
Validation Report

12 Duckenfield Road,
Morpeth NSW

NEW17P-0221-AA
27 March 2018



27 March 2018

Mr John Crawley
107 Wilton Drive,
East Maitland, NSW 2323

Attention: Mr John Crawley

Dear John

**RE: UNDERGROUND STORAGE TANK REMOVAL
12 DUCKENFIELD ROAD, MORPETH NSW
VALIDATION REPORT**

Please find enclosed our Validation Report for the Underground Storage Tank (UST) at 12 Duckenfield Road, Morpeth NSW.

Mr John Crawley obtained consent for the removal of the UST from Maitland City Council (Council). The UST was removed by Aspec Industries Pty Ltd, and Qualtest undertook validation sampling and analysis. This report has been prepared to describe the remediation works carried out, and state whether the excavation area of the former UST is suitable for ongoing residential land use.

This Validation Report was prepared in accordance with the relevant sections of the NSW OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites.

If you have any questions regarding this report, please do not hesitate to contact the undersigned.

For and on behalf of Qualtest Laboratory (NSW) Pty Ltd



Libby Betz

Senior Environmental Scientist

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VALIDATION REPORT - 12 DUCKENFIELD ROAD, MORPETH NSW.

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1.0 Introduction

1.1 General

Qualtest Laboratory NSW Pty Ltd (Qualtest) is pleased to present this Validation Report to Mr John Crawley for the removal of the Underground Storage Tank (UST) at 12 Duckenfield Road, Morpeth NSW. Figure 1 and Figure 2, Appendix A, shows the location of the site.

Mr John Crawley obtained consent for the removal of the UST from Maitland City Council (Council). The UST was removed by Aspec Industries Pty Ltd (Aspec), and Qualtest undertook validation sampling and analysis. This report has been prepared to describe the remediation works carried out, and state whether the excavation area of the former UST is suitable for ongoing residential land use.

This report was prepared in general accordance with the relevant sections of the NSW OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites and the *National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013)*, NEPC 2013, Canberra (referred to as ASC NEPM 2013).

1.2 Objectives

The objective of the remediation and validation works was to render the site (the UST excavation area) suitable for ongoing residential land use.

1.3 Scope of Work

In order to achieve the above objective, the following scope of work was carried out:

- Guiding Aspec during the excavation of contaminated soil surrounding the UST;
- Validation sampling and analysis of the excavation and stockpile; and,
- Preparation of a validation report in accordance with the relevant sections of the NSW OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites.

2.0 Site Description

2.1 Site Identification

The property is located at 12 Duckenfield Road, Morpeth NSW. The property includes a driveway access, an existing house and two storage sheds. A former shed was located on the northwest corner of the property, and the UST was located adjacent to the former shed. For the purposes of this report, the 'site' refers to the location of the former UST and the resultant excavation as shown on Figure 2.

General site information is provided below in Table 2.1.

Table 2.1: Summary of Site Details

Property location:	12 Duckenfield Road, Morpeth NSW
Approximate site area:	Site (UST Excavation): 50 square metres (m ²) Property: 1,869m ²
Title Identification Details:	Lot 6 of DP 6926, within the Maitland local government area
Current Ownership:	Mr John Crawley
Previous Landuse:	Residential
Current Landuse:	Residential
Proposed Landuse:	Residential
Adjoining Site Uses:	North – Duckenfield Road, followed by residential properties; East – Rural-Residential property; West – Residential properties; South – Vacant rural land
Site Coordinates:	32°43'49 S 151°38'16 E

2.2 Topography and Drainage

Reference to the NSW Land and Property Information Spatial Information Exchange website (<https://six.nsw.gov.au/wps/portal/>) indicated the elevation of the site was approximately 10m AHD.

During field investigations, the site surface was observed to be relatively flat. Surface water would be expected to infiltrate into site soils or drain towards an unnamed wetland located about 80m south of the site. The wetland drains to Four Mile Creek located about 770m southeast of the site.

2.3 Geology and Soils

Reference to the 1:100,000 Newcastle Geology Sheet indicates the site is underlain by the Tomago Coal Measures, Four Mile Creek Formation which are characterised by sandstone, conglomerate, minor siltstone, claystone, coal and tuff. These rocks typically weather to form clayey gravelly sands, gravelly clays and sandy clays.

2.4 Hydrogeology

Groundwater beneath the site is anticipated be present in semi-confined or confined aquifers in weathered rock between approximately 5m and 10m below ground surface (bgs). Groundwater flow direction from beneath the site is anticipated to flow to the south and discharge to Four Mile Creek located about 770m southeast of the site.

A search of the NSW Department of Primary Industries (Office of Water) registered groundwater bores located within a 500m radius of the site was undertaken. The search revealed that there are no registered bores within this radius.

3.0 Remediation Objectives

4.1 Remediation Goal

The remediation goal for the site, with respect to contamination, was to remediate the site to a condition that was suitable for ongoing residential land use.

4.2 Investigation Levels

The health and ecological investigation levels for soil, presented in the *National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013)*, *NEPC 2013*, Canberra (referred to as ASC NEPM 2013) are generally used in NSW when selecting investigation levels for chemical contaminants in soil.

ASC NEPM (2013) provides health and ecological investigation and screening levels for different exposure scenarios based on a proposed land use. Health and ecological investigation and screening levels are applicable to the first stage (Tier 1) of site assessment and are used to assist in the iterative development of a Conceptual Site Model (CSM). They are adopted as concentrations of a contaminant above which either further appropriate investigation and/or evaluation will be required, or development of an appropriate management strategy (including remediation).

Health Investigation Levels (HILs) and Health Screening levels (HSLs) are applicable for assessing human health risk via relevant exposure pathways.

The HILs were developed for a broad range of metals and organic substances. These are generic to all soil types.

The HSLs have been developed for selected petroleum compounds and fractions and are applicable to assessing human health risk via inhalation and direct contact with soil and groundwater. The HSLs depend on specific soil physicochemical properties, building configurations, land use scenarios and the depth that groundwater is encountered.

Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) are applicable for assessing risk to terrestrial ecosystems under residential, open space and commercial/industrial land use scenarios. They apply to the top 2m of soil, which corresponds to the root zone and habitation zone of many species.

The EILs are associated with selected metals and organic compounds. The EILs are site specific and are determined by calculating an Ambient Background Concentration (ABC) and an Added Contaminant Limit (ACL) for the site, which are added together to get the EIL. In the absence of ambient background concentration data, a generic ACL, based on the soils pH, Cation Exchange Capacity (CEC) and clay content, has been adopted.

The ESLs are associated with petroleum compounds and fractions and are dependent on specific soil physical properties (i.e. coarse and fine-grained soil).

The following criteria have been adopted:

- HIL A – low density residential land use;
- HSL A – low density residential land use, Clay, 0-1m and 1-2m depth; and,
- EIL A and ESL A – urban residential / public open space.

For validation purposes, the adopted remediation criteria (for residential land use) are listed in Table 4.1 below.

Table 4.1: Adopted Remediation Criteria for Human Health and Environment (mg/kg)

COC	HIL ¹	HSL Clay	HSL Clay	EIL ³	ESL ⁴
Naphthalene	-	5	NL	-	170
TRH C6-C10	-	-	-	-	180
TRH >C10-C16	-	-	-	-	120
TRH >C16-C34	-	-	-	-	1300
TRH >C34-C40	-	-	-	-	5600
TRH C6-C10 minus BTEX (F1)	-	50	90	-	-
TRH >C10-C16 minus Naphthalene	-	280	NL	-	-
Benzene	-	0.7	1	-	65
Toluene	-	480	NL	-	105
Ethylbenzene	-	NL	NL	-	125
Xylenes	-	110	310	-	45
Benzo(a)pyren	3	-	-	-	0.7
Total PAHs	300	-	-	-	-
Lead	300	-	-	1,100	-

Notes:

1 – ASC NEPM (2013) - Table 1A(1): Health Investigation Levels – Residential

2 – ASC NEPM (2013) - Table 1A(3): Health Screening Levels – Residential, Clay 0-1m and 1-2m

3 – ASC NEPM (2013) - Tables 1B(1) to 1B(5): Ecological Investigation Levels - Residential & Open Space

4 – ASC NEPM (2013) - Tables 1B(6): Ecological Screening Levels - Residential & Open Space

4.0 Validation and Remediation Activities

The following remediation and validation activities were undertaken on the site:

- Removal and disposal of the UST by Aspec;
- Excavation and stockpiling of contaminated soils by Aspec under guidance from Qualtest;
- Collection and analysis of validation samples from the excavation by Qualtest;
- Collection and analysis of validation samples from material stockpiled on site by Qualtest; and
- Importation of Virgin Excavated Natural Material (VENM) to backfill the excavation by Mr John Crawley.

5.1 Excavation of UST and Contaminated Soils

The UST removal and excavations works were carried out by Aspec, under the guidance of the site owner.

The UST was exposed and removed from the excavation prior to Qualtest attending the site. Qualtest observed the UST before it was transported from site. The UST was observed to be approximately 2,000L in a fair condition. A photograph of the UST is provided below. The site owner notified Qualtest that the UST was disposed to Mathews Metal Management, East Maitland on 2 December 2017. A copy of the disposal docket is included in Appendix C.

The contaminated soil was excavated under guidance by Qualtest, who used a Photoionisation Detector (PID) and observations to assess whether contamination had been removed to the extent practical.

The excavation (EX1) was approximately 8.5m long and 5.5m wide, and extended to depths of about 1.5m to 1.9m bgs. Samples were taken from the excavation walls at about 10 lineal metres and at varying depths, and from the base of the excavation at about one sample per 12m² (note, not all samples collected were analysed, see Table 6.1 below). The validation samples collected are summarised in Table 5.1 below.

Table 5.1 – Summary of Validation Sampling

Sample ID	Depth (m bgs)	Description	PID (ppm)	Analysed (Y/N)
EX1-1	1.5	Weathered Sandstone, green/brown	184	Y
EX1-2	1.0	Weathered Sandstone, green/brown	65	N
EX1-3	0.2	Sandy Clay, low to medium plasticity, dark brown	0.1	N
EX1-4	1.2	Sandy Clay, low to medium plasticity, dark brown	41	Y
EX1-5	0.5	Sandy Clay, low to medium plasticity, dark brown	0.0	N
EX1-6	1.9 (base)	Weathered Sandstone, green/brown	93	Y
EX1-7	1.9 (base)	Weathered Sandstone, green/brown	125	N
EX1-8	1.8 (bench wall)	Weathered Sandstone, green/brown	256	Y
EX1-9	1.0	Clay, low to medium plasticity, dark brown	91	N
EX1-10 (removed)	1.5	Weathered Sandstone, green/brown	185	N
EX1-11	1.1	Clay, low to medium plasticity, brown	0.0	Y
EX1-12	0.2	Clay, low to medium plasticity, brown	0.0	N

Sample ID	Depth (m bgs)	Description	PID (ppm)	Analysed (Y/N)
EX1-13	1.9 (base)	Weathered Sandstone, green/brown	200	Y
EX1-14	1.2	Clay, low to medium plasticity, brown	34	N
EX1-15	1.2	Clay, low to medium plasticity, brown	35	N
EX1-16	0.5	Sandy Clay, low to medium plasticity, brown	0.0	N
EX1-17	0.5	Sandy Clay, low to medium plasticity, brown	0.0	Y
EX1-18	1.2	Clay, low to medium plasticity, brown	0.0	N
EX1-19	0.6	Sandy Clay, low to medium plasticity, brown	48	Y

Figure 2, Appendix A, shows the location of the excavation, and Figure 3 shows the sample locations.

Material from EX1 was stockpiled adjacent to EX1 for reuse on the property. The stockpile (SP1) was approximately 90m³ and comprised low to medium plasticity, clay and sandy clay. Sampling of the stockpile was undertaken on two separate occasions.

- Samples SP1-1 to SP1-4 were collected on 23/11/2017 (day of excavation), duplicate soil sample QC4 was collected with primary sample SP1-1.
- Validation samples SP1-5 to SP1-12 were collected on 8/03/2018 and 20/03/2018 (following turning of the stockpile, carried out by Mr Crawley), duplicate soil sample QC101 was collected with primary sample SP1-6.

Table 5.2 – Summary of Stockpile Sampling (SP1)

Date	Sample ID	Depth (m)	Description	PID (ppm)	Analysed (Y/N)
23/11/2017	SP1-1	0.5	Clay, low to medium plasticity, dark brown	621.6	Y
	SP1-2	0.5	Sandy Clay, low to medium plasticity, dark brown	63	Y
	SP1-3	0.5	Sandy Clay, low to medium plasticity, dark brown	101	Y
	SP1-4	0.5	Clay, low to medium plasticity, dark brown	217	Y

Date	Sample ID	Depth (m)	Description	PID (ppm)	Analysed (Y/N)
08/03/2018	SP1-5	0.5	Clay, low to medium plasticity, dark brown	0.8	Y
	SP1-6	0.5	Sandy Clay, low to medium plasticity, brown	0.7	Y
	SP1-7	0.5	Clay, low to medium plasticity, brown	0.9	Y
	SP1-8	0.5	Sandy Clay, low to medium plasticity, brown	1	Y
20/03/2018	SP1-9	0.5	Sandy Clay, low to medium plasticity, brown	0.9	Y
	SP1-10	0.5	Sandy Clay, low to medium plasticity, brown	1.1	Y
	SP1-11	0.5	Sandy Clay, low to medium plasticity, brown	0.6	Y
	SP1-12	0.5	Sandy Clay, low to medium plasticity, brown	0.9	Y

Selected photographs taken during the excavation and validation sampling are presented below.



Photograph 1 – UST



Photograph 2 – Excavation area (23/11/2017)



Photograph 3 – Material from excavation in Stockpile 1 (8/3/2018)

5.2 Validation Methodology

Validation soil sampling was carried out in accordance with the following guidelines:

- Australian Standard AS 4482.1 (1997) Guide to the Sampling and Investigation of Potentially Contaminated Sites;
- NEPC (2013) National Environmental Protection (Assessment of Site Contamination) Measure; and,
- NSW EPA (1994) Guidelines for Assessing Service Station Sites.

In order to assess the effectiveness of the remediation works and assess the suitability of the site (UST excavation) for residential land use, the following validation works were carried out:

- The excavation of the exposed soils across the majority of the site was screened with a PID, and visually assessed to confirm that there was no obvious evidence of contamination (i.e. stained or odorous soils);
- Validation soil sampling was then undertaken to confirm that impacted material had been excavated to required extents. Validation soil samples were analysed at the following ratios:
 - One sample per 10 linear metres on the walls, or one sample per wall. Where several samples were collected down the soil profile, the sample with the highest PID was generally selected for analysis;
 - One sample per 25m² on the base;
- Validation soil sampling of material stockpiled in Stockpile 1 (SP1). Validation soil samples were analysed at the following ratios:
 - One sample per 25m³ of material.
- Validation soil samples were tested for:
 - TRH
 - BTEX
 - PAH
 - Lead.

The validation soil samples were collected using an excavator from the excavation floor and walls, and stockpile SP1. The samples were taken from the centre of the excavation bucket and placed into laboratory supplied glass jars. The samples were stored in an ice-filled chest for transport to the laboratory for analysis. Dedicated disposable nitrile gloves were used to collect each sample.

Figure 3, Appendix A, shows the location of the validation samples.

5.2 Importation of fill material

Following validation sampling, approximately 70-100 tonnes of quarried fine-grained gravel was imported to site to backfill EX1.

The quarried VENM material was sourced from Karuah East Quarry, Blue Rock Close, Karuah, NSW. A copy of the VENM certificate is included in Appendix C.

5.0 Quality Assurance and Quality Control

The assessment of field and laboratory quality assurance / quality control (QA / QC) procedures is included in data validation report, which is attached in Appendix D.

In order to assess field QA / QC procedures the following QC samples were collected and analysed:

Table 7.1: Soil QC Samples

Duplicate/Triplicate	Primary Sample	Laboratory	Analysis	Date
QC1 Duplicate	EX1-6	Eurofins MGT	Lead, TRH, BTEX, PAH	23/11/2017
QC2 Triplicate	EX1-6	ALS	Lead, TRH, BTEX, PAH	23/11/2017
QC3 Duplicate	EX1-17	Eurofins MGT	Not Tested	23/11/2017
QC4 Duplicate	SP1-1	Eurofins MGT	Lead, TRH, BTEX, PAH	23/11/2017
QC101 Duplicate	SP1-6	Eurofins MGT	TRH, BTEX	8/03/2018

The number of duplicate/triplicate samples collected was in accordance with the NEPM (2013) requirement of 1 duplicate per 20 primary samples.

Primary and intra lab duplicate samples were analysed by the NATA-accredited Eurofins-MGT laboratory in Oakleigh, VIC. Inter lab duplicates were analysed by NATA-accredited ALS Global laboratory in Springvale, VIC.

Table 2, Appendix B, presents the relative percentage differences (RPDs) between the primary, duplicate and triplicate samples. A review of the Qualtest QA / QC results indicates that RPDs were within the acceptable range (30%), with the exception of ethylbenzene for duplicate pair SP1-1/QC4 (88%). The RPD exceedance is likely due to the distribution of contaminants in the stockpiled material. The concentration of ethylbenzene was within the adopted criteria in SP1-1 and QC4. Therefore, this RPD is not considered to affect the usability of the results.

It is noted that low analytes concentrations exaggerate the percentage differences with respect to small total concentration differences, therefore where results for the primary and duplicate samples were less than 10 times the LOR, the RPD results were disregarded.

The laboratory internal QA/QC reports indicated that the appropriate laboratory QA / QC procedures and rates were undertaken for contamination studies, and that:

- Laboratory blank samples were free of contamination;
- Matrix spike recoveries were within the laboratory control limits, with the exception of a spike recoveries for TRHC16-C34 (370%) and TRHC340-C40 (65%) in batch 574801. The lab quoted code Q08, which states: *"The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference"*;
- Laboratory duplicate RPDs were recorded within the laboratory control limits; and

- Surrogates and laboratory control samples were within the laboratories acceptable ranges.

Based on the assessment presented in Appendix D it is considered that the field and laboratory methods for soil are appropriate and that the data obtained is usable and considered to reasonably represent the concentrations at the sampling points at the time of sampling.

6.0 Validation Results

7.1 Excavation

Table 1, Appendix B, presents the results of the soil analysis from the excavation (EX1). The laboratory reports are presented in Appendix E.

The results of the laboratory testing were compared to the criteria outlined in Section 4.0. The final validation results showed concentrations below the adopted criteria, with the exception of the following:

- Concentrations of TRHC10-C16 above the adopted ESL criteria (120mg/kg) in three samples; EX1-1_1.5m (3800mg/kg), EX1-8_1.8m (660mg/kg) and EX1-19_0.6m (200mg/kg); and
- Concentrations of TRHC16-C34 above the adopted ESL criteria (1300mg/kg) in one sample; EX1-1_1.5m (1500mg/kg).

7.2 Stockpile

Table 1, Appendix B, presents the results of the soil analysis from the SP1. The laboratory reports are presented in Appendix E.

The results of the laboratory testing were compared to the criteria outlined in Section 4.0. The final stockpile validation results showed concentrations below the adopted criteria with the exception of TRH > C10-C16 (130mg/kg) in sample SP1-8, which exceed the ESL (120mg/kg).

95% Upper Confidence Limit Calculations

For concentrations of TRH > C10-C16 exceeding the adopted ESL the 95% Upper Confidence Limits (UCLs) of the average concentrations for the sample results were calculated using ProUCL in accordance with the procedures discussed in NEPM (2013) Schedule B2 Section 13 and NSW EPA (1995) Sampling Design Guidelines.

NEPM (2013) Schedule B1, Section 3.2.1 states that:

- *“At the very least, the maximum and 95%UCL of the arithmetic mean contaminant concentration should be compared to the relevant Tier 1 screening criteria”*
- *“The implications of localised elevated values (hotspots) should also be considered. The results should also meet the following criteria:*
 - *The standard deviation of the results should be less than 50% of the relevant investigation or screening level, and*
 - *No single value should exceed 250% of the relevant investigation or screening level.”*

Calculation sheets for data statistics, including average, standard deviation and 95%UCL of the average, are attached in Appendix F. ProUCL calculates the UCL comparing a number of different methods, including normal distribution, lognormal distribution, gamma distribution and nonparametric. ProUCL then recommends an appropriate method for the data set.

The UCL was calculated for TRH > C10–C16 in stockpiled soils. The calculations showed:

Parameter	Result
No. of samples	8
Average	78.13
Standard deviation	27
95% UCL	96.21
ESL (mg/kg)	120

The 95% UCL calculation shows the average and 95% UCL concentration is below the adopted criteria.

7.0 Discussion

The results of the validation sampling showed that concentrations of contaminants of concern were below the adopted criteria, with the exception of TRHC10-C16 and/or TRHC16-C34 above ESLs in sample locations EX1-1_1.5m, EX1-8_1.8m and EX1-19_0.6m.

EX1-1 was located along the northern boundary of the site (and property). Soil in this area was excavated as close to the boundary as practicable (within approximately 0.3m of the fence) and potential ecological issues would therefore be limited to a small (<0.3m) strip of soil adjacent to the boundary.

The ESLs are applicable to the top 2m of the soil profile and it is noted that the TRH is located from 1.5 to 1.8m depth at two locations (EX1-1 and EX1-8) within weathered rock. Given the depth to rock it is unlikely that the TRH at these two locations would have an ecological impact. The TRH impact in sample EX1-19 only slightly exceeds the ESL and is considered a low risk of ecological impact.

Risks to future plants and vegetation on the site is considered to be low and if deeper-rooted vegetation such as trees are planted on the site in the future, Qualtest considers that soil amendment, such as addition of compost, is likely and this would further reduce potential localised effects.

There is potential for localised concentrations of residual TRH above the ESLs to extend offsite beneath Duckenfield Street road verge beyond the northern property boundary. However, evidence of ecological issues such as vegetation stress associated with contamination has not been observed in the grass verge offsite.

The final stockpile validation results showed concentrations below the adopted criteria, taking into account the 95% UCL calculation for TRH >C10-C16.

8.0 Conceptual Site Model

Based on the works carried out on the site, and results of the validation assessment a conceptual site model (CSM) has been developed.

9.1 Potential Sources of Contamination

Table 9.1 (below) shows the areas of environmental concern (AECs) and associated Chemicals of Concern (COCs) identified for the site.

Table 9.1 – Potential AECs and COCs

AEC	Potentially Contaminating Activity	Potential COCs	Likelihood of Contamination	Sampling Undertaken
1. UST in north eastern portion of property area (the site)	Storage of fuels (leaks and spills)	Lead, TRH, BTEX, PAH	High	EX1-1 to EX1-19 and SP1-1 to SP1-12

9.2 Potentially Affected Media, Receptors and Exposure Pathways

Table 9.2 summarises the potentially affected media, potential receptors to contamination, and potential and complete exposure pathways.

Table 9.2 – Summary of Potentially Affected Media, Receptors and Exposure Pathways

Consideration	Information
Potentially affected media	Soil Surface water Groundwater
Potential transport mechanisms & exposure pathways	Leaching of soil contaminants to surface water and groundwater Direct dermal contact with contaminated soil and/or surface water Ingestion of contaminated soil (as dust) and/or surface water Surface water and groundwater discharge to Four Mile Creek located about 770m southeast of the site.
Potential receptors of contamination	Site occupants & construction/maintenance workers Potential exposure via dermal contact with soil and surface water, and ingestion of soil and surface water. Contact with groundwater is considered unlikely, taking into account the anticipated depth to groundwater (approximately between 5m to 10m bgs), and that groundwater is not currently extracted on site for beneficial use. Surface water Contaminants could leach from soils into surface water in the offsite unnamed wetland.

Consideration	Information
	<p>Groundwater Contaminants could leach from soils into groundwater. This is considered a lower risk due to the anticipated depth of groundwater (between approximately 5m and 10m bgs) and the clayey soil profile observed.</p> <p>Four Mile Creek It is considered that groundwater could discharge to the Four Mile Creek, located about 770m south east of the site. Given the low risk of groundwater to be contaminated as a result of site conditions, the risk of site contamination reaching Four Mile Creek is low.</p>

9.3 Potential and Complete Exposure Pathways

Table 9.3 (below) summarises the potential and complete exposure pathways.

Table 9.3 – Potential and Complete Exposure Pathways

Receptor/Media	Exposure Pathway	Comment
Site occupants and construction/maintenance workers	Incomplete	Low contaminant concentrations were reported in soil from EX1 and SP1, meaning it is unlikely site users and workers will be exposed to contaminated soil.
Soil	Incomplete	Low contaminant concentrations were reported in soil from EX1 and SP1.
Groundwater users	Incomplete	Groundwater is anticipated to be at depths between approximately 5m and 10m bgs, and is not considered to be contaminated, meaning a complete exposure pathway probably does not exist.
Surface water ecosystems and users	Incomplete	Based on the results of the validation soil sampling, low contaminant concentrations were reported in EX1 and/or SP1. Therefore, a complete exposure pathway probably does not exist.

9.0 Remediation and Validation Conclusion

Remediation and validation works were carried out to render the site (the UST excavation area) suitable for ongoing residential land use.

Validation soil samples collected from EX1 and SP1 reported concentrations of contaminants of concern below the adopted criteria, with the exception of some TRH analytes above ESLs in three sample locations. The likelihood of ecological issues on the site was considered by Qualtest to be low based on the depth of contamination (in weathered rock) and limited lateral extent of residual contamination. Risks to future plants and vegetation on the site is considered to be low and if deeper-rooted vegetation such as trees are planted on the site in the future, Qualtest considers that soil amendment, such as addition of compost, is likely and this would further reduce potential localised effects.

The final stockpile validation results showed concentrations below the adopted criteria and suitable for reuse on the site.

Based on the above Qualtest considers the site suitable for ongoing residential land use.

This report was prepared in accordance with the relevant sections of the NSW OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites and the *National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013)*, NEPC 2013, Canberra (referred to as ASC NEPM 2013).

10.0 References

NEPC (2013). *National Environmental Protection (Assessment of Site Contamination) Measure 1999*, as amended in 2013, National Environment Protection Council.

NSW OEH (2011). *Guidelines for Consultants Reporting on Contaminated Sites*.

NSW EPA (1995). *Sampling Design Guidelines*.

NSW EPA (2014) Investigation of Service Station Sites

APPENDIX A:

Figures





Figure based on image taken from web portal Nearmap (<http://maps.au.nearmap.com/>) accessed 9 March 2018.



Client:	JOHN CRAWLEY	Drawing No:	FIGURE 1
Project:	VALIDATION ASSESSMENT	Project No:	NEW17P-0221
Location:	12 DUCKENFIELD ROAD, MORPETH	Scale:	N.T.S.
Title:	SITE LOCATION	Date:	09/03/2018

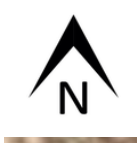


LEGEND:

-  Approx. location of excavation
-  Approx. location of stockpile



Client:	JOHN CRAWLEY	Drawing No:	FIGURE 2
Project:	VALIDATION ASSESSMENT	Project No:	NEW17P-0221
Location:	12 DUCKENFIELD ROAD, MORPETH	Scale:	N.T.S.
Title:	EXCAVATION/ STOCKPILE LOCATION	Date:	09/03/2018



LEGEND:






-  Approx. former UST location
-  Approx. location of excavation
-  Approx. location of stockpile
-  Approx. location of sample (23/11/2017)
-  Interim sample location

Figure based on image taken from web portal Nearmap (<http://maps.au.nearmap.com/>) accessed 9 March 2018.



Client:	JOHN CRAWLEY	Drawing No:	FIGURE 3
Project:	VALIDATION ASSESSMENT	Project No:	NEW17P-0221
Location:	12 DUCKENFIELD ROAD, MORPETH	Scale:	N.T.S.
Title:	SAMPLE LOCATIONS	Date:	09/03/2018

APPENDIX B:

Tables

Analyte		Units	EQL	HIL	HSL-A Clay		EIL/ESL	Excavation Validation									
					0-<1m	1-<2m		EX1-1	EX1-4	EX1-6	EX1-8	EX1-11	EX1-13	EX1-15	EX1-17	EX1-19	
Sample ID								EX1-1	EX1-4	EX1-6	EX1-8	EX1-11	EX1-13	EX1-15	EX1-17	EX1-19	
Depth								1.5	1.2	1.9	1.8	1.1	1.9	1.2	0.5	0.6	
Wall/Base								Wall	Wall	Base	Wall	Wall	Base	Wall	Wall	Wall	
PID (ppm)								184	41	93	256	0.0	200	35	0.0	48	
Soil Type								Sandstone	Sandy Clay	Sandy Clay	Sandstone	Clay	Sandstone	Clay	Sandy Clay	Sandy Clay	
Date								23/11/2017	23/11/2017	23/11/2017	23/11/2017	23/11/2017	23/11/2017	23/11/2017	23/11/2017	23/11/2017	
BTEX	Benzene	mg/kg	0.1			0.7	1	65	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	Toluene	mg/kg	0.1			480	NL	105	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.5	
	Ethylbenzene	mg/kg	0.1			NL	NL	125	1.3	< 0.1	< 0.1	0.1	< 0.1	0.1	0.1	0.6	
	Xylenes - Total	mg/kg	0.3			110	310	45	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.4	< 0.3	0.4	2.6
Metals	Lead	mg/kg	5	300				1100	20	10	13	8.3	< 5	7.5	12	26	14
PAH	Acenaphthene	mg/kg	0.5						< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
	Acenaphthylene	mg/kg	0.5						< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
	Anthracene	mg/kg	0.5						1.1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
	Benz(a)anthracene	mg/kg	0.5						< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
	Benzo(a)pyrene	mg/kg	0.5	3				0.7	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
	Benzo(a)pyrene TEQ	mg/kg	0.5						0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
	Benzo(b&j)fluoranthene	mg/kg	0.5						< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
	Benzo(g,h,i)perylene	mg/kg	0.5						< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
	Benzo(k)fluoranthene	mg/kg	0.5						< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
	Chrysene	mg/kg	0.5						< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
	Dibenz(a,h)anthracene	mg/kg	0.5						< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
	Fluoranthene	mg/kg	0.5						< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
	Fluorene	mg/kg	0.5						3.5	< 0.5	< 0.5	0.7	< 0.5	< 0.5	< 0.5	< 0.5	
	Indeno(1,2,3-cd)pyrene	mg/kg	0.5						< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
	Naphthalene	mg/kg	0.5						4.9	< 0.5	< 0.5	1.1	< 0.5	< 0.5	< 0.5	< 0.5	1.1
	Phenanthrene	mg/kg	0.5						4.1	< 0.5	< 0.5	1.1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Pyrene	mg/kg	0.5						< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
Total PAH*	mg/kg	0.5	300						13.6	< 0.5	< 0.5	2.9	< 0.5	< 0.5	< 0.5	< 0.5	1.1
TRH	Naphthalene	mg/kg	0.5		5	NL	170	6.8	< 0.5	< 0.5	1.7	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.9
	TRH C6-C10	mg/kg	20				180	70	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
	TRH C6-C10 less BTEX (F1)	mg/kg	20		50	90		69	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
	TRH >C10-C16	mg/kg	50				120	3800	93	120	660	< 50	120	< 50	< 50	< 50	200
	TRH >C10-C16 less Naphthalene (F2)	mg/kg	50		280	NL		3800	93	120		< 50	120	< 50	< 50	< 50	200
	TRH >C16-C34	mg/kg	100				1300	1500	< 100	< 100	300	< 100	< 100	< 100	< 100	< 100	260
	TRH >C34-C40	mg/kg	100				5600	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100

Notes:

- Result Concentration exceeds Health Investigation Level (HIL)
- Result Concentration exceeds Health Screening Level (HSL) 0-1m
- Result Concentration exceeds Health Screening Level (HSL) 1-2m
- Result Concentration exceeds Ecological Investigation/Screening Level (EIL/ESL)

Criteria from ASC NEPM (2013) Schedule B1, Guideline on Investigation Levels for Soil and Groundwater:

- HIL A Residential land use, Table 1A(1)
- HSL A Residential land use, Clay soils, 0-1m and 1-<2m, Table 1A(3)
- EIL/ESL Residential land use, Tables 1B(5) and 1B(6)

Table LR1: Soil Analytical Results
UST Removal, Morpeth

		Stockpile																	
		Sample ID	SP1-1	SP1-2	SP1-3	SP1-4	SP1-5	SP1-6	SP1-7	SP1-8	SP1-9	SP1-10	SP1-11	SP1-12					
		Depth	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA					
		Wall/Base	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP					
		PID (ppm)	622	63	101	217	0.8	0.7	0.9	1	0.9	1.1	0.6	0.9					
		Soil Type	Clay	Sandy Clay	Sandy Clay	Clay	Clay	Sandy Clay	Clay	Sandy Clay	Sandy Clay	Sandy Clay	Sandy Clay	Sandy Clay					
		Date	23/11/2017	23/11/2017	23/11/2017	23/11/2017	8/03/2018	8/03/2018	8/03/2018	8/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018					
Analyte	Units	EQL	HIL	HSL-A Clay		EIL/ESL	Interim Results - Prior to Biopiling					Final Results - Following Biopiling							
				0-<1m	1-<2m														
BTEX	Benzene	mg/kg	0.1		0.7	1	65	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Toluene	mg/kg	0.1		480	NL	105	< 0.1	< 0.1	< 0.1	< 0.1	0.4	0.5	0.5	0.7	0.2	0.1	0.2	0.2
	Ethylbenzene	mg/kg	0.1		NL	NL	125	2.3	0.3	1.1	1.4	0.3	0.3	0.4	0.4	0.2	0.2	0.2	0.2
	Xylenes - Total	mg/kg	0.3		110	310	45	2.4	0.6	1.9	2	1.2	1.3	1.5	1.7	0.9	0.5	0.7	1
Metals	Lead	mg/kg	5	300			1100	23	25	9.8	19	-	-	-	-	-	-	-	-
PAH	Acenaphthene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	-
	Acenaphthylene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	-
	Anthracene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	-
	Benz(a)anthracene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	-
	Benzo(a)pyrene	mg/kg	0.5	3			0.7	< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	-
	Benzo(a)pyrene TEQ	mg/kg	0.5					0.6	0.6	0.6	0.6	-	-	-	-	-	-	-	-
	Benzo(b&j)fluoranthene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	-
	Benzo(g,h,i)perylene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	-
	Benzo(k)fluoranthene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	-
	Chrysene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	-
	Dibenz(a,h)anthracene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	-
	Fluoranthene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	-
	Fluorene	mg/kg	0.5					0.8	< 0.5	< 0.5	< 0.5	0.8	-	-	-	-	-	-	-
	Indeno(1,2,3-cd)pyrene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	-
	Naphthalene	mg/kg	0.5					4	0.6	0.7	1.6	-	-	-	-	-	-	-	-
	Phenanthrene	mg/kg	0.5					1.3	< 0.5	< 0.5	0.7	-	-	-	-	-	-	-	-
Pyrene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	-	
Total PAH*	mg/kg	0.5	300				6.1	0.6	0.7	3.1	-	-	-	-	-	-	-	-	
TRH	Naphthalene	mg/kg	0.5		5	NL	170	6.2	1.2	1.1	2.7	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
	TRH C6-C10	mg/kg	20				180	150	< 20	28	41	< 20	< 20	< 20	< 20	< 20	< 20	< 20	
	TRH C6-C10 less BTEX (F1)	mg/kg	20		50	90		150	< 20	25	38	< 20	< 20	< 20	< 20	< 20	< 20	< 20	
	TRH >C10-C16	mg/kg	50				120	910	350	390	880	69	87	100	130	74	< 50	< 50	65
	TRH >C10-C16 less Naphthalene (F2)	mg/kg	50		280	NL		900	350	390	880	69	87	100	130	74	< 50	< 50	65
	TRH >C16-C34	mg/kg	100				1300	370	190	130	310	300	540	370	410	290	280	230	280
	TRH >C34-C40	mg/kg	100				5600	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100

Notes:

- Result Concentration exceeds Health Investigation Level (HIL)
- Result Concentration exceeds Health Screening Level (HSL) 0-1m
- Result Concentration exceeds Health Screening Level (HSL) 1-2m
- Result Concentration exceeds Ecological Investigation/Screening Level (EIL/ESL)

Criteria from ASC NEPM (2013) Schedule B1, Guideline on Investigation Levels for Soil and Groundwater:

- HIL A Residential land use, Table 1A(1)
- HSL A Residential land use, Clay soils, 0-1m and 1-<2m, Table 1A(3)
- EIL/ESL Residential land use, Tables 1B(5) and 1B(6)

Table LR2: Quality Control Results
UST Removal, Morpeth

Analyte	Units	EQL		EX1-6		QC1	RPD%	EX1-6		QC2	RPD%	SP1-1		QC4	RPD%	SP1-6		QC101	RPD%	QC5	QC102
		Soil	Water	Soil	Water	Primary		Duplicate	Primary	Triplicate		Primary	Duplicate	Primary		Duplicate	Trip Blank	Trip Blank			
		mg/kg	mg/L	mg/kg	mg/L	23/11/2017		23/11/2017	23/11/2017	23/11/2017		23/11/2017	23/11/2017	23/11/2017		23/11/2017	8/03/2018	8/03/2018		23/11/2017	8/03/2018
TRH	Naphthalene	mg/kg	-	0.5	-	<0.5	<0.5	NA	<0.5	<1	NA	6.2	2.5	85	<0.5	<0.5	NA	-	-		
	TRH C6-C10	mg/kg	-	20	-	<20	<20	NA	<20	<10	NA	150	48	103	<20	<20	NA	-	-		
	TRH C6-C10 less BTEX (F1)	mg/kg	-	20	-	<20	<20	NA	<20	<10	NA	150	46	106	<20	<20	NA	-	-		
	TRH >C10-C16	mg/kg	-	50	-	120	280	80	120	200	50	910	1100	19	87	93	7	-	-		
	TRH >C10-C16 less Naphthalene (F2)	mg/kg	-	50	-	120	280	80	120	200	50	900	1100	20	87	93	7	-	-		
	TRH >C16-C34	mg/kg	-	100	-	<100	160	NA	<100	200	NA	370	550	39	540	660	20	-	-		
	TRH >C34-C40	mg/kg	-	100	-	<100	<100	NA	<100	<100	NA	<100	<100	NA	<100	100	NA	-	-		
BTEX	Benzene	mg/kg	mg/L	0.1	0.001	<0.1	<0.1	NA	<0.1	<0.2	NA	<0.1	<0.1	NA	<0.1	<0.1	NA	<0.001	<0.001		
	Toluene	mg/kg	mg/L	0.1	0.001	<0.1	<0.1	NA	<0.1	<0.5	NA	<0.1	<0.1	NA	0.5	0.4	NA	<0.001	<0.001		
	Ethylbenzene	mg/kg	mg/L	0.1	0.001	<0.1	<0.1	NA	<0.1	<0.5	NA	2.3	0.9	88	0.3	0.2	40	<0.001	<0.001		
	Xylenes - Total	mg/kg	mg/L	0.3	0.003	<0.3	<0.3	NA	<0.3	<0.5	NA	2.4	1.3	59	1.3	1	26	<0.003	<0.003		
PAH	Acenaphthene	mg/kg	-	0.5	-	<0.5	<0.5	NA	<0.5	<0.5	NA	<0.5	<0.5	NA	-	-	NA	-	-		
	Acenaphthylene	mg/kg	-	0.5	-	<0.5	<0.5	NA	<0.5	<0.5	NA	<0.5	<0.5	NA	-	-	NA	-	-		
	Anthracene	mg/kg	-	0.5	-	<0.5	<0.5	NA	<0.5	<0.5	NA	<0.5	<0.5	NA	-	-	NA	-	-		
	Benz(a)anthracene	mg/kg	-	0.5	-	<0.5	<0.5	NA	<0.5	<0.5	NA	<0.5	<0.5	NA	-	-	NA	-	-		
	Benzo(a)pyrene	mg/kg	-	0.5	-	<0.5	<0.5	NA	<0.5	<0.5	NA	<0.5	<0.5	NA	-	-	NA	-	-		
	Benzo(a)pyrene TEQ	mg/kg	-	0.5	-	0.6	0.6	0	0.6	0.6	0	0.6	0.6	0	-	-	NA	-	-		
	Benzo(b&j)fluoranthene	mg/kg	-	0.5	-	<0.5	<0.5	NA	<0.5	<0.5	NA	<0.5	<0.5	NA	-	-	NA	-	-		
	Benzo(g,h,i)perylene	mg/kg	-	0.5	-	<0.5	<0.5	NA	<0.5	<0.5	NA	<0.5	<0.5	NA	-	-	NA	-	-		
	Benzo(k)fluoranthene	mg/kg	-	0.5	-	<0.5	<0.5	NA	<0.5	<0.5	NA	<0.5	<0.5	NA	-	-	NA	-	-		
	Chrysene	mg/kg	-	0.5	-	<0.5	<0.5	NA	<0.5	<0.5	NA	<0.5	<0.5	NA	-	-	NA	-	-		
	Dibenz(a,h)anthracene	mg/kg	-	0.5	-	<0.5	<0.5	NA	<0.5	<0.5	NA	<0.5	<0.5	NA	-	-	NA	-	-		
	Fluoranthene	mg/kg	-	0.5	-	<0.5	<0.5	NA	<0.5	<0.5	NA	<0.5	0.8	0.8	NA	-	-	NA	-	-	
	Fluorene	mg/kg	-	0.5	-	<0.5	0.5	NA	<0.5	<0.5	NA	0.8	0.6	29	-	-	NA	-	-		
	Indeno(1.2.3-cd)pyrene	mg/kg	-	0.5	-	<0.5	<0.5	NA	<0.5	<0.5	NA	<0.5	<0.5	NA	-	-	NA	-	-		
	Naphthalene	mg/kg	-	0.5	-	<0.5	0.9	NA	<0.5	<0.5	NA	4	4.7	16	-	-	NA	-	-		
	Phenanthrene	mg/kg	-	0.5	-	<0.5	0.8	NA	<0.5	0.6	NA	1.3	1.4	7	-	-	NA	-	-		
	Pyrene	mg/kg	-	0.5	-	<0.5	<0.5	NA	<0.5	<0.5	NA	<0.5	0.9	NA	-	-	NA	-	-		
Total PAH*	mg/kg	-	0.5	-	<0.5	2.2	NA	<0.5	0.6	NA	6.1	8.4	32	-	-	NA	-	-			
Metals	Lead	mg/kg	-	5	-	13	8.7	40	13	10	26	23	42	58	-	-	NA	-	-		

Notes

RPD % Exceeds RPD control limits

NA RPD not calculated as primary and duplicate samples show concentration below LOR, making it impractical to calculate an RPD

RPD control limits: Results less than 10xLOR - 200%, Results greater than 10xLOR - 30%

APPENDIX C:

Disposal Docket and VENM Certificate



CLASSIFICATION TICKET

CT No: 69045

DATE 2 / 17 / 17

VEHICLE REGO

SUPPLIER NAME Aspec Industries

VEHICLE GROSS WEIGHTkg

TARE WEIGHTkg

GROSS NETT WEIGHTkg

REASON DEDUCTIONkg

NETT WEIGHTkg

Insize	<u>S/black</u> .....kg	A/L	<u>4/5</u> .....kg
Oversize	.....kg	A/L	.....kg
Oxy	.....kg	Brass	.....kg
Black Iron	.....kg	Copper	.....kg
Cars	.....kg	Brass	.....kg

RECEIPT FOR ALUMINIUM CANS PURCHASES UNDER: \$20.00

A Canskg @p/kg Total \$:

NAME: Signature:

MMM NAME: JASON Signature: [Signature]

Tick when entered MYOB

ABN: 90 113 352 720

**Certification:
Virgin excavated natural material**



<p>1. I Debbie CHARMAN <i>of Karuah East Quarry Blue Rock Close KARUAH NSW 2324</i></p> <p>certify that the waste as set out in section 2 of this notice is Virgin Excavated Natural Material (VENM) as defined in Schedule 1 of the <i>Protection of the Environment Operations Act 1997</i>.</p>
<p>2. The waste was generated at:</p> <p>Street address: Blue Rock Close, Karuah, NSW 2324</p> <p>Title reference DP 1024564 Lots 12 &13</p> <p>The amount of waste is: 70 – 100t</p>
<p>3. I have made the determination that the waste is VENM because:</p> <ul style="list-style-type: none"><input checked="" type="checkbox"/> I have assessed the historical and current land use of the site at which the waste was generated.<input checked="" type="checkbox"/> The waste is not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities.<input checked="" type="checkbox"/> The waste does not contain any sulfidic ores or soils.<input checked="" type="checkbox"/> The waste does not contain any other waste.<input checked="" type="checkbox"/> The waste does not contain asbestos in any form.

Note: that all sections of this form must be completed including all boxes checked in Section 3 above and signed below for any material to be certified as VENM.

Signature(s)

.....

Name(s) (printed)

Debbie Charman

Date

01/12/17

Warning: There are significant penalties under s.144AA of the *Protection of the Environment Operations Act 1997* for a person who supplies (whether knowingly or not) information that is false or misleading in a material respect about waste.

This certificate is intended to assist waste generators, contractors and/or receivers of VENM to have confidence that a range of relevant factors have been considered in the classification of a waste material as VENM.

APPENDIX D:

Data Validation Report

QA/QC DATA VALIDATION REPORT

VALIDATION ASSESSMENT, 12 Duckenfield Road, Morpeth

Eurofins report: 574801-S, 574801-W, 588774-S, 588774-W, 590297-S

ALS report: EM1716432

Job No: NEW17P-0221

1. SAMPLE HANDLING

Item	Yes/No	Comments
Were the sample holding times met?	Yes	-
Were the samples in proper custody between collection in the field and reaching the laboratory?	Yes	-
Were the samples properly and adequately preserved?	Yes	-
Were the samples received by the laboratory in good condition?	Yes	-

Sampling Handling was:

Satisfactory :	✓	Partially Satisfactory:	Unsatisfactory:
----------------	---	-------------------------	-----------------

2. PRECISION AND ACCURACY ASSESSMENT

Item	Yes/No	Comment
Was a NATA registered laboratory used?	Yes	-
Did the laboratory perform the requested tests?	Yes	-
Were the laboratory methods adopted NATA endorsed?	Yes	-
Were the appropriate test procedures followed?	Yes	-
Were the reporting limits satisfactory?	Yes	-
Was the NATA seal on the reports?	Yes	-
Were the reports signed by an authorised person?	Yes	-

Laboratory Precision and Accuracy was:

Satisfactory :	✓	Partially Satisfactory:	Unsatisfactory:
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3. FIELD QA/QC

Item	Sample
Number of Samples Analysed	21 soil
Number of Days Sampling	3
Number of Sampling Events	3

Number and Type of QA/QC Samples Collected

Item	Sample
Field Duplicates (at least one in twenty samples)	4 intra-lab, 1 inter-lab
Trip Blanks (at least one per day or one per sampling event)	2
Wash Blanks (at least one per day, per matrix, or equipment)	0
Other (Trip blank and Trip Spike etc)	0
Were the reporting limits satisfactory?	Yes

Field Duplicates

Item	Yes/No	Comments
Were an adequate number of field duplicates collected?	Yes	Frequency of 4 per 21
Were RPDs within control limits? Greater than 10 x LOR – 30% Less than 10 x LOR – 200%	No	<p>One RPD for Ethylbenzene (88%) was recorded above the acceptance limit for duplicate pair SP1-1/QC4. The RPD exceedance is likely due to the distribution of contaminants in the stockpiled material. The concentration of ethylbenzene was within the adopted criteria in SP1-1 and QC4. Therefore, this RPD is not considered to affect the usability of the results.</p> <p>It is noted that low analytes concentrations exaggerate the percentage differences with respect to small total concentration differences, therefore where results for the primary and duplicate samples were less than 10 times the LOR, the acceptable limit was set at 200%.</p>

Trip Blanks/Trip Spikes

Item	Yes/No	Comments
Were an adequate number of trip blanks and Trip Spikes collected?	Yes	Two trip blanks were collected. No trip spikes were collected.
Were the trip blanks free of contaminants? (If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals).	N/A	Yes
Were the trip spikes within recovery limits (between 100% and 120%)	N/A	-

Rinsate Samples

Item	Yes/No	Comments
Were an adequate number of rinsate samples used? (1 per day of using reusable sampling equipment – trowel, hand auger etc)	N/A	No equipment rinsate samples were collected. As samples were collected directly from the stockpile or excavation wall, no reusable sampling equipment was used. Based on this, no equipment rinsate samples were required.
Were the rinsate samples free of contaminants? (If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals).	N/A	-

Field QC was:

Satisfactory :	✓	Partially Satisfactory:	Unsatisfactory:
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4. LABORATORY INTERNAL QUALITY CONTROL PROCEDURES

A) Type of QA/QC Sample	Yes/No	Comments
Laboratory Blanks/Reagent Blanks (at least 1 per batch)	Yes	-
Laboratory Duplicates (at least 1 per batch or 1 per 10 samples)	Yes	-
Matrix Spikes, Matrix Spike Duplicates (1 for each sample type)	Yes	-
Laboratory Control Spike	Yes	-
Surrogate (where appropriate)	Yes	-

Item	Yes/No	Comments
B) Were the laboratory blanks and/or reagent blanks free of contamination?	Yes	-
C) Were the spike recoveries within control limits?	No	Two spike recoveries for TRH > C16 - C34 and TRH > C34 - C40 were outside of the control limits. Lab code Q08 was quoted (in each case): <i>"The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference"</i> . Based on this, the spike recoveries are not considered to affect the usability of the results.
D) Were the RPDs of the laboratory duplicates within control limits?	No	In report 574801-S - One laboratory duplicate for lead was outside the control limits. Lab code Q15 was quoted: <i>"The RPD reported passes Eurofins | mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report"</i> . In report 588774-S - One laboratory duplicate for Toluene, Ethylbenzene, m & p - Xylenes, o - Xylene and Xylenes - Total were outside the control limits. Lab code Q15 was quoted: <i>"The RPD reported passes Eurofins | mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report"</i> . In report 590297-S - One laboratory duplicate for TRH C6-C9 and TRH C6-C10 were outside the control limits. Lab code Q15 was quoted: <i>"The RPD reported passes Eurofins | mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report"</i> . Based on this, the laboratory duplicates are not considered to affect the usability of the results.
E) Were the surrogate recoveries within control limits?	NA	-

Laboratory Internal QA/QC was:

Satisfactory :	✓	Partially Satisfactory:	Unsatisfactory:
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5. DATA USABILITY

Item	Yes/No	Comments
Was the data directly usable?	Yes	-
Was the data usable with the following corrections/modifications? (see comments)	NA	-
Was the data not usable?	NA	-

APPENDIX E:

Laboratory Reports

Certificate of Analysis

Qualtest
8 Ironbark Close
Warabrook
NSW 2304



NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
 The results of the tests, calibrations and/or
 measurements included in this document are traceable
 to Australian/national standards.

Attention: Emma Coleman

Report 574801-S
 Project name PANACEA MORPETH
 Project ID NEW17P-0221
 Received Date Nov 28, 2017

Client Sample ID			EX1-1	EX1-4	EX1-6	EX1-8
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M17-No34172	M17-No34173	M17-No34174	M17-No34175
Date Sampled			Nov 23, 2017	Nov 23, 2017	Nov 23, 2017	Nov 23, 2017
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	37	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	2400	59	73	390
TRH C15-C28	50	mg/kg	3400	96	130	660
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	5800	155	203	1050
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	1.3	< 0.1	< 0.1	0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	90	77	83	96
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	6.8	< 0.5	< 0.5	1.7
TRH C6-C10	20	mg/kg	70	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	69	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	3800	93	120	660
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	3800	93	120	660
TRH >C16-C34	100	mg/kg	1500	< 100	< 100	300
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	1.1	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5

Client Sample ID			EX1-1	EX1-4	EX1-6	EX1-8
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M17-No34172	M17-No34173	M17-No34174	M17-No34175
Date Sampled			Nov 23, 2017	Nov 23, 2017	Nov 23, 2017	Nov 23, 2017
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	3.5	< 0.5	< 0.5	0.7
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	4.9	< 0.5	< 0.5	1.1
Phenanthrene	0.5	mg/kg	4.1	< 0.5	< 0.5	1.1
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	13.6	< 0.5	< 0.5	2.9
2-Fluorobiphenyl (surr.)	1	%	63	85	99	87
p-Terphenyl-d14 (surr.)	1	%	79	93	104	97
Heavy Metals						
Lead	5	mg/kg	20	10	13	8.3
% Moisture	1	%	23	13	13	9.6

Client Sample ID			EX1-11	EX1-13	EX1-15	EX1-17
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M17-No34176	M17-No34177	M17-No34178	M17-No34179
Date Sampled			Nov 23, 2017	Nov 23, 2017	Nov 23, 2017	Nov 23, 2017
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	80	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	130	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	210	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.1
Ethylbenzene	0.1	mg/kg	< 0.1	0.1	0.1	0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	0.3	< 0.2	0.3
o-Xylene	0.1	mg/kg	< 0.1	0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	0.4	< 0.3	0.4
4-Bromofluorobenzene (surr.)	1	%	74	80	79	93
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	120	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	120	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5

Client Sample ID			EX1-11	EX1-13	EX1-15	EX1-17
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M17-No34176	M17-No34177	M17-No34178	M17-No34179
Date Sampled			Nov 23, 2017	Nov 23, 2017	Nov 23, 2017	Nov 23, 2017
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	94	69	76	103
p-Terphenyl-d14 (surr.)	1	%	100	70	81	99
Heavy Metals						
Lead	5	mg/kg	< 5	7.5	12	26
% Moisture						
	1	%	20	10	22	15

Client Sample ID			EX1-19	QC1	QC4	SP1-1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M17-No34180	M17-No34181	M17-No34182	M17-No34184
Date Sampled			Nov 23, 2017	Nov 23, 2017	Nov 23, 2017	Nov 23, 2017
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	63
TRH C10-C14	20	mg/kg	130	170	740	650
TRH C15-C28	50	mg/kg	320	320	1100	760
TRH C29-C36	50	mg/kg	65	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	515	490	1840	1410
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	0.5	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	0.6	< 0.1	0.9	2.3
m&p-Xylenes	0.2	mg/kg	2.2	< 0.2	1.2	2.3
o-Xylene	0.1	mg/kg	0.4	< 0.1	0.1	0.1
Xylenes - Total	0.3	mg/kg	2.6	< 0.3	1.3	2.4
4-Bromofluorobenzene (surr.)	1	%	91	95	89	88
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	0.9	< 0.5	2.5	6.2
TRH C6-C10	20	mg/kg	< 20	< 20	48	150
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	46	150
TRH >C10-C16	50	mg/kg	200	280	1100	910
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	200	280	1100	900
TRH >C16-C34	100	mg/kg	260	160	550	370
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100

Client Sample ID			EX1-19	QC1	QC4	SP1-1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M17-No34180	M17-No34181	M17-No34182	M17-No34184
Date Sampled			Nov 23, 2017	Nov 23, 2017	Nov 23, 2017	Nov 23, 2017
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	0.8	< 0.5
Fluorene	0.5	mg/kg	< 0.5	0.5	0.6	0.8
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	1.1	0.9	4.7	4.0
Phenanthrene	0.5	mg/kg	< 0.5	0.8	1.4	1.3
Pyrene	0.5	mg/kg	< 0.5	< 0.5	0.9	< 0.5
Total PAH*	0.5	mg/kg	1.1	2.2	8.4	6.1
2-Fluorobiphenyl (surr.)	1	%	100	81	93	89
p-Terphenyl-d14 (surr.)	1	%	93	91	99	88
Heavy Metals						
Lead	5	mg/kg	14	8.7	42	23
% Moisture						
	1	%	9.2	12	13	18

Client Sample ID			SP1-2	SP1-3	SP1-4
Sample Matrix			Soil	Soil	Soil
Eurofins | mgt Sample No.			M17-No34185	M17-No34186	M17-No34187
Date Sampled			Nov 23, 2017	Nov 23, 2017	Nov 23, 2017
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	20	mg/kg	< 20	< 20	20
TRH C10-C14	20	mg/kg	230	260	570
TRH C15-C28	50	mg/kg	350	330	760
TRH C29-C36	50	mg/kg	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	580	590	1330
BTEX					
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	0.3	1.1	1.4
m&p-Xylenes	0.2	mg/kg	0.5	1.9	2.0
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	0.6	1.9	2.0
4-Bromofluorobenzene (surr.)	1	%	97	85	101

Client Sample ID			SP1-2	SP1-3	SP1-4
Sample Matrix			Soil	Soil	Soil
Eurofins | mgt Sample No.			M17-No34185	M17-No34186	M17-No34187
Date Sampled			Nov 23, 2017	Nov 23, 2017	Nov 23, 2017
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene ^{N02}	0.5	mg/kg	1.2	1.1	2.7
TRH C6-C10	20	mg/kg	< 20	28	41
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	25	38
TRH >C10-C16	50	mg/kg	350	390	880
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	350	390	880
TRH >C16-C34	100	mg/kg	190	130	310
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons					
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	0.8
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	0.6	0.7	1.6
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	0.7
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	0.6	0.7	3.1
2-Fluorobiphenyl (surr.)	1	%	74	85	82
p-Terphenyl-d14 (surr.)	1	%	69	81	86
Heavy Metals					
Lead	5	mg/kg	25	9.8	19
% Moisture					
	1	%	13	15	20

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B4			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C36	Melbourne	Dec 01, 2017	14 Day
BTEX - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Dec 01, 2017	14 Day
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Dec 01, 2017	14 Day
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Dec 01, 2017	14 Day
Polycyclic Aromatic Hydrocarbons - Method: LTM-ORG-2130 PAH and Phenols in Soils by GCMS	Melbourne	Dec 01, 2017	14 Day
Heavy Metals - Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)	Melbourne	Dec 01, 2017	180 Day
% Moisture - Method: LTM-GEN-7080 Moisture	Melbourne	Nov 29, 2017	14 Day

Company Name: Qualtest	Order No.:	Received: Nov 28, 2017 11:24 AM
Address: 8 Ironbark Close Warabrook NSW 2304	Report #: 574801	Due: Dec 5, 2017
	Phone: 02 4968 4468	Priority: 5 Day
	Fax: 02 4960 9775	Contact Name: Emma Coleman
Project Name: PANACEA MORPETH		
Project ID: NEW17P-0221		

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Lead	BTEX	Moisture Set	Eurofins | mgt Suite B4
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X
Sydney Laboratory - NATA Site # 18217										X
Brisbane Laboratory - NATA Site # 20794										
Perth Laboratory - NATA Site # 23736										
External Laboratory										
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID					
1	EX1-1	Nov 23, 2017		Soil	M17-No34172		X		X	X
2	EX1-4	Nov 23, 2017		Soil	M17-No34173		X		X	X
3	EX1-6	Nov 23, 2017		Soil	M17-No34174		X		X	X
4	EX1-8	Nov 23, 2017		Soil	M17-No34175		X		X	X
5	EX1-11	Nov 23, 2017		Soil	M17-No34176		X		X	X
6	EX1-13	Nov 23, 2017		Soil	M17-No34177		X		X	X
7	EX1-15	Nov 23, 2017		Soil	M17-No34178		X		X	X
8	EX1-17	Nov 23, 2017		Soil	M17-No34179		X		X	X
9	EX1-19	Nov 23, 2017		Soil	M17-No34180		X		X	X

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Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X
Sydney Laboratory - NATA Site # 18217										X
Brisbane Laboratory - NATA Site # 20794										
Perth Laboratory - NATA Site # 23736										
10	QC1	Nov 23, 2017		Soil	M17-No34181		X		X	X
11	QC4	Nov 23, 2017		Soil	M17-No34182		X		X	X
12	QC5	Nov 23, 2017		Water	M17-No34183			X		
13	SP1-1	Nov 23, 2017		Soil	M17-No34184		X		X	X
14	SP1-2	Nov 23, 2017		Soil	M17-No34185		X		X	X
15	SP1-3	Nov 23, 2017		Soil	M17-No34186		X		X	X
16	SP1-4	Nov 23, 2017		Soil	M17-No34187		X		X	X
17	EX1-2	Nov 23, 2017		Soil	M17-No34188	X				
18	EX1-3	Nov 23, 2017		Soil	M17-No34189	X				
19	EX1-5	Nov 23, 2017		Soil	M17-No34190	X				
20	EX1-7	Nov 23, 2017		Soil	M17-No34191	X				
21	EX1-9	Nov 23, 2017		Soil	M17-No34192	X				

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Sample Detail						HOLD	Lead	BTEX	Moisture Set	Eurofins mgt Suite B4
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X
Sydney Laboratory - NATA Site # 18217										X
Brisbane Laboratory - NATA Site # 20794										
Perth Laboratory - NATA Site # 23736										
22	EX1-10	Nov 23, 2017		Soil	M17-No34193	X				
23	EX1-12	Nov 23, 2017		Soil	M17-No34194	X				
24	EX1-14	Nov 23, 2017		Soil	M17-No34195	X				
25	EX1-16	Nov 23, 2017		Soil	M17-No34196	X				
26	EX1-18	Nov 23, 2017		Soil	M17-No34197	X				
27	QC3	Nov 23, 2017		Soil	M17-No34198	X				
Test Counts						11	15	1	15	15

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g,h,i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a,h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Heavy Metals							
Lead	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	88			70-130	Pass	
TRH C10-C14	%	102			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	90			70-130	Pass	
Toluene	%	96			70-130	Pass	
Ethylbenzene	%	103			70-130	Pass	
m&p-Xylenes	%	106			70-130	Pass	

Test	Units	Result 1	Acceptance Limits	Pass Limits	Qualifying Code		
Xylenes - Total	%	106	70-130	Pass			
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	123	70-130	Pass			
TRH C6-C10	%	88	70-130	Pass			
TRH >C10-C16	%	94	70-130	Pass			
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	90	70-130	Pass			
Acenaphthylene	%	92	70-130	Pass			
Anthracene	%	97	70-130	Pass			
Benz(a)anthracene	%	98	70-130	Pass			
Benzo(a)pyrene	%	100	70-130	Pass			
Benzo(b&j)fluoranthene	%	105	70-130	Pass			
Benzo(g,h,i)perylene	%	93	70-130	Pass			
Benzo(k)fluoranthene	%	113	70-130	Pass			
Chrysene	%	94	70-130	Pass			
Dibenz(a,h)anthracene	%	95	70-130	Pass			
Fluoranthene	%	85	70-130	Pass			
Fluorene	%	93	70-130	Pass			
Indeno(1,2,3-cd)pyrene	%	96	70-130	Pass			
Naphthalene	%	92	70-130	Pass			
Phenanthrene	%	91	70-130	Pass			
Pyrene	%	88	70-130	Pass			
LCS - % Recovery							
Heavy Metals							
Lead	%	111	80-120	Pass			
Test	Lab Sample ID	QA Source	Units	Result 1	Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1			
TRH C6-C9	M17-No33955	NCP	%	103	70-130	Pass	
Spike - % Recovery							
BTEX				Result 1			
Benzene	M17-No33955	NCP	%	106	70-130	Pass	
Toluene	M17-No33955	NCP	%	114	70-130	Pass	
Ethylbenzene	M17-No33955	NCP	%	119	70-130	Pass	
m&p-Xylenes	M17-No33955	NCP	%	125	70-130	Pass	
o-Xylene	M17-No33955	NCP	%	117	70-130	Pass	
Xylenes - Total	M17-No33955	NCP	%	122	70-130	Pass	
Spike - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1			
Naphthalene	M17-No33955	NCP	%	85	70-130	Pass	
TRH C6-C10	M17-No33955	NCP	%	97	70-130	Pass	
TRH >C16-C34	M17-No37037	NCP	%	370	70-130	Fail	Q08
TRH >C34-C40	M17-No37037	NCP	%	65	70-130	Fail	Q08
Spike - % Recovery							
Polycyclic Aromatic Hydrocarbons				Result 1			
Acenaphthene	M17-De04542	NCP	%	93	70-130	Pass	
Acenaphthylene	M17-De04542	NCP	%	100	70-130	Pass	
Anthracene	M17-De04542	NCP	%	105	70-130	Pass	
Benz(a)anthracene	M17-De04542	NCP	%	102	70-130	Pass	
Benzo(a)pyrene	M17-De04542	NCP	%	99	70-130	Pass	
Benzo(b&j)fluoranthene	M17-De04542	NCP	%	95	70-130	Pass	
Benzo(g,h,i)perylene	M17-De04542	NCP	%	90	70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Benzo(k)fluoranthene	M17-De04542	NCP	%	78			70-130	Pass	
Chrysene	M17-De04542	NCP	%	98			70-130	Pass	
Dibenz(a,h)anthracene	M17-De04542	NCP	%	92			70-130	Pass	
Fluoranthene	M17-De04542	NCP	%	90			70-130	Pass	
Fluorene	M17-De04542	NCP	%	99			70-130	Pass	
Indeno(1,2,3-cd)pyrene	M17-De04542	NCP	%	91			70-130	Pass	
Naphthalene	M17-De04542	NCP	%	99			70-130	Pass	
Phenanthrene	M17-De04542	NCP	%	101			70-130	Pass	
Pyrene	M17-De04542	NCP	%	91			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	M17-No33940	NCP	%	77			75-125	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	M17-No34176	CP	%	98			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	M17-No34176	CP	%	97			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M17-No33954	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	M17-No37036	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M17-No37036	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M17-No37036	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M17-No33954	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M17-No33954	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M17-No33954	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M17-No33954	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M17-No33954	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	M17-No33954	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M17-No33954	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M17-No33954	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	M17-No37036	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	M17-No37036	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	M17-No37036	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	M17-De04541	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	M17-De04541	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	M17-De04541	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	M17-De04541	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	M17-De04541	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	M17-De04541	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g,h,i)perylene	M17-De04541	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	M17-De04541	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	M17-De04541	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a,h)anthracene	M17-De04541	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	M17-De04541	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	M17-De04541	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Indeno(1.2.3-cd)pyrene	M17-De04541	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	M17-De04541	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	M17-De04541	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	M17-De04541	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	M17-No34180	CP	mg/kg	14	20	33	30%	Fail	Q15
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M17-No34181	CP	%	12	13	8.0	30%	Pass	

Comments
Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Comments
Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference
Q15	The RPD reported passes Eurofins | mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Andrew Black	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Alex Petridis	Senior Analyst-Organic (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)


Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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Certificate of Analysis

Qualtest
8 Ironbark Close
Warabrook
NSW 2304



NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
 The results of the tests, calibrations and/or
 measurements included in this document are traceable
 to Australian/national standards.

Attention: **Emma Coleman**

Report **574801-W**
 Project name PANACEA MORPETH
 Project ID NEW17P-0221
 Received Date Nov 28, 2017

Client Sample ID			QC5
Sample Matrix			Water
Eurofins | mgt Sample No.			M17-No34183
Date Sampled			Nov 23, 2017
Test/Reference	LOR	Unit	
BTEX			
Benzene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
o-Xylene	0.001	mg/L	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003
4-Bromofluorobenzene (surr.)	1	%	70

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description

Eurofins | mgt Suite B4

BTEX

- Method: TRH C6-C40 - LTM-ORG-2010

Testing Site

Melbourne

Extracted

Nov 30, 2017

Holding Time

14 Day

Company Name: Qualtest	Order No.:	Received: Nov 28, 2017 11:24 AM
Address: 8 Ironbark Close Warabrook NSW 2304	Report #: 574801	Due: Dec 5, 2017
	Phone: 02 4968 4468	Priority: 5 Day
	Fax: 02 4960 9775	Contact Name: Emma Coleman
Project Name: PANACEA MORPETH		
Project ID: NEW17P-0221		

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Lead	BTEX	Moisture Set	Eurofins | mgt Suite B4
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X
Sydney Laboratory - NATA Site # 18217										X
Brisbane Laboratory - NATA Site # 20794										
Perth Laboratory - NATA Site # 23736										
External Laboratory										
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID					
1	EX1-1	Nov 23, 2017		Soil	M17-No34172		X		X	X
2	EX1-4	Nov 23, 2017		Soil	M17-No34173		X		X	X
3	EX1-6	Nov 23, 2017		Soil	M17-No34174		X		X	X
4	EX1-8	Nov 23, 2017		Soil	M17-No34175		X		X	X
5	EX1-11	Nov 23, 2017		Soil	M17-No34176		X		X	X
6	EX1-13	Nov 23, 2017		Soil	M17-No34177		X		X	X
7	EX1-15	Nov 23, 2017		Soil	M17-No34178		X		X	X
8	EX1-17	Nov 23, 2017		Soil	M17-No34179		X		X	X
9	EX1-19	Nov 23, 2017		Soil	M17-No34180		X		X	X

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	Fax: 02 4960 9775	Contact Name: Emma Coleman
Project Name: PANACEA MORPETH		
Project ID: NEW17P-0221		

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Lead	BTEX	Moisture Set	Eurofins | mgt Suite B4
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X
Sydney Laboratory - NATA Site # 18217										X
Brisbane Laboratory - NATA Site # 20794										
Perth Laboratory - NATA Site # 23736										
10	QC1	Nov 23, 2017		Soil	M17-No34181		X		X	X
11	QC4	Nov 23, 2017		Soil	M17-No34182		X		X	X
12	QC5	Nov 23, 2017		Water	M17-No34183			X		
13	SP1-1	Nov 23, 2017		Soil	M17-No34184		X		X	X
14	SP1-2	Nov 23, 2017		Soil	M17-No34185		X		X	X
15	SP1-3	Nov 23, 2017		Soil	M17-No34186		X		X	X
16	SP1-4	Nov 23, 2017		Soil	M17-No34187		X		X	X
17	EX1-2	Nov 23, 2017		Soil	M17-No34188	X				
18	EX1-3	Nov 23, 2017		Soil	M17-No34189	X				
19	EX1-5	Nov 23, 2017		Soil	M17-No34190	X				
20	EX1-7	Nov 23, 2017		Soil	M17-No34191	X				
21	EX1-9	Nov 23, 2017		Soil	M17-No34192	X				

Company Name: Qualtest	Order No.:	Received: Nov 28, 2017 11:24 AM
Address: 8 Ironbark Close Warabrook NSW 2304	Report #: 574801	Due: Dec 5, 2017
	Phone: 02 4968 4468	Priority: 5 Day
	Fax: 02 4960 9775	Contact Name: Emma Coleman
Project Name: PANACEA MORPETH		
Project ID: NEW17P-0221		

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						HOLD	Lead	BTEX	Moisture Set	Eurofins | mgt Suite B4
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X
Sydney Laboratory - NATA Site # 18217										X
Brisbane Laboratory - NATA Site # 20794										
Perth Laboratory - NATA Site # 23736										
22	EX1-10	Nov 23, 2017		Soil	M17-No34193	X				
23	EX1-12	Nov 23, 2017		Soil	M17-No34194	X				
24	EX1-14	Nov 23, 2017		Soil	M17-No34195	X				
25	EX1-16	Nov 23, 2017		Soil	M17-No34196	X				
26	EX1-18	Nov 23, 2017		Soil	M17-No34197	X				
27	QC3	Nov 23, 2017		Soil	M17-No34198	X				
Test Counts						11	15	1	15	15

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
BTEX									
Benzene			mg/L	< 0.001			0.001	Pass	
Toluene			mg/L	< 0.001			0.001	Pass	
Ethylbenzene			mg/L	< 0.001			0.001	Pass	
m&p-Xylenes			mg/L	< 0.002			0.002	Pass	
o-Xylene			mg/L	< 0.001			0.001	Pass	
Xylenes - Total			mg/L	< 0.003			0.003	Pass	
LCS - % Recovery									
BTEX									
Benzene			%	98			70-130	Pass	
Toluene			%	104			70-130	Pass	
Ethylbenzene			%	90			70-130	Pass	
m&p-Xylenes			%	96			70-130	Pass	
Xylenes - Total			%	95			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M17-No30003	NCP	mg/L	0.016	0.016	3.0	30%	Pass	
Toluene	M17-No30003	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	M17-No30003	NCP	mg/L	0.003	0.003	10	30%	Pass	
m&p-Xylenes	M17-No30003	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	M17-No30003	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	M17-No30003	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Comments

Authorised By

Andrew Black	Analytical Services Manager
Harry Bacalis	Senior Analyst-Volatile (VIC)



Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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NSW 2304



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Accreditation Number 1261
Site Number 1254

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 The results of the tests, calibrations and/or
 measurements included in this document are traceable
 to Australian/national standards.

Attention: Emma Coleman

Report 588774-S
 Project name PANACEA MORPETH
 Project ID NEW17P-0221
 Received Date Mar 09, 2018

Client Sample ID			SP1-5	SP1-6	SP1-7	SP1-8
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M18-Ma11928	M18-Ma11929	M18-Ma11930	M18-Ma11931
Date Sampled			Mar 08, 2018	Mar 08, 2018	Mar 08, 2018	Mar 08, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	50	52	63
TRH C15-C28	50	mg/kg	320	450	390	450
TRH C29-C36	50	mg/kg	< 50	180	68	74
TRH C10-36 (Total)	50	mg/kg	320	680	510	587
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	0.1	0.1
Toluene	0.1	mg/kg	0.4	0.5	0.5	0.7
Ethylbenzene	0.1	mg/kg	0.3	0.3	0.4	0.4
m&p-Xylenes	0.2	mg/kg	0.9	1.1	1.2	1.4
o-Xylene	0.1	mg/kg	0.2	0.2	0.3	0.3
Xylenes - Total	0.3	mg/kg	1.2	1.3	1.5	1.7
4-Bromofluorobenzene (surr.)	1	%	59	59	60	59
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	69	87	100	130
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	69	87	100	130
TRH >C16-C34	100	mg/kg	300	540	370	410
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
% Moisture	1	%	8.3	7.3	7.8	5.6

Client Sample ID			QC101
Sample Matrix			Soil
Eurofins | mgt Sample No.			M18-Ma11932
Date Sampled			Mar 08, 2018
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	20	mg/kg	< 20
TRH C10-C14	20	mg/kg	52
TRH C15-C28	50	mg/kg	540
TRH C29-C36	50	mg/kg	240
TRH C10-36 (Total)	50	mg/kg	832
BTEX			
Benzene	0.1	mg/kg	< 0.1
Toluene	0.1	mg/kg	0.4
Ethylbenzene	0.1	mg/kg	0.2
m&p-Xylenes	0.2	mg/kg	0.8
o-Xylene	0.1	mg/kg	0.2
Xylenes - Total	0.3	mg/kg	1.0
4-Bromofluorobenzene (surr.)	1	%	57
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene ^{N02}	0.5	mg/kg	< 0.5
TRH C6-C10	20	mg/kg	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20
TRH >C10-C16	50	mg/kg	93
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	93
TRH >C16-C34	100	mg/kg	660
TRH >C34-C40	100	mg/kg	100
% Moisture			
	1	%	10

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C36	Melbourne	Mar 13, 2018	14 Day
BTEX - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Mar 13, 2018	14 Day
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Mar 13, 2018	14 Day
Eurofins | mgt Suite B1 Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Mar 13, 2018	14 Day
% Moisture - Method: LTM-GEN-7080 Moisture	Melbourne	Mar 10, 2018	14 Day

Company Name: Qualtest	Order No.:	Received: Mar 9, 2018 9:27 AM
Address: 8 Ironbark Close Warabrook NSW 2304	Report #: 588774	Due: Mar 19, 2018
	Phone: 02 4968 4468	Priority: 5 Day
	Fax: 02 4960 9775	Contact Name: Emma Coleman
Project Name: PANACEA MORPETH		
Project ID: NEW17P-0221		

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Moisture Set	Eurofins | mgt Suite B1	BTEXN and Volatile TRH
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	SP1-5	Mar 08, 2018		Soil	M18-Ma11928	X	X	
2	SP1-6	Mar 08, 2018		Soil	M18-Ma11929	X	X	
3	SP1-7	Mar 08, 2018		Soil	M18-Ma11930	X	X	
4	SP1-8	Mar 08, 2018		Soil	M18-Ma11931	X	X	
5	QC101	Mar 08, 2018		Soil	M18-Ma11932	X	X	
6	QC102	Mar 08, 2018		Water	M18-Ma11933			X
Test Counts						5	5	1

Internal Quality Control Review and Glossary

General

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2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Method Blank								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9	mg/kg	< 20			20	Pass		
TRH C10-C14	mg/kg	< 20			20	Pass		
TRH C15-C28	mg/kg	< 50			50	Pass		
TRH C29-C36	mg/kg	< 50			50	Pass		
Method Blank								
BTEX								
Benzene	mg/kg	< 0.1			0.1	Pass		
Toluene	mg/kg	< 0.1			0.1	Pass		
Ethylbenzene	mg/kg	< 0.1			0.1	Pass		
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass		
o-Xylene	mg/kg	< 0.1			0.1	Pass		
Xylenes - Total	mg/kg	< 0.3			0.3	Pass		
Method Blank								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
Naphthalene	mg/kg	< 0.5			0.5	Pass		
TRH C6-C10	mg/kg	< 20			20	Pass		
TRH >C10-C16	mg/kg	< 50			50	Pass		
TRH >C16-C34	mg/kg	< 100			100	Pass		
TRH >C34-C40	mg/kg	< 100			100	Pass		
LCS - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9	%	99			70-130	Pass		
TRH C10-C14	%	83			70-130	Pass		
LCS - % Recovery								
BTEX								
Benzene	%	80			70-130	Pass		
Toluene	%	80			70-130	Pass		
Ethylbenzene	%	82			70-130	Pass		
m&p-Xylenes	%	84			70-130	Pass		
Xylenes - Total	%	83			70-130	Pass		
LCS - % Recovery								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
Naphthalene	%	95			70-130	Pass		
TRH C6-C10	%	101			70-130	Pass		
TRH >C10-C16	%	84			70-130	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9	M18-Ma15666	NCP	%	76		70-130	Pass	
TRH C10-C14	M18-Ma16839	NCP	%	94		70-130	Pass	
Spike - % Recovery								
BTEX								
Benzene	M18-Ma15666	NCP	%	78		70-130	Pass	
Toluene	M18-Ma15666	NCP	%	84		70-130	Pass	
Ethylbenzene	M18-Ma15666	NCP	%	90		70-130	Pass	
m&p-Xylenes	M18-Ma15666	NCP	%	93		70-130	Pass	
o-Xylene	M18-Ma15666	NCP	%	92		70-130	Pass	
Xylenes - Total	M18-Ma15666	NCP	%	93		70-130	Pass	
Spike - % Recovery								

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M18-Ma15666	NCP	%	103			70-130	Pass	
TRH C6-C10	M18-Ma15666	NCP	%	79			70-130	Pass	
TRH >C10-C16	M18-Ma16839	NCP	%	96			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	M18-Ma16838	NCP	mg/kg	31	33	7.0	30%	Pass	
TRH C15-C28	M18-Ma16838	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M18-Ma16838	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	M18-Ma16838	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	M18-Ma16838	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	M18-Ma16838	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M18-Ma11839	NCP	%	7.0	8.6	20	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M18-Ma11932	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M18-Ma11932	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M18-Ma11932	CP	mg/kg	0.4	0.6	45	30%	Fail	Q15
Ethylbenzene	M18-Ma11932	CP	mg/kg	0.2	0.3	49	30%	Fail	Q15
m&p-Xylenes	M18-Ma11932	CP	mg/kg	0.8	1.2	42	30%	Fail	Q15
o-Xylene	M18-Ma11932	CP	mg/kg	0.2	0.3	37	30%	Fail	Q15
Xylenes - Total	M18-Ma11932	CP	mg/kg	1.0	1.5	41	30%	Fail	Q15
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M18-Ma11932	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M18-Ma11932	CP	mg/kg	< 20	< 20	<1	30%	Pass	

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Comments

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
Q15	The RPD reported passes Eurofins | mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Andrew Black	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)



Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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Certificate of Analysis

Qualtest
8 Ironbark Close
Warabrook
NSW 2304



NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
 The results of the tests, calibrations and/or
 measurements included in this document are traceable
 to Australian/national standards.

Attention: Emma Coleman

Report 588774-W
 Project name PANACEA MORPETH
 Project ID NEW17P-0221
 Received Date Mar 09, 2018

Client Sample ID			QC102
Sample Matrix			Water
Eurofins | mgt Sample No.			M18-Ma11933
Date Sampled			Mar 08, 2018
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene ^{N02}	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	< 0.02
BTEX			
Benzene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
o-Xylene	0.001	mg/L	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003
4-Bromofluorobenzene (surr.)	1	%	69

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Mar 13, 2018	7 Day
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C36	Melbourne	Mar 13, 2018	7 Day
BTEX - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Mar 13, 2018	14 Day

Company Name: Qualtest	Order No.:	Received: Mar 9, 2018 9:27 AM
Address: 8 Ironbark Close Warabrook NSW 2304	Report #: 588774	Due: Mar 19, 2018
	Phone: 02 4968 4468	Priority: 5 Day
	Fax: 02 4960 9775	Contact Name: Emma Coleman
Project Name: PANACEA MORPETH		
Project ID: NEW17P-0221		

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Moisture Set	Eurofins | mgt Suite B1	BTEXN and Volatile TRH
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	SP1-5	Mar 08, 2018		Soil	M18-Ma11928	X	X	
2	SP1-6	Mar 08, 2018		Soil	M18-Ma11929	X	X	
3	SP1-7	Mar 08, 2018		Soil	M18-Ma11930	X	X	
4	SP1-8	Mar 08, 2018		Soil	M18-Ma11931	X	X	
5	QC101	Mar 08, 2018		Soil	M18-Ma11932	X	X	
6	QC102	Mar 08, 2018		Water	M18-Ma11933			X
Test Counts						5	5	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test		Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Method Blank									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions									
Naphthalene		mg/L	< 0.01			0.01	Pass		
TRH C6-C10		mg/L	< 0.02			0.02	Pass		
Method Blank									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions									
TRH C6-C9		mg/L	< 0.02			0.02	Pass		
Method Blank									
BTEX									
Benzene		mg/L	< 0.001			0.001	Pass		
Toluene		mg/L	< 0.001			0.001	Pass		
Ethylbenzene		mg/L	< 0.001			0.001	Pass		
m&p-Xylenes		mg/L	< 0.002			0.002	Pass		
o-Xylene		mg/L	< 0.001			0.001	Pass		
Xylenes - Total		mg/L	< 0.003			0.003	Pass		
LCS - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions									
Naphthalene		%	82			70-130	Pass		
TRH C6-C10		%	106			70-130	Pass		
LCS - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions									
TRH C6-C9		%	106			70-130	Pass		
LCS - % Recovery									
BTEX									
Benzene		%	86			70-130	Pass		
Toluene		%	76			70-130	Pass		
Ethylbenzene		%	93			70-130	Pass		
m&p-Xylenes		%	99			70-130	Pass		
Xylenes - Total		%	101			70-130	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions									
Naphthalene		M18-Ma12398	NCP	%	87		70-130	Pass	
TRH C6-C10		M18-Ma12398	NCP	%	71		70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions									
TRH C6-C9		M18-Ma12398	NCP	%	72		70-130	Pass	
Spike - % Recovery									
BTEX									
Benzene		M18-Ma12398	NCP	%	83		70-130	Pass	
Toluene		M18-Ma12398	NCP	%	79		70-130	Pass	
Ethylbenzene		M18-Ma12398	NCP	%	72		70-130	Pass	
m&p-Xylenes		M18-Ma12398	NCP	%	75		70-130	Pass	
o-Xylene		M18-Ma12398	NCP	%	79		70-130	Pass	
Xylenes - Total		M18-Ma12398	NCP	%	76		70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions									
Naphthalene		M18-Ma12397	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass
TRH C6-C10		M18-Ma12397	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass

Duplicate								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD		
TRH C6-C9	M18-Ma12397	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass
Duplicate								
BTEX				Result 1	Result 2	RPD		
Benzene	M18-Ma12397	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Toluene	M18-Ma12397	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Ethylbenzene	M18-Ma12397	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
m&p-Xylenes	M18-Ma12397	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass
o-Xylene	M18-Ma12397	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Xylenes - Total	M18-Ma12397	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Comments
Qualifier Codes/Comments

Code	Description
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.

Authorised By

Andrew Black	Analytical Services Manager
Harry Bacalis	Senior Analyst-Volatile (VIC)


Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

 Measurement uncertainty of test data is available on request or please [click here](#).

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Certificate of Analysis

Qualtest
8 Ironbark Close
Warabrook
NSW 2304



NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
 The results of the tests, calibrations and/or
 measurements included in this document are traceable
 to Australian/national standards.

Attention: Emma Coleman

Report 590297-S
 Project name PANACEA MORPETH
 Project ID NEW17P 0221
 Received Date Mar 21, 2018

Client Sample ID			SP1-9	SP1-10	SP1-11	SP1-12
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M18-Ma24063	M18-Ma24064	M18-Ma24065	M18-Ma24066
Date Sampled			Mar 20, 2018	Mar 20, 2018	Mar 20, 2018	Mar 20, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	360	290	250	340
TRH C29-C36	50	mg/kg	54	83	58	< 50
TRH C10-36 (Total)	50	mg/kg	414	373	308	340
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	0.2	0.1	0.2	0.2
Ethylbenzene	0.1	mg/kg	0.2	0.2	0.2	0.2
m&p-Xylenes	0.2	mg/kg	0.7	0.4	0.6	0.8
o-Xylene	0.1	mg/kg	0.2	0.1	0.1	0.2
Xylenes - Total	0.3	mg/kg	0.9	0.5	0.7	1.0
4-Bromofluorobenzene (surr.)	1	%	87	83	88	90
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	74	< 50	< 50	65
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	74	< 50	< 50	65
TRH >C16-C34	100	mg/kg	290	280	230	280
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
% Moisture	1	%	2.6	3.3	2.4	2.7

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B1			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C36	Melbourne	Mar 21, 2018	14 Day
BTEX - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Mar 21, 2018	14 Day
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Mar 21, 2018	14 Day
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Mar 21, 2018	14 Day
% Moisture - Method: LTM-GEN-7080 Moisture	Melbourne	Mar 21, 2018	14 Day

Company Name: Qualtest	Order No.:	Received: Mar 21, 2018 11:41 AM
Address: 8 Ironbark Close Warabrook NSW 2304	Report #: 590297	Due: Mar 26, 2018
	Phone: 02 4968 4468	Priority: 3 Day
	Fax: 02 4960 9775	Contact Name: Emma Coleman
Project Name: PANACEA MORPETH		
Project ID: NEW17P 0221		

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Moisture Set	Eurofins | mgt Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
External Laboratory							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	SP1-9	Mar 20, 2018		Soil	M18-Ma24063	X	X
2	SP1-10	Mar 20, 2018		Soil	M18-Ma24064	X	X
3	SP1-11	Mar 20, 2018		Soil	M18-Ma24065	X	X
4	SP1-12	Mar 20, 2018		Soil	M18-Ma24066	X	X
Test Counts						4	4

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test		Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9		mg/kg	< 20			20	Pass	
TRH C10-C14		mg/kg	< 20			20	Pass	
TRH C15-C28		mg/kg	< 50			50	Pass	
TRH C29-C36		mg/kg	< 50			50	Pass	
Method Blank								
BTEX								
Benzene		mg/kg	< 0.1			0.1	Pass	
Toluene		mg/kg	< 0.1			0.1	Pass	
Ethylbenzene		mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes		mg/kg	< 0.2			0.2	Pass	
o-Xylene		mg/kg	< 0.1			0.1	Pass	
Xylenes - Total		mg/kg	< 0.3			0.3	Pass	
Method Blank								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
Naphthalene		mg/kg	< 0.5			0.5	Pass	
TRH C6-C10		mg/kg	< 20			20	Pass	
TRH >C10-C16		mg/kg	< 50			50	Pass	
TRH >C16-C34		mg/kg	< 100			100	Pass	
TRH >C34-C40		mg/kg	< 100			100	Pass	
LCS - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9		%	116			70-130	Pass	
TRH C10-C14		%	99			70-130	Pass	
LCS - % Recovery								
BTEX								
Benzene		%	95			70-130	Pass	
Toluene		%	99			70-130	Pass	
Ethylbenzene		%	103			70-130	Pass	
m&p-Xylenes		%	104			70-130	Pass	
Xylenes - Total		%	103			70-130	Pass	
LCS - % Recovery								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
Naphthalene		%	112			70-130	Pass	
TRH C6-C10		%	118			70-130	Pass	
TRH >C10-C16		%	93			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C6-C9		S18-Ma17649	NCP	%	92		70-130	Pass
TRH C10-C14		M18-Ma20632	NCP	%	109		70-130	Pass
Spike - % Recovery								
BTEX								
Benzene		S18-Ma17649	NCP	%	72		70-130	Pass
Toluene		S18-Ma17649	NCP	%	80		70-130	Pass
Ethylbenzene		S18-Ma17649	NCP	%	89		70-130	Pass
m&p-Xylenes		S18-Ma17649	NCP	%	90		70-130	Pass
o-Xylene		S18-Ma17649	NCP	%	92		70-130	Pass
Xylenes - Total		S18-Ma17649	NCP	%	91		70-130	Pass
Spike - % Recovery								

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S18-Ma17649	NCP	%	117			70-130	Pass	
TRH C6-C10	S18-Ma17649	NCP	%	94			70-130	Pass	
TRH >C10-C16	M18-Ma20632	NCP	%	96			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M18-Ma22199	NCP	mg/kg	59	87	39	30%	Fail	Q15
TRH C10-C14	M18-Ma21743	NCP	mg/kg	160	< 20	<1	30%	Pass	
TRH C15-C28	M18-Ma21743	NCP	mg/kg	400	< 50	<1	30%	Pass	
TRH C29-C36	M18-Ma21743	NCP	mg/kg	130	< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M18-Ma22199	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M18-Ma22199	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M18-Ma22199	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M18-Ma22199	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M18-Ma22199	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	M18-Ma22199	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M18-Ma22199	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M18-Ma22199	NCP	mg/kg	120	180	39	30%	Fail	Q15
TRH >C10-C16	M18-Ma21743	NCP	mg/kg	270	< 50	<1	30%	Pass	
TRH >C16-C34	M18-Ma21743	NCP	mg/kg	340	< 100	<1	30%	Pass	
TRH >C34-C40	M18-Ma21743	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M18-Ma24043	NCP	%	12	12	4.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
Q15	The RPD reported passes Eurofins | mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Andrew Black	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)



Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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CERTIFICATE OF ANALYSIS

Work Order	: EM1716432	Page	: 1 of 5
Client	: QUALTEST LABORATORY(NSW) PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: EMMA COLEMAN	Contact	:
Address	: 8 IRONBARK CLOSE WARABROOK NEW SOUTH WALES 4053	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: 02 4968 4468	Telephone	: +61-3-8549 9600
Project	: NEW17P-0221	Date Samples Received	: 30-Nov-2017 12:35
Order number	: ----	Date Analysis Commenced	: 30-Nov-2017
C-O-C number	: ----	Issue Date	: 05-Dec-2017 16:35
Sampler	: ----		
Site	: Panacea, Morpeth		
Quote number	: SYBQ/388/15		
No. of samples received	: 1		
No. of samples analysed	: 1		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Nancy Wang	Senior Semivolatile Instrument Chemist	Melbourne Organics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR.
Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID			QC2	----	----	----	----
		Client sampling date / time			23-Nov-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM1716432-001	-----	-----	-----	-----	-----
				Result	----	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	11.8	----	----	----	----	----
EG005T: Total Metals by ICP-AES									
Lead	7439-92-1	5	mg/kg	10	----	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	0.6	----	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	----	----	----	----
Benzo(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	----	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	----	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	0.6	----	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	----	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	----	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	----	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg	110	----	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg	280	----	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	----	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	390	----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	QC2	----	----	----	----
Client sampling date / time				23-Nov-2017 00:00	----	----	----	----	----
Compound	CAS Number	LOR	Unit	EM1716432-001	-----	-----	-----	-----	-----
				Result	----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>C10 - C16 Fraction	----	50	mg/kg	200	----	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	200	----	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	400	----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	200	----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	----	----	----	----	----
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	----	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%	94.0	----	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	90.3	----	----	----	----	----
2,4,6-Tribromophenol	118-79-6	0.5	%	73.4	----	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%	97.1	----	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%	109	----	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	114	----	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	83.8	----	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	96.7	----	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	93.4	----	----	----	----	----



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2,4,6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124

QUALITY CONTROL REPORT

Work Order	: EM1716432	Page	: 1 of 5
Client	: QUALTEST LABORATORY(NSW) PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: EMMA COLEMAN	Contact	:
Address	: 8 IRONBARK CLOSE WARABROOK NEW SOUTH WALES 4053	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: 02 4968 4468	Telephone	: +61-3-8549 9600
Project	: NEW17P-0221	Date Samples Received	: 30-Nov-2017
Order number	: ----	Date Analysis Commenced	: 30-Nov-2017
C-O-C number	: ----	Issue Date	: 05-Dec-2017
Sampler	: ----		
Site	: Panacea, Morpeth		
Quote number	: SYBQ/388/15		
No. of samples received	: 1		
No. of samples analysed	: 1		



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This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Nancy Wang	Senior Semivolatile Instrument Chemist	Melbourne Organics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC



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Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: SOIL

				Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)		
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1284052)											
EM1716430-001	Anonymous	EA055: Moisture Content	----	1	%	12.0	12.1	0.00	0% - 50%		
EM1716456-003	Anonymous	EA055: Moisture Content	----	1	%	17.4	18.8	8.08	0% - 50%		
EG005T: Total Metals by ICP-AES (QC Lot: 1282240)											
EM1716393-019	Anonymous	EG005T: Lead	7439-92-1	5	mg/kg	13	13	0.00	No Limit		
EM1716304-001	Anonymous	EG005T: Lead	7439-92-1	5	mg/kg	11	11	0.00	No Limit		
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1284027)											
EM1716432-001	QC2	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	0.6	<0.5	0.00	No Limit		
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
					205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit				
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit				
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1283237)											

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 Work Order : EM1716432
 Client : QUALTEST LABORATORY(NSW) PTY LTD
 Project : NEW17P-0221



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1283237) - continued									
EM1716432-001	QC2	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EM1716456-009	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1284028)									
EM1716456-006	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	29200	30000	2.51	0% - 20%
		EP071: C29 - C36 Fraction	----	100	mg/kg	6920	7210	4.15	0% - 20%
		EP071: C10 - C14 Fraction	----	50	mg/kg	350	330	7.28	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	36500	37500	2.89	0% - 20%
EM1716432-001	QC2	EP071: C15 - C28 Fraction	----	100	mg/kg	280	360	24.8	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	110	170	42.0	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	390	530	30.4	0% - 50%
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1283237)									
EM1716432-001	QC2	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1716456-009	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1284028)									
EM1716456-006	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	33800	34700	2.77	0% - 20%
		EP071: >C34 - C40 Fraction	----	100	mg/kg	2620	2850	8.18	0% - 20%
		EP071: >C10 - C16 Fraction	----	50	mg/kg	680	640	6.57	0% - 50%
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	37100	38200	2.90	0% - 20%
EM1716432-001	QC2	EP071: >C16 - C34 Fraction	----	100	mg/kg	200	220	13.6	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	200	300	37.4	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	400	520	26.1	0% - 50%
EP080: BTEXN (QC Lot: 1283237)									
EM1716432-001	QC2	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM1716456-009	Anonymous	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
		EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			106-42-3						
	EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit	



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EG005T: Total Metals by ICP-AES (QCLot: 1282240)									
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	91.8	78	106	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1284027)									
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	96.6	80	121	
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	99.7	70	130	
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	99.4	80	120	
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	99.0	70	124	
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	103	80	122	
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	1.5 mg/kg	110	80	126	
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	99.1	70	128	
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	102	80	125	
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	91.5	70	130	
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	104	80	126	
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	92.4	70	124	
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	99.4	75	125	
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	86.1	65	125	
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	91.4	65	128	
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	92.6	65	126	
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	92.3	65	127	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1283237)									
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	115	70	127	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1284028)									
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	806 mg/kg	95.4	65	131	
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3006 mg/kg	104	70	126	
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1584 mg/kg	104	70	122	
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1283237)									
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	113	68	125	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1284028)									
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1160 mg/kg	99.3	68	130	
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3978 mg/kg	103	72	116	
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	313 mg/kg	106	38	132	
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----	
EP080: BTEXN (QCLot: 1283237)									



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP080: BTEXN (QCLot: 1283237) - continued									
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	112	74	124	
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	118	77	125	
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	115	73	125	
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	116	77	128	
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	114	81	128	
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	113	66	130	

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%) MS	Recovery Limits (%) Low High	
EG005T: Total Metals by ICP-AES (QCLot: 1282240)							
EM1716392-001	Anonymous	EG005T: Lead	7439-92-1	50 mg/kg	94.6	76	124
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1284027)							
EM1716439-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	95.9	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	107	52	148
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1283237)							
EM1716433-001	Anonymous	EP080: C6 - C9 Fraction	----	28 mg/kg	87.5	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1284028)							
EM1716433-001	Anonymous	EP071: C10 - C14 Fraction	----	806 mg/kg	106	53	123
		EP071: C15 - C28 Fraction	----	3006 mg/kg	109	70	124
		EP071: C29 - C36 Fraction	----	1584 mg/kg	106	64	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1283237)							
EM1716433-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	83.3	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1284028)							
EM1716433-001	Anonymous	EP071: >C10 - C16 Fraction	----	1160 mg/kg	106	65	123
		EP071: >C16 - C34 Fraction	----	3978 mg/kg	107	67	121
		EP071: >C34 - C40 Fraction	----	313 mg/kg	104	44	126
EP080: BTEXN (QCLot: 1283237)							
EM1716433-001	Anonymous	EP080: Benzene	71-43-2	2 mg/kg	109	50	136
		EP080: Toluene	108-88-3	2 mg/kg	109	56	139

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1716432	Page	: 1 of 4
Client	: QUALTEST LABORATORY(NSW) PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: EMMA COLEMAN	Telephone	: +61-3-8549 9600
Project	: NEW17P-0221	Date Samples Received	: 30-Nov-2017
Site	: Panacea, Morpeth	Issue Date	: 05-Dec-2017
Sampler	: ----	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**



Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) QC2	23-Nov-2017	----	----	----	01-Dec-2017	07-Dec-2017	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) QC2	23-Nov-2017	30-Nov-2017	22-May-2018	✓	30-Nov-2017	22-May-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) QC2	23-Nov-2017	01-Dec-2017	07-Dec-2017	✓	01-Dec-2017	10-Jan-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP071) QC2	23-Nov-2017	01-Dec-2017	07-Dec-2017	✓	01-Dec-2017	10-Jan-2018	✓
Soil Glass Jar - Unpreserved (EP080) QC2	23-Nov-2017	30-Nov-2017	07-Dec-2017	✓	01-Dec-2017	07-Dec-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP071) QC2	23-Nov-2017	01-Dec-2017	07-Dec-2017	✓	01-Dec-2017	10-Jan-2018	✓
Soil Glass Jar - Unpreserved (EP080) QC2	23-Nov-2017	30-Nov-2017	07-Dec-2017	✓	01-Dec-2017	07-Dec-2017	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) QC2	23-Nov-2017	30-Nov-2017	07-Dec-2017	✓	01-Dec-2017	07-Dec-2017	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.