PPK Environment & Infrastructure

Groundwater Field Parameters

Job Number: 27K140A **Well No. GW10**

Client: INDEC	**Purging Date:** 4 /12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 4 /12/98
Casing Diameter (mm): 50	Well depth from TOC (m): 4.53
Depth to floating product (m): -	Depth to groundwater from TOC (m): 1.84
Product thickness (mm): -	Depth to be purged (m): 2.69

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 5.5
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 3
Start time (2400hr):	Total purge volume: litres 17

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.68	1.26	-	-	18.2
After **4** purge volumes:					
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details	**Analysis Required (tick if yes)**	
Method/pump type: waterra O whaler O **bailer O**	**TPH**	Ammonia
Tubing material: HDPE O PVC O **S/Steel O**	**BTEX**	SVOCs
Is there a hydrocarbon sheen?: Yes (No)	VOCs	CrVI
Odour: No	Cyanide	Other
Colour: light brown	PAHs	Other
Turbidity: (L) M H	Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 23 °C	Cloud cover: % 10

Other comments and observations:

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

Groundwater Field Parameters

PPK Environment & Infrastructure

Job Number: 27K140A **Well No. GW11**

Client: INDEC		**Purging Date:** 4 /12/98	
Site Location: CANBERRA Railyard		**Sampling Date:** 4 /12/98	
Casing Diameter (mm):	50	Well depth from TOC (m):	5.70
Depth to floating product (m):	-	Depth to groundwater from TOC (m):	3.22
Product thickness (mm):	-	Depth to be purged (m):	2.48

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O		One purge volume:	litres 5
Tubing material: HDPE O **PVC O** S/Steel O		No. of times purged:	2
Start time (2400hr):		Total purge volume:	litres 10

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.49	0.56	-	-	18.6
After **4** purge volumes:					
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details	**Analysis Required (tick if yes)**	
Method/pump type: waterra O whaler O **bailer O**	**TPH**	Ammonia
Tubing material: HDPE O PVC O **S/Steel O**	**BTEX**	SVOCs
Is there a hydrocarbon sheen?: Yes (No)	VOCs	CrVI
Odour: Nil	Cyanide	Other
Colour: light brown	PAHs	Other
Turbidity: (L) M H	Metals	*(see custody form for list)*

Weather Conditions

Rain: No	Temperature: 23 °C	Cloud cover: 10 %

Other comments and observations: Dup 1 taken here

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

PPK Environment & Infrastructure

Groundwater Field Parameters

Job Number: 27K140A **Well No. GW12**

Client: INDEC	**Purging Date:** 4 /12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 4 /12/98
Casing Diameter (mm): 50	Well depth from TOC (m): 7.80
Depth to floating product (m): --	Depth to groundwater from TOC (m): 3.96
Product thickness (mm): -	Depth to be purged (m): 3.84

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 8
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 2
Start time (2400hr):	Total purge volume: litres 16

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.52	0.56	-	-	18.2
After **4** purge volumes:					
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details	Analysis Required (tick if yes)	
Method/pump type: waterra O whaler O **bailer O**	**TPH**	Ammonia
Tubing material: HDPE O PVC O **S/Steel O**	**BTEX**	SVOCs
Is there a hydrocarbon sheen?: Yes (No)	VOCs	CrVI
Odour: Nil	Cyanide	Other
Colour: clear	PAHs	Other
Turbidity: L M H	Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 23 °C	Cloud cover: 10 %

Other comments and observations:

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

Groundwater Field Parameters

PPK Environment & Infrastructure

Job Number: 27K140A **Well No. GW13**

Client: INDEC	**Purging Date:** 4 /12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 4 /12/98
Casing Diameter (mm): 50	Well depth from TOC (m): 5.70
Depth to floating product (m): –	Depth to groundwater from TOC (m): 4.78
Product thickness (mm): –	Depth to be purged (m): 0.92

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 2
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 3
Start time (2400hr):	Total purge volume: litres 6

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.47	0.67	–	–	18
After **4** purge volumes:					
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details	**Analysis Required (tick if yes)**	
Method/pump type: waterra O whaler O **bailer O**	**TPH**	Ammonia
Tubing material: HDPE O PVC O **S/Steel O**	**BTEX**	SVOCs
Is there a hydrocarbon sheen?: Yes No	VOCs	CrVI
Odour: Nil	Cyanide	Other
Colour: light brown	PAHs	Other
Turbidity: (L) M H	Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 23 °C	Cloud cover: 10 %

Other comments and observations:

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

PPK Environment & Infrastructure

Groundwater Field Parameters

Job Number: 27K140A

Well No. GW14

Client: INDEC	**Purging Date:** 4 /12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 4 /12/98
Casing Diameter (mm): 50	Well depth from TOC (m): 7.90
Depth to floating product (m): -	Depth to groundwater from TOC (m): 4.71
Product thickness (mm): -	Depth to be purged (m): 3.19

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 6
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 3
Start time (2400hr):	Total purge volume: litres 18

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.69	1.69	-	-	18.0
After **4** purge volumes:					
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details

Method/pump type: waterra O whaler O **bailer O**

Tubing material: HDPE O PVC O **S/Steel O**

Is there a hydrocarbon sheen?: Yes (No)

Odour: Nil

Colour: Brown

Turbidity: L M H

Analysis Required (tick if yes)

TPH	Ammonia
BTEX	SVOCs
VOCs	CrVI
Cyanide	Other
PAHs	Other
Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 23 °C	Cloud cover: 10 %

Other comments and observations:

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

PPK Environment & Infrastructure

Groundwater Field Parameters

Job Number: 27K140A **Well No. GW16**

Client: INDEC	**Purging Date:** 4 /12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 4 /12/98
Casing Diameter (mm): 50	Well depth from TOC (m): 7.50
Depth to floating product (m): -	Depth to groundwater from TOC (m): 5.32
Product thickness (mm): -	Depth to be purged (m): 2.18

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 4
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 3
Start time (2400hr):	Total purge volume: litres 12

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.44	2.86	-	-	18.4
After **4** purge volumes:					
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details	**Analysis Required (tick if yes)**	
Method/pump type: waterra O whaler O **bailer O**	**TPH**	Ammonia
Tubing material: HDPE O PVC O **S/Steel O**	**BTEX**	SVOCs
Is there a hydrocarbon sheen?: Yes (No)	VOCs	CrVI
Odour: Nil	Cyanide	Other
Colour: light Brown	PAHs	Other
Turbidity: (L) M H	Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 23 °C	Cloud cover: 10 %

Other comments and observations:

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

PPK Environment & Infrastructure

Groundwater Field Parameters

Job Number: 27K140A **Well No.** GW17

Client: INDEC	**Purging Date:** 8 /12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 8 /12/98
Casing Diameter (mm): 50	Well depth from TOC (m): 6.00
Depth to floating product (m): -	Depth to groundwater from TOC (m): 2.09
Product thickness (mm): -	Depth to be purged (m): 3.91

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 8
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 3
Start time (2400hr):	Total purge volume: litres 24

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.76	1.70	-	-	18.0
After **4** purge volumes:					
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details	**Analysis Required (tick if yes)**	
Method/pump type: waterra O whaler O **bailer O**	**TPH**	Ammonia
Tubing material: HDPE O PVC O **S/Steel O**	**BTEX**	SVOCs
Is there a hydrocarbon sheen?: Yes (No)	VOCs	CrVI
Odour: No	Cyanide	Other
Colour: cloudy brown	PAHs	Other
Turbidity: (L) M H	Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 26 °C	Cloud cover: 25 %

Other comments and observations:

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

Groundwater Field Parameters

PPK Environment & Infrastructure

Job Number: 27K140A **Well No. GW19**

Client: INDEC	**Purging Date:** 8 /12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 8 /12/98
Casing Diameter (mm): 50	Well depth from TOC (m): 6.00
Depth to floating product (m): —	Depth to groundwater from TOC (m): 1.88
Product thickness (mm): —	Depth to be purged (m): 4.12

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 8
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 2
Start time (2400hr):	Total purge volume: litres 16

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.71	1.46	—	—	18.0
After **4** purge volumes:					
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details

Method/pump type: waterra O whaler O **bailer O**

Tubing material: HDPE O PVC O **S/Steel O**

Is there a hydrocarbon sheen?: Yes (No)

Odour: No

Colour: light brown

Turbidity: (L) M H

Analysis Required (tick if yes)

TPH	Ammonia
BTEX	SVOCs
VOCs	CrVI
Cyanide	Other
PAHs	Other
Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 26 °C	Cloud cover: 25 %

Other comments and observations:

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

PPK Environment&Infrastructure

Groundwater Field Parameters

Job Number: 27K140A

Well No. GW21

Client: INDEC	**Purging Date:** 8 /12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 8 /12/98
Casing Diameter (mm): 50	Well depth from TOC (m): 5.80
Depth to floating product (m): –	Depth to groundwater from TOC (m): 1.65
Product thickness (mm): –	Depth to be purged (m): 4.15

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 8
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 4
Start time (2400hr):	Total purge volume: litres 32

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.43	1.30	–	–	18.6
After **4** purge volumes:	7.46	1.26	–	–	18.2
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details

Method/pump type: waterra O whaler O **bailer O**

Tubing material: HDPE O PVC O **S/Steel O**

Is there a hydrocarbon sheen?: Yes (No)

Odour: No

Colour: light brown

Turbidity: (L) M H

Analysis Required (tick if yes)

TPH	Ammonia
BTEX	SVOCs
VOCs	CrVI
Cyanide	Other
PAHs	Other
Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 25 °C	Cloud cover: 25 %

Other comments and observations:

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

Groundwater Field Parameters

PPK Environment & Infrastructure

Job Number: 27K140A **Well No. GW 22**

Client: INDEC	**Purging Date:** 8/12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 8/12/98
Casing Diameter (mm): 50	Well depth from TOC (m): 6.00
Depth to floating product (m): -	Depth to groundwater from TOC (m): 2.03
Product thickness (mm): -	Depth to be purged (m): 3.97

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 8
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 3
Start time (2400hr):	Total purge volume: litres 24

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.49	1.56	-	-	18.2
After **4** purge volumes:					
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details	**Analysis Required (tick if yes)**	
Method/pump type: waterra O whaler O **bailer O**	**TPH**	Ammonia
Tubing material: HDPE O PVC O **S/Steel O**	**BTEX**	SVOCs
Is there a hydrocarbon sheen?: Yes (No)	VOCs	CrVI
Odour: faint	Cyanide	Other
Colour: clear	PAHs	Other
Turbidity: L M H	Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 26 °C	Cloud cover: 25 %

Other comments and observations:

Purgers name:	MBR	Signature	M Reynolds
Samplers name:	MBR	Signature:	M Reynolds

PPK Environment & Infrastructure

Groundwater Field Parameters

Job Number: 27K140A

Well No. GW 24

Client: INDEC	**Purging Date:** 8 /12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 8 /12/98
Casing Diameter (mm): 50	Well depth from TOC (m): 6.15
Depth to floating product (m): -	Depth to groundwater from TOC (m): 1.81
Product thickness (mm): -	Depth to be purged (m): 4.34

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 9
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 4
Start time (2400hr):	Total purge volume: litres 38

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.59	1.26	-	-	18.0
After **4** purge volumes:	7.55	1.29	-	-	18.0
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details

Method/pump type: waterra O whaler O **bailer O**

Tubing material: HDPE O PVC O **S/Steel O**

Is there a hydrocarbon sheen?: (Yes) No

Odour: Strong Hydro carbon

Colour: Light brown

Turbidity: (L) M H

Analysis Required (tick if yes)

TPH	Ammonia
BTEX	SVOCs
VOCs	CrVI
Cyanide	Other
PAHs	Other
Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 25 °C	Cloud cover: 25 %

Other comments and observations:

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

Groundwater Field Parameters

PPK Environment & Infrastructure

Job Number: 27K140A **Well No. GW26**

Client: INDEC	**Purging Date:** 8 /12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 8 /12/98
Casing Diameter (mm): 50	Well depth from TOC (m): 5.96
Depth to floating product (m): -	Depth to groundwater from TOC (m): 1.96
Product thickness (mm): -	Depth to be purged (m): 4.00

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 8
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 4
Start time (2400hr):	Total purge volume: litres 32

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	8.06	1.09	-	-	18.4
After **4** purge volumes:	7.94	106	-	-	18.2
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details	**Analysis Required (tick if yes)**	
Method/pump type: waterra O whaler O **bailer O**	**TPH**	Ammonia
Tubing material: HDPE O PVC O **S/Steel O**	**BTEX**	SVOCs
Is there a hydrocarbon sheen?: Yes (No)	VOCs	CrVI
Odour: No	Cyanide	Other
Colour: light brown	PAHs	Other
Turbidity: (L) M H	Metals	*(see custody form for list)*

Weather Conditions

Rain: No	Temperature: 26 °C	Cloud cover: 25 %

Other comments and observations:

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

PPK Environment & Infrastructure

Groundwater Field Parameters

Job Number: 27K140A **Well No.** GW28

Client: INDEC	**Purging Date:** 8 /12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 8 /12/98
Casing Diameter (mm): 50	Well depth from TOC (m): 6 00
Depth to floating product (m): -	Depth to groundwater from TOC (m): 2·59
Product thickness (mm): -	Depth to be purged (m): 3·41

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 7
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 3
Start time (2400hr):	Total purge volume: litres 21

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7·86	1·70	-	-	18·0
After **4** purge volumes:					
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details	**Analysis Required (tick if yes)**	
Method/pump type: waterra O whaler O **bailer O**	**TPH**	Ammonia
Tubing material: HDPE O PVC O **S/Steel O**	**BTEX**	SVOCs
Is there a hydrocarbon sheen?: Yes (No)	VOCs	CrVI
Odour: No	Cyanide	Other
Colour: light brown	PAHs	Other
Turbidity: (L) M H	Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 26 °C	Cloud cover: 25 %

Other comments and observations:

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

PPK Environment & Infrastructure

Groundwater Field Parameters

Job Number: 27K140A **Well No. GW30**

Client: INDEC	**Purging Date:** 8/12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 8/12/98
Casing Diameter (mm): 50	Well depth from TOC (m): 6.20
Depth to floating product (m): -	Depth to groundwater from TOC (m): 2.29
Product thickness (mm): -	Depth to be purged (m): 3.91

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 8
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 3.5
Start time (2400hr):	Total purge volume: litres 28

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.86	1.02	—	—	18.2
After **4** purge volumes:	7.83	0.99	—	—	18.0
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details	Analysis Required (tick if yes)	
Method/pump type: waterra O whaler O **bailer O**	**TPH**	Ammonia
Tubing material: HDPE O PVC O **S/Steel O**	**BTEX**	SVOCs
Is there a hydrocarbon sheen?: Yes (No)	VOCs	CrVI
Odour: No	Cyanide	Other
Colour: light brown	PAHs	Other
Turbidity: (L) M H	Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 26 °C	Cloud cover: 25 %

Other comments and observations:

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

PPK Environment & Infrastructure

Groundwater Field Parameters

Job Number: 27K140A **Well No.** GW32

Client: INDEC	**Purging Date:** 8 /12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 8 /12/98
Casing Diameter (mm): 50	Well depth from TOC (m): 6.00
Depth to floating product (m): -	Depth to groundwater from TOC (m): 2.08
Product thickness (mm): -	Depth to be purged (m): 3.92

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 8
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 4
Start time (2400hr):	Total purge volume: litres 32

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.89	1.01	-	-	18.2
After **4** purge volumes:	7.93	1.00	-	-	18.6
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details	**Analysis Required (tick if yes)**	
Method/pump type: waterra O whaler O **bailer O**	**TPH**	Ammonia
Tubing material: HDPE O PVC O **S/Steel O**	**BTEX**	SVOCs
Is there a hydrocarbon sheen?: Yes (No)	VOCs	CrVI
Odour: Nil	Cyanide	Other
Colour: light brown	PAHs	Other
Turbidity: (L) M H	Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 26 °C	Cloud cover: 25 %

Other comments and observations:

Dup 5 taken here

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

Groundwater Field Parameters

PPK Environment & Infrastructure

Job Number: 27K140A **Well No. GW33**

Client: INDEC **Site Location:** CANBERRA Railyard	**Purging Date:** 6 /12/98 **Sampling Date:** 6 /12/98
Casing Diameter (mm):	Well depth from TOC (m): 6.20
Depth to floating product (m):	Depth to groundwater from TOC (m): 3.40
Product thickness (mm):	Depth to be purged (m): 2.80

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres ~6
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 3
Start time (2400hr):	Total purge volume: litres 18

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.77	1.63	-	-	18.0
After **4** purge volumes:					
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details	**Analysis Required (tick if yes)**	
Method/pump type: waterra O whaler O **bailer O**	**TPH**	Ammonia
Tubing material: HDPE O PVC O **S/Steel O**	**BTEX**	SVOCs
Is there a hydrocarbon sheen?: Yes (No)	VOCs	CrVI
Odour: No	Cyanide	Other
Colour: cloudy brown	PAHs	Other
Turbidity: (L) M H	Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 20 °C	Cloud cover: 90 %

Other comments and observations:

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

PPK Environment & Infrastructure

Groundwater Field Parameters

Job Number: 27K140A **Well No.** GW34

Client: INDEC	**Purging Date:** 6 /12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 6 /12/98
Casing Diameter (mm):	Well depth from TOC (m): 6.02
Depth to floating product (m):	Depth to groundwater from TOC (m): obstructed @ 2.2m
Product thickness (mm):	Depth to be purged (m):

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged:
Start time (2400hr):	Total purge volume: litres

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:					
After **4** purge volumes:					
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): **Yes** No *(if No, append additional purge data)*

Sampling Details	Analysis Required (tick if yes)	
Method/pump type: waterra O whaler O **bailer O**	**TPH**	Ammonia
Tubing material: HDPE O PVC O **S/Steel O**	**BTEX**	SVOCs
Is there a hydrocarbon sheen?: Yes No	VOCs	CrVI
Odour:	Cyanide	Other
Colour:	PAHs	Other
Turbidity: L M H	Metals *(see custody form for list)*	

Weather Conditions

Rain:	Temperature: °C	Cloud cover: %

Other comments and observations: lid removed and well blocked @ 2.2m

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

Groundwater Field Parameters

PPK Environment & Infrastructure

Job Number: 27K140A **Well No. GW35**

Client: INDEC	**Purging Date:** 6/12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 6/12/98
Casing Diameter (mm): 50	Well depth from TOC (m): 5.00
Depth to floating product (m): -	Depth to groundwater from TOC (m): 1.48
Product thickness (mm): -	Depth to be purged (m): 3.52

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 7
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 3
Start time (2400hr):	Total purge volume: litres 21

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.41	0.92	-	-	18.0
After **4** purge volumes:					
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details	**Analysis Required (tick if yes)**	
Method/pump type: waterra O whaler O **bailer O**	**TPH**	Ammonia
Tubing material: HDPE O PVC O **S/Steel O**	**BTEX**	SVOCs
Is there a hydrocarbon sheen?: (Yes) No	VOCs	CrVI
Odour: Strong H/C	Cyanide	Other
Colour: Clear	PAHs	Other
Turbidity: L M H	Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 20 °C	Cloud cover: 90 %

Other comments and observations:

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

PPK Environment & Infrastructure

Groundwater Field Parameters

Job Number: 27K140A **Well No.** GW36

Client: INDEC	**Purging Date:** /12/98
Site Location: CANBERRA Railyard	**Sampling Date:** /12/98
Casing Diameter (mm): 50	Well depth from TOC (m): 6.00
Depth to floating product (m): -	Depth to groundwater from TOC (m): 4.07
Product thickness (mm): -	Depth to be purged (m): 1.93

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 4
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 3
Start time (2400hr):	Total purge volume: litres 12

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.38	1.28	-	-	18.6
After **4** purge volumes:					
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details	**Analysis Required (tick if yes)**	
Method/pump type: waterra O whaler O **bailer O**	**TPH**	Ammonia
Tubing material: HDPE O PVC O **S/Steel O**	**BTEX**	SVOCs
Is there a hydrocarbon sheen?: Yes (No)	VOCs	CrVI
Odour: No	Cyanide	Other
Colour: light brown	PAHs	Other
Turbidity: (L) M H	Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 20°C	Cloud cover: 90%

Other comments and observations:
Dup 3 taken here

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

Groundwater Field Parameters

PPK Environment & Infrastructure

Job Number: 27K140A **Well No.** GW37

Client: INDEC	**Purging Date:** 6 /12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 6 /12/98
Casing Diameter (mm):	Well depth from TOC (m): 4.50
Depth to floating product (m):	Depth to groundwater from TOC (m): 1.40
Product thickness (mm):	Depth to be purged (m): 3.1

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 6
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 4
Start time (2400hr):	Total purge volume: litres 24

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.71	0.55	-	-	18.2
After **4** purge volumes:	7.65	0.59	-	-	18.0
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details	**Analysis Required (tick if yes)**	
Method/pump type: waterra O whaler O **bailer O**	**TPH**	Ammonia
Tubing material: HDPE O PVC O **S/Steel O**	**BTEX**	SVOCs
Is there a hydrocarbon sheen?: Yes (No)	VOCs	CrVI
Odour: No	Cyanide	Other
Colour: Light Brown	PAHs	Other
Turbidity: (L) M H	Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 20 °C	Cloud cover: 90 %

Other comments and observations:

Purgers name:	MBR	Signature	M Reynolds
Samplers name:	MBR	Signature:	M Reynolds

Procedures based on AS/NZS 5667.11:1998 Water quality - Sampling
Part 11: Guidance on sampling of groundwaters

PPK Environment & Infrastructure

Groundwater Field Parameters

Job Number: 27K140A

Well No. GW38

Client: INDEC	**Purging Date:** 6/12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 6/12/98
Casing Diameter (mm):	Well depth from TOC (m): 7.00
Depth to floating product (m):	Depth to groundwater from TOC (m): 3.67
Product thickness (mm):	Depth to be purged (m): 3.33

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 7
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 2
Start time (2400hr):	Total purge volume: litres 14

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.76	1.58	-	-	18.2
After **4** purge volumes:					
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details

Method/pump type: waterra O whaler O **bailer O**

Tubing material: HDPE O PVC O **S/Steel O**

Is there a hydrocarbon sheen?: Yes (No)

Odour: No

Colour: light brown

Turbidity: (L) M H

Analysis Required (tick if yes)

TPH	Ammonia
BTEX	SVOCs
VOCs	CrVI
Cyanide	Other
PAHs	Other
Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 20 °C	Cloud cover: 90 %

Other comments and observations:

Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

Groundwater Field Parameters

PPK Environment & Infrastructure

Job Number: 27K140A **Well No. GW39**

Client: INDEC	**Purging Date:** 7 /12/98
Site Location: CANBERRA Railyard	**Sampling Date:** 7 /12/98
Casing Diameter (mm): 50	Well depth from TOC (m): 7.40
Depth to floating product (m): -	Depth to groundwater from TOC (m): 4.80
Product thickness (mm): -	Depth to be purged (m): 2.6

Purging Information

Purge 5 casing volumes or until 'dry'
1 casing volume = 2 L/m for wells of 50 mm ID
1 casing volume = 8 L/m for wells of 100 mm ID

Method/pump type: waterra O **whaler O** bailer O	One purge volume: litres 5
Tubing material: HDPE O **PVC O** S/Steel O	No. of times purged: 4
Start time (2400hr):	Total purge volume: litres 20

Field Results While Purging

	pH	Conductivity (mS/cm)	Redox (mV)	DO (ppm)	Temp. °C
After **1** purge volume:	7.36	0.82	-	-	18.2
After **4** purge volumes:	7.41	0.83	-	-	18.2
After **5** purge volumes:					
Extra if required					
Extra if required					

Measurements for pH should be within 0.1 pH units and measurements for conductivity, salinity and dissolved oxygen should be within 10% and temperature within 0.5 °C before the well is sampled.

Are the field results acceptable to allow sampling? (circle one): (Yes) No *(if No, append additional purge data)*

Sampling Details	**Analysis Required (tick if yes)**	
Method/pump type: waterra O whaler O **bailer O**	**TPH**	Ammonia
Tubing material: HDPE O PVC O **S/Steel O**	**BTEX**	SVOCs
Is there a hydrocarbon sheen?: Yes (No)	VOCs	CrVI
Odour: No	Cyanide	Other
Colour: light Brown / Grey	PAHs	Other
Turbidity: L (M) H	Metals *(see custody form for list)*	

Weather Conditions

Rain: No	Temperature: 25 °C	Cloud cover: 5 %

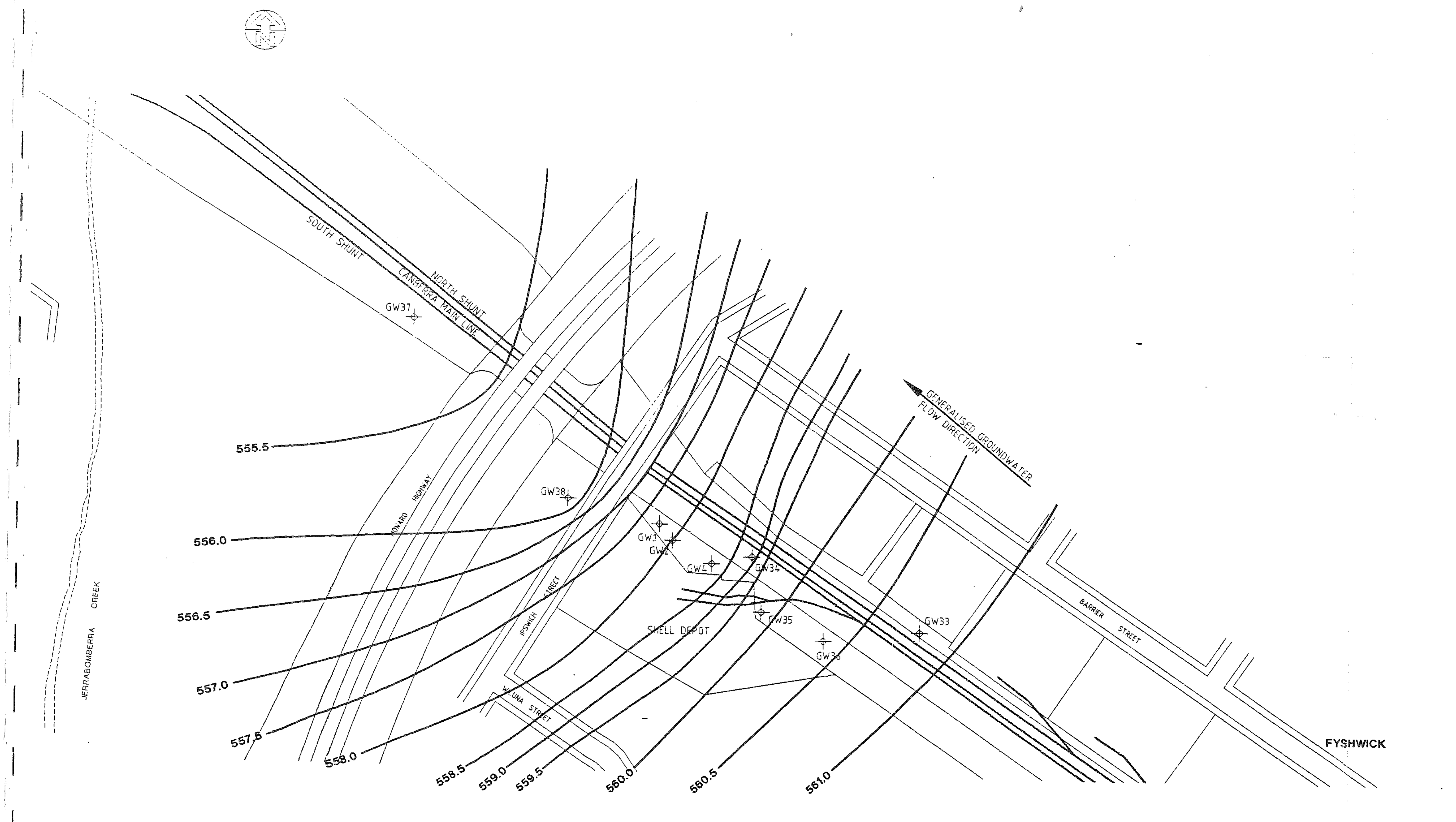
Other comments and observations:

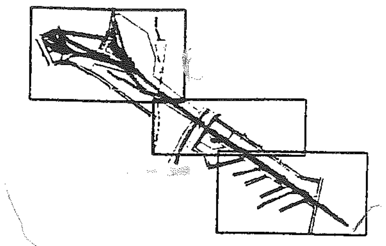
Purgers name:	**MBR**	Signature	**M Reynolds**
Samplers name:	**MBR**	Signature:	**M Reynolds**

Appendix F

Interpolated Groundwater Flow Contours

Figures 4, 5 & 6





GW1
GW2
GW4
GW34
GW35
GW36
GW38
GW33

LEGEND

GW2 DENOTES GROUNDWATER WELL LOCATION 'JUNE 98'

CODE	DATE	DESCRIPTION	BY	APPR	CODE	DATE	DESCRIPTION	BY	APPR
		REVISIONS AND APPROVALS					REVISIONS AND APPROVALS		

CLIENT
INDEC CONSULTING

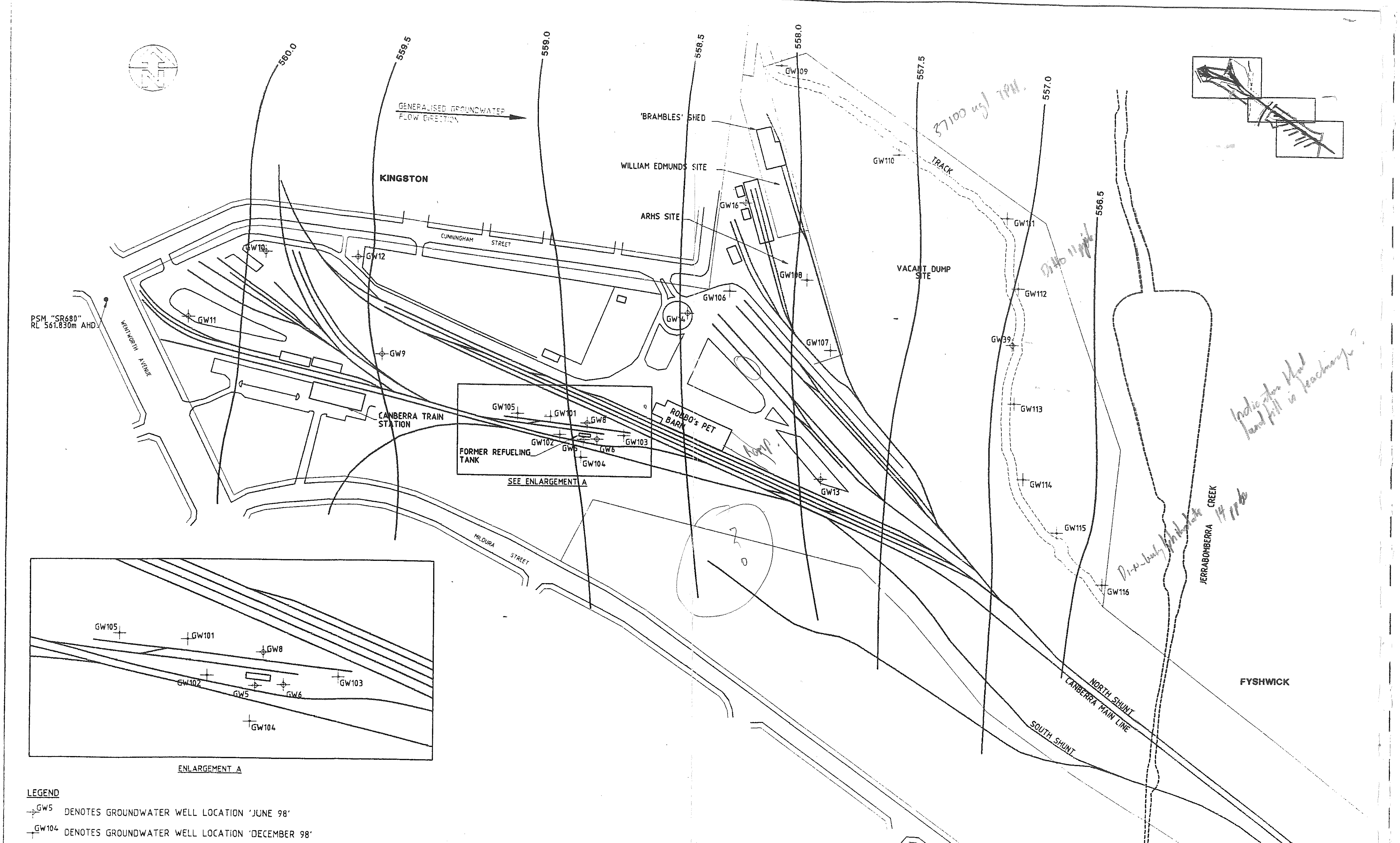
PPK Environment & Infrastructure

PPK Environment & Infrastructure Pty. Ltd.
PPK HOUSE
101 PIRIE STREET ADELAIDE
SOUTH AUSTRALIA 5000
TELEPHONE (08) 8405 4300
FAX (08) 8405 4303
Email: ppkadel@ozemail.com.au

PROJECT
CANBERRA RAIL YARDS

TITLE
PHASE 2B INVESTIGATION
GROUNDWATER CONTOURS
SHEET 5 OF 6

DESIGNED	DATE	SCALES A1 1:2000, A3 1:4000
DESIGN CHECK		CAD REFERENCE 27K140B
DRAWN BJB	18.12.98	PROJECT APPROVAL
DRAWING CHECK SPT	18.12.98	CLIENT APPROVAL -
DRAWING No. 27K140B/05		-


560.0
559.5
559.0
558.5
558.0
557.5
557.0
556.5
GENERALISED GROUNDWATER FLOW DIRECTION
KINGSTON
'BRAMBLES' SHED
WILLIAM EDMUNDS SITE
ARHS SITE
VACANT DUMP SITE
TRACK
CUNNINGHAM STREET
PSM "SR680" RL 561.830m AHD
WENTWORTH AVENUE
CANBERRA TRAIN STATION
FORMER REFUELING TANK
SEE ENLARGEMENT A
ROBBO's PET BARN
MILDURA STREET
JERRABOMBERRA CREEK
NORTH SHUNT
CANBERRA MAIN LINE
SOUTH SHUNT
FYSHWICK
GW9
GW10
GW11
GW12
GW13
GW14
GW16
GW39
GW101
GW102
GW103
GW104
GW105
GW106
GW107
GW108
GW109
GW110
GW111
GW112
GW113
GW114
GW115
GW116
GW5
GW6
GW8
ENLARGEMENT A
LEGEND
GW5 DENOTES GROUNDWATER WELL LOCATION 'JUNE 98'
GW104 DENOTES GROUNDWATER WELL LOCATION 'DECEMBER 98'
37100 ug/l TPH.

CLIENT: INDEC CONSULTING

PPK Environment & Infrastructure

PPK Environment & Infrastructure Pty. Ltd.
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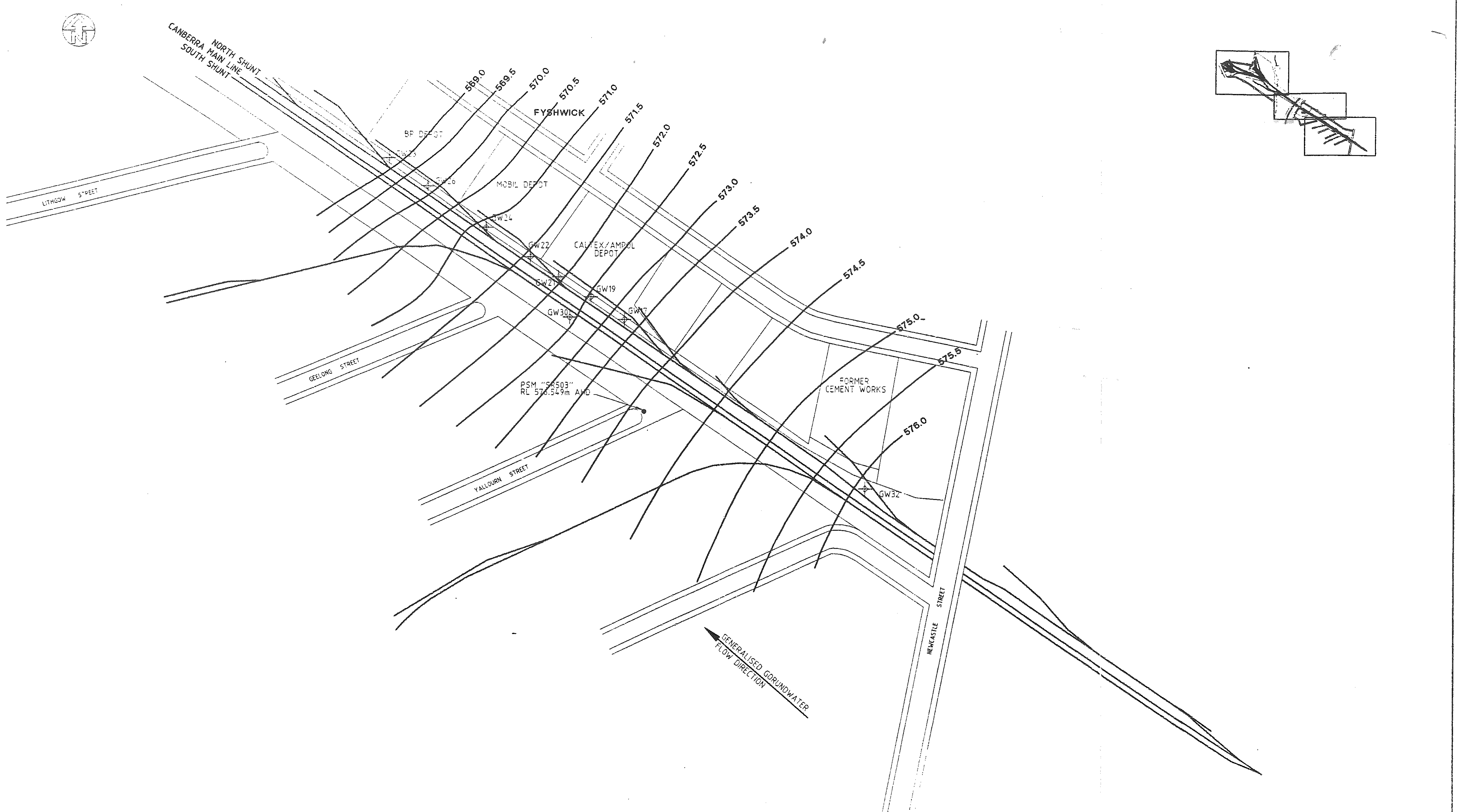
101 PIRIE STREET ADELAIDE SOUTH AUSTRALIA 5000
TELEPHONE (08) 8405 4300
FAX (08) 8405 4303

PROJECT: CANBERRA RAIL YARDS

TITLE: PHASE 2B INVESTIGATION GROUNDWATER CONTOURS SHEET 4 OF 6

DESIGNED		
DESIGN CHECK		
DRAWN	BJB	18.12.98
DRAWING CHECK	SPT	18.12.98
SCALES	A1 1:2000, A3 1:4000	
CAD REFERENCE	27K140B	
DRAWING No	27K140B/04	

REVISIONS AND APPROVALS



LEGEND

DENOTES GROUNDWATER WELL LOCATION 'JUNE 98'

CLIENT: INDEC CONSULTING

PPK Environment & Infrastructure

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PROJECT: CANBERRA RAIL YARDS

TITLE: PHASE 2B INVESTIGATION GROUNDWATER CONTOURS SHEET 6 OF 6

DESIGNED		SCALES	A1 1:2000, A3 1:4000
DESIGN CHECK		CAD REFERENCE	27K140B
DRAWN	BJB 16.12.98	PROJECT APPROVAL	
DRAWING CHECK	SPT 16.12.98	CLIENT APPROVAL	-
DRAWING No	27K140B/06		-

REVISIONS AND APPROVALS

Appendix G

Laboratory Chain of Custody Documentation

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

☐ **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: 3574

Job Title: CANBERRA RAIL YARDS + SOIL ✗
Laboratory Name: AMDEL
Address: NSW
Fax Number:
Phone Number:
Contact Name:
Delivery Method:
Quote Number:

PPK Job Number: 27K1408
Job Location: CANBERRA

Project Manager: S. TAYLOR
Results Expected by/on:
Fax Results to: N/A
Fax Number:
Phone Number:
Spreadsheet of Results Required: Y / N
Format:
Turnaround Time Required: 5 days
Invoice to: N/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**							Initials	Comments/Additional Information and/or Analysis Required
1/12/98		DUP1	1x125					X	X	X										
"		GW101 3.0	"					X	X	X										
"		GW101 4.0	"					X	X	X										
"		GW101 5.0	"					X	X	X										
"		GW101 6.0	"					X	X	X										
"		GW101 7.0	"					X	X	X										
"		GW102 3.0	"					X	X	X										
"		GW102 5.0	"					X	X	X										
"		GW102 7.0	"					X	X	X										
"		GW103 3.0	"					X	X	X										
"		GW103 5.0	"					X	X	X										

Relinquished by: M. Reynolds	Relinquished by:	Relinquished by:
Date & Time: 8/12/98	Date & Time:	Date & Time:
Company: PPK	Company:	Company:
Signature: MBR	Signature:	Signature:
Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):
Date & Time:	Date & Time:	Date & Time:
Company:	Company:	Company:
Signature:	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

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Chain of Custody

Order No: 3575

Job Title: CANBERRA RAILYARDS *WATER*	PPK Job Number: 27K140B	Job Location: CANBERRA	Project Manager: S. TAYLOR
Laboratory Name: AMDEL			Results Expected by/on:
Address: NSW			Fax Results to: A/A
			Fax Number:
			Phone Number:
Fax Number:			Spreadsheet of Results Required: Y / N
Phone Number:			Format:
Contact Name:			Turnaround Time Required: 5 days
Delivery Method:			Invoice to: A/A
Quote Number:			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**	VOC's 8260	SVOC's 8270	pH	TDS	Initials	Comments/Additional Information and/or Analysis Required
6/12/98		GW107	Various x 5					X				X	X	X	X	X		
6/12/98		GW108	"					X				X	X	X	X	X		
7/12/98		GW 109	"					X				X	X	X	X	X		
"		GW 110	"					X				X	X	X	X	X		
"		GW 111	"					X				X	X	X	X	X		
"		GW 112	"					X				X	X	X	X	X		
"		GW 113	"					X				X	X	X	X	X		
"		GW 114	"					X				X	X	X	X	X		
"		GW 115	"					X				X	X	X	X	X		
"		GW 116	"					X				X	X	X	X	X		
"		DUP 4	"					X				X	X	X	X	X		
"		Rinse Blank	"					X				X	X	X	X	X		

Relinquished by: M. Reynolds	Relinquished by:	Relinquished by:
Date & Time: 8/12/98	Date & Time:	Date & Time:
Company: DPK	Company:	Company:
Signature: MBR	Signature:	Signature:
Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):
Date & Time:	Date & Time:	Date & Time:
Company:	Company:	Company:
Sig:	ignatu	ture:

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

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Chain of Custody

Order No: 3576

Job Title: CANBERRA RAIL YARDS * WATER *	PPK Job Number: 27K140B	Job Location: CANBERRA	Project Manager: S. TAYLOR
Laboratory Name: AMDEL			Results Expected by/on:
Address: NSW			Fax Results to: A/A
			Fax Number:
			Phone Number:
Fax Number:			Spreadsheet of Results Required: Y / N
Phone Number:			Format:
Contact Name:			Turnaround Time Required: ~~ATA~~ 5days
Delivery Method:			Invoice to: A/A
Quote Number:			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**	VOC's 8260	Initials	Comments/Additional Information and/or Analysis Required
6/12/98		DUP3	Various x 4					X		X		X	X		
"		GW36	"					X		X		X	X		
"		GW33	"					X		X		X	X		
"		GW35	"					X		X		X	X		
"		GW1	"					X		X		X	X		
"		GW2	"					X		X		X	X		
"		GW4	"					X		X		X	X		
"		GW37	"					X		X		X	X		
"		GW38	"					X		X		X	X		
6/12/98		Rinse Blank	"					X		X		X	X		

Relinquished by: M. Reynolds	Relinquished by:	Relinquished by:
Date & Time: 8/12/98	Date & Time:	Date & Time:
Company: PPK	Company:	Company:
Signature:	Signature:	Signature:
Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):
Date & Time:	Date & Time:	Date & Time:
Company:	Company:	Company:
Signature:	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

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Chain of Custody

Order No: 3573

Job Title: CANBERRA RAILYARDS *SOIL*
Laboratory Name: AMDEL
Address: NSW
Fax Number:
Phone Number:
Contact Name:
Delivery Method:
Quote Number:

PPK Job Number: 27K140B

Job Location: CANBERRA

Project Manager: S. TAYLOR
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**	HOLD						Initials	Comments/Additional Information and/or Analysis Required
3/12/98		GW32/5/0.15-0.3	1x 125									X	X							
"		GW32/5/0.3-0.4	"									X	X							
"		GW32/6/0-0.1	"									X	X							
"		GW32/6/0.15-0.3	"									X	X							
"		GW32/6/0.3-0.4	"									X	X							

Relinquished by: M. Reynolds	Relinquished by:	Relinquished by:
Date & Time: 8/12/98	Date & Time:	Date & Time:
Company: PPK	Company:	Company:
Signature: MBR	Signature:	Signature:
Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):
Date & Time:	Date & Time:	Date & Time:
Company:	Company:	Company:
Signature:	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

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Chain of Custody

Order No: 3572

Job Title: CANBERRA *SOIL* RAIL YARDS	PPK Job Number: 27K1403	Job Location: CANBERRA	Project Manager: S. TAYLOR
Laboratory Name: AMDEL			Results Expected by/on:
Address: NSW			Fax Results to: A/A
Fax Number:			Fax Number:
Phone Number:			Phone Number:
Contact Name:			Spreadsheet of Results Required: Y / N
Delivery Method:			Format:
Quote Number:			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**	pH	Initials	Comments/Additional Information and/or Analysis Required
3/12/98		Dup 2	1x125									x	x		
"		GW32/1/0-0.1	"									x	x		
"		GW32/1/0.15-0.3	"									x	x		
"	-	GW32/1/0.32-0.34	"									x	x		
"		GW32/2/0-0.1	"									x	x		
"		GW32/2/0.15-0.29	"									x	x		
"		GW32/3/0-0.1	"									x	x		
"		GW32/3/0.15-0.3	"									x	x		
"		GW32/3/0.35-0.42	"									x	x		
"		GW32/4/0-0.1	"									x	x		
"		GW32/4/0.15-0.3	"									x	x		
"		GW32/5/0-0.1	"									x	x		

Relinquished by: M. Reynolds	Relinquished by:	Relinquished by:
Date & Time: 9/12/98	Date & Time:	Date & Time:
Company: PPK	Company:	Company:
Signature: MBR	Signature:	Signature:
Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):
Date & Time:	Date & Time:	Date & Time:
Company:	Company:	Company:
Signature:	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

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Chain of Custody

Order No: 3571

Job Title: CANBERRA *water* RAILYARDS
PPK Job Number: 27K140A
Job Location: CANBERRA
Project Manager: S. TAYLOR

Laboratory Name: AMDEC
Address: NSW
Results Expected by/on:
Fax Results to: A/A
Fax Number:
Phone Number:

Fax Number:
Phone Number:
Contact Name:
Delivery Method:
Quote 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**	Initials	Comments/Additional Information and/or Analysis Required
5/12/98		Rinse Blank	1x1000 1x75 2x40				1	X	X	X		X		
"		Dup 2	"					X	X	X		X		
"		GW6	"					X	X	X		X		
"		GW8	"					X	X	X		X		
"		GW101	"					X	X	X		X		
"		GW102	"					X	X	X		X		
"		GW103	"					X	X	X		X		
"		GW104	"					X	X	X		X		
"		GW105	"					X	X	X		X		

Relinquished by: M. Reynolds	Relinquished by:	Relinquished by:
Date & Time: 8/12/98	Date & Time:	Date & Time:
Company: PPK	Company:	Company:
Signature: MBR	Signature:	Signature:
Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):
Date & Time:	Date & Time:	Date & Time:
Company:	Company:	Company:
Sig	ignatu	ature:

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

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Chain of Custody
Order No: 3570

Job Title: * water *
CANBERRA RAILWAY YARDS

Laboratory Name: AMDEL
Address: NSW

Fax Number:
Phone Number: DUP1
Contact Name:
Delivery Method:
Quote Number:

PPK Job Number: 27K1408

Job Location: CANBERRA

Project Manager: STUART TAYLOR
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**	Initials	Comments/Additional Information and/or Analysis Required
4/12/98		Rinse Blank	1x1000 1x75				1			X	X	X		
"		DUP 1	"				"			X		X		
"		GW9	"				"			X		X		
"		GW10	"				1			X		X		
"		GW11	"				1			X		X		
"		GW12	"				1			X		X		
"		GW13	"				1			X		X		
"		GW14	"				1			X		X		
"		GW16	"				1			X		X		
"		GW106	"				1			X		X		

Relinquished by: M. Reynolds	Relinquished by:	Relinquished by:
Date & Time: 8/12/98	Date & Time:	Date & Time:
Company: PPK	Company:	Company:
Signature: MRR	Signature:	Signature:
Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):
Date & Time:	Date & Time:	Date & Time:
Company:	Company:	Company:
Signature:	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

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Chain of Custody

Order No: 3578

Job Title: CANBERRA RAIL YARD - WATER -	PPK Job Number: 27K140B	Job Location: CANBERRA	Project Manager: S. TAYLOR
Laboratory Name: AMDEL			Results Expected by/on: /
Address: NSW			Fax Results to: N/A
			Fax Number:
			Phone Number:
Fax Number:			Spreadsheet of Results Required: Y / N
Phone Number:			Format:
Contact Name:			Turnaround Time Required: 5 day
Delivery Method:			Invoice to: N/A
Quote Number:			Comments:

Date Sampled	Time	Sample I.D.	Container Size	Sample Location	Medium*	Preservative Type	Filtered (X)	TPH	BTEX	PAH's	OC/OP/PCBs	Metals**	VOC's 8260	SVOC's 8270	pH	TDS	Initials	Comments/Additional Information and/or Analysis Required
7/12/98		GW 39	Various x5				1	+				+	+	+	+	+		

Relinquished by: M. Reynolds	Relinquished by:	Relinquished by:
Date & Time: 8/12/98	Date & Time:	Date & Time:
Company: PPK	Company:	Company:
Signature: MRKen	Signature:	Signature:
Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):
Date & Time:	Date & Time:	Date & Time:
Company:	Company:	Company:
Signature:	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

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Chain of Custody

Order No: 3580

Job Title: CANBERRA RAILYARD WATER	PPK Job Number: 27K1408	Job Location: CANBERRA	Project Manager: S. TAYLOR
Laboratory Name: AMDEL			Results Expected by/on:
Address: NSW			Fax Results to: A/A
Fax Number:			Fax Number:
Phone Number:			Phone Number:
Contact Name:			Spreadsheet of Results Required: Y / N
Delivery Method:			Format:
Quote Number:			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**	Initials	Comments/Additional Information and/or Analysis Required
8/12/98		PMW 2					1	X	X	X		X		
"		PMW 3					1	X	X	X		X		

Relinquished by: M. Reynolds	Relinquished by:	Relinquished by:
Date & Time: 8/12/98	Date & Time:	Date & Time:
Company: PPK	Company:	Company:
Signature: MBR	Signature:	Signature:
Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):
Date & Time:	Date & Time:	Date & Time:
Company:	Company:	Company:
Signature:	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

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Chain of Custody

Order No: 3579

Job Title: CANBERRA RAILYARDS
Laboratory Name: AMDEC
Address: NSW
Fax Number:
Phone Number:
Contact Name:
Delivery Method:
Quote Number:

PPK Job Number: 27K140B

Job Location: CANBERRA

Project Manager: S. TAYLOR
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**	Initials	Comments/Additional Information and/or Analysis Required
8/12/98		DUP5					1	X	X	X		X		
		Rinse Blank					1	X	X	X		X		
		GW 30					1	X	X	X		X		
		GW 32					1	X	X	X		X		Metals are Pb, Hg
		GW 17					1	X	X	X		X		
		GW 21					1	X	X	X		X		
		GW 26					1	X	X	X		X		
		GW 28					1	X	X	X		X		
		GW 22					1	X	X	X		X		
		GW 19					1	X	X	X		X		
		GW 24					1	X	X	X		X		
		PMW 1					1	X	X	X		X		

GW 32 metals = Pb, Hg, As, Cu, Cr, Ca, Zn

Relinquished by: M. Reynolds	Relinquished by:	Relinquished by:
Date & Time: 8/12/98	Date & Time:	Date & Time:
Company: PPK	Company:	Company:
Signature: MBR	Signature:	Signature:
Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):
Date & Time:	Date & Time:	Date & Time:
Company:	Company:	Company:
Sig	Signatu	ature:

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

☐ **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: 3581

Job Title: CANBERRA RAILYARDS	PPK Job Number: 27K140B	Job Location: CANBERRA	Project Manager: S. TAYLOR
Laboratory Name: AMDEL			Results Expected by/on:
Address: NSW			Fax Results to: A/A
Fax Number:			Fax Number:
Phone Number:			Phone Number:
Contact Name:			Spreadsheet of Results Required: Y / N
Delivery Method:			Format:
Quote Number:			Turnaround Time Required: 24 hrs
			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**	Initials	Comments/Additional Information and/or Analysis Required
22/12/98		GW17	x 5				1	x	x	x		x		
"		GW19	"				1	x	x	x		x		
"		GW21	"				1	x	x	x		x		
"		GW22	"				1	x	x	x		x		
"		GW24	"				1	x	x	x		x		
"		GW26	"				1	x	x	x		x		
"		GW28	"				1	x	x	x		x		
"		GW30	"				1	x	x	x		x		
"		GW32	"				1	x	x	x		x		x + metals As, Cr, Co, Cd, Zn, Pb,
"		PMW1	"				1	x	x	x		x		
"		PMW2	"				1	x	x	x		x		
"		PMW3	"				1	x	x	x		x		
"		DUP1	"				1	x	x	x		x		

Relinquished by: M. Reynolds	Relinquished by:	Relinquished by:
Date & Time: 22/12/98	Date & Time:	Date & Time:
Company: PPK	Company:	Company:
Signature: MBR	Signature:	Signature:
Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):
Date & Time:	Date & Time:	Date & Time:
Company:	Company:	Company:
Signature:	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

Appendix H

Original Certified Laboratory Results

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 : 8E02408

ATTENTION : Mr Stuart Taylor

CLIENT : PPK Adelaide

SAMPLES : 17

REFERENCE : 27K140B 3/12/98

DATE RECEIVED : 09/12/98

DATE REPORTED : 14/12/98

Method	Description	Extracted	Analysed
E7500	Moisture (%w/w)	11/12/98	12/12/98
E5910	Metals by ICP-AES	09/12/98	14/12/98
E5950	Mercury in Soil	10/12/98	11/12/98
E3600	pH in Soil	10/12/98	10/12/98

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.

PLEASE SEE ATTACHED PAGES FOR RESULTS

per G.W. ANDERSON
Manager Environmental Sydney

Job Number : 8E02408
Client : PPK Adelaide
Reference : 27K140B 3/12/98

Analyte	Lab No	E65558	E65559	E65560	E65561	E65562
			GW32/	GW32/	GW32/1/013	GW32/
	Sample Id	DUP2	1/0-0.1	1/0.15-0.3	0.32-0.34	2/0-0.1
	PQL					
Moisture Content	**1**	9%	9%	3%	7%	6%
E5910 Metals in Soil						
Arsenic	**5**	14	10	nd	5	nd
Cadmium	**0.5**	0.6	nd	nd	nd	11.6
Chromium	**5**	46	28	20	37	333
Copper	**5**	125	39	17	26	4399
Lead	**5**	125	36	16	7	5420
Zinc	**5**	1073	203	66	54	49531
Mercury	**0.05**	nd	nd	nd	nd	nd
pH	**0.1**	8.7	8.6	9.1	9.1	12.0

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 : 8E02408
Client : PPK Adelaide
Reference : 27K140B 3/12/98

	Lab No	E65563	E65564	E65565	E65566	E65567
		GW32/2/0.1	GW32/	GW32/	GW32/3/0.3	GW32/
	Sample Id	5-0.28	3/0-0.13/0.15-0.3		5-0.42	4/0-0.1
Analyte	PQL					
Moisture Content	**1**	5%	6%	15%	6%	8%
E5910 Metals in Soil						
Arsenic	**5**	11	8	13	8	16
Cadmium	**0.5**	nd	2.1	nd	nd	nd
Chromium	**5**	40	87	42	38	25
Copper	**5**	157	716	85	42	56
Lead	**5**	141	1032	80	40	72
Zinc	**5**	1350	8038	623	332	609
Mercury	**0.05**	nd	nd	nd	nd	nd
pH	**0.1**	8.5	9.2	8.4	8.7	9.3

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 : 8E02408
Client : PPK Adelaide
Reference : 27K140B 3/12/98

Analyte	Lab No	E65568	E65569	E65570	E65571	E65572
		GW32/	GW32/	GW32/	GW32/	GW32/
	Sample Id	4/0.15-0.3	5/0-0.15/0.15-0.3		5/0.3-0.4	6/0-0.1
	PQL					
Moisture Content	**1**	11%	7%	7%	2%	3%
E5910 Metals in Soil						
Arsenic	**5**	41	8	9	nd	9
Cadmium	**0.5**	nd	nd	nd	nd	0.8
Chromium	**5**	25	23	32	15	38
Copper	**5**	84	90	95	25	248
Lead	**5**	39	105	95	29	449
Zinc	**5**	280	1016	942	180	2796
Mercury	**0.05**	nd	nd	nd	nd	nd
pH	**0.1**	12.1	11.6	11.5	9.5	9.4

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 : 8E02408
Client : PPK Adelaide
Reference : 27K140B 3/12/98

Analyte	Lab No	E65573	E65574			
		GW32/	GW32/			
	Sample Id	6/0.15-0.3	6/0.3-0.4			
	PQL					
Moisture Content	**1**	6%	15%			
E5910 Metals in Soil						
Arsenic	**5**	10	16			
Cadmium	**0.5**	nd	nd			
Chromium	**5**	30	43			
Copper	**5**	94	27			
Lead	**5**	121	45			
Zinc	**5**	881	49			
Mercury	**0.05**	nd	nd			
pH	**0.1**	9.2	8.2			

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

QA/QC APPENDIX NO. 8E02408

Method	Description
E5910	Metals by ICP-AES
E5950	Mercury in Soil
E3600	pH in Soil

Chromatography QA/QC

	Yes	No	N/A
Retention Time Window Within Acceptance Criteria(±2%)			√
Check Standard Within Acceptance Criteria(±10%)			√
Recalibration Within Acceptance Criteria(±15%)			√

Other QA/QC

Holding time conforming With Method Specification	√		
Chain of Custody Attached	√		

N/A=Not Applicable

Comments

1. Laboratory QA/QC including Method Blanks, Duplicates, Matrix Spike Duplicates, Laboratory Control Samples or CRM's are included in this QA/QC appendix. (Where applicable)
2. Inter-Laboratory proficiency trial results available on request. (Where applicable)
3. Surrogate description and recoveries are recorded in the Report. (Where applicable)
4. Acceptance criteria for specific analytes are available upon request (Refer to SPM-01).
5. Practical Quantitation Limit (PQL is typically 2-10 x method detection limit (MDL)).
6. PQL's are matrix dependent and are increased accordingly where sample extracts are diluted.
7. Results are uncorrected for matrix spike or surrogate recoveries.

per G.W. ANDERSON
Manager Environmental Sydney

Job Number : 8E02408

QAQC : Spike Recoveries

Analyte	Spike Level	Level Detected		Recovery Details			
		Spike 1	Spike 2	Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E5910 Metals in Soil							
Arsenic	50	47	46	94%	93%	93%	1%
Cadmium	50	48.2	47.4	96%	95%	96%	2%
Chromium	50	37	43	74%	85%	79%	14%
Mercury	0.50	0.49	0.49	98%	98%	98%	0%

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

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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02408

QAQC : Laboratory Control Sample

Analyte	Level	Level Result1	Detected Result2	Recovery Details Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E5910 Metals in Soil							
Copper	50	56		112%			
Lead	50	49		98%			
Zinc	50	52		104%			
pH	7.40	7.4		100%			

PQL = Practical Quantitation Limit (S) Soils : mg/kg (ppm) dry weight nd = <PQL
-- = Not Applicable (W) Waters : mg/l (ppm) unless otherwise specified

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02408

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
E5910 Metals in Soil					
Arsenic	**5**	11	14	12	24%
Cadmium	**0.5**	nd	0.6	0.6	
Chromium	**5**	36	46	41	24%
Copper	**5**	130	125	127	3%
Lead	**5**	127	125	126	1%
Zinc	**5**	1137	1073	1105	5%
Mercury	**0.05**	nd	nd		
pH	**0.1**	8.7	8.7	8.7	0%

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

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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID PQL	Blank				
E5910 Metals in Soil						
Arsenic	**5**	nd				
Cadmium	**0.5**	nd				
Chromium	**5**	nd				
Copper	**5**	nd				
Lead	**5**	nd				
Zinc	**5**	nd				
Mercury	**0.05**	nd				
pH	**0.1**	7.3				

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

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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

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 7584

Client: PPK Adelaide	**Our Ref:** 8E02408
Your Ref: 27K140B 3/12/98	**Date:** 14/12/98

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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Tel: (07) 3218 2222 Fax: (07) 3831 4223

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

☐ **Perth**
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Tel: (08) 9389 8688 Fax: (08) 9389 8417

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

Chain of Custody

Order No: 35172

Job Title: CANBERRA RAIL YARDS *SOIL*

Laboratory Name: AMDEL

Address: NSW

Fax Number:

Phone Number:

Contact Name:

Delivery Method:

Quote Number:

PPK Job Number: 27K1408

Job Location: CANBERRA

Project Manager: S TAYLOR

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**	Pb										Initials	Comments/Additional Information and/or Analysis Required
3/12/98		Dup 2	1x125									X	X											
"		GW32/1/0-0.1	"									X	X											
"		GW32/1/0.15-0.3	"									X	X											
"		GW32/1/0.32-0.39	"									X	X											
"		GW32/2/0-0.1	"									X	X											
"		GW32/2/0.15-0.25	"									X	X											
"		GW32/3/0-0.1	"									X	X											
"		GW32/3/0.15-0.3	"									X	X											
"		GW32/3/0.35-0.42	"									X	X											
"		GW32/4/0-0.1	"									X	X											
"		GW32/4/0.15-0.3	"									X	X											
"		GW32/5/0-0.1	"									X	X											

RECEIVED
09 DEC 1998
EC02408

Relinquished by: M. Reynolds
Date & Time: 8/12/98
Company: PPK
Signature: MBR

Received in Good Order & Condition by (Name): A. Tomkins
Date & Time: 9.12.98 9.00am
Company: AMDEL

Relinquished by:
Date & Time:
Company:
Signature:

Received in Good Order & Condition by (Name):
Date & Time:
Company:

Relinquished by:
Date & Time:
Company:
Signature:

Received in Good Order & Condition by (Name):
Date & Time:
Company:

Medium*: (S) Soil, W Water, V Vapour

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

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

Samples on Ice: (Yes) | No

Please [illegible]

PPK
Environment & Infrastructure
ACN 078 004 798

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

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☐ **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: 3573

Job Title: CANBERRA RAILYARDS *SOIL*

Laboratory Name: AMDEL

Address: NSW

Fax Number:

Phone Number:

Contact Name:

Delivery Method:

Quote Number:

PPK Job Number: 27K140B

Job Location: CANBERRA

Project Manager: S. TAYLOR

Results Expected by/on:

Fax Results to: A/A

Fax Number:

Phone Number:

Spreadsheet of Results Required: Y / N

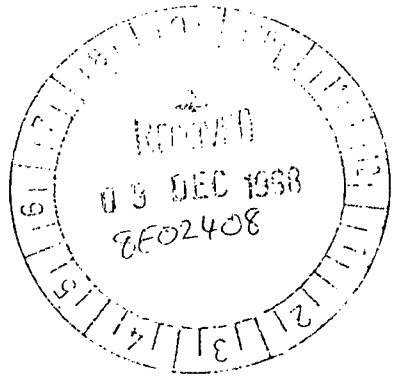
Format:

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**	pH						Initials	Comments/Additional Information and/or Analysis Required
3/12/98		GW32/5/0.15-0.3	1x 125									X	X							
"		GW32/5/0.3-0.4	"									X	X							
"		GW32/6/0-0.1	"									X	X							
"		GW32/6/0.15-0.3	"									X	X							
"		GW32/6/0.3-0.4	"									X	X							
		SB																		



Relinquished by: M. Reynolds	Relinquished by:	Relinquished by:	Medium*: (S) Soil, W Water, V - Vapour
Date & Time: 8/12/98	Date & Time:	Date & Time:	Legend**: (circle the following to be tested)
Company: PPK	Company:	Company:	Metals: Al (As) Be (Cd) Co (Cr) (Cu) Fe (Pb)
Signature: MBR	Signature:	Signature:	Ti Mg Mn Ni (Zn) Se Sn V (Zn)
Received in Good Order & Condition by (Name): A. TOMCINS	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):	Samples on Ice: ✓ Yes | No
Date & Time: 9.12.98 900am	Date & Time:	Date & Time:	Please fax back a signed copy when
Company: AMDEL	Company:	Company:	

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 : 8E02409

ATTENTION : Mr Stuart Taylor

CLIENT : PPK Adelaide

SAMPLES : 20

REFERENCE : 27k140b/3571&3574

DATE RECEIVED : 09/12/98

DATE REPORTED : 17/12/98

Method	Description	Extracted	Analysed
E0220	Total Petroleum Hydrocarbons	09/12/98	17/12/98
E0010	Benzene,Toluene,Ethylbenzene & Xylene	16/12/98	17/12/98
E0110	Polycyclic Aromatic Hydrocarbons	10/12/98	11/12/98
E4870	Dissolved Metals by ICP-MS	14/12/98	14/12/98
E48501	Mercury low level	15/12/98	15/12/98
E7500	Moisture (%w/w)	11/12/98	12/12/98
E1220	Total Petroleum Hydrocarbons	09/12/98	17/12/98
E1010	Benzene,Toluene,Ethylbenzene & Xylene	09/12/98	17/12/98
E1110	Polycyclic Aromatic Hydrocarbons	09/12/98	11/12/98

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.

PLEASE SEE ATTACHED PAGES FOR RESULTS

per G.W. ANDERSON
Manager Environmental Sydney

Job Number : 8E02409
Client : PPK Adelaide
Reference : 27k140b/3571&3574

Analyte	Lab No	E65575	E65576	E65577	E65578	E65579
		rinse bl	dup2	gw6	gw8	gw101
	Sample Id	05/12/98	05/12/98	05/12/98	05/12/98	05/12/98
	PQL					
E0220 TPH in Water (µg/L)						
Total C6-C36	**20**	nd	nd	nd	nd	384000
C6-C9 Fraction	**20**	nd	nd	nd	nd	600
C10-C14 Fraction	**20**	nd	nd	nd	nd	135000
C15-C28 Fraction	**100**	nd	nd	nd	nd	246000
C29-C36 Fraction	**100**	nd	nd	nd	nd	2100
E0010 BTEX (P&T) in Water (µg/L)						
Benzene	**0.5**	nd	nd	nd	nd	1.0
Toluene	**1**	1	nd	nd	nd	nd
Ethylbenzene	**1**	nd	nd	nd	nd	4
Total Xylenes	**3**	nd	nd	nd	nd	5
E4870 Dissolved Metals in Waters						
Lead	**0.001**	nd	0.002	0.002	0.002	0.003
E48501 Dissolved Mercury in Waters						
Mercury	**0.00005**	nd	0.00012	0.00012	0.00027	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 : 8E02409
Client : PPK Adelaide
Reference : 27k140b/3571&3574

Analyte	Lab No	E65580	E65581	E65582	E65583	
		gw102	gw103	gw104	gw105	
	Sample Id	05/12/98	05/12/98	05/12/98	05/12/98	
	PQL					
E0220 TPH in Water (µg/L)						
Total C6-C36	**20**	1173271	6400	nd	nd	
C6-C9 Fraction	**20**	2800	nd	nd	nd	
C10-C14 Fraction	**20**	408000	1900	nd	nd	
C15-C28 Fraction	**100**	761000	4500	nd	nd	
C29-C36 Fraction	**100**	800	nd	nd	nd	
E0010 BTEX (P&T) in Water (µg/L)						
Benzene	**0.5**	1.0	nd	nd	nd	
Toluene	**1**	nd	nd	nd	nd	
Ethylbenzene	**1**	4	nd	nd	nd	
Total Xylenes	**3**	3	nd	nd	nd	
E4870 Dissolved Metals in Waters						
Lead	**0.001**	nd	nd	0.001	0.002	
E48501 Dissolved Mercury in Waters						
Mercury	**0.00005**	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 : 8E02409
Client : PPK Adelaide
Reference : 27k140b/3571&3574

Analyte	Lab No	E65575	E65576	E65577	E65578	E65579
		rinse bl	dup2	gw6	gw8	gw101
	Sample Id	05/12/98	05/12/98	05/12/98	05/12/98	05/12/98
	PQL					
E0110 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	15
Phenanthrene	1	nd	nd	nd	nd	24
Anthracene	1	nd	nd	nd	nd	4
Fluoranthene	1	nd	nd	nd	nd	2
Pyrene	1	nd	nd	nd	nd	2
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 PAH	1	nd	nd	nd	nd	47
2-Fluorobiphenyl-SURROGATE	1	120%	112%	120%	105%	97%
Anthracene-D10-SURROGATE	1	103%	107%	105%	105%	88%
p-Terphenyl-D14-SURROGATE	1	125%	130%	120%	130%	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 : 8E02409
Client : PPK Adelaide
Reference : 27k140b/3571&3574

Analyte	Lab No	E65580	E65581	E65582	E65583
		gw102	gw103	gw104	gw105
	Sample Id	05/12/98	05/12/98	05/12/98	05/12/98
	PQL				
E0110 PAH's in Water (µg/L)					
Naphthalene	1	88	nd	nd	nd
Acenaphthylene	1	nd	nd	nd	nd
Acenaphthene	1	nd	nd	nd	nd
Fluorene	1	nd	nd	nd	nd
Phenanthrene	1	143	nd	nd	nd
Anthracene	1	15	nd	nd	nd
Fluoranthene	1	7	nd	nd	nd
Pyrene	1	7	nd	nd	nd
Benz(a)anthracene	1	nd	nd	nd	nd
Chrysene	1	nd	nd	nd	nd
Benzo(b) & (k)fluoranthene	2	nd	nd	nd	nd
Benzo(a)pyrene	1	nd	nd	nd	nd
Indeno(1.2.3-cd)pyrene	1	nd	nd	nd	nd
Dibenz(a.h)anthracene	1	nd	nd	nd	nd
Benzo(g.h.i)perylene	1	nd	nd	nd	nd
Total PAH	1	260	nd	nd	nd
2-Fluorobiphenyl-SURROGATE	1	95%	101%	97%	100%
Anthracene-D10-SURROGATE	1	83%	95%	86%	88%
p-Terphenyl-D14-SURROGATE	1	117%	118%	108%	110%

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

Analyte	Lab No	E65584	E65585	E65586	E65587	E65588
		dup1	gw101	gw101	gw101	gw101
	Sample Id	01/12/98	3.0	4.0	5.0	6.0
	PQL					
Moisture Content	**1**	14%	18%	12%	12%	11%
E1220 TPH in Soil						
Total C6-C36	**10**	nd	nd	nd	230	400
C6-C9 Fraction	**10**	nd	nd	nd	nd	nd
C10-C14 Fraction	**10**	nd	nd	nd	70	130
C15-C28 Fraction	**50**	nd	nd	nd	160	270
C29-C36 Fraction	**50**	nd	nd	nd	nd	nd
E1010 BTEX (P&T) in Soil						
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

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 : 8E02409
Client : PPK Adelaide
Reference : 27k140b/3571&3574

Analyte	Lab No	E65589	E65590	E65591	E65592	E65593
		gw101	gw102	gw102	gw102	gw103
	Sample Id	7.0	3.0	5.0	7.0	3.0
	PQL					
Moisture Content	**1**	9%	12%	11%	12%	33%
E1220 TPH in Soil						
Total C6-C36	**10**	20	450	nd	80	nd
C6-C9 Fraction	**10**	nd	nd	nd	nd	nd
C10-C14 Fraction	**10**	20	150	nd	30	nd
C15-C28 Fraction	**50**	nd	300	nd	50	nd
C29-C36 Fraction	**50**	nd	nd	nd	nd	nd
E1010 BTEX (P&T) in Soil						
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

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 : 8E02409
Client : PPK Adelaide
Reference : 27k140b/3571&3574

Analyte	Lab No	E65594				
		gw103				
	Sample Id	5.0				
	PQL					
Moisture Content	1	12%				
E1220 TPH in Soil						
Total C6-C36	10	nd				
C6-C9 Fraction	10	nd				
C10-C14 Fraction	10	nd				
C15-C28 Fraction	50	nd				
C29-C36 Fraction	50	nd				
E1010 BTEX (P&T) in Soil						
Benzene	0.5	nd				
Toluene	1	nd				
Ethylbenzene	1	nd				
Total Xylenes	3	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

Analyte	Lab No	E65584	E65585	E65586	E65587	E65588
		dup1	gw101	gw101	gw101	gw101
	Sample Id	01/12/98	3.0	4.0	5.0	6.0
	PQL					
E1110 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 PAH	**0.5**	nd	nd	nd	nd	nd
2-Fluorobiphenyl-SURROGATE	**1**	119%	117%	125%	125%	123%
Anthracene-d10-SURROGATE	**1**	111%	110%	115%	116%	112%
p-Terphenyl-D14-SURROGATE	**1**	107%	109%	119%	113%	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

	Lab No	E65589	E65590	E65591	E65592	E65593
		gw101	gw102	gw102	gw102	gw103
	Sample Id	7.0	3.0	5.0	7.0	3.0
Analyte	PQL					
E1110 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 PAH	**0.5**	nd	nd	nd	nd	nd
2-Fluorobiphenyl-SURROGATE	**1**	119%	122%	120%	113%	125%
Anthracene-d10-SURROGATE	**1**	109%	114%	105%	105%	113%
p-Terphenyl-D14-SURROGATE	**1**	110%	115%	105%	102%	115%

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 : 8E02409
Client : PPK Adelaide
Reference : 27k140b/3571&3574

Analyte	Lab No	E65594				
		gw103				
	Sample Id	5.0				
	PQL					
E1110 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 PAH	**0.5**	nd				
2-Fluorobiphenyl-SURROGATE	**1**	121%				
Anthracene-d10-SURROGATE	**1**	109%				
p-Terphenyl-D14-SURROGATE	**1**	111%				

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

QA/QC APPENDIX NO. 8E02409

Method	Description
E0220	Total Petroleum Hydrocarbons
E0010	Benzene,Toluene,Ethylbenzene & Xylene
E0110	Polycyclic Aromatic Hydrocarbons
E4870	Dissolved Metals by ICP-MS
E48501	Mercury low level
E1220	Total Petroleum Hydrocarbons
E1010	Benzene,Toluene,Ethylbenzene & Xylene
E1110	Polycyclic Aromatic Hydrocarbons

Chromatography QA/QC

	Yes	No	N/A
Retention Time Window Within Acceptance Criteria(±2%)	√		
Check Standard Within Acceptance Criteria(±10%)	√		
Recalibration Within Acceptance Criteria(±15%)	√		

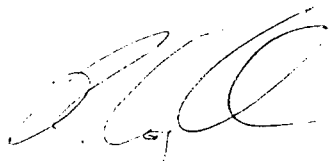
Other QA/QC

Holding time conforming With Method Specification	√		
Chain of Custody Attached	√		

N/A=Not Applicable

Comments

1. Laboratory QA/QC including Method Blanks, Duplicates, Matrix Spike Duplicates, Laboratory Control Samples or CRM's are included in this QA/QC appendix. (Where applicable)
2. Inter-Laboratory proficiency trial results available on request. (Where applicable)
3. Surrogate description and recoveries are recorded in the Report. (Where applicable)
4. Acceptance criteria for specific analytes are available upon request (Refer to SPM-01).
5. Practical Quantitation Limit (PQL is typically 2-10 x method detection limit (MDL)).
6. PQL's are matrix dependent and are increased accordingly where sample extracts are diluted.
7. Results are uncorrected for matrix spike or surrogate recoveries.



per G.W. ANDERSON
Manager Environmental Sydney

Job Number : 8E02409

QAQC : Spike Recoveries

Analyte	Spike Level	Level Spike 1	Detected Spike 2	Recovery Details Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E0220 TPH in Water (µg/L)							
Total C6-C36	9500	8860	8400	93%	88%	91%	5%
C6-C9 Fraction	4000	3900	3800	96%	94%	95%	2%
C15-C28 Fraction	5500	5000	4600	91%	84%	88%	8%
E4870 Dissolved Metals in Waters							
Lead	0.100	0.102	0.101	102%	101%	102%	1%
E48501 Dissolved Mercury in Waters							
Mercury	0.001	0.0010	0.0010	100%	100%	100%	0%

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

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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02409

QAQC : Laboratory Control Sample

Analyte	Level	Level Result1	Detected Result2	Recovery Details Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E0010 BTEX (P&T) in Water (µg/L)							
Benzene	10	10.0		100%			
Toluene	10	10		100%			
Ethylbenzene	10	10		100%			
Total Xylenes	30	30		100%			

PQL = Practical Quantitation Limit
-- = Not Applicable

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

nd = <PQL

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID	Blank				
	PQL					
E0220 TPH in Water (µg/L)						
Total C6-C36	**20**	nd				
C6-C9 Fraction	**20**	nd				
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				
E4870 Dissolved Metals in Waters						
Lead	**0.001**	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02409

QAQC : Laboratory Control Sample

Analyte	Level	Level Detected		Recovery Details			
		Result1	Result2	Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E0110 PAH's in Water (µg/L)							
Naphthalene	10	9		90%			
Acenaphthylene	10	10		100%			
Acenaphthene	10	9		90%			
Fluorene	10	9		90%			
Phenanthrene	10	10		100%			
Anthracene	10	11		110%			
Fluoranthene	10	12		120%			
Pyrene	10	12		120%			
Benz(a)anthracene	10	12		120%			
Chrysene	10	12		120%			
Benzo(b) & (k)fluoranthene	20	22		110%			
Benzo(a)pyrene	10	10		100%			
Indeno(1.2.3-cd)pyrene	10	9		90%			
Dibenz(a.h)anthracene	10	9		90%			
Benzo(g.h.i)perylene	10	8		80%			

PQL = Practical Quantitation Limit
-- = Not Applicable

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

nd = <PQL

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID	Blank				
	PQL					
E0110 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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02409

QAQC : Spike Recoveries

Analyte	Spike Level	Level Spike 1	Detected Spike 2	Recovery Details Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E1220 TPH in Soil							
Total C6-C36	950	760	760	80%	80%	80%	0%
C6-C9 Fraction	400	330	330	81%	81%	81%	0%
C15-C28 Fraction	550	440	440	79%	79%	79%	0%
E1010 BTEX (P&T) in Soil							
Benzene	10	10.9	11.2	109%	112%	111%	3%
Toluene	10	11	11	107%	112%	110%	5%
Ethylbenzene	10	11	11	106%	110%	108%	4%
Total Xylenes	30	32	33	105%	109%	107%	3%

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

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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02409

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
E1220 TPH in Soil					
Total C6-C36	**10**	nd	nd		
C6-C9 Fraction	**10**	nd	nd		
C10-C14 Fraction	**10**	nd	nd		
C15-C28 Fraction	**50**	nd	nd		
C29-C36 Fraction	**50**	nd	nd		
E1010 BTEX (P&T) in Soil					
Benzene	**0.5**	nd	nd		
Toluene	**1**	nd	nd		
Ethylbenzene	**1**	nd	nd		
Total Xylenes	**3**	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID PQL	Blank				
E1220 TPH in Soil						
Total C6-C36	**10**	nd				
C6-C9 Fraction	**10**	nd				
C10-C14 Fraction	**10**	nd				
C15-C28 Fraction	**50**	nd				
C29-C36 Fraction	**50**	nd				
E1010 BTEX (P&T) in Soil						
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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02409

QAQC : Spike Recoveries

Analyte	Spike Level	Level Detected		Recovery Details			
		Spike 1	Spike 2	Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E1110 PAH's in Soil							
Naphthalene	5	5.7	5.5	114%	110%	112%	4%
Acenaphthylene	5	5.9	5.7	118%	114%	116%	3%
Acenaphthene	5	5.5	5.3	110%	106%	108%	4%
Fluorene	5	5.5	5.3	110%	106%	108%	4%
Phenanthrene	5	5.2	5.0	104%	100%	102%	4%
Anthracene	5	5.3	5.2	106%	104%	105%	2%
Fluoranthene	5	5.3	5.1	106%	102%	104%	4%
Pyrene	5	5.3	5.2	106%	104%	105%	2%
Benz(a)anthracene	5	5.5	5.2	110%	104%	107%	6%
Chrysene	5	5.4	5.2	108%	104%	106%	4%
Benzo(b) & (k)fluoranthene	10	11	10	106%	101%	104%	5%
Benzo(a)pyrene	5	5.1	4.8	102%	96%	99%	6%
Indeno(1.2.3-cd)pyrene	5	4.8	5.2	96%	104%	100%	8%
Dibenz(a.h)anthracene	5	5.0	4.8	100%	96%	98%	4%
Benzo(g.h.i)perylene	5	4.3	4.3	86%	86%	86%	0%

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

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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02409

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
E1110 PAH's in Soil					
Naphthalene	**0.5**	nd	nd		
Acenaphthylene	**0.5**	nd	nd		
Acenaphthene	**0.5**	nd	nd		
Fluorene	**0.5**	nd	nd		
Phenanthrene	**0.5**	nd	nd		
Anthracene	**0.5**	nd	nd		
Fluoranthene	**0.5**	nd	nd		
Pyrene	**0.5**	nd	nd		
Benz(a)anthracene	**0.5**	nd	nd		
Chrysene	**0.5**	nd	nd		
Benzo(b) & (k)fluoranthene	**1**	nd	nd		
Benzo(a)pyrene	**0.5**	nd	nd		
Indeno(1.2.3-cd)pyrene	**0.5**	nd	nd		
Dibenz(a.h)anthracene	**0.5**	nd	nd		
Benzo(g.h.i)perylene	**0.5**	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID PQL	Blank				
E1110 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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

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 7584

Client: PPK Adelaide	**Our Ref:** 8E02409
Your Ref: 27k140b/3571&3574	**Date:** 17/12/98

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 078 001 799

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

Services to the office indicated:

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

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

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

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

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

Order No: 3571

Job Title: *water* CANBERRA RAILYARDS

Laboratory Name: AMDEL

Address: NSW

Fax Number:

Phone Number:

Contact Name:

Delivery Method:

Quote Number:

PPK Job Number: 27K140A

Job Location: CANBERRA

Project Manager: S. TAYLOR

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**	Initials	Comments/Additional Information and/or Analysis Required
5/12/98		Rinse Blank	1 x 1L 1 x 75 2 x 40	E65575			1	X	X	X		X		
"		Dup 2	"	76				X	X	X		X		
"		GW6	"	77				X	X	X		X		
"		GW8	"	78				X	X	X		X		
"		GW101	"	79				X	X	X		X		
"		GW102	"	80				X	X	X		X		
"		GW103	"	81				X	X	X		X		
"		GW104	"	82				X	X	X		X		
"		GW105	"	83				X	X	X		X		
		SB												

EEC2409

Relinquished by: M. Reynolds	Relinquished by:	Relinquished by:
Date & Time: 8/12/98	Date & Time:	Date & Time:
Company: PPK	Company:	Company:
Signature: MBR	Signature:	Signature:
Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):
Date & Time:	Date & Time:	Date & Time:
Company:	Company:	Company:
Signature:	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

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

services to the office indicated:

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

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

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

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

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

Order No: 3574

Job Title: CANBERRA RAIL YARDS #SOIL#

Laboratory Name: AMDEL

Address: NSW

Fax Number:

Phone Number:

Contact Name:

Delivery Method:

Quote Number:

PPK Job Number: 27K140B

Job Location: CANBERRA

Project Manager: S. TAYLOR

Results Expected by/on:

Fax Results to: A/A

Fax Number:

Phone Number:

Spreadsheet of Results Required: Y / N

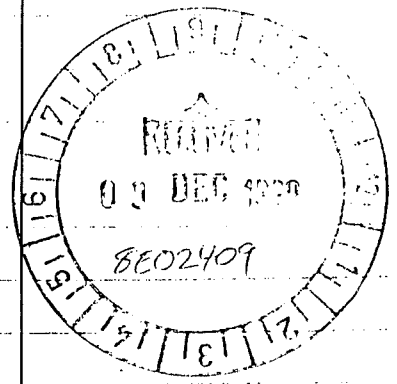
Format:

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**	Initials	Comments/Additional Information and/or Analysis Required
1/12/98		DUP1	1x125	E65 584				X	X	X				
"		GWIC1 3.0	"	85				X	X	X				
"		GWIC1 4.0	"	86				X	X	X				
"		GWIC1 5.0	"	87				X	X	X				
"		GWIC1 6.0	"	88				X	X	X				
"		GWIC1 7.0	"	89				X	X	X				
"		GWIC2 3.0	"	90				X	X	X				
"		GWIC2 5.0	"	91				X	X	X				
"		GWIC2 7.0	"	92				X	X	X				
"		GWIC3 3.0	"	93				X	X	X				
"		GWIC3 5.0	"	94				X	X	X				
		SB												



Relinquished by: M Reynolds
Date & Time: 8/12/98
Company: PPK
Signature:

Relinquished by:
Date & Time:
Company:
Signature:

Relinquished by:
Date & Time:
Company:
Signature:

Received in Good Order & Condition by (Name): M. WILLIAMS
Date & Time: 9-12-98
Company: AMDEL
Signature:

Received in Good Order & Condition by (Name):
Date & Time:
Company:
Signature:

Received in Good Order & Condition by (Name):
Date & Time:
Company:
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

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 : 8E02410

ATTENTION : Mr Stuart Taylor

CLIENT : PPK Adelaide

SAMPLES : 13

REFERENCE : 27K140B-CANBERRA

DATE RECEIVED : 09/12/98

DATE REPORTED : 21/12/98

Method	Description	Extracted	Analysed
E0220	Total Petroleum Hydrocarbons	09/12/98	21/12/98
E4870	Dissolved Metals by ICP-MS	14/12/98	15/12/98
E48501	Mercury low level	15/12/98	16/12/98
E0290	Volatile Organic Compounds	21/12/98	21/12/98
E0180	Semivolatile Organic Compounds	14/12/98	18/12/98
E2600	pH	10/12/98	10/12/98
E2690	Total Dissolved Solids	14/12/98	16/12/98

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.

PLEASE SEE ATTACHED PAGES FOR RESULTS

per G.W. ANDERSON
Manager Environmental Sydney

Job Number : 8E02410
Client : PPK Adelaide
Reference : 27K140B-CANBERRA

Analyte	Lab No	E65595	E65596	E65597	E65598	E65599
		GW107	GW108	GW109	GW110	GW111
	Sample Id	6/12/98	6/12/98	7/12/98	7/12/98	7/12/98
	PQL					
E0220 TPH in Water (µg/L)						
Total C6-C36	**20**	nd	nd	nd	37100	nd
C6-C9 Fraction	**20**	nd	nd	nd	nd	nd
C10-C14 Fraction	**20**	nd	nd	nd	6900	nd
C15-C28 Fraction	**100**	nd	nd	nd	30200	nd
C29-C36 Fraction	**100**	nd	nd	nd	nd	nd
E4870 Dissolved Metals in Waters						
Arsenic	**0.001**	0.004	0.005	0.003	0.006	0.005
Cadmium	**0.0001**	0.0001	nd	0.0002	nd	nd
Cobalt	**0.001**	nd	0.005	0.012	0.006	0.002
Chromium	**0.001**	0.003	0.006	0.005	0.007	0.003
Copper	**0.001**	nd	0.002	0.004	0.004	0.005
Manganese	**0.001**	0.577	1.79	2.30	2.41	0.351
Nickel	**0.001**	0.004	0.013	0.011	0.012	0.010
Lead	**0.001**	nd	nd	nd	nd	nd
Zinc	**0.002**	0.010	0.012	0.036	0.014	0.006
E48501 Dissolved Mercury in Waters						
Mercury	**0.00005**	nd	0.00005	nd	nd	nd
E2600 pH in Water						
pH	**0.1**	7.1	7.2	7.1	7.4	7.6
E2690 Total Dissolved Solids in Water						
TDS	**1**	562	1249	1140	1606	813

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

Analyte	Lab No	E65600	E65601	E65602	E65603	E65604
		GW112	GW113	GW114	GW115	GW116
	Sample Id	7/12/98	7/12/98	7/12/98	7/12/98	7/12/98
	PQL					
E0220 TPH in Water (µg/L)						
Total C6-C36	**20**	nd	nd	nd	nd	nd
C6-C9 Fraction	**20**	nd	nd	nd	nd	nd
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
E4870 Dissolved Metals in Waters						
Arsenic	**0.001**	0.004	0.001	0.011	0.002	0.002
Cadmium	**0.0001**	nd	nd	0.0001	0.0001	0.0001
Cobalt	**0.001**	0.004	0.002	0.008	0.004	0.005
Chromium	**0.001**	0.006	0.003	0.008	0.003	0.002
Copper	**0.001**	0.002	0.002	0.002	0.002	0.002
Manganese	**0.001**	2.26	2.35	1.86	2.67	3.38
Nickel	**0.001**	0.012	0.007	0.024	0.006	0.007
Lead	**0.001**	nd	nd	nd	nd	nd
Zinc	**0.002**	0.039	0.010	0.030	0.017	0.023
E48501 Dissolved Mercury in Waters						
Mercury	**0.00005**	nd	nd	nd	nd	0.00005
E2600 pH in Water						
pH	**0.1**	7.3	7.1	6.9	7.1	7.1
E2690 Total Dissolved Solids in Water						
TDS	**1**	1089	480	1445	409	521

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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

Analyte	Lab No	E65605	E65606	E65607		
		DUP4	RINSE BLAN	GW39		
	Sample Id	7/12/98K	7/12/98	7/12/98		
	PQL					
E0220 TPH in Water (µg/L)						
Total C6-C36	**20**	nd	169	nd		
C6-C9 Fraction	**20**	nd	70	nd		
C10-C14 Fraction	**20**	nd	100	nd		
C15-C28 Fraction	**100**	nd	nd	nd		
C29-C36 Fraction	**100**	nd	nd	nd		
E4870 Dissolved Metals in Waters						
Arsenic	**0.001**	0.003	nd	0.003		
Cadmium	**0.0001**	0.0001	nd	nd		
Cobalt	**0.001**	0.010	nd	0.002		
Chromium	**0.001**	0.003	nd	0.003		
Copper	**0.001**	0.004	nd	0.001		
Manganese	**0.001**	2.12	nd	1.34		
Nickel	**0.001**	0.011	nd	0.006		
Lead	**0.001**	nd	nd	nd		
Zinc	**0.002**	0.032	0.004	0.009		
E48501 Dissolved Mercury in Waters						
Mercury	**0.00005**	nd	nd	nd		
E2600 pH in Water						
pH	**0.1**	7.0	7.3	6.9		
E2690 Total Dissolved Solids in Water						
TDS	**1**	1062	6	778		

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 : 8E02410
Client : PPK Adelaide
Reference : 27K140B-CANBERRA

Analyte	Lab No	E65595	E65596	E65597	E65598	E65599
		GW107	GW108	GW109	GW110	GW111
	Sample Id	6/12/98	6/12/98	7/12/98	7/12/98	7/12/98
	PQL					
E0180 Semivolatile Organic Compounds	**(µg/L)**					
Phenol	**10**	nd	nd	nd	nd	nd
Aniline	**100**	nd	nd	nd	nd	nd
Bis(2-chloroethyl) ether	**10**	nd	nd	nd	nd	nd
2-Chlorophenol	**10**	nd	nd	nd	nd	nd
1.3-Dichlorobenzene	**10**	nd	nd	nd	nd	nd
1.4-Dichlorobenzene	**10**	nd	nd	nd	nd	nd
1.2-Dichlorobenzene	**10**	nd	nd	nd	nd	nd
Benzyl Alcohol	**10**	nd	nd	nd	nd	nd
2-Methylphenol	**10**	nd	nd	nd	nd	nd
N-Nitrosodi-n-propylamine	**10**	nd	nd	nd	nd	nd
Bis(2-chloroisopropyl) ether	**10**	nd	nd	nd	nd	nd
4-Methylphenol	**10**	nd	nd	nd	nd	nd
3-Methylphenol	**10**	nd	nd	nd	nd	nd
Hexachloroethane	**10**	nd	nd	nd	nd	nd
Nitrobenzene	**10**	nd	nd	nd	nd	nd
Isophorone	**10**	nd	nd	nd	nd	nd
2-Nitrophenol	**10**	nd	nd	nd	nd	nd
2.4-Dimethylphenol	**10**	nd	nd	nd	nd	nd
Bis(2-chloroethoxy) methane	**10**	nd	nd	nd	nd	nd
Benzoic Acid	**100**	nd	nd	nd	nd	nd
2.4-Dichlorophenol	**10**	nd	nd	nd	nd	nd
1.2.4-Trichlorobenzene	**10**	nd	nd	nd	nd	nd
Naphthalene	**10**	nd	nd	nd	nd	nd
4-Chloroaniline	**10**	nd	nd	nd	nd	nd

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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

Analyte	Lab No	E65595	E65596	E65597	E65598	E65599
		GW107	GW108	GW109	GW110	GW111
	Sample Id	6/12/98	6/12/98	7/12/98	7/12/98	7/12/98
	PQL					
Hexachlorobutadiene	**10**	nd	nd	nd	nd	nd
4-Chloro-3-methylphenol	**10**	nd	nd	nd	nd	nd
2-Methylnaphthalene	**10**	nd	nd	nd	nd	nd
Hexachlorocyclopentadiene	**10**	nd	nd	nd	nd	nd
2.4.6-Trichlorophenol	**10**	nd	nd	nd	nd	nd
2.4.5-Trichlorophenol	**10**	nd	nd	nd	nd	nd
2-Chloronaphthalene	**10**	nd	nd	nd	nd	nd
2-Nitroaniline	**10**	nd	nd	nd	nd	nd
Dimethyl phthalate	**10**	nd	nd	nd	nd	nd
2.6-Dinitrotoluene	**10**	nd	nd	nd	nd	nd
Acenaphthylene	**10**	nd	nd	nd	nd	nd
3-Nitroaniline	**10**	nd	nd	nd	nd	nd
Acenaphthene	**10**	nd	nd	nd	nd	nd
2.4-Dinitrophenol	**10**	nd	nd	nd	nd	nd
4-Nitrophenol	**10**	nd	nd	nd	nd	nd
Dibenzofuran	**10**	nd	nd	nd	nd	nd
Diethyl phthalate	**10**	nd	nd	nd	nd	nd
Fluorene	**10**	nd	nd	nd	nd	nd
4-Chlorophenyl phenyl ether	**10**	nd	nd	nd	nd	nd
4-Nitroaniline	**10**	nd	nd	nd	nd	nd
4.6-Dinitro-2-methylphenol	**10**	nd	nd	nd	nd	nd
Azobenzene	**100**	nd	nd	nd	nd	nd
N-Nitrosodiphenylamine	**100**	nd	nd	nd	nd	nd
a-BHC	**10**	nd	nd	nd	nd	nd
4-Bromophenyl phenyl ether	**10**	nd	nd	nd	nd	nd

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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

Analyte	Lab No	E65595	E65596	E65597	E65598	E65599
		GW107	GW108	GW109	GW110	GW111
	Sample Id	6/12/98	6/12/98	7/12/98	7/12/98	7/12/98
	PQL					
Hexachlorobenzene	**10**	nd	nd	nd	nd	nd
b-BHC	**10**	nd	nd	nd	nd	nd
Pentachlorophenol	**10**	nd	nd	nd	nd	nd
g-BHC	**10**	nd	nd	nd	nd	nd
Phenanthrene	**10**	nd	nd	nd	nd	nd
Anthracene	**10**	nd	nd	nd	nd	nd
d-BHC	**10**	nd	nd	nd	nd	nd
Heptachlor	**10**	nd	nd	nd	nd	nd
Di-n-butyl phthalate	**10**	nd	nd	nd	nd	nd
Aldrin	**10**	nd	nd	nd	nd	nd
Heptachlor epoxide	**10**	nd	nd	nd	nd	nd
Fluoranthene	**10**	nd	nd	nd	nd	nd
Pyrene	**10**	nd	nd	nd	nd	nd
Endosulfan 1	**10**	nd	nd	nd	nd	nd
4.4-DDE	**10**	nd	nd	nd	nd	nd
Dieldrin	**10**	nd	nd	nd	nd	nd
Endrin	**10**	nd	nd	nd	nd	nd
Endosulfan 2	**10**	nd	nd	nd	nd	nd
4.4-DDD	**10**	nd	nd	nd	nd	nd
Endrin aldehyde	**10**	nd	nd	nd	nd	nd
Butyl benzyl phthalate	**10**	nd	nd	nd	nd	nd
Endosulfan sulfate	**10**	nd	nd	nd	nd	nd
4.4-DDT	**10**	nd	nd	nd	nd	nd
3.3-Dichlorobenzidine	**100**	nd	nd	nd	nd	nd
Benzo(a)anthracene	**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

Analyte	Lab No	E65595	E65596	E65597	E65598	E65599
		GW107	GW108	GW109	GW110	GW111
	Sample Id	6/12/98	6/12/98	7/12/98	7/12/98	7/12/98
	PQL					
Chrysene	**10**	nd	nd	nd	nd	nd
Bis(2-ethylhexyl) phthalate	**10**	nd	nd	nd	nd	nd
Di-n-octylphthalate	**10**	nd	nd	nd	nd	nd
Benzo(b)fluoranthene	**10**	nd	nd	nd	nd	nd
Benzo(k)fluoranthene	**10**	nd	nd	nd	nd	nd
Benzo(a)pyrene	**10**	nd	nd	nd	nd	nd
Indeno(1.2.3-cd)pyrene	**10**	nd	nd	nd	nd	nd
Dibenz(a.h)anthracene	**10**	nd	nd	nd	nd	nd
Benzo(g.h.i)perylene	**10**	nd	nd	nd	nd	nd
2-Fluorophenol-SURROGATE	**1**	81%	109%	98%	96%	79%
Phenol-D5-SURROGATE	**1**	68%	95%	81%	80%	69%
Nitrobenzene-D5-SURROGATE	**1**	109%	100%	86%	87%	84%
2-Fluorobiphenyl-SURROGATE	**1**	98%	97%	81%	82%	81%
2.4.6-Tribromophenol-SURROGATE	**1**	103%	104%	84%	90%	88%
p-Terphenyl-D14-SURROGATE	**1**	113%	130%	103%	105%	107%

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 : 8E02410
Client : PPK Adelaide
Reference : 27K140B-CANBERRA

Analyte	Lab No	E65600	E65601	E65602	E65603	E65604
		GW112	GW113	GW114	GW115	GW116
	Sample Id	7/12/98	7/12/98	7/12/98	7/12/98	7/12/98
	PQL					
E0180 Semivolatile Organic Compounds(µg/L)						
Phenol	**10**	nd	nd	nd	nd	nd
Aniline	**100**	nd	nd	nd	nd	nd
Bis(2-chloroethyl) ether	**10**	nd	nd	nd	nd	nd
2-Chlorophenol	**10**	nd	nd	nd	nd	nd
1.3-Dichlorobenzene	**10**	nd	nd	nd	nd	nd
1.4-Dichlorobenzene	**10**	nd	nd	nd	nd	nd
1.2-Dichlorobenzene	**10**	nd	nd	nd	nd	nd
Benzyl Alcohol	**10**	nd	nd	nd	nd	nd
2-Methylphenol	**10**	nd	nd	nd	nd	nd
N-Nitrosodi-n-propylamine	**10**	nd	nd	nd	nd	nd
Bis(2-chloroisopropyl) ether	**10**	nd	nd	nd	nd	nd
4-Methylphenol	**10**	nd	nd	nd	nd	nd
3-Methylphenol	**10**	nd	nd	nd	nd	nd
Hexachloroethane	**10**	nd	nd	nd	nd	nd
Nitrobenzene	**10**	nd	nd	nd	nd	nd
Isophorone	**10**	nd	nd	nd	nd	nd
2-Nitrophenol	**10**	nd	nd	nd	nd	nd
2.4-Dimethylphenol	**10**	nd	nd	nd	nd	nd
Bis(2-chloroethoxy) methane	**10**	nd	nd	nd	nd	nd
Benzoic Acid	**100**	nd	nd	nd	nd	nd
2.4-Dichlorophenol	**10**	nd	nd	nd	nd	nd
1.2.4-Trichlorobenzene	**10**	nd	nd	nd	nd	nd
Naphthalene	**10**	nd	nd	nd	nd	nd
4-Chloroaniline	**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

Analyte	Lab No	E65600	E65601	E65602	E65603	E65604
		GW112	GW113	GW114	GW115	GW116
	Sample Id	7/12/98	7/12/98	7/12/98	7/12/98	7/12/98
	PQL					
Hexachlorobutadiene	**10**	nd	nd	nd	nd	nd
4-Chloro-3-methylphenol	**10**	nd	nd	nd	nd	nd
2-Methylnaphthalene	**10**	nd	nd	nd	nd	nd
Hexachlorocyclopentadiene	**10**	nd	nd	nd	nd	nd
2.4.6-Trichlorophenol	**10**	nd	nd	nd	nd	nd
2.4.5-Trichlorophenol	**10**	nd	nd	nd	nd	nd
2-Chloronaphthalene	**10**	nd	nd	nd	nd	nd
2-Nitroaniline	**10**	nd	nd	nd	nd	nd
Dimethyl phthalate	**10**	nd	nd	nd	nd	nd
2.6-Dinitrotoluene	**10**	nd	nd	nd	nd	nd
Acenaphthylene	**10**	nd	nd	nd	nd	nd
3-Nitroaniline	**10**	nd	nd	nd	nd	nd
Acenaphthene	**10**	nd	nd	nd	nd	nd
2.4-Dinitrophenol	**10**	nd	nd	nd	nd	nd
4-Nitrophenol	**10**	nd	nd	nd	nd	nd
Dibenzofuran	**10**	nd	nd	nd	nd	nd
Diethyl phthalate	**10**	nd	nd	nd	nd	nd
Fluorene	**10**	nd	nd	nd	nd	nd
4-Chlorophenyl phenyl ether	**10**	nd	nd	nd	nd	nd
4-Nitroaniline	**10**	nd	nd	nd	nd	nd
4.6-Dinitro-2-methylphenol	**10**	nd	nd	nd	nd	nd
Azobenzene	**100**	nd	nd	nd	nd	nd
N-Nitrosodiphenylamine	**100**	nd	nd	nd	nd	nd
a-BHC	**10**	nd	nd	nd	nd	nd
4-Bromophenyl phenyl ether	**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

Analyte	Lab No	E65600	E65601	E65602	E65603	E65604
		GW112	GW113	GW114	GW115	GW116
	Sample Id	7/12/98	7/12/98	7/12/98	7/12/98	7/12/98
	PQL					
Hexachlorobenzene	**10**	nd	nd	nd	nd	nd
b-BHC	**10**	nd	nd	nd	nd	nd
Pentachlorophenol	**10**	nd	nd	nd	nd	nd
g-BHC	**10**	nd	nd	nd	nd	nd
Phenanthrene	**10**	nd	nd	nd	nd	nd
Anthracene	**10**	nd	nd	nd	nd	nd
d-BHC	**10**	nd	nd	nd	nd	nd
Heptachlor	**10**	nd	nd	nd	nd	nd
Di-n-butyl phthalate	**10**	11	nd	nd	nd	14
Aldrin	**10**	nd	nd	nd	nd	nd
Heptachlor epoxide	**10**	nd	nd	nd	nd	nd
Fluoranthene	**10**	nd	nd	nd	nd	nd
Pyrene	**10**	nd	nd	nd	nd	nd
Endosulfan 1	**10**	nd	nd	nd	nd	nd
4.4-DDE	**10**	nd	nd	nd	nd	nd
Dieldrin	**10**	nd	nd	nd	nd	nd
Endrin	**10**	nd	nd	nd	nd	nd
Endosulfan 2	**10**	nd	nd	nd	nd	nd
4.4-DDD	**10**	nd	nd	nd	nd	nd
Endrin aldehyde	**10**	nd	nd	nd	nd	nd
Butyl benzyl phthalate	**10**	nd	nd	nd	nd	nd
Endosulfan sulfate	**10**	nd	nd	nd	nd	nd
4.4-DDT	**10**	nd	nd	nd	nd	nd
3.3-Dichlorobenzidine	**100**	nd	nd	nd	nd	nd
Benzo(a)anthracene	**10**	nd	nd	nd	nd	nd

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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 < USEPA 34 ppm

Analyte	Lab No	E65600	E65601	E65602	E65603	E65604
		GW112	GW113	GW114	GW115	GW116
	Sample Id	7/12/98	7/12/98	7/12/98	7/12/98	7/12/98
	PQL					
Chrysene	**10**	nd	nd	nd	nd	nd
Bis(2-ethylhexyl) phthalate	**10**	nd	nd	nd	nd	nd
Di-n-octylphthalate	**10**	nd	nd	nd	nd	nd
Benzo(b)fluoranthene	**10**	nd	nd	nd	nd	nd
Benzo(k)fluoranthene	**10**	nd	nd	nd	nd	nd
Benzo(a)pyrene	**10**	nd	nd	nd	nd	nd
Indeno(1.2.3-cd)pyrene	**10**	nd	nd	nd	nd	nd
Dibenz(a.h)anthracene	**10**	nd	nd	nd	nd	nd
Benzo(g.h.i)perylene	**10**	nd	nd	nd	nd	nd
2-Fluorophenol-SURROGATE	**1**	82%	105%	113%	102%	92%
Phenol-D5-SURROGATE	**1**	76%	87%	95%	88%	79%
Nitrobenzene-D5-SURROGATE	**1**	69%	86%	94%	87%	71%
2-Fluorobiphenyl-SURROGATE	**1**	78%	81%	90%	83%	73%
2.4.6-Tribromophenol-SURROGATE	**1**	90%	88%	98%	100%	94%
p-Terphenyl-D14-SURROGATE	**1**	105%	105%	109%	111%	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

Analyte	Lab No	E65605	E65606	E65607		
		DUP4R	INSE BLAN	GW39		
	Sample Id	7/12/98K	7/12/98	7/12/98		
	PQL					
E0180 Semivolatile Organic Compounds(µg/L)						
Phenol	**10**	nd	nd	nd		
Aniline	**100**	nd	nd	nd		
Bis(2-chloroethyl) ether	**10**	nd	nd	nd		
2-Chlorophenol	**10**	nd	nd	nd		
1.3-Dichlorobenzene	**10**	nd	nd	nd		
1.4-Dichlorobenzene	**10**	nd	nd	nd		
1.2-Dichlorobenzene	**10**	nd	nd	nd		
Benzyl Alcohol	**10**	nd	nd	nd		
2-Methylphenol	**10**	nd	nd	nd		
N-Nitrosodi-n-propylamine	**10**	nd	nd	nd		
Bis(2-chloroisopropyl) ether	**10**	nd	nd	nd		
4-Methylphenol	**10**	nd	nd	nd		
3-Methylphenol	**10**	nd	nd	nd		
Hexachloroethane	**10**	nd	nd	nd		
Nitrobenzene	**10**	nd	nd	nd		
Isophorone	**10**	nd	nd	nd		
2-Nitrophenol	**10**	nd	nd	nd		
2.4-Dimethylphenol	**10**	nd	nd	nd		
Bis(2-chloroethoxy) methane	**10**	nd	nd	nd		
Benzoic Acid	**100**	nd	nd	nd		
2.4-Dichlorophenol	**10**	nd	nd	nd		
1.2.4-Trichlorobenzene	**10**	nd	nd	nd		
Naphthalene	**10**	nd	nd	nd		
4-Chloroaniline	**10**	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

Analyte	Lab No	E65605	E65606	E65607		
		DUP4	RINSE BLAN	GW39		
	Sample Id	7/12/98K	7/12/98	7/12/98		
	PQL					
Hexachlorobutadiene	**10**	nd	nd	nd		
4-Chloro-3-methylphenol	**10**	nd	nd	nd		
2-Methylnaphthalene	**10**	nd	nd	nd		
Hexachlorocyclopentadiene	**10**	nd	nd	nd		
2.4.6-Trichlorophenol	**10**	nd	nd	nd		
2.4.5-Trichlorophenol	**10**	nd	nd	nd		
2-Chloronaphthalene	**10**	nd	nd	nd		
2-Nitroaniline	**10**	nd	nd	nd		
Dimethyl phthalate	**10**	nd	nd	nd		
2.6-Dinitrotoluene	**10**	nd	nd	nd		
Acenaphthylene	**10**	nd	nd	nd		
3-Nitroaniline	**10**	nd	nd	nd		
Acenaphthene	**10**	nd	nd	nd		
2.4-Dinitrophenol	**10**	nd	nd	nd		
4-Nitrophenol	**10**	nd	nd	nd		
Dibenzofuran	**10**	nd	nd	nd		
Diethyl phthalate	**10**	nd	nd	nd		
Fluorene	**10**	nd	nd	nd		
4-Chlorophenyl phenyl ether	**10**	nd	nd	nd		
4-Nitroaniline	**10**	nd	nd	nd		
4.6-Dinitro-2-methylphenol	**10**	nd	nd	nd		
Azobenzene	**100**	nd	nd	nd		
N-Nitrosodiphenylamine	**100**	nd	nd	nd		
a-BHC	**10**	nd	nd	nd		
4-Bromophenyl phenyl ether	**10**	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

Analyte	Lab No	E65605	E65606	E65607		
		DUP4	RINSE BLAN	GW39		
	Sample Id	7/12/98K	7/12/98	7/12/98		
	PQL					
Hexachlorobenzene	**10**	nd	nd	nd		
b-BHC	**10**	nd	nd	nd		
Pentachlorophenol	**10**	nd	nd	nd		
g-BHC	**10**	nd	nd	nd		
Phenanthrene	**10**	nd	nd	nd		
Anthracene	**10**	nd	nd	nd		
d-BHC	**10**	nd	nd	nd		
Heptachlor	**10**	nd	nd	nd		
Di-n-butyl phthalate	**10**	nd	nd	nd		
Aldrin	**10**	nd	nd	nd		
Heptachlor epoxide	**10**	nd	nd	nd		
Fluoranthene	**10**	nd	nd	nd		
Pyrene	**10**	nd	nd	nd		
Endosulfan 1	**10**	nd	nd	nd		
4.4-DDE	**10**	nd	nd	nd		
Dieldrin	**10**	nd	nd	nd		
Endrin	**10**	nd	nd	nd		
Endosulfan 2	**10**	nd	nd	nd		
4.4-DDD	**10**	nd	nd	nd		
Endrin aldehyde	**10**	nd	nd	nd		
Butyl benzyl phthalate	**10**	nd	nd	nd		
Endosulfan sulfate	**10**	nd	nd	nd		
4.4-DDT	**10**	nd	nd	nd		
3.3-Dichlorobenzidine	**100**	nd	nd	nd		
Benzo(a)anthracene	**10**	nd	nd	nd		

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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 : 8E02410
Client : PPK Adelaide
Reference : 27K140B-CANBERRA

Analyte	Lab No	E65605	E65606	E65607		
		DUP4	RINSE BLAN	GW39		
	Sample Id	7/12/98K	7/12/98	7/12/98		
	PQL					
Chrysene	**10**	nd	nd	nd		
Bis(2-ethylhexyl) phthalate	**10**	nd	nd	nd		
Di-n-octylphthalate	**10**	nd	nd	nd		
Benzo(b)fluoranthene	**10**	nd	nd	nd		
Benzo(k)fluoranthene	**10**	nd	nd	nd		
Benzo(a)pyrene	**10**	nd	nd	nd		
Indeno(1.2.3-cd)pyrene	**10**	nd	nd	nd		
Dibenz(a.h)anthracene	**10**	nd	nd	nd		
Benzo(g.h.i)perylene	**10**	nd	nd	nd		
2-Fluorophenol-SURROGATE	**1**	110%	94%	108%		
Phenol-D5-SURROGATE	**1**	92%	81%	107%		
Nitrobenzene-D5-SURROGATE	**1**	90%	75%	90%		
2-Fluorobiphenyl-SURROGATE	**1**	86%	77%	84%		
2.4.6-Tribromophenol-SURROGATE	**1**	95%	88%	91%		
p-Terphenyl-D14-SURROGATE	**1**	107%	99%	97%		

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

Analyte	Lab No	E65595	E65596	E65597	E65598	E65599
		GW107	GW108	GW109	GW110	GW111
	Sample Id	6/12/98	6/12/98	7/12/98	7/12/98	7/12/98
	PQL					
E0290 Volatile Organic Compounds (µg/L)						
Benzene	5	nd	nd	nd	nd	nd
Bromobenzene	5	nd	nd	nd	nd	nd
Bromochloromethane	5	nd	nd	nd	nd	nd
Bromodichloromethane	5	nd	nd	nd	nd	nd
Bromoform	5	nd	nd	nd	nd	nd
Bromomethane	5	nd	nd	nd	nd	nd
n-Butylbenzene	5	nd	nd	nd	nd	nd
sec-Butylbenzene	5	nd	nd	nd	nd	nd
tert-Butylbenzene	5	nd	nd	nd	nd	nd
Carbon tetrachloride	5	nd	nd	nd	nd	nd
Chlorobenzene	5	nd	nd	nd	nd	nd
Chloroethane	5	nd	nd	nd	nd	nd
Chloroform	5	nd	nd	nd	nd	nd
Chloromethane	5	nd	nd	nd	nd	nd
2-Chlorotoluene	5	nd	nd	nd	nd	nd
4-Chlorotoluene	5	nd	nd	nd	nd	nd
Dibromochloromethane	5	nd	nd	nd	nd	nd
1.2-Dibromo-3-chloropropane	5	nd	nd	nd	nd	nd
1.2-Dibromoethane (EDB)	5	nd	nd	nd	nd	nd
Dibromomethane	5	nd	nd	nd	nd	nd
1.2-Dichlorobenzene	5	nd	nd	nd	nd	nd
1.3-Dichlorobenzene	5	nd	nd	nd	nd	nd
1.4-Dichlorobenzene	5	nd	nd	nd	nd	nd
Dichlorodifluoromethane	5	nd	nd	nd	nd	nd

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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

Analyte	Lab No	E65595	E65596	E65597	E65598	E65599
		GW107	GW108	GW109	GW110	GW111
	Sample Id	6/12/98	6/12/98	7/12/98	7/12/98	7/12/98
	PQL					
1.1-Dichloroethene	5	nd	nd	nd	nd	nd
1.2-Dichloroethane	5	nd	nd	nd	nd	nd
1.1-Dichloroethane	5	nd	nd	nd	nd	nd
cis-1.2-Dichloroethene	5	nd	nd	nd	nd	nd
trans-1.2-Dichloroethene	5	nd	nd	nd	nd	nd
1.2-Dichloropropane	5	nd	nd	nd	nd	nd
1.3-Dichloropropane	5	nd	nd	nd	nd	nd
2.2-Dichloropropane	5	nd	nd	nd	nd	nd
1.1-Dichloropropylene	5	nd	nd	nd	nd	nd
cis-1.3-Dichloropropylene	5	nd	nd	nd	nd	nd
trans-1.3-Dichloropropylene	5	nd	nd	nd	nd	nd
Ethylbenzene	5	nd	nd	nd	nd	nd
Hexachlorobutadiene	5	nd	nd	nd	nd	nd
Isopropylbenzene	5	nd	nd	nd	nd	nd
p-Isopropyltoluene	5	nd	nd	nd	nd	nd
Methylene chloride	5	nd	nd	nd	nd	nd
Naphthalene	5	nd	nd	nd	nd	nd
n-Propylbenzene	5	nd	nd	nd	nd	nd
Styrene	5	nd	nd	nd	nd	nd
1.1.1.2-Tetrachloroethane	5	nd	nd	nd	nd	nd
1.1.2.2-Tetrachloroethane	5	nd	nd	nd	nd	nd
Tetrachloroethene	5	nd	nd	nd	nd	nd
Toluene	5	nd	nd	nd	nd	nd
1.2.3-Trichlorobenzene	5	nd	nd	nd	nd	nd
1.2.4-Trichlorobenzene	5	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

Analyte	Lab No	E65595	E65596	E65597	E65598	E65599
		GW107	GW108	GW109	GW110	GW111
	Sample Id	6/12/98	6/12/98	7/12/98	7/12/98	7/12/98
	PQL					
1.1.1-Trichloroethane	**5**	nd	nd	nd	nd	nd
1.1.2-Trichloroethane	**5**	nd	nd	nd	nd	nd
Trichloroethene	**5**	nd	nd	nd	nd	nd
Trichlorofluoromethane	**5**	nd	nd	nd	nd	nd
1.2.3-Trichloropropane	**5**	nd	nd	nd	nd	nd
1.2.4-Trimethylbenzene	**5**	nd	nd	nd	nd	nd
1.3.5-Trimethylbenzene	**5**	nd	nd	nd	nd	nd
Vinyl chloride	**5**	nd	nd	nd	nd	nd
ortho-Xylene	**5**	nd	nd	nd	nd	nd
meta- & para-Xylene	**10**	nd	nd	nd	nd	nd
Pentafluorobenzene-SURROGATE	**1**	98%	98%	97%	97%	100%
Toluene-D8-SURROGATE	**1**	88%	86%	86%	88%	83%
4-Bromofluorobenzene-SURROGATE	**1**	76%	77%	74%	82%	77%

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

Analyte	Lab No	E65600	E65601	E65602	E65603	E65604
		GW112	GW113	GW114	GW115	GW116
	Sample Id	7/12/98	7/12/98	7/12/98	7/12/98	7/12/98
	PQL					
E0290 Volatile Organic Compounds (µg/L)						
Benzene	5	nd	nd	nd	nd	nd
Bromobenzene	5	nd	nd	nd	nd	nd
Bromochloromethane	5	nd	nd	nd	nd	nd
Bromodichloromethane	5	nd	nd	nd	nd	nd
Bromoform	5	nd	nd	nd	nd	nd
Bromomethane	5	nd	nd	nd	nd	nd
n-Butylbenzene	5	nd	nd	nd	nd	nd
sec-Butylbenzene	5	nd	nd	nd	nd	nd
tert-Butylbenzene	5	nd	nd	nd	nd	nd
Carbon tetrachloride	5	nd	nd	nd	nd	nd
Chlorobenzene	5	nd	nd	nd	nd	nd
Chloroethane	5	nd	nd	nd	nd	nd
Chloroform	5	nd	nd	nd	nd	nd
Chloromethane	5	nd	nd	nd	nd	nd
2-Chlorotoluene	5	nd	nd	nd	nd	nd
4-Chlorotoluene	5	nd	nd	nd	nd	nd
Dibromochloromethane	5	nd	nd	nd	nd	nd
1.2-Dibromo-3-chloropropane	5	nd	nd	nd	nd	nd
1.2-Dibromoethane (EDB)	5	nd	nd	nd	nd	nd
Dibromomethane	5	nd	nd	nd	nd	nd
1.2-Dichlorobenzene	5	nd	nd	nd	nd	nd
1.3-Dichlorobenzene	5	nd	nd	nd	nd	nd
1.4-Dichlorobenzene	5	nd	nd	nd	nd	nd
Dichlorodifluoromethane	5	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

Analyte	Lab No	E65600	E65601	E65602	E65603	E65604
		GW112	GW113	GW114	GW115	GW116
	Sample Id	7/12/98	7/12/98	7/12/98	7/12/98	7/12/98
	PQL					
1.1-Dichloroethene	5	nd	nd	nd	nd	nd
1.2-Dichloroethane	5	nd	nd	nd	nd	nd
1.1-Dichloroethane	5	nd	nd	nd	nd	nd
cis-1.2-Dichloroethene	5	nd	nd	nd	nd	nd
trans-1.2-Dichloroethene	5	nd	nd	nd	nd	nd
1.2-Dichloropropane	5	nd	nd	nd	nd	nd
1.3-Dichloropropane	5	nd	nd	nd	nd	nd
2.2-Dichloropropane	5	nd	nd	nd	nd	nd
1.1-Dichloropropylene	5	nd	nd	nd	nd	nd
cis-1.3-Dichloropropylene	5	nd	nd	nd	nd	nd
trans-1.3-Dichloropropylene	5	nd	nd	nd	nd	nd
Ethylbenzene	5	nd	nd	nd	nd	nd
Hexachlorobutadiene	5	nd	nd	nd	nd	nd
Isopropylbenzene	5	nd	nd	nd	nd	nd
p-Isopropyltoluene	5	nd	nd	nd	nd	nd
Methylene chloride	5	nd	nd	nd	nd	nd
Naphthalene	5	nd	nd	nd	nd	nd
n-Propylbenzene	5	nd	nd	nd	nd	nd
Styrene	5	nd	nd	nd	nd	nd
1.1.1.2-Tetrachloroethane	5	nd	nd	nd	nd	nd
1.1.2.2-Tetrachloroethane	5	nd	nd	nd	nd	nd
Tetrachloroethene	5	nd	nd	nd	nd	nd
Toluene	5	nd	nd	nd	nd	nd
1.2.3-Trichlorobenzene	5	nd	nd	nd	nd	nd
1.2.4-Trichlorobenzene	5	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 : 8E02410
Client : PPK Adelaide
Reference : 27K140B-CANBERRA

Analyte	Lab No	E65600	E65601	E65602	E65603	E65604
		GW112	GW113	GW114	GW115	GW116
	Sample Id	7/12/98	7/12/98	7/12/98	7/12/98	7/12/98
	PQL					
1.1.1-Trichloroethane	**5**	nd	nd	nd	nd	nd
1.1.2-Trichloroethane	**5**	nd	nd	nd	nd	nd
Trichloroethene	**5**	nd	nd	nd	nd	nd
Trichlorofluoromethane	**5**	nd	nd	nd	nd	nd
1.2.3-Trichloropropane	**5**	nd	nd	nd	nd	nd
1.2.4-Trimethylbenzene	**5**	nd	nd	nd	nd	nd
1.3.5-Trimethylbenzene	**5**	nd	nd	nd	nd	nd
Vinyl chloride	**5**	nd	nd	nd	nd	nd
ortho-Xylene	**5**	nd	nd	nd	nd	nd
meta- & para-Xylene	**10**	nd	nd	nd	nd	nd
Pentafluorobenzene-SURROGATE	**1**	97%	94%	94%	78%	114%
Toluene-D8-SURROGATE	**1**	86%	88%	89%	87%	94%
4-Bromofluorobenzene-SURROGATE	**1**	74%	75%	73%	75%	83%

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

Analyte	Lab No	E65605	E65606	E65607		
		DUP4	RINSE BLAN	GW39		
	Sample Id	7/12/98K	7/12/98	7/12/98		
	PQL					
E0290 Volatile Organic Compounds (µg/L)						
Benzene	5	nd	nd	nd		
Bromobenzene	5	nd	nd	nd		
Bromochloromethane	5	nd	nd	nd		
Bromodichloromethane	5	nd	9	nd		
Bromoform	5	nd	5	nd		
Bromomethane	5	nd	nd	nd		
n-Butylbenzene	5	nd	nd	nd		
sec-Butylbenzene	5	nd	nd	nd		
tert-Butylbenzene	5	nd	nd	nd		
Carbon tetrachloride	5	nd	nd	nd		
Chlorobenzene	5	nd	nd	nd		
Chloroethane	5	nd	nd	nd		
Chloroform	5	nd	5	nd		
Chloromethane	5	nd	nd	nd		
2-Chlorotoluene	5	nd	nd	nd		
4-Chlorotoluene	5	nd	nd	nd		
Dibromochloromethane	5	nd	12	nd		
1.2-Dibromo-3-chloropropane	5	nd	nd	nd		
1.2-Dibromoethane (EDB)	5	nd	nd	nd		
Dibromomethane	5	nd	nd	nd		
1.2-Dichlorobenzene	5	nd	nd	nd		
1.3-Dichlorobenzene	5	nd	nd	nd		
1.4-Dichlorobenzene	5	nd	nd	nd		
Dichlorodifluoromethane	5	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

Analyte	Lab No	E65605	E65606	E65607		
		DUP4	RINSE BLAN	GW39		
	Sample Id	7/12/98K	7/12/98	7/12/98		
	PQL					
1.1-Dichloroethene	5	nd	nd	nd		
1.2-Dichloroethane	5	nd	nd	nd		
1.1-Dichloroethane	5	nd	nd	nd		
cis-1.2-Dichloroethene	5	nd	nd	nd		
trans-1.2-Dichloroethene	5	nd	nd	nd		
1.2-Dichloropropane	5	nd	nd	nd		
1.3-Dichloropropane	5	nd	nd	nd		
2.2-Dichloropropane	5	nd	nd	nd		
1.1-Dichloropropylene	5	nd	nd	nd		
cis-1.3-Dichloropropylene	5	nd	nd	nd		
trans-1.3-Dichloropropylene	5	nd	nd	nd		
Ethylbenzene	5	nd	nd	nd		
Hexachlorobutadiene	5	nd	nd	nd		
Isopropylbenzene	5	nd	nd	nd		
p-Isopropyltoluene	5	nd	nd	nd		
Methylene chloride	5	nd	nd	nd		
Naphthalene	5	nd	nd	nd		
n-Propylbenzene	5	nd	nd	nd		
Styrene	5	nd	nd	nd		
1.1.1.2-Tetrachloroethane	5	nd	nd	nd		
1.1.2.2-Tetrachloroethane	5	nd	nd	nd		
Tetrachloroethene	5	nd	nd	nd		
Toluene	5	nd	8	nd		
1.2.3-Trichlorobenzene	5	nd	nd	nd		
1.2.4-Trichlorobenzene	5	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 : 8E02410
Client : PPK Adelaide
Reference : 27K140B-CANBERRA

Analyte	Lab No	E65605	E65606	E65607		
		DUP4	RINSE BLAN	GW39		
	Sample Id	7/12/98K	7/12/98	7/12/98		
	PQL					
1.1.1-Trichloroethane	**5**	nd	nd	nd		
1.1.2-Trichloroethane	**5**	nd	nd	nd		
Trichloroethene	**5**	nd	nd	nd		
Trichlorofluoromethane	**5**	nd	nd	nd		
1.2.3-Trichloropropane	**5**	nd	nd	nd		
1.2.4-Trimethylbenzene	**5**	nd	35	nd		
1.3.5-Trimethylbenzene	**5**	nd	8	nd		
Vinyl chloride	**5**	nd	nd	nd		
ortho-Xylene	**5**	nd	24	nd		
meta- & para-Xylene	**10**	nd	28	nd		
Pentafluorobenzene-SURROGATE	**1**	78%	83%	80%		
Toluene-D8-SURROGATE	**1**	94%	94%	93%		
4-Bromofluorobenzene-SURROGATE	**1**	80%	93%	79%		

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

QA/QC APPENDIX NO. 8E02410

Method	Description
E0220	Total Petroleum Hydrocarbons
E4870	Dissolved Metals by ICP-MS
E48501	Mercury low level
E0290	Volatile Organic Compounds
E0180	Semivolatile Organic Compounds
E2600	pH
E2690	Total Dissolved Solids

Chromatography QA/QC

	Yes	No	N/A
Retention Time Window Within Acceptance Criteria(±2%)	√		
Check Standard Within Acceptance Criteria(±10%)	√		
Recalibration Within Acceptance Criteria(±15%)	√		

Other QA/QC

Holding time conforming With Method Specification	√		
Chain of Custody Attached	√		

N/A=Not Applicable

Comments

1. Laboratory QA/QC including Method Blanks, Duplicates, Matrix Spike Duplicates, Laboratory Control Samples or CRM's are included in this QA/QC appendix. (Where applicable)
2. Inter-Laboratory proficiency trial results available on request. (Where applicable)
3. Surrogate description and recoveries are recorded in the Report. (Where applicable)
4. Acceptance criteria for specific analytes are available upon request (Refer to SPM-01).
5. Practical Quantitation Limit (PQL is typically 2-10 x method detection limit (MDL)).
6. PQL's are matrix dependent and are increased accordingly where sample extracts are diluted.
7. Results are uncorrected for matrix spike or surrogate recoveries.

per G.W. ANDERSON
Manager Environmental Sydney

Job Number : 8E02410

QAQC : Spike Recoveries

Analyte	Spike Level	Level Detected		Recovery Details			
		Spike 1	Spike 2	Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E0220 TPH in Water (µg/L)							
Total C6-C36	9500	8170	8060	86%	85%	85%	1%
C6-C9 Fraction	4000	3700	3600	92%	90%	91%	2%
C15-C28 Fraction	5500	4500	4400	82%	81%	81%	1%
E4870 Dissolved Metals in Waters							
Arsenic	0.100	0.114	0.112	114%	112%	113%	2%
Cadmium	0.1000	0.100	0.098	100%	98%	99%	2%
Cobalt	0.100	0.095	0.093	95%	93%	94%	2%
Chromium	0.100	0.105	0.102	105%	102%	104%	3%
Copper	0.100	0.104	0.102	104%	102%	103%	2%
Manganese	0.100	0.098	0.092	98%	92%	95%	6%
Nickel	0.100	0.112	0.110	112%	110%	111%	2%
Lead	0.100	0.095	0.094	95%	94%	95%	1%
Zinc	0.100	0.109	0.107	109%	107%	108%	2%
E48501 Dissolved Mercury in Waters							
Mercury	0.001	0.00099	0.00098	100%	100%	100%	0%

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

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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Amdel

Job Number : 8E02410

QAQC : Laboratory Control Sample

Analyte	Level	Level Detected		Recovery Details			
		Result1	Result2	Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E2600 pH in Water							
pH	7.4	7.4		100%			
E2690 Total Dissolved Solids in Water							
TDS	293	299		102%			

PQL = Practical Quantitation Limit
-- = Not Applicable

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

nd = <PQL

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02410

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
E4870 Dissolved Metals in Waters					
Arsenic	**0.001**	0.004	0.004	0.004	0%
Cadmium	**0.0001**	nd	0.0001	0.0001	
Cobalt	**0.001**	nd	nd		
Chromium	**0.001**	0.003	0.003	0.003	0%
Copper	**0.001**	nd	nd		
Manganese	**0.001**	0.586	0.577	0.58	1%
Nickel	**0.001**	0.005	0.004	0.005	22%
Lead	**0.001**	nd	nd		
Zinc	**0.002**	0.012	0.010	0.01	18%
E48501 Dissolved Mercury in Waters					
Mercury	**0.00005**	0.00005	0.00005	0.00005	0%
E2600 pH in Water					
pH	**0.1**	7.1	7.1	7.1	0%
E2690 Total Dissolved Solids in Water					
TDS	**1**	588	562	575	4%

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

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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02410

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
E0180 Semivolatile Organic Compounds(μg/L)					
Phenol	**10**	nd	nd		
Aniline	**100**	nd	nd		
Bis(2-chloroethyl) ether	**10**	nd	nd		
2-Chlorophenol	**10**	nd	nd		
1.3-Dichlorobenzene	**10**	nd	nd		
1.4-Dichlorobenzene	**10**	nd	nd		
1.2-Dichlorobenzene	**10**	nd	nd		
Benzyl Alcohol	**10**	nd	nd		
2-Methylphenol	**10**	nd	nd		
N-Nitrosodi-n-propylamine	**10**	nd	nd		
Bis(2-chloroisopropyl) ether	**10**	nd	nd		
4-Methylphenol	**10**	nd	nd		
3-Methylphenol	**10**	nd	nd		
Hexachloroethane	**10**	nd	nd		
Nitrobenzene	**10**	nd	nd		
Isophorone	**10**	nd	nd		
2-Nitrophenol	**10**	nd	nd		
2.4-Dimethylphenol	**10**	nd	nd		
Bis(2-chloroethoxy) methane	**10**	nd	nd		
Benzoic Acid	**100**	nd	nd		
2.4-Dichlorophenol	**10**	nd	nd		
1.2.4-Trichlorobenzene	**10**	nd	nd		
Naphthalene	**10**	nd	nd		
4-Chloroaniline	**10**	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02410

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
Hexachlorobutadiene	**10**	nd	nd		
4-Chloro-3-methylphenol	**10**	nd	nd		
2-Methylnaphthalene	**10**	nd	nd		
Hexachlorocyclopentadiene	**10**	nd	nd		
2.4.6-Trichlorophenol	**10**	nd	nd		
2.4.5-Trichlorophenol	**10**	nd	nd		
2-Chloronaphthalene	**10**	nd	nd		
2-Nitroaniline	**10**	nd	nd		
Dimethyl phthalate	**10**	nd	nd		
2.6-Dinitrotoluene	**10**	nd	nd		
Acenaphthylene	**10**	nd	nd		
3-Nitroaniline	**10**	nd	nd		
Acenaphthene	**10**	nd	nd		
2.4-Dinitrophenol	**10**	nd	nd		
4-Nitrophenol	**10**	nd	nd		
Dibenzofuran	**10**	nd	nd		
Diethyl phthalate	**10**	nd	nd		
Fluorene	**10**	nd	nd		
4-Chlorophenyl phenyl ether	**10**	nd	nd		
4-Nitroaniline	**10**	nd	nd		
4.6-Dinitro-2-methylphenol	**10**	nd	nd		
Azobenzene	**100**	nd	nd		
N-Nitrosodiphenylamine	**100**	nd	nd		
a-BHC	**10**	nd	nd		
4-Bromophenyl phenyl ether	**10**	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02410

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
Hexachlorobenzene	**10**	nd	nd		
b-BHC	**10**	nd	nd		
Pentachlorophenol	**10**	nd	nd		
g-BHC	**10**	nd	nd		
Phenanthrene	**10**	nd	nd		
Anthracene	**10**	nd	nd		
d-BHC	**10**	nd	nd		
Heptachlor	**10**	nd	nd		
Di-n-butyl phthalate	**10**	nd	nd		
Aldrin	**10**	nd	nd		
Heptachlor epoxide	**10**	nd	nd		
Fluoranthene	**10**	nd	nd		
Pyrene	**10**	nd	nd		
Endosulfan 1	**10**	nd	nd		
4.4-DDE	**10**	nd	nd		
Dieldrin	**10**	nd	nd		
Endrin	**10**	nd	nd		
Endosulfan 2	**10**	nd	nd		
4.4-DDD	**10**	nd	nd		
Endrin aldehyde	**10**	nd	nd		
Butyl benzyl phthalate	**10**	nd	nd		
Endosulfan sulfate	**10**	nd	nd		
4.4-DDT	**10**	nd	nd		
3.3-Dichlorobenzidine	**100**	nd	nd		
Benzo(a)anthracene	**10**	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02410

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
Chrysene	**10**	nd	nd		
Bis(2-ethylhexyl) phthalate	**10**	nd	nd		
Di-n-octylphthalate	**10**	nd	nd		
Benzo(b)fluoranthene	**10**	nd	nd		
Benzo(k)fluoranthene	**10**	nd	nd		
Benzo(a)pyrene	**10**	nd	nd		
Indeno(1.2.3-cd)pyrene	**10**	nd	nd		
Dibenz(a.h)anthracene	**10**	nd	nd		
Benzo(g.h.i)perylene	**10**	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID PQL	Blank				
E0180 Semivolatile Organic Compounds(μg/L)						
Phenol	**10**	nd				
Aniline	**100**	nd				
Bis(2-chloroethyl) ether	**10**	nd				
2-Chlorophenol	**10**	nd				
1.3-Dichlorobenzene	**10**	nd				
1.4-Dichlorobenzene	**10**	nd				
1.2-Dichlorobenzene	**10**	nd				
Benzyl Alcohol	**10**	nd				
2-Methylphenol	**10**	nd				
N-Nitrosodi-n-propylamine	**10**	nd				
Bis(2-chloroisopropyl) ether	**10**	nd				
4-Methylphenol	**10**	nd				
3-Methylphenol	**10**	nd				
Hexachloroethane	**10**	nd				
Nitrobenzene	**10**	nd				
Isophorone	**10**	nd				
2-Nitrophenol	**10**	nd				
2.4-Dimethylphenol	**10**	nd				
Bis(2-chloroethoxy) methane	**10**	nd				
Benzoic Acid	**100**	nd				
2.4-Dichlorophenol	**10**	nd				
1.2.4-Trichlorobenzene	**10**	nd				
Naphthalene	**10**	nd				
4-Chloroaniline	**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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID	Blank				
	PQL					
Hexachlorobutadiene	**10**	nd				
4-Chloro-3-methylphenol	**10**	nd				
2-Methylnaphthalene	**10**	nd				
Hexachlorocyclopentadiene	**10**	nd				
2.4.6-Trichlorophenol	**10**	nd				
2.4.5-Trichlorophenol	**10**	nd				
2-Chloronaphthalene	**10**	nd				
2-Nitroaniline	**10**	nd				
Dimethyl phthalate	**10**	nd				
2.6-Dinitrotoluene	**10**	nd				
Acenaphthylene	**10**	nd				
3-Nitroaniline	**10**	nd				
Acenaphthene	**10**	nd				
2.4-Dinitrophenol	**10**	nd				
4-Nitrophenol	**10**	nd				
Dibenzofuran	**10**	nd				
Diethyl phthalate	**10**	nd				
Fluorene	**10**	nd				
4-Chlorophenyl phenyl ether	**10**	nd				
4-Nitroaniline	**10**	nd				
4.6-Dinitro-2-methylphenol	**10**	nd				
Azobenzene	**100**	nd				
N-Nitrosodiphenylamine	**100**	nd				
a-BHC	**10**	nd				
4-Bromophenyl phenyl ether	**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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID PQL	Blank				
Hexachlorobenzene	**10**	nd				
b-BHC	**10**	nd				
Pentachlorophenol	**10**	nd				
g-BHC	**10**	nd				
Phenanthrene	**10**	nd				
Anthracene	**10**	nd				
d-BHC	**10**	nd				
Heptachlor	**10**	nd				
Di-n-butyl phthalate	**10**	nd				
Aldrin	**10**	nd				
Heptachlor epoxide	**10**	nd				
Fluoranthene	**10**	nd				
Pyrene	**10**	nd				
Endosulfan 1	**10**	nd				
4.4-DDE	**10**	nd				
Dieldrin	**10**	nd				
Endrin	**10**	nd				
Endosulfan 2	**10**	nd				
4.4-DDD	**10**	nd				
Endrin aldehyde	**10**	nd				
Butyl benzyl phthalate	**10**	nd				
Endosulfan sulfate	**10**	nd				
4.4-DDT	**10**	nd				
3.3-Dichlorobenzidine	**100**	nd				
Benzo(a)anthracene	**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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID PQL	Blank				
Chrysene	**10**	nd				
Bis(2-ethylhexyl) phthalate	**10**	nd				
Di-n-octylphthalate	**10**	nd				
Benzo(b)fluoranthene	**10**	nd				
Benzo(k)fluoranthene	**10**	nd				
Benzo(a)pyrene	**10**	nd				
Indeno(1.2.3-cd)pyrene	**10**	nd				
Dibenz(a.h)anthracene	**10**	nd				
Benzo(g.h.i)perylene	**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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02410

QAQC : Spike Recoveries

Analyte	Spike Level	Level Spike 1	Detected Spike 2	Recovery Details Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E0290 Volatile Organic Compounds (µg/L)							
Benzene	25	25	25	99%	98%	99%	1%
Chlorobenzene	25	25	25	101%	99%	100%	2%
1.1-Dichloroethene	25	25	25	101%	100%	101%	1%
Toluene	25	26	24	103%	98%	100%	5%
Trichloroethene	25	24	25	97%	99%	98%	2%

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

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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
E0290 Volatile Organic Compounds (µg/L)					
Benzene	5	nd	nd		
Bromobenzene	5	nd	nd		
Bromochloromethane	5	nd	nd		
Bromodichloromethane	5	nd	nd		
Bromoform	5	nd	nd		
Bromomethane	5	nd	nd		
n-Butylbenzene	5	nd	nd		
sec-Butylbenzene	5	nd	nd		
tert-Butylbenzene	5	nd	nd		
Carbon tetrachloride	5	nd	nd		
Chlorobenzene	5	nd	nd		
Chloroethane	5	nd	nd		
Chloroform	5	nd	nd		
Chloromethane	5	nd	nd		
2-Chlorotoluene	5	nd	nd		
4-Chlorotoluene	5	nd	nd		
Dibromochloromethane	5	nd	nd		
1.2-Dibromo-3-chloropropane	5	nd	nd		
1.2-Dibromoethane (EDB)	5	nd	nd		
Dibromomethane	5	nd	nd		
1.2-Dichlorobenzene	5	nd	nd		
1.3-Dichlorobenzene	5	nd	nd		
1.4-Dichlorobenzene	5	nd	nd		
Dichlorodifluoromethane	5	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02410

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
1.1-Dichloroethene	5	nd	nd		
1.2-Dichloroethane	5	nd	nd		
1.1-Dichloroethane	5	nd	nd		
cis-1.2-Dichloroethene	5	nd	nd		
trans-1.2-Dichloroethene	5	nd	nd		
1.2-Dichloropropane	5	nd	nd		
1.3-Dichloropropane	5	nd	nd		
2.2-Dichloropropane	5	nd	nd		
1.1-Dichloropropylene	5	nd	nd		
cis-1.3-Dichloropropylene	5	nd	nd		
trans-1.3-Dichloropropylene	5	nd	nd		
Ethylbenzene	5	nd	nd		
Hexachlorobutadiene	5	nd	nd		
Isopropylbenzene	5	nd	nd		
p-Isopropyltoluene	5	nd	nd		
Methylene chloride	5	nd	nd		
Naphthalene	5	nd	nd		
n-Propylbenzene	5	nd	nd		
Styrene	5	nd	nd		
1.1.1.2-Tetrachloroethane	5	nd	nd		
1.1.2.2-Tetrachloroethane	5	nd	nd		
Tetrachloroethene	5	nd	nd		
Toluene	5	nd	nd		
1.2.3-Trichlorobenzene	5	nd	nd		
1.2.4-Trichlorobenzene	5	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02410

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
1.1.1-Trichloroethane	**5**	nd	nd		
1.1.2-Trichloroethane	**5**	nd	nd		
Trichloroethene	**5**	nd	nd		
Trichlorofluoromethane	**5**	nd	nd		
1.2.3-Trichloropropane	**5**	nd	nd		
1.2.4-Trimethylbenzene	**5**	nd	nd		
1.3.5-Trimethylbenzene	**5**	nd	nd		
Vinyl chloride	**5**	nd	nd		
ortho-Xylene	**5**	nd	nd		
meta- & para-Xylene	**10**	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID	Blank				
	PQL					
E0290 Volatile Organic Compounds (µg/L)						
Benzene	5	nd				
Bromobenzene	5	nd				
Bromochloromethane	5	nd				
Bromodichloromethane	5	nd				
Bromoform	5	nd				
Bromomethane	5	nd				
n-Butylbenzene	5	nd				
sec-Butylbenzene	5	nd				
tert-Butylbenzene	5	nd				
Carbon tetrachloride	5	nd				
Chlorobenzene	5	nd				
Chloroethane	5	nd				
Chloroform	5	nd				
Chloromethane	5	nd				
2-Chlorotoluene	5	nd				
4-Chlorotoluene	5	nd				
Dibromochloromethane	5	nd				
1.2-Dibromo-3-chloropropane	5	nd				
1.2-Dibromoethane (EDB)	5	nd				
Dibromomethane	5	nd				
1.2-Dichlorobenzene	5	nd				
1.3-Dichlorobenzene	5	nd				
1.4-Dichlorobenzene	5	nd				
Dichlorodifluoromethane	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID	Blank				
	PQL					
1.1-Dichloroethene	5	nd				
1.2-Dichloroethane	5	nd				
1.1-Dichloroethane	5	nd				
cis-1.2-Dichloroethene	5	nd				
trans-1.2-Dichloroethene	5	nd				
1.2-Dichloropropane	5	nd				
1.3-Dichloropropane	5	nd				
2.2-Dichloropropane	5	nd				
1.1-Dichloropropylene	5	nd				
cis-1.3-Dichloropropylene	5	nd				
trans-1.3-Dichloropropylene	5	nd				
Ethylbenzene	5	nd				
Hexachlorobutadiene	5	nd				
Isopropylbenzene	5	nd				
p-Isopropyltoluene	5	nd				
Methylene chloride	5	nd				
Naphthalene	5	nd				
n-Propylbenzene	5	nd				
Styrene	5	nd				
1.1.1.2-Tetrachloroethane	5	nd				
1.1.2.2-Tetrachloroethane	5	nd				
Tetrachloroethene	5	nd				
Toluene	5	nd				
1.2.3-Trichlorobenzene	5	nd				
1.2.4-Trichlorobenzene	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID	Blank				
	PQL					
1.1.1-Trichloroethane	**5**	nd				
1.1.2-Trichloroethane	**5**	nd				
Trichloroethene	**5**	nd				
Trichlorofluoromethane	**5**	nd				
1.2.3-Trichloropropane	**5**	nd				
1.2.4-Trimethylbenzene	**5**	nd				
1.3.5-Trimethylbenzene	**5**	nd				
Vinyl chloride	**5**	nd				
ortho-Xylene	**5**	nd				
meta- & para-Xylene	**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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

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 7584

Client: PPK Adelaide	**Our Ref:** 8E02410
Your Ref: 27K140B-CANBERRA	**Date:** 21/12/98

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

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

☐ **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 8688 Fax (08) 9 389 8447

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

Chain of Custody

Order No: 3518

Job Title: CANBERRA RAIL YARD "WATER"

PPK Job Number: 27K140B

Job Location: CANBERRA

Laboratory Name: AMDEL

Address: NSW

Fax Number:

Phone Number:

Contact Name:

Delivery Method:

Quote Number:

Project Manager: S. TAYLOR

Results Expected by/on: /

Fax Results to: N/A

Fax Number:

Phone Number:

Spreadsheet of Results Required: Y / N

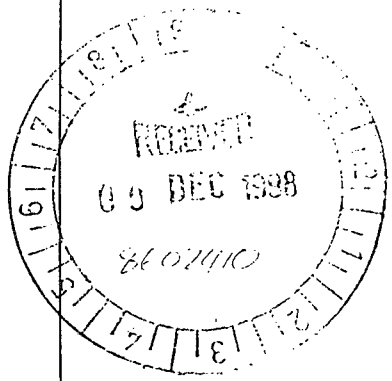
Format:

Turnaround Time Required: 5 day

Invoice to: N/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**	VOC's 8260	SVOC's 8270	pH	TDS	Initials	Comments/Additional Information and/or Analysis Required
7/12/98		GW 39	Various x 5				1	+				+	+	+	+	+		



Relinquished by:	Relinquished by:	Relinquished by:
Date & Time: 8/12/98	Date & Time:	Date & Time:
Company: PPK	Company:	Company:
Signature: MRKeynolds	Signature:	Signature:
Received in Good Order & Condition by (Name): A. TOMLINS	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):
Date & Time: 9.12.98	Date & Time:	Date & Time:
Company: AMDEL	Company:	Company:

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

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

☐ **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: 3575

Job Title: CANBERRA RAILYARDS *WATER*

Laboratory Name: AMDEL

Address: NSW

Fax Number:

Phone Number:

Contact Name:

Delivery Method:

Quote Number:

PPK Job Number: 27K140B

Job Location: CANBERRA

Project Manager: S. TAYLOR

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** ✓	VOC's 8260	SVOC's 8270 ✓	pH ✓	TDS ✓		Initials	Comments/Additional Information and/or Analysis Required
6/12/98		GW107	Various x 5					X				X	X	X	X	X			
6/12/98		GW108	"					X				X	X	X	X	X			
7/12/98		GW109	"					X				X	X	X	X	X			
"		GW110	"					X				X	X	X	X	X			
"		GW111	"					X				X	X	X	X	X			
"		GW112	"					X				X	X	X	X	X			
"		GW113	"					X				X	X	X	X	X			
"		GW114	"					X				X	X	X	X	X			
"		GW115	"					X				X	X	X	X	X			
"		GW116	"					X				X	X	X	X	X			
"		DUP 4	"					X				X	X	X	X	X			
"		Rinse Blank	"					X				X	X	X	X	X			

RECEIVED 09 DEC 1998

Relinquished by: M. Reynolds
Date & Time: 8/12/98
Company: PPK
Signature: MBR

Received in Good Order & Condition by (Name): A. Tomkins
Date & Time: 9.12.98 900am
Company: AMDEL

Relinquished by:
Date & Time:
Company:
Signature:

Received in Good Order & Condition by (Name):
Date & Time:
Company:

Relinquished by:
Date & Time:
Company:
Signature:

Received in Good Order & Condition by (Name):
Date & Time:
Company:

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 ...

amdel

Accreditation No. 1464

...test(s) reported herein have been performed in accordance with its terms of accreditation. This document shall not be reproduced except in full.

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 : 8E02411

ATTENTION : Mr Stuart Taylor

CLIENT : PPK Adelaide

SAMPLES : 20

REFERENCE : 27k140b/3570 & 3576

DATE RECEIVED : 09/12/98

DATE REPORTED : 18/12/98

Method	Description	Extracted	Analysed
E0110	Polycyclic Aromatic Hydrocarbons	14/12/98	15/12/98
E4870	Dissolved Metals by ICP-MS	14/12/98	14/12/98
E48501	Mercury low level	16/12/98	16/12/98
E0220	Total Petroleum Hydrocarbons	10/12/98	18/12/98
E0290	Volatile Organic Compounds	18/12/98	18/12/98

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.

PLEASE SEE ATTACHED PAGES FOR RESULTS

per G.W. ANDERSON
Manager Environmental Sydney

Job Number : 8E02411
Client : PPK Adelaide
Reference : 27k140b/3570 & 3576

Analyte	Lab No	E65608	E65609	E65610	E65611	E65612
		rinse bl	dup 1	gw 9	gw 10	gw 11
	Sample Id	04/12/98	04/12/98	04/12/98	04/12/98	04/12/98
	PQL					
E0110 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 PAH	1	nd	nd	nd	nd	nd
2-Fluorobiphenyl-SURROGATE	1	110%	105%	103%	93%	103%
Anthracene-D10-SURROGATE	1	90%	90%	85%	79%	82%
p-Terphenyl-D14-SURROGATE	1	120%	125%	125%	115%	119%

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 : 8E02411
Client : PPK Adelaide
Reference : 27k140b/3570 & 3576

Analyte	Lab No	E65613	E65614	E65615	E65616	E65617
		gw 12	gw 13	gw 14	gw 16	gw 106
	Sample Id	04/12/98	04/12/98	04/12/98	04/12/98	04/12/98
	PQL					
E0110 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 PAH	1	nd	nd	nd	nd	nd
2-Fluorobiphenyl-SURROGATE	1	97%	89%	93%	80%	92%
Anthracene-D10-SURROGATE	1	83%	82%	79%	70%	82%
p-Terphenyl-D14-SURROGATE	1	122%	117%	114%	104%	110%

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 : 8E02411
Client : PPK Adelaide
Reference : 27k140b/3570 & 3576

Analyte	Lab No	E65618	E65619	E65620	E65621	E65622
		dup 3	gw 36	gw 33	gw 35	gw 1
	Sample Id	06/12/98	06/12/98	06/12/98	06/12/98	06/12/98
	PQL					
E0110 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 PAH	1	nd	nd	nd	nd	nd
2-Fluorobiphenyl-SURROGATE	1	87%	76%	77%	84%	73%
Anthracene-D10-SURROGATE	1	76%	70%	72%	74%	70%
p-Terphenyl-D14-SURROGATE	1	103%	99%	109%	103%	98%

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 : 8E02411
Client : PPK Adelaide
Reference : 27k140b/3570 & 3576

Analyte	Lab No	E65623	E65624	E65625	E65626	E65627
		gw 2	gw 4	gw 37	gw 38	rinse bl
	Sample Id	06/12/98	06/12/98	06/12/98	06/12/98	06/12/98
	PQL					
E0110 PAH's in Water (µg/L)						
Naphthalene	1	9	139	nd	nd	nd
Acenaphthylene	1	nd	nd	nd	nd	nd
Acenaphthene	1	nd	nd	nd	nd	nd
Fluorene	1	nd	1	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 PAH	1	9	140	nd	nd	nd
2-Fluorobiphenyl-SURROGATE	1	83%	93%	86%	106%	100%
Anthracene-D10-SURROGATE	1	77%	77%	77%	107%	71%
p-Terphenyl-D14-SURROGATE	1	102%	97%	90%	116%	99%

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

Analyte	Lab No	E65608	E65609	E65610	E65611	E65612
		rinse bl	dup 1	gw 9	gw 10	gw 11
	Sample Id	04/12/98	04/12/98	04/12/98	04/12/98	04/12/98
	PQL					
E4870 Dissolved Metals in Waters						
Lead	**0.001**	nd	0.003	0.007	0.004	0.003
E48501 Dissolved Mercury in Waters						
Mercury	**0.00005**	nd	nd	nd	nd	nd
E0220 TPH in Water (µg/L)						
Total C6-C36	**20**	--	--	--	--	--
C6-C9 Fraction	**20**	--	--	--	--	--
C10-C14 Fraction	**20**	--	--	--	--	--
C15-C28 Fraction	**100**	--	--	--	--	--
C29-C36 Fraction	**100**	--	--	--	--	--

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 : 8E02411
Client : PPK Adelaide
Reference : 27k140b/3570 & 3576

Analyte	Lab No	E65613	E65614	E65615	E65616	E65617
		gw 12	gw 13	gw 14	gw 16	gw 106
	Sample Id	04/12/98	04/12/98	04/12/98	04/12/98	04/12/98
	PQL					
E4870 Dissolved Metals in Waters						
Lead	**0.001**	0.002	nd	0.003	0.004	0.001
E48501 Dissolved Mercury in Waters						
Mercury	**0.00005**	nd	nd	nd	0.00005	nd
E0220 TPH in Water (µg/L)						
Total C6-C36	**20**	--	--	--	--	--
C6-C9 Fraction	**20**	--	--	--	--	--
C10-C14 Fraction	**20**	--	--	--	--	--
C15-C28 Fraction	**100**	--	--	--	--	--
C29-C36 Fraction	**100**	--	--	--	--	--

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 : 8E02411
Client : PPK Adelaide
Reference : 27k140b/3570 & 3576

Analyte	Lab No	E65618	E65619	E65620	E65621	E65622
		dup 3	gw 36	gw 33	gw 35	gw 1
	Sample Id	06/12/98	06/12/98	06/12/98	06/12/98	06/12/98
	PQL					
E4870 Dissolved Metals in Waters						
Lead	**0.001**	0.074	0.079	0.120	0.009	0.001
E48501 Dissolved Mercury in Waters						
Mercury	**0.00005**	nd	nd	nd	nd	0.00059
E0220 TPH in Water (µg/L)						
Total C6-C36	**20**	nd	nd	nd	90	nd
C6-C9 Fraction	**20**	nd	nd	nd	40	nd
C10-C14 Fraction	**20**	nd	nd	nd	60	nd
C15-C28 Fraction	**100**	nd	nd	nd	nd	nd
C29-C36 Fraction	**100**	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 : 8E02411
Client : PPK Adelaide
Reference : 27k140b/3570 & 3576

Analyte	Lab No	E65623	E65624	E65625	E65626	E65627
		gw 2	gw 4	gw 37	gw 38	rinse bl
	Sample Id	06/12/98	06/12/98	06/12/98	06/12/98	06/12/98
	PQL					
E4870 Dissolved Metals in Waters						
Lead	**0.001**	0.001	0.012	nd	0.022	nd
E48501 Dissolved Mercury in Waters						
Mercury	**0.00005**	nd	0.00005	nd	nd	nd
E0220 TPH in Water (µg/L)						
Total C6-C36	**20**	8140	50100	nd	nd	nd
C6-C9 Fraction	**20**	7300	40900	nd	nd	nd
C10-C14 Fraction	**20**	810	8900	nd	nd	nd
C15-C28 Fraction	**100**	nd	340	nd	nd	nd
C29-C36 Fraction	**100**	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

Analyte	Lab No	E65618	E65619	E65620	E65621	E65622
		dup 3	gw 36	gw 33	gw 35	gw 1
	Sample Id	06/12/98	06/12/98	06/12/98	06/12/98	06/12/98
	PQL					
E0290 Volatile Organic Compounds (µg/L)						
Benzene	5	nd	nd	nd	nd	nd
Bromobenzene	5	nd	nd	nd	nd	nd
Bromochloromethane	5	nd	nd	nd	nd	nd
Bromodichloromethane	5	nd	nd	nd	nd	nd
Bromoform	5	nd	nd	nd	nd	nd
Bromomethane	5	nd	nd	nd	nd	nd
n-Butylbenzene	5	nd	nd	nd	nd	nd
sec-Butylbenzene	5	nd	nd	nd	nd	nd
tert-Butylbenzene	5	nd	nd	nd	nd	nd
Carbon tetrachloride	5	nd	nd	nd	nd	nd
Chlorobenzene	5	nd	nd	nd	nd	nd
Chloroethane	5	nd	nd	nd	nd	nd
Chloroform	5	nd	nd	nd	nd	nd
Chloromethane	5	nd	nd	nd	nd	nd
2-Chlorotoluene	5	nd	nd	nd	nd	nd
4-Chlorotoluene	5	nd	nd	nd	nd	nd
Dibromochloromethane	5	nd	nd	nd	nd	nd
1.2-Dibromo-3-chloropropane	5	nd	nd	nd	nd	nd
1.2-Dibromoethane (EDB)	5	nd	nd	nd	nd	nd
Dibromomethane	5	nd	nd	nd	nd	nd
1.2-Dichlorobenzene	5	nd	nd	nd	nd	nd
1.3-Dichlorobenzene	5	nd	nd	nd	nd	nd
1.4-Dichlorobenzene	5	nd	nd	nd	nd	nd
Dichlorodifluoromethane	5	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

Analyte	Lab No	E65618	E65619	E65620	E65621	E65622
		dup 3	gw 36	gw 33	gw 35	gw 1
	Sample Id	06/12/98	06/12/98	06/12/98	06/12/98	06/12/98
	PQL					
1.1-Dichloroethene	5	nd	nd	nd	nd	nd
1.2-Dichloroethane	5	nd	nd	nd	nd	nd
1.1-Dichloroethane	5	nd	nd	nd	nd	nd
cis-1.2-Dichloroethene	5	nd	nd	nd	nd	nd
trans-1.2-Dichloroethene	5	nd	nd	nd	nd	nd
1.2-Dichloropropane	5	nd	nd	nd	nd	nd
1.3-Dichloropropane	5	nd	nd	nd	nd	nd
2.2-Dichloropropane	5	nd	nd	nd	nd	nd
1.1-Dichloropropylene	5	nd	nd	nd	nd	nd
cis-1.3-Dichloropropylene	5	nd	nd	nd	nd	nd
trans-1.3-Dichloropropylene	5	nd	nd	nd	nd	nd
Ethylbenzene	5	nd	nd	nd	nd	nd
Hexachlorobutadiene	5	nd	nd	nd	nd	nd
Isopropylbenzene	5	nd	nd	nd	nd	nd
p-Isopropyltoluene	5	nd	nd	nd	nd	nd
Methylene chloride	5	15	nd	nd	nd	nd
Naphthalene	5	nd	nd	nd	nd	nd
n-Propylbenzene	5	nd	nd	nd	nd	nd
Styrene	5	nd	nd	nd	nd	nd
1.1.1.2-Tetrachloroethane	5	nd	nd	nd	nd	nd
1.1.2.2-Tetrachloroethane	5	nd	nd	nd	nd	nd
Tetrachloroethene	5	nd	nd	nd	nd	nd
Toluene	5	nd	nd	nd	nd	nd
1.2.3-Trichlorobenzene	5	nd	nd	nd	nd	nd
1.2.4-Trichlorobenzene	5	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 : 8E02411
Client : PPK Adelaide
Reference : 27k140b/3570 & 3576

Analyte	Lab No	E65618	E65619	E65620	E65621	E65622
		dup 3	gw 36	gw 33	gw 35	gw 1
	Sample Id	06/12/98	06/12/98	06/12/98	06/12/98	06/12/98
	PQL					
1.1.1-Trichloroethane	**5**	nd	nd	nd	nd	nd
1.1.2-Trichloroethane	**5**	nd	nd	nd	nd	nd
Trichloroethene	**5**	nd	nd	nd	nd	nd
Trichlorofluoromethane	**5**	nd	nd	nd	nd	nd
1.2.3-Trichloropropane	**5**	nd	nd	nd	nd	nd
1.2.4-Trimethylbenzene	**5**	nd	nd	nd	nd	nd
1.3.5-Trimethylbenzene	**5**	nd	nd	nd	nd	nd
Vinyl chloride	**5**	nd	nd	nd	nd	nd
ortho-Xylene	**5**	nd	nd	nd	nd	nd
meta- & para-Xylene	**10**	nd	nd	nd	nd	nd
Pentafluorobenzene-SURROGATE	**1**	101%	100%	93%	91%	90%
Toluene-D8-SURROGATE	**1**	92%	91%	90%	91%	92%
4-Bromofluorobenzene-SURROGATE	**1**	77%	80%	78%	80%	76%

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

Analyte	Lab No	E65623	E65624	E65625	E65626	E65627
		gw 2	gw 4	gw 37	gw 38	rinse bl
	Sample Id	06/12/98	06/12/98	06/12/98	06/12/98	06/12/98
	PQL					
E0290 Volatile Organic Compounds (µg/L)						
Benzene	5	3644	10407	nd	nd	nd
Bromobenzene	5	*<250	*<500	nd	nd	nd
Bromochloromethane	5	*<250	*<500	nd	nd	nd
Bromodichloromethane	5	*<250	*<500	nd	nd	nd
Bromoform	5	*<250	*<500	nd	nd	nd
Bromomethane	5	*<250	*<500	nd	nd	nd
n-Butylbenzene	5	*<250	*<500	nd	nd	nd
sec-Butylbenzene	5	*<250	*<500	nd	nd	nd
tert-Butylbenzene	5	*<250	*<500	nd	nd	nd
Carbon tetrachloride	5	*<250	*<500	nd	nd	nd
Chlorobenzene	5	*<250	*<500	nd	nd	nd
Chloroethane	5	*<250	*<500	nd	nd	nd
Chloroform	5	*<250	*<500	nd	nd	nd
Chloromethane	5	*<250	*<500	nd	nd	nd
2-Chlorotoluene	5	*<250	*<500	nd	nd	nd
4-Chlorotoluene	5	*<250	*<500	nd	nd	nd
Dibromochloromethane	5	*<250	*<500	nd	nd	nd
1.2-Dibromo-3-chloropropane	5	*<250	*<500	nd	nd	nd
1.2-Dibromoethane (EDB)	5	*<250	*<500	nd	nd	nd
Dibromomethane	5	*<250	*<500	nd	nd	nd
1.2-Dichlorobenzene	5	*<250	*<500	nd	nd	nd
1.3-Dichlorobenzene	5	*<250	*<500	nd	nd	nd
1.4-Dichlorobenzene	5	*<250	*<500	nd	nd	nd
Dichlorodifluoromethane	5	*<250	*<500	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
* : PQL raised due to matrix interefence.

Analyte	Lab No	E65623	E65624	E65625	E65626	E65627
		gw 2	gw 4	gw 37	gw 38	rinse bl
	Sample Id	06/12/98	06/12/98	06/12/98	06/12/98	06/12/98
	PQL					
1.1-Dichloroethene	5	*<250	*<500	nd	nd	nd
1.2-Dichloroethane	5	*<250	*<500	nd	nd	nd
1.1-Dichloroethane	5	*<250	*<500	nd	nd	nd
cis-1.2-Dichloroethene	5	*<250	*<500	nd	nd	nd
trans-1.2-Dichloroethene	5	*<250	*<500	nd	nd	nd
1.2-Dichloropropane	5	*<250	*<500	nd	nd	nd
1.3-Dichloropropane	5	*<250	*<500	nd	nd	nd
2.2-Dichloropropane	5	*<250	*<500	nd	nd	nd
1.1-Dichloropropylene	5	*<250	*<500	nd	nd	nd
cis-1.3-Dichloropropylene	5	*<250	*<500	nd	nd	nd
trans-1.3-Dichloropropylene	5	*<250	*<500	nd	nd	nd
Ethylbenzene	5	*<250	615	nd	nd	nd
Hexachlorobutadiene	5	*<250	*<500	nd	nd	nd
Isopropylbenzene	5	*<250	*<500	nd	nd	nd
p-Isopropyltoluene	5	*<250	*<500	nd	nd	nd
Methylene chloride	5	*<250	*<500	nd	nd	nd
Naphthalene	5	*<250	*<500	nd	nd	nd
n-Propylbenzene	5	*<250	*<500	nd	nd	nd
Styrene	5	*<250	*<500	nd	nd	nd
1.1.1.2-Tetrachloroethane	5	*<250	*<500	nd	nd	nd
1.1.2.2-Tetrachloroethane	5	*<250	*<500	nd	nd	nd
Tetrachloroethene	5	*<250	*<500	nd	nd	nd
Toluene	5	1792	11572	nd	nd	nd
1.2.3-Trichlorobenzene	5	*<250	*<500	nd	nd	nd
1.2.4-Trichlorobenzene	5	*<250	*<500	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
* : PQL raised due to matrix interefence.

Job Number : 8E02411
Client : PPK Adelaide
Reference : 27k140b/3570 & 3576

	Lab No	E65623	E65624	E65625	E65626	E65627
		gw 2	gw 4	gw 37	gw 38	rinse bl
	Sample Id	06/12/98	06/12/98	06/12/98	06/12/98	06/12/98
Analyte	PQL					
1.1.1-Trichloroethane	5	*<250	*<500	nd	nd	nd
1.1.2-Trichloroethane	5	*<250	*<500	nd	nd	nd
Trichloroethene	5	*<250	*<500	nd	nd	nd
Trichlorofluoromethane	5	*<250	*<500	nd	nd	nd
1.2.3-Trichloropropane	5	*<250	*<500	nd	nd	nd
1.2.4-Trimethylbenzene	5	*<250	756	nd	nd	nd
1.3.5-Trimethylbenzene	5	*<250	*<500	nd	nd	nd
Vinyl chloride	5	*<250	*<500	nd	nd	nd
ortho-Xylene	5	210	2323	nd	nd	nd
meta- & para-Xylene	10	806	6237	nd	nd	nd
Pentafluorobenzene-SURROGATE	1	86%	105%	87%	99%	94%
Toluene-D8-SURROGATE	1	88%	86%	92%	87%	87%
4-Bromofluorobenzene-SURROGATE	1	88%	89%	76%	74%	74%

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
* : PQL raised due to matrix interefence.

QA/QC APPENDIX NO. 8E02411

Method	Description
E0110	Polycyclic Aromatic Hydrocarbons
E4870	Dissolved Metals by ICP-MS
E48501	Mercury low level
E0220	Total Petroleum Hydrocarbons
E0290	Volatile Organic Compounds

Chromatography QA/QC

	Yes	No	N/A
Retention Time Window Within Acceptance Criteria(±2%)	√		
Check Standard Within Acceptance Criteria(±10%)	√		
Recalibration Within Acceptance Criteria(±15%)	√		

Other QA/QC

Holding time conforming With Method Specification	√		
Chain of Custody Attached	√		

N/A=Not Applicable

Comments

1. Laboratory QA/QC including Method Blanks, Duplicates, Matrix Spike Duplicates, Laboratory Control Samples or CRM's are included in this QA/QC appendix. (Where applicable)
2. Inter-Laboratory proficiency trial results available on request. (Where applicable)
3. Surrogate description and recoveries are recorded in the Report. (Where applicable)
4. Acceptance criteria for specific analytes are available upon request (Refer to SPM-01).
5. Practical Quantitation Limit (PQL is typically 2-10 x method detection limit (MDL)).
6. PQL's are matrix dependent and are increased accordingly where sample extracts are diluted.
7. Results are uncorrected for matrix spike or surrogate recoveries.

per G.W. ANDERSON
Manager Environmental Sydney

Amdel

Job Number : 8E02411

QAQC : Spike Recoveries

Analyte	Spike Level	Level Detected		Recovery Details			
		Spike 1	Spike 2	Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E0110 PAH's in Water (µg/L)							
Naphthalene	10	10	8	98%	75%	87%	27%
Acenaphthylene	10	9	7	94%	73%	84%	25%
Acenaphthene	10	10	8	103%	80%	92%	25%
Fluorene	10	10	8	104%	82%	93%	24%
Phenanthrene	10	11	9	107%	94%	101%	13%
Anthracene	10	11	9	105%	92%	99%	13%
Fluoranthene	10	12	11	116%	106%	111%	9%
Pyrene	10	11	10	114%	104%	109%	9%
Benz(a)anthracene	10	12	11	120%	114%	117%	5%
Chrysene	10	12	11	118%	111%	115%	6%
Benzo(b) & (k)fluoranthene	20	23	23	115%	115%	115%	0%
Benzo(a)pyrene	10	9	9	94%	88%	91%	7%
Indeno(1.2.3-cd)pyrene	10	9	9	91%	87%	89%	4%
Dibenz(a.h)anthracene	10	10	9	95%	90%	93%	5%
Benzo(g.h.i)perylene	10	10	10	103%	96%	100%	7%

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

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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02411

QAQC : Laboratory Control Sample

Analyte	Level	Level Detected		Recovery Details			
		Result1	Result2	Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E0110 PAH's in Water (µg/L)							
Naphthalene	10	8		80%			
Acenaphthylene	10	7		70%			
Acenaphthene	10	8		80%			
Fluorene	10	8		80%			
Phenanthrene	10	9		90%			
Anthracene	10	9		90%			
Fluoranthene	10	10		100%			
Pyrene	10	10		100%			
Benz(a)anthracene	10	11		110%			
Chrysene	10	10		100%			
Benzo(b) & (k)fluoranthene	20	20		100%			
Benzo(a)pyrene	10	9		90%			
Indeno(1.2.3-cd)pyrene	10	9		90%			
Dibenz(a.h)anthracene	10	8		80%			
Benzo(g.h.i)perylene	10	9		90%			

PQL = Practical Quantitation Limit
-- = Not Applicable

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

nd = <PQL

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02411

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
E0110 PAH's in Water (µg/L)					
Naphthalene	1	nd	nd		
Acenaphthylene	1	nd	nd		
Acenaphthene	1	nd	nd		
Fluorene	1	nd	nd		
Phenanthrene	1	nd	nd		
Anthracene	1	nd	nd		
Fluoranthene	1	nd	nd		
Pyrene	1	nd	nd		
Benz(a)anthracene	1	nd	nd		
Chrysene	1	nd	nd		
Benzo(b) & (k)fluoranthene	2	nd	nd		
Benzo(a)pyrene	1	nd	nd		
Indeno(1.2.3-cd)pyrene	1	nd	nd		
Dibenz(a.h)anthracene	1	nd	nd		
Benzo(g.h.i)perylene	1	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID PQL	Blank				
E0110 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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

amdel

Job Number : 8E02411

QAQC : Spike Recoveries

Analyte	Spike Level	Level Spike 1	Detected Spike 2	Recovery Details Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E4870 Dissolved Metals in Waters							
Lead	0.100	0.100	0.099	100%	99%	100%	1%
E48501 Dissolved Mercury in Waters							
Mercury	0.001	0.0010	0.0010	100%	100%	100%	0%
E0220 TPH in Water (µg/L)							
Total C6-C36	9500	11400	11300	120%	119%	119%	0%
C6-C9 Fraction	4000	4800	5100	120%	127%	124%	6%
C15-C28 Fraction	5500	6600	6200	119%	113%	116%	5%

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

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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02411

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
E4870 Dissolved Metals in Waters					
Lead	**0.001**	nd	nd		
E48501 Dissolved Mercury in Waters					
Mercury	**0.00005**	nd	nd		
E0220 TPH in Water (µg/L)					
Total C6-C36	**20**	nd	nd		
C6-C9 Fraction	**20**	nd	nd		
C10-C14 Fraction	**20**	nd	nd		
C15-C28 Fraction	**100**	nd	nd		
C29-C36 Fraction	**100**	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID	Blank				
	PQL					
E4870 Dissolved Metals in Waters						
Lead	**0.001**	nd				
E48501 Dissolved Mercury in Waters						
Mercury	**0.00005**	nd				
E0220 TPH in Water (µg/L)						
Total C6-C36	**20**	nd				
C6-C9 Fraction	**20**	nd				
C10-C14 Fraction	**20**	nd				
C15-C28 Fraction	**100**	nd				
C29-C36 Fraction	**100**	nd				

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

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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02411

QAQC : Spike Recoveries

Analyte	Spike Level	Level Spike 1	Detected Spike 2	Recovery Details Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E0290 Volatile Organic Compounds (µg/L)							
Benzene	25	26	26	104%	103%	104%	1%
Chlorobenzene	25	26	26	104%	103%	104%	1%
1.1-Dichloroethene	25	27	29	108%	114%	111%	6%
Toluene	25	27	26	107%	105%	106%	2%
Trichloroethene	25	23	23	93%	93%	93%	0%

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

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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
E0290 Volatile Organic Compounds (µg/L)					
Benzene	5	nd	nd		
Bromobenzene	5	nd	nd		
Bromochloromethane	5	nd	nd		
Bromodichloromethane	5	nd	nd		
Bromoform	5	nd	nd		
Bromomethane	5	nd	nd		
n-Butylbenzene	5	nd	nd		
sec-Butylbenzene	5	nd	nd		
tert-Butylbenzene	5	nd	nd		
Carbon tetrachloride	5	nd	nd		
Chlorobenzene	5	nd	nd		
Chloroethane	5	nd	nd		
Chloroform	5	nd	nd		
Chloromethane	5	nd	nd		
2-Chlorotoluene	5	nd	nd		
4-Chlorotoluene	5	nd	nd		
Dibromochloromethane	5	nd	nd		
1.2-Dibromo-3-chloropropane	5	nd	nd		
1.2-Dibromoethane (EDB)	5	nd	nd		
Dibromomethane	5	nd	nd		
1.2-Dichlorobenzene	5	nd	nd		
1.3-Dichlorobenzene	5	nd	nd		
1.4-Dichlorobenzene	5	nd	nd		
Dichlorodifluoromethane	5	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02411

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
1.1-Dichloroethene	5	nd	nd		
1.2-Dichloroethane	5	nd	nd		
1.1-Dichloroethane	5	nd	nd		
cis-1.2-Dichloroethene	5	nd	nd		
trans-1.2-Dichloroethene	5	nd	nd		
1.2-Dichloropropane	5	nd	nd		
1.3-Dichloropropane	5	nd	nd		
2.2-Dichloropropane	5	nd	nd		
1.1-Dichloropropylene	5	nd	nd		
cis-1.3-Dichloropropylene	5	nd	nd		
trans-1.3-Dichloropropylene	5	nd	nd		
Ethylbenzene	5	nd	nd		
Hexachlorobutadiene	5	nd	nd		
Isopropylbenzene	5	nd	nd		
p-Isopropyltoluene	5	nd	nd		
Methylene chloride	5	13	15	14	14%
Naphthalene	5	nd	nd		
n-Propylbenzene	5	nd	nd		
Styrene	5	nd	nd		
1.1.1.2-Tetrachloroethane	5	nd	nd		
1.1.2.2-Tetrachloroethane	5	nd	nd		
Tetrachloroethene	5	nd	nd		
Toluene	5	nd	nd		
1.2.3-Trichlorobenzene	5	nd	nd		
1.2.4-Trichlorobenzene	5	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02411

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
1.1.1-Trichloroethane	**5**	nd	nd		
1.1.2-Trichloroethane	**5**	nd	nd		
Trichloroethene	**5**	nd	nd		
Trichlorofluoromethane	**5**	nd	nd		
1.2.3-Trichloropropane	**5**	nd	nd		
1.2.4-Trimethylbenzene	**5**	nd	nd		
1.3.5-Trimethylbenzene	**5**	nd	nd		
Vinyl chloride	**5**	nd	nd		
ortho-Xylene	**5**	nd	nd		
meta- & para-Xylene	**10**	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID PQL	Blank				
E0290 Volatile Organic Compounds (µg/L)						
Benzene	5	nd				
Bromobenzene	5	nd				
Bromochloromethane	5	nd				
Bromodichloromethane	5	nd				
Bromoform	5	nd				
Bromomethane	5	nd				
n-Butylbenzene	5	nd				
sec-Butylbenzene	5	nd				
tert-Butylbenzene	5	nd				
Carbon tetrachloride	5	nd				
Chlorobenzene	5	nd				
Chloroethane	5	nd				
Chloroform	5	nd				
Chloromethane	5	nd				
2-Chlorotoluene	5	nd				
4-Chlorotoluene	5	nd				
Dibromochloromethane	5	nd				
1.2-Dibromo-3-chloropropane	5	nd				
1.2-Dibromoethane (EDB)	5	nd				
Dibromomethane	5	nd				
1.2-Dichlorobenzene	5	nd				
1.3-Dichlorobenzene	5	nd				
1.4-Dichlorobenzene	5	nd				
Dichlorodifluoromethane	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID	Blank				
	PQL					
1.1-Dichloroethene	5	nd				
1.2-Dichloroethane	5	nd				
1.1-Dichloroethane	5	nd				
cis-1.2-Dichloroethene	5	nd				
trans-1.2-Dichloroethene	5	nd				
1.2-Dichloropropane	5	nd				
1.3-Dichloropropane	5	nd				
2.2-Dichloropropane	5	nd				
1.1-Dichloropropylene	5	nd				
cis-1.3-Dichloropropylene	5	nd				
trans-1.3-Dichloropropylene	5	nd				
Ethylbenzene	5	nd				
Hexachlorobutadiene	5	nd				
Isopropylbenzene	5	nd				
p-Isopropyltoluene	5	nd				
Methylene chloride	5	nd				
Naphthalene	5	nd				
n-Propylbenzene	5	nd				
Styrene	5	nd				
1.1.1.2-Tetrachloroethane	5	nd				
1.1.2.2-Tetrachloroethane	5	nd				
Tetrachloroethene	5	nd				
Toluene	5	nd				
1.2.3-Trichlorobenzene	5	nd				
1.2.4-Trichlorobenzene	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID	Blank				
	PQL					
1.1.1-Trichloroethane	**5**	nd				
1.1.2-Trichloroethane	**5**	nd				
Trichloroethene	**5**	nd				
Trichlorofluoromethane	**5**	nd				
1.2.3-Trichloropropane	**5**	nd				
1.2.4-Trimethylbenzene	**5**	nd				
1.3.5-Trimethylbenzene	**5**	nd				
Vinyl chloride	**5**	nd				
ortho-Xylene	**5**	nd				
meta- & para-Xylene	**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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

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 7584

Client: PPK Adelaide	**Our Ref:** 8E02411
Your Ref: 27k140b/3570 & 3576	**Date:** 18/12/98

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

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:

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

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

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

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

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

Chain of Custody

Order No: 3570

Job Title: * water *
CANBERRA RAILWAY YARDS

Laboratory Name: AMDEL

Address: NSW

Fax Number:

Phone Number:

Contact Name:

Delivery Method:

Quote Number:

PPK Job Number: 27K140B

Job Location: CANBERRA

Project Manager: STUART TAYLOR

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**	Initials	Comments/Additional Information and/or Analysis Required
4/12/98	-	Rinse Blank	1x1000 1x 75	E65608			1			X	X	X		
"	/	DUP 1	"	09			1			X		X		
"	/	GW9	"	10			1			X		X		
"	/	GW10	"	11			1			X		X		
"	/	GW11	"	12			1			X		X		
"	/	GW12	"	13			1			X		X		
"	/	GW13	"	14			1			X		X		
"	/	GW14	"	15			1			X		X		
"	/	GW16	"	16			1			X		X		
"	/	GW106	"	17			1			X		X		

RECEIVED
09 DEC 1998
BEC2411

Relinquished by: M. Reynolds	Relinquished by:	Relinquished by:	Medium*: S = Soil, W = Water, V = Vapour
Date & Time: 8/12/98	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
Signature: MBR	Signature:	Signature:	Li Mg Mn Ni Pb Se Sn V Zn
Received in Good Order & Condition by (Name): ATOMICAS	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):	Samples on Ice: ☑ Yes ☐ No
Date & Time: 9.12.98 9:00am	Date & Time:	Date & Time:	*Please fax back a signed copy when samples are received at the laboratory*
Company: AMDEL	Company:	Company:	
Signature:	Signature:	Signature:	

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
- ☐ 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: 3576

Job Title: CANBERRA RAILYARDS * WATER *

Laboratory Name: AMDEL

Address: NSW

Fax Number:

Phone Number:

Contact Name:

Delivery Method:

Quote Number:

PPK Job Number: 27K140 B

Job Location: CANBERRA

Project Manager: S. TAYLOR

Results Expected by/on:

Fax Results to: A/A

Fax Number:

Phone Number:

Spreadsheet of Results Required: Y / N

Format:

Turnaround Time Required: ~~ATA~~ 5days

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**	Voc's 8260	Initials	Comments/Additional Information and/or Analysis Required
6/12/98		DUP3	various/4	E65618				X		X		X	X		
"		GW36	"	19				X		X		X	X		
"		GW33	"	20				X		X		X	X		
"		GW35	"	21				X		X		X	X		
"		GW1	"	22				X		X		X	X		
"		GW2	"	23				X		X		X	X		
"		GW4	"	24				X		X		X	X		
"		GW37	"	25				X		X		X	X		
"		GW38	"	26				X		X		X	X		
6/12/98		Rinse Blank	"	27				X		X		X	X		
		SR													

RECEIVED
09 DEC 1998
BE02411

Relinquished by: M. Reynolds
Date & Time: 8/12/98
Company: PPK
Signature: MRR

Relinquished by:
Date & Time:
Company:
Signature:

Relinquished by:
Date & Time:
Company:
Signature:

Received in Good Order & Condition by (Name): A. TOMLINS
Date & Time: 9-12-98 900am
Company: AMDEL
Signature:

Received in Good Order & Condition by (Name):
Date & Time:
Company:
Signature:

Received in Good Order & Condition by (Name):
Date & Time:
Company:
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) Ir 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

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 : 8E02412 Rev.1

ATTENTION : Mr Stuart Taylor

CLIENT : PPK Adelaide

SAMPLES : 14

REFERENCE : 27K140B-8/12/98

DATE RECEIVED : 09/12/98

DATE REPORTED : 24/12/98

Method	Description	Extracted	Analysed
E0220	Total Petroleum Hydrocarbons	15/12/98	17/12/98
E0010	Benzene,Toluene,Ethylbenzene & Xylene	16/12/98	18/12/98
E0110	Polycyclic Aromatic Hydrocarbons	09/12/98	11/12/98
E4870	Dissolved Metals by ICP-MS	15/12/98	15/12/98
E48501	Mercury low level	15/12/98	15/12/98

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 amended report replaces the report issued on the 17/12/98.
Please replace all copies of the previously issued report with this amended report.
Note that for schemes indicated with * NATA accreditation does not cover the performance of this service.

PLEASE SEE ATTACHED PAGES FOR RESULTS

per G.W. ANDERSON
Manager Environmental Sydney

Job Number : 8E02412 Rev.1
Client : PPK Adelaide
Reference : 27K140B-8/12/98

Analyte	Lab No	E65628	E65629	E65630	E65631	E65632
			RINSE			
	Sample Id	DUP5	BLANK	GW 30	GW 32	GW 17
	PQL					
E0220 TPH in Water (µg/L)						
Total C6-C36	**20**	nd	351	nd	nd	nd
C6-C9 Fraction	**20**	nd	80	nd	nd	nd
C10-C14 Fraction	**20**	nd	160	nd	nd	nd
C15-C28 Fraction	**100**	nd	110	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	8	nd	nd	nd
Ethylbenzene	**1**	nd	4	nd	nd	nd
Total Xylenes	**3**	nd	54	nd	nd	nd
E4870 Dissolved Metals in Waters						
Arsenic	**0.001**	--	--	--	nd	--
Chromium	**0.001**	--	--	--	0.003	--
Copper	**0.001**	--	--	--	nd	--
Cadmium	**0.0001**	--	--	--	nd	--
Lead	**0.001**	0.001	nd	nd	0.001	0.003
Zinc	**0.002**	--	--	--	0.004	--
E48501 Dissolved Mercury in Waters						
Mercury	**0.00005**	nd	nd	0.00005	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

Analyte	Lab No / Sample Id / PQL	E65633 GW 21	E65634 GW 26	E65635 GW 28	E65636 GW 22	E65637 GW 19
E0220 TPH in Water (µg/L)						
Total C6-C36	**20**	nd	nd	nd	nd	nd
C6-C9 Fraction	**20**	nd	nd	nd	nd	nd
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**	4.0	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
E4870 Dissolved Metals in Waters						
Arsenic	**0.001**	--	--	--	--	--
Chromium	**0.001**	--	--	--	--	--
Copper	**0.001**	--	--	--	--	--
Cadmium	**0.0001**	--	--	--	--	--
Lead	**0.001**	nd	0.002	0.003	0.002	0.003
Zinc	**0.002**	--	--	--	--	--
E48501 Dissolved Mercury in Waters						
Mercury	**0.00005**	nd	0.00005	nd	0.00005	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

Analyte	Lab No / Sample Id / PQL	E65638 GW 24	E65639 PMW 1	E65640 PMW 2	E65641 PMW 3
E0220 TPH in Water (µg/L)					
Total C6-C36	**20**	4130	2520	nd	nd
C6-C9 Fraction	**20**	40	150	nd	nd
C10-C14 Fraction	**20**	2200	1500	nd	nd
C15-C28 Fraction	**100**	1900	900	nd	nd
C29-C36 Fraction	**100**	nd	nd	nd	nd
E0010 BTEX (P&T) in Water (µg/L)					
Benzene	**0.5**	12.0	26.0	1.0	nd
Toluene	**1**	1	1	nd	nd
Ethylbenzene	**1**	nd	94	nd	nd
Total Xylenes	**3**	nd	16	nd	nd
E4870 Dissolved Metals in Waters					
Arsenic	**0.001**	--	--	--	--
Chromium	**0.001**	--	--	--	--
Copper	**0.001**	--	--	--	--
Cadmium	**0.0001**	--	--	--	--
Lead	**0.001**	0.003	0.006	0.006	nd
Zinc	**0.002**	--	--	--	--
E48501 Dissolved Mercury in Waters					
Mercury	**0.00005**	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 : 8E02412 Rev.1
Client : PPK Adelaide
Reference : 27K140B-8/12/98

Analyte	Lab No	E65628	E65629	E65630	E65631	E65632
			RINSE			
	Sample Id	DUP5	BLANK	GW 30	GW 32	GW 17
	PQL					
E0110 PAH's in Water (µg/L)						
Naphthalene	1	nd	3	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 PAH	1	nd	3	nd	nd	nd
2-Fluorobiphenyl-SURROGATE	1	94%	98%	83%	92%	98%
Anthracene-D10-SURROGATE	1	96%	97%	81%	77%	75%
p-Terphenyl-D14-SURROGATE	1	126%	125%	106%	113%	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

Analyte	Lab No	E65633	E65634	E65635	E65636	E65637
	Sample Id	GW 21	GW 26	GW 28	GW 22	GW 19
	PQL					
E0110 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 PAH	1	nd	nd	nd	nd	nd
2-Fluorobiphenyl-SURROGATE	1	95%	85%	97%	82%	78%
Anthracene-D10-SURROGATE	1	74%	70%	75%	70%	70%
p-Terphenyl-D14-SURROGATE	1	110%	107%	103%	95%	97%

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

Analyte	Lab No	E65638	E65639	E65640	E65641	
	Sample Id	GW 24	PMW 1	PMW 2	PMW 3	
	PQL					
E0110 PAH's in Water (µg/L)						
Naphthalene	1	7	22	nd	nd	
Acenaphthylene	1	1	nd	nd	nd	
Acenaphthene	1	3	1	nd	nd	
Fluorene	1	4	1	nd	nd	
Phenanthrene	1	2	nd	nd	nd	
Anthracene	1	nd	nd	nd	nd	
Fluoranthene	1	nd	nd	nd	nd	
Pyrene	1	nd	nd	nd	nd	
Benz(a)anthracene	1	nd	nd	nd	nd	
Chrysene	1	nd	nd	nd	nd	
Benzo(b) & (k)fluoranthene	2	nd	nd	nd	nd	
Benzo(a)pyrene	1	nd	nd	nd	nd	
Indeno(1.2.3-cd)pyrene	1	nd	nd	nd	nd	
Dibenz(a.h)anthracene	1	nd	nd	nd	nd	
Benzo(g.h.i)perylene	1	nd	nd	nd	nd	
Total PAH	1	17	24	nd	nd	
2-Fluorobiphenyl-SURROGATE	1	83%	82%	84%	86%	
Anthracene-D10-SURROGATE	1	70%	70%	76%	71%	
p-Terphenyl-D14-SURROGATE	1	87%	85%	100%	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

QA/QC APPENDIX NO. 8E02412 Rev.1

Method	Description
E0220	Total Petroleum Hydrocarbons
E0010	Benzene, Toluene, Ethylbenzene & Xylene
E0110	Polycyclic Aromatic Hydrocarbons
E4870	Dissolved Metals by ICP-MS
E4870	Dissolved Metals by ICP-MS
E48501	Mercury low level

Chromatography QA/QC

	Yes	No	N/A
Retention Time Window Within Acceptance Criteria(±2%)	√		
Check Standard Within Acceptance Criteria(±10%)	√		
Recalibration Within Acceptance Criteria(±15%)	√		

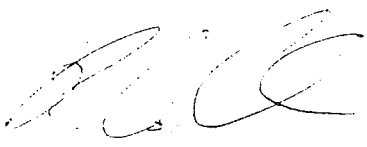
Other QA/QC

Holding time conforming With Method Specification	√		
Chain of Custody Attached	√		

N/A=Not Applicable

Comments

1. Laboratory QA/QC including Method Blanks, Duplicates, Matrix Spike Duplicates, Laboratory Control Samples or CRM's are included in this QA/QC appendix. (Where applicable)
2. Inter-Laboratory proficiency trial results available on request. (Where applicable)
3. Surrogate description and recoveries are recorded in the Report. (Where applicable)
4. Acceptance criteria for specific analytes are available upon request (Refer to SPM-01).
5. Practical Quantitation Limit (PQL is typically 2-10 x method detection limit (MDL)).
6. PQL's are matrix dependent and are increased accordingly where sample extracts are diluted.
7. Results are uncorrected for matrix spike or surrogate recoveries.



per G.W. ANDERSON
Manager Environmental Sydney

Job Number : 8E02412 Rev.1

QAQC : Spike Recoveries

Analyte	Spike Level	Level Detected		Recovery Details			
		Spike 1	Spike 2	Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E0220 TPH in Water (µg/L)							
Total C6-C36	9500	8810	10800	93%	113%	103%	20%
C6-C9 Fraction	4000	3700	4900	91%	123%	107%	29%
C15-C28 Fraction	5500	5200	5900	94%	106%	100%	13%
E4870 Dissolved Metals in Waters							
Arsenic	0.100	0.105	0.103	105%	103%	104%	2%
Chromium	0.100	0.106	0.105	106%	105%	106%	1%
Copper	0.100	0.096	0.094	96%	94%	95%	2%
Cadmium	0.1000	0.10	0.10	103%	101%	102%	2%
Lead	0.100	0.102	0.101	102%	101%	102%	1%
Zinc	0.100	0.101	0.099	101%	99%	100%	2%
E48501 Dissolved Mercury in Waters							
Mercury	0.001	0.0010	0.0010	100%	100%	100%	0%

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

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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

amdel

Job Number : 8E02412 Rev.1

QAQC : Laboratory Control Sample

Analyte	Level	Level	Detected	Recovery Details			
		Result1	Result2	Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E0010 BTEX (P&T) in Water (µg/L)							
Benzene	10	10.0		100%			
Toluene	10	10		100%			
Ethylbenzene	10	10		100%			
Total Xylenes	30	30		100%			

PQL = Practical Quantitation Limit
-- = Not Applicable

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

nd = <PQL

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
E0220 TPH in Water (µg/L)					
Total C6-C36	**20**	nd	nd		
C6-C9 Fraction	**20**	nd	nd		
C10-C14 Fraction	**20**	nd	nd		
C15-C28 Fraction	**100**	nd	nd		
C29-C36 Fraction	**100**	nd	nd		
E0010 BTEX (P&T) in Water (µg/L)					
Benzene	**0.5**	nd	nd		
Toluene	**1**	nd	nd		
Ethylbenzene	**1**	nd	nd		
Total Xylenes	**3**	nd	nd		
Lead	**0.001**	0.001	0.001	0.001	0%
E48501 Dissolved Mercury in Waters					
Mercury	**0.00005**	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID PQL	Blank				
E0220 TPH in Water (µg/L)						
Total C6-C36	**20**	nd				
C6-C9 Fraction	**20**	nd				
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				
E4870 Dissolved Metals in Waters						
Arsenic	**0.001**	nd				
Chromium	**0.001**	nd				
Copper	**0.001**	nd				
Cadmium	**0.0001**	nd				
Lead	**0.001**	nd				
Zinc	**0.002**	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Spike Recoveries

Analyte	Spike Level	Level Spike 1	Detected Spike 2	Recovery Details Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E0110 PAH's in Water (µg/L)							
Naphthalene	10	9	7	91%	70%	81%	26%
Acenaphthylene	10	8	7	81%	70%	76%	15%
Acenaphthene	10	9	8	90%	76%	83%	17%
Fluorene	10	9	8	91%	76%	84%	18%
Phenanthrene	10	9	8	94%	80%	87%	16%
Anthracene	10	9	8	94%	80%	87%	16%
Fluoranthene	10	10	9	100%	87%	94%	14%
Pyrene	10	10	9	98%	86%	92%	13%
Benz(a)anthracene	10	10	9	101%	91%	96%	10%
Chrysene	10	10	10	104%	97%	101%	7%
Benzo(b) & (k)fluoranthene	20	19	18	95%	90%	93%	5%
Benzo(a)pyrene	10	8	7	81%	70%	76%	15%
Indeno(1.2.3-cd)pyrene	10	7	8	72%	75%	74%	4%
Dibenz(a.h)anthracene	10	7	8	71%	79%	75%	11%
Benzo(g.h.i)perylene	10	8	7	78%	71%	75%	9%

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

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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Laboratory Control Sample

Analyte	Level	Level	Detected	Recovery Details			
		Result1	Result2	Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E0110 PAH's in Water (µg/L)							
Naphthalene	10	8		80%			
Acenaphthylene	10	7		70%			
Acenaphthene	10	8		80%			
Fluorene	10	8		80%			
Phenanthrene	10	9		90%			
Anthracene	10	9		90%			
Fluoranthene	10	10		100%			
Pyrene	10	10		100%			
Benz(a)anthracene	10	11		110%			
Chrysene	10	10		100%			
Benzo(b) & (k)fluoranthene	20	20		100%			
Benzo(a)pyrene	10	9		90%			
Indeno(1.2.3-cd)pyrene	10	9		90%			
Dibenz(a.h)anthracene	10	8		80%			
Benzo(g.h.i)perylene	10	9		90%			

PQL = Practical Quantitation Limit
-- = Not Applicable

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

nd = <PQL

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
E0110 PAH's in Water (µg/L)					
Naphthalene	1	nd	nd		
Acenaphthylene	1	nd	nd		
Acenaphthene	1	nd	nd		
Fluorene	1	nd	nd		
Phenanthrene	1	nd	nd		
Anthracene	1	nd	nd		
Fluoranthene	1	nd	nd		
Pyrene	1	nd	nd		
Benz(a)anthracene	1	nd	nd		
Chrysene	1	nd	nd		
Benzo(b) & (k)fluoranthene	2	nd	nd		
Benzo(a)pyrene	1	nd	nd		
Indeno(1.2.3-cd)pyrene	1	nd	nd		
Dibenz(a.h)anthracene	1	nd	nd		
Benzo(g.h.i)perylene	1	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID PQL	Blank				
E0110 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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

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Environment & Infrastructure
ACN 078 004 798

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services from the office indicated:

☑ Adelaide
101 Pirie Street Adelaide SA 5000
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Tel: (07) 3218 2222 Fax: (07) 3831 4223

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

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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

Order No: 3579

Job Title: CANBERRA RAILYARDS
Laboratory Name: AMDEL
Address: NSW
Fax Number:
Phone Number:
Contact Name:
Delivery Method:
Quote Number:

PPK Job Number: 27K140B

Job Location: CANBERRA

Project Manager: S TAYLOR
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**	Initials	Comments/Additional Information and/or Analysis Required
8/12/99		DUP 5					1	X	X	X		X		
		Rinse Blank					1	X	X	X		X		
		GW 30					1	X	X	X		X		
		GW 32					1	X	X	X		X		
		GW 17					1	X	X	X		X		
		GW 21					1	X	X	X		X		
		GW 26					1	X	X	X		X		
		GW 25					1	X	X	X		X		
		GW 22					1	X	X	X		X		
		GW 19					1	X	X	X		X		
		GW 24					1	X	X	X		X		
		PMW 1					1	X	X	X		Y		

Metals are ~~[redacted]~~ ↓ Pb, Hg

GW32 Metals are As, Pb, Cu, Cd, Hg, Zn

8E02412

Relinquished by: M. Reynolds
Date & Time: 8/12/99
Company: PPK
Signature: MBR

Received in Good Order & Condition by (Name): A. TOMLINSON
Date & Time: 8-12-99 2000 hrs
Company: AMDEL
Signature:

Relinquished by:
Date & Time:
Company:
Signature:

Received in Good Order & Condition by (Name):
Date & Time:
Company:
Signature:

Relinquished by:
Date & Time:
Company:
Signature:

Received in Good Order & Condition by (Name):
Date & Time:
Company:
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

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

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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 Custo[illegible]

Order No: 3580

Job Title: CANBERRA RAILYARD WATER
Laboratory Name: AMDEL
Address: NSW
Fax Number:
Phone Number:
Contact Name:
Delivery Method:
Quote Number:

PPK Job Number: 27K140B

Job Location: CANBERRA

Project Manager: S TAYLOR
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**						Initials	Comments/Additional Information and/or Analysis Required
8/12/98		PMW 2					/	x	x	x		x							
〃		PMW3					/	x	x	x		x							

RECEIVED 09 DEC 1998 8E02412

Relinquished by: M. Reynolds	Relinquished by:	Relinquished by:
Date & Time: 8/12/98	Date & Time:	Date & Time:
Company: PPK	Company:	Company:
Signature: MBR	Signature:	Signature:
Received in Good Order & Condition by (Name): A. TOMKINS	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):
Date & Time: 9.12.98 900am.	Date & Time:	Date & Time:
Company: AMDEL	Company:	Company:
Signature: [signature]	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

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 : 8E02499

ATTENTION : Mr Stuart Taylor

CLIENT : PPK Adelaide

SAMPLES : 13

REFERENCE : 27K140B-CANBERRA

DATE RECEIVED : 23/12/98

DATE REPORTED : 24/12/98

Method	Description	Extracted	Analysed
E0220	Total Petroleum Hydrocarbons	23/12/98	24/12/98
E0010	Benzene,Toluene,Ethylbenzene & Xylene	24/12/98	24/12/98
E0110	Polycyclic Aromatic Hydrocarbons	24/12/98	24/12/98
E4870	Dissolved Metals by ICP-MS	23/12/98	23/12/98
E49501	Mercury low level	23/12/98	24/12/98

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.

PLEASE SEE ATTACHED PAGES FOR RESULTS

per G.W. ANDERSON
Manager Environmental Sydney

Job Number : 8E02499
Client : PPK Adelaide
Reference : 27K140B-CANBERRA

Analyte	Lab No	E66714	E66715	E66716	E66717	E66718
	Sample Id	GW17	GW19	GW21	GW22	GW24
	PQL					
E0220 TPH in Water (µg/L)						
Total C6-C36	**20**	nd	nd	nd	nd	307
C6-C9 Fraction	**20**	nd	nd	nd	nd	nd
C10-C14 Fraction	**20**	nd	nd	nd	nd	190
C15-C28 Fraction	**100**	nd	nd	nd	nd	120
C29-C36 Fraction	**100**	nd	nd	nd	nd	nd
E0010 BTEX (P&T) in Water (µg/L)						
Benzene	**0.5**	nd	4.0	nd	nd	12.0
Toluene	**1**	nd	nd	nd	nd	1
Ethylbenzene	**1**	nd	nd	nd	nd	nd
Total Xylenes	**3**	nd	nd	nd	nd	nd
E4870 Dissolved Metals in Waters						
Arsenic	**0.001**	0.003	0.002	nd	0.001	0.005
Chromium	**0.001**	0.004	0.002	0.002	0.002	0.001
Cobalt	**0.001**	nd	nd	nd	nd	0.001
Cadmium	**0.0001**	nd	nd	nd	nd	nd
Zinc	**0.002**	nd	0.003	0.005	nd	nd
Lead	**0.001**	0.003	0.003	nd	0.003	nd
E49501 Total Recoverable Mercury in Water						
Mercury	**0.00005**	0.00013	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

Analyte	Lab No	E66719	E66720	E66721	E66722	E66723
	Sample Id	GW26	GW28	GW30	GW32	PMW1
	PQL					
E0220 TPH in Water (µg/L)						
Total C6-C36	**20**	nd	nd	nd	nd	50700
C6-C9 Fraction	**20**	nd	nd	nd	nd	570
C10-C14 Fraction	**20**	nd	nd	nd	nd	20200
C15-C28 Fraction	**100**	nd	nd	nd	nd	30000
C29-C36 Fraction	**100**	nd	nd	nd	nd	nd
E0010 BTEX (P&T) in Water (µg/L)						
Benzene	**0.5**	nd	nd	nd	nd	18.0
Toluene	**1**	nd	nd	nd	nd	*<10
Ethylbenzene	**1**	nd	nd	nd	nd	58
Total Xylenes	**3**	nd	nd	nd	nd	*<30
E4870 Dissolved Metals in Waters						
Arsenic	**0.001**	0.001	0.004	nd	nd	0.006
Chromium	**0.001**	0.002	0.005	0.002	0.002	nd
Cobalt	**0.001**	nd	nd	nd	nd	0.003
Cadmium	**0.0001**	nd	nd	nd	nd	nd
Zinc	**0.002**	0.002	nd	nd	nd	0.006
Lead	**0.001**	0.001	0.002	nd	nd	0.004
E49501 Total Recoverable Mercury in Water						
Mercury	**0.00005**	nd	0.00016	nd	nd	nd

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
-- = Not Applicable
* : PQL raised 10x due matrix interference.

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

Analyte	Lab No / Sample Id / PQL	E66724 / PMW2	E66725 / PMW3	E66726 / DUP1		
E0220 TPH in Water (µg/L)						
Total C6-C36	**20**	108500	nd	nd		
C6-C9 Fraction	**20**	830	nd	nd		
C10-C14 Fraction	**20**	47500	nd	nd		
C15-C28 Fraction	**100**	60200	nd	nd		
C29-C36 Fraction	**100**	nd	nd	nd		
E0010 BTEX (P&T) in Water (µg/L)						
Benzene	**0.5**	1.0	nd	nd		
Toluene	**1**	nd	nd	nd		
Ethylbenzene	**1**	2	nd	nd		
Total Xylenes	**3**	nd	nd	nd		
E4870 Dissolved Metals in Waters						
Arsenic	**0.001**	0.004	nd	nd		
Chromium	**0.001**	0.002	nd	0.002		
Cobalt	**0.001**	0.012	nd	nd		
Cadmium	**0.0001**	nd	nd	nd		
Zinc	**0.002**	nd	nd	nd		
Lead	**0.001**	0.003	nd	nd		
E49501 Total Recoverable Mercury in Water						
Mercury	**0.00005**	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

Analyte	Lab No	E66714	E66715	E66716	E66717	E66718
	Sample Id	GW17	GW19	GW21	GW22	GW24
	PQL					
E0110 PAH's in Water (µg/L)						
Naphthalene	1	nd	nd	nd	nd	2
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 PAH	1	nd	nd	nd	nd	2
2-Fluorobiphenyl-SURROGATE	1	88%	97%	106%	99%	87%
Anthracene-D10-SURROGATE	1	80%	78%	90%	80%	77%
p-Terphenyl-D14-SURROGATE	1	104%	99%	110%	98%	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

Analyte	Lab No	E66719	E66720	E66721	E66722	E66723
	Sample Id	GW26	GW28	GW30	GW32	PMW1
	PQL					
E0110 PAH's in Water (µg/L)						
Naphthalene	1	nd	nd	nd	nd	43
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 PAH	1	nd	nd	nd	nd	43
2-Fluorobiphenyl-SURROGATE	1	78%	72%	75%	89%	88%
Anthracene-D10-SURROGATE	1	70%	70%	71%	73%	78%
p-Terphenyl-D14-SURROGATE	1	85%	81%	91%	88%	103%

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 : 8E02499
Client : PPK Adelaide
Reference : 27K140B-CANBERRA

Analyte	Lab No	E66724	E66725	E66726		
	Sample Id	PMW2	PMW3	DUP1		
	PQL					
E0110 PAH's in Water (µg/L)						
Naphthalene	1	nd	nd	nd		
Acenaphthylene	1	nd	nd	nd		
Acenaphthene	1	nd	nd	nd		
Fluorene	1	nd	nd	nd		
Phenanthrene	1	nd	nd	nd		
Anthracene	1	nd	nd	nd		
Fluoranthene	1	nd	nd	nd		
Pyrene	1	nd	nd	nd		
Benz(a)anthracene	1	nd	nd	nd		
Chrysene	1	nd	nd	nd		
Benzo(b) & (k)fluoranthene	2	nd	nd	nd		
Benzo(a)pyrene	1	nd	nd	nd		
Indeno(1.2.3-cd)pyrene	1	nd	nd	nd		
Dibenz(a.h)anthracene	1	nd	nd	nd		
Benzo(g.h.i)perylene	1	nd	nd	nd		
Total PAH	1	nd	nd	nd		
2-Fluorobiphenyl-SURROGATE	1	84%	70%	100%		
Anthracene-D10-SURROGATE	1	77%	69%	92%		
p-Terphenyl-D14-SURROGATE	1	96%	80%	115%		

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

QA/QC APPENDIX NO. 8E02499

Method	Description
E0220	Total Petroleum Hydrocarbons
E0010	Benzene,Toluene,Ethylbenzene & Xylene
E0110	Polycyclic Aromatic Hydrocarbons
E4870	Dissolved Metals by ICP-MS
E49501	Mercury low level

Chromatography QA/QC

	Yes	No	N/A
Retention Time Window Within Acceptance Criteria(±2%)	√		
Check Standard Within Acceptance Criteria(±10%)	√		
Recalibration Within Acceptance Criteria(±15%)	√		

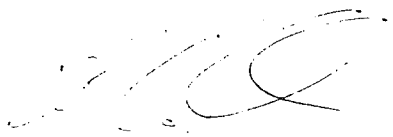
Other QA/QC

Holding time conforming With Method Specification	√		
Chain of Custody Attached	√		

N/A=Not Applicable

Comments

1. Laboratory QA/QC including Method Blanks, Duplicates, Matrix Spike Duplicates, Laboratory Control Samples or CRM's are included in this QA/QC appendix. (Where applicable)
2. Inter-Laboratory proficiency trial results available on request. (Where applicable)
3. Surrogate description and recoveries are recorded in the Report. (Where applicable)
4. Acceptance criteria for specific analytes are available upon request (Refer to SPM-01).
5. Practical Quantitation Limit (PQL is typically 2-10 x method detection limit (MDL)).
6. PQL's are matrix dependent and are increased accordingly where sample extracts are diluted.
7. Results are uncorrected for matrix spike or surrogate recoveries.



per G.W. ANDERSON
Manager Environmental Sydney

Amdel

Job Number : 8E02499

QAQC : Spike Recoveries

Analyte	Spike Level	Level Spike 1	Detected Spike 2	Recovery Details Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E0220 TPH in Water (µg/L)							
Total C6-C36	9500	7700	7780	81%	82%	81%	1%
C6-C9 Fraction	4000	3300	3600	83%	90%	87%	8%
C15-C28 Fraction	5500	4400	4200	79%	76%	78%	5%
E4870 Dissolved Metals in Waters							
Arsenic	0.100	0.120	0.118	120%	118%	119%	2%
Chromium	0.100	0.114	0.113	114%	113%	114%	1%
Cobalt	0.100	0.103	0.101	103%	101%	102%	2%
Cadmium	0.1000	0.10	0.10	103%	102%	103%	1%
Zinc	0.100	0.102	0.100	102%	100%	101%	2%
Lead	0.100	0.099	0.097	99%	97%	98%	2%
E49501 Total Recoverable Mercury in Water							
Mercury	0.0010	0.0011	0.0010	100%	100%	100%	0%

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

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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

amdel

Job Number : 8E02499

QAQC : Laboratory Control Sample

Analyte	Level	Level	Detected	Recovery Details			
		Result1	Result2	Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E0010 BTEX (P&T) in Water (µg/L)							
Benzene	10	*11.0		110%			
Toluene	10	*10		100%			
Ethylbenzene	10	*10		100%			
Total Xylenes	30	*30		100%			

PQL = Practical Quantitation Limit
-- = Not Applicable

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

nd = <PQL

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

* : Insufficient sample to conduct matrix spike thus Laboratory Control Sample recovery reported.

Amdel

Job Number : 8E02499

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
E0220 TPH in Water (µg/L)					
Total C6-C36	**20**	nd	nd		
C6-C9 Fraction	**20**	nd	nd		
C10-C14 Fraction	**20**	nd	nd		
C15-C28 Fraction	**100**	nd	nd		
C29-C36 Fraction	**100**	nd	nd		
E4870 Dissolved Metals in Waters					
Arsenic	**0.001**	0.003	0.003	0.003	0%
Chromium	**0.001**	0.004	0.004	0.004	0%
Cobalt	**0.001**	nd	nd		
Cadmium	**0.0001**	nd	nd		
Zinc	**0.002**	nd	nd		
Lead	**0.001**	0.003	0.003	0.003	0%
E49501 Total Recoverable Mercury in Water					
Mercury	**0.00005**	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID PQL	Blank				
E0220 TPH in Water (µg/L)						
Total C6-C36	**20**	nd				
C6-C9 Fraction	**20**	nd				
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				
E4870 Dissolved Metals in Waters						
Arsenic	**0.001**	nd				
Chromium	**0.001**	nd				
Cobalt	**0.001**	nd				
Cadmium	**0.0001**	nd				
Zinc	**0.002**	nd				
Lead	**0.001**	nd				
E49501 Total Recoverable Mercury in Water						
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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Spike Recoveries

Analyte	Spike Level	Level Detected		Recovery Details			
		Spike 1	Spike 2	Rec 1 (%)	Rec 2 (%)	Average (%)	RPD (%)
E0110 PAH's in Water (µg/L)							
Naphthalene	10	9	9	94%	90%	92%	4%
Acenaphthylene	10	10	9	96%	93%	95%	3%
Acenaphthene	10	10	9	97%	92%	95%	5%
Fluorene	10	10	9	101%	94%	98%	7%
Phenanthrene	10	10	10	99%	96%	98%	3%
Anthracene	10	9	9	94%	90%	92%	4%
Fluoranthene	10	10	10	99%	100%	100%	1%
Pyrene	10	10	10	101%	101%	101%	0%
Benz(a)anthracene	10	11	10	105%	98%	102%	7%
Chrysene	10	10	10	100%	103%	102%	3%
Benzo(b) & (k)fluoranthene	20	20	20	101%	101%	101%	0%
Benzo(a)pyrene	10	10	10	100%	100%	100%	0%
Indeno(1.2.3-cd)pyrene	10	10	12	99%	121%	110%	20%
Dibenz(a.h)anthracene	10	10	9	97%	93%	95%	4%
Benzo(g.h.i)perylene	10	10	9	95%	90%	93%	5%

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

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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

Job Number : 8E02499

QAQC : Laboratory Duplicates

Analyte	PQL	Dupl 1	Dupl 2	Average	RPD (%)
E0110 PAH's in Water (µg/L)					
Naphthalene	1	nd	nd		
Acenaphthylene	1	nd	nd		
Acenaphthene	1	nd	nd		
Fluorene	1	nd	nd		
Phenanthrene	1	nd	nd		
Anthracene	1	nd	nd		
Fluoranthene	1	nd	nd		
Pyrene	1	nd	nd		
Benz(a)anthracene	1	nd	nd		
Chrysene	1	nd	nd		
Benzo(b) & (k)fluoranthene	2	nd	nd		
Benzo(a)pyrene	1	nd	nd		
Indeno(1.2.3-cd)pyrene	1	nd	nd		
Dibenz(a.h)anthracene	1	nd	nd		
Benzo(g.h.i)perylene	1	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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

QAQC : Method Blank

ANALYTE	SAMPLE ID PQL	Blank				
E0110 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

All results are within the acceptance criteria:

Refer to Amdel-Sydney Quality Control Manual SPM-01 5th Edition 1/6/98

PPK
Environment & Infrastructure
ACN 078 001 798

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

☐ 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 Gladstone Road, Rhodes NSW 2138
Tel: (02) 9743 0333 Fax: (02) 9736 1568

Chain of Custody

Order No: 3581

Job Title: CANBERRA RAILYARDS

Laboratory Name: AMDEL

Address: NSW

Fax Number:

Phone Number:

Contact Name:

Delivery Method:

Quote Number:

PPK Job Number: 27K140B

Job Location: CANBERRA

Project Manager: S. TAYLOR

Results Expected by/on:

Fax Results to: A/A

Fax Number:

Phone Number:

Spreadsheet of Results Required: Y / N

Format:

Turnaround Time Required: 24 hrs

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**	Initials	Comments/Additional Information and/or Analysis Required
22/12/98		GW17 ✓	x 5				1	x	x	x		x		
"		GW19 ✓	"				1	x	x	x		x		
"		GW21 ✓	"				1	x	x	x		x		
"		GW22 ✓	"				1	x	x	x		x		
"		GW24 ✓	"				1	x	x	x		x		
"		GW26 ✓	"				1	x	x	x		x		
"		GW28 ✓	"				1	x	x	x		x		
"		GW30 ✓	"				1	x	x	x		x		
"		GW32 ✓	"				1	x	x	x		x		
"		PMW1 ✓	"				1	x	x	x		x		
"		PMW2 ✓	"				1	x	x	x		x		
"		PMW3 ✓	"				1	x	x	x		x		
"		DUP1 ✓	"				1	x	x	x		x		

RECEIVED
23 DEC 1998
8E02499

x + metals As, Cr, Co, Cd, Zn, Pb, Al

Relinquished by: M. Reynolds
Date & Time: 22/12/98
Company: PPK
Signature:

Received in Good Order & Condition by (Name): BG
Date & Time: 23/12/98
Company: Amdel
Signature: BG

Relinquished by:
Date & Time:
Company:
Signature:

Received in Good Order & Condition by (Name):
Date & Time:
Company:
Signature:

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

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

Metals: Al As Be Cd Co Cr Cu Fe (Pb) 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

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A NATA Certified Quality Company

Our Reference 27K140C/JCR/jcc

17 December 1999

Mr Colin Denton
Indec Consulting
300 Flinders Street
ADELAIDE SA 5000

Dear **Colin**

Report on Further Environmental Site Investigations and Site Remedial Works Canberra Railway Station Yards and Rail Corridor

PPK is pleased to provide three copies of the above investigation report for your consideration.

I trust that I have interpreted your requirements correctly. If you have any queries or questions relating to the above report or the remediation and validation program, please do not hesitate to call either of the undersigned on the above number.

Yours faithfully

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

Jason Rollison
Environmental Consultant
PPK Environment and Infrastructure Pty Ltd

Report on Further Environmental Site Investigations and Site Remedial Works Canberra Railway Station Yards and Rail Corridor

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17 December 1999
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Executive Summary

PPK Environment & Infrastructure Pty Ltd (PPK) was commissioned by Indec Consulting (Indec) on behalf of Australian National under Contract 1013 to undertake Further Environmental Site Investigations and Site Remedial Works, Canberra Railway Station Yards and Rail Corridor as part of the Commonwealth's Environmental Remediation Program. The Canberra Railway Station Yards and Rail Corridor is located in the south east of Canberra in the suburbs of Kingston and Fyshwick.

The main objective of the site investigations and remedial works was to characterise, delineate and reduce potential environmental liabilities and/or human health risks posed by the identified site conditions for the continued use of the site for which it was last used prior to the AN sale date.

PPK based the investigation and remedial works program on previous environmental investigations at the site including a Phase 1 Environmental Audit, Phase 2 Environmental Site Assessment and Phase 2B Further Soil and Groundwater Investigations, which identified environmental impacts in six areas. The further works in each of the six areas are summarised below.

Former Locomotive Refuelling Area

The principal contaminants of concern in the former locomotive refuelling area are total petroleum hydrocarbons (TPH) and mono aromatic hydrocarbons (BTEX). TPH impacts, have been identified in eleven on-site wells, with phase separated hydrocarbon (PSH) impacts, with a maximum apparent product thickness of 4 mm, observed in three wells and dissolved phase hydrocarbon (DPH) impacts identified in eight wells. The extent of these hydrocarbon impacts has been defined laterally.

The product recovery socks installed within the wells containing PSH impacts (GW5, GW102 and GW103) recovered a total of only about 5 litres. Permeability testing in the location of the observed phase separated products identified a very low permeability, and higher recovery rates would therefore be difficult to achieve.

One dimensional fate transport modelling for the DPH impacts in this area indicated that dissolved phase hydrocarbon products, above the laboratory method limit of reporting, would not be observed at the site boundary, due to migration of the observed source impacts. The 1D model suggests that observed impacts 40 metres from the source would be less than 0.01% of the source concentration. The closest known down-gradient groundwater receptor is the Jerrabomberra Creek system, approximately 800 metres and the site boundary is approximately 780 metres down-gradient. The modelled concentrations of TPH and BTEX constituents would not exceed the assessment criteria (protection of fresh water ecosystems) at these distances.

It is recommended that restrictions be placed on the extraction of groundwater, for human consumption, in the vicinity of the former refuelling area, where impacts have been observed. It is considered that no further site remedial and/or management measures are required in the area for a site use which is consistent with the last known site use, prior to the AN sale date.

Eastern Rail Corridor – Adjacent Former Cement Works

Metallic contaminants (primarily lead and zinc) were confirmed at levels which exceeded the assessment criteria. A further assessment of the fill materials, which contain ash and cinders, identified limited exposure pathways for either on-site and/or off-site receptors, under the current site conditions.

The reported analyte concentrations were assessed against the National Environmental Health Forum (NEHF) hot-spot criterion for zinc (commercial/industrial land use) and the health based risk assessment (HRA) undertaken for the Port Pirie Rail Site, located at Port Pirie, South Australia. The Port Pirie HRA considered the on-site exposure of rail (commercial) workers, and off-site exposure of residential tenants, to surface lead impacts at the Port Pirie Rail Site. It is considered appropriate to use the outcomes of this HRA as a Tier 1 reference value for the Canberra Rail site, given the decreased exposure potential.

The fill materials at the Canberra site were localised, identified at depth and contained lead concentrations well below the observed concentrations used as input data in the HRA. The HRA is therefore considered conservative to be used as a Tier 1 reference for the Canberra site. On this basis, the risk assessment works for indicated lead concentrations the Canberra Site are not likely to pose potential health risks to on-site workers under normal site activities and operations.

Leachability testing has also confirmed that the elevated lead and zinc constituents are quite stable, and the potential for leachate generation and subsequent impacts to groundwater are negligible in the current site conditions. This has been further confirmed through chemical analysis of groundwater in the area.

It is considered that no further site remedial and/or management measures are required in the area for a site use which is consistent with the last known site use, prior to the AN sale date.

Municipal Waste Disposal Area

Fill materials – silty clay and gravel, with varying quantities of bricks, scrap metal bitumen fragments, glass, paper and plastic, car tyres, ash/cinders and wire – within the municipal waste disposal area, reach a maximum thickness of 4.9 metres at the centre of the waste disposal area, generally thinned out toward the north and east.

Minor localised areas of waste reported analyte concentrations above the assessment criteria, however no elevated contaminant levels exceeding this criterion were identified within the natural soil underlying the waste fill materials.

Initial laboratory analysis of groundwater samples (June 199) reported the presence of dissolved phase hydrocarbons in two wells (GW39 and GW110) at levels that exceeded the laboratory method limit of reporting. This was not confirmed at GW39 by subsequent sampling and laboratory analysis. Monitoring wells surrounding GW39 also reported TPH concentrations below the laboratory method detection limits.

The elevated concentration of dissolved phase TPH and PAH with the groundwater at GW110, was confirmed by subsequent sampling and laboratory analysis. The impacts identified within the groundwater at the location of GW110, appear to be localised, with adjacent wells not reporting TPH or PAH concentrations above the laboratory method limit of reporting.

One dimensional fate transport modelling for the DPH impacts in this area indicated that dissolved phase hydrocarbon products above the laboratory method limit of reporting, would not be observed at the site boundary, due to migration of the observed source impacts. The 1D model suggested that observed impacts 40 metres from the source would be less than 0.01% of the source concentration. The closest known down-gradient groundwater receptor is the Jerrabomberra Creek system, approximately 350 metres and the site boundary is approximately 330 metres down-gradient. The modelled concentrations of TPH and BTEX constituents would not exceed the assessment criteria (protection of fresh water ecosystems) at these distances.

Concentrations of heavy metals and ammonia whilst in some instances reported above the assessment criteria (Australian Drinking Water Guidelines ADWG) but were generally consistent with the concentrations reported elsewhere in the entire site, indicating no significant contribution from any waste materials. In terms of potential risks or impacts to the receiving creek and wetland systems, the concentrations of all heavy metal constituents, with the exception of lead, reported during the groundwater monitoring events have been below the assessment criteria (protection of fresh water ecosystems). These criteria have not been exceeded within the site, and therefore are not likely to be exceeded at the site boundary or the Jerrabomberra Creek system.

A localised lead concentration, in excess of the assessment criteria (ADWG and protection of fresh water ecosystems) was identified at the location of GW206. The elevated concentration is not considered to be significant with no elevated lead concentrations reported in adjacent wells, and the mean concentration of lead below the assessment criteria (ADWG and protection of fresh water ecosystems).

It is recommended that restrictions be placed on the extraction of groundwater, for human consumption, within the municipal waste disposal area, where impacts have been observed. It is considered that no further site remedial and/or management measures are required in the area for a site use which is consistent with the last known site use, prior to the AN sale date.

Eastern Rail Corridor – Impacts from off-site Sources

Additional groundwater monitoring confirmed previous investigation results, with TPH concentrations reported above the laboratory method limit of reporting, in groundwater samples collected from adjacent the Shell, Mobil, BP and Caltex/Ampol fuel depots. Total petroleum hydrocarbon impacts, adjacent to the Shell and Mobil depots, were considered significant, with reported TPH concentrations of approximately 80,000 ug/L. This investigation has not delineated the lateral extent of the observed impacts.

It is understood that the oil companies responsible for the depots have been informed of the observed impacts, and that Mobil Oil Australia and Shell Australia Limited have undertaken further investigation works for their respective properties.

With respect to potential risks to on-site rail workers, the observed site contaminant conditions are not likely to pose potential health risks under normal site activities and operations. However, future maintenance works involving excavation, or extraction and/or use of the groundwater within these areas, could pose potential health risks.

Fouled Ballast Investigation

The current investigation has identified buried ballast materials in the southern portion of the main railyard area, confirming anecdotal information which detailed the disposal location.

The results of the intrusive investigation concluded that ballast was present in the southern portion of the main railyard to a depth of 3.5 metres. Laboratory analysis of selected soil samples and groundwater identified no TPH impacts in excess of the assessment criteria and remedial actions to address the ballast are therefore considered unnecessary.

Underground Storage Tanks

No visual or olfactory evidence of petroleum hydrocarbon impacts were identified during the test-pitting program, near the three identified abandoned underground storage tanks and laboratory analysis of selected soil samples identified no elevated contaminant levels above the assessment criteria.

Laboratory analysis of groundwater samples collected hydraulically down-gradient of the investigation areas reported no dissolved phase hydrocarbons impacts, with reported TPH, BTEX and PAH concentrations below the laboratory method limit of reporting.

It is considered that no further site remedial and/or management measures are required in the area for a site use which is consistent with the last known site use, prior to the AN sale date.

Conclusions and Recommendations

Based on the approved scope of assessment, remediation and validation works, completed by PPK, the environmental effects and risks on site are considered to have been adequately identified and/or remediated to the environmental standards formally agreed between the Commonwealth and other jurisdictions in which AN operated, with the exception of:

- *dissolved phase hydrocarbon impacts identified but not delineated within the eastern rail corridor (off site sources).*

On this basis the following are recommended:

- *Indec on behalf of AN or the current site owner, as a pro-active site management measure, liaises with the oil companies (in particular Shell and Mobil), on the outcomes of further investigation, assessment and/or remedial works required to address the identified dissolved phase hydrocarbon impacts, likely to be associated with the fuel depots.*

The conclusions and recommendations made in this report are based on the continued use of the site for which it was last used prior to the AN sale date. This site use scenario assumes no groundwater extraction on site and only limited soil disturbance. Therefore it is recommended that site management measures be put in place to ensure this continues to be the case or to provide adequate information and/or direction for site works other than those assumed to be undertaken. If the site is to be re-developed for a use other than for the purpose of which it was last used prior to the AN sale date, then further investigation and/or assessment works would be mandatory.

1. Introduction

PPK Environment & Infrastructure Pty Ltd (PPK) was commissioned by Indec Consulting (Indec) on behalf of Australian National under Contract 1013 to undertake Further Environmental Site Investigations and Site Remedial Works, Canberra Railway Station Yards and Rail Corridor as part of the Commonwealth's Environmental Remediation Program. The Canberra Railway Station Yards and Rail Corridor is located in the south east of Canberra in the suburbs of Kingston and Fyshwick.

The scope of additional soil and groundwater investigations, completed during the period February and August 1999, were based on the results and findings of the following previous investigations, undertaken and reported by PPK:

- Environmental Audit of the Australian National Facilities, Canberra Railway Station Yards and Rail Corridor (PPK Document No. 98-182).
- Phase II Environmental Site Assessment, Canberra Railway Station and Rail Corridor (PPK Document No. 98-845).
- Report on Further Soil and Groundwater Investigations, Canberra Railway Station and Rail Corridor (PPK Document No. 99-014).

Based on these investigations, PPK was engaged to undertake further investigation works and site remedial works in accordance with the proposed scope of works documented in the following PPK submissions:

- Proposal to Undertake Site Remediation and Monitoring Works – Australian National, Canberra Railyards (PPK Reference No. 27K140C, 27th January 1999).
- Proposal to Undertake Further Soil and Groundwater Investigations – Australian National, Canberra Railyards (PPK Reference No. 27K140C, 5th May 1999).
- Proposal to Undertake Further Soil and Groundwater Investigations – Former Tanker Refuelling Area and Request for Sampling Fee Variation, Australian National, Canberra Railyards (PPK Reference No. 27K140C, 9th July 1999).

The principal objective of the site investigations and remedial works were to characterise, delineate and reduce potential environmental liabilities and/or human health risks posed by the identified site conditions for the continued use of the site for which it was last used prior to the AN sale date.

To achieve this objective, the site investigation and remedial works program included the following activities:

- Review of existing site information.
- Further investigation of the observed soil and groundwater impacts in order to delineate impacted areas.
- Risk based assessment of all site contaminant data, to determine the requirements for remedial works and/or site management measures.
- Undertake appropriate remedial works where required.
- Assessment of investigation findings and preparation of this report.

This report presents the findings of the combined environmental site works conducted in the period February to August 1999.

2. Site Details

2.1 Site Identification

The address of the railway station property is Wentworth Avenue, Kingston, ACT, with the railway corridor extending to the east through Queanbeyan in New South Wales. A map reference showing the location of the Canberra Railway Station and railway corridor is included in Appendix A, and site plans are included in Appendix B.

2.2 Site and Surrounding Land Usage

The site is bounded by Cunningham Street and Wentworth Avenue to the north and west of the main railway station area respectively. A mix of residential and commercial properties is located opposite the site along these boundaries. The Jerrabomberra Creek borders the site to the north-east, and commercial and light industrial properties border the site to the south.

The Jerrabomberra Creek crosses the site to the south east of the main railway station yards and flows north and north-west into Lake Burley Griffin. Adjacent to the rail lines at the location of the creek crossing, the site is bordered by undeveloped land, vegetated with tall grass and trees. Further south-east Monaro Highway and Ipswich Street both cross the rail corridor via bridges over the rail lines. South east of Ipswich Street the rail corridor is bordered on both sides by industrial land usage.

2.3 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 south west of the rail lines. The entire area is reasonably flat, with elevations between approximately 560 and 564 m above the Australian Height Datum (AHD). Along the north-eastern boundary of the site (adjacent to the Jerrabomberra Creek silt trap), an embankment several metres high, created by the placement of fill in this area, is present. The residential development to the north is several metres higher than the rail yards area, and the site slopes away from the residential area towards both the south and east.

From where the rail lines cross 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.

2.4 Local Soil and Groundwater

For a detailed discussion of the Local Soil Profile, and the Regional and Local Hydrogeology, please refer to the previous PPK report on 'Phase II Environmental Site

Assessment, Canberra Railway Station and Rail Corridor' (PPK Document No. 98-845) of November 1998.

In general, the site soils consist predominantly a mixture of sedimentary rock and alluvial soil deposits. The sedimentary rock is likely to consist of calcareous shale, limestone, sandstone and tuff, which is likely to be overlain by quartz pebble gravel and coarse sand. The alluvial deposits are likely to include gravel, sand, silt and clays associated with Jerrabomberra Creek.

Anecdotal information suggests that the local groundwater depth varies seasonally from 2 m below ground level (bgl) to 10 m bgl, and generally lies between 4 m and 6 m bgl. Based on the investigation works undertaken by PPK, these depths to groundwater were generally confirmed, however groundwater depths of as little as 0.5 metres were observed. The general direction of groundwater flow beneath the site (as reported in the previous PPK investigation reports) tends toward Jerrabomberra Creek.

3. Overview of Previous Environmental Investigation Reports

3.1 Phase I Environmental Audit Report

The site was the subject of a Phase I Environmental Audit, undertaken by PPK and reported in the PPK '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.

Based on the findings of the site history investigations, undertaken during the Phase 1 Environmental Audit, the following site contamination issues were identified and selected for further investigation during the subsequent Phase II ESA program:

- Surface and sub-surface soil and groundwater contamination by hydrocarbon products adjacent to the fuel terminals, along the rail corridor in Fyshwick.
- Hydrocarbon contamination around the disused locomotive refuelling facility.
- Contamination from fill materials consisting of ash and cinders in western part of the site.
- Contamination from fill materials of an unknown nature in the northern part of the site.
- Oily wastes disposed to earthen stormwater drains adjacent to the Shell depot and in the ARHS site.
- Coal stockpiles and localised hydrocarbon surface staining.

3.2 Phase II Environmental Site Assessment Report

Based on the results and findings of the audit report, the site was the subject of a Phase 2 Environmental Site Assessment, undertaken by PPK and reported in the PPK document 'Phase 2 Environmental Site Assessment Canberra Railway Station Yards and Rail Corridor' (PPK document number 98-845) in November 1998.

The results and findings of the Phase 2 Environmental Site Assessment identified the following:

- Localised soil and groundwater impacts adjacent the former municipal waste dump (vertical and lateral extent of impacts not delineated).
- Localised soil impacts (heavy metals) adjacent the former cement works (vertical extent delineated, however lateral extent of impacts not delineated).
- Localised soil and groundwater impacts in the location of the former refuelling area, in the main station complex (lateral extent of impacts not delineated).
- Localised groundwater and soil impacts (petroleum hydrocarbons) in the eastern rail corridor, adjacent to and potentially resulting from the Shell, Caltex/Ampol and Mobil fuel depots (the lateral extent of these impacts was not delineated).

Following the completion of the Phase 2 Assessment works, recommendations were made to undertake additional investigations in order to delineate the areas of identified impacts, as listed above.

3.3 Phase IIB Further Soil and Groundwater Investigation Report

Based on the results and findings of the Phase 1 and Phase 2 works, the site was the subject of a 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 99-014) in January 1999.

The results and findings of the Further Soil and Groundwater Investigation identified the following:

- Further delineation of soil and groundwater impacts adjacent the former refuelling area. (impacted area estimated at 25 m^2, with apparent thickness of phase separated hydrocarbon 4 mm).
- Localised soil impacts (heavy metals) adjacent the former cement works were confirmed and recommendations for minor remedial works to address the soil impacts were made.
- Localised soil and groundwater impacts adjacent the former municipal waste dump (vertical and lateral extent of impacts further delineated).
- Localised groundwater impacts (petroleum hydrocarbons) were confirmed in the eastern rail corridor, adjacent to and potentially resulting from the Shell and Mobil fuel depots (lateral extent of these impacts was not delineated).

4. Summary of Contamination Issues

Based on all of the data collected during the previous environmental investigations undertaken at the site, and based on observations made during the course of additional investigations undertaken and reported within this report, the following issues were addressed:

Former Locomotive Refuelling Area

- Elevated concentrations of dissolved phase petroleum hydrocarbons in four groundwater monitoring wells.
- Phase separated petroleum hydrocarbons were identified in three wells, adjacent to the former refuelling tank, with an maximum apparent thickness of 4 mm (MW5).
- Absorbed phase petroleum hydrocarbon soil impacts.

Eastern Rail Corridor – Adjacent Former Cement Works

- Elevated concentrations of lead and zinc, reported within fill materials, containing ash and cinders.

Municipal Waste Disposal Area

- Visual identification of ash, cinders, slag, asbestos containing materials, coal, metal objects and an abandoned heating oil tank, within the bulk fill materials.
- Minor localised elevated TPH constituents reported within the groundwater sample collected from one groundwater monitoring well.
- Trace concentrations of Phthalates reported in the groundwater samples collected in June 1999.

Eastern Rail Corridor – Impacts from off-site Sources

- Dissolved phase petroleum hydrocarbon impacts were identified in the eastern rail corridor adjacent to the Shell, Mobil and Caltex/Ampol Fuel Depots.

Disposal Site for Fouled Ballast

- Anecdotal information indicated that ballast materials, potentially contaminated with petroleum hydrocarbons.

Area of Underground Storage Tanks (USTs)

- The identification of three abandoned underground storage tanks adjacent the William Edmunds leased area. Potential past underground product releases may have impacted the soils and groundwater with petroleum hydrocarbons.

5. Objectives of the Investigation/Remedial Works Program

The principal objectives of the Investigation/Remedial Works Program were to:

- Delineate the extent of soil and groundwater impacts present on site as a result of the current and historical usage of the site.
- Identify the potential environmental liabilities or potential risks to human health posed by the identified contaminants.
- Undertake a site specific risk based assessment of the identified potential environmental liabilities and/or human health risks.
- Undertake any required remediation and rehabilitation works in order to reduce potential environmental liabilities and/or human health risks posed by the identified site conditions for the continued use of the site for the purpose it was last used prior to the AN sale date.

6. Further Soil and Groundwater Assessment Program

6.1 Assessment Rationale

The further soil and groundwater assessment program was based on the scope of works nominated within the following proposal documents.

- Proposal to Undertake Site Remediation and Monitoring Works – Australian National, Canberra Railyards (PPK Reference No. 27K140C, 27th January 1999).
- Proposal to Undertake Further Soil and Groundwater Investigations – Australian National, Canberra Railyards (PPK Reference No. 27K140C, 5th May 1999).
- Proposal to Undertake Further Soil and Groundwater Investigations – Former Tanker Refuelling Area and Request for Sampling Fee Variation, Australian National, Canberra Railyards (PPK Reference No. 27K140C, 9th July 1999).

The further soil assessment program comprised of the excavation and sampling of thirty–three (33) test pits. Test pit locations were targeted to identify and delineate the following issues:

- Areas where fouled ballast was reportedly disposed of, in the southern portion of the main railyards.
- Former Municipal Dump area, in the north-eastern portion of the main railyards area.
- The location of the underground storage tanks, in the northern portion of the main railyards area, adjacent to the William Edmunds leased area.

Table 6.1 details the approximate locations and rationale behind the excavation of the thirty-three test pits.

Table 6.1 Soil Test Pit Locations

Test Pit	Location	Target/Rationale
BTP1A – BTP1E	Main rail yards area, south of Robbo's Pet Barn.	Fouled Ballast.
BTP2A – BTP2J	Main rail yards area, south-east of the Railway Station.	Fouled Ballast.
BTP3A – BTP3G	Main rail yards area, south-east of Robbo's Pet Barn.	Fouled Ballast.
DTP1 – DTP8	Former Municipal Dump site.	Probable deep filling of undetermined origin.
USTP1 – USTP3	Main rail yards area, north of William Edmunds leased area.	Potential for hydrocarbon impacts adjacent the observed USTs.

The general location of the thirty-three (33) test pits is graphically presented in Figures 1, 2 and 3 in Appendix C.

The further groundwater assessment program comprised of the drilling, construction and sampling of twenty–four (24) groundwater monitoring wells, in addition to the on-going monitoring of the previously constructed groundwater monitoring wells. New groundwater monitoring well locations were targeted to identify and delineate the following issues:

- Observed groundwater impacts adjacent the former refuelling area.
- Localised groundwater impacts identified within the former Municipal Waste Dump area.

Table 6.2 details the approximate locations and rationale behind the drilling of the twenty-four groundwater monitoring wells.

Table 6.2 New Groundwater Monitoring Well Locations

Monitoring Well	Location	Target/Rationale
GW201 – GW204	Former locomotive refuelling area.	Delineation of observed impacts.
GW205 – GW208	Municipal Waste Dump area.	Delineation of observed impacts.
GW209 – GW211	Former locomotive refuelling area.	Delineation of observed impacts.
GW301 – GW311	Former locomotive refuelling area.	Delineation of observed impacts.
GW312 – GW313	Municipal Waste Dump area.	Delineation of observed impacts.

The general location of the twenty-four (24) additional groundwater monitoring wells (marked GW2XX and GW3XX) is graphically presented in Figure 4 in Appendix G.

6.2 Groundwater Monitoring Well Details

All groundwater monitoring wells were drilled using a truck mounted drilling rig using push tube rods and rotary air. All wells were constructed from Class 18 uPVC materials with machine slotted uPVC screens placed from the base of each well to within approximately 1 m of the ground level to allow the inflow of phase separated products, if present.

Well development and purging were conducted in accordance with the guidelines and procedures specified within section A2.12 *Groundwater monitoring bore development* and section A2.13 *Groundwater Monitoring bore purging and sampling* as per the *Investigation Scope definition Overview and Generic Workplan for Australian National Projects*.

Environmental borelogs and well construction logs are presented in Appendices D and H respectively.

All groundwater monitoring wells, constructed during this investigation, were level surveyed to the same arbitrary datum as all other groundwater monitoring wells on the site. This was undertaken, together with gauging the depth to groundwater in each well, to confirm the direction of local groundwater flow beneath the site. Groundwater was encountered beneath the site at depths ranging between 0.53 m below ground level (bgl) and 6.88 m bgl. Well gauging data is presented in

Appendix L, and approximate standing groundwater level contours and extrapolated flow directions are graphically shown in Figures 8, 9 and 10, in Appendix M.

Based on the field conductivity readings, derived field TDS levels are calculated between 300 mg/L TDS and 2,050 mg/L TDS, corresponding to low to moderate salinities indicating potential beneficial uses of the groundwater including human consumption and domestic irrigation.

6.3 Sampling Procedures

All soil and groundwater samples were recovered, labelled, stored and transferred to the laboratory in accordance with the requirements of the *Investigation Scope definition Overview and Generic Workplan for Australian National Projects,* prepared by the Australian National Project Consultancy panel in November 1996.

On the completion of field activities, all samples were checked for labelling consistency against the field sampling record, and packed into chilled and iced eskies prior to shipment to laboratories for analysis. The Sample Transmittal Forms were completed to maintain the Chain of Custody, and were transferred to the laboratory within one week of sample retrieval.

Field sampling documents for soil (environmental borehole and test pit logs) and groundwater (well construction logs, field sampling records), are contained in Appendices D, H, and I respectively.

6.4 Analytes

Selected soil and groundwater samples were submitted for a range of chemical analyses targeted specifically to delineate observed impacts, which had formerly been identified.

The rationale for the selection of these analytes can be obtained from the former PPK Investigation report for the site 'Report on Further Soil and Groundwater Investigations, Canberra Railway Station and Rail Corridor' (PPK Document No. 99-014).

In general, the following analytes were addressed:

- Acidity/alkalinity (pH)
- Ammonia
- Total Kjeldahl Nitrogen (TKN)
- Sulphate, Total Phosphate
- Cyanides
- Total dissolved solids (TDS)
- Heavy metals
- Total petroleum hydrocarbons (TPH) and mono aromatic hydrocarbons (BTEX)
- Polycylic aromatic hydrocarbons (PAHs)
- Semi-volatile organic compounds (SVOCs)
- Volatile organic compounds (VOCs).

Chain of custody documents and analytical request documents are presented in Appendices E and J for soil and groundwater respectively.

6.5 Laboratory Used

All soil and groundwater samples recovered as part of the field investigation program were submitted to AMDEL Laboratories Limited for the nominated analytical program.

AMDEL Laboratories Limited
5 Kelray Place
ASQUITH NSW 2077

AMDEL has NATA accreditation for operating a quality management system (ISO 9001) together with NATA registration for all of the nominated chemical analyses.

Original laboratory results and certified reports are presented in Appendices F and K for soil and groundwater respectively.

6.6 Assessment Criteria

In order to assess the level and significance of any potential contaminants detected through analytical laboratory testing it is usual to reference established environmental investigation levels and/or human health threshold exposure levels. The agreed and adopted screening level criteria, for this investigation, are consistent with the investigation levels referenced in the previous Environmental Site Assessment reports undertaken for the Canberra Railyards site. These investigation criteria can be summarised as follows:

6.6.1 Soil Assessment Criteria

Reference will be drawn from the following sources:

- "A Practical Guide to the Health Risk Assessment and Management of Contaminated Land in SA" – South Australian Health Commission, January 1993.
- "Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites" Australian and New Zealand Environment and Conservation Council (ANZECC) / National Health and Medical Research Council (NH&MRC), 1992.
- "Health Based Soil Investigation Levels - National Environmental Health Forum Monographs, Soil Series No. 1, 2nd Edition" National Environmental Health Forum, 1998 (commercial/industrial land use).
- "Environmental Quality Objectives in the Netherlands – A review of environmental quality objectives and their policy framework in the Netherlands" Ministry of Housing, Spatial Planning and the Environment, 1994

6.6.2 Groundwater Assessment Criteria

For the purpose of assessing the groundwater contaminant levels it is usual to take account of the potential beneficial uses of the groundwater and the potential for the groundwater to discharge to sensitive receiving water bodies (marine or freshwater).

Based on the measured salinity range of the groundwater beneath the site, it is apparent that the groundwater quality is within plausible potable limits (TDS below 1,000 mg/L) and therefore potential beneficial uses of the groundwater must include human consumption. Although groundwater beneath the site or immediate surrounds does not appear to be used for human consumption, assessment of the groundwater will be conservatively made to the lower of the health-based and aesthetic-based values contained within the Australian Drinking Water Guidelines (ADWG, 1996).

When assessing the potential impacts to the Jerrabomberra Creek and adjoining Wetlands, reference has also been made to the Australian Water Quality Guidelines for Fresh and Marine Receiving Waters (ANZECC, 1992).

In the case of analytes not covered by the above (ie. TPHs) reference has been drawn from the Dutch Intervention Levels for groundwater, however it must be recognised that these guidelines have no legal standing in Australia and are used here solely for comparison purposes.

7. Contamination Assessment

7.1 Former Locomotive Refuelling Area

Located in the main station rail yards, south west of the former goods shed (currently Robbo's Pet Barn), this area of site was targeted during the earlier Phase II and Phase IIB ESA works as an area formerly used for the storage and distribution of locomotive fuel. The area is no longer used for the storage or distribution of fuels, and based on anecdotal information, provided by State Rail, the area has not been operated as a refuelling area for more than 15 years (probably 20 – 25 years).

Petroleum hydrocarbon impacts were identified in the soil at this location however, laboratory analysis of the impacted soils reported petroleum hydrocarbon concentrations below the assessment criteria. No further investigation works were therefore proposed with respect to soil impacts in this area.

Petroleum hydrocarbon impacts were also identified in the groundwater in the location of GW5. Additional groundwater investigations were undertaken which consisted of the drilling, construction and sampling of seventeen (17) groundwater monitoring wells to delineate the observed impacts.

7.1.1 Additional Groundwater Sampling Points

In an attempt to further delineate the extent of dissolved phase groundwater impacts identified during the Phase II ESA, and the Further Soil and Groundwater Investigations, an additional seventeen (17) groundwater monitoring wells (GW201 – GW204, GW209 – GW210 and GW301 – GW311) were drilled and constructed surrounding the former refuelling tank and existing wells. The approximate location of the groundwater monitoring wells is shown in Figure 5, Appendix G.

All groundwater samples recovered from the groundwater monitoring wells were submitted to Amdel and analysed for TPH, BTEX and PAHs.

7.1.2 Field Observations and Contamination Assessment

The soil profile encountered during the drilling of the additional monitoring wells was generally consistent with the soil profile encountered across the majority of the main railyards. Fill depths generally varied from 0.1m bgl to 0.6 m bgl and comprised predominantly of clayey silty sands with occasional cinder and slag/ballast fragments. Area of deeper fill, defined by the groundwater monitoring wells GW210, GW305, GW307, GW309 and GW310 were identified south and north-east of the former goods shed. The fill materials in this area extend to 5 metres north-east of the goods shed (GW305, GW307, GW309 and GW310) and 4 metres south of the goods shed (GW210). The fill material in all locations was underlain by natural clays with some inclusions of quartzitic and ironstone gravels.

Following the original proposed scope of works, additional groundwater monitoring rounds and the installation of further groundwater monitoring wells were proposed in order to delineate the areas of observed impacts. The installation of product recovery socks was proposed for wells which contained phase separated hydrocarbons.

Sampling and analysis was conducted based on the previously identified impacts, with analysis of groundwater samples for total petroleum hydrocarbons (TPHs), mono-aromatic hydrocarbons (BTEX), polycyclic aromatic hydrocarbons (PAHs) and lead. The groundwater sampling and analysis program was undertaken during three sampling events in 1999, and the field observations, and sampling results for each monitoring event are described below for each sampling event.

March 1999

Sampling undertaken in the March 1999 sampling round involved the sampling and analysis of eight (8) groundwater monitoring wells, previously installed by PPK. The wells sampled were GW5, GW6 and GW8 (Phase 2 ESA) and GW101, GW102, GW103, GW104 and GW105 (Further Soil & Groundwater Investigation).

The results of the monitoring round indicated that phase separated hydrocarbons were present in GW5, GW101 and GW102, all adjacent the former refuelling tank. Laboratory analysis of groundwater samples reported the presence of dissolved phase hydrocarbons (characteristic of a degraded distillate product) in the monitoring well GW103. Laboratory analysis also reported no dissolved phase TPH impacts in monitoring wells GW6, GW8, GW104 or GW105.

The installation of additional groundwater monitoring wells in the area was recommended, to delineate the observed impacts. Product recovery socks were also installed in wells GW5, GW101 and GW102.

May/June 1999

Sampling undertaken in the May/June 1999 sampling round involved the sampling and analysis of thirteen (13) groundwater monitoring wells. These wells consisted of the eight wells, previously installed by PPK and sampled during March 1999, and five additional wells, installed by PPK, following the results of the March sampling event. The wells sampled were GW5, GW6 and GW8 (Phase 2 ESA), GW101, GW102, GW103, GW104 and GW105 (Further Soil & Groundwater Investigation) and GW201, GW202, GW203, GW204 and GW211 (current investigation).

The results of the monitoring round indicated that phase separated hydrocarbons were still present in GW5, GW101 and GW102. Laboratory analysis of groundwater samples reported the presence of dissolved phase hydrocarbons (characteristic of a degraded distillate product) in the monitoring wells GW6, GW103, GW201, GW202 and GW211. Laboratory analysis also reported no dissolved phase TPH impacts in monitoring wells GW8, GW104, GW105, GW203, GW204.

The presence of dissolved phase hydrocarbons, at concentrations above the laboratory method limit of reporting were identified in GW6, where no impacts had previously been identified.

The installation of additional groundwater monitoring wells, in the area, was recommended to delineate the impacts reported during this monitoring event.

Product recovery socks were checked in wells GW5, GW101 and GW102. Residual free-phase product was confirmed in each of the wells, and therefore replacement socks were installed. The socks, when full, retain approximately 1 litre of hydrocarbon products. Each of the socks was approximately 80%-95% full, relating to a total product recovery of approximately 2.5 litres.

August 1999

Sampling undertaken in the August 1999 sampling round involved the sampling and analysis of twenty-four (24) groundwater monitoring wells. These wells consisted of the thirteen wells, previously installed by PPK and sampled during June 1999, and eleven additional wells, installed by PPK, following the results of the June sampling event. The wells sampled were GW5, GW6 and GW8 (Phase 2 ESA), GW101, GW102, GW103, GW104 and GW105 (Further Soil & Groundwater Investigation), GW201, GW202, GW203, GW204 and GW211 (current investigation, Phase A) and GW301, GW302, GW303, GW304, GW305, GW306, GW307, GW308, GW309 and GW211 (current investigation, Phase B).

The results of the monitoring round indicated that phase separated hydrocarbons were still present in GW5, GW101 and GW102. Laboratory analysis of groundwater samples reported the presence of dissolved phase hydrocarbons (characteristic of a degraded distillate product) in the monitoring wells GW103, GW202, GW308 and GW309. Laboratory analysis also reported no dissolved phase TPH impacts in monitoring wells GW6, GW8, GW104, GW105, GW201, GW203, GW204, GW211, GW301, GW302, GW303, GW305, GW306, GW307, GW310 and GW311.

Laboratory analysis of the groundwater sample collected from GW304 reported the presence of dissolved phase hydrocarbons (characteristic of a motor spirit product).

The observed dissolved phase hydrocarbons impacts, identified in GW6, GW201 and GW211 were not confirmed during the August 1999 monitoring event, with reported TPH concentrations below the laboratory method limit of reporting for each of the three wells.

Product recovery socks were checked in wells GW5, GW101 and GW102. Residual free-phase product was confirmed in each of the wells, and therefore replacement socks were installed. The socks were approximately 40%-85% full, relating to a total product recovery of approximately 2 litres.

7.1.3 Groundwater Analytical Results (Summary)

The results for total petroleum hydrocarbon (TPH) analysis of the three groundwater monitoring rounds are summarised in Table 7.1.

The results indicated the presence of phase separated hydrocarbon (PSH) products in three wells, and dissolved phase hydrocarbon (DPH) products in an additional eight wells.

Table 7.1 Groundwater TPH Results (Summary)

Well ID	March 1999	May/June 1999	August 1999
GW5	**PSH**	**PSH**	**PSH**
GW6	nd.	740	.nd.
GW101	**PSH**	**PSH**	**PSH**
GW102	**PSH**	**PSH**	**PSH**
GW103	**23,090**	1,866	1,403
GW201	-	196	.nd.
GW202	-	2,649	**7,470**
GW211	-	277	.nd.
GW304	-	-	**67,760**
GW308	-	-	310
GW309	-	-	100

Note: PSH indicates phase separated hydrocarbon product observed.
BOLD indicates value exceeds the Assessment Criteria. (5,000 ug/L $C_{10} - C_{36}$)
nd. indicates reported concentration below the laboratory method detection limit.

7.2 Eastern Rail Corridor – Adjacent Former Cement Works

Located to the east of the main railyards, within the Fyshwick industrial area, this area comprises the rail corridor and northern access areas adjacent to the Newcastle Street bridge. This area previously adjoined the southern boundary of a former cement works where visually discoloured and potentially impacted surface soils were identified during the initial Phase 1 Environmental Audit.

The Phase II ESA program comprised the drilling and construction of a single groundwater monitoring well within the northern portion of the rail corridor and access area to the former cement works (now industrial/commercial premises). Results and findings of the drilling and sampling works identified the presence of a shallow band of ballast, ash and cinders, in which concentrations of lead and zinc (4,733 mg/kg & 53,264 mg/kg respectively) were both identified in excess of the Phase II ESA assessment criteria.

During the Further Soil and Groundwater Investigations (PPK, January 1999), the lateral and vertical extent of the fill materials was defined.

7.2.1 Additional Soil Sampling

Based on the observed presence of ash/cinder and ballast fill layer, which contained elevated concentrations of metallic analytes (particularly lead and zinc), further works were proposed to confirm the elevated concentrations, and to examine the potential for leachate generation.

One (1) additional sample (AAA) was collected from the fill material, which contained ash and cinders. This sample was taken from an equivalent location (immediately east) and depth (0-0.15) of BH32 (Phase II ESA, PPK, November 1998), where elevated leads and zinc levels were previously identified.

The soil sample was submitted to Amdel and analysed for a metals screen which included aluminium, arsenic, beryllium, cadmium, cobalt, chromium, copper, iron, lithium, magnesium, mercury, nickel, lead, selenium, tin, vanadium and zinc. Following these analyses, Amdel undertook a toxicity characteristic leachate procedure (TCLP), to determine the potential for leachate generation in the in-situ material.

7.2.2 Field Observations and Contamination Assessment

The soil profile encountered during the collection of the soil/fill sample was generally consistent with the soil profile identified during the initial drilling in the area (BH32), where fill material was identified to a depth of 0.9 metres. The depth of fill was however not confirmed during the additional works.

The results of the limited soil-sampling program confirmed the initial results reported in the Phase II ESA report. Laboratory analysis of ash/cinder sample reported the presence of elevated metallic contaminants, which exceed the assessment criteria. The elevated results can be summarised as follows:

Table 7.2 Elevated Concentrations of Metallic Analytes

Analyte	Maximum Concentration	Assessment Criteria	Assessment Criteria (hot-spot)
Lead	5,420 mg/kg	1,500 mg/kg	3,750 mg/kg
Zinc	50,600 mg/kg	35,000 mg/kg	87,500 mg/kg

The results indicate that, of the contaminants of concern, only the elevated lead concentration exceeds the general screening level hot-spot criterion, referenced through the National Environmental Health Forum (NEHF, 1998).

For the Port Pirie Rail Site, located at Port Pirie, South Australia, a risk assessment document has been produced with respect to elevated lead concentrations. The results of the health based risk assessment (HRA) concluded that for the Port Pirie Rail Site, a maximum allowable soil lead concentration of 11,800 mg/kg should be adopted. It is considered that the Port Pirie HRA criterion, based on surficial lead impacts, would be suitable for use as a Tier 1 risk assessment reference for the Canberra Rail Site. The assumptions made within the Port Pirie HRA (widespread surficial lead impacts), are considered conservative for the localised lead impacts identified at depth within the Canberra Rail Site.

The maximum concentration of lead within the ash/cinder fill material was 5,420 mg/kg, which is below the HRA based maximum allowable concentration of 11,800 mg/kg. An excerpt from the Health Risk Assessment (HRA), produced for the Port Pirie Rail Site is included in Appendix O.

7.2.3 Toxicity Characteristic Leachate Procedure (TCLP) Assessment

Following the observed elevated metallic analyte (lead and zinc) concentrations, further laboratory analysis was undertaken to determine the potential for leachate generation in the in-situ materials. The results of the TCLP analysis are summarised in Table 7.3.

The results of the TCLP testing indicate that the potential for leachate generation in the ash/cinder fill materials is low, thereby confirming that the elevated contaminant levels are generally associated within the bound matrix of the ash/cinder material.

Table 7.3 TCLP Results (Ash/Cinder Fill)

Analyte	TCLP Result	Criterion*
Lead	0.27 mg/L	5 mg/L
Zinc	18.1 mg/L	250 mg/L

* Criterion based on SA-EPA disposal criterion for Contaminated Soils

The South Australian EPA disposal criteria for contaminated soils is based on the New South Wales EPA criterion for the disposal of contaminated soils. It is understood that Environment ACT primarily conform to these standards.

7.3 Municipal Waste Disposal Area

Located in the far northern and eastern portions of the main rail yards, this area of site was used extensively from the early 1950's through to the late 1970's or early 1980's as a dumping ground for municipal wastes.

Test pit excavations combined with the drilling and construction of a groundwater monitoring well during the Phase II ESA identified the presence of buried waste materials extending beyond 3.9m bgl within the centre and perimeter of the dump site. Visual assessment of the fill materials did not identify any obvious gross visually contaminated materials, however ash, cinders, slag, fibre cement sheeting, coal and metal objects were identified.

Laboratory analysis of selected samples reported a single exceedance of the Phase II ESA assessment criteria, with an elevated concentration of Benzo(a)pyrene identified in a test pit containing extensive ash, cinder and slag materials. Laboratory analysis of the single monitoring well, located on the north-eastern side of the main fill area, reported a lead concentration, slightly in excess of the Phase II ESA assessment criteria (ADWG).

Following the proposed scope of works, additional groundwater monitoring rounds and the installation of further groundwater monitoring wells were proposed in order to delineate the areas of observed impacts. An additional soil test-pitting program was also proposed, to further delineate the nature and composition of the fill materials.

7.3.1 Field Observations and Contamination Assessment (Soil)

The soil profile encountered during the excavation of the additional test pits was generally consistent with the findings of the initial intrusive investigations. The fill materials were observed to a maximum depth of 4.9 metres, and consisted of extensive silty clay and gravel fill materials, with inclusions of bricks, scrap metal bitumen fragments, glass, paper and plastic, with occasional inclusions of car tyres, ash/cinders and wire. Fibre cement sheeting, suspected of containing asbestos, was identified within the waste materials in earlier investigations, however this was not confirmed during the current investigation program. Natural sandy silts and silty sandy clays to depths in excess of 8m bgl underlay the fill material.

The observed thickness of fill materials was generally greatest (4.9 metres) in the central portion of the dump site with the depth of fill generally decreasing to the north and to the east. The observed fill thickness was 1.0 – 2.9 metres along the test pits on the eastern side of the dump site (DTP2 – DTP6), and 2.2 metres in the north of the dump site (GW205). The fill materials reported in the far northern portion of the site were generally free of wastes, consisting of mainly disturbed natural soils. Laboratory analysis was not undertaken on the soils from the test pits, and no significant quantities of ash/cinders were reported in any of the additional test pits.

During the groundwater monitoring program, six (6) additional groundwater monitoring wells were installed in the northern portion of the dump site (GW205 – GW208 and GW312 – GW313). During the drilling program, soil samples were collected, both within, and below the fill materials present. Selected samples were then submitted to Amdel for laboratory analysis to be conducted.

The results of the limited soil-sampling program identified no elevated contaminant levels which exceeded the assessment criteria, within the natural soil underlying the dump fill materials.

7.3.2 Field Observations and Contamination Assessment (Groundwater)

Groundwater sampling and analysis was undertaken at three sampling events in 1999, and the field observations, and sampling results for each monitoring event are described below for each sampling event.

The approximate location of the groundwater monitoring wells is shown in Figure 4, Appendix G.

June 1999

Sampling undertaken in the June 1999 sampling round involved the sampling and analysis of fifteen (15) groundwater monitoring wells. These wells consisted of the eleven, previously installed by PPK, and four additional wells, installed by PPK in May 1999. The wells sampled were GW39 (Phase 2 ESA), GW107, GW108, GW109, GW110, GW111, GW112, GW113, GW114, GW115 and GW116 (Further Soil & Groundwater Investigation) and GW205, GW206, GW207 and GW208 (current investigation).

Laboratory analysis of groundwater samples reported the presence of dissolved phase hydrocarbons in two wells (GW39 and GW110) at levels, which exceeded the laboratory method limit of reporting. These results generally confirmed the monitoring results for December 1998 (reported within the Further Soil and Groundwater Investigation Report, PPK), however, the reported TPH concentrations within GW39 were not observed during the initial investigations. Examination of the TPH chromatograph indicated that the reported TPH concentration (101 ug/L) was primarily due to a single isolated peak, indicating that a specific compound, rather than a petroleum hydrocarbon product was the likely contaminant.

Laboratory analysis of groundwater identified some analytes in excess of the assessment criteria. These results are summarised in Table 7.4.

Table 7.4 Elevated Concentrations of Analytes - Groundwater

Analyte	Maximum Concentration	Assessment Criteria (ADWG)	Assessment Criteria (Aquatic ECO)	Wells with Elevated Analyte Concentrations.
TPH	48,100 µg/L	-	-	GW39, **110**
Bis(2-Ethylhexyl)pht	132 µg/L	-	-	All wells
Acenaphthene	2 µg/L	-	-	GW110
Fluorene	6 µg/L	-	-	GW110
Phenanthrene	4 µg/L	-	-	GW110
Benzo(a)anthracene	1 µg/L	-	-	GW110
Total PAHs	13 µg/L	-	3 µg/L	**GW110**
Arsenic	0.013 mg/L	0.007 mg/L	0.050 mg/L	GW205
Manganese	887 mg/L	0.5 mg/L	-	GW39, 107, 108, 110, 111, 112, 113, 114, 115, 116, 208
Lead	0.019 mg/L	0.010 mg/L	0.001 - 0.005 mg/L	**GW206**
Ammonia	8.99 mg/L	0.5 mg/L	-	GW107, 108, 110, 114

Note: **Bold** well IDs indicate maximum reported concentration in excess of the Assessment Criteria (Aquatic Ecosystems and Dutch Intervention[TPH]).

The results indicate that the groundwater beneath the site contains some elevated contaminant levels in excess of the assessment criteria (AWDG). These elevated results generally appear to be consistent with localised exceedances, including the elevated lead concentration observed in GW206. The concentration of Total PAH identified within GW110 exceeded the assessment criteria (protection of fresh water ecosystems).

The average concentration of dissolved phase lead is below the assessment criteria (ADWG) however the average concentration of dissolved phase manganese is above the assessment criteria (ADWG). Two significant manganese concentrations, well above the mean concentration, were identified in GW113 and GW116. With respect to the protection of aquatic ecosystems (specifically Jerrabomberra Creek), there is no specific guideline for the concentration of dissolved phase manganese.

Based on the results of this sampling and monitoring round, the installation of a further two (2) groundwater monitoring wells adjacent to GW39 were proposed.

July 1999

During the installation of the two additional wells, re-sampling of GW39 was undertaken to confirm the reported total petroleum hydrocarbon (TPH) concentration identified during the June 1999 sampling round.

The results of the monitoring round did not confirm the elevated TPH concentration, with TPH concentrations reported below the laboratory method detection limit.

August 1999

Sampling undertaken in the August 1999 sampling round involved the sampling and analysis of three (3) groundwater monitoring wells. These wells consisted of GW39 and two additional wells, installed by PPK in July 1999. The wells sampled were GW39 (Phase 2 ESA) and GW312 and GW313 (current investigation, Phase B).

The results of the monitoring round identified TPH, BTEX and PAH concentrations below the laboratory method detection limit.

7.4 Eastern Rail Corridor – Impacts from Off-Site Sources

Located to the east of the main rail yards, within the Fyshwick industrial area, the rail corridor extends between the Ipswich and Newcastle Street bridges. This area of the rail corridor provides sidings and access to numerous industrial premises, including the operational Shell, Mobil, Caltex/Ampol and BP Fuel Depots.

Adsorbed phase soil and dissolved phase groundwater impacts, characteristic of a degraded distillate/motor spirit mix were identified during the Phase 2 ESA and Phase 2b Further Soil and Groundwater Investigations, within the sub-surface soils adjacent to the northern boundary of the Shell depot, located adjacent to the Monaro Highway. Laboratory analysis of groundwater samples recovered from three of the monitoring wells located adjacent to the Mobil depot and from a single well located adjacent to the Caltex/Ampol depot, reported high concentrations of dissolved phase petroleum hydrocarbons, including TPH, benzene and PAH compounds. Two of the three impacted samples recovered from wells adjacent to the Mobil depot, were recovered from existing monitoring wells, however it is unknown as to who commissioned or constructed the monitoring wells. The approximate location of the groundwater monitoring wells is shown in Figures 6 and 7, Appendix G.

7.4.1 Field Observations and Contamination Assessment (Groundwater)

PPK undertook an additional round of groundwater monitoring in the vicinity of the fuel depots, to confirm the original analysis results, and to assess the nature and extent of the observed impacts.

The results of the groundwater monitoring event confirmed the earlier investigation findings, with elevated dissolved phase hydrocarbon impacts observed wells adjacent to the Shell and Mobil Fuel Depots. The groundwater monitoring results for the latest monitoring event (May 1999) have been included in Table 7.5, with the results from previous groundwater monitoring events.

Table 7.5 Groundwater TPH Results (Eastern Rail Corridor)

Well ID	Fuel Depot	July 1998	December 1998	May 1999
GW1	Shell	.nd.	.nd.	.nd.
GW2	Shell	-	**8,140**	**9,990**
GW4	Shell	**95,700**	**50,100**	**77,100**
GW17	Caltex/Ampol	.nd.	.nd.	.nd.
GW19	Caltex/Ampol	296	.nd.	.nd.
GW21	Caltex/Ampol	.nd.	.nd.	.nd.
GW22	Mobil	.nd.	.nd.	.nd.
GW24	Mobil	**255,000**	307	**78,100**
GW26	BP	.nd.	.nd.	203
GW28	BP	.nd.	.nd.	.nd.
GW30	Caltex/Ampol	.nd.	.nd.	190
GW35	Shell	**31,200**	.nd.	**4,010***
GW38	Shell	.nd.	.nd.	.nd.
PWM1	Mobil	**34,900**	**50,700**	**86,800**
PMW2	Mobil	**18,700**	**108,500**	295
PMW3	Mobil	.nd.	.nd.	.nd.

Note: **Bold** Result indicates concentration exceeds the Assessment Criteria (TPH (C_6-C_9), 600* ug/L; TPH (C_{10}-C_{36}), 5,000 ug/L)

7.4.2 Further Investigation of Off-Site Sources of Contamination

Following the recommendation of the Further Soil and Groundwater Investigations (PPK, 1999), it is understood that Indec Consulting, on behalf of AN, have initiated discussions with Mobil, Caltex/Ampol and Shell.

It is further understood, that both Shell Australia Limited and Mobil Oil Australia have commissioned investigation works at their respective depots. It is anticipated that these works will confirm and or delineate the observed impacts.

It is not known if similar investigations have been conducted for the Caltex/Ampol and BP Depots.

7.5 Disposal Site for Fouled Ballast

According to information provided by Environment ACT, fouled ballast and soil was excavated from the northern portion of the main rail station platform and used as filling materials within the southern portion of the site adjacent to the residential fenceline.

In order to assess the nature and extent of impacts both within these fill materials and within the underlying natural soil profile and groundwater, a test pitting program, incorporating the analysis of selected soil/ballast samples and the installation of groundwater monitoring bores, located hydraulically down-gradient of the suspected disposal locations, was proposed.

7.5.1 Field Observations and Contamination Assessment (Soil)

During the test-pitting program, a total of twenty-two (22) test pits were excavated. The locations of these test pits is shown in Figures 2 and 3 in Appendix C. Of these twenty-two test pits, five pits showed evidence of ballast burial (ballast reported at depths extending beyond 0.5 metres). Three (3) additional test pits contained evidence of minor ballast burial, and a further six (6) pits contained evidence of shallow ballast (0.1 – 0.5 metres).

Evidence of fouled ballast burial was identified in five test pits, primarily south east of Robbo's Pet Barn. The locations where oily ballast was reported were (3A, 3B and 3C). Ballast was also identified at depth in two of the test pits, excavated south-east of the rail station (2G and 2H). The ballast in these locations however contained no visual or olfactory evidence of hydrocarbon impacts.

Adjacent to the oily ballast (3A, 3B and 3C), three additional test pits identified deep fill, with minor ballast only at depth (3D, 3E and 3F). It is considered likely that this fill would have been associated with the fouled ballast disposal works.

Minor Evidence of shallow ballast burial was identified in six (6) locations, south-east of the rail station. These test pits (2A, 2B, 2C, 2D, 2E and 2F) identified ballast, mixed with the surficial fill materials, however no visual or olfactory evidence of hydrocarbon impacts were apparent.

No evidence of ballast disposal was noted at the following test pit locations (1A, 1B, 1C, 1D, 1E, 2I, 2J and 3G).

The results of the limited soil/ballast-sampling program identified no elevated contaminant levels which exceeded the assessment criteria. Generally, the reported analyte concentrations (TPH, BTEX, and PAHs) were reported below the laboratory method limit of reporting.

7.5.2 Field Observations and Contamination Assessment (Groundwater)

Groundwater sampling and analysis was undertaken in one sampling event during 1999, and the field observations, and sampling results for this monitoring event are described below.

June 1999

Sampling undertaken in the June 1999 involved the sampling and analysis of two (2) groundwater monitoring wells. These wells (GW209 and GW210) were constructed by PPK, in accordance with the proposed scope of works in May 1999.

Laboratory analysis of groundwater samples reported no dissolved phase hydrocarbons impacts, with reported TPH, BTEX and PAH concentrations below the laboratory method limit of reporting.

A lead concentration of 0.017 mg/kg, marginally in excess of the assessment criteria (ADWG), (0.01 mg/kg) was reported within the sample collected from GW210. However this level is not in excess of the assessment criteria (protection of fresh water ecosystems).

7.6 Area of Underground Storage Tanks

Evidence of three abandoned underground storage tanks (USTs) were identified adjacent to the William Edmunds leased area.

Following verbal discussions with Indec Consulting, limited test pitting and investigation works were approved to investigate potential impacts, due to the possible past underground release of hydrocarbon products.

7.6.1 Field Observations and Contamination Assessment (Soil)

The soil profile encountered during the excavation of the exploratory test pits can be summarised as follows. The fill materials were observed to a maximum depth of 3.5 metres, and consisted generally of silty clay and gravel fill materials, with numerous glass inclusions. Field evidence indicated that this area might have been used for the disposal of bottles in the past. Below this, lay natural sandy silts and silty sandy clays.

During the excavation of test pits, surrounding the abandoned USTs, no visual or olfactory evidence of hydrocarbon impacts were noted. This was confirmed, with analytical results of the soil-sampling program identifying no elevated contaminant levels which exceeded the assessment criteria. Generally, the reported analyte concentrations (TPH, BTEX) were reported below the laboratory method limit of reporting.

A plan showing the soil sampling locations (1BT, 2BT, RT and LT) in the vicinity of the underground storage tanks is included as Drawing 27K140C/05 in Appendix C.

7.6.2 Field Observations and Contamination Assessment (Groundwater)

Groundwater sampling and analysis was undertaken immediately down-gradient of the UST area, during sampling and analysis of the municipal waste disposal area. A detailed description of the field observations and sampling results for each monitoring event (for well GW208) are included in Section 7.3.2 of this report.

8. Summary of Results

The results described in Section 7 of this report are summarised in the following sections of this report. A graphical representation of the observed hydrocarbon impacts in groundwater is included in Appendix Q, for each of the areas where hydrocarbon impacts in the groundwater have been observed.

8.1 Former Locomotive Refuelling Area

Following the results of the final monitoring round, the following conclusions can be drawn:

- Phase Separated Hydrocarbons (PSH) were identified in three on-site groundwater monitoring wells, adjacent the former refuelling tank, with a maximum apparent product thickness of 4 mm (measured in GW5). The total volume of PSH product within the area is estimated at 50 litres, based on an approximate area of impaction of 25 m^2 and an average product thickness of ½ the maximum observed.
- Dissolved Phase Hydrocarbons (DPH) were identified within eight on-site groundwater monitoring wells, adjacent the former refuelling tank. Five of these wells reported DPH impacts in the final groundwater monitoring event.
- The extent of hydrocarbon impacts has been defined laterally.

8.2 Eastern Rail Corridor – Adjacent Former Cement Works

Following the results of the additional soil/fill sampling and analysis, the following conclusions can be drawn:

- Elevated levels of metallic contaminants (primarily lead and zinc) were confirmed at levels which exceeded the assessment criteria.
- The elevated results were however below the HRA based maximum allowable concentration for lead and the NEHF hot-spot criterion for zinc (commercial/industrial land use).
- The results of TCLP testing indicated that the elevated contaminants identified were relatively immobile, based on the SA-EPA and NSW EPA criterion for disposal of contaminated soil.

8.3 Municipal Waste Disposal Area

Following the results of the additional soil/fill sampling and analysis, the following conclusions can be drawn:

- Fill materials consisted of silty clay and gravel, with varying quantities of bricks, scrap metal bitumen fragments, glass, paper and plastic, car tyres, ash/cinders and wire.

- The maximum observed thickness of fill was 4.9 metres, within the centre of the waste disposal area. The observed thickness of waste materials generally decreases toward the north and east.

- Minor localised areas of waste reported analyte concentrations above the assessment criteria (previous investigations), however no elevated contaminant levels exceeding the assessment criteria, were identified within the natural soil underlying the waste fill materials.

Following the results of the additional groundwater sampling and analysis, the following conclusions can be drawn:

- Initial laboratory analysis of groundwater samples (June 1999) reported the presence of dissolved phase hydrocarbons in two wells (GW39 and GW110) at levels which exceeded the laboratory method limit of reporting.

- The impacts identified within GW110 were in excess of the Dutch Intervention Criteria for TPH (C_{10}-C_{36}). The elevated concentration of dissolved phase hydrocarbons was confirmed by laboratory analysis, during further monitoring.

- The elevated concentrations of dissolved phase PAH compounds were also identified within the groundwater at GW110.

- The extent of impacts identified within the groundwater at the location of GW110, appear to be localised, with adjacent wells not reporting elevated concentrations of either TPH or PAHs.

- The reported concentration of dissolved phase hydrocarbons within the groundwater at GW39 was not consistent with a petroleum hydrocarbon product. The elevated result was not confirmed by laboratory analysis during further monitoring, with analytical results for GW39 and surrounding wells reporting TPH concentrations below the laboratory method detection limits.

- Localised elevated concentrations of several potential contaminants (arsenic and ammonia) were identified within the groundwater beneath the waste disposal area, at levels which exceeded the assessment criteria (ADWG), but were below the assessment criteria (protection of fresh water ecosystems).

- A Lead concentration (0.019 mg/L), marginally in excess of the assessment criteria (ADWG and protection of fresh water ecosystems) 0.01 mg/L and 0.005 mg/L respectively, was reported within the sample collected from GW206. This concentration is considered to represent a localised exceedance, with no elevated lead concentrations identified in GW110, and is not considered to be significant.

- Elevated concentrations of manganese, in excess of the assessment criteria (ADWG), were identified in several wells across the waste disposal area, with two

localised areas where the reported concentration of manganese was an order of magnitude higher than the mean.

- There is no formal guideline value for manganese concentrations in groundwater, for the protection of fresh water ecosystems, within the adopted assessment criteria.

8.4 Eastern Rail Corridor – Impacts from Off-Site Sources

It is understood that the discussions with the relevant oil companies, who own and/or operate the bulk fuel depots, have been undertaken. The results of these discussions, as understood by PPK at the time of reporting, can be summarised as follows:

- The Shell Company of Australia have undertaken independent sampling and analysis of the groundwater in the vicinity of the Shell Fuel Depot, to confirm and/or delineate the extent of petroleum hydrocarbon impacts.

- Mobil Oil Australia has commissioned an environmental investigation program at the Mobil fuel Depot. It is understood that Mobil had not requested access to the groundwater wells, to confirm the presence or absence of groundwater impacts.

- Caltex/Ampol and BP have been contacted regarding the results of the AN groundwater investigations, however, Indec, acting on behalf of AN, had not been contacted for access to the monitoring wells, so that further independent investigation works could be undertaken.

8.5 Fouled Ballast Investigation

Following the results of the additional soil/fill sampling and analysis, the following conclusions can be drawn:

- Evidence of ballast disposal/burial was identified within the areas investigated.
- Laboratory analysis of selected soil/ballast samples identified no elevated contaminant levels above the assessment criteria.

Following the results of the additional groundwater sampling and analysis, the following conclusions can be drawn:

- Laboratory analysis of groundwater samples hydraulically down-gradient of the investigation areas reported no dissolved phase hydrocarbons impacts, with reported TPH, BTEX and PAH concentrations below the laboratory method limit of reporting.
- A lead concentration of 0.017 mg/kg, in excess of the assessment criteria (ADWG) (0.01 mg/kg), was reported within the sample collected from GW210. This level is not in excess of the assessment criteria (protection of fresh water ecosystems).

8.6 Underground Storage Tanks

Following the results of the additional soil/fill sampling and analysis, the following conclusions can be drawn:

- No visual or olfactory evidence of petroleum hydrocarbon impacts were identified during the test-pitting program, adjacent to the identified underground storage tanks (USTs).
- Laboratory analysis of selected soil samples identified no elevated contaminant levels above the assessment criteria.

Following the results of the additional groundwater sampling and analysis, the following conclusions can be drawn:

- Laboratory analysis of groundwater samples hydraulically down-gradient of the investigation areas reported no dissolved phase hydrocarbons impacts, with reported TPH, BTEX and PAH concentrations below the laboratory method limit of reporting.
- A Manganese concentration (1.05 mg/kg), in excess of the assessment criteria (ADWG) (0.5 mg/kg), was reported within the sample collected from GW208. This level is not considered to be significant, and no formal criterion exists within the assessment criteria (protection of fresh water ecosystems).

9. Groundwater Modelling

To determine the site-specific groundwater characteristics, and to predict possible future fate transport scenarios, groundwater investigations and site-specific groundwater modelling was undertaken. The investigations centred on field permeability testing, to determine the transmissivity of the underlying unconfined aquifer/aquitard and surveying of the local groundwater wells to determine the hydraulic gradient.

9.1 Field Permeability Testing

To determine the in-situ permeability of the underlying unconfined aquifer, field permeability testing was undertaken in the general area of dissolved-phase impacts. The field permeability testing provides data on the likely groundwater flow velocities, and can be used as site specific data for inclusion into solute transport models. The field permeability results have been utilised for a one-dimensional solute transport model (see Section 9.3 of this report).

The permeability testing was undertaken on five (5) on-site groundwater monitoring wells, using the displacement test method. The displacement method incorporates the displacement of groundwater, within the groundwater monitoring well, and the collection of measurements to accurately map the recovery of the groundwater within the bore, until an equilibrium in the standing water level in the vicinity of the bore has been re-established.

For the five permeability tests undertaken at the site (GW8, GW11, GW13, GW39 and GW106), a 'slug' (a solid cylindrical object) was used to displace the groundwater.

The results of the permeability tests are shown in Appendix N, and are summarised in Table 9.1 below.

Table 9.1 Summary of Permeability Testing Results

Well ID	Location	Calculated Hydraulic Conductivity
GW8	Former re-fuelling area (FRFA)	4.07×10^{-6} m/min
GW11	Up-gradient, FRFA	3.79×10^{-6} m/min
GW13	Down-gradient, FRFA	1.16×10^{-5} m/min
GW39	Municipal waste disposal area (MWDA)	3.24×10^{-6} m/min
GW106	Between FRFA and MWDA	2.98×10^{-6} m/min
	Average	5.14×10^{-6} m/min

The results of the permeability testing indicated that the underlying unconfined aquifer is reasonably uniform, with the calculated results generally being within one order of magnitude. The results indicated that the permeability of the aquifer underlying the Municipal Waste Disposal area is consistent with the permeability of the aquifer underlying the Former Locomotive Re-fuelling area.

9.2 Local Groundwater Characteristics

Further to the general information contained in Section 2.4 of this report, the site specific groundwater data can be summarised as follows:

- Average depth to groundwater (based on latest gauging data) = 5.14 m
- Average hydraulic gradient (Main Station Area) = 0.005 m/m
- Average hydraulic gradient (Eastern Rail Corridor) = 0.006 m/m
- Groundwater flow direction = toward Jerrabomberra Creek
- Average permeability of the underlying aquifer/aquitard = 5.14×10^{-6} m/min.

The results summarised above have been utilised for the assessment of dissolved phase contaminant migration using one-dimensional solute transport modelling.

9.3 One-Dimensional Solute Transport Model

Based on the identified presence of dissolved-phase hydrocarbon impacts, in the vicinity of the former locomotive re-fuelling area and the municipal waste disposal area, solute transport modelling was undertaken to determine the likely migration of dissolved-phase hydrocarbons impacts in the area.

In general, dissolved components migrate hydraulically down-gradient in groundwater. Dispersive effects during transport result in a dilution of contaminant concentrations. Transport of the contaminant plume can be retarded by the effects of sorption to organic matter and other aquifer material. Concentrations may also reduce with time, due to biodegradation and volatilisation.

A one-dimensional (1-D) solute transport model has been used in this assessment, in order to estimate the possible future down-gradient migration of dissolved phase hydrocarbons in the groundwater. The model also allows assessment of the possible significance of biodegradation in reducing hydrocarbon concentrations and limiting the extent of dissolved phase impacts. Based on the consistency of the calculated permeability, for the five bores located throughout the site, it is considered that one model will be suitable to simulate dissolved-phase contaminant migration within the groundwater for both the former locomotive re-fuelling area and the municipal waste disposal area, where dissolved phase-hydrocarbon impacts have been identified. An assessment of the dissolved phase TPH impacts in the Eastern Rail Corridor (from off-site sources) has not been included in this model.

The 1-D model used in this assessment is an exact analytical solution to the general 3-D advection-dispersion equation. The 1-D equation is 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).

The model assumes a steady state uniform groundwater flow field and takes the following into account:

- Source concentration
- Groundwater velocity
- Longitudinal dispersion (but not lateral or vertical dispersion)
- Retardation
- Degradation.

9.3.1 Input Parameters

The following site-specific parameters and assumptions were used as the basis for the model:

- **Concentration of solute at the source (Co).** Set at 10,000 (arbitrary units). A relative concentration term was selected to allow the results of the model to be applied to all constituents of concern.

- **Initial concentration across the domain (Ci).** Set at 0, thereby assuming the groundwater is initially uncontaminated in all locations. The start time of the model therefore represents some time in the past, when groundwater impacts first commenced at the site.

- **Effective Porewater Velocity (v).** This is estimated to be 0.09 m/yr, based on Darcy's law: $v = ki/n$

  where k = permeability (2.7 m/yr [5.14 x 10^{-6} m/min], average of results from the five borehole permeability tests)
  i = hydraulic gradient (0.01)
  n = porosity (assume 0.3)

  It should be noted that the observed hydraulic gradient at the site was between 0.004 and 0.008 m/m, however, a conservative 0.01 m/m has been used in the model.

- **Dispersion Coefficient (d).** The dispersion coefficient is calculated as the product of the dispersivity (a) and the groundwater velocity (v). Dispersivity is generally considered to be scale dependent, and in this assessment is assumed to be in the range 1 – 10 m, which is in the order of 10% of the size of the area of interest.

- **Retardation coefficient (r).** Set at 1. To be conservative, it has been assumed that the dissolved components are not retarded relative to the groundwater flow. In reality there is likely to be significant retardation.

- **First Order Sink Rate (decay constant) (k).** The actual degradation rate of hydrocarbons in the groundwater beneath the site is not known. To be conservative a relatively long degradation half-life of 10 years has been assumed (decay constant = 0.0693).

Two model simulations were undertaken: one with a dispersivity of 1 m and the second with a dispersivity of 10 m. In both simulations there is assumed to be a continuing source of dissolved phase groundwater impacts.

Other parameters input into the model include the down-gradient distance over which results are required and the time intervals at which model output is required.

It should be noted that the site-specific values of many of these input parameters are not known (in particular the retardation coefficient and the degradation rate). The results of the modelling should therefore be treated as indicative only. However, as the assumptions and data values used are generally conservative, the modelled results would be expected to over-estimate the true down-gradient concentrations of dissolved hydrocarbons in the groundwater.

The graphical output of the modelling, showing the simulated variations of concentration with distance at different times (up to 3,000 years), is contained in Appendix P.

9.3.2 Modelling Results

The plots indicate that for both model runs the simulated concentrations reach steady state within 300 years. In reality, steady state is likely to be reached much quicker, due to faster degradation. The modelled degradation half-life of 10 years is considered to be conservative.

The plots indicate that the contaminant concentrations decline with increasing distance from the source, as would be expected. The reduction in concentrations is due to the effects of dispersion as well as degradation. Simulated eventual (steady state) concentrations at various distances hydraulically down-gradient of the source location are summarised in Table 9.2.

Table 9.2 Summary of Simulated Steady State Down-gradient Concentrations

Distance	Assumed Dispersivity	
Down-gradient (m)	1 m	10 m
10 m	0.61%	9.83%
20 m	0.0037%	0.97%
30 m	<0.0001%	0.095%
40 m	<0.0001%	0.0093%
50 m	<0.0001%	0.0009%
60 m	<0.0001%	0.0001%

Note: Results based on steady, ongoing source concentration of 100%

The results indicate that under the assumed parameter values, dissolved impacts of 0.01% of the source concentration are predicted to migrate no more than 40 m down-gradient from a source area.

9.3.3 Down-Gradient Impacts

In terms of beneficial use of the groundwater, it is assumed that no groundwater use will occur on the site itself. This is supported by there being no licensed groundwater abstraction wells on the site, other than those used for groundwater monitoring purposes.

Down-gradient of the impacted areas, it is assumed that the groundwater will discharge to the Jerrabomberra Creek, located approximately 350 m down-gradient of the observed impacts within the municipal waste disposal area. The Jerrabomberra Creek is also located in excess of 800 m down-gradient of the former locomotive refuelling area. Based on the modelling results there should be no risk of adverse groundwater quality impacts to the creek.

9.3.4 Correlation of Predicted and Observed Impacts

Following groundwater modelling, it is usual to look at the predicted migration of contaminants, and to check the predicted analyte concentrations, with those observed in the field to determine the suitability of the model. The results of the comparative analysis are as follows:

- The maximum modelled concentration (122,000 ug/L) was identified at GW5 during the Phase 2 ESA investigation (June 1998). A slight hydrocarbon sheen was noted on the surface, however a sample was collected. Further gauging of the well GW5, has identified the presence of a distinct phase separated layer, and therefore subsequent sampling at GW5 has not been undertaken.
- Reported solubilities of hydrocarbon constituents are generally an order of magnitude, or more, below 100,000 ug/L, and anecdotal information suggests phase separated impacts will be observed above TPH concentrations of 10,000 ug/L (10 mg/L).
- Higher concentrations of TPH were reported on the site (GW24, 255,106 ug/L; GW101, 383,700 ug/L; GW102, 1,171,880 ug/L), however a hydrocarbon sheen was noted on the surface of the water in each of these sampling events. These reported results are considered to represent entrained phase separated products.
- The maximum observed concentration of TPH, during the current investigation, at GW6 was 740 ug/L. GW6 is located approximately 15 metres hydraulically down-gradient. At a distance of 15 metres, the predicted impacts would be 450 ug/L (15 years following release) and 1,050 ug/L (20 years following the release). The model therefore correlates well with an estimated initial product release of 15 – 20 years (approximately 1980).
- The maximum observed concentration of TPH, during the current investigation, at GW8 was below the laboratory method detection limit. GW8 is located approximately 25 metres hydraulically down-gradient from GW101, where PSH impacts were identified. At a distance of 25 metres, the predicted impact would be <1 ug/L (15 years following release) and 4 ug/L (20 years following release), both below the laboratory method limit of reporting for impacts predominantly in the C_{10} - C_{28} TPH range. The model therefore concurs with the observed impacts for a product release at about 1980.

Based on the analytical results of the groundwater monitoring events, the observed impacts appear to confirm the predicted results, and therefore the assumptions made during the groundwater modelling appear valid.

10. Conclusions and Recommendations

The results and findings of the Investigation and Remedial Works Program, as summarised in Section 8 of this report, has identified and confirmed the presence of localised on-site soil and groundwater impacts, considered to be the result of on-site and off-site sources of contamination.

Impacts from On-Site Activities

Localised impacted areas considered to be the result of either current or former on site sources of contamination were identified and delineated within the former locomotive refuelling area and the adjacent former municipal waste dump, and the former cement works, adjacent to Newcastle Street.

Former Locomotive Refuelling Area

Construction of additional groundwater monitoring wells and subsequent sampling and analysis works have identified the presence of a phase separated hydrocarbon product within three groundwater monitoring wells, adjacent to the former refuelling tank. The lateral extent of impacts has been delineated, and work actions, to monitor and remove this identified product have been undertaken during the course of the currently reported works. Product recovery socks have been used as the preferred method of product recovery and approximately 5 litres of product has been removed. Permeability testing on the site has identified a low permeability aquifer underlying the site, and although product recovery is low, it is considered that product recovery at more accelerated rates would be difficult to achieve.

Dissolved phase petroleum hydrocarbon impacts were delineated within a further eight (8) groundwater monitoring wells. The lateral extent of dissolved phase impacts has been delineated, with groundwater monitoring wells, surrounding the observed impacts reporting analyte concentrations below the laboratory method limit of reporting. One dimensional fate transport modelling has been undertaken for the hydrocarbon impacts in this area. Based on the results of this modelling, it is considered that dissolved phase hydrocarbon products, above the laboratory method limit of reporting, would not be observed at the site boundary, due to migration of the observed source impacts. This groundwater modelling was undertaken with a n assumed continuous source of dissolved phase hydrocarbons impacts, consistent with residual PSH remaining in-situ. A comparative analysis between the predicted and observed impacts has shown the groundwater model to be conservative.

Based on the results of the 1-dimensional model, calculated on a continuous source concentration equal to the maximum observed dissolved phase TPH concentration (122,000 ug/L), the concentration of TPH would not exceed 1.1 ug/L at a distance of 50 metres from the source. Dissolved phase benzene impacts (maximum concentration of 14,700 ug/L) were also identified within GW304. Based on the 1D model, using a continuous source concentration of 14,700 ug/L, the concentration of benzene would not exceed 1.37 ug/L, well below the assessment criteria (protection of

fresh water ecosystems) (300 ug/L) at a distance of 40 metres from the source. Based on the 1D model, these concentrations would not be exceeded within 3,000 years.

The Jerrabomberra Creek system, located approximately 800 metres, is the closest receiving aquatic environment, and therefore, no impacts in excess of the assessment criteria (protection of fresh water ecosystems) would be expected from the identified sources considered. This conclusion is also supported by the analysis of groundwater between the source (former locomotive refuelling area) and the Jerrabomberra Creek. Remedial actions to address the dissolved phase hydrocarbon impacts, are therefore considered unnecessary.

It is recommended that restrictions be placed on the extraction of groundwater, for human consumption, in the vicinity of the former refuelling area, where impacts have been observed. It is considered that no further site remedial and/or management measures are required in the area for a site use which is consistent with the last known site use, prior to the AN sale date.

Municipal Waste Disposal Area

The extensive filling of the northern and eastern portions of the main railyards is considered to represent potential environmental and structural limitations for the future use or development of these portions of site.

Visual assessment of the fill materials within the main portion of the former dump area identified waste materials including ash, cinders, slag, glass, plastic, fibre cement sheeting suspected of containing asbestos, coal and metal objects to a depth of 4.9m bgl. Laboratory analysis of selected soil/fill samples reported only minor localised exceedances of the assessment criteria. These isolated elevated levels of contaminants in this portion of the site are not considered significant based on the last known use of the site, prior to the AN sale date.

Laboratory analysis of the groundwater samples recovered from the monitoring wells surrounding the hydraulically down-gradient perimeter of the waste fill areas reported the no significant organic constituents, with the exception of a single sample recovered from the north western portion of the site, where concentrations of dissolved phase TPH constituents were reported. Chromatographic analysis of the sample identified the hydrocarbon contaminant as a highly degraded kerosene or distillate product however, no obvious source zone or surrounding impacts was identified.

Based on the results of the 1-dimensional model, the observed maximum TPH concentration (48,100 ug/L), the concentration of TPH would not exceed 0.43 ug/L (below the laboratory method limit of reporting) at a distance of 50 metres from the source. Based on the 1D model, these concentrations would not be exceeded within 3,000 years.

The Jerrabomberra Creek system, located approximately 350 metres, is the closest receiving aquatic environment, and therefore, no impacts in excess of the assessment criteria (protection of fresh water ecosystems) would be expected from the identified sources considered. This conclusion is also supported by the analysis of groundwater

between the source and the Jerrabomberra Creek. Remedial actions to address the dissolved phase hydrocarbon impacts, are therefore considered unnecessary.

A localised lead concentration, in excess of the assessment criteria (ADWG and protection of fresh water ecosystems) was identified at the location of GW206, however the elevated concentration is not considered to be significant with no elevated lead concentrations reported in adjacent wells, and the mean concentration of lead below the assessment criteria (ADWG and protection of fresh water ecosystems).

Concentrations of all other heavy metals analysed, whilst in some instances in excess of the assessment criteria (ADWG) were generally consistent with the concentrations reported across the entire site, indicating no significant contribution from any waste materials and subsequent leachate products (if any) from the known waste fill areas. In terms of potential risks or impacts to the receiving creek and wetland systems, the concentration of heavy metal constituents, with the exception of lead, reported analyte concentrations below the assessment criteria (protection of fresh water ecosystems) and are therefore considered to represent negligible risks under current site conditions.

It is recommended that restrictions be placed on the extraction of groundwater, for human consumption, within the municipal waste disposal area, where impacts have been observed. It is considered that no further site remedial and/or management measures are required in the area for site use which is consistent with the last known site use, prior to the AN sale date.

Eastern Rail Corridor (adjacent former Cement Works)

Additional soil investigations undertaken during the currently reported investigations confirmed the presence of lead and zinc concentrations above the assessment criteria.

The reported analyte concentrations were below the National Environmental Health Forum (NEHF) hot-spot criterion for zinc (commercial/industrial land use) and the health based risk assessment (HRA) undertaken for the Port Pirie Rail Site, located at Port Pirie, South Australia, which is considered to represent a conservative Tier 1 reference for 'allowable' lead concentrations at the Canberra site.

Toxicity Characteristic Leachate Procedure (TCLP) testing indicated that the elevated contaminants identified were relatively immobile. Results of lead and zinc analysis from the groundwater monitoring well located within the area of fill materials confirmed the relative immobility, with a reported lead and zinc concentrations below the assessment criteria (ADWG).

It is considered that no further site remedial and/or management measures are required in the area for a site use which is consistent with the last known site use, prior to the AN sale date.

Disposal of Fouled Ballast

The current investigation has identified buried ballast materials in the southern portion of the main railyard area. The identification of these materials confirmed the anecdotal information provided, which detailed the disposal location.

Results of the intrusive investigation concluded that ballast was present in the southern portion of the main railyard to a depth of 3.5 metres bgl. Laboratory analysis of selected soil samples and groundwater identified no TPH impacts, in excess of the assessment criteria. Remedial actions to address the ballast are therefore considered unnecessary.

Impacts from Suspected Off-Site Activities

Total petroleum hydrocarbon (TPH) impacts were identified within the eastern portion of the rail corridor during the Phase II ESA works and subsequent further investigation works. These impacts are considered to be the result of on site migration of petroleum hydrocarbon products from the fuel depots located along the rail corridor.

Results of the additional groundwater monitoring confirmed previous investigation results, with TPH concentrations reported above the laboratory method limit of reporting in groundwater samples collected from adjacent the Shell, Mobil, BP and Caltex/Ampol fuel depots. Minor impacts were observed adjacent the BP and Caltex/Ampol depots with TPH concentrations of approximately 200 ug/L reported. More significant impacts were observed adjacent to the Shell and Mobil depots with TPH concentrations of approximately 80,000 ug/L reported.

The lateral extent of the observed impacts has not been delineated, due to the presence of rail infrastructure, however it is understood that the oil companies responsible for the fuel depots have been informed of the observed impacts. It is understood that Mobil Oil Australia and Shell Australia Limited, have undertaken further investigation works for their respective properties.

Localised groundwater flow within the eastern rail corridor was confirmed to be in a general westerly direction, with the nearest groundwater receptor likely to be the Jerrabomberra Creek, located in excess of 1,200m west of the Mobil Depot, and approximately 700 metres north-west of the Shell Depot.

With respect to potential risks to on site rail workers, it is considered that due to the depth of the impacted soils and groundwater within the rail corridor the observed site contaminant conditions are not likely to pose potential health risks to rail workers under normal site activities and operations, however potential health risks may be present if future maintenance works or works involving either excavations within these areas or if extraction and/or use of the groundwater within these areas occurs. On site personnel should be made aware of site conditions such that appropriate safety procedures can be adopted prior to the commencement of any such works.

General

Based on the approved scope of assessment, remediation and validation works completed by PPK, the environmental effects and risks on site are considered to have been adequately identified and remediated to the environmental standards formally agreed between the Commonwealth and other jurisdictions in which AN operated, with the exception of:

- Dissolved phase hydrocarbon impacts identified but not delineated within the eastern rail corridor (off site sources).

On this basis the following are recommended:

- Indec on behalf of AN or the current site owner, as a pro-active site management measure, liaises with the oil companies (in particular Shell and Mobil), on the outcomes of further investigation, assessment and/or remedial works required to address the identified dissolved phase hydrocarbon impacts, likely to be associated with the fuel depots.

The conclusions and recommendations made in this report are based on the continued use of the site for which it was last used prior to the AN sale date. This site use scenario assumes no groundwater extraction on site and only limited soil disturbance. Therefore it is recommended that site management measures be put in place to ensure this continues to be the case or to provide adequate information and/or direction for site works other than those assumed to be undertaken. If the site is to be re-developed for a use other than the purpose of which it was last used prior to the AN sale date, then further investigation and/or assessment works would be mandatory.

11. Statement of Limitations

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").

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 enquires 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.

Appendix A

Site Location Plan