of the main railway station yards and flows north and northwest into Lake Burley Griffin.

The site is a rectangular shaped block, situated along the western side of a railway siding and is currently being leased from the Federal Government by William Edmunds for a plumbers workshop and store. The site consists of an elevated warehouse (elevated to allow for the movement of goods between the store and trains) and road way. The USTs are located in a grassy area to the north west of the warehouse. A schematic site layout is shown in *Figure 2*.

The known details of each tank are presented in *Table 3.1*, below.

Table 3.1 Tank Inventory

	Tank Type	Nominal Capacity (Litres)	Product Stored	Approximate Age (Years)
1	Underground Storage Tank	5,000	Unknown	Unknown
2	Underground Storage Tank	10,000	Diesel	Unknown
3	Underground Storage Tank	10,000	Super	Unknown

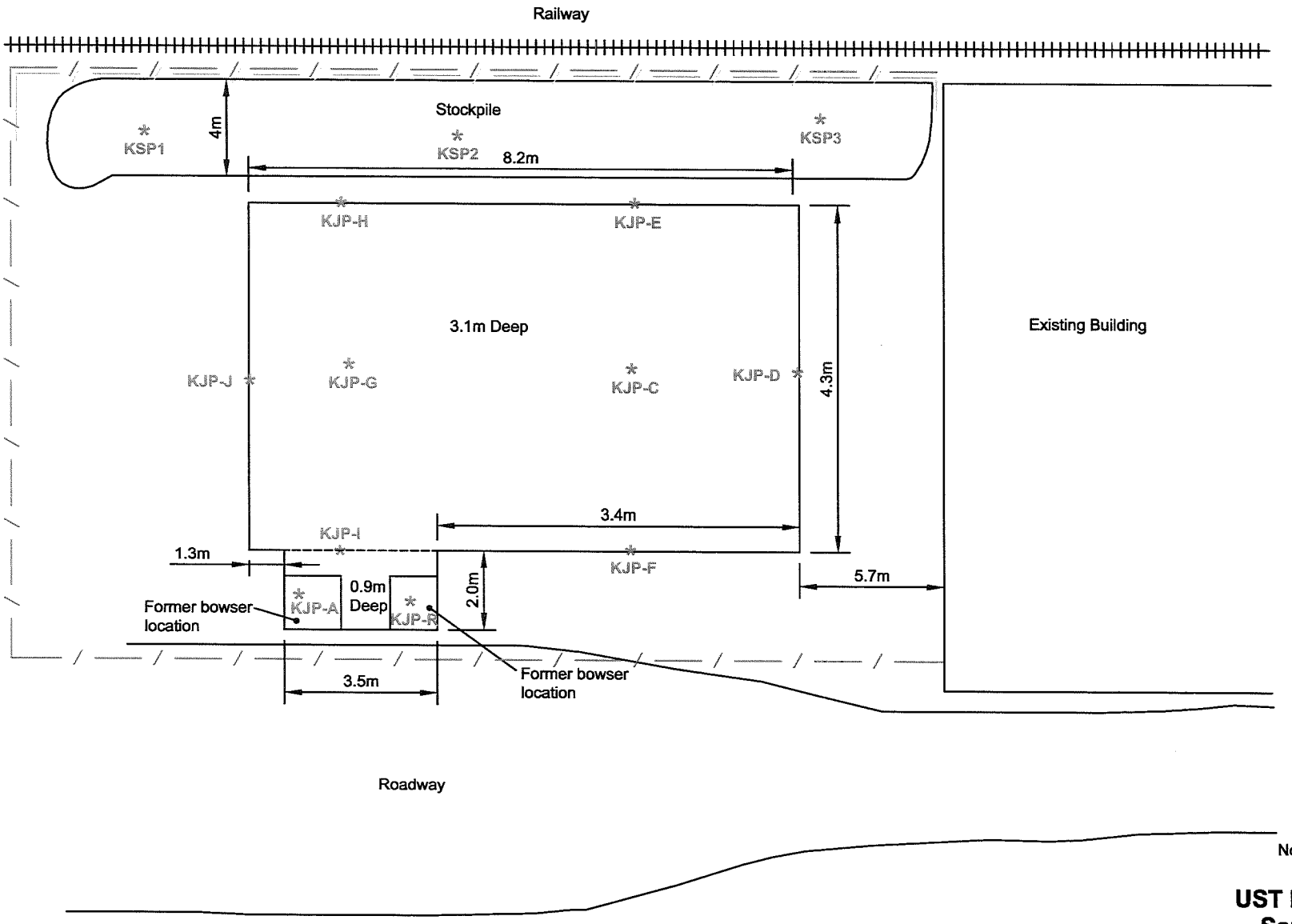
3.2 Topography

The main railway station area and adjacent shunting yards have undergone substantial filling in the eastern part of the site and some cutting to the southwest of the rail lines. The entire area is reasonably flat, with elevations between approximately 560 and 564 m above Australian Height Datum (AHD). Along the north eastern boundary of the site (adjacent to the Jerrabomberra Creek silt trap), an embankment several metres high is present, created by the placement of fill in this area. The residential development to the north is several metres higher than the railway yards area, and the site slopes away from the residential area towards the south and east.

From where the rail line crosses the Jerrabomberra Creek, the ground level along the rail corridor rises steadily towards the south east from an elevation of approximately 560 mAHD adjacent the creek to approximately 580 mAHD at the Newcastle Street bridge.

Client: Indec Consulting
Project: UST Removal and Excavation Validation
Location: Kingston, ACT

PPK
Environment & Infrastructure



Not to Scale

UST Excavation and Sample Locations

Figure 2

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3.3 Local Soil and Groundwater

For a detailed discussion of the local soil profile, and the regional and local hydrogeology, please refer to the PPK report 'Phase II Environmental Site Assessment, Canberra Railway Station and Rail Corridor' (PPK Document No. 98-845) dated November 1998.

In general, the soil found on the site consisted predominately of a mixture of sedimentary rock (calcareous shale, limestone, sandstone and tuff) and alluvial soil deposits (gravel, sand, silt and clays associated with Jerrabomberra Creek).

Anecdotal information suggests that the local groundwater depth varies seasonally from 2 mBGL to 10 mBGL, but generally lies between 4 and 6 mBGL.

During the excavation and validation activities the geology was observed to consist of silty sand fill with fragments of glass, rock, concrete and the occasional car tyre to a depth of 2.0 mBGL. The natural material underlying the fill consisted of a dry red silty clay and extended to the limit of the investigation at 3.1 mBGL.

A generalised stratigraphic log is presented in *Table 3.2*.

Table 3.2 Generalised Stratigraphic Log

Average Depth (mBGL)	Lithology
0.0–2.0	Fill; silty sand, red – orange/brown, fine grained, dry, loose. Contained fragments of glass, concrete, rock, plastic and car tyres.
2.0–3.1 (Limit of Investigation)	Silty CLAY; Red /dark brown, low plasticity, MC < PL, firm, some organic matter.

Notes: mBGL = metres below ground level.

4. Field Work

Site demolition and validation works were undertaken on 17 and 18 December 2001. All site infrastructure including the USTs, pipe work and fuel dispensing facilities were removed from site and disposed of accordingly. The tank pit was excavated to a depth of 3.1 mBGL, and to 0.9 mBGL beneath the former bowser locations. No groundwater was encountered during excavation works. An inventory of underground storage tanks is presented in *Table 3.1*.

On completion of the removal of the USTs and associated infrastructure, the tanks were inspected and were found to be in good condition. The tank pit was cleaned and excavated backfill material stockpiled. The entire work area was secured with semi-permanent steel mesh fence and the tank pit void was individually fenced with day glow mesh fencing. The appropriate warning signs were attached to the perimeter fence surrounding the site.

A copy of tank destruction certificates is presented in *Appendix A* and the relevant PPK Day Sheets are presented in *Appendix B*.

5. Excavation Validation

The soil validation samples were collected from the walls and base of the excavation to confirm that any potentially impacted material was removed. Material removed was stockpiled adjacent to the excavation. Approximately 75 m^3 of excavated soil was stockpiled on-site. Validation of the stockpiled soil included collection and analysis of approximately one soil sample per 25 m^3. The sample locations were spread evenly over the stockpile in order to characterise the material as a whole.

Soil validation samples were collected from the excavation and stockpile in duplicate. The primary sample was collected for chemical analysis, while the secondary sample was collected for a headspace analysis to determine soil vapour volatile organic compound (VOC) levels using a portable Photo Ionisation Detector (PID). Analysis of the headspace samples consisted of a snap-lock bag filled with the sampled soil to obtain a ratio of approximately 1:5 soil to air. The sample was then left to equilibrate. A small hole was made through the snap lock seal and the probe of the PID inserted. The VOC reading for the sample was recorded as a guide to likely soil impact. Calibration details for the PID are presented in the PPK field day sheets (*Appendix B*).

Samples were collected from at least 0.3 m depth to minimise any loss of volatiles, which would be expected from the surface soils. The extent of the excavation is shown in *Figure 2*.

All field sampling methods, labelling, transportation, storage and QA/QC procedures were in accordance with PPK's standard procedures which are presented in *Appendix C*.

Intra-laboratory and inter-laboratory samples were collected in the field at a ratio of at least 1:10 and 1:20 respectively.

Sampling containers were provided by the laboratory, Amdel, who also advised the type of sample container, sample preservation technique and holding time suitable for each analysis.

All samples retained for chemical analysis were stored in appropriately chilled secure insulated containers and transported to the laboratory certified by NATA for the required analyses (TPH, BTEX, PAHs and Lead). The integrity of the samples was assured by the use of "chain of custody" documentation that accompanied the samples from the time of collection until their receipt by the laboratory. PPK selected Amdel Pty Limited, Asquith NSW, as the primary laboratory, with Australian Laboratory Services Pty Ltd as the secondary check laboratory. Amdel and ALS meet in house compliances under the respective ISO 9001 quality assurance programs, are NATA certified and perform their own internal QA/QC programs. All analytical methods used by the laboratories conform (where required) to Schedule B(3) (NEPM, 1999). The laboratory certificates are presented in *Appendix A*.

6. Validation Criteria

To assess the significance of any contamination detected in the soil during the UST removal and tank pit validation of the former refuelling facility it is necessary to define the concentrations to be used for comparison.

The NSW EPA uses, as its primary evaluation criteria for land use, a combination of guidelines as follows:

Soil

- NSW EPA Guidelines for the NSW Site Auditor Scheme (NSW EPA, 1998).
- NSW EPA Guidelines for Assessing Service Station Sites (NSW EPA, 1994).

Environment ACT has adopted these guidelines for assessment of contaminated sites.

Each of the above criteria is discussed in further detail below.

Guidelines for the NSW Site Auditor Scheme

The NSW EPA have outlined soil investigation levels for use by site auditors undertaking site audits in NSW. These guidelines outline Health-Based Investigation Levels and Provisional Phytotoxicity-Based Investigation Levels (for sandy loams, pH 6-8).

Furthermore, the Health-Based Investigation Levels are outlined for four categories of development as follows:

- residential with gardens and accessible soil (home grown produce contributing less than 10 percent fruit and vegetable intake; no poultry), including children's day care centre, preschools and primary school, or town houses or villas;
- residential with minimal access to soil including high rise apartments and flats;
- parks, recreational open space, playing fields including secondary schools; and
- commercial or industrial.

NSW EPA Guidelines for Assessing Service Station Sites

Threshold concentrations for sensitive land uses are contained within the NSW EPA Guidelines for Assessing Service Station Sites (1994). These levels are for the redevelopment of former service station sites, however can be applied to other former land uses where hydrocarbons have been used. Some of the levels quoted in these guidelines are derived from work carried out by the Dutch Government, while others are based upon the ANZECC (1992) Investigation Levels.

Adopted Validation Criteria – Soils

PPK selected the "NSW EPA (1998) Guidelines for the NSW Site Auditor Scheme" NEHF F SIL4 Criteria (that is, Commercial/Industrial) and the NSW EPA (1994) Guidelines for Assessing Service Station Sites" as the primary validation criteria. Additionally consideration will also be given to the "NSW EPA (1998) Guidelines for the NSW Site Auditor Scheme" SIL5 (that is, provisional phytotoxicity based investigation level for sandy loams, pH 6–8).

The adopted Validation Criteria for soils are presented in *Table 6.1*.

Table 6.1 Site Validation Criteria – Soils

Contaminant	Threshold Concentration for Soils (mg/kg)	
Heavy Metals:		
Lead	1,500[1]	600[2]
Total Petroleum Hydrocarbons:		
C_6–C_9	65[3]	
C_{10}–C_{40}	1,000[3]	
Monocyclic Aromatic Hydrocarbons:		
Benzene	1[3]	
Toluene	1.4[3]	
Ethyl benzene	3.1[3]	
Total Xylenes	14[3]	
Polycyclic Aromatic Hydrocarbons:		
Total	100[1]	
Benzo(a)pyrene	5[1]	

Notes:
1 NSW EPA (1998) Guidelines for the NSW Site Auditor Scheme – Commercial/Industrial (NEHF F).
2 NSW EPA (1998) Guidelines for the NSW Site Auditor Scheme – Provisional Phytotoxicity based investigation levels for sandy loams.
3 NSW EPA (1994) Guidelines for Assessing Service Station Sites.

Should additional material be required to fill voids in the excavation left by removal of the USTs, the material will be analysed for substances of concern as outlined in the NSW EPA (1994) Guidelines.

7. Site Results and Discussion

7.1 Field PID Readings

The PID readings for validation excavation and stockpile samples ranged from 1.2 to 6.9 ppm and 1.6 to 4.2 ppm respectively. All PID readings were found to be low, indicating that the soil had not been significantly impacted by photoionisable Volatile Organic Compounds (VOCs). All PID results are presented in *Table 7.1*.

7.2 Excavation Validation

A total of 10 validation samples were collected from the UST excavation and indicate the following:

- all validation samples collected and analysed contained concentrations of TPH, BTEX and PAHs which were either less than the laboratory quantifiable detection limit and/or less then the site validation criteria;
- lead concentrations ranged between 8 and 39 mg/kg. These concentrations are less than the validation criteria; and
- the chemical analysis results are presented in *Tables 7.1 and 7.2,* with copies of the NATA certified laboratory reports presented in *Appendix D*.

7.3 Excavated Material

Three stockpile samples were collected from material excavated in accordance with a 1:25 m^3 ratio from a depth of 0.3 m. All stockpile samples reported TPH, BTEX, PAH and lead results less than the adopted site validation criteria. Given the results of the chemical analysis, this material was considered suitable for reinstatement of the void. The chemical analysis results are presented in *Tables 7.1 and 7.2* with copies of the NATA certified laboratory reports presented in *Appendix D*.

7.4 Imported Fill

To make up the void left in the excavation by the removal of the USTs, additional material was required to be imported to the site. This material comprised crushed igneous rock "hardcore" filling and sand/soil mix (top soil) supplied by Corkhill Bros. Sales Pty Ltd.

This material was visually free from contamination. However, to verify its suitability for use on site, one sample of the top soil was collected and submitted for chemical analysis for TPH/BTEX/PAHs, organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs) and a suite of heavy metals. The chemical analysis results are presented in *Tables 7.3 and 7.4* with copies of the NATA certified laboratory reports presented in *Appendix D*.

The results of chemical analysis indicated concentrations of TPH/BTEX, PAHs, OCPs and PCBs less than the detection limit of the laboratory method used. Concentrations of heavy metals were either low or less than the detection limit of the laboratory method used. All concentrations reported were less than the site validation criteria, thus the material was considered suitable for use on site.

8. Quality Assurance/Quality Control

Field methods were consistent with PPK's Field Procedures. *Table 8.1* summarises the conformance of field and laboratory QA/QC with respect to data quality objectives.

Table 8.1 Data Validation

Data Quality Objective	Completed	Comments
Clean sample collected from centre of excavation bucket by hand.	Yes	Clean samples were taken from the excavator bucket taking care not to take material that has come in contact with bucket. A new set of Nitrile gloves were worn for each sample to prevent cross contamination.
Sample storage and analysis within recommended holding times and with correct preservative	Yes	All samples collected in the field were stored in an iced filled insulated container (esky).
All analyses NATA accredited	Yes	Laboratories used (AMDEL and ALS) hold NATA accreditation for the analyses undertaken.
Laboratory QA/QC acceptance criteria met for method blanks, laboratory duplicates, laboratory control samples, matrix spike samples and surrogate spike samples	Yes	Amdel and ALS laboratory QA/QC results comply with the QA/QC acceptance criteria of labs, which is part of their NATA registration.
Required number of blind duplicates (intra laboratory duplicates). Reported RPDs within acceptance limits.	Yes/No	Validation: blind duplicates for soil sampling: TPHs, BTEX, PAHs and lead. (Refer to text below for further explanation).
Required number of split samples (inter laboratory duplicates). Reported RPDs within acceptance limits.	Yes	Validation: blind duplicates for soil sampling: TPHs, BTEX, PAHs and lead.

The Relative Percentage Differences (RPDs) were calculated for the primary and duplicate intra and inter laboratory quality control samples to assess data quality. The RPD calculations are presented in *Table 8.2*, with the values obtained compared to acceptance criteria published in NEPM (1999) Schedule B(3) (RPD = < 30 percent).

No field quality control samples analysed contained concentrations of TPH/BTEX or PAHs greater then the laboratory PQL. As such no RPD could be calculated. Given that the concentrations were well below the site validation criteria, these quality control results are considered acceptable.

Slight RPD exceedances were calculated for lead in both the intra and inter laboratory duplicates. These variations in concentrations determined may have resulted from concentrations close to the laboratory PQL and the heterogenous nature of the material sampled. Although RPD exceedances have been reported, the concentrations of lead determine are well below the site validation criteria, thus elevated RPDs do not affect the data set. Therefore the data obtained from the laboratories is considered reliable and representative of the site conditions.

9. Conclusions

With respect to the UST removal and validation works, the following conclusions are made in relation to the potential land use at the site:

- three USTs and associated infrastructure have been removed from the site and disposed of in an appropriate manner. All USTs were observed to be in a good condition and certificates of destruction received;
- validation works have been performed in accordance with NSW EPA Guidelines for Assessing Service Station Sites (1994);
- all excavation validation samples analysed were determined to contain concentrations of the identified chemicals of concern below the adopted site criteria;
- all stockpile samples analysed were determined to contain concentrations of the identified chemicals of concern below the adopted site criteria. Thus, this material was considered suitable to reinstate the excavation; and
- fill material imported to make up the excavation void was determined to be suitable for use on the site.

In summary, PPK concludes that the excavation and the excavated soil stockpiled have been appropriately assessed and validated. The criteria to which the area has been validated is the NSW EPA sensitive land use criteria specified in the NSW EPA *Guidelines for Assessing Service Station Sites* (1994). The results also meet the NEHF Residential "A" and Commercial/Industrial "F" Criteria found in the NSW EPA *Guidelines for the NSW Site Auditor Scheme* (1998). Therefore, this portion of the site is considered to be suitable from an environmental and human health perspective for either commercial/industrial or residential land use.

10. Statement of Limitations and Restrictions

Scope of Services

This environmental site assessment report ("the report") has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and PPK ("scope of services"). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

Reliance on Data

In preparing the report, PPK has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise stated in the report, PPK has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. PPK will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to PPK.

Environmental Conclusions

In accordance with the scope of services, PPK has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

On all sites, varying degrees of non-uniformity of the vertical and horizontal soil or groundwater conditions are encountered. Hence no monitoring, common testing or sampling technique can eliminate the possibility that monitoring or testing results/samples are not totally representative of soil and/or groundwater conditions encountered. The conclusions are based upon the data and the environmental field monitoring and/or testing and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions.

Also, it should be recognised that site conditions, including the extent and concentration of contaminants, can change with time.

Within the limitations imposed by the scope of services, the monitoring, testing, sampling and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

Report for Benefit of Client

The report has been prepared for the benefit of the Client and no other party. PPK assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of PPK or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

Other Limitations

PPK will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in the report nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

Appendix A

Tank Destruction Certificates

Group of Companies

John F. Taylor & Sons (NSW) Pty. Ltd. A.C.N. 003 800 440
John F. Taylor & Sons (Qld) Pty. Ltd. A.C.N. 071 332 119
John F. Taylor & Sons (Civil) Pty. Ltd. A.C.N. 002 467 594
Milray Consulting Services Pty. Ltd. A.C.N. 082 721 971
JFT Petroleum Services Pty. Ltd. A.C.N. 091 974 622
JFT Environmental Services Pty. Ltd. A.C.N. 091 973 429

CERTIFICATE OF TANK DESTRUCTION

To: PPK ENVIRONMENT & INFRASTRUCTURE

of: 101 PIRIE STREET
ADELAIDE SA 5001

Attention: [redacted]

I hereby certify that the destruction of all tankage, as specified below, removed from:

FORMER COMMONWEALTH RAILWAY YARDS
PART SECTION 47, NEWCASTLE STREET, FYSHWICK

was completed in full by close of business 24 December, 2001 The tanks were cut up in terms of all regulatory standards; Australian Standards 1940-1993 and AIP Code of Practice 22.

Total number of tanks received from site: Three (3)

Size (litres)	Qty
5,000	1
10,000	2

[redacted]

Signed: [redacted] Date: 23.01.02

For & on behalf of
John F Taylor & Sons (NSW) Pty. Ltd.

Sydney
26 Bosci Road,
Ingleburn, NSW 2565
Phone: (02) 9618 0155
Fax: (02) 9618 0244
Email: info-nsw@jft.com.au

Brisbane
1388 Kingsford Smith Drive,
Meeandah, Qld. 4008
Phone: (07) 3260 1406
Fax: (07 3260 1408
Email: info-qld@jft.com.au

Townsville
22 Carmel Street,
Garbutt, Qld. 4814
Phone: (07) 4779 7216
Fax: (07) 4728 1152
Email: info-townsville@jft.com.au

CORKHILL BROS. SALES PTY. LTD.

AH

A.C.N. 008 467 767
72 MARYBOROUGH ST., FYSHWICK, A.C.T.
TELEPHONE 6280 4011
FACSIMILE 6280 4029
QUALITY ASSURED COMPANY
POSTAL ADDRESS: P.O. BOX 328 FYSHWICK, A.C.T 2609

DATE 23/ 1 /02

INVOICE
483506

TAX INVOICE
ABN: 44 008 467 767
The total price includes GST

TO JOHN F. TAYLOR

RECEIVED
- 8 FEB 2002

DATE	DESCRIPTION	RATE	AMOUNT
	ORDER NO: 110316		
	36 m HARD CORE FILLING		
	10 m S/SOIL		
	9 TON TIPPER HIRE 11.40AM-12.20pm	40min	
	1pm - 2pm	1hr	
	TIPPING FEES		
	DOCKET NO: 903,949		
	DOCKET NO: 904040		
	NEWCASTLE ST KINGSTON. Schedule 2.2(a)(ii)		
	RAILWAY HISTORICAL SOCIETY		
	Schedule 2.2(a)(ii)		

GREEN - DELIVERY DOCKET
ORANGE - ACCOUNTS COPY
BLACK - OFFICE COPY

GST COMPONENT: $

TOTAL

Appendix B

PPK Day Sheets

PPK
Environment&Infrastructure

Day Field Sheet

Project UST Removal and Excavation Validation, Kingston, ACT **Date** 17/12/01
Job Number 27L311E
Location Commonwealth Railway Yards, Kingston, ACT
Field Engineer/Scientist Grant Sainsbery
Time on site 1030 **Time off site** 1700
Vehicle ID Rental **kms travelled** 400
Contractor JFT and Sons Pty Ltd
Contractor time on site 1030 **Contractor time off site** 1730
Weather ■ **Sunny** ☐ **Overcast** ☐ **Rain** **Temp** 25 °C

Equipment **Calibrated (√)**

- ■ **PID #** 2 ■ 61.8 **result ppm to** 103 **ppm isobutylene equivalent**
- ■ **Esky with Ice/Ice Bricks**
- ☐ **Water Parameter Kit #**_____ ☐ _____**pH** _____**Cond** _____**Sal**
  Calibrated to buffer value _____**pH** _____**Cond** _____**Sal**
- ☐ **Dip Meter**_____ ☐ **Interface Probe** _____
- ☐ **Other** _____

Reason for site visit:

- ■ **Contractor supervision**
- ■ **Excavation**
- ☐ **Soil bores/Groundwater well installation**
- ☐ **Groundwater/Surface water sampling**
- ■ **Soil sampling**
- ☐ **Other** _____
- ☐ **Environmental Audit**
- ☐ **Emergency Response**

Environmental Management:

Soil/Water Disposal: Into Stockpile **PPE Disposal:** At PPK
Other: _____

NOTES

1. Contractor Inductions Completed
2. 3 Tanks (1 Diesel, 1 Unleaded, 1 Super) removed
3. Tanks inspected and found to be in good condition
4. Tank Pit sands excavated
5. Tank Pit Sampled as per Figure 2
6. Approximately 75m^3 of soil removed, stockpiled and sampled
7. Site fence erected and site secured
8. KTP-J = QA1 and QA1A
9. KSP-1 = QA2
10. Tank Pit walls looked clean with no obvious signs of contamination

Schedule 2.2(a)(ii)

Signed_____

PPK
Environment & Infrastructure

Day Field Sheet

Project UST Removal and Excavation Validation, Kingston, ACT **Date** 18/12/01
Job Number 27L311E
Location Commonwealth Railway Yards, Kingston, ACT
Field Engineer/Scientist Grant Sainsbery
Time on site 0900 **Time off site** 1100
Vehicle ID Rental **kms travelled** 400
Contractor JFT and Sons Pty Ltd
Contractor time on site 0900 **Contractor time off site** 1100
Weather ■ Sunny ☐ Overcast ☐ Rain **Temp** 24 °C

Equipment **Calibrated (√)**

☐ **PID #** 2 ☐ **result ppm to ppm isobutylene equivalent**
☐ **Esky with Ice/Ice Bricks**
☐ **Water Parameter Kit #**_____ ☐ _____**pH** _____**Cond** _____**Sal**
Calibrated to buffer value _____**pH** _____**Cond** _____**Sal**
☐ **Dip Meter**_____ ☐ **Interface Probe** _____
☐ **Other** _____

Reason for site visit:

■ **Contractor supervision**
☐ **Excavation**
☐ **Soil bores/Groundwater well installation**
☐ **Groundwater/Surface water sampling**
☐ **Soil sampling**
☐ **Other** _____
☐ **Environmental Audit**
☐ **Emergency Response**

Environmental Management:

Soil/Water Disposal: N/A **PPE Disposal:** At PPK
Other:_____

NOTES

1. Secured site
2. Put up safety signs
3. Plant de-mobilisation
4. Curb and guttering damaged when excavator was being loaded

Signed_ Schedule 2.2(a)(ii) _____

Appendix C

PPK Standard Procedures

Sampling and Analysis Methodologies

Soil/Fill Sampling Protocols

For all samples, care was taken to ensure that representative samples were obtained. Where possible, the samples maintained the integrity of the original medium from the point of collection to the point of analysis. The samples were collected and placed within an appropriate wide-mouth glass jar as described in the following paragraphs.

The decision on which sample to be analysed was based on soil vapour measurements taken in the field using a portable photo-ionisation detector (PID); on obvious indicators of impact such as discolouration, staining, unusual odours; and on technical considerations related to the interpreted attenuative capacity of certain soil layers (for example, just below or above a clay lens). If evidence of impact was noted within a soil/fill sample the sample was generally selected for analysis.

For chemical testing purposes all samples were prepared as detailed below:

- part of the selected area was placed immediately into a 125ml glass jar for laboratory analysis (if subsequently selected). The sample jar, which was provided by the laboratory, was completely filled. The jar was immediately placed in a cool box in which ice was had been added to keep the samples below a temperature of 4°C;
- a corresponding sample to that selected for possible laboratory analysis was placed into a 'glad' snap-lock plastic bag jar for Head Space Analysis testing. The bag was half filled with soil and sealed. Head Space Analysis testing comprised hand warming the sample (or leaving the sample in sunlight) for ten minutes with occasional agitation to maximise the release of VOCs into the bag. A PID probe was then inserted into the bag and the highest reading recorded. The PID was periodically calibrated; and
- the soil/fill was immediately logged.

All samples were classified in the field based on soil/fill characteristics and obvious signs of impact such as discolouration or odour noted. The samples selected for analysis were transported to the laboratory under Chain-of Custody procedures and maintained in an ice-filled cooler.

Chemical Analysis

All sample jars had screw caps and Teflon liners. Once filled, the caps were checked to ensure that they were secure (and that there were no head space in the relevant jars). All jars were labelled with sample number, project number, date obtained, and site name. This information was repeated on the chain-of-custody record form.

All samples were maintained in an ice filled cooler prior to and during transit to the laboratory. The samples were transported under chain-of-custody within insulated chests which contained coolant packs. 'This Side Up' and 'Fragile' labels were placed on the cooler. The lid of the cooler was taped shut. All samples arrived within 24 hours of being dispatched. The laboratory was contacted to ensure that the samples had arrived and to ascertain the status of the samples. All samples were analysed/extracted within the relevant holding times and analysed (where required) according to NEPC (1999) Schedule B(3).

Appendix D

Analytical Laboratory Results

amdel

INDUSTRIAL SERVICES DIVISION

ABN 30 008 127 802

Correspondence to:
PO Box 514
HORNSBY NSW 1630

5 Kelray Place
ASQUITH NSW 2077
Telephone: (02) 9482 1922
Facsimile: (02) 9482 1734

CERTIFICATE OF ANALYSIS

Contents :
1. Cover Pages (2)
2. Analysis Report Pages
3. QA/QC Appendix
4. Additional Reports - External (if applicable)
5. Chain of Custody (if applicable)

Report No.	:	1E3627
Attention	:	Mr Greg Watkins
Client	:	PPK Sydney PO Box 248 CONCORD WEST NSW 2138
Samples	:	15
Reference/Order	:	27L311E/45541315
Project	:	KINGSTON
Received Samples	:	19/12/01
Instructions	:	19/12/01
Date Reported	:	27/12/01

PLEASE SEE FOLLOWING PAGE FOR METHOD LISTING

RESULTS

All samples were analysed as received. This report relates specifically to the samples as received. Results relate to the source material only to the extent that the samples as supplied are truly representative of the sample source. This report replaces any preliminary results issued. Note that for methods indicated with "*", NATA accreditation does not cover the performance of this service. Three significant figures (or 2 for <10PQL) are reported for statistical purposes only. Where "Total" concentrations are reported for organic suites of compounds this is the summation of the individual compounds and the PQL is noted for reporting purposes only. This report has been auto-authorized by NATA signatories for PDF format. Refer to the method descriptions for further information.

PLEASE SEE ATTACHED PAGES FOR RESULTS

R. Mooney B.Sc.(Hons)Dip. FDA
Technical Services Manager Sydney

amdel

Report No. : 1E3627

Please note: Where samples are collected/submitted over several days, the date on which the last samples were analysed or extracted is reported.

Method	Description	Extracted	Analysed	Authorised
E7500	Moisture (%w/w)	20/12/01	21/12/01	SYS 096
E1230	TPH C6-C9 by Purge & Trap	19/12/01	20/12/01	DUM 094
E1221	TPH (C10-C36)	20/12/01	21/12/01	DUM 094
E1010	Benzene,Toluene,Ethylbenzene & Xylene	19/12/01	20/12/01	DUM 094
E5910	Metals by ICP-AES	20/12/01	27/12/01	DGO 093
E1110	Polycyclic Aromatic Hydrocarbons	20/12/01	21/12/01	MNG 095

amdel

Job Number : 1E3627
Client : PPK Sydney
Reference : 27L311E/45541315
Project : KINGSTON

Analyte	Lab No	E43133	E43134	E43135	E43136	E43137
	Sample Id	KJP-A	KJP-B	KJP-C	KJP-D	KJP-E
	PQL					
Moisture Content	1	29%	17%	18%	28%	19%
E1230 TPH in Soil by Purge & Trap/GC-MS						
C6-C9 Fraction	5	nd	nd	nd	nd	nd
E1221 TPH in Soil						
C10-C14 Fraction	10	nd	40	nd	nd	nd
C15-C28 Fraction	50	nd	220	nd	nd	nd
C29-C36 Fraction	50	nd	nd	nd	nd	nd
E1010 BTEX (P&T) in Soil						
Benzene	0.2	nd	nd	nd	nd	nd
Toluene	1	nd	nd	nd	nd	nd
Ethylbenzene	1	nd	nd	nd	nd	nd
Total Xylenes	3	nd	nd	nd	nd	nd
4-Bromofluorobenzene-SURROGATE	1	92%	96%	95%	91%	98%
E5910 Metals in Soil						
Lead	5	15	26	21	26	17

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable
Refer to Amdel standard laboratory qualifier codes for comments.

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

amdel

Job Number : 1E3627
Client : PPK Sydney
Reference : 27L311E/45541315
Project : KINGSTON

Analyte	Lab No	E43138	E43139	E43140	E43141	E43142
	Sample Id	KJP-F	KJP-G	KJP-H	KJP-I	KJP-J
	PQL					
Moisture Content	1	19%	14%	22%	16%	24%
E1230 TPH in Soil by Purge & Trap/GC-MS						
C6-C9 Fraction	5	nd	nd	nd	nd	nd
E1221 TPH in Soil						
C10-C14 Fraction	10	nd	nd	nd	nd	nd
C15-C28 Fraction	50	nd	nd	nd	nd	nd
C29-C36 Fraction	50	nd	nd	nd	nd	nd
E1010 BTEX (P&T) in Soil						
Benzene	0.2	nd	nd	nd	nd	nd
Toluene	1	nd	nd	nd	nd	nd
Ethylbenzene	1	nd	nd	nd	nd	nd
Total Xylenes	3	nd	nd	nd	nd	nd
4-Bromofluorobenzene-SURROGATE	1	98%	102%	95%	92%	97%
E5910 Metals in Soil						
Lead	5	17	13	8	9	8

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Refer to Amdel standard laboratory qualifier codes for comments.

amdel

Job Number : 1E3627
Client : PPK Sydney
Reference : 27L311E/45541315
Project : KINGSTON

Analyte	Lab No	E43143	E43144	E43145	E43146	E43147
	Sample Id	KSP 1	KSP 2	KSP 3	1712QA1	1712QA2
	PQL					
Moisture Content	1	20%	26%	15%	22%	26%
E1230 TPH in Soil by Purge & Trap/GC-MS						
C6-C9 Fraction	5	nd	nd	nd	nd	nd
E1221 TPH in Soil						
C10-C14 Fraction	10	nd	nd	nd	nd	nd
C15-C28 Fraction	50	nd	nd	nd	nd	nd
C29-C36 Fraction	50	nd	nd	nd	nd	nd
E1010 BTEX (P&T) in Soil						
Benzene	0.2	nd	nd	nd	nd	nd
Toluene	1	nd	nd	nd	nd	nd
Ethylbenzene	1	nd	nd	nd	nd	nd
Total Xylenes	3	nd	nd	nd	nd	nd
4-Bromofluorobenzene-SURROGATE	1	94%	95%	96%	96%	92%
E5910 Metals in Soil						
Lead	5	22	30	39	11	17

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Refer to Amdel standard laboratory qualifier codes for comments.

amdel

Job Number : 1E3627
Client : PPK Sydney
Reference : 27L311E/45541315
Project : KINGSTON

Analyte	Lab No	E43133	E43134	E43135	E43136	E43137
	Sample Id	KJP-A	KJP-B	KJP-C	KJP-D	KJP-E
	PQL					
E1110 Priority PAH's in Soil						
Naphthalene	0.5	nd	nd	nd	nd	nd
Acenaphthylene	0.5	nd	nd	nd	nd	nd
Acenaphthene	0.5	nd	nd	nd	nd	nd
Fluorene	0.5	nd	nd	nd	nd	nd
Phenanthrene	0.5	nd	nd	nd	nd	nd
Anthracene	0.5	nd	nd	nd	nd	nd
Fluoranthene	0.5	nd	nd	nd	nd	nd
Pyrene	0.5	nd	nd	nd	nd	nd
Benz(a)anthracene	0.5	nd	nd	nd	nd	nd
Chrysene	0.5	nd	nd	nd	nd	nd
Benzo(b) & (k)fluoranthene	1	nd	nd	nd	nd	nd
Benzo(a)pyrene	0.5	nd	nd	nd	nd	nd
Indeno(1.2.3-cd)pyrene	0.5	nd	nd	nd	nd	nd
Dibenz(a.h)anthracene	0.5	nd	nd	nd	nd	nd
Benzo(g.h.i)perylene	0.5	nd	nd	nd	nd	nd
Total USEPA Priority PAHs	0.5	nd	nd	nd	nd	nd
2-Fluorobiphenyl-SURROGATE	1	109%	103%	98%	97%	100%
Anthracene-d10-SURROGATE	1	107%	94%	94%	101%	103%
p-Terphenyl-D14-SURROGATE	1	118%	106%	106%	111%	114%

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Refer to Amdel standard laboratory qualifier codes for comments.

amdel

Job Number : 1E3627
Client : PPK Sydney
Reference : 27L311E/45541315
Project : KINGSTON

Analyte	Lab No	E43138	E43139	E43140	E43141	E43142
	Sample Id	KJP-F	KJP-G	KJP-H	KJP-I	KJP-J
	PQL					
E1110 Priority PAH's in Soil						
Naphthalene	0.5	nd	nd	nd	nd	nd
Acenaphthylene	0.5	nd	nd	nd	nd	nd
Acenaphthene	0.5	nd	nd	nd	nd	nd
Fluorene	0.5	nd	nd	nd	nd	nd
Phenanthrene	0.5	nd	nd	nd	nd	nd
Anthracene	0.5	nd	nd	nd	nd	nd
Fluoranthene	0.5	nd	nd	nd	nd	nd
Pyrene	0.5	nd	nd	nd	nd	nd
Benz(a)anthracene	0.5	nd	nd	nd	nd	nd
Chrysene	0.5	nd	nd	nd	nd	nd
Benzo(b) & (k)fluoranthene	1	nd	nd	nd	nd	nd
Benzo(a)pyrene	0.5	nd	nd	nd	nd	nd
Indeno(1.2.3-cd)pyrene	0.5	nd	nd	nd	nd	nd
Dibenz(a.h)anthracene	0.5	nd	nd	nd	nd	nd
Benzo(g.h.i)perylene	0.5	nd	nd	nd	nd	nd
Total USEPA Priority PAHs	0.5	nd	nd	nd	nd	nd
2-Fluorobiphenyl-SURROGATE	1	98%	93%	96%	97%	98%
Anthracene-d10-SURROGATE	1	98%	95%	100%	100%	96%
p-Terphenyl-D14-SURROGATE	1	108%	104%	109%	109%	107%

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable
Refer to Amdel standard laboratory qualifier codes for comments.

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

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Job Number : 1E3627
Client : PPK Sydney
Reference : 27L311E/45541315
Project : KINGSTON

Analyte	Lab No	E43143	E43144	E43145	E43146	E43147
	Sample Id	KSP 1	KSP 2	KSP 3	1712QA1	1712QA2
	PQL					
E1110 Priority PAH's in Soil						
Naphthalene	0.5	nd	nd	nd	nd	nd
Acenaphthylene	0.5	nd	nd	nd	nd	nd
Acenaphthene	0.5	nd	nd	nd	nd	nd
Fluorene	0.5	nd	nd	nd	nd	nd
Phenanthrene	0.5	nd	nd	nd	nd	nd
Anthracene	0.5	nd	nd	nd	nd	nd
Fluoranthene	0.5	nd	nd	nd	nd	nd
Pyrene	0.5	nd	nd	nd	nd	nd
Benz(a)anthracene	0.5	nd	nd	nd	nd	nd
Chrysene	0.5	nd	nd	nd	nd	nd
Benzo(b) & (k)fluoranthene	1	nd	nd	nd	nd	nd
Benzo(a)pyrene	0.5	nd	nd	nd	nd	nd
Indeno(1.2.3-cd)pyrene	0.5	nd	nd	nd	nd	nd
Dibenz(a.h)anthracene	0.5	nd	nd	nd	nd	nd
Benzo(g.h.i)perylene	0.5	nd	nd	nd	nd	nd
Total USEPA Priority PAHs	0.5	nd	nd	nd	nd	nd
2-Fluorobiphenyl-SURROGATE	1	99%	97%	100%	97%	97%
Anthracene-d10-SURROGATE	1	99%	95%	98%	100%	95%
p-Terphenyl-D14-SURROGATE	1	108%	106%	110%	110%	105%

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable
Refer to Amdel standard laboratory qualifier codes for comments.

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

CHAIN-OF-CUSTODY

Kingston Tank Pull

Laboratory Name:	Amdel
Address:	5 Kelray Place Asquith
Fax Number:	02 9482 1734
Phone Number:	02 9482 1922
Contact Name:	Andrew Spencer (Sydney)

PPK Job No.
(Quote on all correspondence)

27L311E

Results Expected By/On:	27-Dec-01
Fax Results To:	Greg Watkins
Fax Number:	9736 1568
Phone Number:	9743 0333

Invoice To: Greg Watkins

Date Sampled	Time	Sample I.D Location	Sample I.D Depth (m)	Vol	Medium *	Preservative Type	Filtered (x)	No. of Containers	Analysis Required: TPH/BTEX	PAH	OCP/OPP/PCB	Metals	Lead	Sampled By	Company	Signature	Remarks
17/12/2001		KJP - A	4333	125 mL	s	ice		1	X	X			X	GS	PPK		
17/12/2001		KJP - B	34	125mL	s	ice		1	X	X			X	GS	PPK		
17/12/2001		KJP - C	35	125mL	s	ice		1	X	X			X	GS	PPK		
17/12/2001		KJP - D	36	125mL	s	ice		1	X	X			X	GS	PPK		
17/12/2001		KJP - E	37	125mL	s	ice		1	X	X			X	GS	PPK		
17/12/2001		KJP - F	38	125mL	s	ice		1	X	X			X	GS	PPK		
17/12/2001		KJP - G	39	125mL	s	ice		1	X	X			X	GS	PPK		
17/12/2001		KJP - H	40	125mL	s	ice		1	X	X			X	GS	PPK		
17/12/2001		KJP - I	41	125mL	s	ice		1	X	X			X	GS	PPK		
17/12/2001		KJP - J	42	125mL	s	ice		1	X	X			X	GS	PPK		
17/12/2001		KSP 1	43	125mL	s	ice		1	X	X			X	GS	PPK		
17/12/2001		KSP 2	44	125mL	s	ice		1	X	X			X	GS	PPK		
17/12/2001		KSP 3	45	125mL	s	ice		1	X	X			X	GS	PPK		
17/12/2001		1712 QA1	46	125mL	s	ice		1	X	X			X	GS	PPK		
17/12/2001		1712 QA2	47	125mL	s	ice		1	X	X			X	GS	PPK		

Relinquished By (Name):	G.Sainsbery	Received By (Name):	K. Crase	Relinquished By (Name):		Received By (Name):	
Date:	19/12/2001	Date:	19/12/01	Date:		Date:	
Company:	PPK	Company:	Amdel	Company:		Company:	
On Behalf Of:		On Behalf Of:		On Behalf Of:		On Behalf Of:	
Signature:		Signature:		Signature:		Signature:	

PPK
9 Blaxland Road,
Rhodes NSW 2138
Environmental and Geotechnical Services

Comments: Metals include As, Cd, Cr, Cu, Ni, Pb, Zn, Hg

Analysis to be billed direct to Mobil. Refer to above purchase order no.

*** Legend:** S = Soil, W = Water, F = Filter, T = Tube

1E3627

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AMDEL INTERNAL QUALITY ASSURANCE REVIEW.

Job No. 2E0320

General

1. Laboratory QA/QC including Method Blanks, Duplicates, Matrix Spikes, Laboratory Control Samples or CRM's are included in this QA/QC appendix. (Where applicable)
2. Inter-Laboratory proficiency trial results are available upon request.
3. PQLs are matrix dependent and are increased accordingly where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spike or surrogate recoveries.
5. Where 3 and 2 significant figures are reported for >10x PQL and <10x PQL respectively, the last figure is uncertain and is provided for statistical purposes only.
6. Samples duplicated or spiked are from this job only and are identified in the following QA/QC report.
7. SVOC analyses on waters are performed on homogenized, unfiltered samples, unless noted otherwise.

Maximum Holding Times for Soils, Sediments and Waters

Parameter	Holding Times
Soils	
Volatile and Semi-Volatile Organic Analysis.	Extracted in 14 days, analysed within 40 days.
Metals	Extracted and analysed within 28 days-6 months.
Inorganics*	Extracted and analysed within 7-28 days.
TCLPs*	Extracted and analysed within 14 days, (Zero Headspace-TCLP 7 days).
Waters	
Volatile Organic Analysis	Analysed within 7 days (USEPA requires 14 days).
Semi-Volatile Organic Analysis	Extracted in 7 days, analysed within 40 days.
Inorganics*	Analysed within 24 hrs-28 days.
Metals (dissolved metals should be supplied field filtered)	Prepared and analysed within 28 days.

* Please refer to 'Preservation Information Chart for Soils, Sediments & Waters' for further information. (ISFORM.098). Holding times may be extended with the use of preservation bottles and/or freezing samples. Holding times can be calculated from dates reported in the body of the report. Tests clearly exceeding holding times will be noted when sufficient information is provided.
Reference: USEPA SW846 and AMDEL SPM-01 (incorporating NEPM Guidelines).

Chain of Custody and Sample Integrity

	Yes/No/NA
Chain of Custody / instructions received with samples	Yes
Custody seals were received intact, if used	NA
Samples were received chilled and in good condition	Yes
Samples received appropriately preserved for all tests	Yes
VOC/SVOC samples were received in teflon lined containers	Yes
Samples received with Zero Headspace	Yes
Chain of Custody completed and attached (if applicable)	Yes

Chromatography Calibration/Acceptence Criteria (if applicable)

Retention time window meets acceptance criteria (+/-2%)	Yes
Reference standard meets acceptance criteria (+/-10%)	Yes
Recalibration standard meets acceptance criteria (+/-15%)	Yes
Internal standard recovery acceptable.	Yes

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AMDEL INTERNAL QUALITY ASSURANCE REVIEW Cont..

Amdel QA/QC Compliance Assessment

	Compliance
Surrogates performed on all appropriate GC analyses and meet acceptance limits (70% - 130% recovery*).	Please see body of report
Matrix Spikes performed once per process batch and at least 1 in 20 samples (Results meet acceptance limits - 70% - 130% recovery* or 80% - 120% recovery* for inorganics in water.)	Please see body of report
Laboratory Control samples performed once per process batch and at least 1 in 20 samples (Results meet acceptance limits - 70% - 130% recovery* in soil or 70%-130%/90-110% recovery* for waters.)	Yes
Laboratory Duplicate samples performed once per process batch and at least 1 in 10 samples	NA
Laboratory duplicates meet acceptance criteria <4 PQL - +/- 2 PQL 4-10 PQL - 0-25 or 50% RPD >10 PQL - 0-10 or 30% RPD	Please see body of report
Method Blanks performed once per process batch and at least 1 in 20 samples (Results not detected at the PQL).	Yes

N/A=Not Applicable.

* Phenols 50% - 130% recovery
* SVOCs 60% - 130% recovery
* Phenoxy Acid Herbicides 60% - 140% recovery

QA/QC Appendix

Please refer to the following pages for the QA/QC data.
For further information on samples or non-conformance in QC protocols please see notations in the body of the report plus comments on the following page.

Additional Comments

Schedule 2.2(a)(ii)

R. Mooney B.Sc.(Hons) Dip. FDA
Technical Services Manager Sydney

amdel

AMDEL STANDARD LABORATORY QUALIFIER CODES.

Job NO. 2E0320

General

Qualifier Codes	Description
*	PQLs are raised due to matrix interference.
@	PQLs are raised due to the insufficient sample.
$	The mass imbalance indicates the presence of other ions not measured as part of this procedure.
&	Surrogate recoveries could not be determined due to the dilution required to quantify the analyte.
IS	Insufficient sample was supplied to conduct this analysis.
nd	<PQL
--	Not applicable
LNR	Sample listed on the COC, but not received.
J	The analyte was positively identified; the associated numerial value is the approximate concentration of the analyte in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a 'tentative' identification.
NJ	The analysis indicates the presences of an analyte that has been 'tentatively' identified, and the associated numerical value represents it's approximate concentration.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The presence or absence of the analye cannot be verified.
#	The matrix spike concentration is significantly less than the sample analyte concentration, thus spike recovery can not be accurately determined.
**	The surrogate recovery is outside of the recommended acceptance criteria, due to matrix interference.
***	The surrogate recovery is outside of the recommended acceptance criteria. Insufficent sample to perform confirmation.
A	The spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.
B	The duplicate %RPD is outside the recommended acceptance criteria. Further analysis indicates sample heterogeneity.
C	The sample was not received in a suitable timeframe to allow completion within the recommended holding time.
O	The results reported are 'recoverable organics' for this fraction, as the chromatogram and peak shape indicates the presence of a significant concentration of polar compounds.
P	The concentration reported is mainly due to a single peak.
ISM	Insufficient sample was supplied to conduct matrix spike analysis.
ISD	Insufficient sample was supplied to conduct duplicate analysis.
M	The sample was received with the incorrect preservation for this analysis.
S	The sample contained significant amounts of sediment. Sample aliquots have been taken via decanting in an attempt to avoid including sediment in the analysis portion.
K	The raw data indicates the absence of 0.055g of Copper Sulphate in the sample.
L	Theoretically the TKN result should be greater or equal to ammonia concentration. However the difference reported is within the uncertainty of the individual tests.
D	Theoretically the total result should be greater or equal to the dissolved concentration. However the difference reported is within the uncertainty of the individual tests.
I	During Kjeldahl digestion, nitrate (>10mg/L) can oxidise ammonia resulting in a negative TKN interference.
E	The mass imbalance was equal to or less than 0.2 milli-equivalents.
F	Samples results are reported on an 'as received' basis.
H	This sample was received with headspace (see first analyte notation).
T	This test was performed outside the recommended holding time
G	Samples contain volatile halogenated oxygenated or other compounds that are not quantitated as part of C6-9.
J	Results expressed in mg/L (ppm) due to the high concentration of the analyte.

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Job Number : 2E0320

QAQC : Laboratory Control Sample(s)

Analyte	Level	Level Detected			Recovery Details		
		Result1	Result2	Result3	Rec 1 (%)	Rec 2 (%)	Rec 3 (%)
E1230 TPH in Soil by Purge & Trap/GC-MS							
C6-C9 Fraction	100	91			91%		
E1221 TPH in Soil							
C10-C14 Fraction		--					
C15-C28 Fraction	550	520			94%		
C29-C36 Fraction		--					
E1010 BTEX (P&T) in Soil							
Benzene	10	9.2			91%		
Toluene	10	9			94%		
Ethylbenzene	10	9			94%		
m&p-Xylene	20	19			97%		
o-Xylene	10	10			95%		

PQL = Practical Quantitation Limit
-- = Not Applicable
nd = <PQL

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

QAQC : Method Blank(s)

ANALYTE	Sample ID PQL	Blank1	Blank2	Blank3	Blank4	Blank5
E1230 TPH in Soil by Purge & Trap/GC-MS						
C6-C9 Fraction	5	nd				
E1221 TPH in Soil						
C10-C14 Fraction	10	nd				
C15-C28 Fraction	50	nd				
C29-C36 Fraction	50	nd				
E1010 BTEX (P&T) in Soil						
Benzene	0.2	nd				
Toluene	1	nd				
Ethylbenzene	1	nd				
m&p-Xylene	2	nd				
o-Xylene	1	nd				

PQL = Practical Quantitation Limit
nd = <PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

amdel

Job Number : 2E0320

QAQC : Laboratory Control Sample(s)

Analyte	Level	Level Detected			Recovery Details		
		Result1	Result2	Result3	Rec 1 (%)	Rec 2 (%)	Rec 3 (%)
E1110 Priority PAH's in Soil							
Naphthalene	5	5.2			104%		
Acenaphthylene	5	5.4			108%		
Acenaphthene	5	5.2			102%		
Fluorene	5	5.2			102%		
Phenanthrene	5	5.2			102%		
Anthracene	5	5.0			98%		
Fluoranthene	5	5.0			100%		
Pyrene	5	5.0			100%		
Benz(a)anthracene	5	5.0			100%		
Chrysene	5	5.0			98%		
Benzo(b) & (k)fluoranthene	10	10			100%		
Benzo(a)pyrene	5	5.0			100%		
Indeno(1.2.3-cd)pyrene	5	5.2			102%		
Dibenz(a.h)anthracene	5	5.4			108%		
Benzo(g.h.i)perylene	5	5.4			106%		

PQL = Practical Quantitation Limit
-- = Not Applicable
nd = <PQL

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

QAQC : Method Blank(s)

ANALYTE	Sample ID PQL	Blank1	Blank2	Blank3	Blank4	Blank5
E1110 Priority PAH's in Soil						
Naphthalene	0.5	nd				
Acenaphthylene	0.5	nd				
Acenaphthene	0.5	nd				
Fluorene	0.5	nd				
Phenanthrene	0.5	nd				
Anthracene	0.5	nd				
Fluoranthene	0.5	nd				
Pyrene	0.5	nd				
Benz(a)anthracene	0.5	nd				
Chrysene	0.5	nd				
Benzo(b) & (k)fluoranthene	1	nd				
Benzo(a)pyrene	0.5	nd				
Indeno(1.2.3-cd)pyrene	0.5	nd				
Dibenz(a.h)anthracene	0.5	nd				
Benzo(g.h.i)perylene	0.5	nd				

PQL = Practical Quantitation Limit
nd = <PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

amdel

Job Number : 2E0320

QAQC : Laboratory Control Sample(s)

Analyte	Level	Level Detected			Recovery Details		
		Result1	Result2	Result3	Rec 1 (%)	Rec 2 (%)	Rec 3 (%)
E1081 OC's & Total PCB's in Soil							
HCB	0.5	0.5			94%		
a-BHC	0.5	0.5			91%		
g-BHC	0.5	0.5			92%		
Heptachlor	0.5	0.5			93%		
Aldrin	0.5	0.5			93%		
b-BHC	0.5	0.5			94%		
d-BHC	0.5	0.4			80%		
Oxychlordane	0.5	0.5			93%		
Heptachlor epoxide	0.5	0.5			93%		
Endosulfan 1	0.5	0.5			92%		
Chlordane-Trans	0.5	0.5			93%		
Chlordane-Cis	0.5	0.5			93%		
trans-Nonachlor	0.5	0.5			93%		
DDE	1.0	1.0			93%		
Dieldrin	0.5	0.5			92%		
Endrin	0.5	0.5			92%		
DDD	1	1.0			93%		
Endosulfan 2	0.5	0.5			92%		
DDT	1.0	1.0			95%		
Endosulfan sulfate	0.5	0.5			92%		
Methoxychlor	0.5	0.5			94%		
Total Polychlorinated biphenyl	-	--					

PQL = Practical Quantitation Limit
-- = Not Applicable
nd = <PQL

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

QAQC : Method Blank(s)

ANALYTE	Sample ID PQL	Blank1	Blank2	Blank3	Blank4	Blank5
E1081 OC's & Total PCB's in Soil						
HCB	0.1	nd				
a-BHC	0.1	nd				
g-BHC	0.1	nd				
Heptachlor	0.1	nd				
Aldrin	0.1	nd				
b-BHC	0.1	nd				
d-BHC	0.1	nd				
Oxychlordane	0.1	nd				
Heptachlor epoxide	0.1	nd				
Endosulfan 1	0.1	nd				
Chlordane-Trans	0.1	nd				
Chlordane-Cis	0.1	nd				
trans-Nonachlor	0.1	nd				
DDE	0.1	nd				
Dieldrin	0.1	nd				
Endrin	0.1	nd				
DDD	0.1	nd				
Endosulfan 2	0.1	nd				
DDT	0.1	nd				
Endosulfan sulfate	0.1	nd				
Methoxychlor	0.1	nd				
Total Polychlorinated biphenyl	1	nd				

PQL = Practical Quantitation Limit
nd = <PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

amdel

Job Number : 2E0320

QAQC : Laboratory Control Sample(s)

Analyte	Level	Level Detected			Recovery Details		
		Result1	Result2	Result3	Rec 1 (%)	Rec 2 (%)	Rec 3 (%)
E5910 Metals in Soil							
Arsenic	50	51			103%		
Cadmium	50	49			98%		
Chromium	50	52			103%		
Copper	50	53			107%		
Nickel	50	49			99%		
Lead	50	49			97%		
Zinc	50	50			100%		
E5950 Mercury in Soil							
Mercury	0.50	0.50			100%		

PQL = Practical Quantitation Limit
-- = Not Applicable
nd = <PQL

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

amdel

Job Number : 2E0320

QAQC : Method Blank(s)

ANALYTE	Sample ID PQL	Blank1	Blank2	Blank3	Blank4	Blank5
E5910 Metals in Soil						
Arsenic	5	nd				
Cadmium	0.5	nd				
Chromium	5	nd				
Copper	5	nd				
Nickel	2	nd				
Lead	5	nd				
Zinc	5	nd				
E5950 Mercury in Soil						
Mercury	0.05	nd				

PQL = Practical Quantitation Limit
nd = <PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

INDUSTRIAL SERVICES DIVISION

ABN 30 008 127 802

Correspondence to:
PO Box 514
HORNSBY NSW 1630

5 Kelray Place
ASQUITH NSW 2077
Telephone: (02) 9482 1922
Facsimile: (02) 9482 1734

CERTIFICATE OF ANALYSIS

Contents :
1. Cover Pages (2)
2. Analysis Report Pages
3. QA/QC Appendix
4. Additional Reports - External (if applicable)
5. Chain of Custody (if applicable)

Report No.	:	2E0320
Attention	:	Mr Greg Watkins
Client	:	PPK Sydney PO Box 248 CONCORD WEST NSW 2138
Samples	:	1
Reference/Order	:	27L311E
Project	:	27L311E
Received Samples	:	05/02/02
Instructions	:	05/02/02
Date Reported	:	11/02/02

PLEASE SEE FOLLOWING PAGE FOR METHOD LISTING

RESULTS

All samples were analysed as received. This report relates specifically to the samples as received. Results relate to the source material only to the extent that the samples as supplied are truly representative of the sample source. This report replaces any preliminary results issued. Note that for methods indicated with "*", NATA accreditation does not cover the performance of this service. Three significant figures (or 2 for <10PQL) are reported for statistical purposes only. Where "Total" concentrations are reported for organic suites of compounds this is the summation of the individual compounds and the PQL is noted for reporting purposes only. This report has been auto-authorized by NATA signatories for PDF format. Refer to the method descriptions for further information.

PLEASE SEE ATTACHED PAGES FOR RESULTS

Schedule 2.2(a)(ii)

R. Mooney B.Sc.(Hons)Dip. FDA
Technical Services Manager Sydney

amdel

Report No. : 2E0320

Please note: Where samples are collected/submitted over several days, the date on which the last samples were analysed or extracted is reported.
Unless Ferrous Iron is determined on site, the possibility of a ferrous-ferric ratio change may occur.

Method	Description	Extracted	Analysed	Authorised
E7500	Moisture (%w/w)	06/02/02	07/02/02	KSA 096
E1230	TPH C6-C9 by Purge & Trap	05/02/02	06/02/02	DUM 094
E1221	TPH (C10-C36)	05/02/02	06/02/02	DUM 094
E1010	Benzene,Toluene,Ethylbenzene & Xylene	05/02/02	06/02/02	DUM 094
E1110	Polycyclic Aromatic Hydrocarbons	05/02/02	06/02/02	MNG 095
E1081	Organochlorine Pesticides and PCBs	05/02/02	06/02/02	MNG 095
E5910	Metals by ICP-AES	06/02/02	11/02/02	DGO 093
E5950	Mercury in Soil	06/02/02	07/02/02	SMA 093

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Job Number : 2E0320
Client : PPK Sydney
Reference : 27L311E
Project : 27L311E

Analyte	Lab No	E47948				
	Sample Id	SP1				
	PQL					
Moisture Content	1	8%				
E1230 TPH in Soil by Purge & Trap/GC-MS						
C6-C9 Fraction	5	nd				
E1221 TPH in Soil						
C10-C14 Fraction	10	nd				
C15-C28 Fraction	50	nd				
C29-C36 Fraction	50	nd				
E1010 BTEX (P&T) in Soil						
Benzene	0.2	nd				
Toluene	1	nd				
Ethylbenzene	1	nd				
m&p-Xylene	2	nd				
o-Xylene	1	nd				
4-Bromofluorobenzene-SURROGATE	1	99%				

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable
Refer to Amdel standard laboratory qualifier codes for comments.

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

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Job Number : 2E0320
Client : PPK Sydney
Reference : 27L311E
Project : 27L311E

Analyte	Lab No / Sample Id / PQL	E47948 / SP1				
E1110 Priority PAH's in Soil						
Naphthalene	0.5	nd				
Acenaphthylene	0.5	nd				
Acenaphthene	0.5	nd				
Fluorene	0.5	nd				
Phenanthrene	0.5	nd				
Anthracene	0.5	nd				
Fluoranthene	0.5	nd				
Pyrene	0.5	nd				
Benz(a)anthracene	0.5	nd				
Chrysene	0.5	nd				
Benzo(b) & (k)fluoranthene	1	nd				
Benzo(a)pyrene	0.5	nd				
Indeno(1.2.3-cd)pyrene	0.5	nd				
Dibenz(a.h)anthracene	0.5	nd				
Benzo(g.h.i)perylene	0.5	nd				
Total USEPA Priority PAHs	0.5	nd				
2-Fluorobiphenyl-SURROGATE	1	107%				
Anthracene-d10-SURROGATE	1	108%				
p-Terphenyl-D14-SURROGATE	1	120%				

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Refer to Amdel standard laboratory qualifier codes for comments.

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Job Number : 2E0320
Client : PPK Sydney
Reference : 27L311E
Project : 27L311E

Analyte	Lab No	E47948				
	Sample Id	SP1				
	PQL					
E1081 OC's & Total PCB's in Soil						
HCB	0.1	nd				
a-BHC	0.1	nd				
g-BHC	0.1	nd				
Heptachlor	0.1	nd				
Aldrin	0.1	nd				
b-BHC	0.1	nd				
d-BHC	0.1	nd				
Oxychlordane	0.1	nd				
Heptachlor epoxide	0.1	nd				
Endosulfan 1	0.1	nd				
Chlordane-Trans	0.1	nd				
Chlordane-Cis	0.1	nd				
trans-Nonachlor	0.1	nd				
DDE	0.1	nd				
Dieldrin	0.1	nd				
Endrin	0.1	nd				
DDD	0.1	nd				
Endosulfan 2	0.1	nd				
DDT	0.1	nd				
Endosulfan sulfate	0.1	nd				
Methoxychlor	0.1	nd				
Total Polychlorinated biphenyl	1	nd				
2.4.5.6-TCMX-SURROGATE	1	112%				

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Refer to Amdel standard laboratory qualifier codes for comments.

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Job Number : 2E0320
Client : PPK Sydney
Reference : 27L311E
Project : 27L311E

Analyte	Lab No / Sample Id / PQL	E47948 / SP1				
E5910 Metals in Soil						
Arsenic	5	nd				
Cadmium	0.5	nd				
Chromium	5	11				
Copper	5	9				
Nickel	2	7				
Lead	5	9				
Zinc	5	26				
E5950 Mercury in Soil						
Mercury	0.05	nd				

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable
Refer to Amdel standard laboratory qualifier codes for comments.

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

CHAIN-OF-CUSTODY

Laboratory Name:	Amdel
Address:	5 Kelray Place Asquith
Fax Number:	02 9482 1734
Phone Number:	02 9482 1922
Contact Name:	Andrew Spencer (Sydney)

PPK Job No.
(Quote on all correspondence)

27L311E

Results Expected By/On:	12-Feb-02
Fax Results To:	Greg Watkins
Fax Number:	9736 1568
Phone Number:	9736 9725

Invoice To: Greg Watkins

PPK

RECEIVED
- 5 FEB 2002
2E0320

Date Sampled	Time	Sample I.D Submitted	Container Size	Sample Location	Medium *	Preservative Type	Filtered (x)	No. of Containers	Analysis Required: TPH/BTEX	PAH	OC/PCB	Metals			Sampled By	Company	Signature	Remarks
5/02/2002	Ea7998	SP1	125ml		s	-	-	2	x	x	x	x				PPK		

Relinquished By (Name):	Grant Sainsbery	Received By (Name):	Karen Gough	Relinquished By (Name):		Received By (Name):	
Date:	5/02/2002	Date:	5/2/02	Date:		Date:	
Company:	PPK	Company:	Amdel	Company:		Company:	
On Behalf Of:		On Behalf Of:		On Behalf Of:		On Behalf Of:	
Signature:	Schedule 2.2(a)(ii)	Signature:	Schedule 2.2(a)(ii)	Signature:		Signature:	

PPK
9 Blaxland Road,
Rhodes NSW 2138
Environmental and Geotechnical Services

Comments: Metals include As, Cd, Cr, Cu, Ni, Pb, Zn, Hg

*** Legend:** S = Soil, W = Water, F = Filter, T = Tube

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AMDEL INTERNAL QUALITY ASSURANCE REVIEW.

Job No. 2E0320

General

1. Laboratory QA/QC including Method Blanks, Duplicates, Matrix Spikes, Laboratory Control Samples or CRM's are included in this QA/QC appendix. (Where applicable)
2. Inter-Laboratory proficiency trial results are available upon request.
3. PQLs are matrix dependent and are increased accordingly where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spike or surrogate recoveries.
5. Where 3 and 2 significant figures are reported for >10x PQL and <10x PQL respectively, the last figure is uncertain and is provided for statistical purposes only.
6. Samples duplicated or spiked are from this job only and are identified in the following QA/QC report.
7. SVOC analyses on waters are performed on homogenized, unfiltered samples, unless noted otherwise.

Maximum Holding Times for Soils, Sediments and Waters

Parameter	Holding Times
Soils	
Volatile and Semi-Volatile Organic Analysis.	Extracted in 14 days, analysed within 40 days.
Metals	Extracted and analysed within 28 days-6 months.
Inorganics*	Extracted and analysed within 7-28 days.
TCLPs*	Extracted and analysed within 14 days, (Zero Headspace-TCLP 7 days).
Waters	
Volatile Organic Analysis	Analysed within 7 days (USEPA requires 14 days).
Semi-Volatile Organic Analysis	Extracted in 7 days, analysed within 40 days.
Inorganics*	Analysed within 24 hrs-28 days.
Metals (dissolved metals should be supplied field filtered)	Prepared and analysed within 28 days.

* Please refer to 'Preservation Information Chart for Soils, Sediments & Waters' for further information. (ISFORM.098). Holding times may be extended with the use of preservation bottles and/or freezing samples. Holding times can be calculated from dates reported in the body of the report. Tests clearly exceeding holding times will be noted when sufficient information is provided.
Reference: USEPA SW846 and AMDEL SPM-01 (incorporating NEPM Guidelines).

Chain of Custody and Sample Integrity

	Yes/No/NA
Chain of Custody / instructions received with samples	Yes
Custody seals were received intact, if used	NA
Samples were received chilled and in good condition	Yes
Samples received appropriately preserved for all tests	Yes
VOC/SVOC samples were received in teflon lined containers	Yes
Samples received with Zero Headspace	Yes
Chain of Custody completed and attached (if applicable)	Yes

Chromatography Calibration/Acceptence Criteria (if applicable)

Retention time window meets acceptance criteria (+/-2%)	Yes
Reference standard meets acceptance criteria (+/-10%)	Yes
Recalibration standard meets acceptance criteria (+/-15%)	Yes
Internal standard recovery acceptable.	Yes

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AMDEL INTERNAL QUALITY ASSURANCE REVIEW Cont..

Amdel QA/QC Compliance Assessment

	Compliance
Surrogates performed on all appropriate GC analyses and meet acceptance limits (70% - 130% recovery*).	Please see body of report
Matrix Spikes performed once per process batch and at least 1 in 20 samples (Results meet acceptance limits - 70% - 130% recovery* or 80% - 120% recovery* for inorganics in water.)	Please see body of report
Laboratory Control samples performed once per process batch and at least 1 in 20 samples (Results meet acceptance limits - 70% - 130% recovery* in soil or 70%-130%/90-110% recovery* for waters.)	Yes
Laboratory Duplicate samples performed once per process batch and at least 1 in 10 samples	NA
Laboratory duplicates meet acceptance criteria <4 PQL - +/- 2 PQL 4-10 PQL - 0-25 or 50% RPD >10 PQL - 0-10 or 30% RPD	Please see body of report
Method Blanks performed once per process batch and at least 1 in 20 samples (Results not detected at the PQL).	Yes

N/A=Not Applicable.

* Phenols 50% - 130% recovery
* SVOCs 60% - 130% recovery
* Phenoxy Acid Herbicides 60% - 140% recovery

QA/QC Appendix

Please refer to the following pages for the QA/QC data.
For further information on samples or non-conformance in QC protocols please see notations in the body of the report plus comments on the following page.

Additional Comments

Schedule 2.2(a)(ii)

R. Mooney B.Sc.(Hons) Dip. FDA
Technical Services Manager Sydney

amdel

AMDEL STANDARD LABORATORY QUALIFIER CODES.

Job NO. 2E0320

General

Qualifier Codes	Description
*	PQLs are raised due to matrix interference.
@	PQLs are raised due to the insufficient sample.
$	The mass imbalance indicates the presence of other ions not measured as part of this procedure.
&	Surrogate recoveries could not be determined due to the dilution required to quantify the analyte.
IS	Insufficient sample was supplied to conduct this analysis.
nd	<PQL
--	Not applicable
LNR	Sample listed on the COC, but not received.
J	The analyte was positively identified; the associated numerial value is the approximate concentration of the analyte in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a 'tentative' identification.
NJ	The analysis indicates the presences of an analyte that has been 'tentatively' identified, and the associated numerical value represents it's approximate concentration.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The presence or absence of the analye cannot be verified.
#	The matrix spike concentration is significantly less than the sample analyte concentration, thus spike recovery can not be accurately determined.
**	The surrogate recovery is outside of the recommended acceptance criteria, due to matrix interference.
***	The surrogate recovery is outside of the recommended acceptance criteria. Insufficent sample to perform confirmation.
A	The spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.
B	The duplicate %RPD is outside the recommended acceptance criteria. Further analysis indicates sample heterogeneity.
C	The sample was not received in a suitable timeframe to allow completion within the recommended holding time.
O	The results reported are 'recoverable organics' for this fraction, as the chromatogram and peak shape indicates the presence of a significant concentration of polar compounds.
P	The concentration reported is mainly due to a single peak.
ISM	Insufficient sample was supplied to conduct matrix spike analysis.
ISD	Insufficient sample was supplied to conduct duplicate analysis.
M	The sample was received with the incorrect preservation for this analysis.
S	The sample contained significant amounts of sediment. Sample aliquots have been taken via decanting in an attempt to avoid including sediment in the analysis portion.
K	The raw data indicates the absence of 0.055g of Copper Sulphate in the sample.
L	Theoretically the TKN result should be greater or equal to ammonia concentration. However the difference reported is within the uncertainty of the individual tests.
D	Theoretically the total result should be greater or equal to the dissolved concentration. However the difference reported is within the uncertainty of the individual tests.
I	During Kjeldahl digestion, nitrate (>10mg/L) can oxidise ammonia resulting in a negative TKN interference.
E	The mass imbalance was equal to or less than 0.2 milli-equivalents.
F	Samples results are reported on an 'as received' basis.
H	This sample was received with headspace (see first analyte notation).
T	This test was performed outside the recommended holding time
G	Samples contain volatile halogenated oxygenated or other compounds that are not quantitated as part of C6-9.
J	Results expressed in mg/L (ppm) due to the high concentration of the analyte.

amdel

Job Number : 2E0320

QAQC : Laboratory Control Sample(s)

Analyte	Level	Level Detected			Recovery Details		
		Result1	Result2	Result3	Rec 1 (%)	Rec 2 (%)	Rec 3 (%)
E1230 TPH in Soil by Purge & Trap/GC-MS							
C6-C9 Fraction	100	91			91%		
E1221 TPH in Soil							
C10-C14 Fraction		--					
C15-C28 Fraction	550	520			94%		
C29-C36 Fraction		--					
E1010 BTEX (P&T) in Soil							
Benzene	10	9.2			91%		
Toluene	10	9			94%		
Ethylbenzene	10	9			94%		
m&p-Xylene	20	19			97%		
o-Xylene	10	10			95%		

PQL = Practical Quantitation Limit
-- = Not Applicable
nd = <PQL

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

QAQC : Method Blank(s)

ANALYTE	Sample ID PQL	Blank1	Blank2	Blank3	Blank4	Blank5
E1230 TPH in Soil by Purge & Trap/GC-MS						
C6-C9 Fraction	5	nd				
E1221 TPH in Soil						
C10-C14 Fraction	10	nd				
C15-C28 Fraction	50	nd				
C29-C36 Fraction	50	nd				
E1010 BTEX (P&T) in Soil						
Benzene	0.2	nd				
Toluene	1	nd				
Ethylbenzene	1	nd				
m&p-Xylene	2	nd				
o-Xylene	1	nd				

PQL = Practical Quantitation Limit
nd = <PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

amdel

Job Number : 2E0320

QAQC : Laboratory Control Sample(s)

Analyte	Level	Level Detected			Recovery Details		
		Result1	Result2	Result3	Rec 1 (%)	Rec 2 (%)	Rec 3 (%)
E1110 Priority PAH's in Soil							
Naphthalene	5	5.2			104%		
Acenaphthylene	5	5.4			108%		
Acenaphthene	5	5.2			102%		
Fluorene	5	5.2			102%		
Phenanthrene	5	5.2			102%		
Anthracene	5	5.0			98%		
Fluoranthene	5	5.0			100%		
Pyrene	5	5.0			100%		
Benz(a)anthracene	5	5.0			100%		
Chrysene	5	5.0			98%		
Benzo(b) & (k)fluoranthene	10	10			100%		
Benzo(a)pyrene	5	5.0			100%		
Indeno(1.2.3-cd)pyrene	5	5.2			102%		
Dibenz(a.h)anthracene	5	5.4			108%		
Benzo(g.h.i)perylene	5	5.4			106%		

PQL = Practical Quantitation Limit
-- = Not Applicable
nd = <PQL

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

amdel

Job Number : 2E0320

QAQC : Method Blank(s)

ANALYTE	Sample ID PQL	Blank1	Blank2	Blank3	Blank4	Blank5
E1110 Priority PAH's in Soil						
Naphthalene	0.5	nd				
Acenaphthylene	0.5	nd				
Acenaphthene	0.5	nd				
Fluorene	0.5	nd				
Phenanthrene	0.5	nd				
Anthracene	0.5	nd				
Fluoranthene	0.5	nd				
Pyrene	0.5	nd				
Benz(a)anthracene	0.5	nd				
Chrysene	0.5	nd				
Benzo(b) & (k)fluoranthene	1	nd				
Benzo(a)pyrene	0.5	nd				
Indeno(1.2.3-cd)pyrene	0.5	nd				
Dibenz(a.h)anthracene	0.5	nd				
Benzo(g.h.i)perylene	0.5	nd				

PQL = Practical Quantitation Limit
nd = <PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

amdel

Job Number : 2E0320

QAQC : Laboratory Control Sample(s)

Analyte	Level	Level Detected			Recovery Details		
		Result1	Result2	Result3	Rec 1 (%)	Rec 2 (%)	Rec 3 (%)
E1081 OC's & Total PCB's in Soil							
HCB	0.5	0.5			94%		
a-BHC	0.5	0.5			91%		
g-BHC	0.5	0.5			92%		
Heptachlor	0.5	0.5			93%		
Aldrin	0.5	0.5			93%		
b-BHC	0.5	0.5			94%		
d-BHC	0.5	0.4			80%		
Oxychlordane	0.5	0.5			93%		
Heptachlor epoxide	0.5	0.5			93%		
Endosulfan 1	0.5	0.5			92%		
Chlordane-Trans	0.5	0.5			93%		
Chlordane-Cis	0.5	0.5			93%		
trans-Nonachlor	0.5	0.5			93%		
DDE	1.0	1.0			93%		
Dieldrin	0.5	0.5			92%		
Endrin	0.5	0.5			92%		
DDD	1	1.0			93%		
Endosulfan 2	0.5	0.5			92%		
DDT	1.0	1.0			95%		
Endosulfan sulfate	0.5	0.5			92%		
Methoxychlor	0.5	0.5			94%		
Total Polychlorinated biphenyl	-	--					

PQL = Practical Quantitation Limit
-- = Not Applicable
nd = <PQL

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

QAQC : Method Blank(s)

ANALYTE	Sample ID PQL	Blank1	Blank2	Blank3	Blank4	Blank5
E1081 OC's & Total PCB's in Soil						
HCB	0.1	nd				
a-BHC	0.1	nd				
g-BHC	0.1	nd				
Heptachlor	0.1	nd				
Aldrin	0.1	nd				
b-BHC	0.1	nd				
d-BHC	0.1	nd				
Oxychlordane	0.1	nd				
Heptachlor epoxide	0.1	nd				
Endosulfan 1	0.1	nd				
Chlordane-Trans	0.1	nd				
Chlordane-Cis	0.1	nd				
trans-Nonachlor	0.1	nd				
DDE	0.1	nd				
Dieldrin	0.1	nd				
Endrin	0.1	nd				
DDD	0.1	nd				
Endosulfan 2	0.1	nd				
DDT	0.1	nd				
Endosulfan sulfate	0.1	nd				
Methoxychlor	0.1	nd				
Total Polychlorinated biphenyl	1	nd				

PQL = Practical Quantitation Limit
nd = <PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

amdel

Job Number : 2E0320

QAQC : Laboratory Control Sample(s)

Analyte	Level	Level Detected			Recovery Details		
		Result1	Result2	Result3	Rec 1 (%)	Rec 2 (%)	Rec 3 (%)
E5910 Metals in Soil							
Arsenic	50	51			103%		
Cadmium	50	49			98%		
Chromium	50	52			103%		
Copper	50	53			107%		
Nickel	50	49			99%		
Lead	50	49			97%		
Zinc	50	50			100%		
E5950 Mercury in Soil							
Mercury	0.50	0.50			100%		

PQL = Practical Quantitation Limit
-- = Not Applicable
nd = <PQL

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

QAQC : Method Blank(s)

ANALYTE	Sample ID PQL	Blank1	Blank2	Blank3	Blank4	Blank5
E5910 Metals in Soil						
Arsenic	5	nd				
Cadmium	0.5	nd				
Chromium	5	nd				
Copper	5	nd				
Nickel	2	nd				
Lead	5	nd				
Zinc	5	nd				
E5950 Mercury in Soil						
Mercury	0.05	nd				

PQL = Practical Quantitation Limit
nd = <PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

CHAIN-OF-CUSTODY **Kingston Tank Pull**

Laboratory Name:	ALS Environmental
Address:	277-289 Woodpark Road Smithfield NSW 2164
Fax Number:	
Phone Number:	02 8784 8555
Contact Name:	Micheal Heery (Sydney)

PPK Job No.
(Quote on all correspondence)

27L311E

Results Expected By/On:	27-Dec-01
Fax Results To:	Greg Watkins
Fax Number:	9736 1568
Phone Number:	9736 9725
Invoice To: Greg Watkins	PPK

Date Sampled	Time	Sample I.D Submitted	Container Size	Sample Location	Medium *	Preservative Type	Filtered (x)	No. of Containers	Analysis Required: TPH/BTEX	PAH	OC/PCB	Metals	Lead		Sampled By	Company	Signature	Remarks
17/12/2001		1712 QA1A (1)	125 ml		S	Ice		1	X	X			X		GS	PPK		

Batch No.: ☑ ORG
ES31245
Batched date: 20/12/

☑ Remarks ☐ Ambient
☐ Water ☑ Chilled
☐ Other °C
☐ Subcontract Work
☐ Bottle Return
☐ Imm. Anal. Advised

Relinquished By (Name):	G.Sainsbery	Received By (Name):	Schedule 2.2(a)(ii)	Relinquished By (Name):		Received By (Name):	
Date:	19/12/2001	Date:	20/12/01	Date:		Date:	
Company:	PPK	Company:	ALS	Company:		Company:	
On Behalf Of:		On Behalf Of:	9.55	On Behalf Of:		On Behalf Of:	
Signature:	Schedule 2.2(a)(ii)	Signature:	Schedule 2.2(a)(ii)	Signature:		Signature:	

PPK
9 Blaxland Road,
Rhodes NSW 2138
Environmental and Geotechnical Services

Comments: Metals include As, Cd, Cr, Cu, Ni, Pb, Zn, Hg

* **Legend:** S = Soil, W = Water, F = Filter
T = Tube

ALS Environmental

CERTIFICATE OF ANALYSIS

CONTACT:	MR GREG WATKINS	**BATCH:**	ES31245
CLIENT:	PPK ENVIR & INFRASTRUCTURE P/L	**SUB BATCH:**	0
ADDRESS:	9 BLAXLAND ROAD RHODES NSW 2138	**LABORATORY:**	SYDNEY
		DATE RECEIVED:	20/12/2001
		DATE COMPLETED:	08/01/2002
		SAMPLE TYPE:	SOIL
ORDER No.:	27L311E	**No. of SAMPLES:**	1
PROJECT:	KINGSTON TANK PULL		

COMMENTS

Sample as received digested by USEPA method 200.2 (mod) prior to the determination of Lead. Results reported on a dry weight basis. All analysis and Laboratory QC conducted in accordance with Schedule B(3) NEPM Guideline on Laboratory Analysis of Potentially Contaminated Soil (December 1999).

NOTES

This is the Final Report and supersedes any preliminary reports with this batch number.
All pages of this report have been checked and approved for release.

ISSUING LABORATORY: SYDNEY

Address
277-289 Woodpark Road
SMITHFIELD NSW 2164

Phone: 61-2-8784 8555
Fax: 61-2-8784 8500
Email: brianw@als.com.au

Signatory Schedule 2.2(a)(ii)

LABORATORIES

AUSTRALASIA		*AMERICAS*
Brisbane	*Hong Kong*	*Vancouver*
Melbourne	*Singapore*	*Santiago*
Sydney	*Kuala Lumpur*	*Antofagasta*
Newcastle	*Bogor*	*Lima*
Auckland		

NATA No. 10918

Batch: ES31245
Sub Batch: 0
Date of Issue: 08/01/2002
Client: PPK ENVIR & INFRASTRUCTURE P/L
Client Reference: KINGSTON TANK PULL

CERTIFICATE OF ANALYSIS

				SAMPLE IDENTIFICATION									
		Laboratory I.D.		1									
		Date Sampled		17/12/2001									
METHOD	ANALYSIS DESCRIPTION	UNIT	LOR	1712QA1A									
EA-055	Moisture Content (dried @ 103'C)	%	0.1	16.5									
EG-005T	Lead - Total	mg/kg	1	14									

Batch: ES31245
Sub Batch: 0
Date of Issue: 08/01/2002
Client: PPK ENVIR & INFRASTRUCTURE P/L
Client Reference: KINGSTON TANK PULL

QUALITY CONTROL REPORT

				SAMPLE IDENTIFICATION									
		Laboratory I.D.		200	201	202							
		Date Sampled		20/12/2001	20/12/2001	20/12/2001							
METHOD	ANALYSIS DESCRIPTION	UNIT	LOR	METHOD BLANK	LCS	MS							
				CHECKS AND SPIKES									
EA-055	Moisture Content (dried @ 103'C)	%	0.1	----	----	----							
EG-005T	Lead - Total	mg/kg	1	<1	95.0%	91.0%							

ALS Environmental

CERTIFICATE OF ANALYSIS

CONTACT:	MR GREG WATKINS	**BATCH:**	ES31245
CLIENT:	PPK ENVIR & INFRASTRUCTURE P/L	**SUB BATCH:**	1
ADDRESS:	9 BLAXLAND ROAD RHODES NSW 2138	**LABORATORY:**	SYDNEY
		DATE RECEIVED:	20/12/2001
		DATE COMPLETED:	08/01/2002
		SAMPLE TYPE:	SOIL
ORDER No.:	27L311E	**No. of SAMPLES:**	1
PROJECT:	KINGSTON TANK PULL		

COMMENTS

Sample analysed on an as received basis. Results reported on a dry weight basis. All analysis and Laboratory QC conducted in accordance with Schedule B(3) NEPM Guideline on Laboratory Analysis of Potentially Contaminated Soil (December 1999).

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Phone: 61-2-8784 8555
Fax: 61-2-8784 8500
Email: brianw@als.com.au

Schedule 2.2(a)(ii)

Signatori

Batch: ES31245
Sub Batch: 1
Date of Issue: 08/01/2002
Client: PPK ENVIR & INFRASTRUCTURE P/L
Client Reference: KINGSTON TANK PULL

CERTIFICATE OF ANALYSIS

				SAMPLE IDENTIFICATION									
		Laboratory I.D.		1									
		Date Sampled		17/12/2001									
METHOD	ANALYSIS DESCRIPTION	UNIT	LOR	1712QA1A									
EA-055	Moisture Content (dried @ 103'C)	%	0.1	16.5									
EP-071-SS	**TOTAL PETROLEUM HYDROCARBONS**												
EP-071-SS	C6 - C9 Fraction	mg/kg	2	<2									
EP-071-SS	C10 - C14 Fraction	mg/kg	50	<50									
EP-071-SS	C15 - C28 Fraction	mg/kg	100	<100									
EP-071-SS	C29 - C36 Fraction	mg/kg	100	<100									
EP-080-SS	**BTEX**												
EP-080-SS	Benzene	mg/kg	0.2	<0.2									
EP-080-SS	Toluene	mg/kg	0.2	<0.2									
EP-080-SS	Chlorobenzene	mg/kg	0.2	<0.2									
EP-080-SS	Ethylbenzene	mg/kg	0.2	<0.2									
EP-080-SS	meta- & para-Xylene	mg/kg	0.2	<0.2									
EP-080-SS	ortho-Xylene	mg/kg	0.2	<0.2									
EP-080S-SS	**VOLATILE TPH/BTEX COMPOUND SURROGATES**												
EP-080S-SS	1.2-Dichloroethane-D4	%	1	95									
EP-080S-SS	Toluene-D8	%	1	92									
EP-080S-SS	4-Bromofluorobenzene	%	1	91									

Batch: ES31245
Sub Batch: 1
Date of Issue: 08/01/2002
Client: PPK ENVIR & INFRASTRUCTURE P/L
Client Reference: KINGSTON TANK PULL

QUALITY CONTROL REPORT

				SAMPLE IDENTIFICATION									
		Laboratory I.D.		100	101	102	103	104					
		Date Sampled		20/12/2001	20/12/2001	20/12/2001	20/12/2001	20/12/2001					
METHOD	ANALYSIS DESCRIPTION	UNIT	LOR	METHOD BLANK	NTPHT3025 SCS	NTPHT3025 DCS	NTPHT3025 MS	NTPHT3025 MSD					
				CHECKS AND SPIKES									
EA-055	Moisture Content (dried @ 103'C)	%	0.1	----	----	----	----	----					
EP-071-SS	**TOTAL PETROLEUM HYDROCARBONS**												
EP-071-SS	C6 - C9 Fraction	mg/kg	2	<2	88.0%	101%	83.0%	87.0%					
EP-071-SS	C10 - C14 Fraction	mg/kg	50	<50	96.0%	87.0%	114%	99.0%					
EP-071-SS	C15 - C28 Fraction	mg/kg	100	<100	96.0%	90.0%	117%	102%					
EP-071-SS	C29 - C36 Fraction	mg/kg	100	<100	104%	101%	----	----					
EP-080-SS	**BTEX**												
EP-080-SS	Benzene	mg/kg	0.2	<0.2	92.0%	97.0%	94.0%	94.0%					
EP-080-SS	Toluene	mg/kg	0.2	<0.2	86.0%	102%	84.0%	85.0%					
EP-080-SS	Chlorobenzene	mg/kg	0.2	<0.2	96.0%	102%	93.0%	91.0%					
EP-080-SS	Ethylbenzene	mg/kg	0.2	<0.2	88.0%	101%	----	----					
EP-080-SS	meta- & para-Xylene	mg/kg	0.2	<0.2	91.0%	100%	----	----					
EP-080-SS	ortho-Xylene	mg/kg	0.2	<0.2	92.0%	102%	----	----					
EP-080S-SS	**VOLATILE TPH/BTEX COMPOUND SURROGATES**												
EP-080S-SS	1.2-Dichloroethane-D4	%	1	97	99	92	107	104					
EP-080S-SS	Toluene-D8	%	1	101	96	100	90	89					
EP-080S-SS	4-Bromofluorobenzene	%	1	98	96	99	94	97					

ALS Environmental

CERTIFICATE OF ANALYSIS

CONTACT:	MR GREG WATKINS	**BATCH:**	ES31245
CLIENT:	PPK ENVIR & INFRASTRUCTURE P/L	**SUB BATCH:**	2
ADDRESS:	9 BLAXLAND ROAD RHODES NSW 2138	**LABORATORY:**	SYDNEY
		DATE RECEIVED:	20/12/2001
		DATE COMPLETED:	08/01/2002
		SAMPLE TYPE:	SOIL
ORDER No.:	27L311E	**No. of SAMPLES:**	1
PROJECT:	KINGSTON TANK PULL		

COMMENTS

Sample analysed on an as received basis. Results reported on a dry weight basis. All analysis and Laboratory QC conducted in accordance with Schedule B(3) NEPM Guideline on Laboratory Analysis of Potentially Contaminated Soil (December 1999).

NOTES

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All pages of this report have been checked and approved for release.

ISSUING LABORATORY: SYDNEY

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SMITHFIELD NSW 2164

Phone: 61-2-8784 8555
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Schedule 2.2(a)(ii)

Signator

Batch: ES31245
Sub Batch: 2
Date of Issue: 08/01/2002
Client: PPK ENVIR & INFRASTRUCTURE P/L
Client Reference: KINGSTON TANK PULL

CERTIFICATE OF ANALYSIS

				SAMPLE IDENTIFICATION								
		Laboratory I.D.		1								
		Date Sampled		17/12/2001								
METHOD	ANALYSIS DESCRIPTION	UNIT	LOR	1712QA1A								
EA-055	Moisture Content (dried @ 103'C)	%	0.1	16.5								
EP-076A-SS	**POLYNUCLEAR AROMATIC HYDROCARBONS**											
EP-076A-SS	Naphthalene	mg/kg	0.5	<0.5								
EP-076A-SS	Acenaphthylene	mg/kg	0.5	<0.5								
EP-076A-SS	Acenaphthene	mg/kg	0.5	<0.5								
EP-076A-SS	Fluorene	mg/kg	0.5	<0.5								
EP-076A-SS	Phenanthrene	mg/kg	0.5	<0.5								
EP-076A-SS	Anthracene	mg/kg	0.5	<0.5								
EP-076A-SS	Fluoranthene	mg/kg	0.5	<0.5								
EP-076A-SS	Pyrene	mg/kg	0.5	<0.5								
EP-076A-SS	Benz(a)anthracene	mg/kg	0.5	<0.5								
EP-076A-SS	Chrysene	mg/kg	0.5	<0.5								
EP-076A-SS	Benzo(b)fluoranthene	mg/kg	0.5	<0.5								
EP-076A-SS	Benzo(k)fluoranthene	mg/kg	0.5	<0.5								
EP-076A-SS	Benzo(a)pyrene	mg/kg	0.5	<0.5								
EP-076A-SS	Indeno(1.2.3.cd)pyrene	mg/kg	0.5	<0.5								
EP-076A-SS	Dibenz(a.h)anthracene	mg/kg	0.5	<0.5								
EP-076A-SS	Benzo(g.h.i)perylene	mg/kg	0.5	<0.5								
EP-076S-SS	**SURROGATE COMPOUNDS**											
EP-076S-SS	2-Fluorobiphenyl	%	1	74								
EP-076S-SS	Anthracene-d10	%	1	91								
EP-076S-SS	p-Terphenyl-d14	%	1	125								

Batch: ES31245
Sub Batch: 2
Date of Issue: 08/01/2002
Client: PPK ENVIR & INFRASTRUCTURE P/L
Client Reference: KINGSTON TANK PULL

QUALITY CONTROL REPORT

				SAMPLE IDENTIFICATION									
		Laboratory I.D.		100	101	102	103	104					
		Date Sampled		20/12/2001	20/12/2001	20/12/2001	20/12/2001	20/12/2001					
METHOD	ANALYSIS DESCRIPTION	UNIT	LOR	METHOD BLANK	NEP076S393 SCS	NEP076S393 DCS	NEP076S393 MS	NEP076S393 MSD					
				CHECKS AND SPIKES									
EA-055	Moisture Content (dried @ 103'C)	%	0.1	----	----	----	----	----					
EP-076A-SS	**POLYNUCLEAR AROMATIC HYDROCARBONS**												
EP-076A-SS	Naphthalene	mg/kg	0.5	<0.5	107%	122%	----	----					
EP-076A-SS	Acenaphthylene	mg/kg	0.5	<0.5	105%	122%	----	----					
EP-076A-SS	Acenaphthene	mg/kg	0.5	<0.5	108%	123%	92.0%	108%					
EP-076A-SS	Fluorene	mg/kg	0.5	<0.5	108%	124%	----	----					
EP-076A-SS	Phenanthrene	mg/kg	0.5	<0.5	102%	119%	----	----					
EP-076A-SS	Anthracene	mg/kg	0.5	<0.5	102%	119%	----	----					
EP-076A-SS	Fluoranthene	mg/kg	0.5	<0.5	102%	119%	----	----					
EP-076A-SS	Pyrene	mg/kg	0.5	<0.5	95.6%	112%	99.7%	110%					
EP-076A-SS	Benz(a)anthracene	mg/kg	0.5	<0.5	96.3%	112%	----	----					
EP-076A-SS	Chrysene	mg/kg	0.5	<0.5	99.8%	117%	----	----					
EP-076A-SS	Benzo(b)fluoranthene	mg/kg	0.5	<0.5	98.3%	119%	----	----					
EP-076A-SS	Benzo(k)fluoranthene	mg/kg	0.5	<0.5	103%	117%	----	----					
EP-076A-SS	Benzo(a)pyrene	mg/kg	0.5	<0.5	98.0%	114%	----	----					
EP-076A-SS	Indeno(1.2.3.cd)pyrene	mg/kg	0.5	<0.5	101%	119%	----	----					
EP-076A-SS	Dibenz(a.h)anthracene	mg/kg	0.5	<0.5	101%	119%	----	----					
EP-076A-SS	Benzo(g.h.i)perylene	mg/kg	0.5	<0.5	99.7%	116%	----	----					
EP-076S-SS	**SURROGATE COMPOUNDS**												
EP-076S-SS	2-Fluorobiphenyl	%	1	85	105	118	89	102					
EP-076S-SS	Anthracene-d10	%	1	86	105	123	92	103					
EP-076S-SS	p-Terphenyl-d14	%	1	83	105	121	96	98					

ALS Environmental

ORGANICS QUALITY CONTROL REPORT

BATCH NO: ES31245

DATE BATCH RECEIVED: 20/12/01

CLIENT: PPK E & I, NSW

DATE BATCH COMPLETED: 8/01/02

PROJECT: 27L311E

Method Code	Test	Matrix	Method Reference		QC Lot Number	Date Samples Extracted	Date Samples Analysed
			Extraction	Analysis			
EP-071	TPH(SV)	Soil	Tumbler	USEPA 8015A	NTPHT3025	27/12/01	27/12/01
EP-071/80	TPH(V)/BTEX	Soil	USEPA 5030A	USEPA 8260A	NVOCS3025	27/12/01	27/12/01
EP-076	PAH (USEPA	Soil	Tumbler	USEPA 8270C	NEP076S-393	27/12/01	29/12/01

Where applicable, internal standards are added to sample extracts prior to instrumental analysis. Absolute peak areas and retention times fall within the criteria specified in the individual methods. Continuing Calibration (CC) standards are run at the frequency of 1 in every 20 samples.

Abbreviations: SV = semivolatile, V = volatile

*: In-house methods

BATCH QUALITY CONTROL - CONTROL SPIKE/DUPLICATE

ALS EP-071 : Total Petroleum Hydrocarbons by Fractions

Vol QC Lot : NVOCS3025
Semivol QC Lot : NTPHT3025

MATRIX : Soil

COMPOUND	BATCH ADJ. (MDL)	Blank Conc.	Spike Conc.	Spike Results				Control Limits		
				SCS Conc.	DCS Conc.	Av. Rec.	RPD	Recovery %		RPD
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	%	Low	High	%
C6-C9	2.0	<LOR	20	17.6	20.1	94	13	90	108	20
C10-C14	25	<LOR	200	192	174	92	10	79	117	20
C15-C28	50	<LOR	200	192	180	93	6	83	115	20
C29-C36	50	<LOR	200	208	202	102	3	82	130	20

COMMENTS:

1) The control limits are based on ALS laboratory statistical data (Method QWI-ORG/07).
2) * : Recovery or RPD falls outside the recommended control limit.
3) MDL = Method Detection Limit
4) LOR = Level Of Reporting

BATCH QUALITY CONTROL - CONTROL SPIKE/DUPLICATE

ALS EP-080 : BTEX ANALYSIS

QC Lot No. : NVOCS3025 MATRIX : Soil

COMPOUND	BATCH ADJ. (MDL)	Blank Conc.	Spike Conc.	Spike Results				Control Limits		
				SCS Conc.	DCS Conc.	Av. Rec.	RPD	Recovery %		RPD
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	%	Low	High	%
Benzene	0.1	<LOR	1.0	0.92	0.97	94	5	83	115	20
Toluene	0.1	<LOR	1.0	0.86	1.02	94	18	85	113	20
Chlorobenzene	0.1	<LOR	1.0	0.96	1.02	99	6	89	112	20
Ethylbenzene	0.1	<LOR	1.0	0.88	1.01	94	14	86	114	20
m- & p-Xylene	0.1	<LOR	1.0	0.91	1.00	95	10	80	116	20
o-Xylene	0.1	<LOR	1.0	0.92	1.02	97	9	85	115	20

COMMENTS :

1) The control limits are based on ALS laboratory statistical data (Method QWI-ORG/07).
2) * : Recovery or RPD falls outside the recommended control limit.
3) MDL = Method Detection Limit
4) LOR = Level Of Reporting

BATCH QUALITY CONTROL - MATRIX SPIKE/DUPLICATE

ALS EP-071 : Total Petroleum Hydrocarbons by Fractions

Vol QC Lot : NVOCS3025
Semivol QC Lot : NTPHT3025

SPIKED SAMPLE : ES31077-21
MATRIX : SOIL

COMPOUND	Sample Results	Spike Level	Spike Results				Control Limits*
			MS Conc	MSD Conc	Av. Rec.	RPD	
	mg/kg	mg/kg	mg/kg	mg/kg	%	%	RPD
C6-C9	<LOR	10	8.3	8.7	85	5	20
C10-C14	<LOR	430	490	426	107	14	20
C15-C28	<LOR	1570	1834	1606	110	13	20
C29-C36	<LOR	N/A	--	--	--	--	--

COMMENTS :

1) LOR: level of reporting
2) The control limits are based on ALS laboratory statistical data. (Method QWI-ORG/06)
3) * : Recovery or RPD falls outside of the recommended control limits.

BATCH QUALITY CONTROL - MATRIX SPIKE/DUPLICATE

ALS EP-080 : BTEX ANALYSIS

QC Lot No. : NVOCS3025

SPIKED SAMPLE : ES31077-21
MATRIX : SOIL

COMPOUND	Sample Results	Spike Level	Spike Results				Control Limits
			MS Conc	MSD Conc	Av. Rec.	RPD	
	mg/kg	mg/kg	mg/kg	mg/kg	%	%	RPD
Benzene	<LOR	2.5	2.3	2.3	94	0	20
Toluene	<LOR	2.5	2.1	2.1	84	2	20
Chlorobenzene	<LOR	2.5	2.3	2.3	92	2	20

COMMENTS :

1) LOR: level of reporting

2) The control limits are based on ALS laboratory statistical data. (Method QWI-ORG/06)

3) * : Recovery or RPD falls outside of the recommended control limits.

BATCH QUALITY CONTROL -- DUPLICATE

ALS EP-071 : Total Petroleum Hydrocarbons by Fractions

SEMIVOLATILES QC LOT NO.: NTPHT3025
VOLATILES QC LOT No.: NVOCS3025

ANALYST: NENSI.K.
MATRIX : Soil

COMPOUND	QC DUPLICATE RESULTS		
	ES31077 21	ES31077 21D	RPD
	mg/kg	mg/kg	%
C 6-C 9	<LOR	<LOR	--
C10-C14	<LOR	<LOR	--
C15-C28	<LOR	<LOR	--
C29-C36	<LOR	<LOR	--

BATCH QUALITY CONTROL -- DUPLICATE

ALS EP-080 : BTEX ANALYSIS

QC Lot No. : NVOCS3025 Analyst : H.CAVANAUGH
MATRIX : Soil

	QC DUPLICATE RESULTS		
COMPOUND	**ES31077** 21	**ES31077** 21D	**RPD**
	mg/kg	mg/kg	%
Benzene	**<LOR**	**<LOR**	--
Toluene	**<LOR**	**<LOR**	--
Chlorobenzene	**<LOR**	**<LOR**	--
Ethylbenzene	**<LOR**	**<LOR**	--
m- & p-Xylene	**<LOR**	**<LOR**	--
o-Xylene	**<LOR**	**<LOR**	--

BATCH QUALITY CONTROL -- DUPLICATE

ALS EP-071 : Total Petroleum Hydrocarbons by Fractions

SEMIVOLATILES QC LOT NO.: NTPHT3025 ANALYST: NENSI.K.
VOLATILES QC LOT No.: NVOCS3025 MATRIX : Soil

COMPOUND	QC DUPLICATE RESULTS		
	ES31077 27	ES31077 27D	RPD
	mg/kg	mg/kg	%
C 6-C 9	<LOR	<LOR	--
C10-C14	<LOR	<LOR	--
C15-C28	<LOR	<LOR	--
C29-C36	<LOR	<LOR	--

BATCH QUALITY CONTROL -- DUPLICATE

ALS EP-080 : BTEX ANALYSIS

QC Lot No. : NVOCS3025 Analyst : H.CAVANAUGH
MATRIX : Soil

	QC DUPLICATE RESULTS		
COMPOUND	**ES31077** 27	**ES31077** 27D	**RPD**
	mg/kg	mg/kg	%
Benzene	**<LOR**	**<LOR**	--
Toluene	**<LOR**	**<LOR**	--
Chlorobenzene	**<LOR**	**<LOR**	--
Ethylbenzene	**<LOR**	**<LOR**	--
m- & p-Xylene	**<LOR**	**<LOR**	--
o-Xylene	**<LOR**	**<LOR**	--

BATCH QUALITY CONTROL -- CONTROL SPIKE/DUPLICATE

ALS EP-076 : Polynuclear Aromatic Hydrocarbons

QC LOT No. : NEP076S-393 ANALYST ALICE TAT

MATRIX: Soils

COMPOUND	Blank Conc	Spike Level	SPIKE QC RESULTS				Control Limits		
			SCS Rec.	DCS Rec.	Average Rec.	RPD	Rec.		RPD
	mg/kg	mg/kg	%		%	%	Low	High	%
EP-076A : Polynuclear Aromatic Hydrocarbons									
Naphthalene	<0.25	4.0	107	122	115	13.1	84.6	131	0 - 20
Acenaphthylene	<0.25	4.0	105	122	114	15	83	130	0 - 20
Acenaphthene	<0.25	4.0	108	123	116	13	83.6	128	0 - 20
Fluorene	<0.25	4.0	108	124	116	13.8	87.3	128	0 - 20
Phenanthrene	<0.25	4.0	102	118	110	14.5	79.4	129	0 - 20
Anthracene	<0.25	4.0	102	119	111	15.4	83.8	128	0 - 20
Fluoranthene	<0.25	4.0	102	119	111	15.4	83.3	131	0 - 20
Pyrene	<0.25	4.0	95.6	112	104	15.8	73.6	132	0 - 20
Benzo(a)anthracene	<0.25	4.0	96.3	112	104	15.1	64.6	140	0 - 20
Chrysene	<0.25	4.0	99.8	116	108	15	83.3	130	0 - 20
Benzo(b)fluoranthene	<0.25	4.0	98.3	119	109	19.1	72	136	0 - 20
Benzo(k)fluoranthene	<0.25	4.0	103	117	110	12.7	84.9	133	0 - 20
Benzo(a)pyrene	<0.25	4.0	98	114	106	15.1	80.1	132	0 - 20
Indeno(1.2.4.cd)pyrene	<0.25	4.0	101	119	110	16.4	81.7	126	0 - 20
Dibenzo(a.h)anthracene	<0.25	4.0	101	119	110	16.4	80.6	127	0 - 20
Benzo(g.h.I)perylene	<0.25	4.0	99.7	116	108	15.1	81.2	129	0 - 20
EP-076S : PAH Surrogates									
2-Fluorobiphenyl	85.1%	4.0	105	118	112	11.7	77.1	130	0 - 20
Anthracene-d10	86.2%	4.0	105	123	114	15.8	79.5	132	0 - 20
4-Terphenyl-d14	83.1%	4.0	105	121	113	14.2	80.3	137	0 - 20

COMMENTS:

1) The recovery control limits are based on ALS laboratory statistical data. (Method QWI-ORG/07)

2) The control limits on RPD (relative percent deviation) are fixed.

3) * : Recovery or RPD falls outside of the recommended control limits.

BATCH QUALITY CONTROL -- DUPLICATE

ALS EP-076 : Polynuclear Aromatic Hydrocarbons

QC LOT No. : NEP076S-393
MATRIX : Soils
ANALYST: ALICE TAT

COMPOUND	LOR	QC DUPLICATE RESULTS		RPD	
		ES31092 21	ES31092 21D	RPD	Cont. Limit
	mg/kg	mg/kg	mg/kg	%	
EP-076A : Polynuclear Aromatic Hydrocarbons					
Naphthalene	0.25	<0.25	<0.25	n/a	
Acenaphthylene	0.25	<0.25	<0.25	n/a	
Acenaphthene	0.25	<0.25	<0.25	n/a	
Fluorene	0.25	<0.25	<0.25	n/a	
Phenanthrene	0.25	<0.25	<0.25	n/a	
Anthracene	0.25	<0.25	<0.25	n/a	
Fluoranthene	0.25	<0.25	<0.25	n/a	
Pyrene	0.25	<0.25	<0.25	n/a	
Benzo(a)anthracene	0.25	<0.25	<0.25	n/a	
Chrysene	0.25	<0.25	<0.25	n/a	
Benzo(b)fluoranthene	0.25	<0.25	<0.25	n/a	
Benzo(k)fluoranthene	0.25	<0.25	<0.25	n/a	
Benzo(a)pyrene	0.25	<0.25	<0.25	n/a	
Indeno(1.2.4.cd)pyrene	0.25	<0.25	<0.25	n/a	
Dibenzo(a.h)anthracene	0.25	<0.25	<0.25	n/a	
Benzo(g.h.I)perylene	0.25	<0.25	<0.25	n/a	
EP-076S : PAH Surrogates					
2-Fluorobiphenyl	1%	105%	109%	3.74	0 - 20
Anthracene-d10	1%	107%	108%	0.93	0 - 20
4-Terphenyl-d14	1%	115%	120%	4.26	0 - 20

Note: The permitted range for RPD (relative percent deviation) is specified in ALS Method QWI-EN/38 and is dependent on the magnitude of results in comparison to the level of reporting:
Result < 10 times LOR, no limit.
Result between 10 and 20 times LOR, 0% - 50%.
Results > 20 times LOR, 0% - 20%.

BATCH QUALITY CONTROL -- DUPLICATE

ALS EP-076 : Polynuclear Aromatic Hydrocarbons

QC LOT No. : NEP076S-393
MATRIX : Soils
ANALYST: ALICE TAT

COMPOUND	LOR	QC DUPLICATE RESULTS		RPD	
		ES31092 22	ES31092 22D	RPD	Cont. Limit
	mg/kg	mg/kg	mg/kg	%	
EP-076A : Polynuclear Aromatic Hydrocarbons					
Naphthalene	0.25	<0.25	<0.25	n/a	
Acenaphthylene	0.25	<0.25	<0.25	n/a	
Acenaphthene	0.25	<0.25	<0.25	n/a	
Fluorene	0.25	<0.25	<0.25	n/a	
Phenanthrene	0.25	<0.25	<0.25	n/a	
Anthracene	0.25	<0.25	<0.25	n/a	
Fluoranthene	0.25	<0.25	<0.25	n/a	
Pyrene	0.25	<0.25	<0.25	n/a	
Benzo(a)anthracene	0.25	<0.25	<0.25	n/a	
Chrysene	0.25	<0.25	<0.25	n/a	
Benzo(b)fluoranthene	0.25	<0.25	<0.25	n/a	
Benzo(k)fluoranthene	0.25	<0.25	<0.25	n/a	
Benzo(a)pyrene	0.25	<0.25	<0.25	n/a	
Indeno(1.2.4.cd)pyrene	0.25	<0.25	<0.25	n/a	
Dibenzo(a.h)anthracene	0.25	<0.25	<0.25	n/a	
Benzo(g.h.I)perylene	0.25	<0.25	<0.25	n/a	
EP-076S : PAH Surrogates					
2-Fluorobiphenyl	1%	122%	89.1%	31.2 *	0 - 20
Anthracene-d10	1%	113%	93.3%	19.1	0 - 20
4-Terphenyl-d14	1%	116%	98.7%	16.1	0 - 20

Note: The permitted range for RPD (relative percent deviation) is specified in ALS Method QWI-EN/38 and is dependent on the magnitude of results in comparison to the level of reporting:
Result < 10 times LOR, no limit.
Result between 10 and 20 times LOR, 0% - 50%.
Results > 20 times LOR, 0% - 20%.

BATCH QUALITY CONTROL -- MATRIX SPIKE/DUPLICATE

ALS EP-076 : Polynuclear Aromatic Hydrocarbons

QC LOT No. : NEP076S-393 ANALYST : ALICE TAT

MATRIX: Soils Sample ID: ES31092-22

COMPOUND	Sample Results	Spike Level	SPIKE QC RESULTS				Cont. Limit
			MS Rec.	MSD Rec.	Average Rec.	RPD	RPD
	mg/kg	mg/kg	%	%	%	%	%
EP-076A : Polynuclear Aromatic Hydrocarbons							
Acenaphthene	<0.25	10	92	108	100	16	0 - 35
Pyrene	<0.25	10	99.7	110	105	9.82	0 - 35
EP-076S : PAH Surrogates							
2-Fluorobiphenyl	122%	4	89.2	102	95.6	13.4	0 - 35
Anthracene-d10	113%	4	92.3	102	97.2	9.98	0 - 35
4-Terphenyl-d14	116%	4	95.9	98.1	97	2.27	0 - 35

COMMENTS:

1) The RPD control limits are fixed.

2) *: RPD falls outside the recommended control limit.

Rec 23/3/2001

Draft

Addendum Report: Environmental Site Investigations and Site Remedial Works Canberra Railway Station Yards and Rail Corridor

Indec Consulting

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16 March 2001
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Our Reference 27K140D/SCG/cc

16 March 2001

Mr Colin Denton
Indec Consulting
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ADELAIDE SA 5000

Dear **Colin**

Addendum Report: Environmental Site Investigations and Site Remedial Works Canberra Railway Station Yards and Rail Corridor

PPK is pleased to provide this draft addendum report to answer the queries raised by URS in their preliminary review of the reports associated with the investigation and remediation works at the Canberra railway station yards and rail corridor.

If you have any queries please do not hesitate to call me on the above number.

Yours sincerely

Schedule 2.2(a)(ii)

Stuart Glenn
Principal, Environmental Division
PPK Environment & Infrastructure Pty Ltd

Contents

Appendices

1. Introduction

PPK Environment & Infrastructure Pty Ltd (PPK) was commissioned by Indec Consulting (Indec), on behalf of Australian National under Contract 1013, to undertake a series of environmental investigations and remedial works at the Canberra railway station yards and rail corridor as part of the Commonwealth's environmental remediation program. These investigations and remedial works were comprehensively reported in December 2000 in the document titled "Report on Further Environmental Site Investigations and Site Remedial Works Canberra Railway Station Yards and Rail Corridor" (PPK Ref 27K140D Document No. 99-0885-00).

Following a review of this report by URS a number of issues and clarifications were requested. These were detailed in a report dated 16 November 2000 and titled Review of Canberra Railyards (see Appendix A).

Following this review, PPK undertook a series of further investigations, inclusive of confirmatory groundwater monitoring, increased analyte testing and site inspections. This work was completed on 22 December 2000.

This report relates to these latest investigations undertaken throughout December 2000.

2. Summary of Issues Raised

2.1 Groundwater Monitoring to Confirm Fate Modelling

Solute transport modelling was undertaken and reported in the original PPK report to determine the likely migration of identified dissolved–phase groundwater contamination. In general, PPK determined that dissolved components migrated hydraulically down-gradient in the local groundwater toward Jerrabomberra Creek. It was nominated that dispersive effects during transport potentially would result in a dilution of contaminant concentrations. And that transport of any contaminant plume would also be retarded by the effects of sorption to organic matter and other aquifer material.

To forecast actual impacts, PPK undertook one dimensional (1-D) solute transport modelling as presented by van Genuchten and Alves ('Analytical Solutions of the One-dimensional Convective-Dispersive Solute Transport Equation', 1982, US Department of Agriculture technical Bulletin No.1661). Results of the modelling were clearly defined in Section 9.3 of the abovementioned PPK report. The conclusion drawn from this modelling suggested that any identified groundwater contamination would rapidly dilute, migrate very slowly and not pose any risk to Jerrabomberra Creek.

A review of PPK's findings undertaken by URS noted that additional objective data, in the form of groundwater monitoring results, would be of benefit to confirm the model predictions. This was specifically in relation to two potential areas, namely the former refuelling depot and vacant dump site.

2.1.1 Old Refuelling Depot

Modelling of the identified PSH groundwater contamination plume indicated no risk of impacts to Jerrabomberra Creek in excess of the established assessment criteria for the protection of fresh water ecosystems. This was confirmed at the time of modelling by groundwater monitoring between the source and Jerrabomberra Creek.

To further confirm the model predictions, another monitoring round of wells around the identified source, inclusive of GW104, GW210, GW310, GW13, GW301, GW307, GW305, GW303, GW204, GW311, GW203 and GW105 was undertaken. All results recorded were below laboratory detection limits (see laboratory analyses Appendix B).

This monitoring round objectively reconfirms the model predictions of minimal movement of the identified plume and the absence of risk to Jerrabomberra Creek, sited some 800 m from the source.

2.1.2 Vacant Landfill Site

The previous PPK report identified one localised source of TPH at the northern end of the former waste disposal site. Fate and transport modelling indicated that the identified concentration was not likely to impact on the adjacent Jerrabomberra Creek.

The URS review nominated two areas of clarification, in respect of the vacant landfill site, namely the need for further confirmatory analyses associated with an identified TPH plume and the need for typical leachate analyses within the groundwater.

A further round of groundwater sampling and analysis was undertaken to address these review points.

TPH:

Previous testing had revealed a single sample recovered from the north western portion of the site with concentrations of dissolved-phase TPH. Subsequent testing has confirmed the presence of this contamination, however it is apparently contained, with no adjacent or downgradient wells recording any indications of TPH. The latest results validate the model prediction that "TPH would not exceed 0.43 μg/L (below the laboratory method limit of reporting) at a distance of 50 m from the source."

Leachate:

In addition to TPH, the latest round of analyses included a series of standard leachate parameters to confirm any impact resulting from any landfill materials. Wells sampled included GW109, GW206, GW114, GW313, and GW111 (see laboratory results Appendix C). Results show evidence of minor impact of the local groundwater with typical leachate parameters inclusive of elevated TDS, hardness, nitrate and ammonia. Heavy metal results were all at low concentrations or below detection limits.

Other than evidence of elevated ammonia sulphate levels in some wells no contaminants (major ions, metals, pesticides or hydrocarbons) at levels of concern for this area were identified.

In addition, the modelling of groundwater behaviour corroborates that no impacts, in excess of the assessment criteria for the protection of freshwater ecosystems, would be detected at Jerrabomberra Creek.

On this basis, no further action is required.

2.2 Former Railway Turntable

Reviewing of old ariel photographs revealed that the former rail turntable is located partially under Robbo's Pet Barn and the adjacent bituminised car parking area, this area is surrounded by groundwater wells both up and down gradient. Subsequent testing has confirmed no downgradient wells recording any indications of petroleum hydrocarbon contamination. On this basis, no further action is required.

2.3 Abattoir USTs

The former abattoir site was not part of this site assessment.

2.4 Landfill Area (East of Jerrabomberra Creek)

The former landfill area east of Jerrabomberra Creek, north and adjacent to the railway alignment, was considered to be outside of the scope of this report. This land was not considered to be AN land and was not part of this site assessment.

2.5 Asbestos

Site inspection of the potential asbestos contaminated area on 20 December 2000 revealed no evidence of residual asbestos sheeting (see Photographs Appendix C).

Based on this finding, no further action is required.

2.6 Oily Water Drains

Site inspection on 20 December 2000 confirmed the areas previously identified as potential disposal drains for oily water showed no visual evidence of oil stain or residue (see Photographs Appendix C).

Based on this latest finding, no further action is required.

2.7 Oil Staining on Soils

Previously reported oil staining, both along the fuel depot sidings and adjacent to the Shell depot, was reinspected as part of an overall site review in December 2000.

Staining was no longer in evidence along the fuel depot sidings (see Photographs in Appendix C) and significant growth of grass and other vegetation is now in evidence.

Based on this latest finding, no further action is required.

Staining associated with the Shell depot is considered a matter for Shell and outside the scope of this report.

2.8 Petroleum Hydrocarbon Vapours

PPK is drafting an environmental status report on the Canberra site, highlighting all identified areas of risk inclusive of areas with potential hydrocarbon vapours. This separate report will enable current and future users of the site to develop their own specific Safe Systems of Work.

Appendix A

URS Summary Review

TABLE OF CONTENTS

The ACT Government has requested an independent audit review of the former Australian National (AN) land in Canberra. The review has been carried out by Mr. Warren Pump, a Victorian EPA Accredited Contaminated Land Auditor. The land was Commonwealth property which passed from the Commonwealth Railways to AN when the latter was formed. Since the sale of AN in November 1997 a site assessment and remediation program instigated by AN and now managed by INDEC Consulting (Indec) and funded through the Federal Government has been carried out at the Canberra Site by PPK Environment and Infrastructure (PPK). This audit has been prepared for Indec Consulting and the ACT Government to provide confidence that the necessary investigation and remedial action required for the continued use of the site for which it was last used prior to the sale date of AN has occurred.

At the time of the sale of AN the Federal Government committed funding to remediate former rail sites and property to a standard suitable for the continuing use for which the property was last used prior to the sale date. The Federal Government undertook this action regardless of whether AN or previous land owners or users caused the environmental contamination.

Indec has been appointed by the Commonwealth to manage all aspects of the remediation program. The remediation process is and has been based on a risk management basis which takes account of the commitment of the Commonwealth (in the majority of cases) to remediate sites to allow land-use consistent with ongoing use for which it was last used.

In respect of providing the ACT Government and the Commonwealth adequate levels of confidence that the environmental risks at the site have been identified and addressed an agreed sign off process has been adopted. As part of the sign off process this independent audit has been carried out, which is equivalent to a an environmental audit carried out for contaminated land in accordance with the requirements of the Environment Protection Authority of Victoria. However, this audit is not a statutory audit.

In conducting the audit, the Auditor has consider the suitability of the land, based on its environmental condition, for the following range of land uses:

- Light and heavy industrial, especially industrial processes traditionally associated with urban railways and railyards;
- Commercial activities; and
- Solid waste disposal and soil filling.

In addressing such land uses, the Auditor has formed an opinion of the existence, nature and extent of any actual material environmental harm, or threatened material environmental harm, regarding the site. The term "material environmental harm" has the same meaning as that in the ACT *Environment Protection Act 1997.*

This review is only concerned with impacts to soil and groundwater which may offer a risk to the environment or human health. The review is not concerned with operational issues at the sites, nor is it concerned with the protection of natural flora or fauna (other than those that typically exist in a highly modified form in urban railyards); soil aesthetics; dust; noise; vibration; or ground corrosivity.

The discussion below provides a brief summary of the reports prepared by PPK and the description of the works performed.

"Environmental Audit of the Australian National Facilities, Canberra Railway Station Yards and Rail Corridor", 16 March 1998 Document No. 27K009A 98-182.DOC.

This report presents the past and current activities at the site which have the potential to cause impact to the identified environmental receptors.

"Phase II Environmental Site Assessment, Canberra Railway Station and Rail Corridor", 12 November 1998, Document No. 27K140A 98-845.DOC.

This report presents the results of the first round of soil and groundwater investigations at the various areas identified during the environmental audit above. It specifically assessed the following areas:

- The fuel depots and former cement works and their impact to the railway corridor;
- The former goods shed (now Robbo's Pet Barn) and surrounding area;
- The old refueling depot;
- The main Canberra station area and surrounds;
- Leased area occupied by William Edmunds Plumbers and the Australian Railway Historical Society (ARHS);
- Vacant dump site (which is understood to have been used for uncontrolled disposal of municipal wastes); and
- Corridor between Jerrabomberra Creek and Ipswich Street.

"Report on Further Soil and Groundwater Investigations, Canberra Railway Station and Rail Corridor", 14 January 1999, Document No. 7K140B 99-014.DOC.

This report presents the results of the second (Phase IIB) round of soil and groundwater investigations at various areas identified upon completion of the initial Phase II investigations. It specifically assessed the following areas:

- Contaminated soil issues associated with the former cement works;
- Re-sampling of groundwater from monitoring wells in the railway corridor adjacent to the fuel depots;
- Installation of additional groundwater monitoring bores in the vicinity of former refueling area to delineate the extent of groundwater contamination; and
- Installation of additional groundwater monitoring bores at the vacant dump site to assess potential impacts to the Jerrabomberra Creek.

"Report on Further Environmental Site Investigation and Site remedial Works, Canberra Railway Station Yards and Corridor", 17 December 1999, Document No. 27K140C 99-0885-00.DOC.

This report presents the results of further site assessment works (soil and groundwater) and remediation (groundwater) undertaken as a result of the findings in the Phase IIB assessment. It specifically assessed the following areas:

- Human health risk assessment of soil contamination (metals) adjacent to the former cement works along the rail corridor;
- Further groundwater monitoring adjacent to the fuel depots along the eastern rail corridor;
- Installation of additional groundwater monitoring bores and groundwater remediation at the former refueling area. The assessment also included fate and transport modelling of residual groundwater contamination;
- Further test pitting, installation of additional groundwater monitoring bores and groundwater sampling at the vacant dump site. The assessment also included fate and transport modelling of residual groundwater contamination at the north-western end of the dump site;
- Investigation of underground storage tanks (USTs) at the area leased by William Edmunds Plumbers. The investigation included sampling of soils from test pits and sampling a nearby groundwater monitoring bore in a down-gradient location; and
- Investigation of fouled railway ballast removed from the vicinity of the main Canberra railway station and placed south-east of the station and south Robbo's Pet Barn. The investigation included sampling of the fouled ballast and surrounding soils and collection of groundwater samples from nearby bores in a down-gradient location.

This review is a summary of the main issues identified in the various investigations carried out across the Canberra Rail Facility. Minor non-conformances or areas where there are minor identified risks which do not impact continued railway use of the site will be included in the final audit report.

3.1 FUEL DEPOTS ADJACENT TO THE EASTERN RAIL CORRIDOR

Levels of petroleum hydrocarbon (TPHs) above the adopted criteria for continued railway use were identified adjacent to the Shell and Mobil fuel depots. These levels were at concentrations which represented petroleum hydrocarbons floating on the groundwater table (phase separated hydrocarbons – PSH). It is understood that Indec have communicated these issues to the fuel companies for further consideration.

In most cases the identified TPHs are not likely to impact upon the continued use of this facility for railway purposes. However, a combination of significant concentration of light fraction TPH compounds (C6-C9 at 46,600 ug/L) and the shallow depth to ground water (approximately 2 metres) may expose workers in the areas to potential soil vapours. An assessment of this issue is required to assess that identified receptors are not exposed to any potential risks associated with the soil vapours.

3.2 FORMER CEMENT WORKS ADJACENT TO THE EASTERN RAIL CORRIDOR

Concentrations of metals (lead and zinc) were identified at levels exceeding the adopted criteria for continued railway use. The area was limited in vertical and lateral extent (less than 10 square metres in area and within a depth of 1 metre). The concentrations of zinc were subsequently identified to be within the NEHF, 1998 assessment criteria for 'hot-spots'. The concentration of lead was compared to the health risk assessment (for lead contamination in soils) performed for the Port Pirie Rail Yards. The parameters (exposure pathways, applicable exposure factors and toxicological factors) of the risk assessment for the Port Pirie site were reviewed. The identified parameters are considered to represent a conservative scenario in terms of the Canberra site. Therefore the identified concentration of lead in soils is likely to be acceptable for continued railway use.

3.3 OLD REFUELING DEPOT

Levels of TPHs were identified in the vicinity of the former refueling area above the adopted assessment guidelines. Phase separated hydrocarbons were also noted in three of the groundwater monitoring bores. It was estimated that approximately 50 litres of PSH was floating on the groundwater table. Remediation of the PSH was undertaken using a 'pig sock' lowered into the impacted groundwater bores. The pig sock removed PSH by absorption. The last report prepared for the site documented that approximately 5 litres of PSH had been removed..

The significance of the remaining contaminated groundwater was undertaken using fate and transport groundwater modelling techniques. The modelling indicated that there is likely to be minimal risks to the Jerrabomberra Creek. Future monitoring of this area would be required to confirm the predictions of the modelling.

During assessment of this area groundwater monitoring bore GW304 reported a concentration of TPH C6-C9 at 63,000 ug/L. Assessment of the chromatogram indicated that this petroleum hydrocarbon was not derived from the same source as the former refueling area (which was

predominantly used for storage and dispensing diesel). The significance of this contamination was also assessed using the fate and transport model, which indicated that there is likely to be no future risks associated with this contamination. However, there has been no further explanation of the presence of this contamination. It is recommended that the results be reviewed to address this anomaly.

3.4 FORMER GOODS SHED

There were no significant issues associated with the operations of the goods shed which had the potential to impact the site. However, the facility was established over filled ground. The filled ground included solid and inert wastes.

3.5 MAIN CANBERRA STATION AREA

There are no current activities associated with the Canberra station which have the potential to impact continued railway use of the site. In the past ballast contaminated with TPHs was removed and geofabric liner placed to prevent future TPH leakage from the locomotives. There was no documentation provided up to the time of this review which indicated validation of the excavation was performed. However, groundwater was sampled from monitoring bores down-gradient from the area and there were no impacts identified in the groundwater.

Fouled ballast was deposited in various locations south-east of the station area. It is assumed this material was sourced during the removal of the ballast from the main Canberra station area. Assessment of the ballast material, adjacent soils and groundwater down-gradient from the area indicated that there are no significant issues which would limit continued railway use of the site.

3.6 LEASED AREAS (WILLIAM EDMUNDS PLUMBERS AND ARHS)

Site facilities are located over filled areas and are assumed to be an extension of the vacant dump area. One significant issue was identified in the area occupied within the William Edmunds site. The review identified, three underground storage tanks located north and adjacent to the main building. Assessment of the soils adjacent to the USTs and groundwater down-hydraulic gradient indicated no adverse impacts.

3.7 VACANT DUMP SITE

The results of the investigation of this area indicated the filled area varied from approximately 2m to 6m and contained predominantly domestic (solid / inert wastes) and in the later years of operation, restricted filling to building rubble (soil fill, concrete, bricks, etc.). Levels of TPHs were identified in the northern end of the dump and appeared to be localised in area. Fate and transport modelling indicated that the identified concentration is not likely to impact on the adjacent Jerrabomberra Creek. However, further monitoring of the groundwater should be undertaken to confirm the modelling outcomes.

Although no significant putrescible domestic fill was encountered during the test pitting exercise, there are indications that the groundwater quality has been impacted by leachate generated by the decomposition of putrescible wastes. Traces of cyanide were also detected in GW206 above the guidelines for protection of fresh water ecosystems. It is recommended that groundwater quality be monitored for typical landfill leachate parameters, as well as other parameters identified in previous monitoring.

3.8 CORRIDOR BETWEEN JERRABOMBERRA CREEK AND IPSWICH STREET

No significant issues were identified in this area which would impact upon continued railway use of the area.

Review of the assessment reports has highlighted that other areas have been identified which have the potential, to impact identified receptors at the site. These areas only have the potential to be an issue if significant contamination is present. These include:

- The filling of the former railway turntable. This issue was highlighted in the environmental audit report;
- USTs (now removed) were located in the former abattoir site, immediately east of Newcastle Street. It is presumed that the abattoir site in not part of the site;
- Potential for fragments of asbestos sheeting to exist in the surface soils was highlighted in the environmental audit and no assessment was performed;
- Oily wastes being disposed into the stormwater drain at the ARHS site. This issue was raised in the environmental audit report and no further assessment has been performed;
- The environmental audit report identified filling east of the Jerrabomberra Creek north and adjacent to the railway alignment. The filling, as illustrated in the aerial photo was similar to the vacant dump site area;
- Significant staining of the soils by petroleum hydrocarbons was noted along-side the fuel depot sidings during the environmental audit of the site. No further assessment of these soils was undertaken. It is assumed that the sidings are located on railway land; and
- Black oily waste was observed during the environmental audit in a drainage alignment adjacent to the Shell depot. There was no further assessment of these areas noted in the later environmental site assessment reports.
- The assessments prepared by PPK have been performed in accordance with the methods and guidelines usually employed for the assessment of potentially contaminated sites, however, there has been no comparison of the local requirements of Environment ACT and supporting legislation for the protection of the environment. The detailed audit report will reference the Environment ACT legislation and any relevant guidelines.
- In this review, the Auditor has formed an opinion of the existence, nature and extent of any actual material environmental harm, or threatened material environmental harm, regarding the site. On the basis of the information provided and reviewed, there is no evidence to suggest that the issues assessed present actual material environmental harm to exist. However, until further information can be provided, threatened environmental harm exists for the following issues:
- The potential for landfill leachate from the vacant dump site to be impacting the underlying groundwater and therefore the Jerrabomberra Creek;
- The potential for landfill leachate to be generating from the filled area east of the Jerrabomberra Creek (north and adjacent to the railway alignment) to be impacting the underlying groundwater and therefore the Jerrabomberra Creek; and
- The potential for petroleum hydrocarbon soil vapours adjacent to the Shell bulk to impact upon the identified receptors.

The review has indicated that there have been no issues which are likely to impact the identified continued uses of the site. However, as identified in this review, there are number of issues which require further assessment, documentation or monitoring. This is required to ensure receptors identified at the site (workers or the neighboring environment) are not exposed to adverse risks and to confirm that the outstanding issues identified herein are addressed and pose no impact to continued use of the site for the identified uses.

The works undertaken by the Commonwealth in respect of remediation of contamination at AN sites was constrained by an upper limiting cost. Therefore, the Commonwealth, and its advisers, have sought to optimise the effectiveness of remediation efforts at the AN sites. However, in optimising these works priorities were addressed and this may have resulted in matters at some sites falling beyond the scope of capability of the limited funds. This review has not sought to investigate the total extent of land contamination at the site reviewed, rather it has checked that the works undertaken and the results achieved were appropriately carried out within the constraints of the total number of sites to be managed.

Reliance on Data

This review has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise stated in the report, (the consultant) has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. (the Consultant) will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to (consultant name).

Environmental Conclusions

In accordance with the scope of services, (consultant name) has relied upon the data and has not conducted any environmental field monitoring or testing in the preparation of the report. The conclusions are based upon the data and visual observations and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions.

Within the limitations imposed by the scope of services, the assessment of the site and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

Report for Benefit of Client

The report has been prepared for the benefit of the Client and no other party. (consultant name) assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of (consultant name) or for any loss or damage suffered by any other party in relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

Appendix A
References

Appendix B

Major Site Review Checklist and Conformance Report

Appendix C
Memoranda and Proposed Report Format

The Commonwealth of Australia - Sign-off procedure for former Australian National Land now transferred to - The State of South Australia

Major Site Review. This checklist and conformance report has been developed in accordance with Clause 7 of the Railways Agreement signed on 30 June 1997 by the Commonwealth and South Australian Transport Ministers.

The checklist provides guidance for EPA accredited auditors, appointed as reviewers, to check the conformance of available reports for Major Sites as defined by the Commonwealth, pursuant to Clause 7 of the Agreement. In addition to the Reviewers experience the following references shall be taken into account for the purpose of the review:

1. Clause 7 of the Railways Agreement between the Commonwealth and the State of South Australia.
2. The relevant Clauses of the 'Remediation Program' being a program of works for the purposes of the Railways Agreement, and which details the requirements of the checklist.
3. Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, ANZECC/NHMRC, January 1992.
4. Protocol for the Health Risk Assessment and Management of Contaminated Sites, Contaminated Sites Monograph Series No. 2, 1993.
5. Identification and Assessment of Contaminated Land, Improving Site History Appraisal, Contaminated Sites Monograph Series No. 3, 1994.
6. Protocol for the Health Risk Assessment and Management of Contaminated Sites, Contaminated Sites Monograph Series No. 5, 1996.
7. Draft Australian Standard - Analysis of Soils, Part 1: The Sampling of Potentially Contaminated Soil, Standards Australia, 1995.
8. The Generic Work Plans for Australian National Projects, 15 November 1996.
9. The covering memorandum to this checklist outlining the methodology to be applied in its use.
10. The specific site scope of works developed for each site.

ASSESSOR (Name & Signature):	JOB NUMBER:	JOB TITLE:

LIST OF REPORTS / CORRESPONDENCES	REPORT IDENTIFIER / DATE	INITIAL DOCUMENTS REVIEWED	COMMENTS ON PROVENANCE / CONTENTS / RELATIONSHIP OF DOCUMENTS
"Environmental Audit of the Australian National Facilities, Canberra Railway Station Yards and Rail Corridor".	16 March 1998 Document No. 27K009A 98-182.DOC.	A	Initial environmental audit report which was carried out to identify activities at the site which have the potential to result in contamination of the land.
"Phase II Environmental Site Assessment, Canberra Railway Station and Rail Corridor".	12 November 1998, Document No. 27K140A 98-845.DOC.	B	First phase of soil and groundwater investigations of the main issues identified in the environmental audit report.
"Report on Further Soil and Groundwater Investigations, Canberra Railway Station and Rail Corridor".	14 January 1999, Document No. 7K140B 99-014.DOC.	C	Second phase of soil and groundwater sampling to assist in delineation of the identified contamination issues.
"Report on Further Environmental Site Investigation and Site remedial Works, Canberra Railway Station Yards and Corridor".	17 December 1999, Document No. 27K140C 99-0885-00.DOC.	D	Third phase of soil and groundwater sampling to attempt to assess the significance of the identified contamination issues and to collect additional information on the soil and groundwater quality. Assessment of 'hot spot' areas also included contaminant fate and transport modelling and applying the results of a health risk assessment of undertaken for the Port Pirie Railyard site.

SPECIFICATION	REFERENCE (e.g. 'A' or '3')	COMMENTS	CONFORMANCE STATUS
1. Phase 1 Given scope definition, site history, and site activities, has the investigation been in accordance with Ref 5. Specifically, were the following adequately addressed for the potential risks at the site: - Site description and definition - Current/Previous owners occupiers & users - Raw materials/products (inc. storages) - Wastes produced/disposal locations - Discharges and spills to land and water - Site geology, hydrogeology & catchment characteristics - Adjacent land uses.	A, B, C, D, 3, 5	**Site description and definition** There has been a detailed definition of the site description in Ref A , s2.1. However the site plan provided in Ref A Appendix B does not clearly identify the site boundary. The site boundary is assumed to be as illustrated in Ref B Appendix B, which illustrates a bold outline of the boundary of the site which is being investigated. **Current/Previous owners occupiers & users** Ref A s2.0 and s3.0 has identified the history of the site adequately to assist in identifying activities which have the potential to result in land contamination of the site. **Raw materials/products (inc. storages)** Ref A s5.4 has identified areas of the site where raw materials and products have been stored. It is also noted that the site history assessment has been able to identify the areas of the site which stored significant materials storages (such as the old refuelling depot). **Wastes produced/disposal locations** Ref A s 5.4 attempts to identify the areas which have been highlighted to PPK during the environmental audit. It is assumed that all the areas known to former employees of AN and associated areas have been pointed out to PPK. It is also possible that previously (historic) unidentified areas, containing filling, may exist in minor quantities which have not been identified during the various phases of the assessment. However, it is unlikely that these areas are likely to impact upon continued railway use of the site.	S S S S

		Discharges and spills to land and water Ref A s5.4 highlights the various areas of the site where discharges and spills have occurred at the site. As indicated above, there maybe other areas not highlighted to PPK during this assessment. These areas (if any) are likely to be minor issues and are unlikely to impact upon continued railway use of the site. **Site geology, hydrogeology & catchment characteristics** Ref A s5.1, 5.2, 5.3 discuss the environmental setting of the site including the topography, local geography and hydrogeology, local soil types and geology. There is no reference to an assessment of retained records for existing and nearby groundwater bores. It is noted however, in Ref 4 s9.3.3 there is a reference that there are licensed groundwater abstraction wells. Also it is from the investigation phases of the assessment that regional groundwater flow direction from all areas of the site is towards the Jerrabmberra Creek. There is no reference to the likely beneficial use of the groundwater, however, this is further discussed in Ref B, C and D. **Adjacent land uses.** There is no specific section in Ref A which outlines the surrounding landuses. However, these have been highlighted in various sectons throughout the whole report. There is a specific section in Ref B s3.0 and s3.2 which addresses the specific uses surrounding the site. **Summary** Overall, the issues addressed in the Phase I assessment generally comply with the requirements of Ref 5.	S S S
2. Phase 2 Given the continued use of the site, scope definition, and works from Phase I, was the Phase 2 program adequate from a risk based perspective. Did the sampling program:	B, C, D, 8, 10	The scope of work performed and documented in Refs B, C & D generally conformed with the requirements of Ref 8 & 10. However, the Phase I has highlighted other areas which have the potential to impact identified receptors at the site. These have not been further investigated as part of the Phase 2 and include:	MNC

- Meet the requirements of Ref. 8 - Meet the requirements of Ref. 10 - Adequately define the vertical and lateral extent of identified potential contaminants.		• The filling of the former railway turntable. This issue was highlighted in the environmental audit report; • USTs (now removed) were located in the former abattoir site, immediately east of Newcastle Street. It is presumed that the abattoir site in not part of the site; • Potential for fragments of asbestos sheeting to exist in the surface soils was highlighted in the environmental audit and no assessment was performed; • Oily wastes being disposed into the stormwater drain at the ARHS site. This issue was raised in the environmental audit report and no further assessment has been performed; • The environmental audit report identified filling east of the Jerrabomberra Creek north and adjacent to the railway alignment. The filling, as illustrated in the aerial photo was similar to the vacant dump site area; • Significant staining of the soils by petroleum hydrocarbons was noted along-side the fuel depot sidings during the environmental audit of the site. No further assessment of these soils was undertaken. It is assumed that the sidings are located on railway land; and • Black oily waste was observed during the environmental audit in a drainage alignment adjacent to the Shell depot. There was no further assessment of these areas noted in the later environmental site assessment reports. These areas only have the potential to be an issue if significant contamination is present. During assessment of the former refuelling area groundwater monitoring bore GW304 reported a concentration of TPH C6-C9 at 63,000 ug/L. Assessment of the chromatogram indicated that this petroleum hydrocarbon was not derived from the same source as the former refueling area (which was predominantly used for storage and dispensing diesel). The significance of this contamination was also	MNC

		assessed using the fate and transport model, which indicated that there is likely to be no future risks associated with this contamination. However, there has been no further explanation of the presence of this contamination. It is recommended that the results be reviewed to address this anomaly. Ref B s4.0 (first bullet point) makes reference to "heavy metals and PAHs from power station foundry operations and past on-site disposal of foundry wastes". There has been no further reference to this point in any other of the reports and there has been no assessment of this identified in the reports.	MNC

SPECIFICATION	REFERENCE (e.g. 'A' or '3')	COMMENTS	CONFORMANCE STATUS
3. Soil Sampling Grid/Pattern On the basis of questions 1 and 2, did the sampling grid or pattern adequately define contaminant issues and therefore provide for a baseline set of data for the site.	B, C, D, 3, 7, 8 & 10	Based on the areas investigated during the Phase 2 assessments (Ref B, C, D) and the requirements of Refs 3 & 7 the sampling programs undertaken were satisfactory to provide a baseline set of data for the issues investigated. As mentioned in Question 2 above, there are number of issues identified where there was no further clarification or assessment documented in the Phase 2 reports (Refs B, C, D). Other minor issues to note include: • Ref D s7.6.1, there were test pit logs provided for the excavations around the USTs adjacent to William Edmunds Plumbers.	S MNC
4. Analytes Given the potential sources/contaminating activities identified in Phase 2, were the range of analytes reported appropriate.	B, C, D, 3, 7, 8 & 10	In most cases investigated the analytes selected were appropriate. However, the analyte list in the following areas is considered to be deficient : • The main vacant dump site. Although no significant putrescible domestic fill was encountered during the test pitting exercise, there are indications that the groundwater quality has been impacted by leachate generated by the decomposition of putrescible wastes. Traces of cyanide were also detected in GW206 above the guidelines for protection of fresh water ecosystems. It is recommended that groundwater quality be monitored for typical landfill leachate parameters, as well as other parameters identified in previous monitoring. Typical landfill leachate parameters include COD, BOD, Nitrate (N), Ammonia, pH, Kjeldahl nitrogen, sulphate, phosphate, major anions and cations (it is noted that some of these parameters were tested). • Ref B, s5.3 review of the COCs indicated that no soil samples	MNC MNC

		were analysed for VOCs or cyanide. • Ref B, C & D, there is no evidence in the reports that trip blank samples were collected and placed in sample coolers for primary samples being analysed for VOCs (such as BTEX).	MNC
5. Groundwater Investigations Were the identified potential groundwater problems adequately investigated: - In terms of procedures used (drilling techniques, well construction etc.) - In terms of definition of lateral and vertical extent of identified contaminant plumes. - Have beneficial use(s) of the groundwater been adequately defined. - Correct well construction used? (taking into account possible presence of LNAPL's & DNAPL's	B, C, D, 3, 5, 6, 7, 8 & 10	**Identification of beneficial uses** Assessment of the groundwater beneficial use has been carried in general accordance with the recognised guidelines. **Bore location and construction techniques** The location and construction of the bores has been carried in general accordance with the nominated references for the assessment of LNAPLs. There was no evidence during the assessment that DNAPLs exist at the site. **Groundwater levels, contours and flow direction** Assessment of the interpreted groundwater levels, contours and flow directions has indicated that the standing water level (SWL) reduced levels (RLs) do not correlate with the contours interpreted in the various groundwater maps provided in Refs B & D. The assumed groundwater flow directions are generally correct. However, there are a number of localised variations in the levels and flow directions noted which effect the groundwater flow gradients, and those assumed in the groundwater modelling. There was no information Refs B, C, D to suggest that the groundwater bores were surveyed to AMG coordinates. It is assumed that the bores were surveyed to locate their position.	S S MNC

SPECIFICATION	REFERENCE (e.g. 'A' or '3')	COMMENTS	CONFORMANCE STATUS
6. Groundwater Remediation Where groundwater contamination was identified, were the investigations sufficient to enable development of appropriate groundwater remediation strategies, eg.: - Were the source identified - Were the variables of plume geometry clear - Were aquifer characteristics adequately defined - Were pilot studies, if appropriate, conducted.	D, 1, 2, 3, 6, 8 & 10	Levels of TPHs in the area of the former refuelling area were identified containing phase separated hydrocarbons (PSHs). It was estimate that approximately 50 litres of PSH was floating on the groundwater table. Removal of the PSH was performed using a 'pig-sock' which extracted approximately 5 litres of PSH. There was no further information presented in Ref D which discussed the status of the remaining PSH (if any). Concentrations of dissolved phase TPHs in the former refuelling area were also modelled to assess the likely fate and transport of this remaining contamination. The following comments are provided regarding modelling performed: • The reduced groundwater levels shown in Appendix L Ref D are satisfactory. However, four bores GW6, GW8, GW103 and GW104 and GW105 were gauged and sampled on the 1/3/1999 and 18/8/1999 while the remained were sampled around 15/5/1999. The levels from bores GW6, GW8, GW103, 104 and 105 taken on the 18/8/1999 were used against other bores dated 15/5/1999. The effect on the data are not considered to be too significant but it indicted loose data presentation; • The water levels recorded on the Groundwater Field Parameter sheets (Appendix I, Ref D) are reported as Depth to groundwater from TOC (m). In the table of Ref D Appendix L (Well Gauging Data) some of the measurements are reported as Top of Survey Point and some are reported as Top of Casing – there is no record of which is which on the parameter sheets; • When the reduced water levels are plotted against their corresponding bores and groundwater contours are re-drawn, the groundwater contour maps for both the Figures 8 and 9 (Ref	MNC MNC

		D) are vastly different and the contours shown on these Figures in the report greatly oversimplify the data reported. While this may have no major impact on the final outcome (because the hydraulic conductivity of the aquifer is so low) the figures do not illustrate "actual" groundwater flow lines (direction and length of flow lines) – importantly from areas of contamination where groundwater mounding has an impact; • Hydraulic conductivity testing of five (5) bores across an area as large as the site shown in Figure 8 (Ref D) is not considered to be adequate to get a representative range of aquifer parameters – this is not a major problem in this case as the result of the five tested are within one order of magnitude; • The use of conservative values for both the hydraulic conductivity, hydraulic gradient and decay constant for the 1-D model is acceptable; • The sensitivity analysis of the 1-D model is only limited to two dispersion coefficient values, it would have been good to see some analysis of effects of different hydraulic conductivities since there were only a relatively small number of hydraulic conductivity test done on the site; • The initial source concentration for the model was set at 10,000 units. Testing reported free product in some bores. It is likely that dissolved phase THP in groundwater below the free phase would have TPH concentrations at saturation, i.e. at least one order of magnitude greater than that modelled. Further sensitivity testing of the model is recommended at the higher TPH concentrations. • Based on the outcome of the above recommendation, the fate of a contamiantion plume should be assessed in terms of the groundwater flow lines resulting from actual site conditions not a generalised groundwater flow pattern (as shown in Figures 8 & 9), the conclusions should then be made an that basis.	
		Ref B s6.8, Ref C s2.3.1, there is reference to elevated levels of mercury and lead in a number of the groundwater bores, but there is no further explanation of the possible source of these chemicals. It was also noted in some cases at concentrations above the drinking	MNC

		water guidelines and protection of aquatic ecosystem guidelines.	
7. QA/QC Procedures Were appropriate QA/QC procedures, (inc. work plan reqt's) followed, (see Table A3.1 of Generic work plan), including: - Chain of custody forms included - Duplicates , (sufficient & acceptable limits) - Interlaboratory samples accept. Limits 10% - Trip blanks, (acceptable limits (20% mean for background samples or PQL) - NATA accredited methods	B, C, D, 3, 7, 8 & 10	The results of the assessment of the QA/QC program generally satisfied the requirements outlined in the reference documents. However, the following comments are provided: • Ref C, 10% of the samples were checked for analysis within the nominated holding times. It was identified that some samples were analysed outside of the holding times. • Ref C Appendix H, the result for the rinsate blank (report no. 8E02410 page 22 of 24 Lab No, 65606) which is assumed to be a rinsate sample from groundwater sampling equipment had elevated levels of VOCs, and there was no explanation provided in the report.	MNC MNC

SPECIFICATION	REFERENCE (e.g. 'A' or '3')	COMMENTS	CONFORMANCE STATUS
8..Investigation Levels Were the soil and groundwater analytical results compared with appropriate guideline concentrations, eg.: - Definition of potential receptor confirmed (industrial workers in most cases) - Appropriate guidelines selected - Comparison of analytical results adequate. - 'Outliers' properly addressed	B, C, D, 3, 5, 6, & 8.	Comparison of the results of the soil and groundwater samples with the relevant guideline levels were generally within the requirements of the reference documents. However, the following comments are provided: • Ref B s6.7. It was assessed that groundwater quality would be suitable for drinking water purposes on the basis of TDS. The guidelines adopted in Ref B are "Australian Drinking Water Standards (Draft 1994/Draft 1995). The current suggested guidelines for drinking water purposes are understood to be the "NHMRC/ARMCANZ 1996 Drinking Water Health & Aesthetic Guidelines". It was later identified that the later criteria were used in Ref D. • Ref B s6.7. It was also assessed that for groundwater discharging to the aquatic environment of the Jerrabomberra Creek, the groundwater quality would also be compared with to the ANZECC Australian Water Quality Guidelines for Fresh and Marine Waters (Livestock and Irrigation Standards). The guidelines suggested for groundwater discharging to fresh water ecosystems (which is understood to be the case for the Jerrabomberra Creek) are the ANZECC Australian Water Quality Guidelines - Protection of Aquatic Ecosystems (Fresh Water). • There was no comparison of the soil results with Environmental B levels for the purpose of assessing the impact on ecological receptors. However, given that the site environment is likely to be significantly modified and that there are unlikely to be any significant ecological receptors, this is not likely to be an issue. • Ref D 7.1.3, an assessment criteria for TPH (C10-C36) in groundwater of 5,000 ug/L has been used. It is referenced in Ref D s6.6.2 that the DIL for groundwater would be used and the	MNC MNC S MNC

		actual criteria for TPH C10-C36 is 600 ug/L in groundwater.	
9..Phase 3 Remediation Strategies For identified contamination, were/are phase 3 remediation strategies appropriate, eg.: - Were target clean-up criteria appropriate - Did the remediation strategies offer reasonable technical solutions to identified contamination. If remediation not yet complete: will the remediation technology being adopted achieve the final remediation goal in the time frame proposed. Factors: time, area, likely residual contamination.	D, 1, 2, 3, 8 & 10.	Refer to Question 6 above.	

SPECIFICATION	REFERENCE (e.g. 'A' or '3')	COMMENTS	CONFORMANCE STATUS
10.. Health and Ecological Risk Assessment Given the identified receptors to be protected, (usually on-site rail workers, but being cognisant of possible off-site impacts), were quantitative/ semi-quantitative risk assessment works appropriate, specifically: - Have all COC been considered - Are assessment criteria appropriate - All major exposure and pathways covered - Model inputs appropriate - Toxicological data suitable - Exposure parameters appropriate - Ecological and health receptors considered - Discussion of uncertainly included? - Where appropriate to the scope, have aesthetic issues including odours been adequately addressed.	D, 1, 2, 3, 4, 6, 8 & 10	Concentrations of metals (lead and zinc) were identified at levels exceeding the adopted criteria for continued railway use. The area was limited in vertical and lateral extent (less than approximately 10 square metres in area and within a depth of 1 metre). The concentrations of zinc were subsequently identified to be within the NEHF, 1998 assessment criteria for 'hot-spots'. The concentration of lead was compared to the health risk assessment (for lead contamination in soils) performed for the Port Pirie Rail Yards. The parameters (exposure pathways, applicable exposure factors and toxicological factors) of the risk assessment for the Port Pirie site were reviewed. The identified parameters are considered to represent a conservative scenario in terms of the Canberra site. Therefore the identified concentration of lead in soils is likely to be acceptable for continued railway use.	S
11.. Validation Programs Following remedial works, have appropriate validation programs been implemented/proposed for the Phase 3 works, specifically: - Sampling pattern - Sample frequency soils - Depth of Samples - Groundwater samples - Analytes and levels of detection - QA/QC practices OK	D, 1, 2, 3, 4, 6, & 10	There are three areas where significant concentration of TPHs were identified and fate and transport modelling was performed to address the significance of the insitu contamination. These include the dissolved phase TPH 'hot spot' in the northern end of the landfill, the dissolved phase TPH area associated with the former refuelling area and the dissolved phase (THP C6-C9) hot spot in north and adjacent to the former refuelling area. Ref D has provided no further comments on the remaining PSH which may remain in the former refuelling area and the significance of this contamination.	MNC

		There has been limited follow-up monitoring in the case where dissolved phase TPHs have been assessed by modelling the likely fate and transport of the remaining contamination.	MNC

FAX TRANSMISSION

[redacted]

FAX Transmission

INDEC *consulting*

Attention: ☞ Stuart Glenn

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To Fax No:	(08) 8405 4301	**From Fax No:**	**08 8641 2496**
From:	**David Miller**	**Time:**	
Date:	20-Nov-00	**No of Pages: 8**	
Topic:	Major Site review – Canberra.		

Hello Stuart,

Attached is an edited version of the URS Executive Summary with those issues we discussed highlighted. Would you please liase with Warren Pump at URS, Melbourne to resolve these issues. I would appreciate your prompt response to this issue so the final report is not delayed, Warren will be on holidays for a week beginning Thursday.

Regards

Schedule 2.2(a)(ii)

David

URS

Fax Transmittal

To: David Miller
INDEC Consulting
16 November 2000
Page: 2

In consultation with the ACT Government Indec Consulting acting for the Commonwealth Department of Transport and Regional Development have engaged Woodward Clyde to conduct

REVIEW OF CANBERRA RAILYARDS

Commonwealth Govt.

1. Introduction

~~The ACT Government has requested~~ an independent audit review of the former Australian National (AN) land in Canberra. The review has been carried out by Mr. Warren Pump, a Victorian EPA Accredited Contaminated Land Auditor. The land was Commonwealth property which passed from the Commonwealth Railways to AN when the latter was formed. Since the sale of AN in November 1997 a site assessment and remediation program instigated by AN and now managed by INDEC Consulting (Indec) and funded through the ~~Federal~~ Commonwealth Government has been carried out at the Canberra Site by PPK Environment and Infrastructure (PPK). This audit has been prepared for ~~the~~ Indec Consulting and the ~~ACT~~ Government to provide confidence that the necessary investigation and remedial action required for the continued use of the site for which it was last used prior to the sale date of AN has occurred.

the ACT Government

2. Background

At the time of the sale of AN the ~~Federal~~ Commonwealth Government committed funding to remediate former rail sites and property to a standard suitable for the continuing use for which the property was last used prior to the sale date. The ~~Federal~~ Government undertook this action regardless of whether AN or previous land owners or users caused the environmental contamination.

Indec has been appointed by the Commonwealth to manage all aspects of the remediation program. The remediation process is and has been based on a risk management basis which takes account of the commitment of the Commonwealth ~~([illegible])~~ to remediate sites to allow land-use consistent with ongoing use for which it was last used.

3. Scope of Work

~~In respect of providing the ACT Government and the Commonwealth adequate levels of confidence that the environmental risks at the site have been identified and addressed an agreed sign off process has been adopted. As part of the sign off process~~ this independent audit has been carried out, which is equivalent to a an environmental audit carried out for contaminated land in accordance with the requirements of the Environment Protection Authority of Victoria. However, this audit is not a statutory audit.

In conducting the audit, the Auditor has consider the suitability of the land, based on its environmental condition, for the following range of land uses:

- Light and heavy industrial, especially industrial processes traditionally associated with urban railways and railyards;
- Commercial activities; and
- Solid waste disposal and soil filling.

In addressing such land uses, the Auditor has formed an opinion of the existence, nature and extent of any actual material environmental harm, or threatened material environmental harm,

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regarding the site. The term "material environmental harm" has the same meaning as that in the ACT *Environment Protection Act 1997*.

This review is only concerned with impacts to soil and groundwater which may offer a risk to the environment or human health. The review is not concerned with operational issues at the sites, nor is it concerned with the protection of natural flora or fauna (other than those that typically exist in a highly modified form in urban railyards); soil aesthetics; dust; noise; vibration; or ground corrosivity.

4. Summary of Work Conducted and Reviewed

The discussion below provides a brief summary of the reports prepared by PPK and the description of the works performed.

> "Environmental Audit of the Australian National Facilities, Canberra Railway Station Yards and Rail Corridor", 16 March 1998 Document No. 27K009A 98-182.DOC.

This report presents the past and current activities at the site which have the potential to cause impact to the identified environmental receptors.

> "Phase II Environmental Site Assessment, Canberra Railway Station and Rail Corridor", 12 November 1998, Document No. 27K140A 98-845.DOC.

This report presents the results of the first round of soil and groundwater investigations at the various areas identified during the environmental audit above. It specifically assessed the following areas:

- The fuel depots and former cement works and their impact to the railway corridor;
- The former goods shed (now Robbo's Pet Barn) and surrounding area;
- The old refueling depot;
- The main Canberra station area and surrounds;
- Leased area occupied by William Edmunds Plumbers and the Australian Railway Historical Society (ARHS);
- Vacant dump site (which is understood to have been used for uncontrolled disposal of municipal wastes); and
- Corridor between Jerrabomberra Creek and Ipswich Street.

> "Report on Further Soil and Groundwater Investigations, Canberra Railway Station and Rail Corridor", 14 January 1999, Document No. 7K140B 99-014.DOC.

This report presents the results of the second (Phase IIB) round of soil and groundwater investigations at various areas identified upon completion of the initial Phase II investigations. It specifically assessed the following areas:

- Contaminated soil issues associated with the former cement works;

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- Re-sampling of groundwater from monitoring wells in the railway corridor adjacent to the fuel depots;
- Installation of additional groundwater monitoring bores in the vicinity of former refueling area to delineate the extent of groundwater contamination; and
- Installation of additional groundwater monitoring bores at the vacant dump site to assess potential impacts to the Jerrabomberra Creek.

"Report on Further Environmental Site Investigation and Site remedial Works, Canberra Railway Station Yards and Corridor", 17 December 1999, Document No. 27K140C 99-0885-00.DOC,

This report presents the results of further site assessment works (soil and groundwater) and remediation (groundwater) undertaken as a result of the findings in the Phase IIB assessment. It specifically assessed the following areas:

- Human health risk assessment of soil contamination (metals) adjacent to the former cement works along the rail corridor;
- Further groundwater monitoring adjacent to the fuel depots along the eastern rail corridor;
- Installation of additional groundwater monitoring bores and groundwater remediation at the former refueling area. The assessment also included fate and transport modelling of residual groundwater contamination;
- Further test pitting, installation of additional groundwater monitoring bores and groundwater sampling at the vacant dump site. The assessment also included fate and transport modelling of residual groundwater contamination at the north-western end of the dump site;
- Investigation of underground storage tanks (USTs) at the area leased by William Edmunds Plumbers. The investigation included sampling of soils from test pits and sampling a nearby groundwater monitoring bore in a down-gradient location; and
- Investigation of fouled railway ballast removed from the vicinity of the main Canberra railway station and placed south-east of the station and south Robbo's Pet Barn. The investigation included sampling of the fouled ballast and surrounding soils and collection of groundwater samples from nearby bores in a down-gradient location.

5. Review Findings

This review is a summary of the main issues identified in the various investigations carried out across the Canberra Rail Facility. Minor non-conformances or areas where there are minor identified risks which do not impact continued railway use of the site will be included in the final audit report.

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To: David Miller
INDEC Consulting
16 November 2000
Page 5

5.1 Fuel depots adjacent to the eastern rail corridor

Levels of petroleum hydrocarbon (TPHs) above the adopted criteria for continued railway use were identified adjacent to the Shell and Mobil fuel depots. These levels were at concentrations which represented petroleum hydrocarbons floating on the groundwater table (phase separated hydrocarbons – PSH). It is understood that Indec have communicated these issues to the fuel companies for further consideration.

talk to PPK

In most cases the identified TPHs are not likely to impact upon the continued use of this facility for railway purposes. However, a combination of significant concentration of light fraction TPH compounds (C6-C9 at 46,600 ug/L) and the shallow depth to ground water (approximately 2 metres) may expose workers in the areas to potential soil vapours. An assessment of this issue is required to assess that identified receptors are not exposed to any potential risks associated with the soil vapours.

5.2 Former cement works adjacent to the eastern rail corridor

Concentrations of metals (lead and zinc) were identified at levels exceeding the adopted criteria for continued railway use. The area was limited in vertical and lateral extent (less than 10 square metres in area and within a depth of 1 metre). The concentrations of zinc were subsequently identified to be within the NEHF, 1998 assessment criteria for 'hot-spots'. The concentration of lead was compared to the health risk assessment (for lead contamination in soils) performed for the Port Pirie Rail Yards. The parameters (exposure pathways, applicable exposure factors and toxicological factors) of the risk assessment for the Port Pirie site were reviewed. The identified parameters are considered to represent a conservative scenario in terms of the Canberra site. Therefore the identified concentration of lead in soils is likely to be acceptable for continued railway use.

5.3 Old refueling depot

Levels of TPHs were identified in the vicinity of the former refueling area above the adopted assessment guidelines. Phase separated hydrocarbons were also noted in three of the groundwater monitoring bores. It was estimated that approximately 50 litres of PSH was floating on the groundwater table. Remediation of the PSH was undertaken using a 'pig sock' lowered into the impacted groundwater bores. The pig sock removed PSH by absorption. The last report prepared for the site documented that approximately 5 litres of PSH had been removed.

The significance of the remaining contaminated groundwater was undertaken using fate and transport groundwater modelling techniques. The modelling indicated that there is likely to be minimal risks to the Jerrabomberra Creek. Future monitoring of this area would be required to confirm the predictions of the modelling.

During assessment of this area groundwater monitoring bore GW304 reported a concentration of TPH C6-C9 at 63,000 ug/L. Assessment of the chromatogram indicated that this petroleum hydrocarbon was not derived from the same source as the former refueling area

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(which was predominantly used for storage and dispensing diesel). The significance of this contamination was also assessed using the fate and transport model, which indicated that there is likely to be no future risks associated with this contamination. However, there has been no further explanation of the presence of this contamination. It is recommended that the results be reviewed to address this anomaly.

5.4 Former goods shed

There were no significant issues associated with the operations of the goods shed which had the potential to impact the site. However, the facility was established over filled ground. The filled ground included solid and inert wastes.

5.5 Main Canberra station area

There are no current activities associated with the Canberra station which have the potential to impact continued railway use of the site. In the past ballast contaminated with TPHs was removed and geofabric liner placed to prevent future TPH leakage from the locomotives. There was no documentation provided up to the time of this review which indicated validation of the excavation was performed. However, groundwater was sampled from monitoring bores down-gradient from the area and there were no impacts identified in the groundwater.

Fouled ballast was deposited in various locations south-east of the station area. It is assumed this material was sourced during the removal of the ballast from the main Canberra station area. Assessment of the ballast material, adjacent soils and groundwater down-gradient from the area indicated that there are no significant issues which would limit continued railway use of the site.

5.6 Leased areas (William Edmunds Plumbers and ARHS)

Site facilities are located over filled areas and are assumed to be an extension of the vacant dump area. One significant issue was identified in the area occupied within the William Edmunds site. The review identified, three underground storage tanks located north and adjacent to the main building. Assessment of the soils adjacent to the USTs and groundwater down-hydraulic gradient indicated no adverse impacts.

5.7 Vacant dump site

The results of the investigation of this area indicated the filled area varied from approximately 2m to 6m and contained predominantly domestic (solid / inert wastes) and in the later years of operation, restricted filling to building rubble (soil fill, concrete, bricks, etc.). Levels of TPHs were identified in the northern end of the dump and appeared to be localised in area. Fate and transport modelling indicated that the identified concentration is not likely to impact on the adjacent Jerrabomberra Creek. However, further monitoring of the groundwater should be undertaken to confirm the modelling outcomes.

Although no significant putrescible domestic fill was encountered during the test pitting exercise, there are indications that the groundwater quality has been impacted by leachate

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To David Millar
INDEC Consulting
16 November 2000
Page 7

generated by the decomposition of putrescible wastes. Traces of cyanide were also detected in GW206 above the guidelines for protection of fresh water ecosystems. It is recommended that groundwater quality be monitored for typical landfill leachate parameters, as well as other parameters identified in previous monitoring.

5.9 Corridor between Jerrabomberra Creek and Ipswich Street

No significant issues were identified in this area which would impact upon continued railway use of the area.

Review of the assessment reports has highlighted that other areas have been identified which have the potential, to impact identified receptors at the site. These areas only have the potential to be an issue if significant contamination is present. These include;

- The filling of the former railway turntable. This issue was highlighted in the environmental audit report;
- USTs (now removed) were located in the former abattoir site, immediately east of Newcastle Street. It is presumed that the abattoir site in not part of the site;
- Potential for fragments of asbestos sheeting to exist in the surface soils was highlighted in the environmental audit and no assessment was performed;
- Oily wastes being disposed into the stormwater drain at the ARHS site. This issue was raised in the environmental audit report and no further assessment has been performed;
- The environmental audit report identified filling east of the Jerrabomberra Creek north and adjacent to the railway alignment. The filling, as illustrated in the aerial photo was similar to the vacant dump site area;
- Significant staining of the soils by petroleum hydrocarbons was noted along-side the fuel depot sidings during the environmental audit of the site. No further assessment of these soils was undertaken. It is assumed that the sidings are located on railway land; and
- Black oily waste was observed during the environmental audit in a drainage alignment adjacent to the Shell depot. There was no further assessment of these areas noted in the later environmental site assessment reports.

oil company responsibility

The assessments prepared by PPK have been performed in accordance with the methods and guidelines usually employed for the assessment of potentially contaminated sites, however, there has been no comparison of the local requirements of Environment ACT and supporting legislation for the protection of the environment. The detailed audit report will reference the Environment ACT legislation and any relevant guidelines.

talk to PPK

In this review, the Auditor has formed an opinion of the existence, nature and extent of any actual material environmental harm, or threatened material environmental harm, regarding the site. On the basis of the information provided and reviewed, there is no evidence to suggest that the issues assessed present actual material environmental harm to exist.

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However, until further information can be provided, threatened environmental harm exists for the following issues:

- The potential for landfill leachate from the vacant dump site to be impacting the underlying groundwater and therefore the Jerrabomberra Creek;
- The potential for landfill leachate to be generating from the filled area east of the Jerrabomberra Creek (north and adjacent to the railway alignment) to be impacting the underlying groundwater and therefore the Jerrabomberra Creek; and
- The potential for petroleum hydrocarbon soil vapours adjacent to the Shell bulk terminal to impact upon the identified receptors.

6. Summary

In summary, the review has indicated that there have been no issues which are likely to impact the identified continued uses of the site. However, as identified in this review, there are number of issues which require further assessment, documentation or monitoring. This is required to ensure receptors identified at the site (workers or the neighboring environment) are not exposed to adverse risks and to confirm that the outstanding issues identified herein are addressed and pose no impact to continued use of the site for the identified uses.

Schedule 2.2(a)(ii)

Warren Pump

Senior Principal (EPA Accredited Auditor, Contaminated Land)

Appendix B

Analytical Results

ENVIRONMENTAL AND INDUSTRIAL SERVICES DIVISION
Amdel Limited ABN 30 008 127 802
Correspondence to:
P.O. Box 514
HORNSBY NSW 1630
5 Kelray Place
ASQUITH NSW 2077
Telephone: (02) 9482 1922
Facsimile: (02) 9482 1734

Tax Invoice

INVOICE NO. 00064984LX

PPK65

PPK Adelaide
101 Pirie St
Adelaide SA 5000

Our Ref.
0A01222

Date
25/01/01

Attention : Mr Mike Reynolds
Project
CANBERRA

Your Ref.
27K140D

Account Code : X003000X

Method	Description	Units	Unit Price	Total Amount
E0230	TPH C6-C9 by purge & trap			
E0221	TPH (C10-C36)			
E0010	Benzene,Toluene,Ethylbenzene & Xylene			
E4870	Dissolved Metals by ICP-MS			
E4810	Dissolved Metals by ICP-AES			
E48501	Mercury low level			
E2450	Total Cyanide			
E0120	Polychlorinated Biphenyls			
E2600	pH			
E2430	Conductivity			
E2690	Total Dissolved Solids			
E2310	Total Alkalinity			
E2720	Sulphate			
E2380	Chloride			
E2530	Total Hardness			
E2630	Dissolved Phosphorous			
E2640	Phosphorus-Total			
E2770	TKN			
E2550	Nitrate-N			
E2560	Nitrite-N			
E2330	Ammonia as N			
E2580	Total Organic Carbon			
E2350	BOD (5)			
E2420	Chemical Oxygen Demand			
E0140	Phenols by GC/MS			
E0080	Organochlorine Pesticide			
E0110	Polycyclic Aromatic Hydrocarbons			
GST	Australian GST			

Schedule 2.2(a)(xi)

Net (exclusive of GST)
GST
TOTAL

Terms strictly 30 days nett

Please send remittances to :-
Amdel Ltd
P.O. Box 338, Torrensville Plaza, S.A. 5031

Accreditation No. 1464

ENVIRONMENTAL AND INDUSTRIAL SERVICES DIVISION
Trading as Australian Analytical Laboratories Pty Ltd
ACN 001 491 667

Correspondence to:
PO BOX 514
HORNSBY NSW 1630

5 Kelray Place
ASQUITH NSW 2077
Telephone: (02) 9482 1922
Facsimile: (02) 9482 1734

CERTIFICATE OF ANALYSIS

Contents :
1. Cover Page
2. Analysis Report Pages
3. QA/QC Appendix

Report No.	:	0A01222			
Attention	:	Mr Mike Reynolds			
Client	:	PPK Adelaide			
Samples	:	19			
Reference	:	27K140D			
Project	:	CANBERRA			
Received Samples	:	20/12/00	**Instructions**	:	20/12/00
Date Reported	:	15/01/01			

PLEASE SEE FOLLOWING PAGE FOR METHOD LISTING

RESULTS

All samples were analysed as received. This report relates specifically to the samples received.
Results relate to the source material only to the extent that the samples as supplied are truly representative of the sample source. This report replaces any preliminary results issued.
Note that for schemes indicated with * NATA accreditation does not cover the performance of this service.
Three significant figures (or 2 for <10PQL) are reported for statistical purposes only.

per D. SPRINGER B.App.Sc.
Manager Environmental Sydney

Method	Description	Extracted	Analysed
E0230	TPH C6-C9 by purge & trap	27/12/00	28/12/00
E0221	TPH (C10-C36)	22/12/00	29/12/00
E0010	Benzene,Toluene,Ethylbenzene & Xylene	27/12/00	28/12/00
E4870	Dissolved Metals by ICP-MS	27/12/00	27/12/00
E4810	Dissolved Metals by ICP-AES	22/12/00	27/12/00
E48501	Mercury low level	02/01/01	03/01/01
E2450	Total Cyanide	03/01/01	03/01/01
E0120	Polychlorinated Biphenyls	27/12/00	03/01/01
E2600	pH	21/12/00	21/12/00
E2430	Conductivity	05/01/01	05/01/01
E2690	Total Dissolved Solids	05/01/01	05/01/01
E2310	Total Alkalinity	21/12/00	21/12/00
E2720	Sulphate	21/12/00	22/12/00
E2380	Chloride	21/12/00	22/12/00
E2530	Total Hardness	22/12/00	27/12/00
E2630	Dissolved Phosphorous	21/12/00	02/01/01
E2640	Phosphorus-Total	21/12/00	12/01/01
E2770	TKN	21/12/00	12/01/01
E2550	Nitrate-N	21/12/00	02/01/01
E2560	Nitrite-N	21/12/00	02/01/01
E2330	Ammonia as N	21/12/00	02/01/01
*E2580	Total Organic Carbon	05/01/01	05/01/01
E2350	BOD (5)	22/12/00	27/12/00
E2420	Chemical Oxygen Demand	03/01/01	04/01/01
E0140	Phenols by GC/MS	04/01/01	04/01/01
E0080	Organochlorine Pesticide	27/12/00	03/01/01
E0110	Polycyclic Aromatic Hydrocarbons	27/12/00	03/01/01

* Performed under NATA accreditation No. 198

Job Number : 0A01222
Client : PPK Adelaide
Reference : 27K140D
Project : CANBERRA

Analyte	Lab No	E91136	E91137	E91138	E91139	E91140
	Sample Id	GW104	GW210	GW310	GW13	GW301
	PQL					
E0230 TPH in Water by P&T/GC-MS (µg/L)						
C6-C9 Fraction	**20**	nd	nd	nd	nd	nd
E0221 TPH in Water (µg/L)						
C10-C14 Fraction	**20**	nd	nd	nd	nd	nd
C15-C28 Fraction	**100**	nd	nd	nd	nd	nd
C29-C36 Fraction	**100**	nd	nd	nd	nd	nd
E0010 BTEX (P&T) in Water (µg/L)						
Benzene	**0.5**	nd	nd	nd	nd	nd
Toluene	**1**	nd	nd	nd	nd	nd
Ethylbenzene	**1**	nd	nd	nd	nd	nd
Total Xylenes	**3**	nd	nd	nd	nd	nd
4-Bromofluorobenzene-SURROGATE	**1**	94%	94%	93%	93%	91%

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Job Number : 0A01222
Client : PPK Adelaide
Reference : 27K140D
Project : CANBERRA

	Lab No	E91141	E91142	E91143	E91144	E91145
	Sample Id	GW307	GW305	GW303	GW204	GW311
Analyte	PQL					
E0230 TPH in Water by P&T/GC-MS (µg/L)						
C6-C9 Fraction	**20**	nd	nd	nd	nd	nd
E0221 TPH in Water (µg/L)						
C10-C14 Fraction	**20**	nd	nd	nd	nd	nd
C15-C28 Fraction	**100**	nd	nd	nd	nd	nd
C29-C36 Fraction	**100**	nd	nd	nd	nd	nd
E0010 BTEX (P&T) in Water (µg/L)						
Benzene	**0.5**	nd	nd	nd	nd	nd
Toluene	**1**	nd	nd	nd	nd	nd
Ethylbenzene	**1**	nd	nd	nd	nd	nd
Total Xylenes	**3**	nd	nd	nd	nd	nd
4-Bromofluorobenzene-SURROGATE	**1**	93%	90%	92%	90%	89%

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Job Number : 0A01222
Client : PPK Adelaide
Reference : 27K140D
Project : CANBERRA

Analyte	Lab No	E91146	E91147	E91148	E91149	E91150
	Sample Id	GW203	GW105	DUP1	GW206	DUP2
	PQL					
E0230 TPH in Water by P&T/GC-MS (µg/L)						
C6-C9 Fraction	**20**	nd	nd	nd	nd	nd
E0221 TPH in Water (µg/L)						
C10-C14 Fraction	**20**	nd	nd	nd	nd	50
C15-C28 Fraction	**100**	nd	nd	nd	nd	nd
C29-C36 Fraction	**100**	nd	nd	nd	nd	nd
E0010 BTEX (P&T) in Water (µg/L)						
Benzene	**0.5**	nd	nd	nd	nd	nd
Toluene	**1**	nd	nd	nd	nd	nd
Ethylbenzene	**1**	nd	nd	nd	nd	nd
Total Xylenes	**3**	nd	nd	nd	nd	nd
4-Bromofluorobenzene-SURROGATE	**1**	91%	92%	89%	92%	90%

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Job Number : 0A01222
Client : PPK Adelaide
Reference : 27K140D
Project : CANBERRA

	Lab No	E91151	E91152	E91153	E91154	
	Sample Id	GW114	GW313	GW111	GW109	
Analyte	PQL					
E0230 TPH in Water by P&T/GC-MS (µg/L)						
C6-C9 Fraction	**20**	nd	nd	nd	nd	
E0221 TPH in Water (µg/L)						
C10-C14 Fraction	**20**	nd	nd	nd	50	
C15-C28 Fraction	**100**	nd	nd	nd	nd	
C29-C36 Fraction	**100**	nd	nd	nd	nd	
E0010 BTEX (P&T) in Water (µg/L)						
Benzene	**0.5**	nd	nd	nd	nd	
Toluene	**1**	nd	nd	nd	nd	
Ethylbenzene	**1**	nd	nd	nd	nd	
Total Xylenes	**3**	nd	nd	nd	nd	
4-Bromofluorobenzene-SURROGATE	**1**	89%	89%	91%	89%	

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Job Number : 0A01222
Client : PPK Adelaide
Reference : 27K140D
Project : CANBERRA

Analyte	Lab No	E91149	E91150	E91151	E91152	E91153
	Sample Id	GW206	DUP2	GW114	GW313	GW111
	PQL					
E4870 Dissolved Metals in Waters						
Arsenic	**0.001**	nd	0.001	0.004	0.002	0.003
Beryllium	**0.001**	nd	nd	nd	nd	nd
Cadmium	**0.0001**	nd	nd	0.0007	nd	nd
Cobalt	**0.001**	0.005	nd	0.006	0.008	0.001
Copper	**0.001**	nd	nd	0.002	nd	0.002
Nickel	**0.001**	0.005	0.006	0.025	0.005	0.009
Lead	**0.001**	nd	nd	nd	nd	nd
Zinc	**0.002**	0.011	0.008	0.342	0.007	0.007
E4810 Dissolved Metals in Waters						
Iron	**0.05**	0.31	nd	8.60	nd	nd
Calcium	**0.1**	46	140	260	56	120
Potassium	**0.1**	3.4	16	50	11	6.2
Magnesium	**0.1**	29	54	66	28	52
Sodium	**0.2**	57	59	120	100	290
E48501 Dissolved Mercury in Waters						
Mercury	**0.00005**	nd	0.00006	nd	nd	0.00005

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Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Job Number : 0A01222
Client : PPK Adelaide
Reference : 27K140D
Project : CANBERRA

Analyte	Lab No	E91154				
	Sample Id	GW109				
	PQL					
E4870 Dissolved Metals in Waters						
Arsenic	**0.001**	0.001				
Beryllium	**0.001**	nd				
Cadmium	**0.0001**	nd				
Cobalt	**0.001**	nd				
Copper	**0.001**	nd				
Nickel	**0.001**	0.006				
Lead	**0.001**	nd				
Zinc	**0.002**	0.007				
E4810 Dissolved Metals in Waters						
Iron	**0.05**	nd				
Calcium	**0.1**	140				
Potassium	**0.1**	16				
Magnesium	**0.1**	56				
Sodium	**0.2**	62				
E48501 Dissolved Mercury in Waters						
Mercury	**0.00005**	0.00009				

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-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Job Number : 0A01222
Client : PPK Adelaide
Reference : 27K140D
Project : CANBERRA

Analyte	Lab No	E91149	E91150	E91151	E91152	E91153
	Sample Id	GW206	DUP2	GW114	GW313	GW111
	PQL					
E2450 Total Cyanide in Water						
Total Cyanide	**0.005**	nd	--	--	--	--
E2600 pH in Water						
pH	**0.1**	6.9	6.7	6.8	7.0	7.1
E2430 Conductivity (µS/cm at 25.0 C)						
Electrical Conductivity	**1**	720	1500	2100	930	2000
E2690 Total Dissolved Solids in Water						
TDS (calc.)	**1**	460	960	1400	590	1300
E2310 Total Alkalinity in Water						
Bicarbonate as CaCO3	**1**	340	640	910	350	770
Carbonate as CaCO3	**1**	nd	nd	nd	nd	nd
Hydroxide as CaCO3	**1**	nd	nd	nd	nd	nd
Alkalinity as CaCO3	**1**	340	640	910	350	770
E2720 Sulphate in Water						
Sulphate	**1**	20	140	210	62	170
E2380 Chloride in Water						
Chloride	**1**	19	42	54	52	100
E2530 Total Hardness						
Total Hardness as CaCO3	**0.5**	230	560	330	260	520
E2630 Dissolved Phosphorus in Water						
Dissolved Phosphorus	**0.01**	nd	nd	nd	nd	nd

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Job Number : 0A01222
Client : PPK Adelaide
Reference : 27K140D
Project : CANBERRA

Analyte	Lab No / Sample Id / PQL	E91154 / GW109				
E2450 Total Cyanide in Water						
Total Cyanide	**0.005**	--				
E2600 pH in Water						
pH	**0.1**	7.0				
E2430 Conductivity (µS/cm at 25.0 C)						
Electrical Conductivity	**1**	1500				
E2690 Total Dissolved Solids in Water						
TDS (calc.)	**1**	970				
E2310 Total Alkalinity in Water						
Bicarbonate as CaCO3	**1**	620				
Carbonate as CaCO3	**1**	nd				
Hydroxide as CaCO3	**1**	nd				
Alkalinity as CaCO3	**1**	620				
E2720 Sulphate in Water						
Sulphate	**1**	140				
E2380 Chloride in Water						
Chloride	**1**	44				
E2530 Total Hardness						
Total Hardness as CaCO3	**0.5**	580				
E2630 Dissolved Phosphorus in Water						
Dissolved Phosphorus	**0.01**	nd				

PQL = Practical Quantitation Limit
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nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Job Number : 0A01222
Client : PPK Adelaide
Reference : 27K140D
Project : CANBERRA

	Lab No	E91149	E91150	E91151	E91152	E91153
	Sample Id	GW206	DUP2	GW114	GW313	GW111
Analyte	PQL					
E2640 Total Phosphorus in Water						
Phosphorus	**0.01**	0.45	0.37	0.16	0.34	0.11
E2770 Kjeldahl Nitrogen in Water						
Kjeldahl Nitrogen	**0.1**	1.2	nd	32	2.8	0.8
E2550 Nitrate as N in Water						
Nitrate as N	**0.01**	0.13	8.58	0.05	0.94	0.12
E2560 Nitrite as N in Water						
Nitrite as N	**0.01**	0.15	0.01	0.12	0.56	0.05
E2330 Ammonia as N in Water						
Ammonia as N	**0.01**	0.43	nd	24.2	1.02	0.18
E2580 TOC in Water						
TOC	**1**	11	19	12	7	9
E2350 BOD in Water (5-Day)						
BOD	**5**	nd	nd	11	nd	nd
E2420 Chemical Oxygen Demand						
COD	**50**	nd	nd	nd	nd	nd

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Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

amdel

Job Number : 0A01222
Client : PPK Adelaide
Reference : 27K140D
Project : CANBERRA

Analyte						
	Lab No	E91154				
	Sample Id	GW109				
	PQL					
E2640 Total Phosphorus in Water						
Phosphorus	**0.01**	0.31				
E2770 Kjeldahl Nitrogen in Water						
Kjeldahl Nitrogen	**0.1**	0.5				
E2550 Nitrate as N in Water						
Nitrate as N	**0.01**	9.01				
E2560 Nitrite as N in Water						
Nitrite as N	**0.01**	nd				
E2330 Ammonia as N in Water						
Ammonia as N	**0.01**	nd				
E2580 TOC in Water						
TOC	**1**	12				
E2350 BOD in Water (5-Day)						
BOD	**5**	nd				
E2420 Chemical Oxygen Demand						
COD	**50**	nd				

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Job Number : 0A01222
Client : PPK Adelaide
Reference : 27K140D
Project : CANBERRA

Analyte	Lab No	E91149	E91150	E91151	E91152	E91153
	Sample Id	GW206	DUP2	GW114	GW313	GW111
	PQL					
E0120 PCB's in Water (µg/L)						
Aroclor 1016	**10**	nd	nd	nd	nd	nd
Aroclor 1221	**10**	nd	nd	nd	nd	nd
Aroclor 1232 and Aroclor 1242	**10**	nd	nd	nd	nd	nd
Aroclor 1248 and 1254 as total	**10**	nd	nd	nd	nd	nd
Aroclor 1260 and 1262 as total	**10**	nd	nd	nd	nd	nd
Total Polychlorinated biphenyl	**10**	nd	nd	nd	nd	nd

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Job Number : 0A01222
Client : PPK Adelaide
Reference : 27K140D
Project : CANBERRA

Analyte	Lab No / Sample Id / PQL	E91154 / GW109 /				
E0120 PCB's in Water (µg/L)						
Aroclor 1016	**10**	nd				
Aroclor 1221	**10**	nd				
Aroclor 1232 and Aroclor 1242	**10**	nd				
Aroclor 1248 and 1254 as total	**10**	nd				
Aroclor 1260 and 1262 as total	**10**	nd				
Total Polychlorinated biphenyl	**10**	nd				

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

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Job Number : 0A01222
Client : PPK Adelaide
Reference : 27K140D
Project : CANBERRA

Analyte	Lab No	E91149	E91150	E91151	E91152	E91153
	Sample Id	GW206	DUP2	GW114	GW313	GW111
	PQL					
E0140 Phenols By GC/MS In Water (µg/L)						
Phenol	5	nd	nd	nd	nd	nd
2-Chlorophenol	5	nd	nd	nd	nd	nd
2-Methylphenol	5	nd	nd	nd	nd	nd
3-Methylphenol & 4-Methylphenol	5	nd	nd	nd	nd	nd
2-Nitrophenol	5	nd	nd	nd	nd	nd
2.4-Dimethylphenol	5	nd	nd	nd	nd	nd
2.4-Dichlorophenol	5	nd	nd	nd	nd	nd
2.6-Dichlorophenol	5	nd	nd	nd	nd	nd
4-Chloro-3-methylphenol	5	nd	nd	nd	nd	nd
2.4.5-Trichlorophenol	5	nd	nd	nd	nd	nd
2.4.6-Trichlorophenol	5	nd	nd	nd	nd	nd
2.4-Dinitrophenol	20	nd	nd	nd	nd	nd
4-Nitrophenol	10	nd	nd	nd	nd	nd
2.3.4.6-Tetrachlorophenol	10	nd	nd	nd	nd	nd
4.6-Dinitro-2-methylphenol	20	nd	nd	nd	nd	nd
Pentachlorophenol	10	nd	nd	nd	nd	nd
4.6-Dinitro-2-sec-butylphenol	20	nd	nd	nd	nd	nd
2-Fluorophenol-SURROGATE	1	79%	81%	83%	72%	82%
Phenol-D6-SURROGATE	1	69%	67%	67%	60%	68%
2.4.6-Tribromophenol-SURROGATE	1	81%	86%	81%	87%	108%

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Job Number : 0A01222
Client : PPK Adelaide
Reference : 27K140D
Project : CANBERRA

Analyte	PQL	Sample Id GW109				
		Lab No E91154				
E0140 Phenols By GC/MS In Water (µg/L)						
Phenol	5	nd				
2-Chlorophenol	5	nd				
2-Methylphenol	5	nd				
3-Methylphenol & 4-Methylphenol	5	nd				
2-Nitrophenol	5	nd				
2.4-Dimethylphenol	5	nd				
2.4-Dichlorophenol	5	nd				
2.6-Dichlorophenol	5	nd				
4-Chloro-3-methylphenol	5	nd				
2.4.5-Trichlorophenol	5	nd				
2.4.6-Trichlorophenol	5	nd				
2.4-Dinitrophenol	20	nd				
4-Nitrophenol	10	nd				
2.3.4.6-Tetrachlorophenol	10	nd				
4.6-Dinitro-2-methylphenol	20	nd				
Pentachlorophenol	10	nd				
4.6-Dinitro-2-sec-butylphenol	20	nd				
2-Fluorophenol-SURROGATE	1	81%				
Phenol-D6-SURROGATE	1	69%				
2.4.6-Tribromophenol-SURROGATE	1	106%				

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Job Number : 0A01222
Client : PPK Adelaide
Reference : 27K140D
Project : CANBERRA

	Lab No	E91149	E91150	E91151	E91152	E91153
	Sample Id	GW206	DUP2	GW114	GW313	GW111
Analyte	PQL					
E0080 OC Pesticides in Water (µg/L)						
HCB	1	nd	nd	nd	nd	nd
a-BHC	1	nd	nd	nd	nd	nd
g-BHC	1	nd	nd	nd	nd	nd
Heptachlor	1	nd	nd	nd	nd	nd
Aldrin	1	nd	nd	nd	nd	nd
b-BHC	1	nd	nd	nd	nd	nd
d-BHC	1	nd	nd	nd	nd	nd
Oxychlordane	1	nd	nd	nd	nd	nd
Heptachlor epoxide	1	nd	nd	nd	nd	nd
Endosulfan 1	1	nd	nd	nd	nd	nd
Chlordane-Trans	1	nd	nd	nd	nd	nd
Chlordane-Cis	1	nd	nd	nd	nd	nd
trans-Nonachlor	1	nd	nd	nd	nd	nd
DDE	1	nd	nd	nd	nd	nd
Dieldrin	1	nd	nd	nd	nd	nd
Endrin	1	nd	nd	nd	nd	nd
DDD	1	nd	nd	nd	nd	nd
Endosulfan 2	1	nd	nd	nd	nd	nd
DDT	1	nd	nd	nd	nd	nd
Endosulfan sulfate	1	nd	nd	nd	nd	nd
Methoxychlor	1	nd	nd	nd	nd	nd
2.4.5.6-TCMX-SURROGATE	1	105%	121%	106%	101%	105%

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Job Number : 0A01222
Client : PPK Adelaide
Reference : 27K140D
Project : CANBERRA

Analyte	Lab No / Sample Id / PQL	E91154 / GW109				
E0080 OC Pesticides in Water (µg/L)						
HCB	1	nd				
a-BHC	1	nd				
g-BHC	1	nd				
Heptachlor	1	nd				
Aldrin	1	nd				
b-BHC	1	nd				
d-BHC	1	nd				
Oxychlordane	1	nd				
Heptachlor epoxide	1	nd				
Endosulfan 1	1	nd				
Chlordane-Trans	1	nd				
Chlordane-Cis	1	nd				
trans-Nonachlor	1	nd				
DDE	1	nd				
Dieldrin	1	nd				
Endrin	1	nd				
DDD	1	nd				
Endosulfan 2	1	nd				
DDT	1	nd				
Endosulfan sulfate	1	nd				
Methoxychlor	1	nd				
2.4.5.6-TCMX-SURROGATE	1	94%				

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Job Number : 0A01222
Client : PPK Adelaide
Reference : 27K140D
Project : CANBERRA

	Lab No	E91149	E91150	E91151	E91152	E91153
	Sample Id	GW206	DUP2	GW114	GW313	GW111
Analyte	PQL					
E0110 USEPA Priority PAH's in Water	**(µg/L)**					
Naphthalene	**1**	nd	nd	nd	nd	nd
Acenaphthylene	**1**	nd	nd	nd	nd	nd
Acenaphthene	**1**	nd	nd	nd	nd	nd
Fluorene	**1**	nd	nd	nd	nd	nd
Phenanthrene	**1**	nd	nd	nd	nd	nd
Anthracene	**1**	nd	nd	nd	nd	nd
Fluoranthene	**1**	nd	nd	nd	nd	nd
Pyrene	**1**	nd	nd	nd	nd	nd
Benz(a)anthracene	**1**	nd	nd	nd	nd	nd
Chrysene	**1**	nd	nd	nd	nd	nd
Benzo(b) & (k)fluoranthene	**2**	nd	nd	nd	nd	nd
Benzo(a)pyrene	**1**	nd	nd	nd	nd	nd
Indeno(1.2.3-cd)pyrene	**1**	nd	nd	nd	nd	nd
Dibenz(a.h)anthracene	**1**	nd	nd	nd	nd	nd
Benzo(g.h.i)perylene	**1**	nd	nd	nd	nd	nd
Total USEPA Priority PAHs	**1**	nd	nd	nd	nd	nd
2-Fluorobiphenyl-SURROGATE	**1**	91%	99%	99%	104%	101%
Anthracene-D10-SURROGATE	**1**	97%	99%	106%	112%	93%
p-Terphenyl-D14-SURROGATE	**1**	117%	117%	125%	122%	118%

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Job Number : 0A01222
Client : PPK Adelaide
Reference : 27K140D
Project : CANBERRA

Analyte	PQL	Lab No E91154				
		Sample Id GW109				
E0110 USEPA Priority PAH's in Water	**(µg/L)**					
Naphthalene	**1**	nd				
Acenaphthylene	**1**	nd				
Acenaphthene	**1**	nd				
Fluorene	**1**	nd				
Phenanthrene	**1**	nd				
Anthracene	**1**	nd				
Fluoranthene	**1**	nd				
Pyrene	**1**	nd				
Benz(a)anthracene	**1**	nd				
Chrysene	**1**	nd				
Benzo(b) & (k)fluoranthene	**2**	nd				
Benzo(a)pyrene	**1**	nd				
Indeno(1.2.3-cd)pyrene	**1**	nd				
Dibenz(a.h)anthracene	**1**	nd				
Benzo(g.h.i)perylene	**1**	nd				
Total USEPA Priority PAHs	**1**	nd				
2-Fluorobiphenyl-SURROGATE	**1**	94%				
Anthracene-D10-SURROGATE	**1**	106%				
p-Terphenyl-D14-SURROGATE	**1**	122%				

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

AMDEL INTERNAL QUALITY ASSURANCE REVIEW.

Job NO. 0A01222

All testing in this report is covered by Amdel NATA accreditation number 1464, unless stated otherwise.

General

1. Laboratory QA/QC including Method Blanks, Duplicates, Matrix Spikes, Laboratory Control Samples or CRM's are included in this QA/QC appendix. (Where applicable)
2. Inter-Laboratory proficiency trial results are available upon request.
3. PQL's are matrix dependent and are increased accordingly where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spike or surrogate recoveries.
5. Where 3 and 2 significant figures are reported for >10x PQL and <10x PQL respectively, the last figure is uncertain and is provided for statistical purposes only.
6. Samples duplicated or spiked are from this job and are identified in the following QA/QC report.
7. SVOC analyses on waters are performed on mixed, unfiltered samples(unless noted otherwise).

Maximum Holding Times for Soils, Sediments and Waters

Parameter	Holding Times
Soils	
Volatile and Semi-Volatile Organic Analysis.	Extracted in 14 days, analysed within 40 days.
Metals	Extracted and analysed within 28 days-6 months.
Inorganics*	Extracted and analysed within 7-28 days.
TCLPs*	Extracted and analysed within 14 days, (Zero Headspace-TCLP 7 days).
Waters	
Volatile Organic Analysis	Extracted in 7 days, analysed within 40 days.
Semi-Volatile Organic Analysis	Extracted in 7 days, analysed within 40 days.
Inorganics*	Analysed within 24 hrs-28 days.
Metals (dissolved metals should be supplied field filtered)	Prepared and analysed within 28 days.

* Please refer to 'Preservation Information Chart for Soils, Sediments & Waters' for further information. (ISFORM.098). Holding times may be extended with the use of preservation bottles and/or freezing samples. Reference: USEPA SW846 and AMDEL SPM-01 (incorporating NEPM Guidelines).

Chain of Custody and Sample Integrity

	Yes	No	N/A
Chain of Custody received with samples	√		
Custody seals were received intact, if used			√
Samples were received chilled and in good condition	√		
Samples received appropriately preserved for all tests	√		
VOC/SVOC samples were received in teflon lined containers	√		
Volatiles samples received with Zero Headspace	√		
Samples analysed within recommended holding times	√		
Chain of Custody completed by Amdel and attached	√		

Chromatography Calibration/Acceptence Criteria

Retention time window meets acceptance criteria (±2%)	√
Reference standard meets acceptance criteria (±10%)	√
Recalibration standard meets acceptance criteria (±15%)	√
Internal standard recovery acceptable.	√

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AMDEL INTERNAL QUALITY ASSURANCE REVIEW Cont..

Amdel QA/QC Compliance Assessment

	Yes	No	N/A
Surrogates performed on all appropriate GC analyses and meet acceptance limits (70% - 130% recovery*).	√		
Matrix Spikes performed once per process batch and at least 1 in 20 samples (Results meet acceptance limits - 70% - 130% recovery* or 80% - 120% recovery* for inorganics in water.)	√		
Laboratory Control samples performed once per process batch and at least 1 in 20 samples (Results meet acceptance limits - 70% - 130% recovery* in soil or 80%-120%/90-110% recovery* for waters.)	√		
Laboratory Duplicate samples performed once per process batch and at least 1 in 10 samples (Results meet acceptance limits). <4 PQL - +/- 2 PQL 4-10 PQL - 0-25 or 50% RPD >10 PQL - 0-10 or 30% RPD	√		
Method Blanks performed once per process batch and at least 1 in 20 samples (Results not detected at the PQL).	√		

N/A=Not Applicable.

* Phenols 50% - 130% recovery
* SVOCs 60% - 130% recovery
* Phenoxy Acid Herbicides 60% - 140% recovery

QA/QC Appendix

Please refer to the following pages for the QA/QC data.

Comments specific to sample analyses from this job.

Schedule 2.2(a)(ii)

per D. SPRINGER B.App.Sc.
Manager Environmental Sydne

Job Number : 0A01222

QAQC : Matrix Spike(s)

Analyte	Spike Level	Level Detected		Recovery Details			
		Spike 1	Spike 2	Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E0221 TPH in Water (µg/L)							
C15-C28 Fraction	5500	5290		96%			

PQL = Practical Quantitation Limit
nd = <PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/l (ppm) unless otherwise specified

The number in brackets after the method header identifies the sample tested.

QAQC : Laboratory Control Sample(s)

Analyte	Level (ppm)	Level Detected			Recovery Details		
		Result1 (ppm)	Result2 (ppm)	Result3 (ppm)	Rec 1 (%)	Rec 2 (%)	Rec 3 (%)
E0230 TPH in Water by P&T/GC-MS (µg/L)							
C6-C9 Fraction	200	180			94%		
E0221 TPH in Water (µg/L)							
C15-C28 Fraction	5500	4780			87%		
E0010 BTEX (P&T) in Water (µg/L)							
Benzene	10	10.0			99%		
Toluene	10	9			86%		
Ethylbenzene	10	9			94%		
Total Xylenes	30	26			85%		

PQL = Practical Quantitation Limit
-- = Not Applicable
nd = <PQL

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/l (ppm) unless otherwise specified

Job Number : 0A01222

QAQC : Laboratory Duplicate(s)

Analyte	Dupl A	Dupl B	Average	RPD (%)	Dupl A	Dupl B	Average	RPD (%)
E0221 TPH in Water (µg/L)								
C10-C14 Fraction	nd	nd						
C15-C28 Fraction	nd	nd						
C29-C36 Fraction	nd	nd						

PQL = Practical Quantitation Limit
nd = < PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

The number in brackets after the method header identifies the sample tested.

QAQC : Method Blank(s)

ANALYTE	Sample ID PQL	Blank1	Blank2	Blank3	Blank4	Blank5
E0230 TPH in Water by P&T/GC-MS (µg/L)						
C6-C9 Fraction	**20**	nd				
E0221 TPH in Water (µg/L)						
C10-C14 Fraction	**20**	nd				
C15-C28 Fraction	**100**	nd				
C29-C36 Fraction	**100**	nd				
E0010 BTEX (P&T) in Water (µg/L)						
Benzene	**0.5**	nd				
Toluene	**1**	nd				
Ethylbenzene	**1**	nd				
Total Xylenes	**3**	nd				

PQL = Practical Quantitation Limit
nd = < PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/l (ppm) unless otherwise specified

Job Number : 0A01222

QAQC : Laboratory Control Sample(s)

Analyte	Level (ppm)	Level Detected			Recovery Details		
		Result1 (ppm)	Result2 (ppm)	Result3 (ppm)	Rec 1 (%)	Rec 2 (%)	Rec 3 (%)
E4870 Dissolved Metals in Waters							
Arsenic	0.100	0.099			99%		
Beryllium	0.100	0.101			101%		
Cadmium	0.1000	0.097			97%		
Cobalt	0.100	0.092			92%		
Copper	0.100	0.094			94%		
Nickel	0.100	0.093			93%		
Lead	0.100	0.094			94%		
Zinc	0.100	0.097			97%		
E4810 Dissolved Metals in Waters							
Iron	1.0	1.00			100%		
Calcium	10.0	10			100%		
Potassium	10.0	10			105%		
Magnesium	10.0	9.8			99%		
Sodium	10.0	10			101%		
E48501 Dissolved Mercury in Waters							
Mercury	0.001	0.001			105%		

PQL = Practical Quantitation Limit
-- = Not Applicable
nd = <PQL

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/l (ppm) unless otherwise specified

QAQC : Laboratory Duplicate(s)

Analyte	Dupl A	Dupl B	Average	RPD (%)	Dupl A	Dupl B	Average	RPD (%)
E4870 Dissolved Metals in Waters								
Arsenic	nd	nd						
Beryllium	nd	nd						
Cadmium	nd	nd						
Cobalt	0.005	0.005	0.005	0%				
Copper	nd	nd						
Nickel	0.005	0.005	0.005	0%				
Lead	nd	nd						
Zinc	0.011	0.011	0.011	0%				

PQL = Practical Quantitation Limit
nd = <PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

The number in brackets after the method header identifies the sample tested.

QAQC : Method Blank(s)

ANALYTE	Sample ID PQL	Blank1	Blank2	Blank3	Blank4	Blank5
E4870 Dissolved Metals in Waters						
Arsenic	**0.001**	nd				
Beryllium	**0.001**	nd				
Cadmium	**0.0001**	nd				
Cobalt	**0.001**	nd				
Copper	**0.001**	nd				
Nickel	**0.001**	nd				
Lead	**0.001**	nd				
Zinc	**0.002**	nd				
E4810 Dissolved Metals in Waters						
Iron	**0.05**	nd				
Calcium	**0.1**	nd				
Potassium	**0.1**	nd				
Magnesium	**0.1**	nd				
Sodium	**0.2**	nd				
E48501 Dissolved Mercury in Waters						
Mercury	**0.00005**	nd				

PQL = Practical Quantitation Limit
nd = <PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/l (ppm) unless otherwise specified

QAQC : Laboratory Control Sample(s)

Analyte	Level (ppm)	Level Detected			Recovery Details		
		Result1 (ppm)	Result2 (ppm)	Result3 (ppm)	Rec 1 (%)	Rec 2 (%)	Rec 3 (%)
E2450 Total Cyanide in Water							
Total Cyanide	0.460	0.500			109%		
E2600 pH in Water							
pH	7.4	7.4	7.4	100%	100%	100%	0%
E2430 Conductivity (µS/cm at 25.0 C)							
Electrical Conductivity	303	310			103%		
E2690 Total Dissolved Solids in Water							
TDS (calc.)	194	199			103%		
E2310 Total Alkalinity in Water							
Bicarbonate as CaCO3	59.5	58			98%		
Alkalinity as CaCO3	59.5	58			98%		
E2720 Sulphate in Water							
Sulphate	20	21	20	103%	99%	101%	3%
E2380 Chloride in Water							
Chloride	50	51			102%		
E2530 Total Hardness							
Total Hardness as CaCO3	66.2	66			99%		
E2630 Dissolved Phosphorus in Water							
Dissolved Phosphorus	1.0	1.03			103%		

PQL = Practical Quantitation Limit
-- = Not Applicable
nd = <PQL

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/l (ppm) unless otherwise specified

Job Number : 0A01222

QAQC : Laboratory Duplicate(s)

Analyte	Dupl A	Dupl B	Average	RPD (%)	Dupl A	Dupl B	Average	RPD (%)
E2720 Sulphate in Water								
Sulphate	20	20	20	0%				
E2380 Chloride in Water								
Chloride	18	19	19	5%				

PQL = Practical Quantitation Limit
nd = <PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

The number in brackets after the method header identifies the sample tested.

QAQC : Method Blank(s)

ANALYTE	Sample ID PQL	Blank1	Blank2	Blank3	Blank4	Blank5
E2450 Total Cyanide in Water						
Total Cyanide	**0.005**	nd				
E2600 pH in Water						
pH	**0.1**	5.5				
E2430 Conductivity (µS/cm at 25.0 C)						
Electrical Conductivity	**1**	nd				
E2310 Total Alkalinity in Water						
Bicarbonate as CaCO3	**1**	nd				
Alkalinity as CaCO3	**1**	nd				
E2720 Sulphate in Water						
Sulphate	**1**	nd				
E2380 Chloride in Water						
Chloride	**1**	nd				
E2530 Total Hardness						
Total Hardness as CaCO3	**0.5**	nd				
E2630 Dissolved Phosphorus in Water						
Dissolved Phosphorus	**0.01**	nd				

PQL = Practical Quantitation Limit
nd = < PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/l (ppm) unless otherwise specified

QAQC : Laboratory Control Sample(s)

Analyte	Level (ppm)	Level Detected			Recovery Details		
		Result1 (ppm)	Result2 (ppm)	Result3 (ppm)	Rec 1 (%)	Rec 2 (%)	Rec 3 (%)
E2640 Total Phosphorus in Water							
Phosphorus	1.00	0.95			95%		
E2770 Kjeldahl Nitrogen in Water							
Kjeldahl Nitrogen	5.0	4.6			90%		
E2550 Nitrate as N in Water							
Nitrate as N	1.0	0.90			90%		
E2560 Nitrite as N in Water							
Nitrite as N	1.0	0.92			92%		
E2330 Ammonia as N in Water							
Ammonia as N	1.0	1.00			100%		
E2580 TOC in Water							
TOC	100	98			98%		
E2350 BOD in Water (5-Day)							
BOD	200	200			100%		
E2420 Chemical Oxygen Demand							
COD	500	480			95%		

PQL = Practical Quantitation Limit
-- = Not Applicable
nd = <PQL

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/l (ppm) unless otherwise specified

QAQC : Method Blank(s)

ANALYTE	Sample ID PQL	Blank1	Blank2	Blank3	Blank4	Blank5
E2640 Total Phosphorus in Water						
Phosphorus	**0.01**	nd				
E2770 Kjeldahl Nitrogen in Water						
Kjeldahl Nitrogen	**0.1**	nd				
E2550 Nitrate as N in Water						
Nitrate as N	**0.01**	nd				
E2560 Nitrite as N in Water						
Nitrite as N	**0.01**	nd				
E2330 Ammonia as N in Water						
Ammonia as N	**0.01**	nd				
E2580 TOC in Water						
TOC	**1**	nd				
E2350 BOD in Water (5-Day)						
BOD	**5**	nd				
E2420 Chemical Oxygen Demand						
COD	**50**	nd				

PQL = Practical Quantitation Limit
nd = <PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/l (ppm) unless otherwise specified

QAQC : Laboratory Control Sample(s)

Analyte	Level (ppm)	Level Detected			Recovery Details		
		Result1 (ppm)	Result2 (ppm)	Result3 (ppm)	Rec 1 (%)	Rec 2 (%)	Rec 3 (%)
E0120 PCB's in Water (µg/L)							
Aroclor 1260 and 1262 as total	100	100			106%		

PQL = Practical Quantitation Limit
-- = Not Applicable
nd = <PQL

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/l (ppm) unless otherwise specified

QAQC : Laboratory Duplicate(s)

Analyte	Dupl A	Dupl B	Average	RPD (%)	Dupl A	Dupl B	Average	RPD (%)
E0120 PCB's in Water (µg/L)								
Aroclor 1016	nd	nd						
Aroclor 1221	nd	nd						
Aroclor 1232 and Aroclor 1242	nd	nd						
Aroclor 1248 and 1254 as tota	nd	nd						
Aroclor 1260 and 1262 as tota	nd	nd						

PQL = Practical Quantitation Limit
nd = < PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

The number in brackets after the method header identifies the sample tested.

QAQC : Method Blank(s)

ANALYTE	Sample ID PQL	Blank1	Blank2	Blank3	Blank4	Blank5
E0120 PCB's in Water (µg/L)						
Aroclor 1016	**10**	nd				
Aroclor 1221	**10**	nd				
Aroclor 1232 and Aroclor 1242	**10**	nd				
Aroclor 1248 and 1254 as total	**10**	nd				
Aroclor 1260 and 1262 as total	**10**	nd				

PQL = Practical Quantitation Limit
nd = <PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/l (ppm) unless otherwise specified

QAQC : Laboratory Control Sample(s)

Analyte	Level (ppm)	Level Detected			Recovery Details		
		Result1 (ppm)	Result2 (ppm)	Result3 (ppm)	Rec 1 (%)	Rec 2 (%)	Rec 3 (%)
E0140 Phenols By GC/MS In Water (µg/L)							
Phenol	100	70			70%		
2-Chlorophenol	100	80			80%		
4-Chloro-3-methylphenol	100	110			110%		
4-Nitrophenol	100	100			104%		
Pentachlorophenol	100	80			81%		

PQL = Practical Quantitation Limit
-- = Not Applicable
nd = <PQL

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/l (ppm) unless otherwise specified

QAQC : Method Blank(s)

ANALYTE	Sample ID PQL	Blank1	Blank2	Blank3	Blank4	Blank5
E0140 Phenols By GC/MS In Water (µg/L)						
Phenol	**5**	nd				
2-Chlorophenol	**5**	nd				
2-Methylphenol	**5**	nd				
3-Methylphenol & 4-Methylpheno	**5**	nd				
2-Nitrophenol	**5**	nd				
2.4-Dimethylphenol	**5**	nd				
2.4-Dichlorophenol	**5**	nd				
2.6-Dichlorophenol	**5**	nd				
4-Chloro-3-methylphenol	**5**	nd				
2.4.5-Trichlorophenol	**5**	nd				
2.4.6-Trichlorophenol	**5**	nd				
2.4-Dinitrophenol	**20**	nd				
4-Nitrophenol	**10**	nd				
2.3.4.6-Tetrachlorophenol	**10**	nd				
4.6-Dinitro-2-methylphenol	**20**	nd				
Pentachlorophenol	**10**	nd				
4.6-Dinitro-2-sec-butylphenol	**20**	nd				

PQL = Practical Quantitation Limit
nd = <PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/l (ppm) unless otherwise specified

QAQC : Laboratory Control Sample(s)

Analyte	Level (ppm)	Level Detected			Recovery Details		
		Result1 (ppm)	Result2 (ppm)	Result3 (ppm)	Rec 1 (%)	Rec 2 (%)	Rec 3 (%)
E0080 OC Pesticides in Water (µg/L)							
HCB	10	9			86%		
a-BHC	10	8			84%		
g-BHC	10	9			92%		
Heptachlor	10	9			93%		
Aldrin	10	9			89%		
b-BHC	10	10			99%		
d-BHC	10	10			99%		
Oxychlordane	10	10			101%		
Heptachlor epoxide	10	10			98%		
Endosulfan 1	10	10			101%		
Chlordane-Trans	10	10			100%		
Chlordane-Cis	10	11			105%		
trans-Nonachlor	10	10			104%		
DDE	20	20			102%		
Dieldrin	10	10			103%		
Endrin	10	10			104%		
DDD	20	21			104%		
Endosulfan 2	10	11			107%		
DDT	20	22			108%		
Endosulfan sulfate	10	11			109%		
Methoxychlor	10	11			109%		

PQL = Practical Quantitation Limit
-- = Not Applicable
nd = <PQL

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/l (ppm) unless otherwise specified

QAQC : Laboratory Duplicate(s)

Analyte	Dupl A	Dupl B	Average	RPD (%)	Dupl A	Dupl B	Average	RPD (%)
E0080 OC Pesticides in Water (µg/L)								
HCB	nd	nd						
a-BHC	nd	nd						
g-BHC	nd	nd						
Heptachlor	nd	nd						
Aldrin	nd	nd						
b-BHC	nd	nd						
d-BHC	nd	nd						
Oxychlordane	nd	nd						
Heptachlor epoxide	nd	nd						
Endosulfan 1	nd	nd						
Chlordane-Trans	nd	nd						
Chlordane-Cis	nd	nd						
trans-Nonachlor	nd	nd						
DDE	nd	nd						
Dieldrin	nd	nd						
Endrin	nd	nd						
DDD	nd	nd						
Endosulfan 2	nd	nd						
DDT	nd	nd						
Endosulfan sulfate	nd	nd						
Methoxychlor	nd	nd						

PQL = Practical Quantitation Limit
nd = <PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/L (ppm) unless otherwise specified

The number in brackets after the method header identifies the sample tested.

QAQC : Method Blank(s)

ANALYTE	Sample ID PQL	Blank1	Blank2	Blank3	Blank4	Blank5
E0080 OC Pesticides in Water (µg/L)						
HCB	1	nd				
a-BHC	1	nd				
g-BHC	1	nd				
Heptachlor	1	nd				
Aldrin	1	nd				
b-BHC	1	nd				
d-BHC	1	nd				
Oxychlordane	1	nd				
Heptachlor epoxide	1	nd				
Endosulfan 1	1	nd				
Chlordane-Trans	1	nd				
Chlordane-Cis	1	nd				
trans-Nonachlor	1	nd				
DDE	1	nd				
Dieldrin	1	nd				
Endrin	1	nd				
DDD	1	nd				
Endosulfan 2	1	nd				
DDT	1	nd				
Endosulfan sulfate	1	nd				
Methoxychlor	1	nd				

PQL = Practical Quantitation Limit
nd = <PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/l (ppm) unless otherwise specified

QAQC : Laboratory Control Sample(s)

Analyte	Level (ppm)	Level Detected			Recovery Details		
		Result1 (ppm)	Result2 (ppm)	Result3 (ppm)	Rec 1 (%)	Rec 2 (%)	Rec 3 (%)
E0110 USEPA Priority PAH's in Water (µg/L)							
Naphthalene	10	9			90%		
Acenaphthylene	10	9			87%		
Acenaphthene	10	10			96%		
Fluorene	10	9			93%		
Phenanthrene	10	10			98%		
Anthracene	10	9			94%		
Fluoranthene	10	9			94%		
Pyrene	10	9			93%		
Benz(a)anthracene	10	8			80%		
Chrysene	10	10			103%		
Benzo(b) & (k)fluoranthene	20	15			75%		
Benzo(a)pyrene	10	7			72%		
Indeno(1.2.3-cd)pyrene	10	8			79%		
Dibenz(a.h)anthracene	10	7			73%		
Benzo(g.h.i)perylene	10	8			76%		

PQL = Practical Quantitation Limit
-- = Not Applicable
nd = < PQL

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/l (ppm) unless otherwise specified

QAQC : Method Blank(s)

ANALYTE	Sample ID PQL	Blank1	Blank2	Blank3	Blank4	Blank5
E0110 USEPA Priority PAH's in Water (µg/L)						
Naphthalene	**1**	nd				
Acenaphthylene	**1**	nd				
Acenaphthene	**1**	nd				
Fluorene	**1**	nd				
Phenanthrene	**1**	nd				
Anthracene	**1**	nd				
Fluoranthene	**1**	nd				
Pyrene	**1**	nd				
Benz(a)anthracene	**1**	nd				
Chrysene	**1**	nd				
Benzo(b) & (k)fluoranthene	**2**	nd				
Benzo(a)pyrene	**1**	nd				
Indeno(1.2.3-cd)pyrene	**1**	nd				
Dibenz(a.h)anthracene	**1**	nd				
Benzo(g.h.i)perylene	**1**	nd				

PQL = Practical Quantitation Limit
nd = <PQL
-- = Not Applicable

(S) Soils : mg/kg (ppm) dry weight
(W) Waters : mg/l (ppm) unless otherwise specified

INDUSTRIAL AND ENVIRONMENTAL SERVICES DIVISION
Trading as Australian Analytical Laboratories Pty Ltd
ACN 001 491 667

Correspondence to:
PO BOX 514
HORNSBY NSW 1630

5 Kelray Place
ASQUITH NSW 2077
Telephone: (02) 9482 1922
Facsimile: (02) 9482 1734

Client: PPK Adelaide	**Our Ref:** 0A01222
Your Ref: 27K140D	**Date:** 23/01/01

SAMPLE DISPOSAL ADVICE

All samples remain the client's property after analysis. These will be either returned or disposed of (at the client's cost where applicable) following analysis.

Please indicate your requirements below.

1. RETURN SAMPLES TO CLIENT ☐

2. DISCARD AFTER * 6 Weeks - Soils ☐
   * 4 Weeks - Waters ☐

3. DISCARD IMMEDIATELY ☐

**** Storage times commence from date of issue of the final report.***

ADDITIONAL HOLDING REQUIREMENTS

4. HOLD SAMPLES UNTIL ___/___/___ (DATE) ☐

5. HOLD SAMPLES FOR EXTRA _____ (WEEKS) ☐

PLEASE NOTE: A charge of $2.50 per sample per month or part thereof applies

RETURN TO FOLLOWING ADDRESS _____

_____

_____

TRANSPORT COMPANY _____

PLEASE NOTE: If this advice slip is not returned within 15 days, it will be assumed that the samples referenced above can be discarded after indicated storage times (*)

Authorised Signature _____

Please return to

Kattubava Sahul
AMDEL Ltd
P.O. Box 514
HORNSBY N.S.W. 2077
or fax to (02) 9482 1734

PPK
Environment&Infrastructure
ACN 078 004 798

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Yellow Page - Project File Copy
Green Page - Remains in Book

Please deliver the goods and/or services to the office indicated:

☑ **Adelaide**
101 Pirie Street Adelaide SA 5000
Tel: (08) 8405 4300 Fax: (08) 8405 4301

☐ **Brisbane**
348 Edward Street, Brisbane QLD 4000
Tel: (07) 3218 2222 Fax: (07) 3831 4223

☐ **Melbourne**
163 Eastern Road, South Melbourne VIC 3205
Tel: (03) 9686 1166 Fax: (03) 9686 1110

☐ **Perth**
97 Broadway, Nedlands WA 6009
Tel: (08) 9389 8668 Fax: (08) 9389 8447

☐ **Sydney**
9 Blaxland Road, Rhodes NSW 2138
Tel: (02) 9743 0333 Fax: (02) 9736 1568

Chain of Custody

Order No: 0771

Job Title: Canberra Rail Yards

PPK Job Number: 27K140D

Job Location: Canberra

Laboratory Name: Amdel

Address:

Fax Number:

Phone Number:

Contact Name:

Delivery Method:

Quote Number:

Project Manager: M. Reynolds / S. Glenn

Results Expected by/on:

Fax Results to: A/A

Fax Number:

Phone Number:

Spreadsheet of Results Required: Y / N

Format:

Turnaround Time Required: 5 days

Invoice to: A/A

Comments:

Date Sampled	Time	Sample I.D.	Container Size	Sample Location	Medium*	Preservative Type	Filtered (X)	TPH	BTEX	PAH's	OC/OP/PCB's	Metals**	Cyanide Total
	09/11/00	DUP1						X	X				
	49	GW206						✱				X	X
	50	DUP2							→			X	→
	51	GW 114							→			X	→
	52	GW 313							→			X	→
	53	GW 111							→			X	→
	54	GW 109							→			X	→

Initials	Comments/Additional Information and/or Analysis Required
	Landfill analysis + Total Cyanide
	Landfill analysis
	" "
	" "
	" "
	" "
	See attached sheet

RECEIVED
20 DEC 2000
0901222

Relinquished by: M. Reynolds	Relinquished by:	Relinquished by:
Date & Time: 19-12-2000	Date & Time:	Date & Time:
Company: PPK	Company:	Company:
Signature: Schedule 2.2(a)(ii)	Signature:	Signature:
Received in Good Order & Condition by (Name): R Schaft	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):
Date & Time: 20/12/00	Date & Time:	Date & Time:
Company: Amdel	Company:	Company:
Signature: Schedule 2.2(a)(ii)	Signature:	Signature:

Medium*: S = Soil, W = Water, V = Vapour

Legend**: (circle the following to be tested)

Metals: Al (As) (Be) (Cd) (Co) Cr (Cu) (Fe) (Hg) Li Mg Mn (Ni) (Pb) Se Sn V (Zn)

Samples on Ice: ☑ Yes ☐ No

Please fax back a signed copy when samples are received at the laboratory

PPK Environment&Infrastructure

ACN 078 004 798

White Page - Laboratory Copy
Yellow Page - Project File Copy
Green Page - Remains in Book

Please deliver the goods and/or services to the office indicated:

☑ **Adelaide**
101 Pirie Street Adelaide SA 5000
Tel: (08) 8405 4300 Fax: (08) 8405 4301

☐ **Brisbane**
348 Edward Street, Brisbane QLD 4000
Tel: (07) 3218 2222 Fax: (07) 3831 4223

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Tel: (03) 9686 1166 Fax: (03) 9686 1110

☐ **Perth**
97 Broadway, Nedlands WA 6009
Tel: (08) 9389 8668 Fax: (08) 9389 8447

☐ **Sydney**
9 Blaxland Road, Rhodes NSW 2138
Tel: (02) 9743 0333 Fax: (02) 9736 1568

Chain of Custody

Order No: 0770

Job Title: CANBERRA RAIL YARDS

PPK Job Number: 27K140D

Job Location: Canberra

Laboratory Name: AMDEL
Address:
Fax Number:
Phone Number:
Contact Name:
Delivery Method:
Quote Number:

Project Manager: M. Reynolds S. Glenn
Results Expected by/on:
Fax Results to: AIA
Fax Number:
Phone Number: 84054300
Spreadsheet of Results Required: Y / N
Format:
Turnaround Time Required: 5day
Invoice to: AIA
Comments:

Date Sampled	Time	Sample I.D.	Container Size	Sample Location	Medium*	Preservative Type	Filtered (X)	TPH	BTEX	PAH's	OC/OP/PCB's	Metals**	Initials	Comments/Additional Information and/or Analysis Required
18/12/00	1136	GW104	1x500 2x50					X	X					
"	37	GW210	"					X	X					
"	38	GW310	"					X	X					
"	39	GW13	"					X	X					
"	40	GW301	"					X	X					
"	41	GW307	"					X	X					
"	42	GW305	"					X	X					
"	43	GW303	"					X	X					
"	44	GW204	"					X	X					
"	45	GW311	"					X	X					
"	46	GW203	"					X	X					
"	47	GW105	"				(N)	X	X					

RECEIVED
20 DEC 2000
0A01222

Relinquished by: M. Reynolds	Relinquished by:	Relinquished by:	Medium*: S = Soil, (W = Water), V = Vapour
Date & Time: 19/12/2000	Date & Time:	Date & Time:	Legend**: (circle the following to be tested)
Company: PPK	Company:	Company:	Metals: Al As Be Cd Co Cr Cu Fe Hg Li Mg Mn Ni Pb Se Sn V Zn
Signature: Schedule 2.2(a)(ii)	Signature:	Signature:	
Received in Good Order & Condition by (Name): K Schedule 2.2(a)(ii)	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):	Samples on Ice: ☑ Yes ☐ No
Date & Time: 20/12/00	Date & Time:	Date & Time:	
Company: Amdel	Company:	Company:	***Please fax back a signed copy when sam are ved e la tory***
Signature: Schedule 2.2(a)(ii)	Signature:	Signature:	

- Selected metals (As, Be, Cd, Co, Cu, Fe, Pb, Hg, Ni, Zn)
- PCB's
- CN (GW206 only)
- TPH
- BTEX

Parameters to be analysed will be:

- PH,EC, TDS by EC
- Cations Ca, Mg, Na, K
- Anions CO3, HCO3, SO4, OH, Cl
- Alkalinity (as CO3), hardness (carbonate, non carbonate, total)
- Nutrients phosphate, phosphorus, TKN, nitrate, nitrite, ammonia, ammonium
- TOC, BOD, COD
- Phenols (speciated)
- Pesticides (OCP's)
- PAH's

Appendix C

Photographs

Photo 1: No evidence of asbestos sheeting on surface soils or slabs.

Photo 2: Stormwater drain – no evidence of oil or oil staining.

Photo 3: Stormwater drain – no evidence of oil or oil staining.

Photo 4: Revegetated areas adjacent to fuel depot sidings. No visual evidence of staining.

Photo 5: Revegetated areas adjacent to fuel depot sidings. No visual evidence of staining.

Photo 6: Shell Depot – no evidence of staining.

Photo 7: Shell Depot – no evidence of staining.

Appendix D

Canberra Rail Station and Former Municipal Landfill Area, Groundwater Monitoring Well Locations

Canberra Rail Station & Former Municipal Dump Area, Groundwater Monitoring Wells

PPK
Environment & Infrastructure

Addendum Report: Environmental Site Investigations and Site Remedial Works Canberra Railway Station Yards and Rail Corridor

Indec Consulting

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ABN 84 797 323 433
NCSI Certified Quality System to ISO 9001

A Partnership between PPK E&I Pty Ltd and
Parsons Brinckerhoff International (Australia) Pty Ltd
Parsons Brinckerhoff Companies

16 August 2001
27K140D
01-0078-03.doc

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ABN 84 797 323 433
NCSI Certified Quality System to ISO 9001

Our Reference 27K140D/SCG/cc

16 ~~August~~ 2001

Mr Colin Denton
Indec Consulting
300 Flinders Street
ADELAIDE SA 5000

Dear **Colin**

Addendum Report: Environmental Site Investigations and Site Remedial Works Canberra Railway Station Yards and Rail Corridor

PPK is pleased to provide this ~~draft~~ Final addendum report to answer the queries raised by URS in their preliminary review of the reports associated with the investigation and remediation works at the Canberra railway station yards and rail corridor.

If you have any queries please do not hesitate to call me on the above number.

Yours sincerely

Schedule 2.2(a)(ii)

Dr Peter Woods
Principal Hydrogeologist
PPK E&I Pty Limited

for

Stuart Glenn
Principal, Environmental Division
PPK E&I Pty Limited

Contents

Appendices

1. Introduction

PPK Environment & Infrastructure (PPK) was commissioned by Indec Consulting (Indec), on behalf of Australian National under Contract 1013, to undertake a series of environmental investigations and remedial works at the Canberra railway station yards and rail corridor as part of the Commonwealth's environmental remediation program. These investigations and remedial works were comprehensively reported in December 2000 in the document titled "Report on Further Environmental Site Investigations and Site Remedial Works Canberra Railway Station Yards and Rail Corridor" (PPK Ref 27K140D Document No. 99-0885-00).

Following a review of this report by URS a number of issues and clarifications were requested. These were detailed in a report dated 15 December 2000 and titled "Major Site Environmental Audit – Canberra" (see Appendix A).

Following this review, PPK undertook a series of further investigations, inclusive of confirmatory groundwater monitoring, increased analyte testing and site inspections. This work was completed on 22 December 2000.

This report relates to these latest investigations undertaken throughout December 2000.

2. Summary of Issues Raised

2.1 Groundwater Monitoring to Confirm Fate Modelling

Solute transport modelling was undertaken and reported in the original PPK report to determine the likely migration of identified dissolved–phase groundwater contamination. In general, PPK determined that dissolved components migrated hydraulically down-gradient in the local groundwater toward Jerrabomberra Creek. It was nominated that dispersive effects during transport potentially would result in a dilution of contaminant concentrations. And that transport of any contaminant plume would also be retarded by the effects of sorption to organic matter and other aquifer material.

To forecast actual impacts, PPK undertook one dimensional (1-D) solute transport modelling as presented by van Genuchten and Alves ('Analytical Solutions of the One-dimensional Convective-Dispersive Solute Transport Equation', 1982, US Department of Agriculture technical Bulletin No.1661). Results of the modelling were clearly defined in Section 9.3 of the abovementioned PPK report. The conclusion drawn from this modelling suggested that any identified groundwater contamination would rapidly dilute, migrate very slowly and not pose any risk to Jerrabomberra Creek.

A review of PPK's findings undertaken by URS noted that additional objective data, in the form of groundwater monitoring results, would be of benefit to confirm the model predictions. This was specifically in relation to two potential areas, namely the former refuelling depot and vacant dump site.

2.1.1 Old Refuelling Depot

Modelling of the identified PSH groundwater contamination plume indicated no risk of impacts to Jerrabomberra Creek in excess of the established assessment criteria for the protection of fresh water ecosystems. This was confirmed at the time of modelling by groundwater monitoring between the source and Jerrabomberra Creek.

To further confirm the model predictions, another monitoring round of wells around the identified source, inclusive of GW104, GW210, GW310, GW13, GW301, GW307, GW305, GW303, GW204, GW311, GW203 and GW105 was undertaken. All results recorded were below laboratory detection limits (see laboratory analyses Appendix B).

This monitoring round objectively reconfirms the model predictions of minimal movement of the identified plume and the absence of risk to Jerrabomberra Creek, sited some 800 m from the source.

2.1.2 Vacant Landfill Site

The previous PPK report identified one localised source of TPH at the northern end of the former waste disposal site. Fate and transport modelling indicated that the identified concentration was not likely to impact on the adjacent Jerrabomberra Creek.

The URS review nominated two areas of clarification, in respect of the vacant landfill site, namely the need for further confirmatory analyses associated with an identified TPH plume and the need for typical leachate analyses within the groundwater.

A further round of groundwater sampling and analysis was undertaken to address these review points.

TPH:

Previous testing had revealed a single sample recovered from the north western portion of the site with concentrations of dissolved-phase TPH. Subsequent testing has confirmed the presence of this contamination, however it is apparently contained, with no adjacent or downgradient wells recording any indications of TPH. The latest results validate the model prediction that "TPH would not exceed 0.43 μg/L (below the laboratory method limit of reporting) at a distance of 50 m from the source."

Leachate:

In addition to TPH, the latest round of analyses included a series of standard leachate parameters to confirm any impact resulting from any landfill materials. Wells sampled included GW109, GW206, GW114, GW313, and GW111 (see laboratory results Appendix C). Results show evidence of minor impact of the local groundwater with typical leachate parameters inclusive of elevated TDS, hardness, nitrate and ammonia. Heavy metal results were all at low concentrations or below detection limits.

Other than evidence of elevated ammonia sulphate levels in some wells no contaminants (major ions, metals, pesticides or hydrocarbons) at levels of concern for this area were identified.

In addition, the modelling of groundwater behaviour corroborates that no impacts, in excess of the assessment criteria for the protection of freshwater ecosystems, would be detected at Jerrabomberra Creek.

On this basis, no further action is required.

2.2 Former Railway Turntable

Reviewing of old ariel photographs revealed that the former rail turntable is located partially under Robbo's Pet Barn and the adjacent bituminised car parking area, this area is surrounded by groundwater wells both up and down gradient. Subsequent testing has confirmed no downgradient wells recording any indications of petroleum hydrocarbon contamination. On this basis, no further action is required.

2.3 Abattoir USTs

The former abattoir site was not part of this site assessment.

2.4 Landfill Area (East of Jerrabomberra Creek)

The former landfill area east of Jerrabomberra Creek, north and adjacent to the railway alignment, was considered to be outside of the scope of this report. This land was not considered to be AN land and was not part of this site assessment.

2.5 Asbestos

Site inspection of the potential asbestos contaminated area on 20 December 2000 revealed no evidence of residual asbestos sheeting (see Photographs Appendix C).

Based on this finding, no further action is required.

2.6 Oily Water Drains

Site inspection on 20 December 2000 confirmed the areas previously identified as potential disposal drains for oily water showed no visual evidence of oil stain or residue (see Photographs Appendix C).

Based on this latest finding, no further action is required.

2.7 Oil Staining on Soils

Previously reported oil staining, both along the fuel depot sidings and adjacent to the Shell depot, was reinspected as part of an overall site review in December 2000.

Staining was no longer in evidence along the fuel depot sidings (see Photographs in Appendix C) and significant growth of grass and other vegetation is now in evidence.

Based on this latest finding, no further action is required.

Staining associated with the Shell depot is considered a matter for Shell and outside the scope of this report.

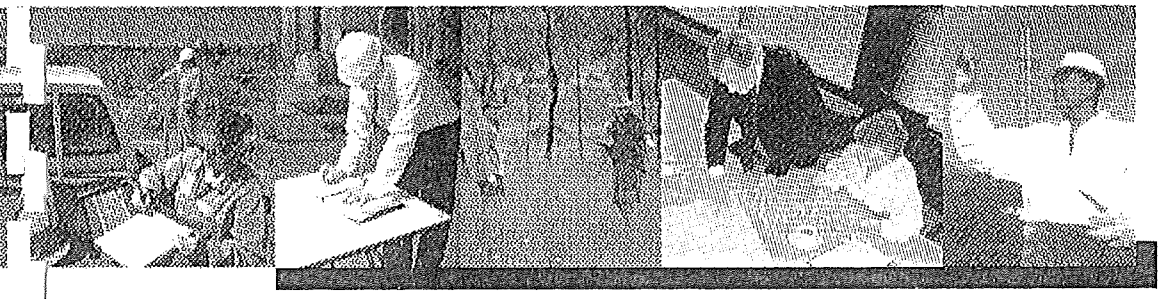
2.8 Petroleum Hydrocarbon Vapours

PPK is drafting an environmental status report on the Canberra site, highlighting all identified areas of risk inclusive of areas with potential hydrocarbon vapours. This separate report will enable current and future users of the site to develop their own specific Safe Systems of Work.

Appendix A

URS Summary Review

URS



environmental
and engineering
professional services

Report

Major Site Environment Audit – Canberra

Prepared for
Indec Consulting

15 December 2000

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Contents

Appendices

In consultation with the ACT Government Indec Consulting (Indec) acting for the Commonwealth Department of Transport and Regional Services have engaged URS Australia Pty Ltd (URS) formerly AGC Woodward-Clyde Pty Ltd to conduct an independent audit review of the former Australian National (AN) land in Canberra. The review has been carried out by Mr. Warren Pump, a Victorian EPA Accredited Contaminated Land Auditor. The land was Commonwealth property which passed from the Commonwealth Railways to AN when the latter was formed. Since the sale of AN in November 1997 a site assessment and remediation program instigated by AN and now managed by Indec and funded through the Commonwealth Government has been carried out at the Canberra Site by PPK Environment and Infrastructure (PPK). This audit has been prepared for Indec Consulting and the Commonwealth Government to provide the ACT Government confidence that the necessary investigation and remedial action required for the continued use of the site for which it was last used prior to the sale date of AN has occurred.

At the time of the sale of AN the Commonwealth Government committed funding to remediate former rail sites and property to a standard suitable for the continuing use for which the property was last used prior to the sale date. The Commonwealth Government undertook this action regardless of whether AN or previous land owners or users caused the environmental contamination.

Indec has been appointed by the Commonwealth to manage all aspects of the remediation program. The remediation process is and has been based on a risk management basis which takes account of the commitment of the Commonwealth to remediate sites to allow land-use consistent with ongoing use for which it was last used.

This independent audit has been carried out, which is equivalent to a an environmental audit carried out for contaminated land in accordance with the requirements of the Environment Protection Authority of Victoria. However, this audit is not a statutory audit.

In conducting the audit, the Auditor has consider the suitability of the land, based on its environmental condition, for the following range of land uses:

- Light and heavy industrial, especially industrial processes traditionally associated with urban railways and railyards;
- Commercial activities; and
- Solid waste disposal and soil filling.

In addressing such land uses, the Auditor has formed an opinion of the existence, nature and extent of any actual material environmental harm, or threatened material environmental harm, regarding the site. The term "material environmental harm" has the same meaning as that in the ACT *Environment Protection Act 1997.*

This review is only concerned with impacts to soil and groundwater which may offer a risk to the environment or human health. The review is not concerned with operational issues at the sites, nor is it

concerned with the protection of natural flora or fauna (other than those that typically exist in a highly modified form in urban railyards); soil aesthetics; dust; noise; vibration; or ground corrosivity.

Summary of Work Conducted and Reviewed

SECTION 2

The discussion below provides a brief summary of the reports prepared by PPK and the description of the works performed.

> "Environmental Audit of the Australian National Facilities, Canberra Railway Station Yards and Rail Corridor", 16 March 1998 Document No. 27K009A 98-182.DOC.

This report presents the past and current activities at the site which have the potential to cause impact to the identified environmental receptors.

> "Phase II Environmental Site Assessment, Canberra Railway Station and Rail Corridor", 12 November 1998, Document No. 27K140A 98-845.DOC.

This report presents the results of the first round of soil and groundwater investigations at the various areas identified during the environmental audit above. It specifically assessed the following areas:

- The fuel depots and former cement works and their impact to the railway corridor;
- The former goods shed (now Robbo's Pet Barn) and surrounding area;
- The old refueling depot;
- The main Canberra station area and surrounds;
- Leased area occupied by William Edmunds Plumbers and the Australian Railway Historical Society (ARHS);
- Vacant dump site (which is understood to have been used for uncontrolled disposal of municipal wastes); and
- Corridor between Jerrabomberra Creek and Ipswich Street.

> "Report on Further Soil and Groundwater Investigations, Canberra Railway Station and Rail Corridor", 14 January 1999, Document No. 7K140B 99-014.DOC

This report presents the results of the second (Phase IIB) round of soil and groundwater investigations at various areas identified upon completion of the initial Phase II investigations. It specifically assessed the following areas:

- Contaminated soil issues associated with the former cement works;
- Re-sampling of groundwater from monitoring wells in the railway corridor adjacent to the fuel depots;
- Installation of additional groundwater monitoring bores in the vicinity of former refueling area to delineate the extent of groundwater contamination; and

- Installation of additional groundwater monitoring bores at the vacant dump site to assess potential impacts to the Jerrabomberra Creek.

  "Report on Further Environmental Site Investigation and Site remedial Works, Canberra Railway Station Yards and Corridor", 17 December 1999, Document No. 27K140C 99-0885-00.DOC.

This report presents the results of further site assessment works (soil and groundwater) and remediation (groundwater) undertaken as a result of the findings in the Phase IIB assessment. It specifically assessed the following areas:

- Human health risk assessment of soil contamination (metals) adjacent to the former cement works along the rail corridor;
- Further groundwater monitoring adjacent to the fuel depots along the eastern rail corridor;
- Installation of additional groundwater monitoring bores and groundwater remediation at the former refueling area. The assessment also included fate and transport modelling of residual groundwater contamination;
- Further test pitting, installation of additional groundwater monitoring bores and groundwater sampling at the vacant dump site. The assessment also included fate and transport modelling of residual groundwater contamination at the north-western end of the dump site;
- Investigation of underground storage tanks (USTs) at the area leased by William Edmunds Plumbers. The investigation included sampling of soils from test pits and sampling a nearby groundwater monitoring bore in a down-gradient location; and
- Investigation of fouled railway ballast removed from the vicinity of the main Canberra railway station and placed south-east of the station and south Robbo's Pet Barn. The investigation included sampling of the fouled ballast and surrounding soils and collection of groundwater samples from nearby bores in a down-gradient location.

This review is a summary of the main issues identified in the various investigations carried out across the Canberra Rail Facility. Minor non-conformances or areas where there are minor identified risks which do not impact continued railway use of the site have been included in the detailed checklist presented in Appendix B.

A number of minor non conformances have been identified during this review, which are presented in this report, and it is understood that PPK is currently addressing these issues.

3.1 Fuel Depots Adjacent to the Eastern Rail corridor

Levels of petroleum hydrocarbon (TPHs) above the adopted criteria for continued railway use were identified adjacent to the Shell and Mobil fuel depots. These levels were at concentrations which represented petroleum hydrocarbons floating on the groundwater table (phase separated hydrocarbons – PSH). It is understood that Indec have communicated these issues to the fuel companies for further consideration.

In most cases the identified TPHs are not likely to impact upon the continued use of this facility for railway purposes. However, a combination of significant concentration of light fraction TPH compounds (C6-C9 at 46,600 ug/L) and the shallow depth to ground water (approximately 2 metres) may expose workers in the areas to potential soil vapours. An assessment of this issue is required to assess that identified receptors are not exposed to any potential risks associated with the soil vapours.

3.2 Former Cement Works Adjacent to the Eastern Rail corridor

Concentrations of metals (lead and zinc) were identified at levels exceeding the adopted criteria for continued railway use. The area was limited in vertical and lateral extent (less than 10 square metres in area and within a depth of 1 metre). The concentrations of zinc were subsequently identified to be within the NEHF, 1998 assessment criteria for 'hot-spots'. The concentration of lead was compared to the health risk assessment (for lead contamination in soils) performed for the Port Pirie Rail Yards. The parameters (exposure pathways, applicable exposure factors and toxicological factors) of the risk assessment for the Port Pirie site were reviewed. The identified parameters are considered to represent a conservative scenario in terms of the Canberra site. Therefore the identified concentration of lead in soils is likely to be acceptable for continued railway use.

3.3 Old Refueling Depot

Levels of TPHs were identified in the vicinity of the former refueling area above the adopted assessment guidelines. Phase separated hydrocarbons were also noted in three of the groundwater monitoring bores. It was estimated that approximately 50 litres of PSH was floating on the groundwater table. Remediation of the PSH was undertaken using a 'pig sock' lowered into the impacted groundwater bores. The pig sock removed PSH by absorption. The last report prepared for the site documented that approximately 5 litres of PSH had been removed.

The significance of the remaining contaminated groundwater was undertaken using fate and transport groundwater modelling techniques. The modelling indicated that there is likely to be minimal risks to the Jerrabomberra Creek. Future monitoring of this area would be required to confirm the predictions of the modelling.

During assessment of this area groundwater monitoring bore GW304 reported a concentration of TPH C6-C9 at 63,000 ug/L. Assessment of the chromatogram indicated that this petroleum hydrocarbon was not derived from the same source as the former refueling area (which was predominantly used for storage and dispensing diesel). The significance of this contamination was also assessed using the fate and transport model, which indicated that there is likely to be no future risks associated with this contamination. However, there has been no further explanation of the presence of this contamination. It is recommended that the results be reviewed to address this anomaly.

3.4 Former Goods Shed

There were no significant issues associated with the operations of the goods shed which had the potential to impact the site. However, the facility was established over filled ground. The filled ground included solid and inert wastes.

3.5 Main Canberra Station Area

There are no current activities associated with the Canberra station which have the potential to impact continued railway use of the site. In the past ballast contaminated with TPHs was removed and geofabric liner placed to prevent future TPH leakage from the locomotives. There was no documentation provided up to the time of this review which indicated validation of the excavation was performed. However, groundwater was sampled from monitoring bores down-gradient from the area and there were no impacts identified in the groundwater.

Fouled ballast was deposited in various locations south-east of the station area. It is assumed this material was sourced during the removal of the ballast from the main Canberra station area. Assessment of the ballast material, adjacent soils and groundwater down-gradient from the area indicated that there are no significant issues which would limit continued railway use of the site.

3.6 Leased Areas (William Edmunds Plumbers and ARHS)

Site facilities are located over filled areas and are assumed to be an extension of the vacant dump area. One significant issue was identified in the area occupied within the William Edmunds site. The review identified, three underground storage tanks located north and adjacent to the main building. Assessment of the soils adjacent to the USTs and groundwater down-hydraulic gradient indicated no adverse impacts.

3.7 Vacant Dump Site

The results of the investigation of this area indicated the filled area varied from approximately 2m to 6m and contained predominantly domestic (solid / inert wastes) and in the later years of operation, restricted filling to building rubble (soil fill, concrete, bricks, etc.). Levels of TPHs were identified in the northern end of the dump and appeared to be localised in area. Fate and transport modelling indicated that the identified concentration is not likely to impact on the adjacent Jerrabomberra Creek. However, further monitoring of the groundwater should be undertaken to confirm the modelling outcomes.

Although no significant putrescible domestic fill was encountered during the test pitting exercise, there are indications that the groundwater quality has been impacted by leachate generated by the decomposition of putrescible wastes. Traces of cyanide were also detected in GW206 above the guidelines for protection of fresh water ecosystems. It is recommended that groundwater quality be monitored for typical landfill leachate parameters, as well as other parameters identified in previous monitoring.

3.8 Corridor between Jerrabomberra Creek and Ipswich Street

No significant issues were identified in this area which would impact upon continued railway use of the area.

Review of the assessment reports has highlighted that other areas have been identified which have the potential, to impact identified receptors at the site. These areas only have the potential to be an issue if significant contamination is present. These include:

- The filling of the former railway turntable. This issue was highlighted in the environmental audit report;
- USTs (now removed) were located in the former abattoir site, immediately east of Newcastle Street. It is presumed that the abattoir site in not part of the site;
- Potential for fragments of asbestos sheeting to exist in the surface soils was highlighted in the environmental audit and no assessment was performed;
- Oily wastes being disposed into the stormwater drain at the ARHS site. This issue was raised in the environmental audit report and no further assessment has been performed;
- The environmental audit report identified filling east of the Jerrabomberra Creek north and adjacent to the railway alignment. The filling, as illustrated in the aerial photo was similar to the vacant dump site area;
- Significant staining of the soils by petroleum hydrocarbons was noted along-side the fuel depot sidings during the environmental audit of the site. No further assessment of these soils was undertaken. It is assumed that the sidings are located on railway land; and

- Black oily waste was observed during the environmental audit in a drainage alignment adjacent to the Shell depot. There was no further assessment of these areas noted in the later environmental site assessment reports.

- The assessments prepared by PPK have been performed in accordance with the methods and guidelines usually employed for the assessment of potentially contaminated sites, however, there has been no comparison of the local requirements of Environment ACT and supporting legislation for the protection of the environment. The detailed audit report will reference the Environment ACT legislation and any relevant guidelines.

- In this review, the Auditor has formed an opinion of the existence, nature and extent of any actual material environmental harm, or threatened material environmental harm, regarding the site. On the basis of the information provided and reviewed, there is no evidence to suggest that the issues assessed present actual material environmental harm to exist. However, until further information can be provided, threatened environmental harm exists for the following issues:

- The potential for landfill leachate from the vacant dump site to be impacting the underlying groundwater and therefore the Jerrabomberra Creek;

- The potential for landfill leachate to be generating from the filled area east of the Jerrabomberra Creek (north and adjacent to the railway alignment) to be impacting the underlying groundwater and therefore the Jerrabomberra Creek; and

- The potential for petroleum hydrocarbon soil vapours adjacent to the Shell bulk terminal to impact upon the identified receptors.

The review has indicated that there have been no issues which are likely to impact the identified continued uses of the site. However, as identified in this review, there are number of issues which require further assessment, documentation or monitoring. This is required to ensure receptors identified at the site (workers or the neighboring environment) are not exposed to adverse risks and to confirm that the outstanding issues identified herein are addressed and pose no impact to continued use of the site for the identified uses.

As indicated in the beginning of Section 3 above, PPK is currently in the process of addressing the issues raised in this review.

This review has not sought to investigate the total extent of potential land contamination at the site reviewed, rather it has checked that the works undertaken and the results achieved were appropriately carried out within the constraints of the total number of sites to be managed.

Reliance on Data

This review has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise stated in the report, URS has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. URS will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to URS.

Environmental Conclusions

In accordance with the scope of services, URS has relied upon the data and has not conducted any environmental field monitoring or testing in the preparation of the report. The conclusions are based upon the data and visual observations and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions.

Within the limitations imposed by the scope of services, the assessment of the site and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

Report for Benefit of Client

The report has been prepared for the benefit of the Client and no other party. URS assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of URS or for any loss or damage suffered by any other party in relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

Appendix A
References