

PATTLE DELAMORE PARTNERS LTD

Baseline Environmental Monitoring, Program 2: Surface Water and Sediment Sampling – Exploration Permit #51985 at Puhipuhi, Northland

Evolution Mining Pty Limited

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Baseline Environmental Monitoring, Program 2: Surface Water and Sediment Sampling - Exploration Permit #51985 at Puhipuhi, Northland

✦ Prepared for

Evolution Mining NZ Pty Limited

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Executive Summary

Pattle Delamore Partners Ltd (PDP) was engaged by Evolution Mining New Zealand Pty Ltd (ENZ) to provide baseline surface water and sediment data within Exploration Permit 51985, to include upstream and downstream locations of the Waiariki River, and adjacent catchments.

Sampling was completed at 19 sites both within and outside the tenement boundary. Water samples were analysed for a wide range of parameters including elements and nutrients, while sediment samples were analysed for trace elements only. Analytical techniques were very low detection limits (0.0005 ppb) were used to measure dissolved and total mercury concentrations in surface waters. These ultra-trace analytical techniques were used to measure very low concentrations of mercury at locations where mercury was undetectable in previous studies.

Measured mercury concentrations in both surface water and sediment are within the range of concentrations found by recent studies in the area. The surface water mercury concentrations measured are lower than those reported in an earlier study by Hoggins and Brooks (1973).

Water Quality Results

Water quality results were compared against both human health guidelines (the New Zealand Drinking Water Standard guidelines and Australian and New Zealand Environment and Conservation Council (ANZECC) Contact Recreational Guidelines), and against ecological guidelines (ANZECC Livestock Drinking Water Guidelines and Aquatic Ecosystem Guidelines).

No surface water samples exceed the New Zealand Drinking Water guidelines, although aesthetic values related to pH and iron were exceeded.

No surface water samples exceeded ANZECC Livestock Drinking Water trigger levels from any sites.

Concentrations of total iron in surface water exceeded the ANZECC Contact Recreational guidelines in all but one sample. Manganese and ammoniacal-nitrogen were elevated above ANZECC Contact Recreational standards in several locations both inside and outside the tenement.

At two locations surface water mercury concentrations exceeded the ANZECC (2000) trigger values for 99% Aquatic Ecosystem Protection Guidelines of 0.06 parts per billion (ppb). One of these sampling locations was located immediately adjacent to a historic Puhipuhi mercury processing plant (site PUX). The water sample collected at this location contained dissolved mercury concentrations of 0.236 ppb. The second site (PSX) is located approximately 1 kilometre downstream of sampling location PUX and the concentration of mercury measured in stream water at that location was 0.1 ppb. Water samples

from all other monitoring sites were below the ANZECC 99% trigger level of 0.06 ppb dissolved mercury.

Dissolved copper and zinc were above the ANZECC 95% trigger values for the protection of freshwater species at several sites within the tenement and one outside it. The copper values in water are comparable to background levels within other Northland Rivers (NRC, 2014). The source of anomalous zinc levels is not known and cannot be related to local geology. No other elements exceeded ANZECC (2000) 95% guidelines.

Sediment Quality Results

Sediment results were compared to the ANZECC Sediment quality guidelines based on ISQG-low and -high range effects.

All sediment results except one (PDX) exceeded the ANZECC ISQG-low range trigger values for one or more inorganic elements.

Thirteen sites (out of 19) exceeded the ANZECC ISQG-high sediment trigger values for one or more inorganic elements. The elements concerned were:

- ✧ Antimony;
- ✧ Arsenic; and
- ✧ Mercury.

Concentrations of mercury in sediment were greatest in the Waikiore Stream catchment close to the historic Puhipuhi mercury mine and processing site.

Concentrations of mercury in sediment decreased significantly with distance downstream from the historic Puhipuhi mercury mine and processing site.

In five samples (out of 14) Acid Volatile Sulfide/Simultaneously Extracted Metals analysis indicated that the mercury present was most likely associated with insoluble metal-sulfides (which have low-bioavailability). Leachability testing via SPLP also indicated that the mercury in the sediment is not associated with highly soluble mineral phases, reducing its availability to be ingested by organisms residing in sediment. Mercury speciation testing indicates that only a small fraction (< 0.8%) of the total mercury measured in the sediment samples is in the form of methyl mercury, one of the most toxic and bioavailable forms of mercury. From the current results it is not possible to say what form the remainder of the mercury is in.

Potential Sources of Mercury

Although this study has not been designed to determine the source of mercury, the use of ultra-trace analytical techniques for mercury has allowed the mercury concentrations in various catchment be compared to each other. Comparison of mercury concentration in various catchments shows a relatively high degree of variation in mercury concentrations. This indicates that there may be a number

of different sources of mercury within the Puhipuhi region. The potential sources for mercury are summarised below:

- ✧ The former Puhipuhi mercury mine and processing site appears to be a source of mercury, iron, and manganese within the Waikiore Stream.
- ✧ Natural weathering of mineralised rock and soil containing elevated concentrations of mercury.
- ✧ An additional source (or sources) of mercury in water and sediment in the Pukekaikio catchment may also include discharges from historic mining and quarrying of mineralised rock.
- ✧ There is potential for another mercury source which has resulted in elevated levels (compared to other samples) of mercury in a sub-tributary to the west of Waikiore Stream.
- ✧ Based on water and sediment samples there is also evidence for a mercury source within the Whenuaroa Stream, despite this stream not being associated with any known historic mining activities.

Discharge of shallow groundwater from the Purua Bed Sedimentary Aquifer in to streams within the Puhipuhi region may also be a source of mercury detected in the Whenuaroa Stream and the lower Waikiore Stream. Testing of shallow groundwater from this aquifer would be required to confirm this.

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Note on Terms Used in this Report

Elements

The focus of this report is on concentrations of fifteen inorganic elements: antimony (Sb), arsenic (As), boron (B), cadmium (Cd), chromium (Cr), Cobalt (Co), copper (Cu), iron (Fe), manganese (Mn), mercury (Hg), nickel (Ni), lead (Pb), thallium (Th) and zinc (Zn). Sometimes antimony, arsenic, cadmium, chromium, cobalt, copper, nickel, manganese, mercury, lead, thallium and zinc are referred to as 'heavy metals.' However, this term is falling out of favour because it is an ambiguous one. A range of different definitions for 'heavy metal' exists in the scientific literature and the group of elements covered by that term changes depending on the definition used. Therefore the more general term "elements" is used in this report to describe both the metals and metalloids (arsenic, antimony, and boron) listed above.

Elevated Concentrations

Elements occur naturally. When their concentrations are greater relative to other sampling locations, they are usually referred to as being **elevated**. This can be caused by either natural chemical or physical processes or by the addition of substances into the environment by human activities.

Units for water samples used in this Report

The standard PDP units for surface water are mg/L (milligrams per litre or ppm) and µg/L (microgram per litre or ppb) for most elements analysed at the trace level. In this study mercury, has also been assessed at the ultra-trace level which is quoted in ng/L (nanograms per litre). Nanograms per litre is equivalent to parts per trillion (ppt or 1 in 1,000,000,000,000). For the purposes of this study, and to remain consistent with previous Puhipuhi environmental monitoring data, all trace element data was been reported in terms of parts per billion. See the glossary below for a comprehensive definition of ppb.

Units for sediment samples used in this Report

The standard PDP units for sediment are mg/kg (milligrams per kilogram or ppm) for most elements analysed at the trace level. In this study mercury, has also been assessed at the ultra-trace level which is quoted in ng/g (nanograms per gram). Nanograms per gram is equivalent to parts per billion (ppb or 1 in 1,000,000,000). See the glossary below for a comprehensive definition of ppb.

Note on Water Quality Guidelines

Accepted practice in New Zealand is that human drinking water quality is assessed using the New Zealand Drinking Water Standard (2008) (DWSNZ) developed by the Ministry of Health. The DWSNZ define maximum concentrations of health significance (called maximum acceptance value or MAV's) in water that, based on current knowledge, constitute no significant health risk to a person who consumes 2 litres of that water a day over their lifetime (usually taken as 70 years) (MoH, 2008).

The DWSNZ also provides guidelines values for aesthetic purposes (such as taste, odour or prevent unacceptable levels of deposition or scale formation). Exceedance of the DWSNZ guidelines for aesthetic purposes does not indicate that the water is unfit for human consumption or that consuming the water will cause an adverse health effect. Rather it indicates that the colour, odour or taste of the water may be objectionable.

The DWSNZ does not set quality standards for water used for industrial or agricultural purposes. To assess the suitability of water for the consumption by livestock the water quality results are compared to the Australian and New Zealand Environment and Conservation Council (2000) (ANZECC, 2000) Livestock Drinking Water Quality guidelines.

ANZECC (2000) Water Quality Guidelines for Contact Recreation addresses recreational contact with water through two categories of sporting activities:

- ✧ Sports in which the user comes in frequent direct contact with water; for example swimming (primary contact).
- ✧ Sports that generally have less-frequent body contact with water; boating or fishing (secondary contact).

These guideline values are based on the assumptions of the World Health Organisation (WHO) contact recreational guidelines, which are in turn based on the WHO drinking water guidelines. The WHO contact recreational guidelines assume that a person would swallow approximately 200 mL of water from the site per day (WHO, 2003). Therefore there is an implicit assumption in the derivation of the contact recreational guidelines that exposure and ingestion of 200 mL of water would need to occur nearly every day.

The WHO contact recreational guidelines state that for a water user who comes in contact with a water body once or who has occasionally repeated exposure it is unlikely that these exposure(s) will result in any adverse health effects (WHO, 2003). Therefore, the use of these guidelines is highly conservative and will overestimate the actual risk present for infrequent users.

ANZECC (2000) also provides guidelines for water quality assessment for Aquatic Ecosystems. For this study ANZECC Water Quality Guidelines for Aquatic

Ecosystems were considered in relation to the protection of 95% of freshwater species for most elements which are appropriate for this type of environment. The ANZECC guidelines do not consider the potential for dietary borne toxicity to cause harm to an organism (Meyer *et al.*, 2005). However, due to the potential for mercury to bio-accumulate up the food chain a higher benchmark of protection of 99% of freshwater species has been used in this report for mercury only.

The use of the ANZECC (2000) aquatic ecosystem trigger values is considered to be appropriate to assess whether there is the potential for inorganic elements such as mercury or compounds such as nitrate or ammonia to have an adverse effect on aquatic ecosystems. Therefore the results from the water quality sampling programme have been compared to these values. The ANZECC (2000) aquatic ecosystem trigger values were derived to protect aquatic ecosystems from chronic or long term exposure to inorganic elements or compounds. In this study, PDP is assessing the potential impacts of long term discharges from sources such as former mining sites or natural weathering of geological material.

For inorganic elements, the ANZECC (2000) trigger values should be compared to the dissolved fraction (i.e. the part of the sample which can pass through a 0.45 µm filter) rather than the total concentration of the element within the sample (i.e. the total metal fraction). Several studies indicate that it is the dissolved elements within a water sample which are the most likely to be taken up by aquatic species and therefore have the potential to cause toxic effects (ANZECC, 2000; Markich, et al., 2001; US EPA, 1993).

Note on Sediment Quality Guidelines

To establish the degree of risk to sediment-dwelling organisms, the results from this study are compared with Australian and New Zealand Environmental Conservation Council (ANZECC) interim guideline values for sediment quality (ISQG's) for the protection of aquatic ecosystems. For each element, there are two ANZECC (2000) guidelines for sediment quality which correspond to the effects range-low and –median presented in Long *et al.* (1995).

- ✧ The lowest is the Interim Sediment Quality Guideline-low (ISQG-low) which represents a concentration below which adverse effects are unlikely. Concentrations of contaminants below the ISQG-low pose a low level of risk to aquatic organisms; and
- ✧ The higher is the ISQG-high, which is a median level at which adverse effects are expected in half of the exposed organisms. Contaminant concentrations above the ISQG-high are interpreted as being reasonably likely to cause significant adverse effects on aquatic organisms.

Concentrations between ISQG-low and ISQG-high represent a possible effects range, within which adverse effects would occasionally occur to aquatic organisms (Long *et al.*, 1995). Concentrations of elements or other chemicals either below or above the ANZECC (2000) trigger values should not be thought of as safe or unsafe, but rather as posing a lower or higher level of risk. This is because site-specific factors such as the chemical form of the compound or element (i.e. As (III) or As (V)), natural background concentration, the concentration of organic matter, iron oxides or reduced sulfide compounds can all modify the toxicity of a particular compound.

Values below the ISQG-low do not guarantee that the concentrations are safe either because complex chemical mixtures of certain compounds are more toxic than their individual chemical components and the ANZECC (2000) guidelines are not designed to protect against those mixtures. Also, certain compounds such as mercury have specific chemical forms (methyl-mercury, ethyl-mercury) which bio-accumulate in organisms and bio-magnify up the food-chain. As bioaccumulation potential is site-specific, more detailed studies are required to assess such risks. Therefore, the ANZECC guidelines are designed to be trigger values to indicate which sites may warrant closer investigation. They do not assess the risk to aquatic organisms from dietary borne toxicity nor do they assess the potential for a compound to bio-accumulate up the food chain.

It should also be noted that the ANZECC (2000) guidelines are designed to protect aquatic ecosystem rather than to protect human health. Although ISQG-low values maybe lower than equivalent soil quality guidelines designed to protect human health, no conclusion should be made on the potential human health risk.

Note on Bio-availability, Bio-accessibility and Selective Extractions

Metals bound to sediments may be in a number of different chemical species and/or mineralogical phases. Some phases or species are highly soluble, while others are so insoluble that their presence does not contribute to the toxicity of the sediment. Traditional analytical techniques, such as US EPA 200.2 total recoverable metals, use strong acids (i.e. concentrated nitric acid) at 85°C for two hours and release metals which are bound to various phases which are not soluble under typical environmental conditions (i.e. pH between 4 to 8 pH units and water temperatures between 5 to 30°C). Chemical forms which can be released into the environment under typical environmental conditions and which have the potential to be uptaken by an aquatic organism are said to be bio-accessible, whereas the fraction of the metals which can be uptaken by an aquatic organism and result in harm of that organism is said to be the bio-available fraction.

Currently, there are no recognised official tests to undertake bio-availability assessment of aquatic organisms for mercury. Therefore, indirect methods such as selective extractions are used as a proxy to assess how soluble metals are under certain environment conditions. These selective extraction methods provide an estimate of the bio-accessibility of the metal being tested. However, hardness, pH and the presence of other chemical compounds in the water will all limit the amount of the metal which can be uptaken by an organism. Therefore, the bio-available fraction of the metals may be lower than the bio-accessible fraction.

Glossary¹

Acidic Having a pH of less than 7.

Alkaline (or basic) Having a pH of greater than 7.

Anion A negatively charged ion. Includes chloride (Cl^-), nitrate (NO_3^-) and sulphate (SO_4^{2-}).

Ammonia Compound of nitrogen toxic to stream life at high concentrations.

Ammoniacal-N A measure of the amount of ammonia in the water; expressed in terms of the amounts of nitrogen in the form of ammonia or ammonium.

APHA American Public Health Association.

AVS/SEM Acid-Volatile Sulphides/ Simultaneously Extracted Metals is a testing method to assess the potential for metal ions found in sediment to be associated with sulfide minerals (which are insoluble and therefore non-bioavailable) or to be associated with a more soluble mineral phase (such as iron oxy-hydroxide) and potentially be released under moderately acidic conditions. If there is more AVS detected in a sample than SEM, then the metal is most likely associated with acid volatile sulfide minerals and unlikely to be bio-accessible to organisms dwelling in the sediment.

Baseline study Data collected to document existing conditions onsite.

Bioaccumulation The build-up of a chemical in body tissues.

Bio-accessibility The fraction (or percentage) of a compound which is soluble and potentially could be uptaken by an organism. Bio-accessibility tests are in-vitro (i.e. inside a test tube) and the analytical tests used in bio-accessibility tests typically have been verified using bioavailability testing.

Bioavailability The fraction (or percentage) of a compound which is uptaken by an aquatic organism and reaches the circulation system (i.e. blood). Bioavailability assessment requires in-vivo testing (i.e. inside organisms) to determine the absolute amount of a compound which can cause harm to the organism.

Cation A positively charged ion. Includes (Ca^{2+}), (Mg^{2+}), (Na^+) and most metals.

¹ Primary sources:

Government of British Columbia, Ministry of Environment, Glossary of Water Quality Terms <http://www.env.gov.bc.ca/wat/wq/reference/glossary.html#index> accessed 05/02/16, and;

Wai Care Manual Book 6 - Fact Sheets, Wai Care, 2003.

CV-AFS Cold Vapour Atomic Florescence Spectrometry is an analytical technique used to measure very low concentrations of mercury (typically between 0.000 5 to 1 ppb).

Detection limit (DL) The concentration below which a particular analytical method becomes difficult to determine with certainty.

Dissolved Water quality analysis is typically referred as being either dissolved or total element (or metal analysis). Total element analysis refers to water which has been analysed for elements both dissolved in water and present in the particulates in the water. To determine the fraction of the water which is associated the dissolved phase (i.e. not bound to particulates) the water samples are filtered through a 0.45 µm filter. Elements associated with the dissolved phases are generally considered to be more mobile and biologically available than elements bound to the particulate phase. In this report dissolved phase elements are compared to guidelines for the protection of ecological receptors as the dissolved phase is more readily up taken by plants and via gills in aquatic organisms. Total element results are compared to drinking water guidelines as some elements can be released from particulates in the acidic conditions found in the stomach of humans and livestock. Total element results have also been compared to aesthetic guideline values as well as elements bound to particulates can also impact on the aesthetic qualities of the water.

Dissolved oxygen (DO) The amount of oxygen present in a water sample.

DQO Data Quality Objectives are qualitative and quantitative statements that specify the quality of the data required.

DWSNZ New Zealand Drinking Water Standard (2008).

Electrical conductivity (EC) The measure of the amount of electrical current a material can carry.

Flow gauging Measuring the flow of water in a river or stream.

IANZ International Accreditation New Zealand. This organisation undertakes independent assessments of laboratories to verify that they have appropriate quality assurance/quality control method to assure that the analysis is undertaken in accordance with international best practice.

Ion A negatively or positively charged atom or molecule which has either an excess or shortage of electrons, respectively.

ISO/IEC (JTC 1) is a joint technical committee of the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). Its purpose is to develop, maintain and promote standards in the fields of information technology (IT) and Information and Communications Technology (ICT).

NATA National Association of Testing Authorities, Australia. NATA is the authority that provides independent assurance of technical competence of analytical testing laboratories.

Nitrogen An element that is essential to all plants and animals.

Nutrient A substance, element or compound, necessary for the growth, development and reproduction of plants and animals; as a pollutant any element or compound, such as phosphorous or nitrogen that encourages abnormally high organic growth in the ecosystem.

NTU (Nephelometric Turbidity Units) A measurement of turbidity that measures the light reflected off particles.

Major elements Geological major elements are defined as those elements that compose 95% of the earth's crust. They are Silicon, Aluminium, Calcium, Magnesium, Sodium, Potassium, Titanium, Iron, Manganese and Phosphorus.

Parameter Any variable that can be measured, e.g. nitrates, electrical conductivity.

PPE Personal Protective Equipment

Part per billion (ppb) Denotes one part per 1,000,000,000 parts or one part in 10^9 . Parts-per billion notation is used to describe very dilute solutions where the element is present at one-billionth of a gram per gram of sample solution. When working with aqueous solutions, it is common to assume that the density of water is 1.00 g/mL. Therefore, it is common to equate 1 kilogram of water with 1L of water. Consequently, 1 ppb corresponds to 1 $\mu\text{g/L}$. This is equivalent to one drop of water (25 mL) diluted into an Olympic size swimming pool (2500 m^3), or about three seconds out of a century.

pH A measure of the acidity or alkalinity of a solution.

Quality Assurance Evaluation of data collection and analysis techniques to ensure correct procedures was followed.

Sediment Particles of sand, clay, silt, and plant or animal matter carried in water.

Selective extraction Analytical tests which determine how soluble a compound is under specific conditions (i.e. temperature, pH and concentration of a particular chemical). Selective extractions are sometimes used as a proxy for bio-accessibility testing.

Synthetic Precipitation Leaching Procedure (SPLP) or (EPA SW-846 Method 1312) is an analytical method to simulate material sitting in-situ exposed to rainfall. SPLP tests are usually undertaken using neutral (pH 7 water) or slightly acidic water (pH 6.5).

Toxicity Characteristic Leaching Procedure (TCLP) (EPA SW-846 Method 1311) is an analytical method designed to determine the mobility of both organic and inorganic under moderately acidic conditions (pH of 4.5 pH units) found in a landfill.

Tributary A stream or river that flows into a larger stream or river.

Trace element In analytical chemistry, a trace element is one whose average concentration of less than 0.1 to 100,000 ppb.

Turbidity A measure of water clarity.

Type 1 Water Deionised purified water which is defined as water having a resistivity of >10 megaohm-cm. This water has been treated to remove all elements from it and does not contain trace elements above 0.1 ppb. In this study Type, 1 water is used as a field blank.

Ultra-trace An analysis and sampling collection methodology which provides results with a detection limit of less 0.1 parts per billion for the purpose of this report. Ultra-trace sampling and analytical techniques (US EPA method 1669 and 1631) were used to collect and analysis dissolved and total mercury concentrations.

US EPA United States Environmental Protection Agency

US EPA method 1631. A laboratory analytical method approved by the US EPA to measure ultra-trace levels of dissolved and total mercury using Cold Vapour Atomic Florescence Spectrometry.

US EPA method 1669. A US EPA approved method to collect ambient water for metals which is to be used in conjunction with trace and ultra-trace analytical techniques.

1.0 Introduction

Pattle Delamore Partners Ltd (PDP) has been engaged by Evolution Mining NZ Pty Limited (ENZ) to undertake an assessment of surface water quality and sediment within their Puhipuhi gold exploration tenement and at a number of selected sites in the upper and middle reaches of the Wairua River (Figures 1 and 2). The primary aim of this programme is to provide defensible and high quality baseline data prior to any exploration-related environmental disturbance at Puhipuhi, Northland.

In addition, the results aim to address a number of key questions and concerns:

- ✧ Does surface water meet safe Drinking Water Standards for humans and livestock?
- ✧ Are surface water and sediment quality of a standard that does not adversely affect aquatic ecosystems?
- ✧ Are the results consistent with earlier monitoring results from the same locations?
- ✧ Can point sources for trace levels of mercury be identified from the data?
- ✧ To what extent does downstream dispersion of mercury occur?

This report presents the results of the surface water quality and sediment sampling undertaken at 19 sites between the 7th and 13th of March 2016.

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2: SURFACE WATER AND SEDIMENT SAMPLING - EXPLORATION PERMIT #51985 AT
PUHIPUHI, NORTHLAND

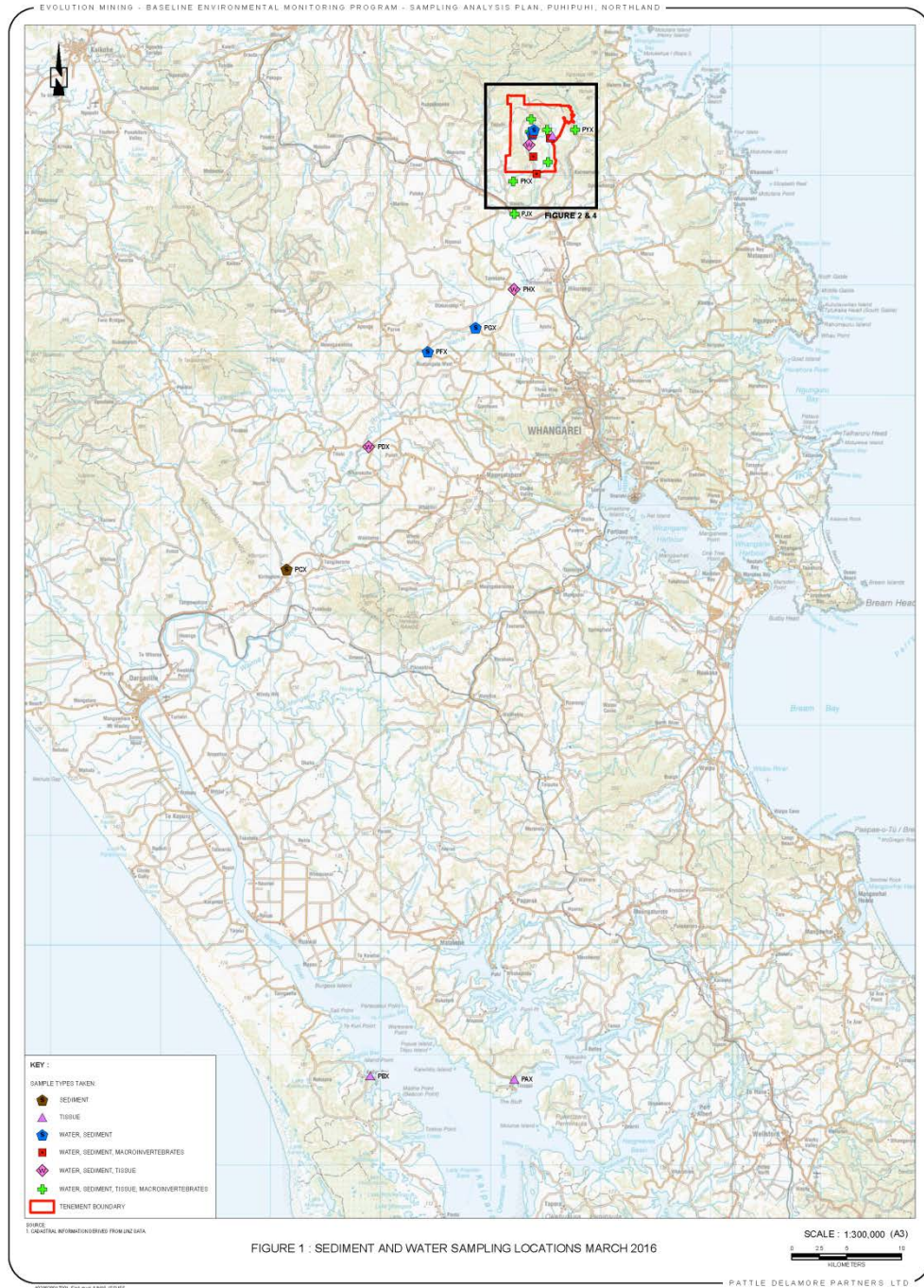


Figure 1: Sampling Locations

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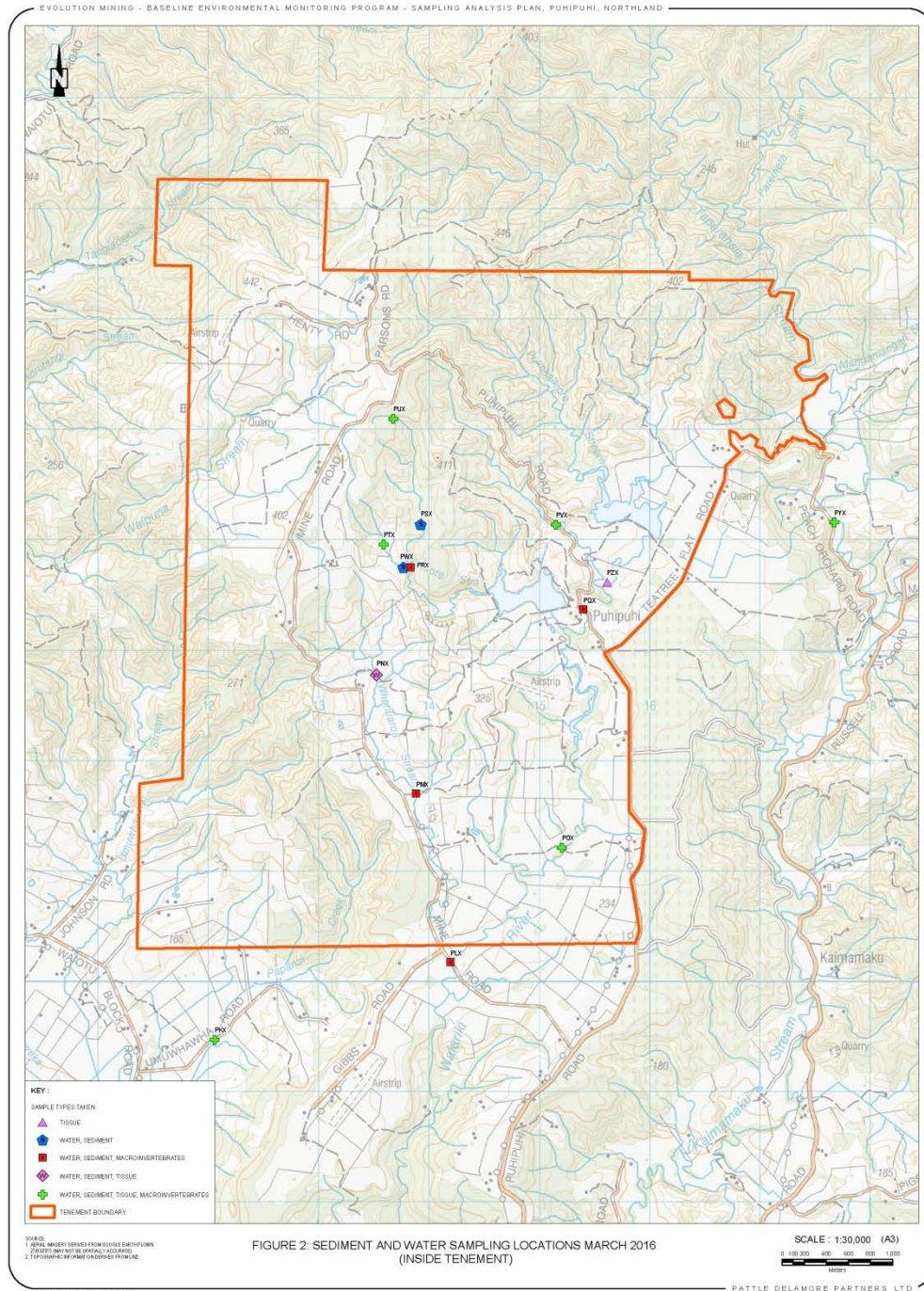


Figure 2: Sampling Locations within ENZ's Tenement

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Figure 3: Sampling Locations – PDP and Hoggins (Outside Tenement)

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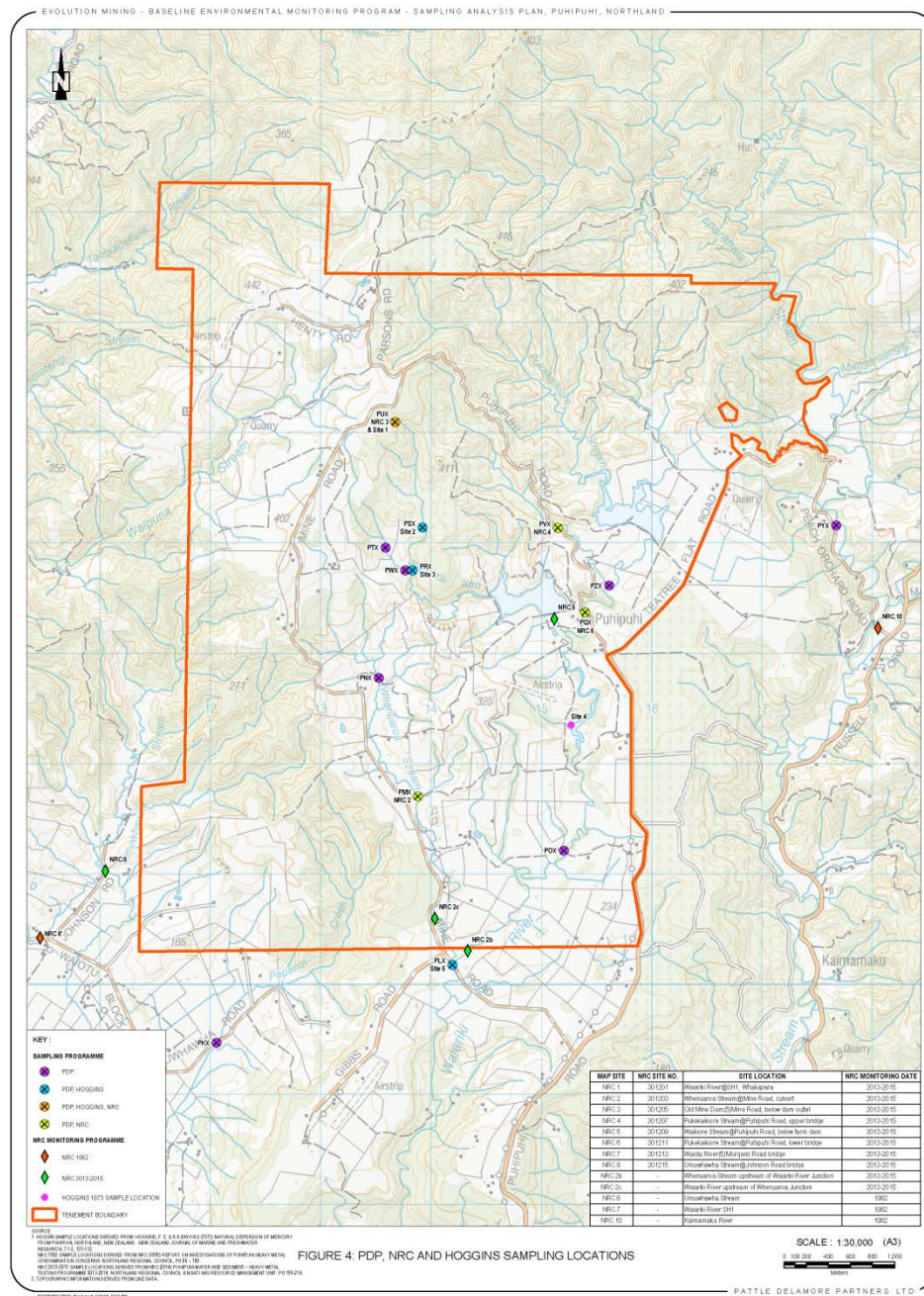


Figure 4: PDP, NRC and Hoggins Sampling Locations

2.0 Project Background

The surface water and sediment sampling programme are one of several baseline environmental investigations being undertaken by PDP on behalf of ENZ. Other environmental investigations being undertaken include groundwater, ecological and air monitoring, hydrogeological assessments and physical environmental surveys. The scope of the project has incorporated the concerns expressed by local iwi and local residents about existing water quality and ecosystem health, including food sources such as eels, and the potential effects of exploration-related activities such as exploration drilling.

A number of studies of water and sediment quality have been undertaken previously at Puhipuhi, both by regulators such as Northland Regional Council and by academic researchers (Figures 3 and 4). Studies have focused on the levels of mercury and other metals in response to legacy issues associated with an abandoned small-scale mercury mine and processing plant, which is located in the headwaters of Waikiore Stream and was active between 1907 and 1945 (DOC, 2010). Previous geological and geochemical surveys have shown that elevated mercury values, consistent with geothermal influence such as at Ngawha (NZEL, 2003), are widespread in Puhipuhi rocks and soils and are not confined to the Waikiore Stream. The current study utilises previous sample locations as a basis for comparison and also extends sample coverage to include catchments not previously assessed.

The main streams draining the Puhipuhi area are the Pukekaikio, Waikiore and Whenuaroa Streams which are the major tributaries of the Waiariki River. The western side of the tenement area is drained by tributaries of the Waiotu River and a small area on the eastern side is drained by tributaries of Kaimamaku Stream (see Figure 5). The streams and river in the tenement area are part of the Wairua/ Wairoa River catchment that drains a substantial part of central Northland. Further, downstream the Wairua River becomes the Wairoa River and flows past Dargaville into the Kaipara Harbour on the west coast. The key receiving river environments downstream of the study area are the Waiariki River, Waiotu River, Kaimamaku Stream, Whakapara River, Wairua River, Wairoa River and the Kaipara Harbour.

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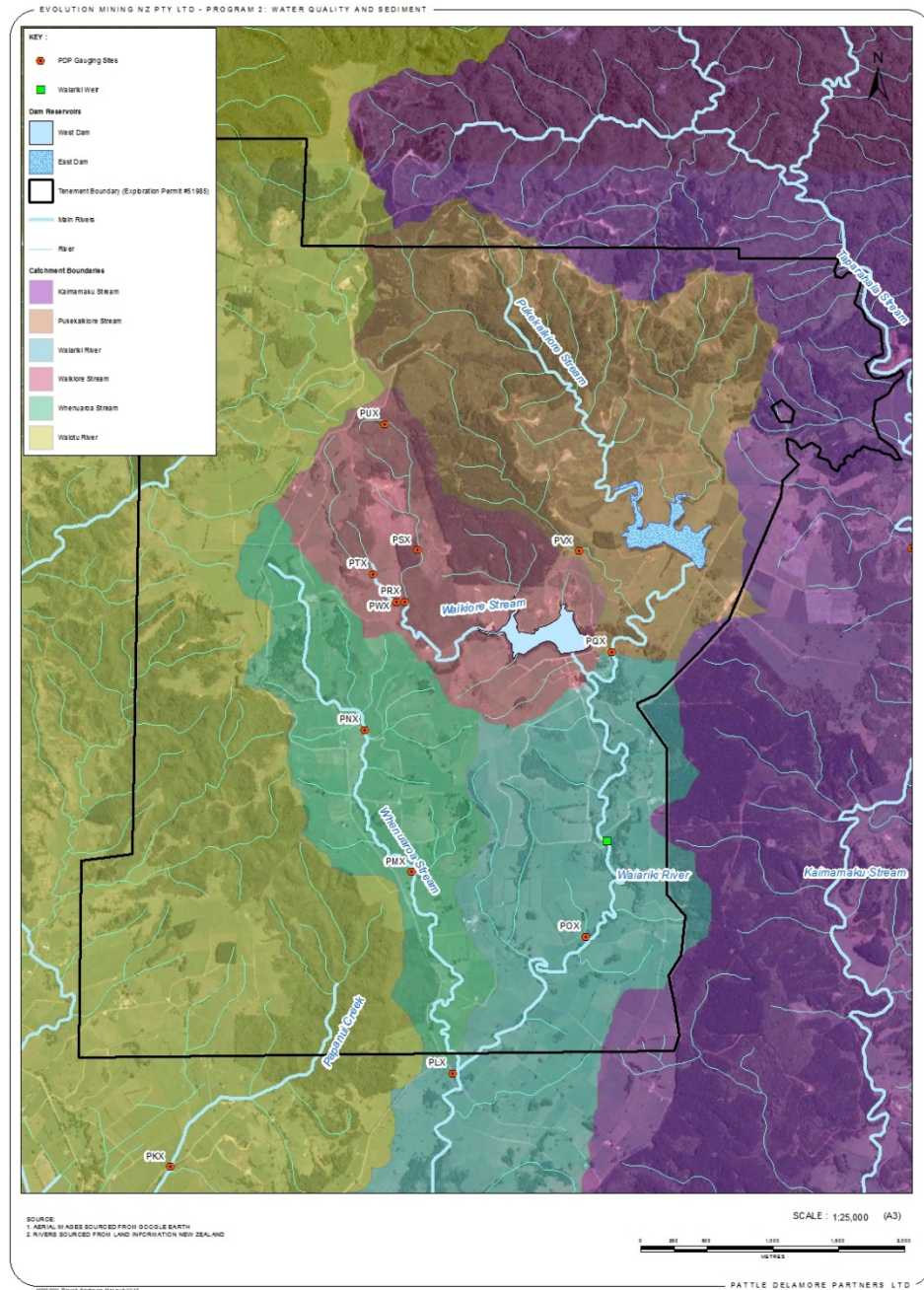


Figure 5: Tributaries and Catchments of the Wairua River

3.0 Scope and Objectives

Evolution Mining has requested:

- I. Surface water and sediment sampling within and outside the exploration tenement boundaries to determine (i) baseline concentrations of metals and parameters that could be used to measure changes to the surface water if drilling was to commence and (ii) determine if there are specific areas within the tenement boundaries that are the source of any metals in the stream system, if metals are present.
- II. Surface water and sediment sampling within and beyond the tenement boundary replicating the locations of the previous sampling, to determine if there have been any changes to the system over time and again provide background data for the future.
- III. All surface water and sediment samples to be analysed at an accredited laboratory (accredited laboratories require an independent assessment of quality control and accuracy standards e.g. by IANZ).

4.0 Methodology

4.1 Site Locations

PDP collected sediment and water quality samples from 19 sampling locations within and downstream of the tenement boundary. The sampling locations were chosen to collect water quality samples from most of the sites in the 1973 study by F.E. Hoggins and R.R. Brooks, and to also include several sites sampled by Northland Regional Council (NRC) between 2013 and 2014. Six additional sampling locations were selected by PDP to extend sample coverage across a larger number of catchments and sub-catchments on the Kaimamaku (PYX), Papanui (PKX), Waikiore (PTX) and Whenuaroa streams (PMX and PNX). Sample locations are shown in Figure 1 and Figure 2 and listed in **Table 1** (comparisons of sample locations from previous studies are shown in Figures 3 and 4).

Table 1: Sampling Locations					
Sample Id	Sample Location	Sample Types	Easting (NZTM)	Northing (NZTM)	Previously Sampled
PCX	Northern Wairoa River at Tangataroria Bridge	Sediment only	1691442	6034156	Hoggins, 1973 (Site 12)
PDX	Wairua river bridge, Houto Road	Sed/Water	1698925	6045315	Hoggins, 1973 (Site 11)
PFX	Wairua River at Pipiwai Road Bridge	Sed/Water	1704307	6054017	Hoggins, 1973 (Site 9)

Table 1: Sampling Locations					
Sample Id	Sample Location	Sample Types	Easting (NZTM)	Northing (NZTM)	Previously Sampled
PGX	Wairua River at Matarau Road bridge	Sed/Water	1708651	6056148	Hoggins, 1973 (Site 8)
PHX	Wairua River at Jordan Valley bridge	Sed/Water	1712129	6059650	Hoggins, 1973 (Site 7)
PJX	Waiariki River downstream of SH1 bridge and waterfall	Sed/Water	1712151	6066496	NRC, 2013 (Site 1); Hoggins, 1973 (Site 6)
PKX	Papanui Stream at Umuwhawha Road	Sed/Water	1712057	6069466	Not previously sampled
PLX	Waiariki Stream at Mine Road	Sed/Water	1714194	6070173	Hoggins, 1973 (Site 5)
PMX	Whenuaroa stream on private farm bridge	Sed/Water	1713882	6071701	NRC, 2014 (Site 2)
PNX	Whenuaroa stream on private farm	Sed/Water	1713526	6072774	Not previously sampled
POX	Farm bridge on private farm	Sed/Water	1715202	6071209	Not previously sampled but downstream of Hoggins, 1973 (Site 4)
PQX	Pukekaikio Stream at Puhipuhi Road Lower Bridge	Sed/Water	1715399	6073367	NRC, 2013 (Site 6)
PRX	Waikiore Stream, downstream of unnamed trib.	Sed/Water	1713834	6073747	Hoggins, 1973 (Site 3)
PSX	Waikiore Stream	Sed/Water	1713925	6074136	Hoggins, 1973 (site 2)
PTX	Unnamed tributary Of Waikiore Stream	Sed/Water	1713590	6073955	Not previously sampled
PUX	Old Mine dam at Mine road, below dam outlet	Sed/Water	1713678	6075093	NRC, 2014 (Site 3); Hoggins, 1973 (Site 1)
PVX	Unnamed tributary of Pukekaikio Stream at Puhipuhi Road Upper Bridge	Sed/Water	1715150	6074132	NRC, 2014 (Site 4)

Table 1: Sampling Locations					
Sample Id	Sample Location	Sample Types	Easting (NZTM)	Northing (NZTM)	Previously Sampled
PWX	Waikiore Stream upstream of PRX	Sed/Water	1713768	6073748	Not previously sampled
PYX	Kaimamaku Stream at Peach Orchard Road	Sed/Water	1717673	6074154	Not previously sampled

4.2 Water Quality Sampling

Water samples were collected in accordance with US EPA method 1669 and sampling procedures are outlined in the sampling and analysis plan (PDP, 2016). A summary of the water quality sampling methodology, analytical procedures, and quality assurance are appended, including procedures to avoid sample contamination (**Appendix A**).

4.2.1 Field Parameters

Immediately after each water sample had been collected, field parameters including dissolved oxygen, electrical conductivity, pH, redox potential, temperature, and turbidity were recorded using hand-held water quality meters.

A YSI Pro-DSS field meter equipped with optical dissolved oxygen and turbidity sensors as well as electrical conductivity, redox, pH and temperature sensors was used as the primary water quality meter. A YSI Pro-plus field meter equipped with pH, redox, electrical conductivity meter, Clark type electrochemical dissolved oxygen sensor and temperature sensor was also used as a backup meter to record field parameters. Calibration checks were routinely undertaken for electrical conductivity, pH, and dissolved oxygen.

4.2.2 Analysis Methods

Water samples were analysed for mercury by two different methods. Water quality samples were analysed using US EPA method 200.2 to trace level detection limits similar to previous monitoring programs (1 ppb). To achieve lower (ultra-trace) detection limits for mercury (0.0005 ppb) additional samples were analysed by a US lab using US EPA method 1631 purge and trap CV-AFS. For interpretation purposes, the results have been rounded up to 0.001 parts per billion. The reason for using this lower detection sampling method was to determine whether ultra-trace levels of mercury in water could be used to map downstream dispersion patterns and identify potential point sources for the release of mercury.

4.3 Sediment Quality Sampling

A targeted sampling program was undertaken with sediment core samples being collected in accordance with the sampling and analysis plan (PDP, 2016).

In the absence of New Zealand guidelines for sediment collection, the sediment sampling was undertaken in accordance with the recommendations contained in the following documents:

- ✧ Handbook for Sediment Quality Assessment. Environmental Trust of Australia/CSIRO (2005); and
- ✧ Methods for Collection, Storage and Manipulation of Sediments for Chemical and Toxicological Analyses: Technical Manual. US EPA, October 2001.

A summary of the sediment quality sampling methodology, analytical procedures, and quality assurance are appended, including procedures to avoid sample contamination (**Appendix A**).

5.0 Water Quality Results

The results of the water quality sampling programme are presented in **Appendix B**. The quality control procedures are summarised in **Appendix C**. Copies of the PDP field sheets are appended in **Appendix D**. The laboratory reports are appended in **Appendix E**.

The analysis of duplicate water samples collected at PMX and POX were within the project's data quality objectives (See **Appendix C - Table C-1 and Table C-2**). This indicates that the analytical results are reproducible.

For water samples collected near the former mercury processing plant, the results showed that mercury concentrations were near the detection limit of the trace analytical techniques. To obtain reliable estimates of the dissolved and total mercury concentration, extremely low-level sampling and analytical techniques were employed at the other sampling locations located both within and outside of the tenement.

5.1 Comparison with New Zealand Drinking Water Standards

To determine if the water in the streams and waterway are safe for human consumption the water quality results have been compared to the maximum acceptable values (MAV's) outlined within the DWSNZ (see **Appendix B - Table B-1**). The DWSNZ also provides guidelines values for aesthetic (i.e. odour, taste and scale formation) determinants and these have also been included within **Table B-1**, although they are not part of the water quality standards. The difference between health based and aesthetic criteria are explained in the notes of **Table B-1**.

Based upon the results outlined in **Table B-1**, PDP found that:

- ✧ No samples exceed the health based MAVs for drinking water guidelines;
- ✧ All samples except for PYW exceeded the aesthetic guideline value of 0.2 mg/L for iron;
- ✧ The highest concentration of mercury detected in this sampling programme (0.236 ppb at PUX) is more than an order of magnitude (ten times) lower than the DWSNZ MAV for mercury in drinking water of 7 ppb. At most sampling locations the concentration of mercury is more than two orders of magnitude (i.e. more than 100 times lower) lower than the MAV for mercury set out in DWSNZ. Therefore, the mercury concentrations measured within the water samples are significantly lower than those known to cause significant risk to human health from direct consumption of drinking water;
- ✧ All samples except PYX exceed the aesthetic value for total iron. It should be noted this aesthetic value is for the staining of laundry and sanitary ware. Iron is a relatively non-toxic element and concentrations less than 2 mg/L in drinking water do not present a hazard to human health (see footnotes 2 and 3 in **Table B-1**); and
- ✧ All samples except one at PDX (which was pH 7.39) were lower (4.27-6.88 pH units) than the range of pH values (7.0 to 8.0 pH units) for aesthetic criteria set in the DWSNZ. Water with a pH value of less than 7.0 pH units can result in increased corrosion of lead pipes. Northland waterways are typically slightly acidic due to the presence of naturally occurring humic acids which are released from swamps (such as the Hikurangi Swamp) and wetlands within the catchment.

5.2 Comparison with ANZECC Livestock Drinking Water Guidelines

The results of the water sampling programme have been compared against the ANZECC (2000) Livestock Drinking Water trigger levels (**Table B-1**). No samples exceeded ANZECC (2000) Livestock Drinking Water trigger levels from any sites. The trigger value for mercury in livestock drinking water is 2 ppb, compared to the maximum value obtained of 0.236 ppb from location PUX.

5.3 Comparison with ANZECC Contact Recreational Guidelines

The water quality data was compared to ANZECC (2000) Contact Recreational Standards.

The ANZECC (2000) Contact Recreational Guidelines do not state if the results for inorganic parameters should be compared against dissolved or total metal fractions. For the purposes of this investigation, they have been compared to total metals as ingestion is the primary route of exposure. When water is ingested acidic conditions within the stomach may release some or all of inorganic elements bound to particulate matter.

The results of comparison are summarised below:

- ✧ All samples except PYX exceed the trigger value for total iron. Northland lowland rivers are naturally high in inorganic elements and metals (NRC, 2015). Therefore, the presence of elevated iron within the waterways may be due to natural sources. Iron is also a relatively non-toxic element and the reason for its inclusion into guidelines is not defined².
- ✧ Eight samples exceeded the trigger value for ammoniacal-nitrogen at sites PDX, PHX, PJX, PLX, POX, PQX, PSX and PUX.
- ✧ Samples at sites PSX, PUX, PVX exceeded the trigger value for total manganese. This result is also possibly due to elevated natural background metal concentrations in lowland Northland rivers (NRC, 2015).
- ✧ Samples at sites PRX, PSX and PVX exceeded the range of trigger values for pH. The measured pH readings at these sites were all lower than 6.5 pH units, which is outside the desired range for contact recreational water quality. High or low pH may cause irritation to the skin and eyes of sensitive people.

5.4 Comparison with ANZECC Aquatic Ecosystem Guidelines

As discussed in the note on Water Quality Guidelines on page ix, the 99% trigger values have been used for mercury while the 95% trigger levels have been used for the remaining elements.

Table B-1 in Appendix B presents the water sampling results and the ANZECC (2000) aquatic ecosystem trigger values. The results are summarised below.

- ✧ The concentration of dissolved mercury at location PUX is 0.236 ppb and at PSX was 0.1 ppb. Both samples exceeded the ANZECC (2000) trigger value for 99% ecosystem protection (0.06 ppb mercury) but are below the trigger value for 95% ecosystem protection (0.6 ppb mercury). This indicates that there may be a minor effect on highly sensitive species at these locations, and the potential for bioaccumulation up the food chain. All other water samples contained less than 0.06 ppb mercury, indicating that adverse effects on the aquatic ecosystem from mercury are highly unlikely at all other locations.

² The ANZECC (2000) does not provide a detailed derivation of the contact recreational guidelines but they do note they are derived from the WHO Guidelines for safe recreational water environments (Volume 1: coastal and fresh water) which in turn refer to the toxicological assessments undertaken in the WHO Drinking water Guidelines. These guidelines state the iron is an essential element in human nutrition and the consumption of 2 L of water containing 2 mg/L per day (or 10 times the contact recreational standard) does not present a hazard to human health (WHO, 2003b).

- ✧ Five sites exceeded the 95% protection trigger levels for both dissolved copper and zinc at sampling locations PDX, PQX, PRX, PSX and PVX. These inorganic element concentrations measured are comparable to other Northland Lowland Rivers, which have been recorded as naturally high in copper (NRC, 2015). This in turn may be related to naturally high levels of copper in basalt volcanic rocks that are common in parts of Northland.
- ✧ All other results were below the 95% protection level guidelines.

6.0 Sediment Quality Results

The results of the sediment sampling programme are presented in **Appendix F-Table F-1**. The quality control procedures are summarised in **Appendix G**. The laboratory reports are provided in **Appendix E**.

The analysis of duplicate samples collected at PDX, PFX, PGX, PHX and PJX (See **Appendix G - Table G-1**) indicate a high degree of variability for some elements measured (up to 145%). The variability of mercury measurements was less than 35% except for one site (PDX) where the variability was 84%. The high degree of variability is not unusual for sediment samples and reflects the inherent heterogeneity in the sediment; particularly for samples obtained from sandy or gravelly streambeds where particle size and mechanical sorting via stream flow are a factor. Consequently care should be taken when comparing results with guideline values or the results of previous studies.

6.1 Comparison of Sediment Quality Results to Guideline Values

The sediment quality results have been compared to ANZECC (2000) sediment quality guidelines for the protection of aquatic ecosystems. Two separate laboratory techniques were used to measure the concentration of total mercury in sediments. Where these results differ for samples from the same site, the greater of the two results has been used. This is considered to be the most conservative approach.

6.1.1 Comparison to ANZECC (2000) Sediment Quality Results

Nineteen sediment samples were compared to the ANZECC Interim Sediment Quality Guidelines (see **Appendix F - Table F-1** and Page 10).

The results of the comparison to the ANZECC guidelines are summarised below:

- ✧ All samples except one (collected from PDX) exceeded the ANZECC ISQG-low range trigger values for one or more inorganic elements.
- ✧ Thirteen sites (out of nineteen) exceeded the ANZECC ISQG-high sediment trigger values for one or more of antimony, arsenic and total mercury.

- ∴ The concentrations of the elements show an overall trend of reducing as the distance down the catchment increases. This is discussed in more detail in Section 8.1.

6.2 Accessibility of Mercury in Sediment

In order for elements to cause effects in organisms, they must be bio-accessible and be in a chemical form which then can be uptaken by an organism. For organisms residing in sediments, the elements are most bio-accessible when dissolved in the pore water. If, however, the elements are bound up in a solid, insoluble form, they are not considered to be bio-accessible (and therefore not bio-available), and are unlikely to cause toxicity in sediment-dwelling organisms.

The bio-accessibility of the mercury in the sediment samples was assessed through different methods:

- a) Acid-Volatile Sulfides/Simultaneously Extracted Metals (AVS/SEM).
- b) Toxicity Characteristic Leaching Procedure (TCLP) and Synthetic Precipitation Leaching Procedure (SPLP).
- c) Methyl mercury concentrations.

6.2.1 AVS/SEM

The AVS/SEM test is a screening tool used to predict situations in which toxicity should not occur to organisms dwelling in the sediment. It was not developed to predict an absence of bio-accumulation. The principle of this technique is that in anoxic environments, total metal concentrations do not necessarily correspond with metal bioavailability (Di Toro et al., 1990; John and Leventhal, 1995). This is because sulfide reacts readily with many metal ions (e.g. lead, mercury, nickel, and zinc) to form metal-sulfide minerals which are insoluble and therefore will not cause toxicity. If metal sulfides are present, an analysis of the total metal concentration of the sediment alone may overestimate the potential toxicity.

In the AVS/SEM approach, two components are measured in the same sediment sample:

1. the amount of acid-volatile sulfide (sulfide which can be liberated from the sediment by treatment with hydrochloric acid) (AVS); and
2. the total concentration of metal(s) in the sample that are liberated at the same time as the AVS. Hence the name simultaneously extracted metals (SEM).

Any metal-sulfide minerals in the sediment that are dissolved by the hydrochloric acid will release both AVS and the corresponding metal at the same time.

In this study only mercury was analysed for in the SEM fraction. Although other metals (e.g. cadmium, copper, lead, nickel and zinc) will also bind to sulfide and form metal-sulfide minerals, mercury has the strongest affinity for sulfide and

will therefore bind to sulfide first. This means that if any AVS is present in the sediment, mercury will preferentially bind to the AVS first, until all the available mercury (or AVS) has been “used up”.

Two values are reported in the AVS/SEM test, the amount of AVS, and, in this case, the amount of mercury in the SEM fraction. If the molar concentration of AVS in the sample is greater than the molar concentration of total mercury in the SEM fraction, then the mercury released was likely to have been bound up in sulfide minerals. This is because one mole of AVS combines with one mole of mercury to form one mole of mercury sulfide.

However, if the molar concentration of mercury in the SEM fraction is greater than the molar concentration of AVS, it is assumed that the majority of the mercury released in the test is not associated with sulfide minerals and is therefore more likely to be in a bio-accessible³ form (Batley and Maher, 2001).

Fourteen sediment samples were analysed for AVS/SEM. All fourteen samples contained mercury in the SEM fraction. Five samples returned values for acid volatile sulfides above the laboratory detection limit of 0.001%. Results were converted in to $\mu\text{mol/kg}$ and are shown in **Appendix F - Table F-1**.

As discussed above, if the molar concentration of AVS is greater than the molar concentration of total mercury in the SEM fraction (i.e. $\text{SEM} < \text{AVS}$), then the mercury is likely to be bound up in sulfide minerals and therefore will not cause toxicity.

Five samples (from locations PDX, PHX, PJX, OX and PRX) had $\text{SEM} < \text{AVS}$ (**Table F-1**) indicating that the mercury in these sediments is more than likely to be in an insoluble metal sulfide form and therefore will not be bio-accessible.

The remaining nine samples had detectable concentrations of mercury in the SEM fraction; however concentrations of AVS were below the laboratory level of detection. The level of detection for AVS in this study was significantly higher ($293 \mu\text{mol/kg}$) than the level of detection for mercury in the SEM fraction ($0.05 \mu\text{mol/kg}$). As a result, AVS may be present in samples at concentrations greater than SEM mercury, yet still below the detection limit. For example, the greatest concentration of mercury detected in the SEM fraction was $49.85 \mu\text{mol/kg}$ from site PSX. This concentration is well below the detection limit for AVS of $293 \mu\text{mol/kg}$. Consequently, in samples where AVS was found to be below the detection limit, it cannot be said with any certainty that the mercury will be in a bio-available form.

It is important to note that not all sulfide minerals are dissolved during the AVS extraction (Cooper and Morse, 1998). In particular, pyrite (iron sulfide - FeS_2) and cinnabar (mercury sulfide - HgS) are not readily dissolved at acid

³ The bio-availability of mercury will also be controlled by other influences such as organic carbon, sorption to iron oxy hydroxides etc.

concentrations used in the AVS test (Mikac, et al., 2002). Furthermore, acid volatile metal sulfide minerals may be encased inside sediment grains and therefore unable to react with the acid.

Mercury may also be sorbed to iron oxy-hydroxides or bound up in other insoluble minerals. Mercury has been found in phosphate minerals in rocks from the Puhipuhi region, however, the solubility of these phosphates is unknown (Craw *et al.*, 2000). Therefore, care should be taken when assessing these test results.

6.2.2 TCLP and SPLP

The concentration of hydrochloric acid used in the AVS/SEM analysis is stronger than is likely to be found in the local environment so the leachability of mercury was also investigated using weaker acids with TCLP and SPLP. These test methods offer a straightforward method to assess the potential mobility of elements in the environment.

Toxicity Characteristic Leaching Procedure (TCLP) is a method to simulate leaching through a landfill (TCLP is sometimes referred to as US leachate procedure). TCLP uses an organic acid (acetic acid at pH 4.9) to leach elements from the sediments. Organic acids (such as humic acid) can occur naturally, particularly in wetlands, peat bogs and in areas with significant amounts of decomposing organic matter.

Synthetic Precipitation Leaching Procedure (SPLP) is a method to simulate the leaching of elements from an in-situ material exposed to rainfall and circum-neutral water.

These methods were selected to understand if the elements associated with the sediment could be easily dissolved (SPLP) or require moderately acidic conditions (TCLP) to become mobile and potentially bio-available.

Fourteen samples which exceeded the ISQG-high trigger value for antimony, arsenic and mercury were analysed using TCLP and SPLP methods across a range of contaminants. The results of this testing are presented in **Appendix F – Table F-2** and summarised below.

An SPLP value for mercury of 0.3 ppb was measured at Site PWX however all other samples were below the TCLP (1 ppb) and SPLP (0.1 ppb) detection limits for mercury. This suggests mercury in the sediment is not particularly mobile or soluble.

Antimony and arsenic, two other elements that exceeded ANZECC ISQG-high guidelines, both had detections for TCLP and SPLP. This indicates that these elements are present in a form that could be potentially soluble.

All other elements with the exception of chromium and thallium were detected at some of the sites indicating a proportion may be soluble.

6.2.3 Methyl Mercury

Methyl mercury is one of the most toxic forms of mercury and is known to be highly bio-accumulative and bio-available to organisms.

The sediment samples were analysed in the laboratory for both total mercury and methyl mercury. The results of this testing are presented in **Appendix F – Table F-1** and summarised below.

The percentage of total mercury that was found to be in the form of methyl mercury was very low, ranging between 0 and 0.78%. This indicates that the majority of the total mercury measured in the sediment is in a form that is less likely to bio-accumulate.

Although the AVS/SEM test has indicated some of the mercury is present as insoluble acid volatile-sulfide minerals, based on the current results it is not possible to say with any certainty what form the remainder of the mercury is in.

7.0 Comparison of Water and Sediment Quality Results with Previous Studies

A comparison of the water and sediment quality results from the current investigation with those found in previous studies undertaken in the Puhipuhi region is presented below. The four relevant comparison studies are listed in chronological order.

7.1 Mercury distribution and mobility at the abandoned Puhipuhi mercury processing site, Northland, New Zealand (Gionfriddo *et al.*, 2015)

The study cited under Gionfriddo *et al.* (2015) was commissioned by the Department of Conservation and submitted on 23rd September 2013 but not published until 2015. The date of sampling is not mentioned in the article but is assumed to be in 2013 when the paper was first presented for review. Gionfriddo *et al.* (2015) collected four water samples from upstream, within and downstream of the dam below the historic Puhipuhi Mine site. No sediment samples were collected.

They found dissolved mercury concentrations within the Waikiore Stream, the upstream mine site and dam ranging between 0.069 ppb and 0.24 ppb (**Table 2**).

The Gionfriddo *et al.* (2015) sample locations PP1 and PP5 were in the same stream location as PDP sample location PUX, and the same analytical technique (US EPA Method 1631 E) was used to determine mercury concentrations in both studies. The concentration of dissolved mercury at PP1/PUX was found to be similar in both studies (0.236 ppb (PDP) versus 0.24 ppb (Gionfriddo)).

Both studies show the concentration of mercury in surface water decreases as the distance from the former mine processing area increases. Gionfriddo *et al.*

also showed that water in the dam and next to the (upstream) mine location had lower levels of mercury compared to sampling sites adjacent to the historic processing plant.

Table 2: Gionfriddo et al. 2015 Surface Water Results

Sample Site	Location	Dissolved Methyl Mercury (ppb)	Dissolved Mercury (ppb)	PDP Dissolved Mercury (ppb)
PP1	Waikiore Stream	0.00141	0.24	0.236 (PUX)
PP4	Dam	0.00195	0.118	Not Analysed
PP5	Waikiore Stream	0.000637	0.219	0.236 (PUX)
PP6	Above Dam	0.000706	0.0696	Not Analysed

7.2 Puhipuhi Water & Sediment Heavy Metal testing programme (Northland Regional Council, 2013-2014)

Northland Regional Council and Ngati Hau conducted a monthly monitoring program within the catchment over a 12 month period in 2013-2014 to provide background data on inorganic elements in surface water and sediment samples.

7.2.1 Water Samples

Total mercury was found to be below the detection limit (0.05 ppb) at most sites, with the exception of Site 3 (equivalent to location PUX at the old mine dam), where 10 of 13 samples contained total mercury concentrations greater than 0.06 ppb; the maximum value was 0.26 ppb. There were numerous recorded exceedances of the ANZECC 95% trigger values for copper and zinc. Chromium and lead trigger values were also exceeded during several monitoring rounds at various sites.

An additional sampling round was completed by Lincoln and Canterbury Universities in 2015 as part of a research programme funded by the Ministry of Business Innovation and Employment (Webster-Brown, 2015). The sites sampled were in the same location as the 2013-2014 NRC investigation and also included two new sites. There were several exceedances of the ANZECC 95% trigger values for copper and zinc, however, no exceedance of mercury was recorded.

Appendix H – Table H-1 compares the NRC and PDP field and lab parameters and element results for water samples collected from the same sample locations (see **Figure 3** and **Figure 4** for locations). The concentrations of elements found in the samples collected by PDP were within the range of those reported by NRC (for sites where both samples were above the laboratory detection limit).

PDP's onsite field parameter readings were generally comparable with NRC 2013-2014 surface water values; however, at one site (PUX) NRC dissolved oxygen concentrations (7.8-9.9 mg/L) were higher than the concentration of dissolved oxygen (3.23 mg/L) that PDP measured at the same site. Dissolved oxygen concentration can naturally vary significantly at some sites depending on the time of day, the flow rate of the stream and the season of the year. Dissolved oxygen concentration may also be affected by the concentration of reduced iron being discharged into the stream at this location. The dissolved iron concentration measured at this location was 22 mg/L which is significantly higher than the dissolved iron concentrations measured at most other monitoring sites. Field staff who collected the water samples at this location observed a significant amount of iron staining on the stream banks and within the stream itself. The precipitation of iron (oxy) hydroxides (which would result in the iron staining observed) could result in a significant depression of dissolved oxygen concentrations within the waterway.

7.2.2 Sediment Samples

Table 3 below compares the results of the NRC testing programme for mercury in sediment conducted over 2013-2014 (Northland Regional Council (2015)). NRC's results are presented as a range of values as multiple samples were taken at each of the sample sites.

Table 3: Northland Regional Council comparison to sediment mercury						
PDP Field ID	PUX		PVX		PQX	
Study	NRC	PDP	NRC	PDP	NRC	PDP
Sample ID	301205	PUS02	301207	PVS02	301211	PQS02
Sampling Date	2013-2015	13-Mar-16	2013-2015	11-Mar-16	2013-2015	11-Mar-16
Total Mercury (ppb)	31,000-83,000	74,900	1,900-6,300	2,900	860-1,900	1,900
PDP Field ID	PJX		PMX			
Study	NRC	PDP	NRC	PDP		
Sample ID	301201	PJX01A	301203	PMS02		
Sampling Date	2013-2015	10-Mar-16	2013-2015	11-Mar-16		
Total Mercury (ppb)	1,600-1,800	2,000	2,200-2,600	3,700		

The comparison shows that in general there is good agreement between the NRC reported values and those found in the current study. Two sites (PMX and PJX) are above NRC's range, the remaining three sites are within the range. Taking into consideration the variability of measured values observed in the duplicate samples, the results from these two studies can be viewed as comparable.

7.3 NRC 1995 Monitoring Study (Northland Regional Council, 1995)

A report was presented by the Northland Regional Council in 1995 following sampling completed in 1982 studying inorganic element concentrations within streams at Puhipuhi (Northland Regional Council, 1995). The 1982 laboratory methods of analysis were much less sensitive than methods used in more recent studies. Mercury in surface water samples was tested for using Cold-Vapour Atomic Absorption Spectrometry (detection limit 1 ppb). Only one location was near a PDP sampling location, and due to the poor sensitivity of the laboratory analysis method, it is not included in the NRC vs PDP comparison.

7.4 Natural dispersion of mercury from Puhipuhi, Northland, New Zealand, (Hoggins and Brooks, 1973)

Hoggins and Brooks (1973) investigated the total mercury content of surface water and sediments in the Wairua (Wairoa) River as well as total mercury content in shellfish in the Kaipara Harbour. Sediment and water samples were collected from various points along streams and rivers draining the Puhipuhi catchment, starting near the historic mercury mine site, and ending approximately 100 km downstream, near Dargaville.

7.4.1 Water Samples

Table 4 below compares the surface water sampling results presented by Hoggins and Brooks (1973) (collected in 1971) and those collected by PDP in March 2016. Sample locations are presented from upstream to downstream. It should be noted that water samples collected by Hoggins and Brooks and PDP were analysed by different analytical techniques (silver trap flameless AAS versus US EPA Method 1631E (CV-AFS) used by PDP). These two analytical techniques have different detection limits (0.1 ppb for the methodology used by Hoggins and Brooks compared to 0.0005 ppb for CV-AFS used in this study).

Table 4: Hoggins & Brooks (1973) Comparison – Surface Water Samples

PDP Field ID	PUX		PSX		PRX	
	Hoggins	PDP	Hoggins	PDP	Hoggins	PDP
Sample ID	Site 1	PUW-1/-2	Site 2	PSW-1/-2	Site 3	PRW-1/-2
Sampling Date	1973	13-Mar-16	1973	12-Mar-16	1973	12-Mar-16
Total Mercury (ppb)	0.7	0.277	0.4	0.112	0.6	0.055
PDP Field ID	POX		PJX			
	Hoggins	PDP	Hoggins	PDP		
Sample ID	Site 4	POW01/02	Site 6	PJW01/02		
Sampling Date	1973	11-Mar-16	1973	10-Mar-16		
Total Mercury (ppb)	0.1	0.020	0.08	0.011		
Note: 1. All results in parts per billion.						

In the Hoggins and Brooks paper, the results of the water quality measurements are not presented in a tabular format. Therefore PDP had to estimate the concentration of mercury from Figure 2 of that paper. The estimate of the total mercury concentration in water presented in **Table 4** may be ± 0.2 ppb of the value obtained by Hoggins and Brooks (1973). It should also be noted that at sample locations PJX and POX (Hoggins and Brooks sites 4 and 6), Hoggins and Brooks report concentrations of mercury at or below their reported analytical detection limit. These results should be treated with extreme caution as results which are less than the analytical detection are not likely to be reliable.

However, taking these limitations into account the mercury content of water samples obtained by PDP are generally lower than the results obtained by Hoggins and Brooks (1973). PDP results confirm the trend identified by Hoggins and Brooks (1973) that total mercury concentrations in water decrease with distance away from the historic mercury mine processing site.

7.4.2 Sediment Samples

As with their water results, Hoggins and Brooks (1973) did not present the results of their sediment measurements in a tabular format. Therefore PDP had to estimate the concentration of mercury from Figure 2 of that paper.

Table 5 below compares total mercury results for sediment samples from PDP's current investigation with those of the Hoggins and Brooks (1973) study. Sample locations are presented from upstream to downstream.

Table 5: Hoggins and Brooks (1973) Comparison - Sediment Samples						
PDP Field ID	PSX		PRX		PLX	
	Hoggins	PDP	Hoggins	PDP	Hoggins	PDP
Sample ID	Site 2	PSS02	Site 3	PRS02	Site 5	PLS01
Sampling Date	1973	12-Mar-16	1973	12-Mar-16	1973	10-Mar-16
Total Mercury (ppb)	41,000	51,300	23,000	45,100	8,000	2,100
PDP Field ID	PJX		PHX		PGX	
	Hoggins	PDP	Hoggins	PDP	Hoggins	PDP
Sample ID	Site 6	PJX01A	Site 7	PHS01	Site 8	PGS01
Sampling Date	1973	10-Mar-16	1973	9-Mar-16	1973	9-Mar-16
Total Mercury (ppb)	1,500	2,000	700	600	400	361
	Hoggins	PDP	Hoggins	PDP	Hoggins	PDP
Sample ID	Site 9	PFS01A	Site 11	PDS01	Site 12	PCS01
Sampling Date	1973	8-Mar-16	1973	8-Mar-16	1973	12-Mar-16
Total Mercury (ppb)	350	210	200	138	300	90

In general, the comparison shows similar trends between the two studies, i.e. total mercury concentrations in sediment decrease with distance downstream from the historic mine site.

For most sites, total mercury concentrations in sediment samples collected by PDP are similar or lower than those reported by Hoggins and Brooks (1973). This is with the exception of three PDP samples from field sites PSX, PRX and PJX which had higher levels of total mercury than those reported by Hoggins and Brooks (1973). Given the limitations associated with estimating the Hoggins and Brooks (1973) data, and the variability of measured values observed in the duplicate samples from the current PDP study, the results from these two studies can be viewed as comparable.

7.5 Summary of Comparisons with Previous Studies

Mercury concentrations in water and sediment measured in this study are either similar to or slightly less than those found in previous studies. Current results also agree with the general trend reported in previous studies of decreasing

mercury concentrations in water and sediment with distance downstream from the historic Puhipuhi mine site.

8.0 Discussion

8.1 Water and Sediment Trends

A discussion of the overall trends, focussing on the elements of concern that reported the greatest concentrations, is presented below.

8.1.1 Mercury

The greatest concentrations of mercury in water (0.236 ppb) and sediment (74,900 ppb) were from samples collected at PUX at the head of the Waikiore Stream. Iron and manganese were also elevated in water samples at PUX. PUX is directly downstream from the historic mine/quarry face, and adjacent to the site where mercury was processed from insoluble mercury-sulfide bearing ore to elemental mercury from the 1930's to 1945.

Figure 6 shows dissolved mercury concentrations in water samples (solid columns) compared with total mercury concentrations in sediment samples (hashed columns) for all of the monitoring sites. Monitoring sites are ordered approximately from north (upstream) to south (downstream) and segregated by their catchments, except for sites PKX and PYX which have been put at the end. The location of the tenement boundary relative to sample sites is indicated by a vertical red line. The ANZECC 99% guideline value for dissolved mercury in water is shown as a horizontal yellow line on **Figure 6** for reference. Exceedances are found at only at two locations (PUX, PSX) which are less than 1 kilometre downstream of the former mine processing plant. The DWSNZ threshold for total mercury in drinking water of 7 ppb is not shown in **Figure 6** as it is significantly higher than any values measured during the study. The ANZECC ISQG-high (1,000 ppb) and low (150 ppb) guideline values for mercury in sediment exceeded at all measurement locations within the tenement and at a number of sites outside the tenement. Due to their proximity to the base of the graph in **Figure 6** these guideline values are not shown.

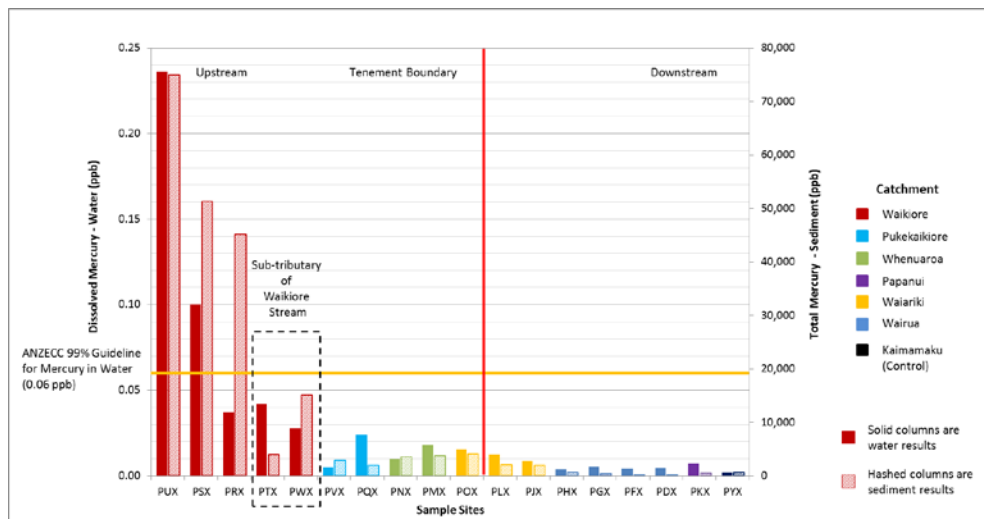


Figure 6: Mercury concentrations in surface water and sediment samples from all sites

It is evident from **Figure 6** that there is not a fixed relationship between mercury concentrations in water and sediment i.e. greater concentrations of total mercury in sediment samples do not always correspond with greater dissolved concentrations in water samples. This suggests that the majority of the mercury in the sediments is in a relatively insoluble form and is only a minor controlling factor in the concentration of mercury in water. Nevertheless, two general trends can be seen.

The first trend which is evident in **Figure 6** is that mercury concentrations in both surface water and sediment samples decrease markedly with distance downstream from the former Puhipuhi mine site. The second trend in the data is that mercury concentrations are not distributed evenly across all catchments. The variation in mercury concentrations across different catchments and the implications for potential sources of mercury are described in more detail in Section 8.2.

8.1.2 Arsenic and Antimony

Along with the mercury sulfide (e.g. cinnabar), arsenic and antimony bearing sulfides (e.g. stibnite, livingstonite and pyrite) are also associated with mineralisation within the Puhipuhi region (Hampton *et al.*, 2004). Arsenic (250 mg/kg) and antimony (90 mg/kg) concentrations in sediment were greatest at site PVX and were also elevated (with respect to other samples) at sites PRX, PNX, PMX and PYX. Although there is some overlap between the mercury, arsenic and antimony concentrations, there is no obvious relationship; many samples containing elevated mercury have relatively low concentrations of arsenic and antimony (of particular note is the sample from site PUX). Arsenic and antimony do not always show a correlation with each other either. A detailed discussion of the source(s) of arsenic and antimony is outside the scope

of this report, but the variations in concentrations may be a reflection of varying enrichment within the mineralised zones.

8.2 Catchment Scale Variation in Mercury and Implications for Potential Sources of Mercury

Mercury samples from this study were analysed by a US laboratory that is accredited for mercury analysis to extremely low levels, and significantly lower than what has been used for previous Puhipuhi studies. For example, the analytical methods for previous studies provided mercury analyses to levels as low as 0.05 ppb, whereas this study was able to detect levels as low as 0.0005 ppb. In previous studies, most water samples returned no detectable mercury other than in the vicinity of the historic mercury mine processing site. However, the extremely low levels obtained in this study have allowed downstream dispersion and potential point sources of mercury to be investigated.

The various tributaries to the Wairua River, their catchments, and PDP sampling locations are shown in **Figure 5** which is reproduced below as **Figure 7**.

EVOLUTION MINING NZ PTY LIMITED - BASELINE ENVIRONMENTAL MONITORING, PROGRAM 2: SURFACE WATER AND SEDIMENT SAMPLING - EXPLORATION PERMIT #51985 AT PUHIPUHI, NORTHLAND

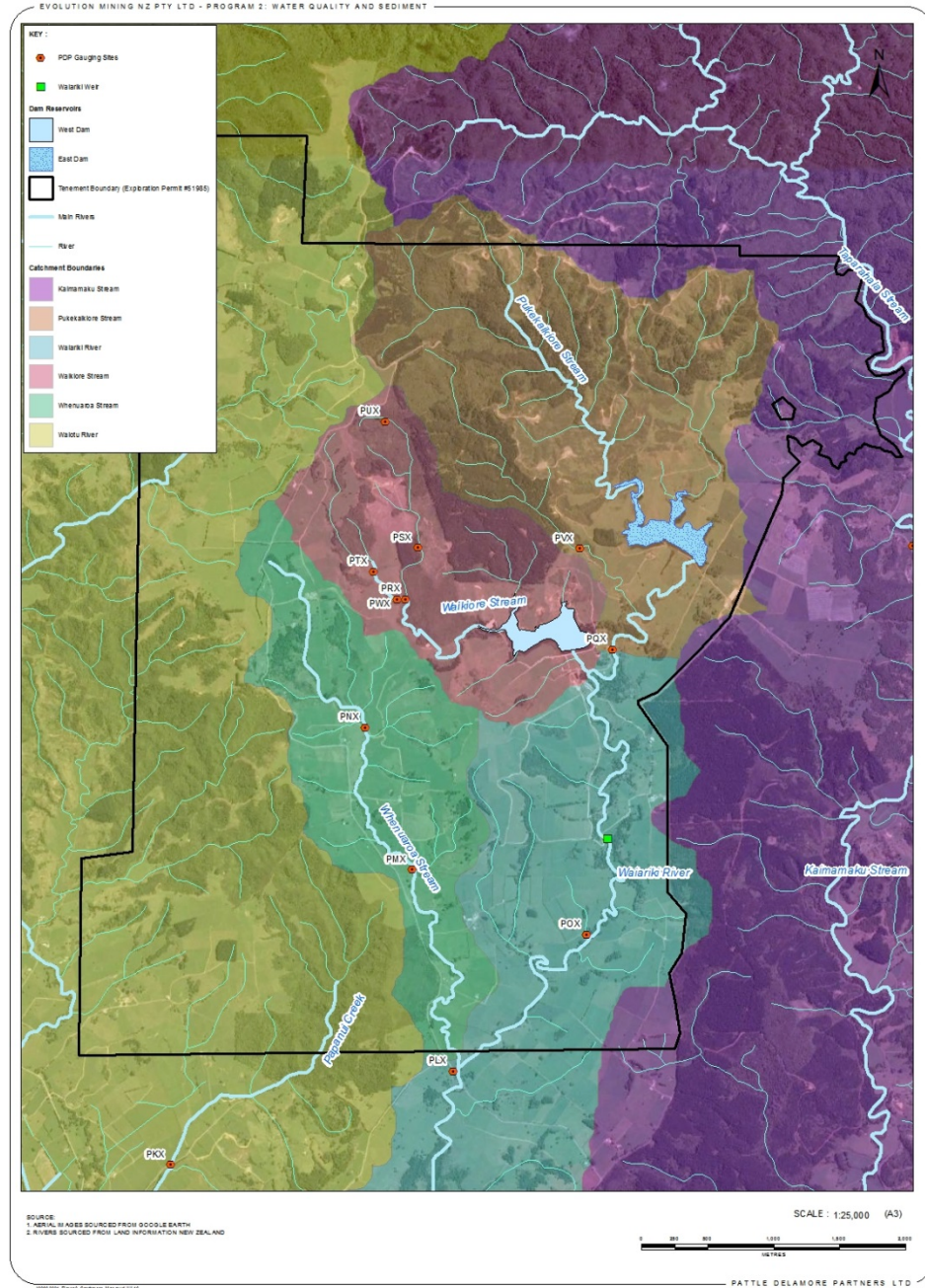


Figure 7: Tributaries and Catchments of the Wairua River

8.2.1 Waikiore Catchment

As discussed in Section 8.1, the greatest concentrations of mercury in water and sediment were from samples collected at PUX at the head of the Waikiore Stream. Iron and manganese were also elevated in water samples at PUX.

Mercury concentrations in water and sediment at sample sites along the Waikiore catchment (presented in **Figure 8**) show a significant decrease with distance downstream from site PUX. Samples collected from PSX and PRX (the next two sample sites downstream of PUX) had dissolved mercury concentrations in water and total mercury concentrations in sediment significantly lower than those found at PUX.

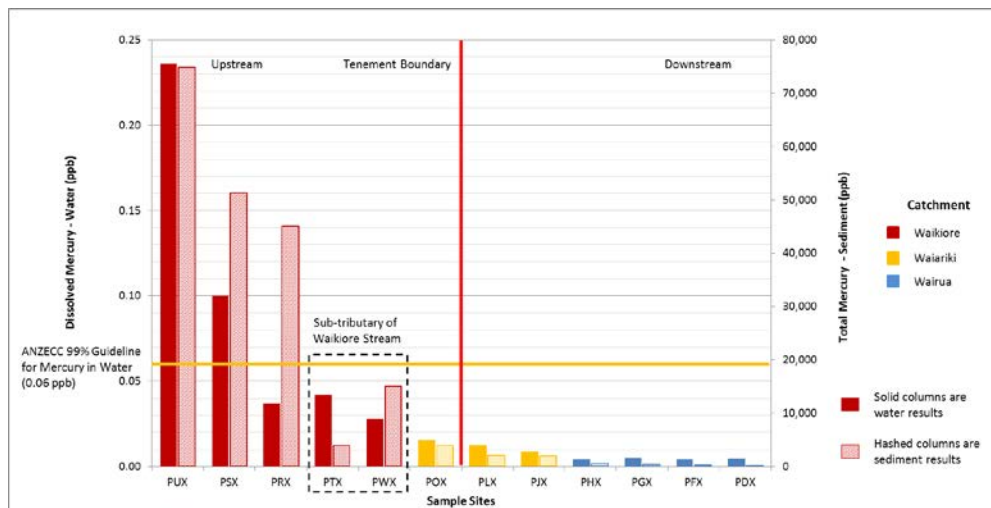


Figure 8: Mercury concentrations in surface water and sediment samples from the Waikiore Stream catchment

PTX and PWX are located on a different tributary of the Waikiore Stream to sites PUX, PSX and PRX (dashed box in **Figure 8**), yet both PTX and PWX reported moderately elevated concentrations of mercury in water and sediment (compared to other samples). Water and sediment samples from PTX contained 0.042 ppb and 3,980 ppb mercury respectively; water and sediment samples from PWX contained 0.028 ppb and 15,000 ppb mercury respectively.

No mining activities are known to have occurred in this tributary, suggesting that in the Waikiore catchment weathering of natural mercury bearing rock or soil may be a significant source of mercury. The potential for shallow groundwater from the Purua Bed Sedimentary Aquifer to be a source of mercury to the streams has not been examined for this catchment.

Mineralised aggregate, quarried from local outcrops, has been used extensively for surfacing roads in the Puhipuhi area. The use of mineralised aggregate has been the subject of investigations relating to the potential for the release of mercury to the environment (Craw *et al.*, 2002; NRC, 1995). In general it was

found that surface runoff from mineralised road aggregate was less than 0.1 ppb, however, road runoff had the potential to transport mercury in sediment in to streams and rivers (Craw *et al.*, 2002). Mineralised aggregate was spread on approximately 20 km of roads within the Puhipuhi region (Craw *et al.*, 2002) and is therefore a potential dissolved mercury source.

8.2.2 Pukekaikioire Catchment

Sediment samples collected from site PVX contained mercury concentrations of 2,900 ppb; however, water from site PVX contained extremely low levels of dissolved mercury (0.005 ppb). Site PVX is on a tributary of the Pukekaikioire Stream and has no known association with any historic mining activities, however there are outcrops of hydrothermally altered rock present. A small area of weakly mineralised rock was quarried from a location further upstream of this site for the purposes of surfacing local forestry roads (referred to as 'Hilltop Quarry' in Craw *et al.* (2002)). An outcrop of weakly mineralised rock containing elevated arsenic and mercury (known locally as 'Bill's Breccia') is located within this catchment (Craw *et al.*, 2002).

Water and sediment samples collected at site PQX, had concentrations of mercury in water and sediment of 0.024 ppb and 1,900 ppb respectively. Site PQX is located on Pukekaikioire Stream above the junction of Waikioire and Pukekaikioire Streams and is therefore not receiving discharge from the historic Puhipuhi mine processing site. This indicates that there is an additional source (or sources) of mercury within the Pukekaikioire Stream catchment upstream of the East Dam.

Mercury found at PQX may be derived from natural weathering of mineralised rock/soil and/or from weathering of such areas that have been previously disturbed through anthropogenic activities. As mentioned above, outcrops of mineralised rock are present within the Pukekaikioire catchment, some of which have undergone quarrying, prospecting and small scale mining. In addition to the 'Hilltop Quarry' mentioned above, two other outcrops of mineralised rock were quarried (for road surfacing) in the headwaters of the Pukekaikioire catchment (referred to as 'Puhipuhi Quarry' and 'Forestry Quarry' in Craw *et al.* (2002)). A water sample (collected sometime between 1994 and 1995) from standing surface water in a small pool at the Puhipuhi Quarry reported a mercury concentration of 4 ppb (NRC, 1995). Mineralised aggregate from the Forestry Quarry has been used on forestry roads within this catchment (Craw *et al.*, 2002).

Two regions of mineralised rock within the Pukekaikioire catchment have undergone prospecting and small scale mining; known as the Joffre Mine and the Rising Sun Claim. It is understood that both these mines were only briefly worked in the 1920's and only minor amounts of ore were removed. The location of these mines is shown on a map of the Puhipuhi region from 1944, which is reproduced in DOC (2011).

8.2.3 Whenuaroa Catchment

Figure 9 below shows mercury concentrations from samples collected along the Whenuaroa Stream catchment; this catchment joins the Waiariki River and flows into the Wairua River.

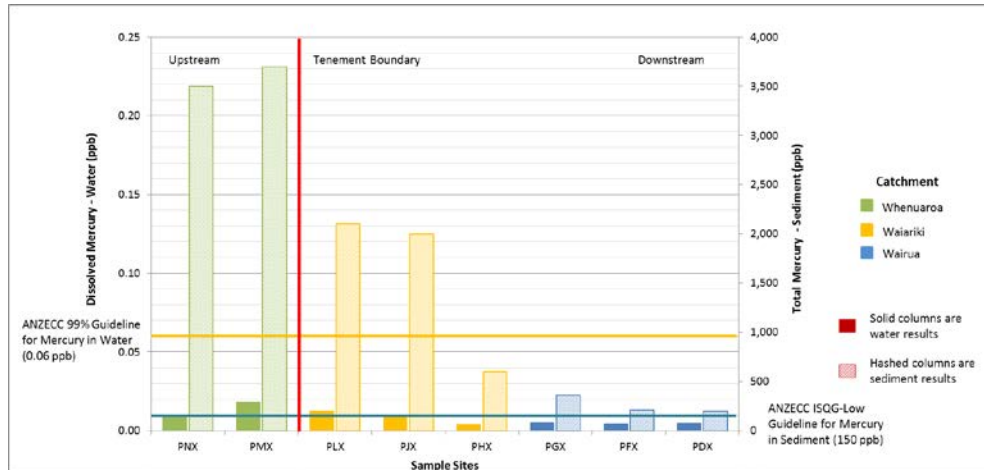


Figure 9: Mercury concentrations in surface water and sediment samples from the Whenuaroa Stream catchment

Water and sediment samples collected from PNK and PMX on the Whenuaroa Stream show evidence for a mercury source within this catchment. Both sites have similar concentrations of mercury in water samples (0.010 ppb for PNK and 0.018 ppb for PMX) and sediment samples (3,500 ppb for PNK and 3,700 ppb for PMX). No mining activities are known to have occurred upstream of these sites, therefore mercury may be being released via the weathering of mineralised rock and soils and/or through discharge of shallow groundwater containing mercury from the Purua Bed Sedimentary Aquifer. It is also possible that runoff from mineralised road aggregate has contributed some mercury (particularly in sediment) to this catchment (Craw *et al.*, 2002). Additional studies would need to be undertaken to determine the relative contribution the above sources have contributed to mercury concentrations detected in the water and sediment within this catchment.

8.2.4 Waiariki Catchment

Site POX on the eastern edge of the tenement is fed by the Waikiore and the Pukekaikore Stream. Water and sediment samples contain slightly lower mercury concentrations than samples collected further upstream on the Waikiore Stream. Mercury in these samples may be attributed to either downstream dispersion from the former mine and processing site, natural weathering of mineralised rock and soil and/or other historic anthropogenic sources discussed above.

Site PLX which is downstream of the confluence of Whenuaroa Stream and Waiariki River and just south of the tenement boundary shows a decrease in mercury concentrations in water and sediment samples.

8.2.5 Other Catchments

Sites PKX (located on the Papanui Creek south west of the tenement) and PYX (located on the Kaimamaku Stream east of the tenement) recorded total mercury concentrations in sediment of 500 ppb and 619 ppb respectively indicating a low level of impact that may be from the local geology and/or historical mining activities. The historic Mt Mitchel mercury mine and processing site is located in the hills above Papanui Creek (DOC, 2011), however, it is not known what the source concentration is of mercury in water from the historic mine site and whether the site drains west into this catchment or east into the Whenuaroa Stream.

8.2.6 Summary of Potential Sources of Mercury

The variation of mercury concentrations in water and sediment samples between different water courses and catchments suggests multiple sources of mercury within the Puhipuhi region. Previous studies have indicated natural mineralisation resulting from geothermal activity at Puhipuhi is variably distributed over a 100 m scale (White, 1986), with mercury content in rock and soil also varying widely across this area (Craw *et al.*, 2002). Weathering and run-off from mineralised rocks and soil, as well as discharge of shallow groundwater that has come in to contact with this material, would result in variable concentrations of elements over relatively small distances (< 1 km).

The localised area sources of mercury suggested by the results of this study can be summarised as follows:

- ✧ The former Puhipuhi mercury mining and processing site in the Waikiore Catchment appears to be a source of mercury, iron, and manganese as shown by elevated levels at site PUX and PSX and to a lesser extent PRX.
- ✧ An additional source (or sources) of mercury has resulted in elevated mercury levels at PVX and PQX in the Pukekaikiore catchment. This may be due to the natural weathering of mineralised rock and soil within this catchment. There is also a potential contribution of mercury from historical quarrying and mining activities and road aggregate used on forestry roads.
- ✧ There is potential for the existence of another mercury source (as yet unidentified) in a sub-tributary to the west of Waikiore Stream which has resulted in elevated levels of mercury at PTX and PWX.
- ✧ There is potential for the existence of a mercury source (as yet unidentified) within the Whenuaroa Stream based on mercury concentrations at PNX and PMX.

- ✧ The elevated concentrations of mercury within catchments that have no history of mining or mineral processing may be attributed to the natural weathering of mineralised rocks and soils within the upper areas of the catchments. Shallow groundwater sources may also be partly responsible. However, as no testing has been carried out for these sources their potential contributions to mercury in the stream waters cannot be confirmed.
- ✧ Mercury is known to be elevated in mineralised rock at Mt Mitchell, which has been prospected and quarried for cinnabar. Only a slightly elevated concentration of mercury was found in sediment collected from the Papanui Creek which has its headwaters near Mt Mitchell. Currently it is unknown if water from the historic Mt Mitchell mine drains west in to the Papanui Creek, or east in to the Whenuaroa Stream.

8.3 Bio-accessibility of Mercury in Sediment

As discussed in previous sections, methyl mercury is one of the most bio-available forms of mercury and is bio-magnified in the food chain from bacteria through to predatory fish. Results from the sediment sampling program indicate only a small fraction (< 0.08 %) of the total mercury present in the samples is in the form of methyl mercury. Further assessment of the potential bio-accessibility of mercury in the sediment samples (in the form of AVS/SEM extraction and leachability testing via SPLP and TCLP tests) indicates mercury in the sediments is relatively insoluble. However, although the AVS/SEM test was designed to predict situations in which toxicity should not occur to organisms dwelling in the sediment, it is important to remember that the AVS/SEM test was not developed to predict an absence of bio-accumulation.

An assessment of risk to human health from the dietary uptake of mercury from the consumption of eels, crayfish and shellfish collected from streams and rivers within the exploration tenement, and at a number of selected sites in the Wairua River and Kaipara Harbour, is presented in the Aquatic Organism Sampling report (PDP, 2016c).

9.0 Summary and Conclusions

The surface water mercury values reported by PDP are within the range of concentrations found in two recent studies: Gionfriddo *et al.* (2015) and a Northland Regional Council study carried out in partnership with Ngati Hau between 2013 and 2014 (NRC, 2015). The most recent studies (PDP (2016), Gionfriddo *et al.* (2015) and NRC (2015)) reported mercury concentrations that are lower than those reported in an early study by Hoggins and Brooks (1973).

The surface water related findings of this report are summarised as follows:

- ✧ No samples exceeded the human health based maximum acceptable values in the New Zealand Drinking Water Standards;

- ✧ The concentrations of iron in surface water samples within the tenement were slightly elevated and exceeded guideline values for aesthetic determinants within the NZ Drinking Water Standards at most of the sites sampled. Therefore the water within the tenement may have an unpleasant metallic taste and may stain laundry. The elevated iron concentrations within the surface water are not a health concern because of the low toxicity of iron to humans⁴;
- ✧ Concentrations of total iron were elevated in all but one sample and exceeded ANZECC (2000) contact recreational guidelines. Manganese and ammoniacal-nitrogen were elevated in several locations above ANZECC (2000) Contact Recreational standards;
- ✧ The concentration of all other inorganic elements meets human drinking water, livestock and contact recreational standards;
- ✧ Two surface water samples exceeded ANZECC (2000) dissolved mercury concentration trigger values for 99% ecosystem protection. Dissolved mercury concentrations at sample location PUX located immediately adjacent to the historic mercury processing site were 0.236 ppb. At PSX, approximately 1 km downstream from PUX, dissolved mercury levels were 0.1 ppb. Mercury concentrations decrease significantly at sites downstream from PSX, which suggests that the historic mine site/processing site area is a point source of dissolved mercury in water within the Waiariki catchment;
- ✧ The concentration of dissolved and total mercury rapidly decreases to below the trigger level of 0.06 ppb for 99% ecosystem protection within 1.2 kilometres of the historic mercury processing site. It appears that levels of mercury in surface water within the tenement boundary may be derived from weathering of mineralised rock and soil or potentially shallow groundwater, although the historic mercury processing site and mine/dam area are also recognised as a point source of mercury in water;
- ✧ Dissolved zinc and copper concentrations were marginally above the ANZECC (2000) trigger value for 95% ecosystem protection at sites PDX, PQX, PRX, PSX, and PVX. Zinc and copper concentrations were below ANZECC (2000) 95% ecosystem trigger values at PUX immediately below the mercury processing site but were elevated at sampling sites PRX and PSX further downstream; and
- ✧ Concentrations of all other inorganic elements are below ANZECC (2000) 95% ecosystem trigger values.

⁴ Iron is an essential element for humans and insufficient amounts of iron can result in severe fatigue, body weakness, and other related health ailments.

The sediment mercury values reported by PDP are similar to the concentrations found by two previous studies: a Northland Regional Council study carried out in partnership with Ngati Hau between 2013-2014 (NRC, 2015) and the study carried out by Hoggins and Brooks in 1973 (Hoggins and Brooks, 1973). The sediment related findings are summarised as follows:

- ✧ All samples except one (PDX) exceeded the ANZECC ISQG-low range trigger values for one or more inorganic elements.
- ✧ Thirteen sites (out of nineteen) exceeded the ANZECC ISQG-high sediment trigger values for one or more inorganic elements. The elements concerned were:
 - Antimony;
 - Arsenic; and
 - Mercury.
- ✧ The ANZECC ISQG-high guideline values for mercury in sediment were exceeded at all measurement locations within the tenement and at two sites outside the tenement.
- ✧ The ANZECC ISQG-low guideline values for mercury in sediment were exceeded at all measurement locations within the tenement and at seven sites outside the tenement.
- ✧ Concentrations of mercury in sediment samples were greatest in the Waikiore Stream catchment where the historic Puhipuhi mercury mine site is located.
- ✧ Concentrations of arsenic and antimony in sediment samples were greatest in the Pukekaikio Stream catchment (sample location PVX) and do not appear to show a relationship with the historic Puhipuhi mine site. These elements may be related to the presence of mineralised rock in this area.
- ✧ The concentrations of the elements show an overall trend of reducing as the distance down the catchment increases.
- ✧ At five (out of 14) sample locations, AVS/SEM analysis indicated that the mercury present in the sediment is most likely in an insoluble, metal-sulfide form that is not bio-available. It is not possible to predict what form the majority of the mercury is in with these results.
- ✧ Leachability testing via SPLP indicated that the mercury in the sediment is not particularly soluble reducing its potential to bio-accumulate in organisms residing in sediments.
- ✧ Only a small fraction (< 0.8%) of the total mercury measured in the sediment samples is in the form of methyl mercury, one of the most toxic forms of mercury.

- ✧ The Pukekaikio Stream catchment shows elevated concentrations (compared to other samples) of mercury in sediment samples, possibly related to natural weathering of mineralised rock in the headwaters of this catchment, some areas of which have been historically quarried and mined.
- ✧ The Whenuaroa Stream catchment shows elevated concentrations (compared to other samples) of mercury, arsenic and antimony despite not being associated with any known historic mining activities.

9.1 Potential Sources of Mercury

For this study water samples for mercury analysis were sent to a USA laboratory that is accredited to detect mercury in water to levels as low as 0.0005 ppb. These very low concentration analytical techniques have been used to measure mercury concentrations at locations where mercury was undetectable in previous studies. This data has allowed dispersion patterns and potential point sources to be investigated.

Comparison of mercury concentrations in water and sediment samples between different streams and catchments shows a relatively high degree of variation and points to multiple sources of mercury within the Puhipuhi region.

The inorganic localised area sources of mercury suggested by the results of this study can be summarised as follows:

- ✧ The former Puhipuhi mercury mining and processing site appears to be a source of mercury, iron, and manganese.
- ✧ Natural weathering of mineralised rock and soil containing elevated concentrations of mercury.
- ✧ An additional source (or sources) of mercury has resulted in elevated mercury levels in the Pukekaikio catchment. This is probably resulting from the natural weathering of mineralised rock and soil within this catchment. There is also a potential contribution of mercury from historical quarrying and mining activities.
- ✧ There is potential for another mercury source which has resulted in elevated levels of mercury in a sub-tributary to the west of Waikio Stream.
- ✧ There is evidence for a mercury source within the Whenuaroa Stream based on mercury concentrations at PNX and PMX.

Discharge of shallow groundwater from the Purua Bed Sedimentary Aquifer may be a source of mercury. Testing of shallow groundwater from this aquifer would be required to confirm this.

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Appendix A

Water and Sediment Sampling and
Analysis Plan

Appendix A: Water and Sediment Sampling and Analysis Plan

Water and sediment samples were collected in accordance with the PDP Surface Water and Sediment Sampling and Analysis Plan, 2016 (PDP, 2016b). This document set out the proposed sample methodology, addressed contaminants of concern, detailed QA/QC field procedures

The following is a summary of this document:

To avoid water sample contamination PDP undertook the following steps:

1. PDP field staff wore disposable Tyvek suits and gloves (certified metal free for ultra-trace metal analysis) which were changed at each monitoring site or whenever the PPE got visually contaminated.
2. Water samples were collected upstream of field staff and water samples were collected before any other samples (sediment or biota) were collected at each site.
3. US EPA method 1669 was utilised to collect water samples at each sampling location. Dedicated sampling lines and inline filters were used at each sampling location and had been cleaned and certified by Eurofins Global Frontiers laboratory.
4. The water samples were collected in the main flow of the stream, upstream of the sampler, and care was taken not to disturb any of the sediment at the bottom of the stream during sampling.
5. Where the stream depth was greater than 0.3 m water samples were collected at least 0.1 m from the top and bottom of the stream.

Sediment samples were collected using either Wildco handcorers (for soft to medium firmness sediments in shallow wadeable waters) and/or Ogeechee corers (for soft to firm sediments).

The upper 50 mm of the cores collected at each of the sampling locations were sub-sectioned and sent to the analytical laboratory.

To avoid contamination of sediment samples and to ensure a consistent sampling methodology, PDP undertook the following procedures:

- ✧ Decontaminate all sampling equipment prior to arriving on-site using triple rinse procedures detailed in the sampling and analysis plan; and
- ✧ The use of single use core liners, core catchers, and plastic core cutters at each site.

Order of Sampling

Samples were collected in a specific order to minimise the potential for cross contamination of samples from earlier sampling events. Downstream, potentially

less elevated samples were collected before upstream (potentially more highly elevated) samples.

At each monitoring site, water samples were collected before any field measurements, sediment sampling, flow monitoring and ecological sampling was undertaken to prevent disturbance of the water quality. Sediment sampling, flow monitoring, and ecological sampling were conducted after the physiochemical measurements were completed.

Variation from Sampling and Analysis Plan

The following variations were noted from the sampling and analysis plan:

- ✧ Sampling location PCX was not sampled for surface water due to health and safety reasons (thick mud on the banks which potentially could have entrapped staff and contaminated sampling equipment).
- ✧ Sampling locations PIX and PPX were not sampled as land owner permission could not be obtained within the timeframe of the survey.
- ✧ Due to the width of the waterway at sampling locations PDX, PFX, PGX, PHX, PJX, PLX and PYX samples could not be collected from the mid-stream location. At these sampling locations water samples were collected approximately 2 m from the bank within the main stream flow.
- ✧ Sampling location PNX was sampled after the upstream sampling sites PUX, PSX, PTX, PWX and PRX because there was a delay in obtaining landowner permission.

Water Sample Laboratory Parameters

Water quality samples were collected and stored in the appropriate sample bottles (as outlined in the Sampling and Analysis Plan), which had been supplied by the analysing laboratory. Each sample bottle was uniquely identified in accordance with PDP chain of custody and sampling labelling procedure.

After collection, the water samples were sent under standard PDP chain of custody documentation to the appropriate laboratories as soon as possible. This was to ensure the laboratories received the samples within the required hold times and to ensure sample integrity was maintained.

Water samples from each of the monitoring sites were analysed by the selected laboratory for the following parameters:

- ✧ pH and Electrical Conductivity (EC);
- ✧ Hardness;
- ✧ Major dissolved ions: magnesium, potassium, sodium, calcium, chlorine, sulphate, alkalinity;

- ✧ Dissolved Nutrients: nitrate, nitrite, ammoniacal-nitrogen;
- ✧ Dissolved and total metals/metalloids including antimony (Sb), arsenic (As), boron (B), cadmium (Cd), Cobalt (Co), chromium (Cr), copper (Cu), iron (Fe), lead (Pb), nickel (Ni), thallium (Tl) and zinc (Zn) using US EPA method 200.2;
- ✧ Total and dissolved mercury using US EPA method 1631.

The laboratory pH determinations are considered reliable and should be used in preference to the field pH data.

Sediment Sample Laboratory Parameters

Sediment samples were analysed by Eurofins Australia and Eurofins Frontier Global Science (for mercury analysis and speciation) for the following parameters:

- ✧ Total Recoverable Metals/metalloids including antimony (Sb), arsenic (As), Boron (B), cadmium (Cd), Cobalt (Co), chromium (Cr), copper (Cu), iron (Fe), lead (Pb), nickel (Ni), thallium (Tl) and zinc (Zn) using US EPA method 200.2;
- ✧ Total mercury using US EPA method 1631;
- ✧ AVS/SEM analysis to determine the amount of mercury associated with the sulphide fraction, and if required;
- ✧ Mercury Selective Sequential Extraction at Eurofins Frontier Global Science.

All analyses will be undertaken on the less than 2 mm fraction of sediments and analysis of metals. All sub-samples will be sent to the laboratory and the compositing of all samples will be undertaken by the laboratory.

All samples should be stored into an ice-cool chilly bin once samples have been collected and frozen (using dry ice) as soon as possible⁵. Freezing of samples is necessary to prevent biological process changing the speciation of the samples.

⁵ Within 12 hours of sample collection

Appendix B

Tabulated Surface Water Sample
Results

Tabulated Surface

Table B-1: Water Quality Laboratory Results ¹

Sample ID		PDW01/02	PFW01/02	PGW01/02	PHW01/02	PJW01/02	PKW01/02	PLW01/02	PMW01/02	PNW01/02	New Zealand Drinking Water Standards ²	ANZECC Water Quality Guidelines 95% Protection ^{3, 4a}	ANZECC Water Quality Guidelines 99% Protection ^{3, 4b}	ANZECC Water Quality Guidelines - Livestock Drinking Water Quality ⁵	ANZECC Water Quality Guidelines - Contact Recreational ³
Sample Site Location		PDX	PFX	PGX	PHX	PJX	PKX	PLX	PMX	PNX					
Eurofins Laboratory ID		M16-Ap02182	M16-Ap02184	M16-Ap02186	M16-Ap02188	M16-Ap02190	M16-Ap02192	M16-Ap02194	M16-Ap02197	M16-Ap02200					
Sampling Date		8-Mar-16	8-Mar-16	9-Mar-16	9-Mar-16	10-Mar-16	10-Mar-16	10-Mar-16	11-Mar-16	13-Mar-16					
Sampling Time (approximate)		15:00	17:00	9:00	16:00	8:00	11:45	14:30	16:00	13:00		Freshwater	Freshwater		
Field Parameters															
pH	pH units	7.39	6.88	6.8	6.87	6.14	6.58	6.07	6.19	6.13	7.0-8.5	-	-	-	5.0-9.0
ORP	mV	235.7	231.3	189.2	176.1	241.8	186.3	238.2	274.3	232	-	-	-	-	-
Dissolved Oxygen (DO)	mg/L	9.21	7.53	5.64	7.49	8.69	9.85	9.58	8.3	9.82	-	-	-	-	-
DO (% Saturation)	% saturation	105.4	80.8	62.1	83.3	92.4	99.5	105.4	89.2	101.3	-	-	-	-	-
Conductivity (at 25°C)	µS/cm	132.6	116.9	112.8	103.5	69.9	76.9	67.4	76.9	73.8	-	-	-	-	-
Turbidity	NTU	358.4	302.8	307	9.5	4.2	4.9	3.4	5	3.6	-	-	-	-	-
Temperature	°C	21.9	21.3	20.2	20.6	18.3	15.9	20	18.9	16.8					
Laboratory Parameters															
Conductivity (at 25°C)	µS/cm	140	120	120	110	75	83	73	81	78	-	-	-	-	-
pH	pH units	6.9	6.8	6.8	6.7	6.4	6.6	6.2	6.5	6.4	7.0-8.5	-	-	-	5.0-9.0
Phosphorus filterable reactive (as P)	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	-	-	-
Chloride	mg/L	17	17	16	16	13	15	13	14	17	250 ^{6a, b}	-	-	-	-
Sulphate (as S)	mg/L	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	250 ^{6a}	-	-	1000	400
Alkali Metals															
Calcium	mg/L	9.8	8.1	7.2	6.7	2.3	2.2	2.2	2.8	2.2	-	-	-	1000	-
Magnesium	mg/L	2.6	2.3	2.2	1.8	1.4	1.4	1.4	1.4	1.5	-	-	-	ID	-
Potassium	mg/L	2.1	1.4	1.3	1.3	0.7	0.7	0.7	0.7	< 0.5	-	-	-	-	-
Sodium	mg/L	15	13	13	13	11	12	10	10	10	200 ^{6a}	-	-	-	300
Alkalinity (speciated)															
Bicarbonate Alkalinity (as CaCO3)	mg/L	22	22	23	20	< 20	< 20	< 20	< 20	< 20	-	-	-	-	-
Carbonate Alkalinity (as CaCO3)	mg/L	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	-	-	-	-	-
Inorganic Elements															
Total Antimony	mg/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.02	ID	ID	-	-
Dissolved Antimony	mg/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	-	-	-	-	-
Total Arsenic	mg/L	0.001	< 0.001	< 0.001	< 0.001	0.002	0.003	0.003	0.007	0.002	0.01	-	-	0.5 up to 5 ⁸	0.05
Dissolved Arsenic	mg/L	0.001	0.001	< 0.001	< 0.001	0.001	0.002	0.002	0.006	0.002	-	0.013 ⁹	0.0008 ⁹	-	-
Total Boron	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	1.4 ¹⁰	-	-	5	1
Dissolved Boron	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	0.37 ¹¹	0.09	-	-
Total Cadmium	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.004	-	-	0.01	0.005
Dissolved Cadmium	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	-	0.0002	0.00006	-	-
Total Chromium	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.05 ¹²	-	-	1	0.05
Dissolved Chromium	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	0.001 ^{7, 11}	0.00001 ⁷	-	-
Total Cobalt	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	1	-
Dissolved Cobalt	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	ID	ID	-	-
Total Copper	mg/L	0.002	0.001	0.001	< 0.001	0.001	< 0.001	0.002	< 0.001	< 0.001	2	-	-	0.4 (sheep); 1 (cattle)	1
Dissolved Copper	mg/L	0.002	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	0.0014	0.001	-	-
Total Iron	mg/L	0.94	0.96	1.1	0.92	0.79	0.53	0.89	0.86	0.31	0.2 ^{6c}	-	-	NST	0.3
Dissolved Iron	mg/L	0.73	0.75	0.82	0.54	0.42	0.31	0.5	0.62	0.2	-	ID	ID	-	-
Total Lead	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.01	-	-	0.1	0.05
Dissolved Lead	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	0.0034	0.001	-	-
Total Manganese	mg/L	0.023	0.028	0.044	0.034	0.024	0.029	0.021	0.029	0.02	0.4	-	-	NST	0.1
Dissolved Manganese	mg/L	0.021	0.027	0.044	0.035	0.022	0.029	0.018	0.027	0.02	-	1.9 ¹¹	1.2	-	-
Total Mercury ¹⁷	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.007 ¹³	-	-	0.002	0.001
Dissolved Mercury ¹⁷	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	-	0.0006 ¹³	0.00006 ¹³	-	-
Total Mercury ¹⁸	mg/L	0.00000487	0.00000495	0.00000568	0.00000497	0.000011	0.00000941	0.0000154	0.0000171	0.0000146	0.007 ¹³	-	-	0.002	0.001
Dissolved Mercury ¹⁸	mg/L	0.00000475	0.00000427	0.00000515	0.00000399	0.00000873	0.00000731	0.0000126	0.0000181	0.0000098	-	0.0006 ¹³	0.00006 ¹³	-	-
Total Mercury ¹⁸	ng/L	4.87	4.95	5.68	4.97	11	9.41	15.4	17.1	14.6	7000 ¹³	-	-	2000	1000
Dissolved Mercury ¹⁸	ng/L	4.75	4.27	5.15	3.99	8.73	7.31	12.6	18.1	9.8	-	600 ¹³	60 ¹³	-	-
Total Nickel	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	< 0.001	0.08	-	-	1	0.1
Dissolved Nickel	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	0.011	0.008	-	-
Total Thallium	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	-
Dissolved Thallium	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	ID	ID	-	-
Total Zinc	mg/L	0.007	0.007	0.007	0.006	0.006	0.006	0.008	0.009	0.007	1.5 ^{6a}	-	-	20	5
Dissolved Zinc	mg/L	0.008	0.006	0.007	0.005	0.005	0.006	0.007	0.007	0.006	-	0.008 ¹¹	0.0024	-	-
Nitrogen Species															
Ammonia (as N)	mg/L	0.02	< 0.01	< 0.01	0.02	0.03	< 0.01	0.03	0.37	< 0.01	1.5 ^{6d}	0.9 ^{11, 14}	0.32 ¹⁴	-	0.01
Ammonium Ion (as N)	mg/L	0.02	< 0.01	< 0.01	0.02	0.03	< 0.01	0.03	0.40	< 0.01	-	-	-	-	-
Nitrate (as N)	mg/L	0.41	0.27	0.23	0.20	0.57	0.29	0.47	0.37	0.54	50 ¹⁵	-	-	90 ¹⁷	10

Notes:

1. All results in mg/L unless otherwise stated.
2. Maximum Acceptable Values (MAV) from Tables 2.1 and 2.2, Guideline Values for aesthetic determinands from Table 2.5 of the *Drinking-water Standards for New Zealand 2005 (Revised 2008)* (Ministry of Health, 2008).
3. Criteria from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Environment and Conservation Council (ANZECC, 2000).
- 4a. ANZECC (2000) trigger values for protection of 95% of aquatic species. Applicable guideline values for surface water.
- 4b. ANZECC (2000) trigger values for protection of 99% of aquatic species. Applicable guideline values for surface water.
5. ANZECC (2000) trigger values (low risk) for livestock drinking water.
6. Guideline value only, for the following aesthetic qualities: a - taste, b - corrosion, c - staining of laundry and snitary ware, d -odour.
7. Trigger Value is for Chromium VI.
8. May be tolerated if not provided as a food additive and natural levels in the diet are low.
9. Trigger value is for AsV.
10. The WHO guideline value (provisional) is 0.5 mg/L.
11. Trigger value may not protect key test species from chronic toxicity.
12. MAV is for total chromium. Limited information on health effects.
13. Trigger value is for inorganic mercury.
14. Value varies with pH, see table 8.3.7 in ANZECC guidelines 2000.
15. The short-term exposure MAVs for nitrate and nitrite have been established to protect against methaemoglobinaemia in bottle-fed infants.
16. Trigger values derived from Nitrate guideline values, conversion is required for Nitrate-N.
17. Mercury determined by ICP-MS (with a detection limit of 0.00001 mg/L or 100 ng/L)
18. Mercury determined by purge and trap CV-AFS (with a detection limit of 0.000 000 5 mg/L or 0.5 ng/L)

ID	Insufficient data to derive a reliable trigger value (ANZECC, 2000).
NST	Not sufficiently toxic.
0.01	Value equals or exceeds ANZECC (2000) Trigger Values for Protection of Freshwater Species (95%).
0.01	Value equals or exceeds ANZECC (2000) Trigger Values for Protection of Freshwater Species (99%).
105	Value equals or exceeds ANZECC (2000) Trigger Values for Recreational Contact.
3.6	Value equals or exceeds ANZECC (2000) Trigger Values for Livestock.
3.6	Sample result exceeds the Maximum Acceptable Value from the NZ Drinking Water Standards.
0.2	Sample result exceeds the Guideline Value for aesthetic determinands from the NZ Drinking Water Standards.

Table B-1: Water Quality Laboratory Results - continued ¹

Sample ID		POW01/02	PQW-1/-2	PRW-1/-2	PSW-1/-2	PTW-1/-2	PUW-1/-2	PVW-1/-2	PWW-1/-2	PYW-1/-2	New Zealand Drinking Water Standards ²	ANZECC Water Quality Guidelines 95% Protection ^{3, 4a}	ANZECC Water Quality Guidelines 99% Protection ^{3, 4b}	ANZECC Water Quality Guidelines - Livestock Drinking Water Quality ⁵	ANZECC Water Quality Guidelines - Contact Recreational ³
Sample Site Location		POX	PQX	PRX	PSX	PTX	PUX	PVX	PWX	PYX					
Eurofins Laboratory ID		M16-Ap02202 M16-Ap02203	M16-Ap02206 M16-Ap02207	M16-Ap02208 M16-Ap02209	M16-Ap02210 M16-Ap02211	M16-Ap02212 M16-Ap02213	M16-Ap02214 M16-Ap02215	M16-Ap02216 M16-Ap02217	M16-Ap02218 M16-Ap02219	M16-Ap02220 M16-Ap02221					
Sampling Date		11-Mar-16	11-Mar-16	12-Mar-16	12-Mar-16	12-Mar-16	13-Mar-16	11-Mar-16	12-Mar-16	10-Mar-16					
Sampling Time (approximate)		7:45	13:30	15:45	15:30	9:00	9:30	15:45	11:00	16:00					
Field Parameters															
pH	pH units	6.39	6.36	5.17	4.27	6.21	6.78	4.74	6.27	6.47	7.0-8.5	-	-	-	5.0-9.0
ORP	mV	346	259.7	374	457	259	66.7	407	336	384	-	-	-	-	-
Dissolved Oxygen (DO)	mg/L	8.23	9.37	9.85	9.78	9.91	3.23	8.49	9.99	9.61	-	-	-	-	-
DO (% Saturation)	% saturation	89.5	104.7	100.7	100	100.2	32.8	87.1	101.5	105.2	-	-	-	-	-
Conductivity (at 25°C)	µS/cm	66.8	62.6	69.3	83.4	68.6	129.4	68.2	68.3	51.4	-	-	-	-	-
Turbidity	NTU	3.3	4.5	6.6	4.5	6.9	4.9	3.2	7.8	4.5	-	-	-	-	-
Temperature	°C	19.4	20.8	16.4	16.4	15.9	16.1	16.6	16.1	19.8	-	-	-	-	-
Laboratory Parameters															
Conductivity (at 25°C)	µS/cm	70	65	71	79	71	76	79	70	72	-	-	-	-	-
pH	pH units	6.3	5.7	4.8	6.1	6.3	5.1	4.5	6.4	6.7	7.0-8.5	-	-	-	5.0-9.0
Phosphorus filterable reactive (as P)	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	-	-	-
Chloride	mg/L	13	15	15	16	14	15	15	13	13	250 ^{6a, b}	-	-	-	-
Sulphate (as S)	mg/L	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	250 ^{6a}	-	-	1000	400
Alkali Metals															
Calcium	mg/L	1.9	1.5	1.7	1.0	2.3	2.0	1.1	2.4	1.6	-	-	-	1000	-
Magnesium	mg/L	1.4	1.3	1.4	1.3	1.5	1.6	1.4	1.5	1.5	-	-	-	ID	-
Potassium	mg/L	0.8	0.9	0.7	0.7	0.7	0.7	0.9	0.7	0.9	-	-	-	-	-
Sodium	mg/L	9.6	9.6	9.5	10	7.6	6.4	8.1	7.4	8.2	200 ^{6a}	-	-	-	300
Alkalinity (speciated)															
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	-	-	-	-	-
Carbonate Alkalinity (as CaCO3)	mg/L	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	-	-	-	-	-
Heavy Metals															
Total Antimony	mg/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.02	ID	ID	-	-
Dissolved Antimony	mg/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	-	-	-	-	-
Total Arsenic	mg/L	0.002	0.002	0.001	< 0.001	< 0.001	< 0.001	0.002	< 0.001	< 0.001	0.01	-	-	0.5 up to 5 ⁸	0.05
Dissolved Arsenic	mg/L	0.002	0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002	< 0.001	< 0.001	-	0.013 ⁹	0.0008 ⁹	-	-
Total Boron	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	1.4 ¹⁰	-	-	5	1
Dissolved Boron	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	0.37 ¹¹	0.09	-	-
Total Cadmium	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.004	-	-	0.01	0.005
Dissolved Cadmium	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	-	0.0002	0.00006	-	-
Total Chromium	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.05 ¹²	-	-	1	0.05
Dissolved Chromium	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	0.001 ^{7, 11}	0.00001 ⁷	-	-
Total Cobalt	mg/L	< 0.001	< 0.001	0.002	0.004	< 0.001	0.004	0.002	< 0.001	< 0.001	-	-	-	1	-
Dissolved Cobalt	mg/L	< 0.001	< 0.001	0.002	0.004	< 0.001	0.004	0.002	< 0.001	< 0.001	-	ID	ID	-	-
Total Copper	mg/L	0.002	0.002	0.002	0.003	< 0.001	0.003	0.006	< 0.001	< 0.001	2	-	-	0.4 (sheep); 1 (cattle)	1
Dissolved Copper	mg/L	0.001	0.002	0.002	0.003	< 0.001	< 0.001	0.006	< 0.001	< 0.001	-	0.0014	0.001	-	-
Total Iron	mg/L	0.94	0.78	0.84	2.2	0.5	23	0.37	0.59	0.16	0.2 ^{6c}	-	-	NST	0.3
Dissolved Iron	mg/L	0.64	0.55	0.45	1.7	0.36	22	0.29	0.40	< 0.05	-	ID	ID	-	-
Total Lead	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.01	-	-	0.1	0.05
Dissolved Lead	mg/L	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	0.0034	0.001	-	-
Total Manganese	mg/L	0.025	0.031	0.072	0.14	0.014	0.30	0.16	0.013	0.007	0.4	-	-	NST	0.1
Dissolved Manganese	mg/L	0.024	0.031	0.063	0.14	0.012	0.31	0.16	0.012	0.006	-	1.9 ¹¹	1.2	-	-
Total Mercury ¹⁷	mg/L	< 0.0001	< 0.0001	< 0.0001	0.0001	< 0.0001	0.0003	< 0.0001	< 0.0001	< 0.0001	0.007 ¹³	-	-	0.002	0.001
Dissolved Mercury ¹⁷	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0002	< 0.0001	< 0.0001	< 0.0001	-	0.0006 ¹³	0.00006 ¹³	-	-
Total Mercury ¹⁸	mg/L	0.0000196	0.0000305	0.0000551	0.000112	0.0000475	0.000277	0.00000729	0.0000415	0.00000329	0.007 ¹³	-	-	0.002	0.001
Dissolved Mercury ¹⁸	mg/L	0.0000155	0.0000238	0.0000371	0.0001	0.0000419	0.000236	0.00000478	0.0000278	0.00000195	-	0.0006 ¹³	0.00006 ¹³	-	-
Total Mercury ¹⁸	ng/L	19.6	30.5	55.1	112	47.5	277	7.29	41.5	3.29	7000 ¹³	-	-	2000	1000
Dissolved Mercury ¹⁸	ng/L	15.5	23.8	37.1	100	41.9	236	4.78	27.8	1.95	-	600 ¹³	60 ¹³	-	-
Total Nickel	mg/L	< 0.001	< 0.001	0.002	0.004	< 0.001	0.004	0.003	< 0.001	< 0.001	0.08	-	-	1	0.1
Dissolved Nickel	mg/L	< 0.001	< 0.001	0.002	0.003	< 0.001	0.003	0.002	< 0.001	< 0.001	-	0.011	0.008	-	-
Total Thallium	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	-
Dissolved Thallium	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	ID	ID	-	-
Total Zinc	mg/L	0.008	0.009	0.013	0.016	0.007	0.007	0.018	0.007	0.006	1.5 ^{6a}	-	-	20	5
Dissolved Zinc	mg/L	0.007	0.009	0.011	0.016	0.006	0.006	0.017	0.006	0.005	-	0.008 ¹¹	0.0024	-	-
Nitrogen Species															
Ammonia (as N)	mg/L	0.04	0.05	< 0.01	0.02	< 0.01	0.25	< 0.01	< 0.01	< 0.01	1.5 ^{6d}	0.9 ^{11, 14}	0.32 ¹⁴	-	0.01
Ammonium Ion (as N)	mg/L	0.05	0.05	< 0.01	0.02	< 0.01	0.27	< 0.01	< 0.01	< 0.01	-	-	-	-	-
Nitrate (as N)	mg/L	0.42	0.20	0.41	0.30	0.81	< 0.02	0.12	0.75	0.14	50 ¹⁵	-	-	90 ¹⁷	10

Notes:

1. All results in mg/L unless otherwise stated.
2. Maximum Acceptable Values (MAV) from Tables 2.1 and 2.2, Guideline Values for aesthetic determinands from Table 2.5 of the *Drinking-water Standards for New Zealand 2005 (Revised 2008)* (Ministry of Health, 2008).
3. Criteria from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Environment and Conservation Council (ANZECC, 2000).
- 4a. ANZECC (2000) trigger values for protection of 95% of aquatic species. Applicable guideline values for surface water.
- 4b. ANZECC (2000) trigger values for protection of 99% of aquatic species. Applicable guideline values for surface water.
5. ANZECC (2000) trigger values (low risk) for livestock drinking water.
6. Guideline value only, for the following aesthetic qualities: a - taste, b - corrosion, c - staining of laundry and snitary ware, d -odour.
7. Trigger Value is for Chromium VI.
8. May be tolerated if not provided as a food additive and natural levels in the diet are low.
9. Trigger value is for AsV.
10. The WHO guideline value (provisional) is 0.5 mg/L.
11. Trigger value may not protect key test species from chronic toxicity.
12. MAV is for total chromium. Limited information on health effects.
13. Trigger value is for inorganic mercury.
14. Value varies with pH, see table 8.3.7 in ANZECC guidelines 2000.
15. The short-term exposure MAVs for nitrate and nitrite have been established to protect against methaemoglobinaemia in bottle-fed infants.
16. Trigger values derived from Nitrate guideline values, conversion is required for Nitrate-N.
17. Mercury determined by ICP-MS (with a detection limit of 0.00001 mg/L or 100 ng/L)
18. Mercury determined by purge and trap CV-AFS (with a detection limit of 0.000 000 5 mg/L or 0.5 ng/L)

ID	Insufficient data to derive a reliable trigger value (ANZECC, 2000).
NST	Not sufficiently toxic.
0.01	Value equals or exceeds ANZECC (2000) Trigger Values for Protection of Freshwater Species (95%).
0.01	Value equals or exceeds ANZECC (2000) Trigger Values for Protection of Freshwater Species (99%).
105	Value equals or exceeds ANZECC (2000) Trigger Values for Recreational Contact.
3.6	Value equals or exceeds ANZECC (2000) Trigger Values for Livestock.
3.6	Sample result exceeds the Maximum Acceptable Value from the NZ Drinking Water Standards.
0.2	Sample result exceeds the Guideline Value for aesthetic determinands from the NZ Drinking Water Standards.

Appendix C

Surface Water Data Quality Evaluation
(QA/QC)

Appendix C: Surface Water Data Quality Evaluation (QA/QC)

Quality Assurance/Quality Control procedures that were followed are detailed below:

- ✧ Field conditions (weather, flow, etc.), station locations, sampling method and handling and storage methods, date, time and identity of the sampler have been noted.
- ✧ Duplicate samples were collected at a rate of one per 10 samples.
- ✧ Field blank a rate of one per 20 samples.
- ✧ An NAFA and ISO/IEC 17025 accredited laboratory (or the equivalent of IANZ) was used for all chemical analysis.

Water Quality Sampling

Quality assurance and quality control (QA/QC) samples (duplicates, field blanks and filter blanks) were collected as part of the monitoring programme. The data quality objectives of the QA/QC monitoring undertaken as part of this project are presented in **Table C-1** below and the analytical results of the QA/QC testing are presented in **Table C-2** and **Table C-3**.

Table C-1: Data Quality Objectives		
Parameter	DQO	Proposed Action
Anion/Cation Balance		
✧ 0-3.0 meq/L	±0.2 meq/L	Check with Lab., identify if missing parameter or lab error.
✧ 3.0-10.0 meq/L	± 2%	Check with Lab., identify if missing parameter or lab error.
✧ 10.0 - 80.0 meq/L	± 5%	Check with Lab., identify if missing parameter or lab error.
Calculated Total Dissolved Solids versus measured EC	0.55 to 0.7	Check with Lab., identify if missing parameter or lab error.
Field pH versus Lab pH	±0.5 pH units	Check with lab if precipitation of iron has occurred.
Field Conductivity versus Lab Conductivity	± 20%	Check calibration of instruments and if precipitation of iron has occurred.
Calculated Total Dissolved Solids versus measured EC	0.55 to 0.7	Check with Lab., identify if missing parameter or lab error.

Table C-1: Data Quality Objectives		
Parameter	DQO	Proposed Action
Split/Duplicate Analysis		
Results more than 10 x Detection Limit (DL) and results are greater than 0.1 ppb	± 30%	Check with lab and re-analyse if necessary.
Results more than 5 x DL but less than 10 x DL or results between 1 x e ⁻⁰⁶ g/m ³ (1 ppt) to 0.0001 g/m ³ (1 ppb)	± 50%	Check with lab and re-analyse if necessary.
Results less than 5 x DL	± 100%	Check with lab and re-analyse if necessary.
General Results Check		
Check if dissolved metal concentration is equal or less than Total metal Concentrations	Check with lab and re-analyse if necessary.	
Note:		
1. Based Upon American Public Health Association (APHA) and Contaminated Land Management Guideline Number 5 (CLMG#5) Recommendations (MfE, 2004)		

Technical Sampling Issues

A field blank collected at sampling location PLX was found to contain trace levels of dissolved and total zinc (5 ppb) and nitrate-N (150 ppb). Leaching of low levels of zinc from HDPE sample containers is a known issue which can affect some HDPE bottles, particularly if the samples bottles contain acid sample preservatives. PDP believes that this is the most likely cause for the trace amounts of zinc being detected in the field blank. The reasons are:

1. A similar level of zinc was detected in the field blank of PDP's groundwater monitoring programme. The elevated zinc cannot be attributed to the water used for the blank samples, or to sampling techniques, for the reasons below:
 - a. A different source of Type 1 water was used in the field blanks for groundwater vs surface water sampling programmes (the Type 1 water used in the surface water sampling programme was sourced from Eurofins Global Frontiers in Seattle).
 - b. Different sampling techniques and sampling personnel were used in the two different sampling projects.
 - c. Different types of gloves were used when handling samples (Metal free clean room type 100 gloves were supplied to PDP from Eurofins Global Frontiers in Seattle for doing trace analysis sampling).

Note: The field blank container for ultra-trace mercury was broken during transit to the USA and could not be analysed.

The source of the nitrate within the field blank has not been identified.

All other QA/QC samples meet the data quality objectives outlined in **Table C-1** above.

Table C-2: Water Quality Control/Quality Assurance Samples ¹

Sample ID	PMW01	PMW03	% RPD ²	POW01	POW-3	% RPD ²	PUW01	PUW-3	% RPD ²	PLW03
Sample Site Location	PMX	Duplicate of PMW01		POX	Duplicate of POW01		PUX	Duplicate of PUW01		Field Blank (collected @ PLX)
Eurofins Laboratory ID	M16-Ap02197 M16-Ap02198	M16-Ap02199		M16-Ap02202 M16-Ap02203	M16-Ap02204 M16-Ap02205		M16-Ap02214 M16-Ap02215	1604643-05 1604643-06		M16-Ap02196
Sampling Date	11-Mar-16	11-Mar-16		11-Mar-16	11-Mar-16		13-Mar-16	13-Mar-16		10-Mar-16
Sampling Time (approximate)	16:00	16:00		7:45	7:45		9:30	9:30		14:30
Field Parameters										
pH	6.19	-	-	6.39	-	-	-	-	-	-
ORP (mV)	274.3	-	-	346	-	-	-	-	-	-
DO (mg/L)	8.3	-	-	8.23	-	-	-	-	-	-
DO (% Saturation)	89.2	-	-	89.5	-	-	-	-	-	-
Conductivity (at 25°C) (µS/cm)	76.9	-	-	66.8	-	-	-	-	-	-
Turbidity (NTU)	5	-	-	3.3	-	-	-	-	-	-
Temperature (°C)	18.9	-	-	19.4	-	-	-	-	-	-
Laboratory Parameters										
Conductivity (at 25°C) (µS/cm)	81	-	-	70	69	1%	-	-	-	4.4
pH	6.5	-	-	6.3	6.1	3%	-	-	-	4.7
Phosphorus filterable reactive (as P)	< 0.05	-	-	< 0.05	< 0.05	NC	-	-	-	< 0.05
Chloride	14	-	-	13	14	7%	-	-	-	< 1
Sulphate (as S)	< 5	-	-	< 5	< 5	NC	-	-	-	< 5
Alkali Metals										
Calcium	2.8	-	-	1.9	1.9	0%	-	-	-	< 0.5
Magnesium	1.4	-	-	1.4	1.4	0%	-	-	-	< 0.5
Potassium	0.7	-	-	0.8	0.9	12%	-	-	-	< 0.5
Sodium	10	-	-	9.6	9.7	1%	-	-	-	< 0.5
Alkalinity (speciated)										
Bicarbonate Alkalinity (as CaCO3)	< 20	-	-	< 20	< 20	NC	-	-	-	< 20
Carbonate Alkalinity (as CaCO3)	< 10	-	-	< 10	< 10	NC	-	-	-	< 10
Heavy Metals										
Total Antimony	< 0.005	< 0.005	NC	< 0.005	< 0.005	NC	-	-	-	< 0.005
Dissolved Antimony	< 0.005	< 0.005	NC	< 0.005	< 0.005	NC	-	-	-	< 0.005
Total Arsenic	0.007	0.007	0%	0.002	0.002	0%	-	-	-	< 0.001
Dissolved Arsenic	0.006	0.007	15%	0.002	0.002	0%	-	-	-	< 0.001
Total Boron	< 0.05	< 0.05	NC	< 0.05	< 0.05	NC	-	-	-	< 0.05
Dissolved Boron	< 0.05	< 0.05	NC	< 0.05	< 0.05	NC	-	-	-	< 0.05
Total Cadmium	< 0.0002	< 0.0002	NC	< 0.0002	< 0.0002	NC	-	-	-	< 0.0002
Dissolved Cadmium	< 0.0002	< 0.0002	NC	< 0.0002	< 0.0002	NC	-	-	-	< 0.0002
Total Chromium	< 0.001	< 0.001	NC	< 0.001	< 0.001	NC	-	-	-	< 0.001
Dissolved Chromium	< 0.001	< 0.001	NC	< 0.001	< 0.001	NC	-	-	-	< 0.001
Total Cobalt	< 0.001	< 0.001	NC	< 0.001	< 0.001	NC	-	-	-	< 0.001
Dissolved Cobalt	< 0.001	< 0.001	NC	< 0.001	< 0.001	NC	-	-	-	< 0.001
Total Copper	< 0.001	< 0.001	NC	0.002	0.002	0%	-	-	-	< 0.001
Dissolved Copper	< 0.001	< 0.001	NC	0.001	0.001	0%	-	-	-	< 0.001
Total Iron	0.86	0.92	7%	0.94	0.99	5%	-	-	-	< 0.05
Dissolved Iron	0.62	0.82	28%	0.64	0.62	3%	-	-	-	< 0.05
Total Lead	< 0.001	< 0.001	NC	< 0.001	< 0.001	NC	-	-	-	< 0.001
Dissolved Lead	< 0.001	< 0.001	NC	0.002	< 0.001	NC	-	-	-	< 0.001
Total Manganese	0.029	0.033	13%	0.025	0.027	8%	-	-	-	< 0.005
Dissolved Manganese	0.027	0.033	20%	0.024	0.023	4%	-	-	-	< 0.005
Total Mercury ³	< 0.0001	< 0.0001	NC	< 0.0001	< 0.0001	NC	-	-	-	< 0.0001
Dissolved Mercury ³	< 0.0001	< 0.0001	NC	< 0.0001	< 0.0001	NC	-	-	-	< 0.0001
Total Mercury ⁴	0.0000171	0.0000191	11%	0.0000196	0.0000199	2%	0.000277	0.0003	8%	-
Dissolved Mercury ⁴	0.0000181	0.0000177	2%	0.0000155	0.0000158	2%	0.000236	0.000254	7%	-
Total Nickel	0.001	< 0.001	NC	< 0.001	< 0.001	NC	-	-	-	< 0.001
Dissolved Nickel	< 0.001	< 0.001	NC	< 0.001	< 0.001	NC	-	-	-	< 0.001
Total Thallium	< 0.001	< 0.001	NC	< 0.001	< 0.001	NC	-	-	-	< 0.001
Dissolved Thallium	< 0.001	< 0.001	NC	< 0.001	< 0.001	NC	-	-	-	< 0.001
Total Zinc	0.009	0.009	0%	0.008	0.008	0%	-	-	-	0.005
Dissolved Zinc	0.007	0.009	25%	0.007	0.007	0%	-	-	-	0.005
Nitrogen Species										
Ammonia (as N)	0.37	-	-	0.04	0.04	0%	-	-	-	< 0.01
Ammonium Ion (as N)	0.40	-	-	0.05	0.05	0%	-	-	-	< 0.01
Nitrate (as N)	0.37	-	-	0.42	0.43	2%	-	-	-	0.15

- Notes:
1. All results in mg/L unless otherwise stated.
 2. RPD = Relative Percent Difference.
 3. Mercury determined by ICP-MS (with a detection limit of 0.00001 mg/L or 100 ng/L).
 4. Mercury determined by purge and trap CV-AFS (with a detection limit of 0.000 000 5 mg/L or 0.5 ng/L).

NC	% RPD not calculated due to one or more results being below the laboratory level of detection.
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Table C-3: Field Parameters Against Laboratory Parameters

Sample ID	PDW01			PFW01			PGW01			PHW01			PJW01			PKW01		
Sample Site Location	PDX			PFX			PGX			PHX			PIX			PKX		
Eurofins Laboratory ID	M16-Ap02182			M16-Ap02184			M16-Ap02186			M16-Ap02188			M16-Ap02190			M16-Ap02192		
Sampling Date	8-Mar-16			8-Mar-16			9-Mar-16			9-Mar-16			10-Mar-16			10-Mar-16		
Sampling time (approximate)	15:00			17:00			9:00			16:00			8:00			11:45		
	Field Parameters	Laboratory Parameters	% RPD	Field Parameters	Laboratory Parameters	% RPD	Field Parameters	Laboratory Parameters	% RPD	Field Parameters	Laboratory Parameters	% RPD	Field Parameters	Laboratory Parameters	% RPD	Field Parameters	Laboratory Parameters	% RPD
pH	7.39	6.9	7%	6.88	6.8	1%	6.8	6.8	0%	6.87	6.7	3%	6.14	6.4	4%	6.58	6.6	0%
Conductivity (at 25°C) (µS/cm)	132.6	140	5%	116.9	120	3%	112.8	120	6%	103.5	110	6%	69.9	75	7%	76.9	83	8%

Sample ID	PLW01			PMW01			PNW01			POW01			PQW-1			PRW-1		
Sample Site Location	PLX			PMX			PNX			POX			PQX			PRX		
Eurofins Laboratory ID	M16-Ap02194			M16-Ap02197			M16-Ap02200			M16-Ap02202			M16-Ap02206			M16-Ap02208		
Sampling Date	10-Mar-16			11-Mar-16			13-Mar-16			11-Mar-16			11-Mar-16			12-Mar-16		
Sampling time (approximate)	14:30			16:00			13:00			7:45			13:30			15:45		
	Field Parameters	Laboratory Parameters	% RPD	Field Parameters	Laboratory Parameters	% RPD	Field Parameters	Laboratory Parameters	% RPD	Field Parameters	Laboratory Parameters	% RPD	Field Parameters	Laboratory Parameters	% RPD	Field Parameters	Laboratory Parameters	% RPD
pH	6.07	6.2	2%	6.19	6.5	5%	6.13	6.4	4%	6.39	6.3	1%	6.36	5.7	11%	5.17	4.8	7%
Conductivity (at 25°C) (µS/cm)	67.4	73	8%	76.9	81	5%	73.8	78	6%	66.8	70	5%	62.6	65	4%	69.3	71	2%

Sample ID	PSW-1			PTW-1			PUW-1			PVW-1			PWW-1			PYW-1		
Sample Site Location	PSX			PTX			PUX			PVX			PWX			PYX		
Eurofins Laboratory ID	M16-Ap02210			M16-Ap02212			M16-Ap02214			M16-Ap02216			M16-Ap02218			M16-Ap02220		
Sampling Date	12-Mar-16			12-Mar-16			13-Mar-16			11-Mar-16			12-Mar-16			10-Mar-16		
Sampling time (approximate)	15:30			9:00			9:30			15:45			11:00			16:00		
	Field Parameters	Laboratory Parameters	% RPD	Field Parameters	Laboratory Parameters	% RPD	Field Parameters	Laboratory Parameters	% RPD	Field Parameters	Laboratory Parameters	% RPD	Field Parameters	Laboratory Parameters	% RPD	Field Parameters	Laboratory Parameters	% RPD
pH	4.27	6.1	35%	6.21	6.3	1%	6.78	5.1	28%	4.74	4.5	5%	6.27	6.4	2%	6.47	6.7	3%
Conductivity (at 25°C) (µS/cm)	83.4	79	5%	68.6	71	3%	129.4	76	52%	68.2	79	15%	68.3	70	2%	51.4	72	33%

Indicates pH results differ by > 12% RPD which is equivalent to ± 0.5 pH units.

Indicates electrical conductivity results differ by > 20% RPD.

PDP Sediment Sampling Form

Auckland (09) 523 6900, Wellington (04) 471 4130, Christchurch (03) 345 7100

Job Number: A02982801		Staff Name: Scott N & Andrew P		Date: 8/03/16.	
Project Name: P - Evolution					
Weather Conditions: Fine / Windy				Tide:	
Sample Location:		PDX			
Sample Method:		Peristaltic Pump.			
Coordinates (NZTM) N					
E		0.634m			
Depth of Sample (m)		PDS YG1			
Field Measurements					
pH	pH units	6.46	7.39		
pE/ORP	mV	207.9	285.7		
DO	ppm	9.21 mg/L	7.39 mg/L		
%DO	%	105.4	84.4		
EC	mS/cm	132.6 μ S/cm	131.2 μ S/cm		
Salinity	ppt	0.06 PSU			
TDS	g/L TDS	0.06 mg/L			
Turbidity	NTU	358.4			
Temp.	°C	21.9	21.9		
Water Sample name					
Sediment Description					
Sample Name		PDS-01A	PDS-01-B		
Depth of oxic layer (mm)		< 200mm	As here		
Subordinate Fraction		Clayey			
MAJOR	Grain Size	Silt			
Minor	Some	Sand (fine)			
	With				
	Trace				
Colour		Light Grey			
Qualifying paragraph					
Strength		Weak			
Moisture					
Grading					
Bedding					
Plasticity		Mod Plastic			
Sensitivity					
Major Fraction					
Weathering of clasts					
Subordinate Fraction					
Minor Fraction					
Odour		NONE			
Other (e.g. biota, shell fragments, woody debris, foreign material, evidence of oil etc.)					

Notes:

- All sediment logged in accordance with NZ Geotechnical Society (2005) Field Description of Soil and Rock.
- Sampling and field observations should be made in accordance with CECR (2005) Handbook for Sediment Quality Assessment.
- Odour should be described as none, organic (compost/silage), anoxic (Sulphidic), oily (petrol smell), earthy, sea/marine, sewage, putrid (dead animal)
- All cores/samples should be photographed

PDS PDX-02 - Total
PDS PDX-02 - Dissolved

PDP Sediment Sampling Form

Auckland (09) 523 6900, Wellington (04) 471 4130, Christchurch (03) 345 7100

Job Number: 102982801		Staff Name: Scott Nicol		Date: 8/03/16	
Project Name: EVOLUTION					
Weather Conditions: Fine & Windy				Tide:	
Sample Location:		PEX			
Sample Method:		Peristaltic			
Coordinates (NZTM) N					
E		0.813m			
Depth of Sample (m)		Pro DSS		Pro Plus	
Field Measurements					
pH	pH units	5.71	6.88		
pE/ORP	mV	231.3	226.7		
DO	ppm	7.53 mg/L	6.84 mg/L		
%DO	%	80.8	85.4%		
EC	mS/cm	116.9 us/cm	116.1		
Salinity	ppt	0.05 PSU			
TDS TSS	mg/L	0.00			
Turbidity	NTU	302.8			
Temp.	°C	21.3	21.4		
Water Sample name					
Sediment Description					
Sample Name		200mm			
Depth of oxic layer (mm)		PFS B.			
Subordinate Fraction		Sandy			
MAJOR	Grain Size	CLAY			
Minor	Some	Gravel			
	With				
	Trace				
Colour	light orange	grey mottled orange			
Qualifying paragraph					
Strength		Firm			
Moisture		Sat			
Grading		-			
Bedding		-			
Plasticity		non plastic			
Sensitivity					
Major Fraction					
Weathering of clasts					
Subordinate Fraction					
Minor Fraction					
Odour		NONE			
Other (e.g. biota, shell fragments, woody debris, foreign material, evidence of oil etc.)					
		rocks, organics, fibres			

Notes:

- All sediment logged in accordance with NZ Geotechnical Society (2005) Field Description of Soil and Rock.
- Sampling and field observations should be made in accordance with CECR (2005) Handbook for Sediment Quality Assessment.
- Odour should be described as none, organic (compost/silage), anoxic (Sulphidic), oily (petrol smell), earthy, sea/marine, sewage, putrid (dead animal)
- All cores/samples should be photographed

PDP Sediment Sampling Form

Auckland (09) 523 6900, Wellington (04) 471 4130, Christchurch (03) 345 7100

Job Number: <i>AD2982801</i>		Staff Name: <i>S. Nicol & Andrew P</i>		Date: <i>9/03/16</i>	
Project Name: <i>EVOLUTION</i>					
Weather Conditions: <i>Fine - Cief.</i>				Tide:	
Sample Location:		<i>PGX</i>			
Sample Method:		<i>Pristine</i>			
Coordinates (NZTM) N					
E					
Depth of Sample (m)		<i>Pro Plug. 1155</i>			
Field Measurements					
pH	pH units	<i>6.55</i>	<i>6.80</i>		
pE/ORP	mV		<i>189.2</i>		
DO	ppm	<i>5.64</i>	<i>3.12</i>		
%DO	%	<i>62.11</i>	<i>28%</i>		
EC	µmS/cm	<i>117.8</i>	<i>112.6</i>		
Salinity	ppt		<i>0.05 PSU</i>		
TDS	g/L				
Turbidity	NTU		<i>370.3</i>		
Temp.	°C	<i>20.2</i>	<i>20.2</i>		
Water Sample name					
Sediment Description					
Sample Name		<i>PGS 01B</i>			
Depth of oxic layer (mm)					
Subordinate Fraction		<i>Sandy</i>			
MAJOR	Grain Size	<i>Silt</i>			
Minor	Some	<i>CLAY</i>			
	With				
	Trace				
Colour	<i>light green mottled black.</i>				
Qualifying paragraph					
Strength	<i>weak - firm</i>				
Moisture	<i>SAT</i>				
Grading	<i>None</i>				
Bedding	<i>None</i>				
Plasticity	<i>Slight - med plastic</i>				
Sensitivity					
Major Fraction					
Weathering of clasts					
Subordinate Fraction					
Minor Fraction					
Odour	<i>None</i>				
Other (e.g. biota, shell fragments, woody debris, foreign material, evidence of oil etc.)					
	<i>Organic debris, roots.</i>				

Notes:

- All sediment logged in accordance with NZ Geotechnical Society (2005) Field Description of Soil and Rock.
- Sampling and field observations should be made in accordance with CECR (2005) Handbook for Sediment Quality Assessment.
- Odour should be described as none, organic (compost/silage), anoxic (Sulphidic), oily (petrol smell), earthy, sea/marine, sewage, putrid (dead animal)
- All cores/samples should be photographed

PDP Sediment Sampling Form

Auckland (09) 523 6900, Wellington (04) 471 4130, Christchurch (03) 345 7100

Job Number: 102982801		Staff Name: SHN & AH		Date: 9/3/16	
Project Name: EVOLUTION					
Weather Conditions: Overcast				Tide:	
Sample Location:		PHX			
Sample Method:		Peristaltic			
Coordinates (NZTM) N					
E					
Depth of Sample (m)		PHX	Pro DSS	Pro Plus	
Field Measurements					
pH	pH units		20.581	6.87	
pE/ORP	mV		176.1	185.9	
DO	ppm		7.49 mg/L	61.5 mg/L	
%DO	%		83.3	70.0	
EC	mS/cm		103.5	105.1 uS/cm	
Salinity	ppt		0.05 PSU		
TDS	g/L				
Turbidity	NTU		9.5		
Temp.	°C		20.6	20.7	
Water Sample name					
Sediment Description					
Sample Name					
Depth of oxic layer (mm)					
Subordinate Fraction		Sand			
MAJOR	Grain Size	Silt			
Minor	Some	Gravels.			
	With				
	Trace				
Colour		light brown orange			
Qualifying paragraph					
Strength		weak			
Moisture		SAT			
Grading		-			
Bedding		-			
Plasticity		slight Plastic			
Sensitivity					
Major Fraction					
Weathering of clasts					
Subordinate Fraction					
Minor Fraction					
Odour					
Other (e.g. biota, shell fragments, woody debris, foreign material, evidence of oil etc.)					
		Organics.			

Notes:

- All sediment logged in accordance with NZ Geotechnical Society (2005) Field Description of Soil and Rock.
- Sampling and field observations should be made in accordance with CECR (2005) Handbook for Sediment Quality Assessment.
- Odour should be described as none, organic (compost/silage), anoxic (Sulphidic), oily (petrol smell), earthy, sea/marine, sewage, putrid (dead animal)
- All cores/samples should be photographed

PDP Sediment Sampling Form

Auckland (09) 523 6900, Wellington (04) 471 4130, Christchurch (03) 345 7100

Job Number: A02982801		Staff Name: SHN & AA		Date: 10/03/16	
Project Name: EVOLUTION					
Weather Conditions: Fine, Crisp.				Tide:	
Sample Location:		PKX			
Sample Method:		Peristaltic.			
Coordinates (NZTM) N					
E					
Depth of Sample (m)		P. DSS Pro Hus.			
Field Measurements					
pH	pH units	8.44	8.58		
pE/ORP	mV	186.3	218.8		
DO	ppm	9.85	7.24		
%DO	%	99.5	73.2		
EC	mS/cm	76.7	101.9		
Salinity	ppt	0.04 PSU			
TDS	g/L TSS	0.00			
Turbidity	NTU	4.9			
Temp.	°C	15.9	15.9		
Water Sample name					
Sediment Description					
Sample Name		PKS 01A PKS 01 B.			
Depth of oxic layer (mm)					
Subordinate Fraction					
MAJOR	Grain Size	Sandy			
Minor	Some	SILT			
	With				
	Trace				
Colour		Dark brownish grey.			
Qualifying paragraph					
Strength		weak			
Moisture		SAT.			
Grading					
Bedding					
Plasticity		moderate.			
Sensitivity					
Major Fraction					
Weathering of clasts					
Subordinate Fraction					
Minor Fraction					
Odour					
Other (e.g. biota, shell fragments, woody debris, foreign material, evidence of oil etc.)					
		Organics near surface.			

Notes:

- All sediment logged in accordance with NZ Geotechnical Society (2005) Field Description of Soil and Rock.
- Sampling and field observations should be made in accordance with CECR (2005) Handbook for Sediment Quality Assessment.
- Odour should be described as none, organic (compost/silage), anoxic (Sulphidic), oily (petrol smell), earthy, sea/marine, sewage, putrid (dead animal)
- All cores/samples should be photographed

PDP Sediment Sampling Form

Auckland (09) 523 6900, Wellington (04) 471 4130, Christchurch (03) 345 7100

Job Number: 102982801		Staff Name: SHN A AR		Date: 10/03/16	
Project Name: Evt					
Weather Conditions: Fine!!				Tide:	
Sample Location:		PJX			
Sample Method:					
Coordinates (NZTM) N					
E					
Depth of Sample (m)		Pro DSS	Pro Plug		
Field Measurements					
pH	pH units	5.64	6.14		
pE/ORP	mV	214.8	129.8		
DO	ppm	8.69	7.92 mg/L		
%DO	%	92.4	84.3		
EC	mS/cm	69.9	72.2		
Salinity	ppt	0.03 PSU			
TDS	g/L TSS	0.00			
Turbidity	NTU	4.2			
Temp.	°C	19.3	18.3		
Water Sample name					
Sediment Description					
Sample Name					
Depth of oxic layer (mm)					
Subordinate Fraction		Sandy			
MAJOR	Grain Size	SILT			
Minor	Some	Gravels.			
	With				
	Trace				
Colour	Dark grey streaked black.				
Qualifying paragraph					
Strength	Weak-firm				
Moisture	SAT.				
Grading					
Bedding					
Plasticity	low				
Sensitivity					
Major Fraction					
Weathering of clasts	angular				
Subordinate Fraction					
Minor Fraction					
Odour					
Other (e.g. biota, shell fragments, woody debris, foreign material, evidence of oil etc.)					

Notes:

- All sediment logged in accordance with NZ Geotechnical Society (2005) Field Description of Soil and Rock.
- Sampling and field observations should be made in accordance with CECR (2005) Handbook for Sediment Quality Assessment.
- Odour should be described as none, organic (compost/silage), anoxic (Sulphidic), oily (petrol smell), earthy, sea/marine, sewage, putrid (dead animal)
- All cores/samples should be photographed

PDP Sediment Sampling Form

Auckland (09) 523 6900, Wellington (04) 471 4130, Christchurch (03) 345 7100

Job Number: 102982901		Staff Name: SHN & AR.		Date: 10/3/16	
Project Name:					
Weather Conditions: Fine				Tide:	
Sample Location:		PLX			
Sample Method:					
Coordinates (NZTM) N					
E		0.517 m. depth.			
Depth of Sample (m)		Pro DSS Pro Plus			
Field Measurements					
pH	pH units	8.80	6.07		
pE/ORP	mV	238.3	178.9		
DO	ppm	9.88 mg/L	9.26 mg/L		
%DO	%	105.4	102.0		
EC	µS/cm	67.4	68.6		
Salinity	ppt	0.03 PSU			
TDS	g/L				
Turbidity	NTU	3.4 NTU			
Temp.	°C	20.0	20.0		
Water Sample name					
Sediment Description					
Sample Name					
Depth of oxic layer (mm)					
Subordinate Fraction					
MAJOR	Grain Size	Sandy			
Minor	Some	Silt			
	With some	Clay & Gravel.			
	Trace	Gravel.			
Colour		Dark orange brown.			
Qualifying paragraph					
Strength		weak-firm			
Moisture		SAT.			
Grading					
Bedding					
Plasticity		moderate			
Sensitivity					
Major Fraction		Gravels are angular.			
Weathering of clasts					
Subordinate Fraction					
Minor Fraction					
Odour		None.			
Other (e.g. biota, shell fragments, woody debris, foreign material, evidence of oil etc.)					
		Organics present			

PLX
PLW 3
is field
bank.
PLW 4
is field
DUPLICATE
PLW 2 is
Total.

Notes:

- All sediment logged in accordance with NZ Geotechnical Society (2005) Field Description of Soil and Rock.
- Sampling and field observations should be made in accordance with CECR (2005) Handbook for Sediment Quality Assessment.
- Odour should be described as none, organic (compost/silage), anoxic (Sulphidic), oily (petrol smell), earthy, sea/marine, sewage, putrid (dead animal)
- All cores/samples should be photographed

PDP Sediment Sampling Form

Auckland (09) 523 6900, Wellington (04) 471 4130, Christchurch (03) 345 7100

Job Number: A0298289		Staff Name: A. Rumsby		Date: 10/10/16	
Project Name: A02					
Weather Conditions: fine			Tide: low		
Sample Location: PYX					
Sample Method: Trowel					
Coordinates (NZTM) N					
E					
Depth of Sample (m)		Surface			
Field Measurements					
pH	pH units	14.5/13.2	6.47		
pE/ORP	mV	286	185		
DO	ppm	9.51	9.48		
%DO	%	105.2	103.4		
EC	mS/cm	57.8	51.4		
Salinity	ppt	-	-		
TDS	g/L	-	-		
Turbidity	NTU	4.5	-		
Temp.	°C	19.8	19.8		
Water Sample name		PY401 (b) PY402 (v)			
Sediment Description					
Sample Name		PY501	PY502		
Depth of oxic layer (mm)		-	-		
Subordinate Fraction		Sand	Sand		
MAJOR	Grain Size	Gravel	Gravel		
Minor	Some	Silt	Silt		
	With				
	Trace				
Colour		Yellowish			
Qualifying paragraph					
Strength					
Moisture					
Grading					
Bedding					
Plasticity					
Sensitivity					
Major Fraction					
Weathering of clasts					
Subordinate Fraction					
Minor Fraction					
Odour		None	None		
Other (e.g. biota, shell fragments, woody debris, foreign material, evidence of oil etc.)					
		Drake			
		Wood			
		Organics			

Notes:

- All sediment logged in accordance with NZ Geotechnical Society (2005) Field Description of Soil and Rock.
- Sampling and field observations should be made in accordance with CECR (2005) Handbook for Sediment Quality Assessment.
- Odour should be described as none, organic (compost/silage), anoxic (Sulphidic), oily (petrol smell), earthy, sea/marine, sewage, putrid (dead animal)
- All cores/samples should be photographed

PDP Sediment Sampling Form

Auckland (09) 523 6900, Wellington (04) 471 4130, Christchurch (03) 345 7100

Job Number: A02982801		Staff Name: SHN & AR		Date: 11/8/16	
Project Name: Evolution					
Weather Conditions: fine & windy				Tide:	
Sample Location:		PMX			
Sample Method:		Peristaltic.			
Coordinates (NZTM) N					
E					
Depth of Sample (m)					
Field Measurements					
pH	pH units	6.02	6.19		
pE/ORP	mV	224.7	177.5		
DO	ppm	8.2	6.32		
%DO	%	89.2	68.0		
EC	mS/cm	76.9	77.7		
Salinity	ppt	-	-		
TDS	g/L	-	-		
Turbidity	NTU	5.0	-		
Temp.	°C	18.9	18.6		
Water Sample name		SPM201	PM202	PM203	PM204
Sediment Description					
Sample Name					
Depth of oxic layer (mm)					
Subordinate Fraction		Sandy			
MAJOR	Grain Size	SILT			
Minor	Some	clay.			
	With				
	Trace				
Colour		Dark orange brown.			
Qualifying paragraph					
Strength		Soft			
Moisture		Sat.			
Grading					
Bedding					
Plasticity		low-med.			
Sensitivity					
Major Fraction					
Weathering of clasts					
Subordinate Fraction					
Minor Fraction					
Odour					
Other (e.g. biota, shell fragments, woody debris, foreign material, evidence of oil etc.)					

Notes:

- All sediment logged in accordance with NZ Geotechnical Society (2005) Field Description of Soil and Rock.
- Sampling and field observations should be made in accordance with CECR (2005) Handbook for Sediment Quality Assessment.
- Odour should be described as none, organic (compost/silage), anoxic (Sulphidic), oily (petrol smell), earthy, sea/marine, sewage, putrid (dead animal)
- All cores/samples should be photographed

PDP Sediment Sampling Form

Auckland (09) 523 6900, Wellington (04) 471 4130, Christchurch (03) 345 7100

Job Number: A02582801		Staff Name: Anna Rung		Date: 11/3/16	
Project Name:					
Weather Conditions: Fine			Tide: —		
Sample Location:		POX.			
Sample Method:		Ogeechee			
Coordinates (NZTM) N					
E					
Depth of Sample (m)					
Field Measurements					
pH	pH units	6.39			
pE/ORP	mV	346.6	209		
DO	ppm	8.23	6.20		
%DO	%	89.5	67.1		
EC	mS/cm	66.8	67.9		
Salinity	ppt	—	—		
TDS	g/L	—	—		
Turbidity	NTU	3.2			
Temp.	°C	19.4	19.4		
Water Sample name		POW-1	POW-2	POW-3	POW-4
Sediment Description					
Sample Name		POS-1	POS-2		
Depth of oxic layer (mm)		—	—		
Subordinate Fraction					
MAJOR	Grain Size	silt	silt		
Minor	Some	crust.	crust		
	With	Sandy	Sandy		
	Trace				
Colour		Grey	Green		
Qualifying paragraph					
Strength					
Moisture					
Grading					
Bedding					
Plasticity					
Sensitivity					
Major Fraction					
Weathering of clasts					
Subordinate Fraction					
Minor Fraction					
Odour					
Other (e.g. biota, shell fragments, woody debris, foreign material, evidence of oil etc.)					

Notes:

- All sediment logged in accordance with NZ Geotechnical Society (2005) Field Description of Soil and Rock.
- Sampling and field observations should be made in accordance with CECR (2005) Handbook for Sediment Quality Assessment.
- Odour should be described as none, organic (compost/silage), anoxic (Sulphidic), oily (petrol smell), earthy, sea/marine, sewage, putrid (dead animal)
- All cores/samples should be photographed

Duplicate

POW-3 - dissolved
POW-4 - Total

POW-1
POW-2

PDP Sediment Sampling Form

Auckland (09) 523 6900, Wellington (04) 471 4130, Christchurch (03) 345 7100

Job Number: 102982801		Staff Name: SHN & AR		Date: 11/3/16	
Project Name: Evolution					
Weather Conditions: Overcast				Tide:	
Sample Location:		PRX			
Sample Method:		Peristaltic			
Coordinates (NZTM) N					
E					
Depth of Sample (m)		Pro DS	4.51		
Field Measurements					
pH	pH units	6.29	6.36		
pE/ORP	mV	259.7	178.1		
DO	ppm	93.7	8.99		
%DO	%	104.7	100		
EC	µS/cm	67.6	61.7		
Salinity	ppt	-	-		
TDS	g/L	-	-		
Turbidity	NTU	4.5	-		
Temp.	°C	20.8	20.9		
Water Sample name		PQW01	PQW02		
Sediment Description					
Sample Name					
Depth of oxic layer (mm)					
Subordinate Fraction		Silty			
MAJOR	Grain Size	Gravel			
Minor	Some	Sand			
	With				
	Trace				
Colour		light brownish grey			
Qualifying paragraph					
Strength		loosely packed			
Moisture		SAT			
Grading					
Bedding					
Plasticity					
Sensitivity					
Major Fraction					
Weathering of clasts		Clasts are sub-angular			
Subordinate Fraction					
Minor Fraction					
Odour		NONE			
Other (e.g. biota, shell fragments, woody debris, foreign material, evidence of oil etc.)					

Notes:

- All sediment logged in accordance with NZ Geotechnical Society (2005) Field Description of Soil and Rock.
- Sampling and field observations should be made in accordance with CECR (2005) Handbook for Sediment Quality Assessment.
- Odour should be described as none, organic (compost/silage), anoxic (Sulphidic), oily (petrol smell), earthy, sea/marine, sewage, putrid (dead animal)
- All cores/samples should be photographed

PDP Sediment Sampling Form

Auckland (09) 523 6900, Wellington (04) 471 4130, Christchurch (03) 345 7100

Job Number: A02982801		Staff Name: Andrew Rumbold		Date: 11/3/16	
Project Name:					
Weather Conditions: 01C - occ. showers			Tide:		
Sample Location:		PUX			
Sample Method:		Trawl			
Coordinates (NZTM) N					
E					
Depth of Sample (m)		ProDSS	VSI		
Field Measurements					
pH	pH units	4.96	4.74		
pE/ORP	mV	407	329		
DO	ppm	8.49	8.02		
%DO	%	87.1	82.3		
EC	µS/cm	68.2	26.5		
Salinity	ppt	—	—		
TDS	g/L	—	—		
Turbidity	NTU	3.2	—		
Temp.	°C	16.6	16.2		
Water Sample name		PUQ01	PUQ02		
Sediment Description					
Sample Name					
Depth of oxic layer (mm)					
Subordinate Fraction					
MAJOR	Grain Size	Silty			
Minor	Some	CLAY			
	With	some gravel			
	Trace				
Colour		light orange grey			
Qualifying paragraph					
Strength		Soft			
Moisture		SAT			
Grading					
Bedding					
Plasticity					
Sensitivity					
Major Fraction					
Weathering of clasts					
Subordinate Fraction					
Minor Fraction					
Odour					
Other (e.g. biota, shell fragments, woody debris, foreign material, evidence of oil etc.)					
		Marine water draining seabed			

Notes:

- All sediment logged in accordance with NZ Geotechnical Society (2005) Field Description of Soil and Rock.
- Sampling and field observations should be made in accordance with CECR (2005) Handbook for Sediment Quality Assessment.
- Odour should be described as none, organic (compost/silage), anoxic (Sulphidic), oily (petrol smell), earthy, sea/marine, sewage, putrid (dead animal)
- All cores/samples should be photographed

PDP Sediment Sampling Form

Auckland (09) 523 6900, Wellington (04) 471 4130, Christchurch (03) 345 7100

Job Number: A02482801		Staff Name: AL/SW		Date: 12/03/16	
Project Name: Shallow OC					
Weather Conditions: snows/OC				Tide: —	
Sample Location:		PTX			
Sample Method:		trawel			
Coordinates (NZTM) N					
E					
Depth of Sample (m)		ProDSS	YSI		
Field Measurements					
pH	pH units	6.33	6.21		
pE/ORP	mV	259	229.6		
DO	ppm	9.41	9.42		
%DO	%	100.2	95.91		
EC	µS/cm	68.6	67.5		
Salinity	ppt	—	—		
TDS	g/L	—	—		
Turbidity	NTU	6.9	—		
Temp.	°C	15.9	15.9		
Water Sample name		PTW01	PTW02		
Sediment Description					
Sample Name		PT501	PT502		
Depth of oxic layer (mm)		—	—		
Subordinate Fraction		C			
MAJOR	Grain Size	CLAY	CLAY		
Minor	Some	gravel	gravel		
	With	sand	sand		
	Trace	cobble	robbie		
Colour		yellow	yellow		
Qualifying paragraph					
Strength					
Moisture					
Grading					
Bedding					
Plasticity					
Sensitivity					
Major Fraction					
Weathering of clasts					
Subordinate Fraction					
Minor Fraction					
Odour					
Other (e.g. biota, shell fragments, woody debris, foreign material, evidence of oil etc.)					

Notes:

- All sediment logged in accordance with NZ Geotechnical Society (2005) Field Description of Soil and Rock.
- Sampling and field observations should be made in accordance with CECR (2005) Handbook for Sediment Quality Assessment.
- Odour should be described as none, organic (compost/silage), anoxic (Sulphidic), oily (petrol smell), earthy, sea/marine, sewage, putrid (dead animal)
- All cores/samples should be photographed

PDP Sediment Sampling Form

Auckland (09) 523 6900, Wellington (04) 471 4130, Christchurch (03) 345 7100

Job Number: <i>A02982801</i>		Staff Name: <i>SHN & AR</i>		Date: <i>12/3/16</i>	
Project Name:					
Weather Conditions: <i>Fine</i>			Tide:		
Sample Location:		<i>PWX</i>			
Sample Method:		<i>Trowel</i>			
Coordinates (NZTM) N		<i>607</i>			
E					
Depth of Sample (m)		<i>YS1</i>	<i>Pro DSS</i>		
Field Measurements					
pH	pH units	<i>6.27</i>	<i>6.50</i>		
pE/ORP	mV	<i>229</i>	<i>336</i>		
DO	ppm	<i>8.87</i>	<i>9.99</i>		
%DO	%	<i>92.7</i>	<i>101.5</i>		
EC	uS /cm	<i>68.6</i>	<i>68.3</i>		
Salinity	ppt	<i>-</i>	<i>-</i>		
TDS	g/L				
Turbidity	NTU		<i>7.8</i>		
Temp.	°C	<i>16.1</i>	<i>16.1</i>		
Water Sample name		<i>PWW01</i>	<i>PWW02</i>		
Sediment Description					
Sample Name		<i>PWS01</i>	<i>PWS02</i>		
Depth of oxic layer (mm)					
Subordinate Fraction		<i>Sandy</i>			
MAJOR	Grain Size	<i>GRAVEL</i>			
Minor	Some				
	With	<i>silt</i>			
	Trace				
Colour		<i>light grey</i>			
Qualifying paragraph					
Strength	<i>-</i>	<i>Soft</i>			
Moisture		<i>Soft</i>			
Grading					
Bedding					
Plasticity					
Sensitivity					
Major Fraction					
Weathering of clasts					
Subordinate Fraction					
Minor Fraction					
Odour					
Other (e.g. biota, shell fragments, woody debris, foreign material, evidence of oil etc.)					

Notes:

1. All sediment logged in accordance with NZ Geotechnical Society (2005) Field Description of Soil and Rock.
2. Sampling and field observations should be made in accordance with CECR (2005) Handbook for Sediment Quality Assessment.
3. Odour should be described as none, organic (compost/silage), anoxic (Sulphidic), oily (petrol smell), earthy, sea/marine, sewage, putrid (dead animal)
4. All cores/samples should be photographed

PDP Sediment Sampling Form

Auckland (09) 523 6900, Wellington (04) 471 4130, Christchurch (03) 345 7100

Job Number: A02982801		Staff Name: SHN · AR		Date: 12/3/16	
Project Name: Evolution					
Weather Conditions:				Tide:	
Sample Location:		PRX			
Sample Method:					
Coordinates (NZTM) N		6073747			
E		1713834			
Depth of Sample (m)		DSS	YSI		
Field Measurements					
pH	pH units	5.01	5.17		
pE/ORP	mV	374	277		
DO	ppm	9.85	9.49		
%DO	%	100.7	97.1		
EC	mS/cm	69.3	70		
Salinity	ppt				
TDS	g/L				
Turbidity	NTU	6.6			
Temp.	°C	16.4	16.4		
Water Sample name					
Sediment Description					
Sample Name					
Depth of oxic layer (mm)					
Subordinate Fraction		Sandily			
MAJOR	Grain Size	GRAVEL			
Minor	Some	Silt			
	With				
	Trace				
Colour		Dark bluish Brown			
Qualifying paragraph					
Strength		loosely packed - soft			
Moisture		SAT.			
Grading					
Bedding					
Plasticity					
Sensitivity					
Major Fraction					
Weathering of clasts					
Subordinate Fraction					
Minor Fraction					
Odour					
Other (e.g. biota, shell fragments, woody debris, foreign material, evidence of oil etc.)					

PRW01 - dissolved
PRW02 - total
PRSQ1 } sediment
PRSQ2 }

Notes:

- All sediment logged in accordance with NZ Geotechnical Society (2005) Field Description of Soil and Rock.
- Sampling and field observations should be made in accordance with CECR (2005) Handbook for Sediment Quality Assessment.
- Odour should be described as none, organic (compost/silage), anoxic (Sulphidic), oily (petrol smell), earthy, sea/marine, sewage, putrid (dead animal)
- All cores/samples should be photographed

PDP Sediment Sampling Form

Auckland (09) 523 6900, Wellington (04) 471 4130, Christchurch (03) 345 7100

Job Number: <u>A02 982801</u>		Staff Name: <u>SHN - AR</u>		Date: <u>12/3/16</u>	
Project Name: <u>Evolution</u>					
Weather Conditions:				Tide:	
Sample Location:		<u>PSX</u>			
Sample Method:					
Coordinates (NZTM) N		<u>6074136</u>			
E		<u>1713925</u>			
Depth of Sample (m)		<u>DSS</u>	<u>YSI</u>		
Field Measurements					
pH	pH units	<u>4.33</u>	<u>4.27</u>		
pE/ORP	mV	<u>457</u>	<u>379.5</u>		
DO	ppm	<u>9.78</u>	<u>8.85</u>		
%DO	%	<u>100</u>	<u>91</u>		
EC	mS/cm	<u>83.4</u>	<u>84.5</u>		
Salinity	ppt				
TDS	g/L				
Turbidity	NTU	<u>4.5</u>			
Temp.	°C	<u>16.4</u>	<u>16.4</u>		
Water Sample name					
Sediment Description					
Sample Name					
Depth of oxic layer (mm)					
Subordinate Fraction		<u>Sandily</u>			
MAJOR	Grain Size	<u>SILT</u>			
Minor	Some	<u>Gravel/s - angular.</u>			
	With				
	Trace				
Colour		<u>light greyish brown streaked black.</u>			
Qualifying paragraph					
Strength		<u>Soft</u>			
Moisture		<u>Sat.</u>			
Grading					
Bedding					
Plasticity		<u>low</u>			
Sensitivity					
Major Fraction					
Weathering of clasts					
Subordinate Fraction					
Minor Fraction					
Odour					
Other (e.g. biota, shell fragments, woody debris, foreign material, evidence of oil etc.)					

Humic colour
water
pSW61 - dissolved
pSW02 - total
pSS01, pSS02
sed.

Notes:

- All sediment logged in accordance with NZ Geotechnical Society (2005) Field Description of Soil and Rock.
- Sampling and field observations should be made in accordance with CECR (2005) Handbook for Sediment Quality Assessment.
- Odour should be described as none, organic (compost/silage), anoxic (Sulphidic), oily (petrol smell), earthy, sea/marine, sewage, putrid (dead animal)
- All cores/samples should be photographed

PDP Sediment Sampling Form

Auckland (09) 523 6900, Wellington (04) 471 4130, Christchurch (03) 345 7100

Job Number: 102982801		Staff Name: SHN & AR		Date: 13/2/16	
Project Name: Evolution					
Weather Conditions:			Tide:		
Sample Location:		PUX			
Sample Method:		Peristaltic			
Coordinates (NZTM) N					
E					
Depth of Sample (m)		Pro DSS	X51		
Field Measurements					
pH	pH units	6.01	6.78		
pE/ORP	mV	66.7	-55.3		
DO	ppm	3.23	2.63		
%DO	%	32.8	26.8		
EC	mS/cm	129.4	127.7		
Salinity	ppt				
TDS	g/L				
Turbidity	NTU	4.9			
Temp.	°C	16.1	16.1		
Water Sample name					
Sediment Description					
Sample Name		PU001	PU002	PU003	
Depth of oxic layer (mm)		10-15mm			
Subordinate Fraction		Sandy			
MAJOR	Grain Size	Gravel			
Minor	Some	silt			
	With				
	Trace	organics			
Colour		black			
Qualifying paragraph					
Strength		loosely packed			
Moisture		Sat			
Grading					
Bedding					
Plasticity					
Sensitivity					
Major Fraction					
Weathering of clasts					
Subordinate Fraction					
Minor Fraction					
Odour		organic odour			
Other (e.g. biota, shell fragments, woody debris, foreign material, evidence of oil etc.)					

PU001
PU002
dissolved

PU003
PU004
Total.

Notes:

- All sediment logged in accordance with NZ Geotechnical Society (2005) Field Description of Soil and Rock.
- Sampling and field observations should be made in accordance with CECR (2005) Handbook for Sediment Quality Assessment.
- Odour should be described as none, organic (compost/silage), anoxic (Sulphidic), oily (petrol smell), earthy, sea/marine, sewage, putrid (dead animal)
- All cores/samples should be photographed

PDP Sediment Sampling Form

Auckland (09) 523 6900, Wellington (04) 471 4130, Christchurch (03) 345 7100

Job Number: <u>AO2982801</u>		Staff Name: <u>SHN: AR</u>		Date: <u>13/3/16</u>	
Project Name: <u>Evolution</u>					
Weather Conditions:			Tide:		
Sample Location:		<u>PNX</u>			
Sample Method:					
Coordinates (NZTM) N		<u>6072774</u>			
E		<u>1713526</u>			
Depth of Sample (m)		<u>DSS</u>	<u>YSI</u>		
Field Measurements					
pH	pH units	<u>6.15</u>	<u>6.13</u>		
pE/ORP	mV	<u>232</u>	<u>166</u>		
DO	ppm	<u>9.12</u>	<u>7.71</u>		
%DO	%	<u>101.3</u>	<u>79.5</u>		
EC	mS/cm	<u>73.8</u>	<u>76.8</u>		
Salinity	ppt				
TDS	g/L				
Turbidity	NTU	<u>3.6</u>			
Temp.	°C	<u>16.1</u>	<u>16.9</u>		
Water Sample name					
Sediment Description					
Sample Name					
Depth of oxic layer (mm)					
Subordinate Fraction		<u>fine clayey</u>			
MAJOR	Grain Size	<u>SILT</u>			
Minor	Some	<u>GRAVEL - Angular</u>			
	With				
	Trace				
Colour		<u>light orange grey brown.</u>			
Qualifying paragraph					
Strength		<u>soft</u>			
Moisture					
Grading		<u>slight deposit 1-5mm.</u>			
Bedding					
Plasticity		<u>low - none</u>			
Sensitivity					
Major Fraction					
Weathering of clasts					
Subordinate Fraction					
Minor Fraction					
Odour		<u>none.</u>			
Other (e.g. biota, shell fragments, woody debris, foreign material, evidence of oil etc.)					

colour
sl. tan
coarse
sprayed w
blue substance

Notes:

- All sediment logged in accordance with NZ Geotechnical Society (2005) Field Description of Soil and Rock.
- Sampling and field observations should be made in accordance with CECR (2005) Handbook for Sediment Quality Assessment.
- Odour should be described as none, organic (compost/silage), anoxic (Sulphidic), oily (petrol smell), earthy, sea/marine, sewage, putrid (dead animal)
- All cores/samples should be photographed

Certificate of Analysis

Pattle Delamore Partners Ltd
PDP House Level 4, 235 Broadway
Newmarket
Auckland New Zealand 1023



NATA Accredited
Accreditation Number 1261
Site Number 1254

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

Attention: Andrew Rumsby

Report 495277-W
Project name A02982801
Received Date Apr 01, 2016

Client Sample ID			PDW01	PDW02	PFW01	PFW02
Sample Matrix			Water	Water	Water	Water
Eurofins mgt Sample No.			M16-Ap02182	M16-Ap02183	M16-Ap02184	M16-Ap02185
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.02	-	< 0.01	-
Ammonium Ion (as N)	0.01	mg/L	0.02	-	< 0.01	-
Chloride	1	mg/L	17	-	17	-
Conductivity (at 25°C)	1	uS/cm	140	-	120	-
Nitrate (as N)	0.02	mg/L	0.41	-	0.27	-
pH	0.1	pH Units	6.9	-	6.8	-
Phosphorus filterable reactive (as P)	0.05	mg/L	< 0.05	-	< 0.05	-
Sulphate (as S)	5	mg/L	< 5	-	< 5	-
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	22	-	22	-
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10	-	< 10	-
Heavy Metals						
Antimony	0.005	mg/L	-	< 0.005	-	< 0.005
Antimony (filtered)	0.005	mg/L	< 0.005	-	< 0.005	-
Arsenic	0.001	mg/L	-	0.001	-	< 0.001
Arsenic (filtered)	0.001	mg/L	0.001	-	0.001	-
Boron	0.05	mg/L	-	< 0.05	-	< 0.05
Boron (filtered)	0.05	mg/L	< 0.05	-	< 0.05	-
Cadmium	0.0002	mg/L	-	< 0.0002	-	< 0.0002
Cadmium (filtered)	0.0002	mg/L	< 0.0002	-	< 0.0002	-
Chromium	0.001	mg/L	-	< 0.001	-	< 0.001
Chromium (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Cobalt	0.001	mg/L	-	< 0.001	-	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Copper	0.001	mg/L	-	0.002	-	0.001
Copper (filtered)	0.001	mg/L	0.002	-	0.001	-
Iron	0.05	mg/L	-	0.94	-	0.96
Iron (filtered)	0.05	mg/L	0.73	-	0.75	-
Lead	0.001	mg/L	-	< 0.001	-	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Manganese	0.005	mg/L	-	0.023	-	0.028
Manganese (filtered)	0.005	mg/L	0.021	-	0.027	-
Mercury	0.0001	mg/L	-	< 0.0001	-	< 0.0001
Mercury (filtered)	0.0001	mg/L	< 0.0001	-	< 0.0001	-
Nickel	0.001	mg/L	-	< 0.001	-	< 0.001
Nickel (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-

Client Sample ID			PDW01	PDW02	PFW01	PFW02
Sample Matrix			Water	Water	Water	Water
Eurofins mgt Sample No.			M16-Ap02182	M16-Ap02183	M16-Ap02184	M16-Ap02185
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Heavy Metals						
Thallium	0.001	mg/L	-	< 0.001	-	< 0.001
Thallium (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Zinc	0.001	mg/L	-	0.007	-	0.007
Zinc (filtered)	0.001	mg/L	0.008	-	0.006	-
Alkali Metals						
Calcium	0.5	mg/L	9.8	-	8.1	-
Magnesium	0.5	mg/L	2.6	-	2.3	-
Potassium	0.5	mg/L	2.1	-	1.4	-
Sodium	0.5	mg/L	15	-	13	-

Client Sample ID			PGW01	PGW02	PHW01	PHW02
Sample Matrix			Water	Water	Water	Water
Eurofins mgt Sample No.			M16-Ap02186	M16-Ap02187	M16-Ap02188	M16-Ap02189
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	< 0.01	-	0.02	-
Ammonium Ion (as N)	0.01	mg/L	< 0.01	-	0.02	-
Chloride	1	mg/L	16	-	16	-
Conductivity (at 25°C)	1	uS/cm	120	-	110	-
Nitrate (as N)	0.02	mg/L	0.23	-	0.20	-
pH	0.1	pH Units	6.8	-	6.7	-
Phosphorus filterable reactive (as P)	0.05	mg/L	< 0.05	-	< 0.05	-
Sulphate (as S)	5	mg/L	< 5	-	< 5	-
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	23	-	20	-
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10	-	< 10	-
Heavy Metals						
Antimony	0.005	mg/L	-	< 0.005	-	< 0.005
Antimony (filtered)	0.005	mg/L	< 0.005	-	< 0.005	-
Arsenic	0.001	mg/L	-	< 0.001	-	< 0.001
Arsenic (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Boron	0.05	mg/L	-	< 0.05	-	< 0.05
Boron (filtered)	0.05	mg/L	< 0.05	-	< 0.05	-
Cadmium	0.0002	mg/L	-	< 0.0002	-	< 0.0002
Cadmium (filtered)	0.0002	mg/L	< 0.0002	-	< 0.0002	-
Chromium	0.001	mg/L	-	< 0.001	-	< 0.001
Chromium (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Cobalt	0.001	mg/L	-	< 0.001	-	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Copper	0.001	mg/L	-	0.001	-	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Iron	0.05	mg/L	-	1.1	-	0.92
Iron (filtered)	0.05	mg/L	0.82	-	0.54	-
Lead	0.001	mg/L	-	< 0.001	-	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Manganese	0.005	mg/L	-	0.044	-	0.034
Manganese (filtered)	0.005	mg/L	0.044	-	0.035	-

Client Sample ID			PGW01 Water	PGW02 Water	PHW01 Water	PHW02 Water
Sample Matrix			M16-Ap02186	M16-Ap02187	M16-Ap02188	M16-Ap02189
Eurofins mgt Sample No.			Not Provided	Not Provided	Not Provided	Not Provided
Date Sampled						
Test/Reference	LOR	Unit				
Heavy Metals						
Mercury	0.0001	mg/L	-	< 0.0001	-	< 0.0001
Mercury (filtered)	0.0001	mg/L	< 0.0001	-	< 0.0001	-
Nickel	0.001	mg/L	-	< 0.001	-	< 0.001
Nickel (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Thallium	0.001	mg/L	-	< 0.001	-	< 0.001
Thallium (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Zinc	0.001	mg/L	-	0.007	-	0.006
Zinc (filtered)	0.001	mg/L	0.007	-	0.005	-
Alkali Metals						
Calcium	0.5	mg/L	7.2	-	6.7	-
Magnesium	0.5	mg/L	2.2	-	1.8	-
Potassium	0.5	mg/L	1.3	-	1.3	-
Sodium	0.5	mg/L	13	-	13	-

Client Sample ID			PJW01 Water	PJW02 Water	PKW01 Water	PKW02 Water
Sample Matrix			M16-Ap02190	M16-Ap02191	M16-Ap02192	M16-Ap02193
Eurofins mgt Sample No.			Not Provided	Not Provided	Not Provided	Not Provided
Date Sampled						
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.03	-	< 0.01	-
Ammonium Ion (as N)	0.01	mg/L	0.03	-	< 0.01	-
Chloride	1	mg/L	13	-	15	-
Conductivity (at 25°C)	1	uS/cm	75	-	83	-
Nitrate (as N)	0.02	mg/L	0.57	-	0.29	-
pH	0.1	pH Units	6.4	-	6.6	-
Phosphorus filterable reactive (as P)	0.05	mg/L	< 0.05	-	< 0.05	-
Sulphate (as S)	5	mg/L	< 5	-	< 5	-
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	< 20	-	< 20	-
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10	-	< 10	-
Heavy Metals						
Antimony	0.005	mg/L	-	< 0.005	-	< 0.005
Antimony (filtered)	0.005	mg/L	< 0.005	-	< 0.005	-
Arsenic	0.001	mg/L	-	0.002	-	0.003
Arsenic (filtered)	0.001	mg/L	0.001	-	0.002	-
Boron	0.05	mg/L	-	< 0.05	-	< 0.05
Boron (filtered)	0.05	mg/L	< 0.05	-	< 0.05	-
Cadmium	0.0002	mg/L	-	< 0.0002	-	< 0.0002
Cadmium (filtered)	0.0002	mg/L	< 0.0002	-	< 0.0002	-
Chromium	0.001	mg/L	-	< 0.001	-	< 0.001
Chromium (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Cobalt	0.001	mg/L	-	< 0.001	-	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Copper	0.001	mg/L	-	0.001	-	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Iron	0.05	mg/L	-	0.79	-	0.53
Iron (filtered)	0.05	mg/L	0.42	-	0.31	-

Client Sample ID			PJW01 Water	PJW02 Water	PKW01 Water	PKW02 Water
Sample Matrix			M16-Ap02190	M16-Ap02191	M16-Ap02192	M16-Ap02193
Eurofins mgt Sample No.			Not Provided	Not Provided	Not Provided	Not Provided
Date Sampled						
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.001	mg/L	-	< 0.001	-	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Manganese	0.005	mg/L	-	0.024	-	0.029
Manganese (filtered)	0.005	mg/L	0.022	-	0.029	-
Mercury	0.0001	mg/L	-	< 0.0001	-	< 0.0001
Mercury (filtered)	0.0001	mg/L	< 0.0001	-	< 0.0001	-
Nickel	0.001	mg/L	-	< 0.001	-	< 0.001
Nickel (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Thallium	0.001	mg/L	-	< 0.001	-	< 0.001
Thallium (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Zinc	0.001	mg/L	-	0.006	-	0.006
Zinc (filtered)	0.001	mg/L	0.005	-	0.006	-
Alkali Metals						
Calcium	0.5	mg/L	2.3	-	2.2	-
Magnesium	0.5	mg/L	1.4	-	1.4	-
Potassium	0.5	mg/L	0.7	-	0.7	-
Sodium	0.5	mg/L	11	-	12	-

Client Sample ID			PLW01 Water	PLW02 Water	PLW03 Water	PMW01 Water
Sample Matrix			M16-Ap02194	M16-Ap02195	M16-Ap02196	M16-Ap02197
Eurofins mgt Sample No.			Not Provided	Not Provided	Not Provided	Not Provided
Date Sampled						
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.03	-	< 0.01	0.37
Ammonium Ion (as N)	0.01	mg/L	0.03	-	< 0.01	0.40
Chloride	1	mg/L	13	-	< 1	14
Conductivity (at 25°C)	1	uS/cm	73	-	4.4	81
Nitrate (as N)	0.02	mg/L	0.47	-	0.15	0.37
pH	0.1	pH Units	6.2	-	4.7	6.5
Phosphorus filterable reactive (as P)	0.05	mg/L	< 0.05	-	< 0.05	< 0.05
Sulphate (as S)	5	mg/L	< 5	-	< 5	< 5
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	< 20	-	< 20	< 20
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10	-	< 10	< 10
Heavy Metals						
Antimony	0.005	mg/L	-	< 0.005	< 0.005	-
Antimony (filtered)	0.005	mg/L	< 0.005	-	< 0.005	< 0.005
Arsenic	0.001	mg/L	-	0.003	< 0.001	-
Arsenic (filtered)	0.001	mg/L	0.002	-	< 0.001	0.006
Boron	0.05	mg/L	-	< 0.05	< 0.05	-
Boron (filtered)	0.05	mg/L	< 0.05	-	< 0.05	< 0.05
Cadmium	0.0002	mg/L	-	< 0.0002	< 0.0002	-
Cadmium (filtered)	0.0002	mg/L	< 0.0002	-	< 0.0002	< 0.0002
Chromium	0.001	mg/L	-	< 0.001	< 0.001	-
Chromium (filtered)	0.001	mg/L	< 0.001	-	< 0.001	< 0.001
Cobalt	0.001	mg/L	-	< 0.001	< 0.001	-
Cobalt (filtered)	0.001	mg/L	< 0.001	-	< 0.001	< 0.001

Client Sample ID			PLW01 Water	PLW02 Water	PLW03 Water	PMW01 Water
Sample Matrix			M16-Ap02194	M16-Ap02195	M16-Ap02196	M16-Ap02197
Eurofins mgt Sample No.			Not Provided	Not Provided	Not Provided	Not Provided
Date Sampled						
Test/Reference	LOR	Unit				
Heavy Metals						
Copper	0.001	mg/L	-	0.002	< 0.001	-
Copper (filtered)	0.001	mg/L	< 0.001	-	< 0.001	< 0.001
Iron	0.05	mg/L	-	0.89	< 0.05	-
Iron (filtered)	0.05	mg/L	0.50	-	< 0.05	0.62
Lead	0.001	mg/L	-	< 0.001	< 0.001	-
Lead (filtered)	0.001	mg/L	< 0.001	-	< 0.001	< 0.001
Manganese	0.005	mg/L	-	0.021	< 0.005	-
Manganese (filtered)	0.005	mg/L	0.018	-	< 0.005	0.027
Mercury	0.0001	mg/L	-	< 0.0001	< 0.0001	-
Mercury (filtered)	0.0001	mg/L	< 0.0001	-	< 0.0001	< 0.0001
Nickel	0.001	mg/L	-	< 0.001	< 0.001	-
Nickel (filtered)	0.001	mg/L	< 0.001	-	< 0.001	< 0.001
Thallium	0.001	mg/L	-	< 0.001	< 0.001	-
Thallium (filtered)	0.001	mg/L	< 0.001	-	< 0.001	< 0.001
Zinc	0.001	mg/L	-	0.008	0.005	-
Zinc (filtered)	0.001	mg/L	0.007	-	0.005	0.007
Alkali Metals						
Calcium	0.5	mg/L	2.2	-	< 0.5	2.8
Magnesium	0.5	mg/L	1.4	-	< 0.5	1.4
Potassium	0.5	mg/L	0.7	-	< 0.5	0.7
Sodium	0.5	mg/L	10	-	< 0.5	10.0

Client Sample ID			PMW02 Water	PMW03 Water	PNW01 Water	PNW02 Water
Sample Matrix			M16-Ap02198	M16-Ap02199	M16-Ap02200	M16-Ap02201
Eurofins mgt Sample No.			Not Provided	Not Provided	Not Provided	Not Provided
Date Sampled						
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	-	-	< 0.01	-
Ammonium Ion (as N)	0.01	mg/L	-	-	< 0.01	-
Chloride	1	mg/L	-	-	17	-
Conductivity (at 25°C)	1	uS/cm	-	-	78	-
Nitrate (as N)	0.02	mg/L	-	-	0.54	-
pH	0.1	pH Units	-	-	6.4	-
Phosphorus filterable reactive (as P)	0.05	mg/L	-	-	< 0.05	-
Sulphate (as S)	5	mg/L	-	-	< 5	-
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	-	-	< 20	-
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	-	-	< 10	-
Heavy Metals						
Antimony	0.005	mg/L	< 0.005	< 0.005	-	< 0.005
Antimony (filtered)	0.005	mg/L	-	< 0.005	< 0.005	-
Arsenic	0.001	mg/L	0.007	0.007	-	0.002
Arsenic (filtered)	0.001	mg/L	-	0.007	0.002	-
Boron	0.05	mg/L	< 0.05	< 0.05	-	< 0.05
Boron (filtered)	0.05	mg/L	-	< 0.05	< 0.05	-
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	-	< 0.0002
Cadmium (filtered)	0.0002	mg/L	-	< 0.0002	< 0.0002	-

Client Sample ID			PMW02	PMW03	PNW01	PNW02
Sample Matrix			Water	Water	Water	Water
Eurofins mgt Sample No.			M16-Ap02198	M16-Ap02199	M16-Ap02200	M16-Ap02201
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Heavy Metals						
Chromium	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Chromium (filtered)	0.001	mg/L	-	< 0.001	< 0.001	-
Cobalt	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Cobalt (filtered)	0.001	mg/L	-	< 0.001	< 0.001	-
Copper	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Copper (filtered)	0.001	mg/L	-	< 0.001	< 0.001	-
Iron	0.05	mg/L	0.86	0.92	-	0.31
Iron (filtered)	0.05	mg/L	-	0.82	0.20	-
Lead	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Lead (filtered)	0.001	mg/L	-	< 0.001	< 0.001	-
Manganese	0.005	mg/L	0.029	0.033	-	0.020
Manganese (filtered)	0.005	mg/L	-	0.033	0.020	-
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	-	< 0.0001
Mercury (filtered)	0.0001	mg/L	-	< 0.0001	< 0.0001	-
Nickel	0.001	mg/L	0.001	< 0.001	-	< 0.001
Nickel (filtered)	0.001	mg/L	-	< 0.001	< 0.001	-
Thallium	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Thallium (filtered)	0.001	mg/L	-	< 0.001	< 0.001	-
Zinc	0.001	mg/L	0.009	0.009	-	0.007
Zinc (filtered)	0.001	mg/L	-	0.009	0.006	-
Alkali Metals						
Calcium	0.5	mg/L	-	-	2.2	-
Magnesium	0.5	mg/L	-	-	1.5	-
Potassium	0.5	mg/L	-	-	< 0.5	-
Sodium	0.5	mg/L	-	-	10	-

Client Sample ID			POW01	POW02	POW-3	POW-4
Sample Matrix			Water	Water	Water	Water
Eurofins mgt Sample No.			M16-Ap02202	M16-Ap02203	M16-Ap02204	M16-Ap02205
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.04	-	0.04	-
Ammonium Ion (as N)	0.01	mg/L	0.05	-	0.05	-
Chloride	1	mg/L	13	-	14	-
Conductivity (at 25°C)	1	uS/cm	70	-	69	-
Nitrate (as N)	0.02	mg/L	0.42	-	0.43	-
pH	0.1	pH Units	6.3	-	6.1	-
Phosphorus filterable reactive (as P)	0.05	mg/L	< 0.05	-	< 0.05	-
Sulphate (as S)	5	mg/L	< 5	-	< 5	-
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	< 20	-	< 20	-
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10	-	< 10	-
Heavy Metals						
Antimony	0.005	mg/L	-	< 0.005	-	< 0.005
Antimony (filtered)	0.005	mg/L	< 0.005	-	< 0.005	-
Arsenic	0.001	mg/L	-	0.002	-	0.002
Arsenic (filtered)	0.001	mg/L	0.002	-	0.002	-

Client Sample ID			POW01 Water	POW02 Water	POW-3 Water	POW-4 Water
Sample Matrix			M16-Ap02202	M16-Ap02203	M16-Ap02204	M16-Ap02205
Eurofins mgt Sample No.			Not Provided	Not Provided	Not Provided	Not Provided
Date Sampled						
Test/Reference	LOR	Unit				
Heavy Metals						
Boron	0.05	mg/L	-	< 0.05	-	< 0.05
Boron (filtered)	0.05	mg/L	< 0.05	-	< 0.05	-
Cadmium	0.0002	mg/L	-	< 0.0002	-	< 0.0002
Cadmium (filtered)	0.0002	mg/L	< 0.0002	-	< 0.0002	-
Chromium	0.001	mg/L	-	< 0.001	-	< 0.001
Chromium (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Cobalt	0.001	mg/L	-	< 0.001	-	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Copper	0.001	mg/L	-	0.002	-	0.002
Copper (filtered)	0.001	mg/L	0.001	-	0.001	-
Iron	0.05	mg/L	-	0.94	-	0.99
Iron (filtered)	0.05	mg/L	0.64	-	0.62	-
Lead	0.001	mg/L	-	< 0.001	-	< 0.001
Lead (filtered)	0.001	mg/L	0.002	-	< 0.001	-
Manganese	0.005	mg/L	-	0.025	-	0.027
Manganese (filtered)	0.005	mg/L	0.024	-	0.023	-
Mercury	0.0001	mg/L	-	< 0.0001	-	< 0.0001
Mercury (filtered)	0.0001	mg/L	< 0.0001	-	< 0.0001	-
Nickel	0.001	mg/L	-	< 0.001	-	< 0.001
Nickel (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Thallium	0.001	mg/L	-	< 0.001	-	< 0.001
Thallium (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Zinc	0.001	mg/L	-	0.008	-	0.008
Zinc (filtered)	0.001	mg/L	0.007	-	0.007	-
Alkali Metals						
Calcium	0.5	mg/L	1.9	-	1.9	-
Magnesium	0.5	mg/L	1.4	-	1.4	-
Potassium	0.5	mg/L	0.8	-	0.9	-
Sodium	0.5	mg/L	9.6	-	9.7	-

Client Sample ID			PQW-1 Water	PQW-2 Water	PRW-1 Water	PRW-2 Water
Sample Matrix			M16-Ap02206	M16-Ap02207	M16-Ap02208	M16-Ap02209
Eurofins mgt Sample No.			Not Provided	Not Provided	Not Provided	Not Provided
Date Sampled						
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.05	-	< 0.01	-
Ammonium Ion (as N)	0.01	mg/L	0.05	-	< 0.01	-
Chloride	1	mg/L	15	-	15	-
Conductivity (at 25°C)	1	uS/cm	65	-	71	-
Nitrate (as N)	0.02	mg/L	0.20	-	0.41	-
pH	0.1	pH Units	5.7	-	4.8	-
Phosphorus filterable reactive (as P)	0.05	mg/L	< 0.05	-	< 0.05	-
Sulphate (as S)	5	mg/L	< 5	-	< 5	-
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	< 20	-	< 20	-
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10	-	< 10	-

Client Sample ID			PQW-1 Water	PQW-2 Water	PRW-1 Water	PRW-2 Water
Sample Matrix			M16-Ap02206	M16-Ap02207	M16-Ap02208	M16-Ap02209
Eurofins mgt Sample No.			Not Provided	Not Provided	Not Provided	Not Provided
Date Sampled						
Test/Reference	LOR	Unit				
Heavy Metals						
Antimony	0.005	mg/L	-	< 0.005	-	< 0.005
Antimony (filtered)	0.005	mg/L	< 0.005	-	< 0.005	-
Arsenic	0.001	mg/L	-	0.002	-	0.001
Arsenic (filtered)	0.001	mg/L	0.001	-	< 0.001	-
Boron	0.05	mg/L	-	< 0.05	-	< 0.05
Boron (filtered)	0.05	mg/L	< 0.05	-	< 0.05	-
Cadmium	0.0002	mg/L	-	< 0.0002	-	< 0.0002
Cadmium (filtered)	0.0002	mg/L	< 0.0002	-	< 0.0002	-
Chromium	0.001	mg/L	-	< 0.001	-	< 0.001
Chromium (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Cobalt	0.001	mg/L	-	< 0.001	-	0.002
Cobalt (filtered)	0.001	mg/L	< 0.001	-	0.002	-
Copper	0.001	mg/L	-	0.002	-	0.002
Copper (filtered)	0.001	mg/L	0.002	-	0.002	-
Iron	0.05	mg/L	-	0.78	-	0.84
Iron (filtered)	0.05	mg/L	0.55	-	0.45	-
Lead	0.001	mg/L	-	< 0.001	-	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Manganese	0.005	mg/L	-	0.031	-	0.072
Manganese (filtered)	0.005	mg/L	0.031	-	0.063	-
Mercury	0.0001	mg/L	-	< 0.0001	-	< 0.0001
Mercury (filtered)	0.0001	mg/L	< 0.0001	-	< 0.0001	-
Nickel	0.001	mg/L	-	< 0.001	-	0.002
Nickel (filtered)	0.001	mg/L	< 0.001	-	0.002	-
Thallium	0.001	mg/L	-	< 0.001	-	< 0.001
Thallium (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Zinc	0.001	mg/L	-	0.009	-	0.013
Zinc (filtered)	0.001	mg/L	0.009	-	0.011	-
Alkali Metals						
Calcium	0.5	mg/L	1.5	-	1.7	-
Magnesium	0.5	mg/L	1.3	-	1.4	-
Potassium	0.5	mg/L	0.9	-	0.7	-
Sodium	0.5	mg/L	9.6	-	9.5	-

Client Sample ID			PSW-1 Water	PSW-2 Water	PTW-1 Water	PTW-2 Water
Sample Matrix			M16-Ap02210	M16-Ap02211	M16-Ap02212	M16-Ap02213
Eurofins mgt Sample No.			Not Provided	Not Provided	Not Provided	Not Provided
Date Sampled						
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.02	-	< 0.01	-
Ammonium Ion (as N)	0.01	mg/L	0.02	-	< 0.01	-
Chloride	1	mg/L	16	-	14	-
Conductivity (at 25°C)	1	uS/cm	79	-	71	-
Nitrate (as N)	0.02	mg/L	0.30	-	0.81	-
pH	0.1	pH Units	6.1	-	6.3	-
Phosphorus filterable reactive (as P)	0.05	mg/L	< 0.05	-	< 0.05	-
Sulphate (as S)	5	mg/L	< 5	-	< 5	-

Client Sample ID			PSW-1 Water	PSW-2 Water	PTW-1 Water	PTW-2 Water
Sample Matrix			M16-Ap02210	M16-Ap02211	M16-Ap02212	M16-Ap02213
Eurofins mgt Sample No.			Not Provided	Not Provided	Not Provided	Not Provided
Date Sampled						
Test/Reference	LOR	Unit				
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	< 20	-	< 20	-
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10	-	< 10	-
Heavy Metals						
Antimony	0.005	mg/L	-	< 0.005	-	< 0.005
Antimony (filtered)	0.005	mg/L	< 0.005	-	< 0.005	-
Arsenic	0.001	mg/L	-	< 0.001	-	< 0.001
Arsenic (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Boron	0.05	mg/L	-	< 0.05	-	< 0.05
Boron (filtered)	0.05	mg/L	< 0.05	-	< 0.05	-
Cadmium	0.0002	mg/L	-	< 0.0002	-	< 0.0002
Cadmium (filtered)	0.0002	mg/L	< 0.0002	-	< 0.0002	-
Chromium	0.001	mg/L	-	< 0.001	-	< 0.001
Chromium (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Cobalt	0.001	mg/L	-	0.004	-	< 0.001
Cobalt (filtered)	0.001	mg/L	0.004	-	< 0.001	-
Copper	0.001	mg/L	-	0.003	-	< 0.001
Copper (filtered)	0.001	mg/L	0.003	-	< 0.001	-
Iron	0.05	mg/L	-	2.2	-	0.50
Iron (filtered)	0.05	mg/L	1.7	-	0.36	-
Lead	0.001	mg/L	-	< 0.001	-	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Manganese	0.005	mg/L	-	0.14	-	0.014
Manganese (filtered)	0.005	mg/L	0.14	-	0.012	-
Mercury	0.0001	mg/L	-	0.0001	-	< 0.0001
Mercury (filtered)	0.0001	mg/L	< 0.0001	-	< 0.0001	-
Nickel	0.001	mg/L	-	0.004	-	< 0.001
Nickel (filtered)	0.001	mg/L	0.003	-	< 0.001	-
Thallium	0.001	mg/L	-	< 0.001	-	< 0.001
Thallium (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Zinc	0.001	mg/L	-	0.016	-	0.007
Zinc (filtered)	0.001	mg/L	0.016	-	0.006	-
Alkali Metals						
Calcium	0.5	mg/L	1.0	-	2.3	-
Magnesium	0.5	mg/L	1.3	-	1.5	-
Potassium	0.5	mg/L	0.7	-	0.7	-
Sodium	0.5	mg/L	10	-	7.6	-

Client Sample ID			PUW-1 Water	PUW-2 Water	PVW-1 Water	PVW-2 Water
Sample Matrix			M16-Ap02214	M16-Ap02215	M16-Ap02216	M16-Ap02217
Eurofins mgt Sample No.			Not Provided	Not Provided	Not Provided	Not Provided
Date Sampled						
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.25	-	< 0.01	-
Ammonium Ion (as N)	0.01	mg/L	0.27	-	< 0.01	-
Chloride	1	mg/L	15	-	15	-
Conductivity (at 25°C)	1	uS/cm	76	-	79	-
Nitrate (as N)	0.02	mg/L	< 0.02	-	0.12	-

Client Sample ID			PUW-1 Water	PUW-2 Water	PVW-1 Water	PVW-2 Water
Sample Matrix			M16-Ap02214	M16-Ap02215	M16-Ap02216	M16-Ap02217
Eurofins mgt Sample No.			Not Provided	Not Provided	Not Provided	Not Provided
Date Sampled						
Test/Reference	LOR	Unit				
pH	0.1	pH Units	5.1	-	4.5	-
Phosphorus filterable reactive (as P)	0.05	mg/L	< 0.05	-	< 0.05	-
Sulphate (as S)	5	mg/L	< 5	-	< 5	-
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	< 20	-	< 20	-
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10	-	< 10	-
Heavy Metals						
Antimony	0.005	mg/L	-	< 0.005	-	< 0.005
Antimony (filtered)	0.005	mg/L	< 0.005	-	< 0.005	-
Arsenic	0.001	mg/L	-	< 0.001	-	0.002
Arsenic (filtered)	0.001	mg/L	< 0.001	-	0.002	-
Boron	0.05	mg/L	-	< 0.05	-	< 0.05
Boron (filtered)	0.05	mg/L	< 0.05	-	< 0.05	-
Cadmium	0.0002	mg/L	-	< 0.0002	-	< 0.0002
Cadmium (filtered)	0.0002	mg/L	< 0.0002	-	< 0.0002	-
Chromium	0.001	mg/L	-	< 0.001	-	< 0.001
Chromium (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Cobalt	0.001	mg/L	-	0.004	-	0.002
Cobalt (filtered)	0.001	mg/L	0.004	-	0.002	-
Copper	0.001	mg/L	-	0.003	-	0.006
Copper (filtered)	0.001	mg/L	< 0.001	-	0.006	-
Iron	0.05	mg/L	-	23	-	0.37
Iron (filtered)	0.05	mg/L	22	-	0.29	-
Lead	0.001	mg/L	-	< 0.001	-	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Manganese	0.005	mg/L	-	0.30	-	0.16
Manganese (filtered)	0.005	mg/L	0.31	-	0.16	-
Mercury	0.0001	mg/L	-	0.0003	-	< 0.0001
Mercury (filtered)	0.0001	mg/L	0.0002	-	< 0.0001	-
Nickel	0.001	mg/L	-	0.004	-	0.003
Nickel (filtered)	0.001	mg/L	0.003	-	0.002	-
Thallium	0.001	mg/L	-	< 0.001	-	< 0.001
Thallium (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Zinc	0.001	mg/L	-	0.007	-	0.018
Zinc (filtered)	0.001	mg/L	0.006	-	0.017	-
Alkali Metals						
Calcium	0.5	mg/L	2.0	-	1.1	-
Magnesium	0.5	mg/L	1.6	-	1.4	-
Potassium	0.5	mg/L	0.7	-	0.9	-
Sodium	0.5	mg/L	6.4	-	8.1	-

Client Sample ID			PWW-1 Water	PWW-2 Water	PYW-1 Water	PYW-2 Water
Sample Matrix			M16-Ap02218	M16-Ap02219	M16-Ap02220	M16-Ap02221
Eurofins mgt Sample No.			Not Provided	Not Provided	Not Provided	Not Provided
Date Sampled						
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	< 0.01	-	< 0.01	-
Ammonium Ion (as N)	0.01	mg/L	< 0.01	-	< 0.01	-
Chloride	1	mg/L	13	-	13	-
Conductivity (at 25°C)	1	uS/cm	70	-	72	-
Nitrate (as N)	0.02	mg/L	0.75	-	0.14	-
pH	0.1	pH Units	6.4	-	6.7	-
Phosphorus filterable reactive (as P)	0.05	mg/L	< 0.05	-	< 0.05	-
Sulphate (as S)	5	mg/L	< 5	-	< 5	-
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO ₃)	20	mg/L	< 20	-	< 20	-
Carbonate Alkalinity (as CaCO ₃)	10	mg/L	< 10	-	< 10	-
Heavy Metals						
Antimony	0.005	mg/L	-	< 0.005	-	< 0.005
Antimony (filtered)	0.005	mg/L	< 0.005	-	< 0.005	-
Arsenic	0.001	mg/L	-	< 0.001	-	< 0.001
Arsenic (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Boron	0.05	mg/L	-	< 0.05	-	< 0.05
Boron (filtered)	0.05	mg/L	< 0.05	-	< 0.05	-
Cadmium	0.0002	mg/L	-	< 0.0002	-	< 0.0002
Cadmium (filtered)	0.0002	mg/L	< 0.0002	-	< 0.0002	-
Chromium	0.001	mg/L	-	< 0.001	-	< 0.001
Chromium (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Cobalt	0.001	mg/L	-	< 0.001	-	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Copper	0.001	mg/L	-	< 0.001	-	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Iron	0.05	mg/L	-	0.59	-	0.16
Iron (filtered)	0.05	mg/L	0.40	-	< 0.05	-
Lead	0.001	mg/L	-	< 0.001	-	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Manganese	0.005	mg/L	-	0.013	-	0.007
Manganese (filtered)	0.005	mg/L	0.012	-	0.006	-
Mercury	0.0001	mg/L	-	< 0.0001	-	< 0.0001
Mercury (filtered)	0.0001	mg/L	< 0.0001	-	< 0.0001	-
Nickel	0.001	mg/L	-	< 0.001	-	< 0.001
Nickel (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Thallium	0.001	mg/L	-	< 0.001	-	< 0.001
Thallium (filtered)	0.001	mg/L	< 0.001	-	< 0.001	-
Zinc	0.001	mg/L	-	0.007	-	0.006
Zinc (filtered)	0.001	mg/L	0.006	-	0.005	-
Alkali Metals						
Calcium	0.5	mg/L	2.4	-	1.6	-
Magnesium	0.5	mg/L	1.5	-	1.5	-
Potassium	0.5	mg/L	0.7	-	0.9	-
Sodium	0.5	mg/L	7.4	-	8.2	-

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 B11			
Ammonia (as N) - Method: APHA 4500-NH3 Ammonia Nitrogen by FIA	Melbourne	Apr 05, 2016	28 Day
Chloride - Method: MGT 1100A	Melbourne	Apr 05, 2016	28 Day
Nitrate (as N) - Method: APHA 4500-NO3 Nitrate Nitrogen by FIA	Melbourne	Apr 05, 2016	7 Day
Sulphate (as S) - Method: In house MGT1110A (SO4 by Discrete Analyser)	Melbourne	Apr 05, 2016	28 Day
Alkalinity (speciated) - Method: APHA 2320 Alkalinity by Titration	Melbourne	Apr 05, 2016	14 Day
Alkali Metals - Method: USEPA 6010 Alkali Metals	Melbourne	Apr 04, 2016	180 Day
Ammonium Ion (as N) - Method: APHA 4500-NH3 Ammonia Nitrogen by FIA	Melbourne	Apr 05, 2016	7 Day
Conductivity (at 25°C) - Method: LTM-INO-4030	Melbourne	Apr 05, 2016	28 Day
pH - Method: LTM-GEN-7090 pH in water by ISE	Melbourne	Apr 05, 2016	0 Hours
Phosphorus filterable reactive (as P) - Method: APHA 4500-P Phosphate (filterable reactive)	Melbourne	Apr 05, 2016	2 Day
Heavy Metals - Method: LTM-MET-3040 Metals in Waters by ICP-MS	Melbourne	Apr 04, 2016	180 Day
Heavy Metals (filtered) - Method: LTM-MET-3040 Metals in Waters by ICP-MS	Melbourne	Apr 04, 2016	180 Day
Mobil Metals : Metals M15 - Method: LTM-MET-3040 Metals in Waters by ICP-MS	Melbourne	Apr 04, 2016	28 Day

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Due: Apr 8, 2016
Priority: 5 Day
Contact Name: Andrew Rumsby

Eurofins | mgt Client Manager: Onur Mehmet

Sample Detail					Eurofins mgt Suite B11																														
					Zinc (filtered)	Zinc	Thallium (filtered)	Thallium	Phosphorus filterable reactive (as P)	pH	Nickel (filtered)	Nickel	Mercury (filtered)	Mercury	Manganese (filtered)	Manganese	Lead (filtered)	Lead	Iron (filtered)	Iron	Copper (filtered)	Copper	Conductivity (at 25°C)	Cobalt (filtered)	Cobalt	Chromium (filtered)	Chromium	Cadmium (filtered)	Cadmium	Boron (filtered)	Boron	Arsenic (filtered)	Arsenic	Antimony (filtered)	Antimony
Laboratory where analysis is conducted																																			
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																																			
Brisbane Laboratory - NATA Site # 20794																																			
External Laboratory																																			
Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																															
PDW01	Not Provided		Water	M16-Ap02182	X		X		X		X		X	X		X		X		X	X		X												
PDW02	Not Provided		Water	M16-Ap02183		X		X		X		X		X		X		X		X			X												
PFW01	Not Provided		Water	M16-Ap02184	X		X		X		X		X	X		X		X		X	X		X												
PFW02	Not Provided		Water	M16-Ap02185		X		X		X		X		X		X		X		X			X												
PGW01	Not Provided		Water	M16-Ap02186	X		X		X		X		X	X		X		X		X	X		X												
PGW02	Not Provided		Water	M16-Ap02187		X		X		X		X		X		X		X		X			X												
PHW01	Not Provided		Water	M16-Ap02188	X		X		X		X		X	X		X		X		X	X		X												
PHW02	Not Provided		Water	M16-Ap02189		X		X		X		X		X		X		X		X			X												
PJW01	Not Provided		Water	M16-Ap02190	X		X		X		X		X	X		X		X		X	X		X												
PJW02	Not Provided		Water	M16-Ap02191		X		X		X		X		X		X		X		X			X												

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Eurofins | mgt Client Manager: Onur Mehmet

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Company Name: Pattle Delamore Partners Ltd
Address: PDP House Level 4, 235 Broadway
Newmarket
Auckland New Zealand 1023
Project Name: A02982801

Order No.:
Report #: 495277
Phone: 0011 64 9 523 6900
Fax: 0011 64 9 523 6901

Received: Apr 1, 2016 5:00 PM
Due: Apr 8, 2016
Priority: 5 Day
Contact Name: Andrew Rumsby

Eurofins | mgt Client Manager: Onur Mehmet

Sample Detail					Eurofins mgt Suite B11	
					Zinc (filtered)	
					Zinc	
					Zinc (filtered)	
					Thallium (filtered)	
					Thallium	
					Phosphorus filterable reactive (as P)	
					pH	
					Nickel (filtered)	
					Nickel	
					Mercury (filtered)	
					Mercury	
					Manganese (filtered)	
					Manganese	
					Lead (filtered)	
					Lead	
					Iron (filtered)	
					Iron	
					Copper (filtered)	
					Copper	
					Conductivity (at 25°C)	
					Cobalt (filtered)	
					Cobalt	
					Chromium (filtered)	
					Chromium	
					Cadmium (filtered)	
					Cadmium	
					Boron (filtered)	
					Boron	
					Arsenic (filtered)	
					Arsenic	
					Antimony (filtered)	
					Antimony	
					Ammonium Ion (as N)	
Laboratory where analysis is conducted						
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
External Laboratory						
PUW-1	Not Provided		Water	M16-Ap02214	X	X
PUW-2	Not Provided		Water	M16-Ap02215		X
PVW-1	Not Provided		Water	M16-Ap02216	X	X
PVW-2	Not Provided		Water	M16-Ap02217		X
PWW-1	Not Provided		Water	M16-Ap02218	X	X
PWW-2	Not Provided		Water	M16-Ap02219		X
PYW-1	Not Provided		Water	M16-Ap02220	X	X
PYW-2	Not Provided		Water	M16-Ap02221		X

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. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. 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

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

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

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

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. 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.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (Eurofins mgt uses NATA accredited in-house method LTM-GEN-7010)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
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 20-130%.

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							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Ammonium Ion (as N)	mg/L	< 0.01			0.01	Pass	
Chloride	mg/L	< 1			1	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Phosphorus filterable reactive (as P)	mg/L	< 0.05			0.05	Pass	
Sulphate (as S)	mg/L	< 5			5	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO ₃)	mg/L	< 10			10	Pass	
Method Blank							
Heavy Metals							
Antimony	mg/L	< 0.005			0.005	Pass	
Antimony (filtered)	mg/L	< 0.005			0.005	Pass	
Arsenic	mg/L	< 0.001			0.001	Pass	
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Boron	mg/L	< 0.05			0.05	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese	mg/L	< 0.005			0.005	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury	mg/L	< 0.0001			0.0001	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Thallium	mg/L	< 0.001			0.001	Pass	
Thallium (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc	mg/L	< 0.001			0.001	Pass	
Zinc (filtered)	mg/L	< 0.001			0.001	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	95			70-130	Pass	
Chloride	%	108			70-130	Pass	
Nitrate (as N)	%	91			70-130	Pass	
Sulphate (as S)	%	113			70-130	Pass	

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery										
Heavy Metals										
Antimony				%	87			80-120	Pass	
Arsenic				%	93			80-120	Pass	
Arsenic (filtered)				%	108			80-120	Pass	
Cadmium				%	94			80-120	Pass	
Cadmium (filtered)				%	94			80-120	Pass	
Chromium				%	95			80-120	Pass	
Chromium (filtered)				%	92			80-120	Pass	
Cobalt				%	92			80-120	Pass	
Cobalt (filtered)				%	85			80-120	Pass	
Copper				%	92			80-120	Pass	
Copper (filtered)				%	87			80-120	Pass	
Iron				%	92			80-120	Pass	
Iron (filtered)				%	89			80-120	Pass	
Lead				%	92			80-120	Pass	
Lead (filtered)				%	100			80-120	Pass	
Manganese				%	92			80-120	Pass	
Manganese (filtered)				%	97			80-120	Pass	
Mercury				%	92			75-125	Pass	
Mercury (filtered)				%	103			70-130	Pass	
Nickel				%	92			80-120	Pass	
Nickel (filtered)				%	84			80-120	Pass	
Thallium				%	92			80-120	Pass	
Thallium (filtered)				%	102			80-120	Pass	
Zinc				%	97			80-120	Pass	
Zinc (filtered)				%	95			80-120	Pass	
LCS - % Recovery										
Alkali Metals										
Calcium				%	83			70-130	Pass	
Magnesium				%	90			70-130	Pass	
Potassium				%	93			70-130	Pass	
Sodium				%	82			70-130	Pass	
Test	Lab Sample ID	QA Source		Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery										
Alkalinity (speciated)					Result 1					
Bicarbonate Alkalinity (as CaCO ₃)	M16-Ap02761	NCP		%	128			70-130	Pass	
Spike - % Recovery										
Heavy Metals					Result 1					
Antimony (filtered)	M16-Ap02182	CP		%	92			75-125	Pass	
Arsenic (filtered)	M16-Ap02182	CP		%	99			70-130	Pass	
Cadmium (filtered)	M16-Ap02182	CP		%	100			70-130	Pass	
Chromium (filtered)	M16-Ap02182	CP		%	99			70-130	Pass	
Cobalt (filtered)	M16-Ap02182	CP		%	99			75-125	Pass	
Copper (filtered)	M16-Ap02182	CP		%	98			70-130	Pass	
Lead (filtered)	M16-Ap02182	CP		%	98			70-130	Pass	
Manganese (filtered)	M16-Ap02182	CP		%	97			70-130	Pass	
Mercury (filtered)	M16-Ap02182	CP		%	88			70-130	Pass	
Nickel (filtered)	M16-Ap02182	CP		%	99			70-130	Pass	
Thallium (filtered)	M16-Ap02182	CP		%	98			75-125	Pass	
Zinc (filtered)	M16-Ap02182	CP		%	103			70-130	Pass	
Spike - % Recovery										
Alkali Metals					Result 1					
Calcium	M16-Ap02182	CP		%	81			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Magnesium	M16-Ap02182	CP	%	89			70-130	Pass	
Potassium	M16-Ap02182	CP	%	80			70-130	Pass	
Sodium	M16-Ap02182	CP	%	84			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Antimony	M16-Ap02183	CP	%	101			70-130	Pass	
Arsenic	M16-Ap02183	CP	%	103			75-125	Pass	
Cadmium	M16-Ap02183	CP	%	105			75-125	Pass	
Chromium	M16-Ap02183	CP	%	106			75-125	Pass	
Cobalt	M16-Ap02183	CP	%	103			75-125	Pass	
Copper	M16-Ap02183	CP	%	103			75-125	Pass	
Lead	M16-Ap02183	CP	%	103			75-125	Pass	
Manganese	M16-Ap02183	CP	%	100			75-125	Pass	
Mercury	M16-Ap02183	CP	%	104			70-130	Pass	
Nickel	M16-Ap02183	CP	%	104			75-125	Pass	
Thallium	M16-Ap02183	CP	%	102			75-125	Pass	
Zinc	M16-Ap02183	CP	%	107			75-125	Pass	
Spike - % Recovery									
				Result 1					
Sulphate (as S)	M16-Ap02186	CP	%	108			70-130	Pass	
Spike - % Recovery									
				Result 1					
Ammonia (as N)	M16-Ap02196	CP	%	95			70-130	Pass	
Nitrate (as N)	M16-Ap02196	CP	%	90			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Antimony (filtered)	M16-Ap02200	CP	%	94			75-125	Pass	
Arsenic (filtered)	M16-Ap02200	CP	%	103			70-130	Pass	
Cadmium (filtered)	M16-Ap02200	CP	%	104			70-130	Pass	
Chromium (filtered)	M16-Ap02200	CP	%	104			70-130	Pass	
Cobalt (filtered)	M16-Ap02200	CP	%	101			75-125	Pass	
Copper (filtered)	M16-Ap02200	CP	%	102			70-130	Pass	
Iron (filtered)	M16-Ap02200	CP	%	82			70-130	Pass	
Lead (filtered)	M16-Ap02200	CP	%	102			70-130	Pass	
Manganese (filtered)	M16-Ap02200	CP	%	100			70-130	Pass	
Mercury (filtered)	M16-Ap02200	CP	%	96			70-130	Pass	
Nickel (filtered)	M16-Ap02200	CP	%	101			70-130	Pass	
Thallium (filtered)	M16-Ap02200	CP	%	101			75-125	Pass	
Zinc (filtered)	M16-Ap02200	CP	%	106			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Antimony	M16-Ap02201	CP	%	92			70-130	Pass	
Arsenic	M16-Ap02201	CP	%	93			75-125	Pass	
Cadmium	M16-Ap02201	CP	%	95			75-125	Pass	
Chromium	M16-Ap02201	CP	%	96			75-125	Pass	
Cobalt	M16-Ap02201	CP	%	94			75-125	Pass	
Copper	M16-Ap02201	CP	%	94			75-125	Pass	
Lead	M16-Ap02201	CP	%	93			75-125	Pass	
Manganese	M16-Ap02201	CP	%	91			75-125	Pass	
Mercury	M16-Ap02201	CP	%	94			70-130	Pass	
Nickel	M16-Ap02201	CP	%	94			75-125	Pass	
Thallium	M16-Ap02201	CP	%	91			75-125	Pass	
Zinc	M16-Ap02201	CP	%	98			75-125	Pass	
Spike - % Recovery									

Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
				Result 1				
Chloride	M16-Ap02202	CP	%	94		70-130	Pass	
Spike - % Recovery								
Alkali Metals				Result 1				
Calcium	M16-Ap02202	CP	%	93		70-130	Pass	
Magnesium	M16-Ap02202	CP	%	102		70-130	Pass	
Potassium	M16-Ap02202	CP	%	86		70-130	Pass	
Sodium	M16-Ap02202	CP	%	96		70-130	Pass	
Spike - % Recovery								
				Result 1				
Sulphate (as S)	M16-Ap02208	CP	%	105		70-130	Pass	
Spike - % Recovery								
				Result 1				
Ammonia (as N)	M16-Ap02210	CP	%	96		70-130	Pass	
Nitrate (as N)	M16-Ap02210	CP	%	91		70-130	Pass	
Spike - % Recovery								
				Result 1				
Ammonia (as N)	M16-Ap02220	CP	%	95		70-130	Pass	
Chloride	M16-Ap02220	CP	%	93		70-130	Pass	
Nitrate (as N)	M16-Ap02220	CP	%	92		70-130	Pass	
Phosphorus filterable reactive (as P)	M16-Ap02220	CP	%	108		70-130	Pass	
Spike - % Recovery								
Heavy Metals				Result 1				
Antimony (filtered)	M16-Ap02220	CP	%	93		75-125	Pass	
Arsenic (filtered)	M16-Ap02220	CP	%	98		70-130	Pass	
Cadmium (filtered)	M16-Ap02220	CP	%	102		70-130	Pass	
Chromium (filtered)	M16-Ap02220	CP	%	102		70-130	Pass	
Cobalt (filtered)	M16-Ap02220	CP	%	100		75-125	Pass	
Copper (filtered)	M16-Ap02220	CP	%	99		70-130	Pass	
Iron (filtered)	M16-Ap02220	CP	%	98		70-130	Pass	
Lead (filtered)	M16-Ap02220	CP	%	100		70-130	Pass	
Manganese (filtered)	M16-Ap02220	CP	%	99		70-130	Pass	
Mercury (filtered)	M16-Ap02220	CP	%	96		70-130	Pass	
Nickel (filtered)	M16-Ap02220	CP	%	100		70-130	Pass	
Thallium (filtered)	M16-Ap02220	CP	%	100		75-125	Pass	
Zinc (filtered)	M16-Ap02220	CP	%	105		70-130	Pass	
Spike - % Recovery								
Heavy Metals				Result 1				
Antimony	M16-Ap02221	CP	%	94		70-130	Pass	
Arsenic	M16-Ap02221	CP	%	96		75-125	Pass	
Cadmium	M16-Ap02221	CP	%	95		75-125	Pass	
Chromium	M16-Ap02221	CP	%	96		75-125	Pass	
Cobalt	M16-Ap02221	CP	%	95		75-125	Pass	
Copper	M16-Ap02221	CP	%	94		75-125	Pass	
Iron	M16-Ap02221	CP	%	85		75-125	Pass	
Lead	M16-Ap02221	CP	%	95		75-125	Pass	
Manganese	M16-Ap02221	CP	%	93		75-125	Pass	
Mercury	M16-Ap02221	CP	%	95		70-130	Pass	
Nickel	M16-Ap02221	CP	%	94		75-125	Pass	
Thallium	M16-Ap02221	CP	%	93		75-125	Pass	
Zinc	M16-Ap02221	CP	%	97		75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (at 25°C)	M16-Ap02182	CP	uS/cm	140	140	<1	30%	Pass	
pH	M16-Ap02182	CP	pH Units	6.9	6.8	pass	30%	Pass	
Duplicate									
Alkalinity (speciated)									
				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO ₃)	M16-Ap02182	CP	mg/L	22	23	3.0	30%	Pass	
Carbonate Alkalinity (as CaCO ₃)	M16-Ap02182	CP	mg/L	< 10	< 10	<1	30%	Pass	
Duplicate									
Heavy Metals									
				Result 1	Result 2	RPD			
Antimony (filtered)	M16-Ap02182	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Arsenic (filtered)	M16-Ap02182	CP	mg/L	0.001	< 0.001	16	30%	Pass	
Boron (filtered)	M16-Ap02662	NCP	mg/L	1.1	0.97	14	30%	Pass	
Cadmium (filtered)	M16-Ap02182	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M16-Ap02182	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	M16-Ap02182	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	M16-Ap02182	CP	mg/L	0.002	0.002	1.0	30%	Pass	
Iron (filtered)	M16-Ap02182	CP	mg/L	0.73	0.73	<1	30%	Pass	
Lead (filtered)	M16-Ap02182	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	M16-Ap02182	CP	mg/L	0.021	0.020	2.0	30%	Pass	
Mercury (filtered)	M16-Ap02182	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	M16-Ap02182	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Thallium (filtered)	M16-Ap02182	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Zinc (filtered)	M16-Ap02182	CP	mg/L	0.008	0.008	2.0	30%	Pass	
Duplicate									
Alkali Metals									
				Result 1	Result 2	RPD			
Calcium	M16-Ap02182	CP	mg/L	9.8	9.0	9.0	30%	Pass	
Magnesium	M16-Ap02182	CP	mg/L	2.6	2.5	3.0	30%	Pass	
Potassium	M16-Ap02182	CP	mg/L	2.1	2.0	7.0	30%	Pass	
Sodium	M16-Ap02182	CP	mg/L	15	13	11	30%	Pass	
Duplicate									
Heavy Metals									
				Result 1	Result 2	RPD			
Antimony	M16-Ap02183	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Arsenic	M16-Ap02183	CP	mg/L	0.001	0.001	4.0	30%	Pass	
Boron	S16-Ap01833	NCP	mg/L	0.10	0.10	6.0	30%	Pass	
Cadmium	M16-Ap02183	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	M16-Ap02183	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt	M16-Ap02183	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	M16-Ap02183	CP	mg/L	0.002	0.002	17	30%	Pass	
Iron	M16-Ap02183	CP	mg/L	0.94	0.91	3.0	30%	Pass	
Lead	M16-Ap02183	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese	M16-Ap02183	CP	mg/L	0.023	0.022	2.0	30%	Pass	
Mercury	M16-Ap02183	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel	M16-Ap02183	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Thallium	M16-Ap02183	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Zinc	M16-Ap02183	CP	mg/L	0.007	0.007	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M16-Ap02186	CP	mg/L	16	17	1.8	30%	Pass	
Sulphate (as S)	M16-Ap02186	CP	mg/L	< 5	< 5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M16-Ap02196	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Ammonium Ion (as N)	M16-Ap02196	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Nitrate (as N)	M16-Ap02196	CP	mg/L	0.15	0.14	1.0	30%	Pass	

Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Antimony (filtered)	M16-Ap02200	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Arsenic (filtered)	M16-Ap02200	CP	mg/L	0.002	0.002	13	30%	Pass
Cadmium (filtered)	M16-Ap02200	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Chromium (filtered)	M16-Ap02200	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cobalt (filtered)	M16-Ap02200	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Copper (filtered)	M16-Ap02200	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Iron (filtered)	M16-Ap02200	CP	mg/L	0.20	0.18	11	30%	Pass
Lead (filtered)	M16-Ap02200	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Manganese (filtered)	M16-Ap02200	CP	mg/L	0.020	0.018	11	30%	Pass
Mercury (filtered)	M16-Ap02200	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass
Nickel (filtered)	M16-Ap02200	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Thallium (filtered)	M16-Ap02200	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Zinc (filtered)	M16-Ap02200	CP	mg/L	0.006	0.006	8.0	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Antimony	M16-Ap02201	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Arsenic	M16-Ap02201	CP	mg/L	0.002	0.003	10	30%	Pass
Cadmium	M16-Ap02201	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Chromium	M16-Ap02201	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cobalt	M16-Ap02201	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Copper	M16-Ap02201	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Iron	M16-Ap02201	CP	mg/L	0.31	0.31	1.0	30%	Pass
Lead	M16-Ap02201	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Manganese	M16-Ap02201	CP	mg/L	0.020	0.020	1.0	30%	Pass
Mercury	M16-Ap02201	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass
Nickel	M16-Ap02201	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Thallium	M16-Ap02201	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Zinc	M16-Ap02201	CP	mg/L	0.007	0.007	8.0	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Chloride	M16-Ap02202	CP	mg/L	13	13	4.8	30%	Pass
Conductivity (at 25°C)	M16-Ap02202	CP	uS/cm	70	70	<1	30%	Pass
pH	M16-Ap02202	CP	pH Units	6.3	6.4	pass	30%	Pass
Sulphate (as S)	M16-Ap02202	CP	mg/L	< 5	< 5	<1	30%	Pass
Duplicate								
Alkalinity (speciated)				Result 1	Result 2	RPD		
Bicarbonate Alkalinity (as CaCO ₃)	M16-Ap02202	CP	mg/L	< 20	< 20	<1	30%	Pass
Carbonate Alkalinity (as CaCO ₃)	M16-Ap02202	CP	mg/L	< 10	< 10	<1	30%	Pass
Duplicate								
Alkali Metals				Result 1	Result 2	RPD		
Calcium	M16-Ap02202	CP	mg/L	1.9	1.9	3.0	30%	Pass
Magnesium	M16-Ap02202	CP	mg/L	1.4	1.4	3.0	30%	Pass
Potassium	M16-Ap02202	CP	mg/L	0.8	0.8	<1	30%	Pass
Sodium	M16-Ap02202	CP	mg/L	9.6	9.6	1.0	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Chloride	M16-Ap02208	CP	mg/L	15	14	6.8	30%	Pass
Sulphate (as S)	M16-Ap02208	CP	mg/L	< 5	< 5	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Ammonia (as N)	M16-Ap02210	CP	mg/L	0.02	0.02	10	30%	Pass
Ammonium Ion (as N)	M16-Ap02210	CP	mg/L	0.02	0.02	10	30%	Pass
Nitrate (as N)	M16-Ap02210	CP	mg/L	0.30	0.30	<1	30%	Pass

Duplicate								
				Result 1	Result 2	RPD		
Ammonia (as N)	M16-Ap02220	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass
Ammonium Ion (as N)	M16-Ap02220	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass
Chloride	M16-Ap02220	CP	mg/L	13	14	6.2	30%	Pass
Nitrate (as N)	M16-Ap02220	CP	mg/L	0.14	0.12	10	30%	Pass
Phosphorus filterable reactive (as P)	M16-Ap02220	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Sulphate (as S)	M16-Ap02220	CP	mg/L	< 5	< 5	<1	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Antimony (filtered)	M16-Ap02220	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Arsenic (filtered)	M16-Ap02220	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cadmium (filtered)	M16-Ap02220	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Chromium (filtered)	M16-Ap02220	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cobalt (filtered)	M16-Ap02220	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Copper (filtered)	M16-Ap02220	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Iron (filtered)	M16-Ap02220	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Lead (filtered)	M16-Ap02220	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Manganese (filtered)	M16-Ap02220	CP	mg/L	0.006	0.006	<1	30%	Pass
Mercury (filtered)	M16-Ap02220	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass
Nickel (filtered)	M16-Ap02220	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Thallium (filtered)	M16-Ap02220	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Zinc (filtered)	M16-Ap02220	CP	mg/L	0.005	0.006	11	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Antimony	M16-Ap02221	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Arsenic	M16-Ap02221	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cadmium	M16-Ap02221	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Chromium	M16-Ap02221	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cobalt	M16-Ap02221	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Copper	M16-Ap02221	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Iron	M16-Ap02221	CP	mg/L	0.16	0.17	8.0	30%	Pass
Lead	M16-Ap02221	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Manganese	M16-Ap02221	CP	mg/L	0.007	0.008	6.0	30%	Pass
Mercury	M16-Ap02221	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass
Nickel	M16-Ap02221	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Thallium	M16-Ap02221	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Zinc	M16-Ap02221	CP	mg/L	0.006	0.006	3.0	30%	Pass

Comments

Sample Integrity

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

Authorised By

Onur Mehmet	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Huong Le	Senior Analyst-Inorganic (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

Uncertainty data is available on request

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02 May 2016

Onur Mehmet

Eurofins MGT (Melbourne)

2-5 Kingston Town Close

Oakleigh, VIC 3164

RE: Freshwater Sediments And Tissues

Enclosed are the analytical results for samples received by Eurofins Frontier Global Sciences. All quality control measurements are within established control limits and there were no analytical difficulties encountered with the exception of those listed in the case narrative section of this report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Amy Goodall

Project Manager



Frontier Global Sciences

11720 Northcreek Pkwy N, Suite 400
Bothell, WA 98011
425.686.1996 Phone
425.686.3096 Fax

Eurofins MGT (Melbourne)
2-5 Kingston Town Close
Oakleigh VIC, 3164

Project: Freshwater Sediments And Tissues
Project Number: Freshwater Sediments And Tissues
Project Manager: Onur Mehmet

Reported:
02-May-16 15:28

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
PNW01 Ap20731	1604643-01	Water	22-Apr-16 00:00	25-Apr-16 13:00
PNW02 Ap20732	1604643-02	Water	22-Apr-16 00:00	25-Apr-16 13:00
PRW01 Ap20733	1604643-03	Water	22-Apr-16 00:00	25-Apr-16 13:00
PRW02 Ap20734	1604643-04	Water	22-Apr-16 00:00	25-Apr-16 13:00
PUW03 Ap20735	1604643-05	Water	22-Apr-16 00:00	25-Apr-16 13:00
PUW04 Ap20736	1604643-06	Water	22-Apr-16 00:00	25-Apr-16 13:00
PLW04 Ap20737	1604643-07	Water	22-Apr-16 00:00	25-Apr-16 13:00

Eurofins Frontier Global Sciences, Inc.

The results in this report only apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Amy Goodall, Project Manager

Page 2 of 15

Eurofins MGT (Melbourne)
2-5 Kingston Town Close
Oakleigh VIC, 3164Project: Freshwater Sediments And Tissues
Project Number: Freshwater Sediments And Tissues
Project Manager: Onur MehmetReported:
02-May-16 15:28

SAMPLE RECEIPT

Samples were received at Eurofins Frontier Global Sciences (EFGS) on 4/25/2016 1:00:00 PM. The samples were received intact, on-ice within a sealed cooler at 9.7 degrees Celsius.

SAMPLE PREPARATION AND ANALYSIS

Samples were prepared and analyzed for total mercury by flow injection atomic fluorescence spectrometry (FI-AFS) in accordance with EPA 1631E.

ANALYTICAL AND QUALITY CONTROL ISSUES

Method blanks were prepared for every preparation to assess possible blank contribution from the sample preparation procedure. The method blanks were carried through the entire analytical procedure. All blanks fell within the established acceptance criteria with the exception of any items narrated above or flagged and described in the notes and definitions section of the report.

Liquid spikes, certified reference material (CRM) or a quality control samples (QCS) were prepared for every preparation as a measure of accuracy. All liquid spikes, CRMs and/or QCS samples fell within the established acceptance criteria with the exception of any items narrated above or flagged and described in the notes and definitions section of the report.

As an additional measure of the accuracy of the methods used and to check for matrix interference, matrix spikes (MS) and matrix spike duplicates (MSD) were digested and analyzed. All of the matrix spike recoveries fell within the established acceptance criteria with the exception of any items flagged and described in the notes and definitions section of the report.

A reasonable measure of the precision of the analytical methods is the relative percent difference (RPD) between a matrix spike recovery and a matrix spike duplicate recovery and between laboratory control sample recovery and laboratory control sample duplicate recoveries. All of the relative percent differences established acceptance criteria with the exception of any items flagged and described in the notes and definitions section of the report.

Eurofins Frontier Global Sciences, Inc.



The results in this report only apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Amy Goodall, Project Manager

Sample Receipt Checklist

EFGS Work Order: 1604643

Client: MGT Melbourne

Date & Time Received: 4/25/16 13:00

Date Labeled: 4/25/16 Labeled By: LM

Project: _____

Received By: LM

Label Verified By: Gma

of Coolers Received: 1 Samples Arrived By: ☒ Shipping Service _____ Courier _____ Hand _____ Other (Specify: _____)

Coolant: ☐ None/Ambient ☐ Loose Ice ☒ Gel Ice ☐ Dry Ice Coolant Required: Y/N Temp Blank Used: Y/N for Cooler(s): _____

Notify Project Manager if packages/coolers are received without coolant or with thawed coolant and at a temperature in excess of 6°C. PM notified: Y/N

Cooler Information:	Y/N/NA	Comments
The coolers do not appear to be tampered with:	<u>Y</u>	
Custody Seals are present and intact:	<u>N</u>	
Custody seals signed:	<u>N</u>	

TID: <u>5225</u>	CF: <u>-6.2°C</u>	Date/time: <u>4/25/16 13:00</u>	By: <u>LM</u>
Cooler 1: <u>9.9</u> °C	w/ CF: <u>9.7</u> °C	Cooler 4: _____ °C	w/ CF: _____ °C
Cooler 2: _____ °C	w/ CF: _____ °C	Cooler 5: _____ °C	w/ CF: _____ °C
Cooler 3: _____ °C	w/ CF: _____ °C	Cooler 6: _____ °C	w/ CF: _____ °C

Chain of Custody:	Y/N/NA	Comments
Sample ID/Description:	<u>Y</u>	
Date and time of collection:	<u>N</u>	
Sampled by:	<u>N</u>	
Preservation type:	<u>N</u>	
Requested analyses:	<u>Y</u>	
Required signatures:	<u>Y</u>	
Internal COC required:	<u>N</u>	

Sample Condition/Integrity:	Y/N/NA	Comments
Sample containers intact/present:	<u>Y</u>	
Sample labels are present and legible:	<u>Y</u>	
Sample ID on container/bag matches COC:	<u>Y</u>	
Correct sample containers used:	<u>Y</u>	
Samples received within holding times:	<u>Y</u>	
Sample volume sufficient for requested analyses:	<u>Y</u>	
Correct preservative used for requested analyses:	<u>NA</u>	

Anomalies/Non-conformances (attach additional pages if needed):



Frontier Global Sciences

11720 Northcreek Pkwy N, Suite 400
Bothell, WA 98011
425.686.1996 Phone
425.686.3096 Fax

Eurofins MGT (Melbourne)
2-5 Kingston Town Close
Oakleigh VIC, 3164

Project: Freshwater Sediments And Tissues
Project Number: Freshwater Sediments And Tissues
Project Manager: Onur Mehmet

Reported:
02-May-16 15:28

PNW01 Ap20731

1604643-01

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
---------	--------	--------------------	--------------------	-------	----------	-------	----------	----------	----------	--------	-------

Sample Preparation: EPA 1631E BrCl Oxidation

Mercury	9.88	-	0.50	ng/L	1	F604327	25-Apr-16	6D28002	27-Apr-16	EPA 1631E	
---------	------	---	------	------	---	---------	-----------	---------	-----------	-----------	--

Eurofins Frontier Global Sciences, Inc.

Amy Goodall

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Amy Goodall, Project Manager

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Oakleigh VIC, 3164

Project: Freshwater Sediments And Tissues
Project Number: Freshwater Sediments And Tissues
Project Manager: Onur Mehmet

Reported:
02-May-16 15:28

PNW02 Ap20732

1604643-02

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	14.6	-	0.50	ng/L	1	F604327	25-Apr-16	6D28002	27-Apr-16	EPA 1631E	

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Amy Goodall

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Amy Goodall, Project Manager

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Oakleigh VIC, 3164

Project: Freshwater Sediments And Tissues
Project Number: Freshwater Sediments And Tissues
Project Manager: Onur Mehmet

Reported:
02-May-16 15:28

PRW01 Ap20733

1604643-03

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	37.1	-	0.50	ng/L	1	F604327	25-Apr-16	6D28002	27-Apr-16	EPA 1631E	

Eurofins Frontier Global Sciences, Inc.

Amy Goodall

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Amy Goodall, Project Manager

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Frontier Global Sciences

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Oakleigh VIC, 3164

Project: Freshwater Sediments And Tissues
Project Number: Freshwater Sediments And Tissues
Project Manager: Onur Mehmet

Reported:
02-May-16 15:28

PRW02 Ap20734

1604643-04

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	55.1	-	5.00	ng/L	10	F604327	25-Apr-16	6D28002	27-Apr-16	EPA 1631E	

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Amy Goodall

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Amy Goodall, Project Manager

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Frontier Global Sciences

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Oakleigh VIC, 3164

Project: Freshwater Sediments And Tissues
Project Number: Freshwater Sediments And Tissues
Project Manager: Onur Mehmet

Reported:
02-May-16 15:28

PUW03 Ap20735

1604643-05

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	254	-	5.00	ng/L	10	F604327	25-Apr-16	6D28002	27-Apr-16	EPA 1631E	

Eurofins Frontier Global Sciences, Inc.

Amy Goodall

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Amy Goodall, Project Manager

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Oakleigh VIC, 3164

Project: Freshwater Sediments And Tissues
Project Number: Freshwater Sediments And Tissues
Project Manager: Onur Mehmet

Reported:
02-May-16 15:28

PUW04 Ap20736

1604643-06

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	300	-	5.00	ng/L	10	F604327	25-Apr-16	6D28002	27-Apr-16	EPA 1631E	

Eurofins Frontier Global Sciences, Inc.

Amy Goodall

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Amy Goodall, Project Manager

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2-5 Kingston Town Close
Oakleigh VIC, 3164

Project: Freshwater Sediments And Tissues
Project Number: Freshwater Sediments And Tissues
Project Manager: Onur Mehmet

Reported:
02-May-16 15:28

PLW04 Ap20737

1604643-07

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	15.4	-	0.50	ng/L	1	F604327	25-Apr-16	6D28002	27-Apr-16	EPA 1631E	

Eurofins Frontier Global Sciences, Inc.

Amy Goodall

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Amy Goodall, Project Manager

Page 12 of 15

Eurofins MGT (Melbourne)
2-5 Kingston Town Close
Oakleigh VIC, 3164

Project: Freshwater Sediments And Tissues
Project Number: Freshwater Sediments And Tissues
Project Manager: Onur Mehmet

Reported:
02-May-16 15:28

Quality Control Data

Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch F604327 - EPA 1631E BrCl Oxidation											
Blank (F604327-BLK1)					Prepared & Analyzed: 27-Apr-16						
Mercury	ND	-	0.50	ng/L							U
Blank (F604327-BLK2)					Prepared & Analyzed: 27-Apr-16						
Mercury	ND	-	0.50	ng/L							U
Blank (F604327-BLK3)					Prepared & Analyzed: 27-Apr-16						
Mercury	ND	-	0.50	ng/L							U
Blank (F604327-BLK4)					Prepared & Analyzed: 27-Apr-16						
Mercury	ND	-	0.52	ng/L							QB-06, U
LCS (F604327-BS1)					Prepared & Analyzed: 27-Apr-16						
Mercury	15.48	-	0.50	ng/L	15.679		98.7	80-120			
LCS Dup (F604327-BSD1)					Prepared & Analyzed: 27-Apr-16						
Mercury	15.29	-	0.50	ng/L	15.679		97.5	80-120	1.24	24	
Duplicate (F604327-DUP1)		Source: 1604642-01			Prepared & Analyzed: 27-Apr-16						
Mercury	10.33	-	0.50	ng/L		10.12			1.98	24	
Matrix Spike (F604327-MS1)		Source: 1604642-01			Prepared & Analyzed: 27-Apr-16						
Mercury	57.86	-	2.50	ng/L	50.601	10.12	94.3	71-125			
Matrix Spike (F604327-MS2)		Source: 1604642-03			Prepared & Analyzed: 27-Apr-16						
Mercury	71.06	-	2.50	ng/L	50.601	18.83	103	71-125			
Matrix Spike Dup (F604327-MSD1)		Source: 1604642-01			Prepared & Analyzed: 27-Apr-16						
Mercury	61.18	-	2.50	ng/L	50.601	10.12	101	71-125	5.57	24	

Eurofins Frontier Global Sciences, Inc.



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Amy Goodall, Project Manager



Frontier Global Sciences

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Oakleigh VIC, 3164

Project: Freshwater Sediments And Tissues
Project Number: Freshwater Sediments And Tissues
Project Manager: Onur Mehmet

Reported:
02-May-16 15:28

Quality Control Data

Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	--------------------	--------------------	-------	----------------	------------------	------	----------------	-----	--------------	-------

Batch F604327 - EPA 1631E BrCl Oxidation

Matrix Spike Dup (F604327-MSD2)

Source: 1604642-03

Prepared & Analyzed: 27-Apr-16

Mercury	68.60	-	2.50	ng/L	50.601	18.83	98.4	71-125	3.52	24	
---------	-------	---	------	------	--------	-------	------	--------	------	----	--

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Amy Goodall

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Amy Goodall, Project Manager

Eurofins MGT (Melbourne)
2-5 Kingston Town Close
Oakleigh VIC, 3164Project: Freshwater Sediments And Tissues
Project Number: Freshwater Sediments And Tissues
Project Manager: Onur Mehmet**Reported:**
02-May-16 15:28**Notes and Definitions**

U	Analyte was not detected and is reported as less than the LOD or as defined by the client. The LOD has been adjusted for any dilution or concentration of the sample.
QB-06	The blank was preserved to 5% BrCl rather than 1%. The control limit for blanks preserved to greater than 1% BrCl is the preservation percentage multiplied by the MRL.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Eurofins Frontier Global Sciences, Inc.

*The results in this report only apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Amy Goodall, Project Manager

15 April 2016

Onur Mehmet

Eurofins MGT (Melbourne)

2-5 Kingston Town Close

Oakleigh, VIC 3164

RE: Freshwater Sediments And Tissues

Enclosed are the analytical results for samples received by Eurofins Frontier Global Sciences. All quality control measurements are within established control limits and there were no analytical difficulties encountered with the exception of those listed in the case narrative section of this report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Amy Goodall

Project Manager

Eurofins MGT (Melbourne)
2-5 Kingston Town Close
Oakleigh VIC, 3164

Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Ma20607	1604083-01	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20608	1604083-02	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20609	1604083-03	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20610	1604083-04	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20611	1604083-05	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20612	1604083-06	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20613	1604083-07	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20614	1604083-08	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20615	1604083-09	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20616	1604083-10	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20617	1604083-11	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20618	1604083-12	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20619	1604083-13	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20620	1604083-14	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20621	1604083-15	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20622	1604083-16	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20623	1604083-17	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20624	1604083-18	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20625	1604083-19	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20626	1604083-20	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20627	1604083-21	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20628	1604083-22	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20629	1604083-23	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20630	1604083-24	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20631	1604083-25	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20632	1604083-26	Water	01-Apr-16 00:00	04-Apr-16 11:30

Eurofins Frontier Global Sciences, Inc.

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Amy Goodall, Project Manager



Frontier Global Sciences

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Eurofins MGT (Melbourne)
2-5 Kingston Town Close
Oakleigh VIC, 3164

Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Ma20633	1604083-27	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20634	1604083-28	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20635	1604083-29	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20636	1604083-30	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20637	1604083-31	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20638	1604083-32	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20639	1604083-33	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20640	1604083-34	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20641	1604083-35	Water	01-Apr-16 00:00	04-Apr-16 11:30
Ma20642	1604083-36	Water	01-Apr-16 00:00	04-Apr-16 11:30

Eurofins Frontier Global Sciences, Inc.

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Amy Goodall, Project Manager

Page 3 of 48

Eurofins MGT (Melbourne)
2-5 Kingston Town Close
Oakleigh VIC, 3164Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur MehmetReported:
15-Apr-16 13:25

SAMPLE RECEIPT

Samples were received at Eurofins Frontier Global Sciences (EFGS) on 4/4/2016 11:30:00 AM . The samples were received intact, on-ice within a sealed cooler at -0.3 degrees Celsius.

Original COC mistakenly requested Methyl Mercury not Total Mercury. Client sent an updated COC with the true requests. Both COC's are included in the final report.

The sample bottle for EFGS sample 1604083-14, 'Ma20620' was received with a large crack down the side. This sample was transfer to a new PETG bottle before preservation.

SAMPLE PREPARATION AND ANALYSIS

Samples were prepared and analyzed for total mercury by flow injection atomic fluorescence spectrometry (FI-AFS) in accordance with EPA 1631E.

ANALYTICAL AND QUALITY CONTROL ISSUES

Method blanks were prepared for every preparation to assess possible blank contribution from the sample preparation procedure. The method blanks were carried through the entire analytical procedure. All blanks fell within the established acceptance criteria with the exception of any items narrated above or flagged and described in the notes and definitions section of the report.

Liquid spikes, certified reference material (CRM) or a quality control samples (QCS) were prepared for every preparation as a measure of accuracy. All liquid spikes, CRMs and/or QCS samples fell within the established acceptance criteria with the exception of any items narrated above or flagged and described in the notes and definitions section of the report.

As an additional measure of the accuracy of the methods used and to check for matrix interference, matrix spikes (MS) and matrix spike duplicates (MSD) were digested and analyzed. All of the matrix spike recoveries fell within the established acceptance criteria with the exception of any items flagged and described in the notes and definitions section of the report.

A reasonable measure of the precision of the analytical methods is the relative percent difference (RPD) between a matrix spike recovery and a matrix spike duplicate recovery and between laboratory control sample recovery and laboratory control sample duplicate recoveries. All of the relative percent differences established acceptance criteria with the exception of any items flagged and described in the notes and definitions section of the report.

Eurofins Frontier Global Sciences, Inc.



The results in this report only apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Amy Goodall, Project Manager

Sample Receipt Checklist

EFGS Work Order: 1604083

Client: MBT

Date & Time Received: 4/4/16 11:30

Date Labeled: 4/4/16 Labeled By: LM

Project: _____

Received By: _____

Label Verified By: LM

of Coolers Received: 2 Samples Arrived By: ☒ Shipping Service _____ Courier _____ Hand _____ Other (Specify: _____)

Coolant: ☐ None/Ambient ☐ Loose Ice ☒ Gel Ice ☐ Dry Ice Coolant Required: ☒ Y ☐ N Temp Blank Used: ☒ Y ☐ N for Cooler(s): _____

Notify Project Manager if packages/coolers are received without coolant or with thawed coolant and at a temperature in excess of 6°C. PM notified: Y/N

Cooler Information:	Y/N/NA	Comments
The coolers do not appear to be tampered with:	<u>Y</u>	
Custody Seals are present and intact:	<u>N</u>	
Custody seals signed:	<u>NA</u>	

TID: <u>5225</u>	CF: <u>-0.2 °C</u>	Date/time: <u>4/4/16 11:30</u>	By: <u>LM</u>
Cooler 1: <u>8.8 °C</u>	w/ CF: <u>8.6 °C</u>	Cooler 4: <u>°C</u>	w/ CF: <u>°C</u>
Cooler 2: <u>-0.1 °C</u>	w/ CF: <u>-0.3 °C</u>	Cooler 5: <u>°C</u>	w/ CF: <u>°C</u>
Cooler 3: <u>°C</u>	w/ CF: <u>°C</u>	Cooler 6: <u>°C</u>	w/ CF: <u>°C</u>

Chain of Custody:	Y/N/NA	Comments
Sample ID/Description:	<u>Y</u>	
Date and time of collection:	<u>N</u>	
Sampled by:	<u>N</u>	
Preservation type:	<u>Y</u>	
Requested analyses:	<u>Y</u>	
Required signatures:	<u>Y</u>	
Internal COC required:	<u>N</u>	

Sample Condition/Integrity:	Y/N/NA	Comments
Sample containers intact/present:	<u>Y</u>	
Sample labels are present and legible:	<u>Y</u>	
Sample ID on container/bag matches COC:	<u>Y</u>	
Correct sample containers used:	<u>Y</u>	
Samples received within holding times:	<u>Y</u>	
Sample volume sufficient for requested analyses:	<u>Y</u>	
Correct preservative used for requested analyses:	<u>Y</u>	

Anomalies/Non-conformances (attach additional pages if needed):

Cooler #1: 10 2890 1495

Cooler #2: 31 0680 6212

Sample 14 was in a cracked PETG and the bottle was placed in a large glass cylinder - LM 4/4/16

1604083



mgt

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Email: EnviroSampleQLD@eurofins.com.au

☐ SYDNEY

W 2066
Email: EnviroSampleNSW@eurofins.com.au

Purchase Order for External Analysis

Eurofins | mgt Ref: 493880 Eurofins | mgt Purchase Order: 16/0237 493880 Results Required: STD Page : 1 of 3

Receiving Laboratory: Eurofins Frontier Global Sciences Eurofins | mgt Contact: Onur Mehmet

Address: 11720 North Creek Parkway North Suite 400
Bothell WA 98011 - USA

Telephone: _____ Fax: _____

Report results to: EnviroReports@eurofins.com.au ☒
Eurofins | mgt, P.O. Box 276, Oakleigh, Vic 3166, Australia ☐
Send invoices to: EnviroAP@eurofins.com.au ☒

Client ID	Eurofins mgt ID	Matrix	Tests Required
	Ma20607	Water	Methyl Mercury
	Ma20608	Water	Methyl Mercury
	Ma20609	Water	Methyl Mercury
	Ma20610	Water	Methyl Mercury
	Ma20611	Water	Methyl Mercury
	Ma20612	Water	Methyl Mercury
	Ma20613	Water	Methyl Mercury
	Ma20614	Water	Methyl Mercury
	Ma20615	Water	Methyl Mercury
	Ma20616	Water	Methyl Mercury
	Ma20617	Water	Methyl Mercury
	Ma20618	Water	Methyl Mercury

Total No. Samples: 12 Comments: Please identify samples using Eurofins | mgt ID and Client ID

Chain of Custody

Relinquished by: Tony W Date/Time: 22/03/16
Received by: [Signature] Date/Time: 4/4/16 11:30
Relinquished by: _____ Date/Time: _____
Received by: _____ Date/Time: _____

Sample Receipt Advice (Receiving Lab Use Only)

All Samples Received in Good Condition ☐ Average sample temp on receipt: (°C) _____
All Documentation in Proper Order ☐ _____
Samples Received with an Attempt to Chill ☐ For all enquires please quote Ref. No. _____
Samples Received Within Holding Times ☐ _____
Please complete this section and email a scan copy to EnviroReports@eurofins.com.au

QS3023_R1

No seal 8.6°C DHL 11:30

Issue Date: 22 August 2013

Approved by: M. Wright Page 1 of 3

1604083

Purchase Order for External Analysis


Eurofins | mgt Ref: 493880 Eurofins | mgt Purchase Order: 16/0237 493880 Results Required: STD Page : 2 of 3
Receiving Laboratory: Eurofins Frontier Global Sciences Eurofins | mgt Contact: **Onur Mehmet**
Address: 11720 North Creek Parkway North Suite 400
Bothell WA 98011 - USA
Telephone: _____ Fax: _____

Report results to: EnviroReports@eurofins.com.au ☒
Eurofins | mgt, P.O. Box 276, Oakleigh, Vic 3166, Australia ☐
Send invoices to: EnviroAP@eurofins.com.au ☒

Client ID	Eurofins mgt ID	Matrix	Tests Required
	Ma20619	Water	Methyl Mercury
	Ma20620	Water	Methyl Mercury
	Ma20621	Water	Methyl Mercury
	Ma20622	Water	Methyl Mercury
	Ma20623	Water	Methyl Mercury
	Ma20624	Water	Methyl Mercury
	Ma20625	Water	Methyl Mercury
	Ma20626	Water	Methyl Mercury
	Ma20627	Water	Methyl Mercury
	Ma20628	Water	Methyl Mercury
	Ma20629	Water	Methyl Mercury
	Ma20630	Water	Methyl Mercury

Total No. Samples: 12 **Comments:** Please identify samples using Eurofins | mgt ID and Client ID

Chain of Custody

Relinquished by: Tony W Date/Time: 22/03/16
Received by:  Date/Time: _____
Relinquished by: _____ Date/Time: _____
Received by: _____ Date/Time: _____

Sample Receipt Advice (Receiving Lab Use Only)

All Samples Received in Good Condition ☐ Average sample temp on receipt: (°C) _____
All Documentation in Proper Order ☐ _____
Samples Received with an Attempt to Chill ☐ For all enquires please quote Ref. No. _____
Samples Received Within Holding Times ☐ _____
Please complete this section and email a scan copy to EnviroReports@eurofins.com.au

1604083



mgt

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 Email: EnviroSampleQLD@eurofins.com.au

☐ **SYDNEY**

W 2066
 Email: EnviroSampleNSW@eurofins.com.au

Purchase Order for External Analysis

Eurofins | mgt Ref: 493880 Eurofins | mgt Purchase Order: 16/0237 493880 Results Required: STD Page : 3 of 3

Receiving Laboratory: Eurofins Frontier Global Sciences Eurofins | mgt Contact: Onur Mehmet

Address: 11720 North Creek Parkway North Suite 400
Bothell WA 98011 - USA

Telephone: _____ Fax: _____

Report results to: EnviroReports@eurofins.com.au ☒
 Eurofins | mgt, P.O. Box 276, Oakleigh, Vic 3166, Australia ☐
 Send invoices to: EnviroAP@eurofins.com.au ☒

Client ID	Eurofins mgt ID	Matrix	Tests Required
	Ma20631	Water	Methyl Mercury
	Ma20632	Water	Methyl Mercury
	Ma20633	Water	Methyl Mercury
	Ma20634	Water	Methyl Mercury
	Ma20635	Water	Methyl Mercury
	Ma20636	Water	Methyl Mercury
	Ma20637	Water	Methyl Mercury
	Ma20638	Water	Methyl Mercury
	Ma20639	Water	Methyl Mercury
	Ma20640	Water	Methyl Mercury
	Ma20641	Water	Methyl Mercury
	Ma20642	Water	Methyl Mercury

Total No. Samples: 12 Comments: Please identify samples using Eurofins | mgt ID and Client ID

Chain of Custody

Relinquished by: Tony W Date/Time: 22/03/16
 Received by: [Signature] Date/Time: _____
 Relinquished by: _____ Date/Time: _____
 Received by: _____ Date/Time: _____

Sample Receipt Advice (Receiving Lab Use Only)

All Samples Received in Good Condition ☐ Average sample temp on receipt: (°C) _____
 All Documentation in Proper Order ☐ _____
 Samples Received with an Attempt to Chill ☐ For all enquires please quote Ref. No. _____
 Samples Received Within Holding Times ☐ _____
 Please complete this section and email a scan copy to EnviroReports@eurofins.com.au



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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20607

1604083-01

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EPA 1631E BrCl Oxidation

Mercury	4.75	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20608

1604083-02

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	4.87	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20609

1604083-03

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	4.27	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20610

1604083-04

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	4.95	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20611

1604083-05

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	5.15	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20612

1604083-06

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	5.68	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20613

1604083-07

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	3.99	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20614

1604083-08

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	4.97	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project Number: 16/0237 493880
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Reported:
15-Apr-16 13:25

Ma20615

1604083-09

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	8.73	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20616

1604083-10

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	11.0	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Reported:
15-Apr-16 13:25

Ma20617

1604083-11

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	7.31	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Reported:
15-Apr-16 13:25

Ma20618

1604083-12

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	9.41	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Reported:
15-Apr-16 13:25

Ma20619

1604083-13

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	12.6	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Reported:
15-Apr-16 13:25

Ma20620

1604083-14

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	8.05	-	0.50	ng/L	1	F604194	11-Apr-16	6D14013	14-Apr-16	EPA 1631E	

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Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20621

1604083-15

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	18.1	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20622

1604083-16

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	17.1	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20623

1604083-17

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	17.7	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20624

1604083-18

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	19.1	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20625

1604083-19

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	15.5	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20626

1604083-20

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	19.6	-	0.50	ng/L	1	F604138	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20627

1604083-21

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	15.8	-	0.50	ng/L	1	F604139	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20628

1604083-22

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	19.9	-	0.50	ng/L	1	F604139	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20629

1604083-23

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	23.8	-	0.50	ng/L	1	F604139	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20630

1604083-24

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	30.5	-	0.50	ng/L	1	F604139	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20631

1604083-25

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	100	-	5.00	ng/L	10	F604139	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20632

1604083-26

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	112	-	5.00	ng/L	10	F604194	08-Apr-16	6D14013	14-Apr-16	EPA 1631E	

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Eurofins MGT (Melbourne)
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Oakleigh VIC, 3164

Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20633

1604083-27

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	41.9	-	5.00	ng/L	10	F604194	08-Apr-16	6D14013	14-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20634

1604083-28

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	47.5	-	5.00	ng/L	10	F604139	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20635

1604083-29

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	236	-	5.00	ng/L	10	F604139	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20636

1604083-30

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	277	-	5.00	ng/L	10	F604139	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20637

1604083-31

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	4.78	-	0.50	ng/L	1	F604139	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20638

1604083-32

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	7.29	-	0.50	ng/L	1	F604139	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20639

1604083-33

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	27.8	-	0.50	ng/L	1	F604139	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20640

1604083-34

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	41.5	-	5.00	ng/L	10	F604139	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20641

1604083-35

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	1.95	-	0.50	ng/L	1	F604139	08-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Ma20642

1604083-36

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
Sample Preparation: EPA 1631E BrCl Oxidation											
Mercury	3.29	-	0.50	ng/L	1	F604139	07-Apr-16	6D11013	11-Apr-16	EPA 1631E	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Quality Control Data

Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch F604138 - EPA 1631E BrCl Oxidation											
Blank (F604138-BLK1)					Prepared & Analyzed: 11-Apr-16						
Mercury	ND	-	0.50	ng/L							U
Blank (F604138-BLK2)					Prepared & Analyzed: 11-Apr-16						
Mercury	ND	-	0.50	ng/L							U
Blank (F604138-BLK3)					Prepared & Analyzed: 11-Apr-16						
Mercury	ND	-	0.50	ng/L							U
LCS (F604138-BS1)					Prepared & Analyzed: 11-Apr-16						
Mercury	15.55	-	0.50	ng/L	15.679		99.2	80-120			
LCS Dup (F604138-BSD1)					Prepared & Analyzed: 11-Apr-16						
Mercury	15.62	-	0.50	ng/L	15.679		99.6	80-120	0.426	24	
Duplicate (F604138-DUP1)					Source: 1604083-01		Prepared & Analyzed: 11-Apr-16				
Mercury	4.63	-	0.50	ng/L		4.75			2.71	24	
Matrix Spike (F604138-MS1)					Source: 1604083-01		Prepared & Analyzed: 11-Apr-16				
Mercury	24.03	-	0.50	ng/L	20.240	4.75	95.2	71-125			
Matrix Spike (F604138-MS2)					Source: 1604083-05		Prepared & Analyzed: 11-Apr-16				
Mercury	24.04	-	0.50	ng/L	20.240	5.15	93.3	71-125			
Matrix Spike Dup (F604138-MSD1)					Source: 1604083-01		Prepared & Analyzed: 11-Apr-16				
Mercury	24.54	-	0.50	ng/L	20.240	4.75	97.8	71-125	2.09	24	
Matrix Spike Dup (F604138-MSD2)					Source: 1604083-05		Prepared & Analyzed: 11-Apr-16				
Mercury	25.29	-	0.50	ng/L	20.240	5.15	99.5	71-125	5.08	24	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Quality Control Data

Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch F604139 - EPA 1631E BrCl Oxidation											
Blank (F604139-BLK1)						Prepared & Analyzed: 11-Apr-16					
Mercury	ND	-	0.50	ng/L							U
Blank (F604139-BLK2)						Prepared & Analyzed: 11-Apr-16					
Mercury	ND	-	0.50	ng/L							U
Blank (F604139-BLK3)						Prepared & Analyzed: 11-Apr-16					
Mercury	ND	-	0.50	ng/L							U
LCS (F604139-BS1)						Prepared & Analyzed: 11-Apr-16					
Mercury	15.04	-	0.50	ng/L	15.679		95.9	80-120			
LCS Dup (F604139-BSD1)						Prepared & Analyzed: 11-Apr-16					
Mercury	15.18	-	0.50	ng/L	15.679		96.8	80-120	0.914	24	
Duplicate (F604139-DUP1)						Source: 1604083-21 Prepared & Analyzed: 11-Apr-16					
Mercury	15.77	-	0.50	ng/L		15.77			0.00253	24	
Matrix Spike (F604139-MS1)						Source: 1604083-31RE1 Prepared & Analyzed: 11-Apr-16					
Mercury	24.95	-	0.50	ng/L	20.240	4.78	99.6	71-125			
Matrix Spike (F604139-MS2)						Source: 1604083-32 Prepared & Analyzed: 11-Apr-16					
Mercury	27.23	-	0.50	ng/L	20.240	7.29	98.5	71-125			
Matrix Spike Dup (F604139-MSD1)						Source: 1604083-31RE1 Prepared & Analyzed: 11-Apr-16					
Mercury	25.17	-	0.50	ng/L	20.240	4.78	101	71-125	0.874	24	
Matrix Spike Dup (F604139-MSD2)						Source: 1604083-32 Prepared & Analyzed: 11-Apr-16					
Mercury	26.51	-	0.50	ng/L	20.240	7.29	95.0	71-125	2.67	24	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Quality Control Data

Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch F604194 - EPA 1631E BrCl Oxidation

Blank (F604194-BLK1)					Prepared: 13-Apr-16 Analyzed: 14-Apr-16						
Mercury	ND	-	0.50	ng/L							U
Blank (F604194-BLK2)					Prepared: 13-Apr-16 Analyzed: 14-Apr-16						
Mercury	ND	-	0.50	ng/L							U
Blank (F604194-BLK3)					Prepared: 13-Apr-16 Analyzed: 14-Apr-16						
Mercury	ND	-	0.50	ng/L							U
LCS (F604194-BS1)					Prepared: 13-Apr-16 Analyzed: 14-Apr-16						
Mercury	15.31	-	0.50	ng/L	15.679		97.6	80-120			
LCS Dup (F604194-BSD1)					Prepared: 13-Apr-16 Analyzed: 14-Apr-16						
Mercury	15.14	-	0.50	ng/L	15.679		96.5	80-120	1.11	24	
Duplicate (F604194-DUP1)					Source: 1604083-27RE1		Prepared: 13-Apr-16 Analyzed: 14-Apr-16				
Mercury	42.45	-	5.00	ng/L		41.86			1.41	24	
Matrix Spike (F604194-MS1)					Source: 1604083-27RE1		Prepared: 13-Apr-16 Analyzed: 14-Apr-16				
Mercury	136.9	-	5.00	ng/L	101.20	41.86	93.9	71-125			
Matrix Spike Dup (F604194-MSD1)					Source: 1604083-27RE1		Prepared: 13-Apr-16 Analyzed: 14-Apr-16				
Mercury	136.8	-	5.00	ng/L	101.20	41.86	93.8	71-125	0.0816	24	

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Oakleigh VIC, 3164

Project: Freshwater Sediments And Tissues
Project Number: 16/0237 493880
Project Manager: Onur Mehmet

Reported:
15-Apr-16 13:25

Notes and Definitions

U Analyte was not detected and is reported as less than the LOD or as defined by the client. The LOD has been adjusted for any dilution or concentration of the sample.

DET Analyte DETECTED

ND Analyte NOT DETECTED at or above the reporting limit

NR Not Reported

dry Sample results reported on a dry weight basis

RPD Relative Percent Difference

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Certificate of Analysis

Pattle Delamore Partners Ltd
PDP House Level 4, 235 Broadway
Newmarket
Auckland New Zealand 1023



NATA Accredited
Accreditation Number 1261
Site Number 1254

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

Attention: Andrew Rumsby

Report 503759-L
Project name A02982801
Received Date Jun 03, 2016

Client Sample ID			PFS01A SPLP - Synthetic Leaching Procedure *	PJS01A SPLP - Synthetic Leaching Procedure *	PLS01 SPLP - Synthetic Leaching Procedure *	PNS01 SPLP - Synthetic Leaching Procedure *
Sample Matrix						
Eurofins mgt Sample No.			M16-Jn07925	M16-Jn07926	M16-Jn07927	M16-Jn07928
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Boron	0.05	mg/L	< 0.5	< 0.5	0.78	< 0.5
Heavy Metals						
Antimony	0.005	mg/L	< 0.005	0.021	0.012	< 0.005
Cobalt	0.001	mg/L	< 0.001	0.002	< 0.001	< 0.001
Iron	0.05	mg/L	1.7	0.30	0.05	0.20
Manganese	0.005	mg/L	0.008	0.19	0.042	0.025
Thallium	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Heavy Metals						
Arsenic	0.001	mg/L	< 0.001	0.006	0.006	0.006
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Lead	0.001	mg/L	0.002	< 0.001	< 0.001	< 0.001
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Nickel	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Zinc	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001

Client Sample ID			POS01 SPLP - Synthetic Leaching Procedure *	PQS SPLP - Synthetic Leaching Procedure *	PRS01 SPLP - Synthetic Leaching Procedure *	PSS01 SPLP - Synthetic Leaching Procedure *
Sample Matrix						
Eurofins mgt Sample No.			M16-Jn07929	M16-Jn07930	M16-Jn07931	M16-Jn07932
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Boron	0.05	mg/L	< 0.5	< 0.5	< 0.5	< 0.5
Heavy Metals						
Antimony	0.005	mg/L	0.010	< 0.005	< 0.005	< 0.005
Cobalt	0.001	mg/L	< 0.001	0.002	0.002	0.006
Iron	0.05	mg/L	4.2	0.10	0.24	0.36
Manganese	0.005	mg/L	0.13	0.14	0.034	0.20
Thallium	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005

Client Sample ID			POS01	PQS	PRS01	PSS01
Sample Matrix			SPLP - Synthetic Leaching Procedure *	SPLP - Synthetic Leaching Procedure *	SPLP - Synthetic Leaching Procedure *	SPLP - Synthetic Leaching Procedure *
Eurofins mgt Sample No.			M16-Jn07929	M16-Jn07930	M16-Jn07931	M16-Jn07932
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	0.001	mg/L	0.018	0.002	< 0.001	< 0.001
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Nickel	0.001	mg/L	< 0.001	0.001	0.003	0.001
Zinc	0.001	mg/L	< 0.001	< 0.001	0.002	< 0.001

Client Sample ID			PTS01	PVS01	PWS01	PKS001
Sample Matrix			SPLP - Synthetic Leaching Procedure *	SPLP - Synthetic Leaching Procedure *	SPLP - Synthetic Leaching Procedure *	SPLP - Synthetic Leaching Procedure *
Eurofins mgt Sample No.			M16-Jn07933	M16-Jn07934	M16-Jn07935	M16-Jn07936
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Boron	0.05	mg/L	< 0.5	< 0.5	< 0.5	< 0.5
Heavy Metals						
Antimony	0.005	mg/L	< 0.005	< 0.005	0.024	0.007
Cobalt	0.001	mg/L	< 0.001	0.001	< 0.001	< 0.001
Iron	0.05	mg/L	0.47	0.18	0.70	< 0.05
Manganese	0.005	mg/L	0.071	0.079	0.012	< 0.005
Thallium	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Heavy Metals						
Arsenic	0.001	mg/L	0.002	0.006	0.002	< 0.001
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	0.0003	< 0.0002
Chromium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper	0.001	mg/L	< 0.001	0.010	< 0.001	< 0.001
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	0.0003	< 0.0001
Nickel	0.001	mg/L	< 0.001	< 0.001	0.001	< 0.001
Zinc	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001

Client Sample ID			PMS001 SPLP - Synthetic Leaching Procedure *	PUS001 SPLP - Synthetic Leaching Procedure *	PFS01A	PJS01A
Sample Matrix					US Leachate	US Leachate
Eurofins mgt Sample No.			M16-Jn07937	M16-Jn07938	M16-Jn07939	M16-Jn07940
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Boron	0.05	mg/L	0.75	< 0.5	< 0.5	< 0.5
Heavy Metals						
Antimony	0.005	mg/L	0.007	< 0.005	< 0.05	< 0.05
Cobalt	0.001	mg/L	< 0.001	0.003	0.04	0.05
Iron	0.05	mg/L	0.25	0.60	7.7	0.53
Manganese	0.005	mg/L	0.024	0.14	4.1	3.8
Thallium	0.005	mg/L	< 0.005	< 0.005	< 0.05	< 0.05
Heavy Metals						
Arsenic	0.001	mg/L	0.007	< 0.001	< 0.01	0.01
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	< 0.005	< 0.005
Chromium	0.001	mg/L	< 0.001	< 0.001	< 0.01	< 0.01
Copper	0.001	mg/L	< 0.001	< 0.001	< 0.01	< 0.01
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.01	< 0.01
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	< 0.001
Nickel	0.001	mg/L	< 0.001	0.002	0.04	0.01
Zinc	0.001	mg/L	< 0.001	< 0.001	0.08	0.03
USA Leaching Procedure						
Leachate Fluid ^{C01}		comment	-	-	1.0	1.0
pH (Leachate fluid)	0.1	pH Units	-	-	5.1	5.1
pH (off)	0.1	pH Units	-	-	5.2	5.1

Client Sample ID			PLS01 US Leachate	PNS01 US Leachate	POS01 US Leachate	PQS US Leachate
Sample Matrix						
Eurofins mgt Sample No.			M16-Jn07941	M16-Jn07942	M16-Jn07943	M16-Jn07944
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Boron	0.05	mg/L	< 0.5	0.50	< 0.5	< 0.5
Heavy Metals						
Antimony	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Cobalt	0.01	mg/L	< 0.01	0.01	0.01	0.03
Iron	0.05	mg/L	0.06	0.08	56	0.16
Manganese	0.05	mg/L	0.86	0.71	1.8	2.0
Thallium	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Heavy Metals						
Arsenic	0.01	mg/L	0.01	< 0.01	0.04	< 0.01
Cadmium	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Chromium	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Copper	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Lead	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Mercury	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Nickel	0.01	mg/L	< 0.01	< 0.01	< 0.01	0.01
Zinc	0.01	mg/L	< 0.01	0.02	< 0.01	0.03

Client Sample ID			PLS01	PNS01	POS01	PQS
Sample Matrix			US Leachate	US Leachate	US Leachate	US Leachate
Eurofins mgt Sample No.			M16-Jn07941	M16-Jn07942	M16-Jn07943	M16-Jn07944
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
USA Leaching Procedure						
Leachate Fluid ^{C01}		comment	1.0	1.0	1.0	1.0
pH (Leachate fluid)	0.1	pH Units	5.1	5.1	5.1	5.1
pH (off)	0.1	pH Units	5.0	5.0	5.1	5.0

Client Sample ID			PRS01	PSS01	PTS01	PVS01
Sample Matrix			US Leachate	US Leachate	US Leachate	US Leachate
Eurofins mgt Sample No.			M16-Jn07945	M16-Jn07946	M16-Jn07947	M16-Jn07948
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Boron	0.05	mg/L	< 0.5	0.98	< 0.05	0.61
Heavy Metals						
Antimony	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Cobalt	0.01	mg/L	< 0.01	< 0.01	0.05	< 0.01
Iron	0.05	mg/L	0.14	0.24	0.13	4.7
Manganese	0.05	mg/L	0.13	0.31	2.7	0.60
Thallium	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Heavy Metals						
Arsenic	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Cadmium	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Chromium	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Copper	0.01	mg/L	< 0.01	< 0.01	< 0.01	0.04
Lead	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Mercury	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Nickel	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Zinc	0.01	mg/L	0.02	< 0.01	0.03	< 0.01
USA Leaching Procedure						
Leachate Fluid ^{C01}		comment	1.0	1.0	1.0	1.0
pH (Leachate fluid)	0.1	pH Units	5.1	5.1	5.1	5.1
pH (off)	0.1	pH Units	5.0	5.0	5.0	5.0

Client Sample ID			PWS01	PKS001	PMS001	PUS001
Sample Matrix			US Leachate	US Leachate	US Leachate	US Leachate
Eurofins mgt Sample No.			M16-Jn07949	M16-Jn07950	M16-Jn07951	M16-Jn07952
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Boron	0.05	mg/L	< 0.5	0.55	< 0.5	< 0.05
Heavy Metals						
Antimony	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Cobalt	0.01	mg/L	< 0.01	< 0.01	< 0.01	0.03
Iron	0.05	mg/L	0.16	< 0.05	0.08	0.29
Manganese	0.05	mg/L	0.07	0.12	0.67	1.6
Thallium	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05

Client Sample ID			PWS01	PKS001	PMS001	PUS001
Sample Matrix			US Leachate	US Leachate	US Leachate	US Leachate
Eurofins mgt Sample No.			M16-Jn07949	M16-Jn07950	M16-Jn07951	M16-Jn07952
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Cadmium	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Chromium	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Copper	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Lead	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Mercury	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Nickel	0.01	mg/L	0.01	< 0.01	< 0.01	0.02
Zinc	0.01	mg/L	0.03	< 0.01	0.01	0.02
USA Leaching Procedure						
Leachate Fluid ^{C01}		comment	1.0	1.0	1.0	1.0
pH (Leachate fluid)	0.1	pH Units	5.1	5.1	5.1	5.1
pH (off)	0.1	pH Units	5.0	5.0	5.0	5.0

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
Boron	Melbourne	Jun 08, 2016	6 Month
- Method: LTM-MET-3030 by ICP-OES			
Heavy Metals	Melbourne	Jun 08, 2016	180 Day
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			

Company Name: Pattle Delamore Partners Ltd
Address: PDP House Level 4, 235 Broadway
Newmarket
Auckland New Zealand 1023
Project Name: A02982801

Order No.:
Report #: 503759
Phone: 0011 64 9 523 6900
Fax: 0011 64 9 523 6901

Received: Jun 3, 2016 8:28 AM
Due: Jun 10, 2016
Priority: 5 Day
Contact Name: Andrew Rumsby

Eurofins | mgt Analytical Services Manager : Onur Mehmet

Sample Detail						Antimony	Arsenic	Boron	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Thallium	Zinc	USA Leaching Procedure
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																				
Brisbane Laboratory - NATA Site # 20794																				
External Laboratory																				
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID															
1	PFS01A	Not Provided		SPLP - Synthetic Leaching Procedure	M16-Jn07925	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
2	PJS01A	Not Provided		SPLP - Synthetic Leaching Procedure	M16-Jn07926	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
3	PLS01	Not Provided		SPLP - Synthetic Leaching Procedure	M16-Jn07927	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
4	PNS01	Not Provided		SPLP - Synthetic	M16-Jn07928	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

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Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																			
Brisbane Laboratory - NATA Site # 20794																			
External Laboratory																			
				Leaching Procedure															
5	POS01	Not Provided		SPLP - Synthetic Leaching Procedure	M16-Jn07929	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	PQS	Not Provided		SPLP - Synthetic Leaching Procedure	M16-Jn07930	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7	PRS01	Not Provided		SPLP - Synthetic Leaching Procedure	M16-Jn07931	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8	PSS01	Not Provided		SPLP - Synthetic	M16-Jn07932	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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Sample Detail					Antimony	Arsenic	Boron	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Thallium	Zinc	USA Leaching Procedure
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																			
Brisbane Laboratory - NATA Site # 20794																			
External Laboratory																			
				Leaching Procedure															
9	PTS01	Not Provided		SPLP - Synthetic Leaching Procedure	M16-Jn07933	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10	PVS01	Not Provided		SPLP - Synthetic Leaching Procedure	M16-Jn07934	X	X	X	X	X	X	X	X	X	X	X	X	X	X
11	PWS01	Not Provided		SPLP - Synthetic Leaching Procedure	M16-Jn07935	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12	PKS001	Not Provided		SPLP - Synthetic	M16-Jn07936	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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Sample Detail						Antimony	Arsenic	Boron	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Thallium	Zinc	USA Leaching Procedure
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																				
Brisbane Laboratory - NATA Site # 20794																				
External Laboratory																				
				Leaching Procedure																
13	PMS001	Not Provided		SPLP - Synthetic Leaching Procedure	M16-Jn07937	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14	PUS001	Not Provided		SPLP - Synthetic Leaching Procedure	M16-Jn07938	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
15	PFS01A	Not Provided		US Leachate	M16-Jn07939	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16	PJS01A	Not Provided		US Leachate	M16-Jn07940	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
17	PLS01	Not Provided		US Leachate	M16-Jn07941	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18	PNS01	Not Provided		US Leachate	M16-Jn07942	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
19	POS01	Not Provided		US Leachate	M16-Jn07943	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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Sample Detail						Antimony	Arsenic	Boron	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Thallium	Zinc	USA Leaching Procedure
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																				
Brisbane Laboratory - NATA Site # 20794																				
External Laboratory																				
20	PQS	Not Provided		US Leachate	M16-Jn07944	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
21	PRS01	Not Provided		US Leachate	M16-Jn07945	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22	PSS01	Not Provided		US Leachate	M16-Jn07946	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23	PTS01	Not Provided		US Leachate	M16-Jn07947	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
24	PVS01	Not Provided		US Leachate	M16-Jn07948	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
25	PWS01	Not Provided		US Leachate	M16-Jn07949	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
26	PKS001	Not Provided		US Leachate	M16-Jn07950	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
27	PMS001	Not Provided		US Leachate	M16-Jn07951	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
28	PUS001	Not Provided		US Leachate	M16-Jn07952	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Test Counts						28	28	28	28	28	28	28	28	28	28	28	28	28	28	14

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. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. 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. 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.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
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 20-130%

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										
Heavy Metals										
Antimony				mg/L	< 0.005			0.005	Pass	
Cobalt				mg/L	< 0.001			0.001	Pass	
Iron				mg/L	< 0.05			0.05	Pass	
Manganese				mg/L	< 0.005			0.005	Pass	
Thallium				mg/L	< 0.005			0.005	Pass	
Method Blank										
Heavy Metals										
Arsenic				mg/L	< 0.001			0.001	Pass	
Cadmium				mg/L	< 0.0002			0.0002	Pass	
Chromium				mg/L	< 0.001			0.001	Pass	
Copper				mg/L	< 0.001			0.001	Pass	
Lead				mg/L	< 0.001			0.001	Pass	
Mercury				mg/L	< 0.0001			0.0001	Pass	
Nickel				mg/L	< 0.001			0.001	Pass	
Zinc				mg/L	< 0.001			0.001	Pass	
Test	Lab Sample ID	QA Source		Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery										
Heavy Metals					Result 1					
Antimony	M16-Jn07925	CP	%		103			70-130	Pass	
Cobalt	M16-Jn07925	CP	%		108			75-125	Pass	
Manganese	M16-Jn07925	CP	%		109			75-125	Pass	
Thallium	M16-Jn07925	CP	%		109			75-125	Pass	
Spike - % Recovery										
Heavy Metals					Result 1					
Arsenic	M16-Jn07925	CP	%		109			75-125	Pass	
Cadmium	M16-Jn07925	CP	%		111			75-125	Pass	
Chromium	M16-Jn07925	CP	%		108			75-125	Pass	
Copper	M16-Jn07925	CP	%		108			75-125	Pass	
Lead	M16-Jn07925	CP	%		108			75-125	Pass	
Mercury	M16-Jn07925	CP	%		103			70-130	Pass	
Nickel	M16-Jn07925	CP	%		108			75-125	Pass	
Zinc	M16-Jn07925	CP	%		110			75-125	Pass	
Spike - % Recovery										
					Result 1					
Boron	M16-Jn07934	CP	%		114			70-130	Pass	
Spike - % Recovery										
Heavy Metals					Result 1					
Antimony	M16-Jn07934	CP	%		92			70-130	Pass	
Cobalt	M16-Jn07934	CP	%		97			75-125	Pass	
Iron	M16-Jn07934	CP	%		98			75-125	Pass	
Manganese	M16-Jn07934	CP	%		97			75-125	Pass	
Thallium	M16-Jn07934	CP	%		97			75-125	Pass	
Spike - % Recovery										
Heavy Metals					Result 1					
Arsenic	M16-Jn07934	CP	%		96			75-125	Pass	
Cadmium	M16-Jn07934	CP	%		99			75-125	Pass	
Chromium	M16-Jn07934	CP	%		98			75-125	Pass	
Copper	M16-Jn07934	CP	%		96			75-125	Pass	
Lead	M16-Jn07934	CP	%		97			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Mercury	M16-Jn07934	CP	%	93			70-130	Pass	
Nickel	M16-Jn07934	CP	%	96			75-125	Pass	
Zinc	M16-Jn07934	CP	%	95			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Antimony	M16-Jn07943	CP	%	100			70-130	Pass	
Cobalt	M16-Jn07943	CP	%	107			75-125	Pass	
Thallium	M16-Jn07943	CP	%	108			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M16-Jn07943	CP	%	110			75-125	Pass	
Cadmium	M16-Jn07943	CP	%	110			75-125	Pass	
Chromium	M16-Jn07943	CP	%	109			75-125	Pass	
Copper	M16-Jn07943	CP	%	107			75-125	Pass	
Lead	M16-Jn07943	CP	%	108			75-125	Pass	
Mercury	M16-Jn07943	CP	%	113			70-130	Pass	
Nickel	M16-Jn07943	CP	%	107			75-125	Pass	
Zinc	M16-Jn07943	CP	%	110			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Boron	M16-Jn07925	CP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	M16-Jn07925	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Cobalt	M16-Jn07925	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron	M16-Jn07925	CP	mg/L	1.7	1.9	7.0	30%	Pass	
Manganese	M16-Jn07925	CP	mg/L	0.008	0.009	10	30%	Pass	
Thallium	M16-Jn07925	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M16-Jn07925	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium	M16-Jn07925	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	M16-Jn07925	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	M16-Jn07925	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lead	M16-Jn07925	CP	mg/L	0.002	0.001	52	30%	Fail	Q15
Mercury	M16-Jn07925	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel	M16-Jn07925	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Zinc	M16-Jn07925	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Boron	M16-Jn07934	CP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	M16-Jn07934	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Cobalt	M16-Jn07934	CP	mg/L	0.001	0.001	30	30%	Pass	
Iron	M16-Jn07934	CP	mg/L	0.18	0.19	6.0	30%	Pass	
Manganese	M16-Jn07934	CP	mg/L	0.079	0.086	8.0	30%	Pass	
Thallium	M16-Jn07934	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic	M16-Jn07934	CP	mg/L	0.006	0.006	9.0	30%	Pass
Cadmium	M16-Jn07934	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Chromium	M16-Jn07934	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Copper	M16-Jn07934	CP	mg/L	0.010	0.010	3.0	30%	Pass
Lead	M16-Jn07934	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Mercury	M16-Jn07934	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass
Nickel	M16-Jn07934	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Zinc	M16-Jn07934	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Boron	M16-Jn07943	CP	mg/L	< 0.5	< 0.5	<1	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Antimony	M16-Jn07943	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Cobalt	M16-Jn07943	CP	mg/L	0.01	< 0.01	10	30%	Pass
Manganese	M16-Jn07943	CP	mg/L	1.8	1.7	4.0	30%	Pass
Thallium	M16-Jn07943	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic	M16-Jn07943	CP	mg/L	0.04	0.04	4.0	30%	Pass
Cadmium	M16-Jn07943	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass
Chromium	M16-Jn07943	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass
Copper	M16-Jn07943	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass
Lead	M16-Jn07943	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass
Mercury	M16-Jn07943	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Nickel	M16-Jn07943	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass
Zinc	M16-Jn07943	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Boron	M16-Jn07952	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass

Comments

SPLP extraction fluid pH 4.2 has been used.

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
C01	Leachate Fluid Key: 1 - pH 5.0; 2 - pH 2.9; 3 - pH 9.2; 4 - Reagent (DI) water; 5 - Client sample, 6 - other
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

Onur Mehmet	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (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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Received: Jun 3, 2016 8:28 AM
Due: Jun 10, 2016
Priority: 5 Day
Contact Name: Andrew Rumsby

Eurofins | mgt Analytical Services Manager : Onur Mehmet

[illegible]

Order No.:
Report #: 503759
Phone: 0011 64 9 523 6900
Fax: 0011 64 9 523 6901

Received: Jun 3, 2016 8:28 AM
Due: Jun 10, 2016
Priority: 5 Day
Contact Name: Andrew Rumsby

Eurofins | mgt Analytical Services Manager : Onur Mehmet

[illegible]

Order No.:
Report #: 503759
Phone: 0011 64 9 523 6900
Fax: 0011 64 9 523 6901

Received: Jun 3, 2016 8:28 AM
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Contact Name: Andrew Rumsby

Eurofins | mgt Analytical Services Manager : Onur Mehmet

[illegible]

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Contact Name: Andrew Rumsby

Eurofins | mgt Analytical Services Manager : Onur Mehmet

[illegible]

Certificate of Analysis

Pattle Delamore Partners Ltd
PDP House Level 4, 235 Broadway
Newmarket
Auckland New Zealand 1023



NATA Accredited
Accreditation Number 1261
Site Number 1254

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

Attention: Andrew Rumsby

Report 495472-S
Project name
Project ID A02982801
Received Date Mar 15, 2016

Client Sample ID			PTX01	PDS-01A	PDS-01B	PKS001A
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins mgt Sample No.			M16-Ap03793	M16-Ap03794	M16-Ap03795	M16-Ap03796
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Boron	10	mg/kg	< 10	< 10	< 10	< 10
% Moisture	1	%	37	25	23	28
Heavy Metals						
Antimony	10	mg/kg	< 10	< 10	< 10	17
Cobalt	5	mg/kg	9.0	< 5	< 5	8.7
Iron	5	mg/kg	76000	9500	9000	73000
Manganese	5	mg/kg	210	120	100	260
Thallium	10	mg/kg	< 10	< 10	< 10	< 10
Heavy Metals						
Arsenic	2	mg/kg	15	2.8	4.7	29
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	30	13	14	33
Copper	5	mg/kg	18	6.1	6.0	21
Lead	5	mg/kg	< 5	7.9	6.6	6.3
Mercury	0.1	mg/kg	4.3	0.2	0.2	0.5
Nickel	5	mg/kg	9.4	< 5	5.1	8.6
Zinc	5	mg/kg	35	19	19	27

Client Sample ID			PLS002	PMS01	PUS01	PQW2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins mgt Sample No.			M16-Ap03797	M16-Ap03798	M16-Ap03799	M16-Ap03800
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Boron	10	mg/kg	< 10	< 10	< 10	< 10
% Moisture	1	%	23	34	43	36
Heavy Metals						
Antimony	10	mg/kg	< 10	37	< 10	25
Cobalt	5	mg/kg	< 5	< 5	7.5	9.0
Iron	5	mg/kg	24000	37000	150000	90000
Manganese	5	mg/kg	78	95	290	210
Thallium	10	mg/kg	< 10	< 10	< 10	< 10

Client Sample ID			PLS002	PMS01	PUS01	PQW2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins mgt Sample No.			M16-Ap03797	M16-Ap03798	M16-Ap03799	M16-Ap03800
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	17	100	2.0	46
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	11	14	38	44
Copper	5	mg/kg	9.3	11	19	35
Lead	5	mg/kg	< 5	< 5	8.3	12
Mercury	0.1	mg/kg	16	3.7	54	1.1
Nickel	5	mg/kg	< 5	5.5	13	9.4
Zinc	5	mg/kg	15	22	23	34

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
Boron	Melbourne	Jun 07, 2016	6 Month
- Method: LTM-MET-3030 by ICP-OES			
Heavy Metals	Melbourne	Jun 07, 2016	180 Day
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
% Moisture	Melbourne	Jun 06, 2016	14 Day
- Method: LTM-GEN-7080 Moisture			

Company Name: Pattle Delamore Partners Ltd
Address: PDP House Level 4, 235 Broadway
Newmarket
Auckland New Zealand 1023

Order No.:
Report #: 495472
Phone: 0011 64 9 523 6900
Fax: 0011 64 9 523 6901

Received: Mar 15, 2016 3:00 PM
Due: Jun 9, 2016
Priority: 3 Day
Contact Name: Andrew Rumsby

Project Name:
Project ID: A02982801

Eurofins | mgt Analytical Services Manager : Onur Mehmet

Sample Detail						Antimony	Arsenic	Boron	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Thallium	Zinc	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																				
Brisbane Laboratory - NATA Site # 20794																				
External Laboratory																				
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID															
1	PTX01	Not Provided		Soil	M16-Ap03793	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	PDS-01A	Not Provided		Soil	M16-Ap03794	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3	PDS-01B	Not Provided		Soil	M16-Ap03795	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4	PKS001A	Not Provided		Soil	M16-Ap03796	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	PLS002	Not Provided		Soil	M16-Ap03797	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	PMS01	Not Provided		Soil	M16-Ap03798	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7	PUS01	Not Provided		Soil	M16-Ap03799	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8	PQW2	Not Provided		Soil	M16-Ap03800	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Test Counts						8	8	8	8	8	8	8	8	8	8	8	8	8	8	8

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. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. 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

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

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

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

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. 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.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
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 20-130%

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								
Boron			mg/kg	< 10		10	Pass	
Method Blank								
Heavy Metals								
Antimony			mg/kg	< 10		10	Pass	
Cobalt			mg/kg	< 5		5	Pass	
Iron			mg/kg	< 5		5	Pass	
Manganese			mg/kg	< 5		5	Pass	
Thallium			mg/kg	< 10		10	Pass	
Method Blank								
Heavy Metals								
Arsenic			mg/kg	< 2		2	Pass	
Cadmium			mg/kg	< 0.4		0.4	Pass	
Chromium			mg/kg	< 5		5	Pass	
Copper			mg/kg	< 5		5	Pass	
Lead			mg/kg	< 5		5	Pass	
Mercury			mg/kg	< 0.1		0.1	Pass	
Nickel			mg/kg	< 5		5	Pass	
Zinc			mg/kg	< 5		5	Pass	
LCS - % Recovery								
Boron			%	91		70-130	Pass	
LCS - % Recovery								
Heavy Metals								
Antimony			%	88		80-120	Pass	
Cobalt			%	97		80-120	Pass	
Manganese			%	93		80-120	Pass	
LCS - % Recovery								
Heavy Metals								
Arsenic			%	91		80-120	Pass	
Cadmium			%	93		80-120	Pass	
Chromium			%	98		80-120	Pass	
Copper			%	98		80-120	Pass	
Lead			%	95		80-120	Pass	
Mercury			%	92		75-125	Pass	
Nickel			%	94		80-120	Pass	
Zinc			%	103		80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
				Result 1				
Boron	M16-Jn03279	NCP	%	88		70-130	Pass	
Spike - % Recovery								
				Result 1				
Mercury	M16-Jn03278	NCP	%	96		70-130	Pass	
Spike - % Recovery								
				Result 1				
Antimony	M16-Ap03794	CP	%	84		70-130	Pass	
Cobalt	M16-Ap03794	CP	%	91		75-125	Pass	
Manganese	M16-Ap03794	CP	%	90		75-125	Pass	
Spike - % Recovery								
				Result 1				
Arsenic	M16-Ap03794	CP	%	86		75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Cadmium	M16-Ap03794	CP	%	92			75-125	Pass	
Chromium	M16-Ap03794	CP	%	97			75-125	Pass	
Copper	M16-Ap03794	CP	%	108			75-125	Pass	
Lead	M16-Ap03794	CP	%	93			75-125	Pass	
Nickel	M16-Ap03794	CP	%	90			75-125	Pass	
Zinc	M16-Ap03794	CP	%	92			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Boron	M16-Ap03793	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	M16-Ap03793	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Cobalt	M16-Ap03793	CP	mg/kg	9.0	9.1	1.0	30%	Pass	
Iron	M16-Ap03793	CP	mg/kg	76000	78000	3.0	30%	Pass	
Manganese	M16-Ap03793	CP	mg/kg	210	210	<1	30%	Pass	
Thallium	M16-Ap03793	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M16-Ap03793	CP	mg/kg	15	14	6.0	30%	Pass	
Cadmium	M16-Ap03793	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	M16-Ap03793	CP	mg/kg	30	34	12	30%	Pass	
Copper	M16-Ap03793	CP	mg/kg	18	15	22	30%	Pass	
Lead	M16-Ap03793	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Mercury	M16-Jn03278	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	M16-Ap03793	CP	mg/kg	9.4	8.8	6.0	30%	Pass	
Zinc	M16-Ap03793	CP	mg/kg	35	24	37	30%	Fail	Q15
Duplicate									
				Result 1	Result 2	RPD			
Boron	M16-Ap03794	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	M16-Ap03794	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Cobalt	M16-Ap03794	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Iron	M16-Ap03794	CP	mg/kg	9500	8800	8.0	30%	Pass	
Manganese	M16-Ap03794	CP	mg/kg	120	120	2.0	30%	Pass	
Thallium	M16-Ap03794	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M16-Ap03794	CP	mg/kg	2.8	3.7	28	30%	Pass	
Cadmium	M16-Ap03794	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	M16-Ap03794	CP	mg/kg	13	13	<1	30%	Pass	
Copper	M16-Ap03794	CP	mg/kg	6.1	6.2	2.0	30%	Pass	
Lead	M16-Ap03794	CP	mg/kg	7.9	8.6	9.0	30%	Pass	
Nickel	M16-Ap03794	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	M16-Ap03794	CP	mg/kg	19	19	1.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M16-Ap03800	CP	%	36	31	15	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
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

Onur Mehmet	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Huong Le	Senior Analyst-Inorganic (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

Uncertainty data is available on request

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Received: Mar 15, 2016 3:00 PM
Due: Jun 9, 2016
Priority: 3 Day
Contact Name: Andrew Rumsby

Eurofins | mgt Analytical Services Manager : Onur Mehmet

[illegible]

Certificate of Analysis

Pattle Delamore Partners Ltd
PDP House Level 4, 235 Broadway
Newmarket
Auckland New Zealand 1023



NATA Accredited
Accreditation Number 1261
Site Number 1254

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

Attention: Andrew Rumsby

Report 495418-S
Project name
Project ID A02982801
Received Date Mar 15, 2016

Client Sample ID			PNS01 Sediment	POS Sediment	PQS Sediment	PRS01 Sediment
Sample Matrix			M16-Ap03555	M16-Ap03556	M16-Ap03557	M16-Ap03558
Eurofins mgt Sample No.			Not Provided	Not Provided	Not Provided	Not Provided
Date Sampled						
Test/Reference	LOR	Unit				
Acid Volatile Sulfide (AVS)*	0.001	%	< 0.001	0.006	< 0.001	0.002
% Moisture	1	%	30	37	30	25
Heavy Metals						
Antimony	2	mg/kg	37	11	8.2	32
Arsenic	2	mg/kg	230	41	35	97
Boron	5	mg/kg	< 5	< 5	< 5	< 5
Cadmium	1	mg/kg	< 1	< 1	< 1	< 1
Chromium	5	mg/kg	39	23	41	56
Cobalt	5	mg/kg	< 5	< 5	5.7	18
Copper	5	mg/kg	36	17	38	49
Iron	5	mg/kg	75000	43000	80000	55000
Lead	5	mg/kg	15	19	14	30
Manganese	5	mg/kg	140	220	270	230
Mercury	0.1	mg/kg	3.5	4.0	1.9	6.9
Nickel	5	mg/kg	9.0	5.4	6.8	18
Thallium	10	mg/kg	< 10	< 10	< 10	< 10
Zinc	5	mg/kg	27	24	55	40
Eurofins mgt Suite 21						
Mercury (SEM)*	0.01	mg/kg	1.9	1.5	1.4	5.3

Client Sample ID			PSS01 Sediment	PTS01 Sediment	PVS01 Sediment	PWS01 Sediment
Sample Matrix			M16-Ap03559	M16-Ap03560	M16-Ap03561	M16-Ap03562
Eurofins mgt Sample No.			Not Provided	Not Provided	Not Provided	Not Provided
Date Sampled						
Test/Reference	LOR	Unit				
Acid Volatile Sulfide (AVS)*	0.001	%	< 0.001	< 0.001	< 0.001	< 0.001
% Moisture	1	%	41	39	45	39
Heavy Metals						
Antimony	2	mg/kg	17	2.4	90	12
Arsenic	2	mg/kg	34	40	250	130
Boron	5	mg/kg	< 5	< 5	< 5	< 5
Cadmium	1	mg/kg	< 1	< 1	< 1	< 1
Chromium	5	mg/kg	160	94	36	87

Client Sample ID			PSS01 Sediment	PTS01 Sediment	PVS01 Sediment	PWS01 Sediment
Sample Matrix			M16-Ap03559	M16-Ap03560	M16-Ap03561	M16-Ap03562
Eurofins mgt Sample No.			Not Provided	Not Provided	Not Provided	Not Provided
Date Sampled						
Test/Reference	LOR	Unit				
Heavy Metals						
Cobalt	5	mg/kg	44	20	9.3	16
Copper	5	mg/kg	110	57	270	61
Iron	5	mg/kg	110000	66000	56000	66000
Lead	5	mg/kg	41	36	60	38
Manganese	5	mg/kg	1200	290	370	320
Mercury	0.1	mg/kg	33	1.2	2.9	15
Nickel	5	mg/kg	50	27	11	23
Thallium	10	mg/kg	< 10	< 10	< 10	< 10
Zinc	5	mg/kg	65	80	76	59
Eurofins mgt Suite 21						
Mercury (SEM)*	0.01	mg/kg	10	1.6	2.0	0.67

Client Sample ID			PYS Sediment	PLS01 Sediment	PFS01A Sediment	PFS01B Sediment
Sample Matrix			M16-Ap03563	M16-Ap03564	M16-Ap03565	M16-Ap03566
Eurofins mgt Sample No.			Not Provided	Not Provided	Not Provided	Not Provided
Date Sampled						
Test/Reference	LOR	Unit				
Acid Volatile Sulfide (AVS)*	0.001	%	< 0.001	< 0.001	0.014	< 0.001
% Moisture	1	%	24	39	34	20
Heavy Metals						
Antimony	2	mg/kg	33	33	< 2	< 2
Arsenic	2	mg/kg	99	57	22	25
Boron	5	mg/kg	< 5	< 5	< 5	31
Cadmium	1	mg/kg	< 1	< 1	< 1	< 1
Chromium	5	mg/kg	39	46	51	16
Cobalt	5	mg/kg	19	20	21	11
Copper	5	mg/kg	48	70	52	59
Iron	5	mg/kg	34000	23000	27000	21000
Lead	5	mg/kg	37	33	36	9.6
Manganese	5	mg/kg	600	230	240	1500
Mercury	0.1	mg/kg	0.6	2.1	0.2	< 0.1
Nickel	5	mg/kg	20	26	27	18
Thallium	10	mg/kg	< 10	< 10	< 10	< 10
Zinc	5	mg/kg	100	88	110	94
Eurofins mgt Suite 21						
Mercury (SEM)*	0.01	mg/kg	0.66	2.1	0.21	0.96

Client Sample ID Sample Matrix Eurofins mgt Sample No. Date Sampled Test/Reference	LOR	Unit	PJX01A Sediment M16-Ap03567 Not Provided	PJX01B Sediment M16-Ap03568 Not Provided	PHS01A Sediment M16-Ap03569 Not Provided	PHS01B Sediment M16-Ap03570 Not Provided
Acid Volatile Sulfide (AVS)*	0.001	%	0.006	0.003	0.001	< 0.001
% Moisture	1	%	37	37	50	49
Heavy Metals						
Antimony	2	mg/kg	24	24	3.0	< 2
Arsenic	2	mg/kg	78	84	46	32
Boron	5	mg/kg	< 5	< 5	< 5	< 5
Cadmium	1	mg/kg	< 1	< 1	1.4	< 1
Chromium	5	mg/kg	96	110	62	41
Cobalt	5	mg/kg	34	31	47	36
Copper	5	mg/kg	94	81	76	50
Iron	5	mg/kg	48000	50000	52000	31000
Lead	5	mg/kg	45	49	53	37
Manganese	5	mg/kg	400	320	1700	1200
Mercury	0.1	mg/kg	2.0	2.5	0.6	0.6
Nickel	5	mg/kg	42	47	33	23
Thallium	10	mg/kg	< 10	< 10	< 10	< 10
Zinc	5	mg/kg	100	130	220	150
Eurofins mgt Suite 21						
Mercury (SEM)*	0.01	mg/kg	3.2	4.0	1.2	0.45

Client Sample ID Sample Matrix Eurofins mgt Sample No. Date Sampled Test/Reference	LOR	Unit	PCS01 Sediment M16-Ap03571 Not Provided
Acid Volatile Sulfide (AVS)*	0.001	%	< 0.001
% Moisture	1	%	44
Heavy Metals			
Antimony	2	mg/kg	< 2
Arsenic	2	mg/kg	29
Boron	5	mg/kg	< 5
Cadmium	1	mg/kg	< 1
Chromium	5	mg/kg	64
Cobalt	5	mg/kg	44
Copper	5	mg/kg	63
Iron	5	mg/kg	62000
Lead	5	mg/kg	29
Manganese	5	mg/kg	3200
Mercury	0.1	mg/kg	0.1
Nickel	5	mg/kg	38
Thallium	10	mg/kg	< 10
Zinc	5	mg/kg	160
Eurofins mgt Suite 21			
Mercury (SEM)*	0.01	mg/kg	0.09

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
Acid Volatile Sulfide (AVS)*	Brisbane	Apr 08, 2016	0 Day
Heavy Metals	Melbourne	Apr 05, 2016	180 Day
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Eurofins mgt Suite 21	Melbourne	Apr 05, 2016	14 Day
- Method: EPA-821-R-91-100: Draft analytical method for determination of Acid Volatile Sulfide in sediment - USEPA Office of Water			
% Moisture	Melbourne	Apr 05, 2016	14 Day
- Method: LTM-GEN-7080 Moisture			

Company Name: Pattle Delamore Partners Ltd
Address: PDP House Level 4, 235 Broadway
Newmarket
Auckland New Zealand 1023

Order No.:
Report #: 495418
Phone: 0011 64 9 523 6900
Fax: 0011 64 9 523 6901

Received: Mar 15, 2016 2:29 PM
Due: Mar 22, 2016
Priority: 5 Day
Contact Name: Andrew Rumsby

Project Name:
Project ID: A02982801

Eurofins | mgt Client Manager: Onur Mehmet

Sample Detail					Acid Volatile Sulfide (AVS)*	Antimony	Arsenic	Boron	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Mercury (SEM)*	Nickel	Thallium	Zinc	Moisture Set
Laboratory where analysis is conducted																					
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																					
Brisbane Laboratory - NATA Site # 20794					X																
External Laboratory																					
Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																	
PNS01	Not Provided		Sediment	M16-Ap03555	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POS	Not Provided		Sediment	M16-Ap03556	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PQS	Not Provided		Sediment	M16-Ap03557	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PRS01	Not Provided		Sediment	M16-Ap03558	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PSS01	Not Provided		Sediment	M16-Ap03559	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PTS01	Not Provided		Sediment	M16-Ap03560	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PVS01	Not Provided		Sediment	M16-Ap03561	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PWS01	Not Provided		Sediment	M16-Ap03562	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PYS	Not Provided		Sediment	M16-Ap03563	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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Sample Detail					Acid Volatile Sulfide (AVS)*	Antimony	Arsenic	Boron	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Mercury (SEM)*	Nickel	Thallium	Zinc	Moisture Set
Laboratory where analysis is conducted																					
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																					
Brisbane Laboratory - NATA Site # 20794					X																
External Laboratory																					
PLS01	Not Provided		Sediment	M16-Ap03564	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PFS01A	Not Provided		Sediment	M16-Ap03565	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PFS01B	Not Provided		Sediment	M16-Ap03566	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PJX01A	Not Provided		Sediment	M16-Ap03567	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PJX01B	Not Provided		Sediment	M16-Ap03568	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PHS01A	Not Provided		Sediment	M16-Ap03569	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PHS01B	Not Provided		Sediment	M16-Ap03570	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PCS01	Not Provided		Sediment	M16-Ap03571	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. 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. 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.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
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 20-130%.

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								
Heavy Metals								
Antimony			mg/kg	< 2		2	Pass	
Arsenic			mg/kg	< 2		2	Pass	
Boron			mg/kg	< 5		5	Pass	
Cadmium			mg/kg	< 1		1	Pass	
Chromium			mg/kg	< 5		5	Pass	
Cobalt			mg/kg	< 5		5	Pass	
Copper			mg/kg	< 5		5	Pass	
Iron			mg/kg	< 5		5	Pass	
Lead			mg/kg	< 5		5	Pass	
Manganese			mg/kg	< 5		5	Pass	
Mercury			mg/kg	< 0.1		0.1	Pass	
Nickel			mg/kg	< 5		5	Pass	
Thallium			mg/kg	< 10		10	Pass	
Zinc			mg/kg	< 5		5	Pass	
Method Blank								
Eurofins mgt Suite 21								
Mercury (SEM)*			mg/kg	< 0.01		0.01	Pass	
LCS - % Recovery								
Heavy Metals								
Antimony			%	94		80-120	Pass	
Arsenic			%	91		80-120	Pass	
Boron			%	96		80-120	Pass	
Cadmium			%	94		80-120	Pass	
Chromium			%	93		80-120	Pass	
Cobalt			%	91		80-120	Pass	
Copper			%	100		80-120	Pass	
Lead			%	92		80-120	Pass	
Manganese			%	92		80-120	Pass	
Mercury			%	100		75-125	Pass	
Nickel			%	93		80-120	Pass	
Zinc			%	87		80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Heavy Metals				Result 1				
Antimony	M16-Ap02906	NCP	%	90		70-130	Pass	
Boron	M16-Ap02906	NCP	%	101		75-125	Pass	
Cobalt	M16-Ap02906	NCP	%	92		75-125	Pass	
Manganese	M16-Ap03146	NCP	%	124		75-125	Pass	
Nickel	M16-Ap02906	NCP	%	92		75-125	Pass	
Zinc	M16-Ap02906	NCP	%	103		75-125	Pass	
Spike - % Recovery								
Heavy Metals				Result 1				
Arsenic	M16-Ap03563	CP	%	77		75-125	Pass	
Cadmium	M16-Ap03563	CP	%	79		75-125	Pass	
Chromium	M16-Ap03563	CP	%	84		75-125	Pass	
Copper	M16-Ap03563	CP	%	94		75-125	Pass	
Lead	M16-Ap03563	CP	%	79		75-125	Pass	
Mercury	M16-Ap03563	CP	%	54		70-130	Fail	Q08

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Acid Volatile Sulfide (AVS)*	M16-Ap03555	CP	%	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Manganese	M16-Ap01750	NCP	mg/kg	610	600	2.0	30%	Pass	
Mercury	M16-Ap03555	CP	mg/kg	3.5	3.8	9.0	30%	Pass	
Duplicate									
Eurofins mgt Suite 21				Result 1	Result 2	RPD			
Mercury (SEM)*	M16-Ap03555	CP	mg/kg	1.9	2.2	14	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Mercury	M16-Ap03556	CP	mg/kg	4.0	4.0	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M16-Ap03562	CP	%	39	38	2.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	M16-Ap03562	CP	mg/kg	12	20	51	30%	Fail	Q15
Arsenic	M16-Ap03562	CP	mg/kg	130	130	5.0	30%	Pass	
Boron	M16-Ap03562	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Cadmium	M16-Ap03562	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Chromium	M16-Ap03562	CP	mg/kg	87	91	6.0	30%	Pass	
Cobalt	M16-Ap03562	CP	mg/kg	16	17	7.0	30%	Pass	
Copper	M16-Ap03562	CP	mg/kg	61	60	1.0	30%	Pass	
Iron	M16-Ap03562	CP	mg/kg	66000	65000	1.0	30%	Pass	
Lead	M16-Ap03562	CP	mg/kg	38	37	2.0	30%	Pass	
Mercury	M16-Ap03562	CP	mg/kg	15	16	2.0	30%	Pass	
Nickel	M16-Ap03562	CP	mg/kg	23	22	2.0	30%	Pass	
Thallium	M16-Ap03562	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Zinc	M16-Ap03562	CP	mg/kg	59	59	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	M16-Ap03563	CP	mg/kg	33	30	8.0	30%	Pass	
Arsenic	M16-Ap03563	CP	mg/kg	99	100	3.0	30%	Pass	
Boron	M16-Ap03563	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Cadmium	M16-Ap03563	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Chromium	M16-Ap03563	CP	mg/kg	39	39	<1	30%	Pass	
Cobalt	M16-Ap03563	CP	mg/kg	19	18	1.0	30%	Pass	
Copper	M16-Ap03563	CP	mg/kg	48	49	<1	30%	Pass	
Iron	M16-Ap03563	CP	mg/kg	34000	34000	<1	30%	Pass	
Lead	M16-Ap03563	CP	mg/kg	37	38	3.0	30%	Pass	
Mercury	M16-Ap03563	CP	mg/kg	0.6	0.6	6.0	30%	Pass	
Nickel	M16-Ap03563	CP	mg/kg	20	20	2.0	30%	Pass	
Thallium	M16-Ap03563	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Zinc	M16-Ap03563	CP	mg/kg	100	110	5.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Acid Volatile Sulfide (AVS)*	M16-Ap03565	CP	%	0.014	0.014	<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

Qualifier Codes/Comments

Code	Description
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

Onur Mehmet	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)
Richard Corner	Senior Analyst-Inorganic (QLD)



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

Uncertainty data is available on request

Eurofins | mgt shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins | mgt be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

[illegible]

Received: Mar 15, 2016 2:29 PM
Due: Mar 22, 2016
Priority: 5 Day
Contact Name: Andrew Rumsby

Eurofins | mgt Client Manager: Onur Mehmet

[illegible]

Certificate of Analysis

Pattle Delamore Partners Ltd
PDP House Level 4, 235 Broadway
Newmarket
Auckland New Zealand 1023



NATA Accredited
Accreditation Number 1261
Site Number 1254

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

Attention: Andrew Rumsby

Report 495302-S
Project name
Project ID A02982801
Received Date Mar 15, 2016

Client Sample ID			PGS01A	PGS01B	PMS02	PNS02
Sample Matrix			Sediment	Sediment	Sediment	Sediment
Eurofins mgt Sample No.			M16-Ap02372	M16-Ap02373	M16-Ap02374	M16-Ap02375
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Heavy Metals						
Mercury	0.1	mg/kg	See attached	See attached	See attached	See attached
Methyl Mercury			See attached	See attached	See attached	See attached

Client Sample ID			POS02	PQS02	PRS02	PSS02
Sample Matrix			Sediment	Sediment	Sediment	Sediment
Eurofins mgt Sample No.			M16-Ap02376	M16-Ap02377	M16-Ap02378	M16-Ap02379
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Heavy Metals						
Mercury	0.1	mg/kg	See attached	See attached	See attached	See attached
Methyl Mercury			See attached	See attached	See attached	See attached

Client Sample ID			PTS02	PUS02	PVS02	PWS02
Sample Matrix			Sediment	Sediment	Sediment	Sediment
Eurofins mgt Sample No.			M16-Ap02380	M16-Ap02381	M16-Ap02382	M16-Ap02383
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Heavy Metals						
Mercury	0.1	mg/kg	See attached	See attached	See attached	See attached
Methyl Mercury			See attached	See attached	See attached	See attached

Client Sample ID			PHS01D	PHS01E	PFS01D	PFS01E
Sample Matrix			Sediment	Sediment	Sediment	Sediment
Eurofins mgt Sample No.			M16-Ap02384	M16-Ap02385	M16-Ap02386	M16-Ap02387
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Heavy Metals						
Mercury	0.1	mg/kg	See attached	See attached	See attached	See attached
Methyl Mercury			See attached	See attached	See attached	See attached

Client Sample ID			PDS01D	PDS01E	PGS01D	PGS01E
Sample Matrix			Sediment	Sediment	Sediment	Sediment
Eurofins mgt Sample No.			M16-Ap02388	M16-Ap02389	M16-Ap02390	M16-Ap02391
Date Sampled			Not Provided	Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit				
Heavy Metals						
Mercury	0.1	mg/kg	See attached	See attached	See attached	See attached
Methyl Mercury			See attached	See attached	See attached	See attached

Client Sample ID			PCS01	PKS02	PYS02
Sample Matrix			Sediment	Sediment	Sediment
Eurofins mgt Sample No.			M16-Ap02392	M16-Ap02393	M16-Ap02394
Date Sampled			Not Provided	Not Provided	Not Provided
Test/Reference	LOR	Unit			
Heavy Metals					
Mercury	0.1	mg/kg	See attached	See attached	See attached
Methyl Mercury			See attached	See attached	See attached

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

Heavy Metals

Testing Site

Melbourne

Extracted

Apr 05, 2016

Holding Time

180 Day

- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)

Company Name: Pattle Delamore Partners Ltd
Address: PDP House Level 4, 235 Broadway
Newmarket
Auckland New Zealand 1023

Project Name:
Project ID: A02982801

Order No.:
Report #: 495302
Phone: 0011 64 9 523 6900
Fax: 0011 64 9 523 6901

Received: Mar 15, 2016 2:29 PM
Due: Mar 22, 2016
Priority: 5 Day
Contact Name: Andrew Rumsby

Eurofins | mgt Analytical Services Manager : Onur Mehmet

Sample Detail						Mercury	Methyl Mercury
Melbourne Laboratory - NATA Site # 1254 & 14271						X	
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
External Laboratory							X
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	PGS01A	Not Provided		Sediment	M16-Ap02372	X	X
2	PGS01B	Not Provided		Sediment	M16-Ap02373	X	X
3	PMS02	Not Provided		Sediment	M16-Ap02374	X	X
4	PNS02	Not Provided		Sediment	M16-Ap02375	X	X
5	POS02	Not Provided		Sediment	M16-Ap02376	X	X
6	PQS02	Not Provided		Sediment	M16-Ap02377	X	X
7	PRS02	Not Provided		Sediment	M16-Ap02378	X	X
8	PSS02	Not Provided		Sediment	M16-Ap02379	X	X
9	PTS02	Not Provided		Sediment	M16-Ap02380	X	X
10	PUS02	Not Provided		Sediment	M16-Ap02381	X	X

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Melbourne Laboratory - NATA Site # 1254 & 14271						X	
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
External Laboratory							X
11	PVS02	Not Provided		Sediment	M16-Ap02382	X	X
12	PWS02	Not Provided		Sediment	M16-Ap02383	X	X
13	PHS01D	Not Provided		Sediment	M16-Ap02384	X	X
14	PHS01E	Not Provided		Sediment	M16-Ap02385	X	X
15	PFS01D	Not Provided		Sediment	M16-Ap02386	X	X
16	PFS01E	Not Provided		Sediment	M16-Ap02387	X	X
17	PDS01D	Not Provided		Sediment	M16-Ap02388	X	X
18	PDS01E	Not Provided		Sediment	M16-Ap02389	X	X
19	PGS01D	Not Provided		Sediment	M16-Ap02390	X	X
20	PGS01E	Not Provided		Sediment	M16-Ap02391	X	X
21	PCS01	Not Provided		Sediment	M16-Ap02392	X	X

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Sample Detail						Mercury	Methyl Mercury
Melbourne Laboratory - NATA Site # 1254 & 14271						X	
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
External Laboratory							X
22	PKS02	Not Provided		Sediment	M16-Ap02393	X	X
23	PYS02	Not Provided		Sediment	M16-Ap02394	X	X
Test Counts						23	23

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. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. 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. 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.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
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 20-130%.

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.

Comments

Mercury: Eurofins | Frontier Global Sciences, report number 1604391.

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	Yes

Authorised By

Onur Mehmet	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (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

Uncertainty data is available on request

Eurofins | mgt shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins | mgt be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

Company Name: Pattle Delamore Partners Ltd
Address: PDP House Level 4, 235 Broadway
Newmarket
Auckland New Zealand 1023

Project Name:
Project ID: A02982801

Order No.:
Report #: 495302
Phone: 0011 64 9 523 6900
Fax: 0011 64 9 523 6901

Received: Mar 15, 2016 2:29 PM
Due: Mar 22, 2016
Priority: 5 Day
Contact Name: Andrew Rumsby

Eurofins | mgt Analytical Services Manager : Onur Mehmet

Sample Detail						Mercury	Methyl Mercury
Melbourne Laboratory - NATA Site # 1254 & 14271						X	
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
External Laboratory							X
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	PGS01A	Not Provided		Sediment	M16-Ap02372	X	X
2	PGS01B	Not Provided		Sediment	M16-Ap02373	X	X
3	PMS02	Not Provided		Sediment	M16-Ap02374	X	X
4	PNS02	Not Provided		Sediment	M16-Ap02375	X	X
5	POS02	Not Provided		Sediment	M16-Ap02376	X	X
6	PQS02	Not Provided		Sediment	M16-Ap02377	X	X
7	PRS02	Not Provided		Sediment	M16-Ap02378	X	X
8	PSS02	Not Provided		Sediment	M16-Ap02379	X	X
9	PTS02	Not Provided		Sediment	M16-Ap02380	X	X
10	PUS02	Not Provided		Sediment	M16-Ap02381	X	X

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Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
External Laboratory							X
11	PVS02	Not Provided		Sediment	M16-Ap02382	X	X
12	PWS02	Not Provided		Sediment	M16-Ap02383	X	X
13	PHS01D	Not Provided		Sediment	M16-Ap02384	X	X
14	PHS01E	Not Provided		Sediment	M16-Ap02385	X	X
15	PFS01D	Not Provided		Sediment	M16-Ap02386	X	X
16	PFS01E	Not Provided		Sediment	M16-Ap02387	X	X
17	PDS01D	Not Provided		Sediment	M16-Ap02388	X	X
18	PDS01E	Not Provided		Sediment	M16-Ap02389	X	X
19	PGS01D	Not Provided		Sediment	M16-Ap02390	X	X
20	PGS01E	Not Provided		Sediment	M16-Ap02391	X	X
21	PCS01	Not Provided		Sediment	M16-Ap02392	X	X

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Sample Detail						Mercury	Methyl Mercury
Melbourne Laboratory - NATA Site # 1254 & 14271						X	
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
External Laboratory							X
22	PKS02	Not Provided		Sediment	M16-Ap02393	X	X
23	PYS02	Not Provided		Sediment	M16-Ap02394	X	X
Test Counts						23	23

06 May 2016

Onur Mehmet

Eurofins MGT (Melbourne)

2-5 Kingston Town Close

Oakleigh, VIC 3164

RE: Freshwater Sediments And Tissues

Enclosed are the analytical results for samples received by Eurofins Frontier Global Sciences. All quality control measurements are within established control limits and there were no analytical difficulties encountered with the exception of those listed in the case narrative section of this report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Amy Goodall

Project Manager

Eurofins MGT (Melbourne)
2-5 Kingston Town Close
Oakleigh VIC, 3164

Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Ap02372	1604391-01	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02373	1604391-02	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02374	1604391-03	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02375	1604391-04	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02376	1604391-05	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02377	1604391-06	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02378	1604391-07	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02379	1604391-08	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02380	1604391-09	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02381	1604391-10	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02382	1604391-11	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02383	1604391-12	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02384	1604391-13	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02385	1604391-14	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02386	1604391-15	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02387	1604391-16	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02388	1604391-17	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02389	1604391-18	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02390	1604391-19	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02391	1604391-20	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02392	1604391-21	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02393	1604391-22	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30
Ap02394	1604391-23	Soil/Sediment	07-Apr-16 00:00	08-Apr-16 11:30

Eurofins Frontier Global Sciences, Inc.

The results in this report only apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Amy Goodall, Project Manager

Eurofins MGT (Melbourne)
2-5 Kingston Town Close
Oakleigh VIC, 3164Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur MehmetReported:
06-May-16 16:42

SAMPLE RECEIPT

Samples were received at Eurofins Frontier Global Sciences (EFGS) on 4/8/2016 11:30:00 AM . The samples were received intact, on-ice within a sealed cooler at 5.9 degrees Celsius.

SAMPLE PREPARATION AND ANALYSIS

Total solids analysis was performed in accordance with method SM2540B. Total solids are prepared at the same time as the preparation for the analyte(s) of interest in order to provide the most accurate dry mass correction which may be outside of the method recommended holding time of 7 days from sample collection.

Total mercury preparation and analysis was performed by flow injection atomic fluorescence spectrometry (FI-AFS) in accordance with EPA 1631B.

Samples were prepared and analyzed for methyl mercury by cold vapor gas chromatography atomic fluorescence spectrometry (CV-GC-AFS) in accordance with EPA 1630 (EFGS-070).

ANALYTICAL AND QUALITY CONTROL ISSUES

Method blanks were prepared for every preparation to assess possible blank contribution from the sample preparation procedure. The method blanks were carried through the entire analytical procedure. All blanks fell within the established acceptance criteria with the exception of any items narrated above or flagged and described in the notes and definitions section of the report.

Liquid spikes, certified reference material (CRM) or a quality control samples (QCS) were prepared for every preparation as a measure of accuracy. All liquid spikes, CRMs and/or QCS samples fell within the established acceptance criteria with the exception of any items narrated above or flagged and described in the notes and definitions section of the report.

As an additional measure of the accuracy of the methods used and to check for matrix interference, matrix spikes (MS) and matrix spike duplicates (MSD) were digested and analyzed. All of the matrix spike recoveries fell within the established acceptance criteria with the exception of any items flagged and described in the notes and definitions section of the report.

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Amy Goodall, Project Manager



Frontier Global Sciences

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2-5 Kingston Town Close
Oakleigh VIC, 3164

Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

A reasonable measure of the precision of the analytical methods is the relative percent difference (RPD) between a matrix spike recovery and a matrix spike duplicate recovery and between laboratory control sample recovery and laboratory control sample duplicate recoveries. All of the relative percent differences established acceptance criteria with the exception of any items flagged and described in the notes and definitions section of the report.

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Sample Receipt Checklist

EFGS Work Order: 1604391

Client: MGT Melbourne

Date & Time Received: 4/8/16 1130

Date Labeled: 4/14/16 Labeled By: LM

Project: _____

Received By: CSP

Label Verified By: CSP

of Coolers Received: 1 Samples Arrived By: ✓ Shipping Service _____ Courier _____ Hand _____ Other (Specify: _____)

Coolant: ☐ None/Ambient ☐ Loose Ice ☒ Gel Ice ☐ Dry Ice Coolant Required: Y N Temp Blank Used: Y N for Cooler(s): _____

Notify Project Manager if packages/coolers are received without coolant or with thawed coolant and at a temperature in excess of 6°C. PM notified: Y/N

Cooler Information:	Y/N/NA	Comments
The coolers do not appear to be tampered with:	<u>Y</u>	
Custody Seals are present and intact:	<u>N</u>	
Custody seals signed:	<u>N</u>	

TID: <u>111943150</u> CF: <u>*0.1</u> °C	Date/time: <u>4/8/16 1130</u>	By: <u>CSP</u>
Cooler 1: <u>5.8</u> °C w/ CF: <u>5.9</u> °C	Cooler 4: °C w/ CF: °C	
Cooler 2: °C w/ CF: °C	Cooler 5: °C w/ CF: °C	
Cooler 3: °C w/ CF: °C	Cooler 6: °C w/ CF: °C	

Chain of Custody:	Y/N/NA	Comments
Sample ID/Description:	<u>Y</u>	
Date and time of collection:	<u>N</u>	
Sampled by:	<u>N</u>	
Preservation type:	<u>Y</u>	
Requested analyses:	<u>Y</u>	
Required signatures:	<u>Y</u>	
Internal COC required:	<u>N</u>	

Sample Condition/Integrity:	Y/N/NA	Comments
Sample containers intact/present:	<u>Y</u>	
Sample labels are present and legible:	<u>Y</u>	
Sample ID on container/bag matches COC:	<u>Y</u>	
Correct sample containers used:	<u>Y</u>	
Samples received within holding times:	<u>Y</u>	
Sample volume sufficient for requested analyses:	<u>Y</u>	
Correct preservative used for requested analyses:	<u>MA</u>	

Anomalies/Non-conformances (attach additional pages if needed):



mgt

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☐ BRISBANE

Ph: +61 7 3902 4600
1/21 Smallwood Place Murarrie, Qld 4172
Email: EnviroSampleQLD@eurofins.com.au

☐ SYDNEY

W 2066
Email: EnviroSampleNSW@eurofins.com.au

Purchase Order for External Analysis

Eurofins | mgt Ref: 495302 Eurofins | mgt Purchase Order: 16/0239 495302 Results Required: STD Page: 1 of 2

Receiving Laboratory: Eurofins Frontier Global Sciences

Eurofins | mgt Contact: Onur Mehmet

Address: 11720 North Creek Parkway North Suite 400
Bothell WA 98011 - USA

Report results to: EnviroReports@eurofins.com.au ☒

Eurofins | mgt, P.O. Box 276, Oakleigh, Vic 3166, Australia ☐

Telephone: _____ Fax: _____

Send invoices to: EnviroAP@eurofins.com.au ☒

Client ID	Eurofins mgt ID	Matrix	Tests Required
	Ap02372	Sediment	Total Mercury and Methyl Mercury
	Ap02373	Sediment	Total Mercury and Methyl Mercury
	Ap02374	Sediment	Total Mercury and Methyl Mercury
	Ap02375	Sediment	Total Mercury and Methyl Mercury
	Ap02376	Sediment	Total Mercury and Methyl Mercury
	Ap02377	Sediment	Total Mercury and Methyl Mercury
	Ap02378	Sediment	Total Mercury and Methyl Mercury
	Ap02379	Sediment	Total Mercury and Methyl Mercury
	Ap02380	Sediment	Total Mercury and Methyl Mercury
	Ap02381	Sediment	Total Mercury and Methyl Mercury
	Ap02382	Sediment	Total Mercury and Methyl Mercury

Total No. Samples: 11 Comments: Please identify samples using Eurofins | mgt ID and Client ID

Chain of Custody

Relinquished by: Tony W Date/Time: 5/04/16
Received by: Wendy Cosbin Powell Date/Time: 4/8/16 1130
Relinquished by: _____ Date/Time: _____
Received by: EF65 NA 5.9°C Date/Time: DHL 1130
30 6288 4521

Sample Receipt Advice (Receiving Lab Use Only)

All Samples Received in Good Condition ☐ Average sample temp on receipt: (°C) _____
All Documentation in Proper Order ☐ _____
Samples Received with an Attempt to Chill ☐ For all enquires please quote Ref. No. _____
Samples Received Within Holding Times ☐ _____
Please complete this section and email a scan copy to EnviroReports@eurofins.com.au



mgt

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Email: EnviroSampleQLD@eurofins.com.au

☐ SYDNEY

W 2066
Email: EnviroSampleNSW@eurofins.com.au

1604391

Purchase Order for External Analysis

Eurofins | mgt Ref: 495302 Eurofins | mgt Purchase Order: 16/0289 495302 Results Required: STD Page: 2 of 2

Receiving Laboratory: Eurofins Frontier Global Sciences

Eurofins | mgt Contact: **Onur Mehmet**

Address: 11720 North Creek Parkway North Suite 400
Bothell WA 98011 - USA

Report results to: EnviroReports@eurofins.com.au ☒

Eurofins | mgt, P.O. Box 276, Oakleigh, Vic 3166, Australia ☐

Telephone: _____ Fax: _____

Send invoices to: EnviroAP@eurofins.com.au ☒

Client ID	Eurofins mgt ID	Matrix	Tests Required
	Ap02383	Sediment	Total Mercury and Methyl Mercury
	Ap02384	Sediment	Total Mercury and Methyl Mercury
	Ap02385	Sediment	Total Mercury and Methyl Mercury
	Ap02386	Sediment	Total Mercury and Methyl Mercury
	Ap02387	Sediment	Total Mercury and Methyl Mercury
	Ap02388	Sediment	Total Mercury and Methyl Mercury
	Ap02389	Sediment	Total Mercury and Methyl Mercury
	Ap02390	Sediment	Total Mercury and Methyl Mercury
	Ap02391	Sediment	Total Mercury and Methyl Mercury
	Ap02392	Sediment	Total Mercury and Methyl Mercury
	Ap02393	Sediment	Total Mercury and Methyl Mercury
	Ap02394	Sediment	Total Mercury and Methyl Mercury

Total No. Samples: 12 Comments: Please identify samples using Eurofins | mgt ID and Client ID

Chain of Custody

Relinquished by: Tony W Date/Time: 5/04/16
Received by: *[Signature]* Corbin Powell Date/Time: 4/8/16 1130
Relinquished by: _____ Date/Time: _____
Received by: EFGS NA 5.9°C Date/Time: DHL 1130
30 6288 4521

Sample Receipt Advice (Receiving Lab Use Only)

All Samples Received in Good Condition ☐ Average sample temp on receipt: (°C) _____
All Documentation in Proper Order ☐ _____
Samples Received with an Attempt to Chill ☐ For all enquires please quote Ref. No. _____
Samples Received Within Holding Times ☐ _____
Please complete this section and email a scan copy to EnviroReports@eurofins.com.au



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Oakleigh VIC, 3164

Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02372
1604391-01

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	46.9	-	0.1	% by Weight	1	F604275	21-Apr-16		25-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl2 Extraction for Methyl Hg

Methyl Mercury (as Mercury)	2.81	-	1.10	ng/g dry	10	F604266	25-Apr-16	6D27001	26-Apr-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	361	-	10.1	ng/g dry	100	F604274	21-Apr-16	6D23003	22-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02373

1604391-02

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	47.4	-	0.1	% by Weight	1	F604275	21-Apr-16		25-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl₂ Extraction for Methyl Hg

Methyl Mercury (as Mercury)	2.73	-	1.09	ng/g dry	10	F604266	25-Apr-16	6D27001	26-Apr-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	496	-	9.05	ng/g dry	100	F604274	21-Apr-16	6D23003	22-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02374

1604391-03

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	60.4	-	0.1	% by Weight	1	F604275	21-Apr-16		25-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl2 Extraction for Methyl Hg

Methyl Mercury (as Mercury)	1.49	-	0.879	ng/g dry	10	F604266	25-Apr-16	6D27001	26-Apr-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	1540	-	40.0	ng/g dry	500	F604274	21-Apr-16	6D23003	22-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02375
1604391-04

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	77.9	-	0.1	% by Weight	1	F604275	21-Apr-16		25-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl₂ Extraction for Methyl Hg

Methyl Mercury (as Mercury)	1.13	-	0.064	ng/g dry	0.95057 03	F604266	25-Apr-16	6D27001	26-Apr-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	1770	-	57.4	ng/g dry	1000	F604274	21-Apr-16	6D23003	22-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02376

1604391-05

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	69.5	-	0.1	% by Weight	1	F604275	21-Apr-16		25-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl₂ Extraction for Methyl Hg

Methyl Mercury (as Mercury)	0.730	-	0.073	ng/g dry	0.95057 03	F604266	25-Apr-16	6D27001	26-Apr-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	1940	-	70.8	ng/g dry	1000	F604274	21-Apr-16	6D23003	22-Apr-16	EPA 1631B	
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Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02377

1604391-06

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	72.1	-	0.1	% by Weight	1	F604275	21-Apr-16		25-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl2 Extraction for Methyl Hg

Methyl Mercury (as Mercury)	3.25	-	0.766	ng/g dry	10	F604266	25-Apr-16	6D27001	26-Apr-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	650	-	30.3	ng/g dry	500	F604274	21-Apr-16	6D23003	22-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02378

1604391-07

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	70.5	-	0.1	% by Weight	1	F604275	21-Apr-16		25-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl2 Extraction for Methyl Hg

Methyl Mercury (as Mercury)	0.922	-	0.707	ng/g dry	10	F604266	25-Apr-16	6D27001	26-Apr-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	45100	-	3500	ng/g dry	50000	F604274	21-Apr-16	6D25008	25-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02379

1604391-08

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	65.4	-	0.1	% by Weight	1	F604275	21-Apr-16		25-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl₂ Extraction for Methyl Hg

Methyl Mercury (as Mercury)	3.31	-	0.774	ng/g dry	10	F604266	25-Apr-16	6D27001	26-Apr-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	51300	-	3660	ng/g dry	50000	F604274	21-Apr-16	6D25008	25-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02380

1604391-09

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	58.8	-	0.1	% by Weight	1	F604275	21-Apr-16		25-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl2 Extraction for Methyl Hg

Methyl Mercury (as Mercury)	4.31	-	0.449	ng/g dry	5	F605069	02-May-16	6E04008	04-May-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	3980	-	834	ng/g dry	10000	F604274	21-Apr-16	6D23003	22-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02381
1604391-10

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	54.0	-	0.1	% by Weight	1	F604287	22-Apr-16		27-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl2 Extraction for Methyl Hg

Methyl Mercury (as Mercury)	3.98	-	1.00	ng/g dry	10	F604266	25-Apr-16	6D27001	26-Apr-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	74900	-	3970	ng/g dry	50000	F604286	22-Apr-16	6D25008	25-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02382

1604391-11

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	48.4	-	0.1	% by Weight	1	F604287	22-Apr-16		27-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl₂ Extraction for Methyl Hg

Methyl Mercury (as Mercury)	6.53	-	1.05	ng/g dry	10	F604266	25-Apr-16	6D27001	26-Apr-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	1790	-	48.8	ng/g dry	500	F604286	22-Apr-16	6D25008	25-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02383

1604391-12

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	67.6	-	0.1	% by Weight	1	F604287	22-Apr-16		27-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl₂ Extraction for Methyl Hg

Methyl Mercury (as Mercury)	2.16	-	0.779	ng/g dry	10	F604266	25-Apr-16	6D27001	26-Apr-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	2710	-	158	ng/g dry	2500	F604286	22-Apr-16	6D25008	25-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02384

1604391-13

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	47.4	-	0.1	% by Weight	1	F604287	22-Apr-16		27-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl₂ Extraction for Methyl Hg

Methyl Mercury (as Mercury)	1.69	-	1.16	ng/g dry	10	F604266	25-Apr-16	6D27001	26-Apr-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	570	-	240	ng/g dry	2500	F604286	22-Apr-16	6D25008	25-Apr-16	EPA 1631B	
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Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02385

1604391-14

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	36.6	-	0.1	% by Weight	1	F604287	22-Apr-16		27-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl₂ Extraction for Methyl Hg

Methyl Mercury (as Mercury)	3.31	-	1.41	ng/g dry	10	F604266	25-Apr-16	6D27001	26-Apr-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	568	-	327	ng/g dry	2500	F604286	22-Apr-16	6D25008	25-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02386

1604391-15

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	61.7	-	0.1	% by Weight	1	F604287	22-Apr-16		27-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl2 Extraction for Methyl Hg

Methyl Mercury (as Mercury)	0.344	-	0.077	ng/g dry	0.95057 03	F604266	25-Apr-16	6D27001	26-Apr-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	210	-	172	ng/g dry	2500	F604289	22-Apr-16	6D25008	25-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02387

1604391-16

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	65.2	-	0.1	% by Weight	1	F604287	22-Apr-16		27-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl2 Extraction for Methyl Hg

Methyl Mercury (as Mercury)	0.328	-	0.079	ng/g dry	0.95057 03	F604266	25-Apr-16	6D27001	26-Apr-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	217	-	184	ng/g dry	2500	F604289	22-Apr-16	6D25008	25-Apr-16	EPA 1631B	
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Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02388

1604391-17

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	71.4	-	0.1	% by Weight	1	F604287	22-Apr-16		27-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl₂ Extraction for Methyl Hg

Methyl Mercury (as Mercury)	ND	-	0.066	ng/g dry	0.95057 03	F605069	02-May-16	6E04008	04-May-16	EPA 1630 Mod/FGS-070	U
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	138	-	6.40	ng/g dry	100	F604289	22-Apr-16	6D25008	25-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02389

1604391-18

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	72.4	-	0.1	% by Weight	1	F604287	22-Apr-16		27-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl₂ Extraction for Methyl Hg

Methyl Mercury (as Mercury)	ND	-	0.065	ng/g dry	0.9505703	F605069	02-May-16	6E04008	04-May-16	EPA 1630 Mod/FGS-070	U
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	338	-	147	ng/g dry	2500	F604289	22-Apr-16	6D25008	25-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02390
1604391-19

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	55.1	-	0.1	% by Weight	1	F604287	22-Apr-16		27-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl₂ Extraction for Methyl Hg

Methyl Mercury (as Mercury)	0.663	-	0.089	ng/g dry	0.95057 03	F605069	02-May-16	6E04008	04-May-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	465	-	212	ng/g dry	2500	F604289	22-Apr-16	6D25008	25-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02391

1604391-20

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	52.2	-	0.1	% by Weight	1	F604287	22-Apr-16		27-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl2 Extraction for Methyl Hg

Methyl Mercury (as Mercury)	2.98	-	0.943	ng/g dry	10	F605069	02-May-16	6E04008	04-May-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	457	-	202	ng/g dry	2500	F604289	22-Apr-16	6D25008	25-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02392

1604391-21

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	56.5	-	0.1	% by Weight	1	F604287	22-Apr-16		27-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl2 Extraction for Methyl Hg

Methyl Mercury (as Mercury)	0.114	-	0.088	ng/g dry	0.95057 03	F605069	02-May-16	6E04008	04-May-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	90.2	-	3.99	ng/g dry	50	F604289	22-Apr-16	6D25008	25-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02393

1604391-22

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	64.7	-	0.1	% by Weight	1	F604287	22-Apr-16		27-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl2 Extraction for Methyl Hg

Methyl Mercury (as Mercury)	ND	-	0.077	ng/g dry	0.9505703	F605069	02-May-16	6E04008	04-May-16	EPA 1630 Mod/FGS-070	U
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	462	-	182	ng/g dry	2500	F604289	22-Apr-16	6D25008	25-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Ap02394

1604391-23

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Sequence	Analyzed	Method	Notes
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Sample Preparation: EFGS-019 Solids Analysis

% Solids	76.3	-	0.1	% by Weight	1	F604287	22-Apr-16		27-Apr-16	SM 2540B	O-04, O-09
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Sample Preparation: EFGS-045 MeCl2 Extraction for Methyl Hg

Methyl Mercury (as Mercury)	0.504	-	0.066	ng/g dry	0.95057 03	F605069	02-May-16	6E04008	04-May-16	EPA 1630 Mod/FGS-070	
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Sample Preparation: EFGS-066 Cold Aqua Regia Digestion for Hg

Mercury	619	-	138	ng/g dry	2500	F604289	22-Apr-16	6D25008	25-Apr-16	EPA 1631B	
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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Quality Control Data

Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch F604266 - EFGS-045 MeCl2 Extraction for Methyl Hg

Blank (F604266-BLK1)					Prepared: 25-Apr-16 Analyzed: 26-Apr-16						
Methyl Mercury (as Mercury)	ND	-	0.050	ng/g wet							U
Blank (F604266-BLK2)					Prepared: 25-Apr-16 Analyzed: 26-Apr-16						
Methyl Mercury (as Mercury)	ND	-	0.050	ng/g wet							U
Blank (F604266-BLK3)					Prepared: 25-Apr-16 Analyzed: 26-Apr-16						
Methyl Mercury (as Mercury)	ND	-	0.050	ng/g wet							U
LCS (F604266-BS1)					Prepared: 25-Apr-16 Analyzed: 26-Apr-16						
Methyl Mercury (as Mercury)	3.957	-	0.580	ng/g wet	5.0050		79.1	70-130			
LCS (F604266-BS2)					Prepared: 25-Apr-16 Analyzed: 26-Apr-16						
Methyl Mercury (as Mercury)	11.21	-	1.16	ng/g wet	9.2469		121	70-130			
LCS Dup (F604266-BSD1)					Prepared: 25-Apr-16 Analyzed: 26-Apr-16						
Methyl Mercury (as Mercury)	4.389	-	0.580	ng/g wet	5.0050		87.7	70-130	10.3	35	
Duplicate (F604266-DUP1)		Source: 1604391-02			Prepared: 25-Apr-16 Analyzed: 26-Apr-16						
Methyl Mercury (as Mercury)	3.041	-	1.13	ng/g dry		2.729			10.8	35	
Matrix Spike (F604266-MS1)		Source: 1604391-02			Prepared: 25-Apr-16 Analyzed: 26-Apr-16						
Methyl Mercury (as Mercury)	9.601	-	1.12	ng/g dry	9.6518	2.729	71.2	65-130			
Matrix Spike (F604266-MS2)		Source: 1604391-11			Prepared: 25-Apr-16 Analyzed: 26-Apr-16						
Methyl Mercury (as Mercury)	14.09	-	1.05	ng/g dry	9.1029	6.534	83.0	65-130			
Matrix Spike Dup (F604266-MSD1)		Source: 1604391-02			Prepared: 25-Apr-16 Analyzed: 26-Apr-16						
Methyl Mercury (as Mercury)	11.09	-	1.11	ng/g dry	9.6166	2.729	87.0	65-130	19.9	35	

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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Quality Control Data

Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch F604266 - EFGS-045 MeCl2 Extraction for Methyl Hg

Matrix Spike Dup (F604266-MSD2)

Source: 1604391-11

Prepared: 25-Apr-16 Analyzed: 26-Apr-16

Methyl Mercury (as Mercury)	12.56	-	1.07	ng/g dry	9.2495	6.534	65.1	65-130	24.2	35	
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Batch F604274 - EFGS-066 Cold Aqua Regia Digestion for Hg

Blank (F604274-BLK1)

Prepared: 21-Apr-16 Analyzed: 22-Apr-16

Mercury	ND	-	1.00	ng/g wet							U
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Blank (F604274-BLK2)

Prepared: 21-Apr-16 Analyzed: 22-Apr-16

Mercury	ND	-	1.00	ng/g wet							U
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Blank (F604274-BLK3)

Prepared: 21-Apr-16 Analyzed: 22-Apr-16

Mercury	ND	-	1.00	ng/g wet							U
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Blank (F604274-BLK4)

Prepared: 21-Apr-16 Analyzed: 25-Apr-16

Mercury	ND	-	1.00	ng/g wet							U
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Blank (F604274-BLK5)

Prepared: 21-Apr-16 Analyzed: 25-Apr-16

Mercury	ND	-	1.00	ng/g wet							U
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Blank (F604274-BLK6)

Prepared: 21-Apr-16 Analyzed: 25-Apr-16

Mercury	ND	-	1.00	ng/g wet							U
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LCS (F604274-BS1)

Prepared: 21-Apr-16 Analyzed: 22-Apr-16

Mercury	8.16	-	1.00	ng/g wet	8.0160		102	75-125			
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LCS Dup (F604274-BSD1)

Prepared: 21-Apr-16 Analyzed: 22-Apr-16

Mercury	8.01	-	1.00	ng/g wet	8.0160		100	75-125	1.81	24	
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Amy Goodall, Project Manager

Eurofins MGT (Melbourne)
2-5 Kingston Town Close
Oakleigh VIC, 3164

Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Quality Control Data

Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch F604274 - EFGS-066 Cold Aqua Regia Digestion for Hg

Duplicate (F604274-DUP1)		Source: 1604391-02		Prepared: 21-Apr-16 Analyzed: 22-Apr-16							
Mercury	408.0	-	10.3	ng/g dry		496.3			19.5	24	
Matrix Spike (F604274-MS1)		Source: 1604391-02		Prepared: 21-Apr-16 Analyzed: 22-Apr-16							
Mercury	1187	-	51.9	ng/g dry	830.59	496.3	83.2	71-125			
Matrix Spike (F604274-MS2)		Source: 1604391-03RE1		Prepared: 21-Apr-16 Analyzed: 22-Apr-16							
Mercury	2664	-	39.9	ng/g dry	638.01	1537	177	71-125			E, QM-02
Matrix Spike (F604274-MS3)		Source: 1604391-02		Prepared: 21-Apr-16 Analyzed: 22-Apr-16							
Mercury	3416	-	90.5	ng/g dry	2900.8	496.3	101	71-125			AS
Matrix Spike (F604274-MS4)		Source: 1604391-03RE1		Prepared: 21-Apr-16 Analyzed: 25-Apr-16							
Mercury	8660	-	200	ng/g dry	6417.6	1537	111	71-125			
Matrix Spike Dup (F604274-MSD1)		Source: 1604391-02		Prepared: 21-Apr-16 Analyzed: 22-Apr-16							
Mercury	1149	-	52.6	ng/g dry	842.20	496.3	77.5	71-125	7.16	24	
Matrix Spike Dup (F604274-MSD2)		Source: 1604391-03RE1		Prepared: 21-Apr-16 Analyzed: 22-Apr-16							
Mercury	2126	-	40.3	ng/g dry	644.21	1537	91.4	71-125	63.6	24	E-01, QR-07
Matrix Spike Dup (F604274-MSD3)		Source: 1604391-02		Prepared: 21-Apr-16 Analyzed: 22-Apr-16							
Mercury	3365	-	90.5	ng/g dry	2900.8	496.3	98.9	71-125	1.76	24	AS
Matrix Spike Dup (F604274-MSD4)		Source: 1604391-03RE1		Prepared: 21-Apr-16 Analyzed: 25-Apr-16							
Mercury	8072	-	200	ng/g dry	6417.6	1537	102	71-125	8.61	24	

Batch F604286 - EFGS-066 Cold Aqua Regia Digestion for Hg

Blank (F604286-BLK1)		Prepared: 22-Apr-16 Analyzed: 25-Apr-16									
Mercury	ND	-	1.00	ng/g wet							U

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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Quality Control Data

Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch F604286 - EFGS-066 Cold Aqua Regia Digestion for Hg

Blank (F604286-BLK2)					Prepared: 22-Apr-16 Analyzed: 25-Apr-16						
Mercury	ND	-	1.00	ng/g wet							U
Blank (F604286-BLK3)					Prepared: 22-Apr-16 Analyzed: 25-Apr-16						
Mercury	ND	-	1.00	ng/g wet							U
LCS (F604286-BS1)					Prepared: 22-Apr-16 Analyzed: 25-Apr-16						
Mercury	8.03	-	1.00	ng/g wet	8.0160		100	75-125			
LCS Dup (F604286-BSD1)					Prepared: 22-Apr-16 Analyzed: 25-Apr-16						
Mercury	8.14	-	1.00	ng/g wet	8.0160		102	75-125	1.42	24	
Duplicate (F604286-DUP1)					Source: 1604391-11RE1 Prepared: 22-Apr-16 Analyzed: 25-Apr-16						
Mercury	1497	-	47.3	ng/g dry		1790			17.8	24	
Matrix Spike (F604286-MS1)					Source: 1604391-11RE1 Prepared: 22-Apr-16 Analyzed: 25-Apr-16						
Mercury	2355	-	48.2	ng/g dry	770.94	1790	73.4	71-125			
Matrix Spike (F604286-MS2)					Source: 1604574-01 Prepared: 22-Apr-16 Analyzed: 25-Apr-16						
Mercury	393.9	-	21.9	ng/g dry	349.65	26.97	105	71-125			
Matrix Spike Dup (F604286-MSD1)					Source: 1604391-11RE1 Prepared: 22-Apr-16 Analyzed: 25-Apr-16						
Mercury	2493	-	46.1	ng/g dry	737.90	1790	95.3	71-125	26.0	24	QR-07
Matrix Spike Dup (F604286-MSD2)					Source: 1604574-01 Prepared: 22-Apr-16 Analyzed: 25-Apr-16						
Mercury	388.0	-	23.0	ng/g dry	368.32	26.97	98.0	71-125	6.82	24	

Batch F604289 - EFGS-066 Cold Aqua Regia Digestion for Hg

Blank (F604289-BLK1)					Prepared: 22-Apr-16 Analyzed: 25-Apr-16						
Mercury	ND	-	1.00	ng/g wet							U

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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Quality Control Data

Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch F604289 - EFGS-066 Cold Aqua Regia Digestion for Hg

Blank (F604289-BLK2)					Prepared: 22-Apr-16 Analyzed: 25-Apr-16						
Mercury	ND	-	1.00	ng/g wet							U
Blank (F604289-BLK3)					Prepared: 22-Apr-16 Analyzed: 25-Apr-16						
Mercury	ND	-	1.00	ng/g wet							U
LCS (F604289-BS1)					Prepared: 22-Apr-16 Analyzed: 25-Apr-16						
Mercury	8.23	-	1.00	ng/g wet	8.0160		103	75-125			
LCS Dup (F604289-BSD1)					Prepared: 22-Apr-16 Analyzed: 25-Apr-16						
Mercury	8.14	-	1.00	ng/g wet	8.0160		102	75-125	1.08	24	
Duplicate (F604289-DUP1)					Source: 1604391-15 Prepared: 22-Apr-16 Analyzed: 25-Apr-16						
Mercury	209.1	-	190	ng/g dry		210.5			0.657	24	
Matrix Spike (F604289-MS1)					Source: 1604391-15 Prepared: 22-Apr-16 Analyzed: 25-Apr-16						
Mercury	834.1	-	184	ng/g dry	589.36	210.5	106	71-125			
Matrix Spike Dup (F604289-MSD1)					Source: 1604391-15 Prepared: 22-Apr-16 Analyzed: 25-Apr-16						
Mercury	835.6	-	185	ng/g dry	592.59	210.5	105	71-125	0.311	24	

Batch F605069 - EFGS-045 MeCl2 Extraction for Methyl Hg

Blank (F605069-BLK1)					Prepared: 02-May-16 Analyzed: 04-May-16						
Methyl Mercury (as Mercury)	ND	-	0.050	ng/g wet							U
Blank (F605069-BLK2)					Prepared: 02-May-16 Analyzed: 04-May-16						
Methyl Mercury (as Mercury)	ND	-	0.050	ng/g wet							U

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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Quality Control Data

Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch F605069 - EFGS-045 MeCl2 Extraction for Methyl Hg

Blank (F605069-BLK3)					Prepared: 02-May-16 Analyzed: 04-May-16						
Methyl Mercury (as Mercury)	ND	-	0.050	ng/g wet							U
LCS (F605069-BS1)					Prepared: 02-May-16 Analyzed: 04-May-16						
Methyl Mercury (as Mercury)	4.000	-	0.290	ng/g wet	5.0050		79.9	70-130			
LCS (F605069-BS2)					Prepared: 02-May-16 Analyzed: 04-May-16						
Methyl Mercury (as Mercury)	11.48	-	0.569	ng/g wet	9.2469		124	70-130			
LCS Dup (F605069-BSD1)					Prepared: 02-May-16 Analyzed: 04-May-16						
Methyl Mercury (as Mercury)	4.502	-	0.290	ng/g wet	5.0050		89.9	70-130	11.8	35	
Duplicate (F605069-DUP1)					Source: 1604391-17RE1 Prepared: 02-May-16 Analyzed: 04-May-16						
Methyl Mercury (as Mercury)	0.019	-	0.060	ng/g dry		0.027			31.1	35	U
Matrix Spike (F605069-MS1)					Source: 1604391-17RE1 Prepared: 02-May-16 Analyzed: 04-May-16						
Methyl Mercury (as Mercury)	4.796	-	0.341	ng/g dry	5.8906	0.027	81.0	65-130			
Matrix Spike (F605069-MS2)					Source: 1604460-01 Prepared: 02-May-16 Analyzed: 04-May-16						
Methyl Mercury (as Mercury)	7.125	-	0.531	ng/g dry	4.5816	2.236	107	65-130			
Matrix Spike Dup (F605069-MSD1)					Source: 1604391-17RE1 Prepared: 02-May-16 Analyzed: 04-May-16						
Methyl Mercury (as Mercury)	4.816	-	0.369	ng/g dry	6.3610	0.027	75.3	65-130	7.27	35	
Matrix Spike Dup (F605069-MSD2)					Source: 1604460-01 Prepared: 02-May-16 Analyzed: 04-May-16						
Methyl Mercury (as Mercury)	7.063	-	0.549	ng/g dry	4.7373	2.236	102	65-130	4.61	35	

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Amy Goodall, Project Manager



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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Quality Control Data

Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch F604275 - EFGS-019 Solids Analysis

Duplicate (F604275-DUP1)		Source: 1604391-02			Prepared: 21-Apr-16 Analyzed: 25-Apr-16						
% Solids	47.2	-	0.1	% by Weight		47.4			0.423	10	
Duplicate (F604275-DUP2)		Source: 1604391-03			Prepared: 21-Apr-16 Analyzed: 25-Apr-16						
% Solids	60.4	-	0.1	% by Weight		60.4			0.00	10	

Batch F604287 - EFGS-019 Solids Analysis

Duplicate (F604287-DUP1)		Source: 1604391-15			Prepared: 22-Apr-16 Analyzed: 27-Apr-16						
% Solids	61.4	-	0.1	% by Weight		61.7			0.487	10	O-04, O-09
Duplicate (F604287-DUP2)		Source: 1604391-18			Prepared: 22-Apr-16 Analyzed: 27-Apr-16						
% Solids	73.3	-	0.1	% by Weight		72.4			1.24	10	O-04, O-09

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Project: Freshwater Sediments And Tissues
Project Number: 16/0239 495302
Project Manager: Onur Mehmet

Reported:
06-May-16 16:42

Notes and Definitions

U	Analyte was not detected and is reported as less than the LOD or as defined by the client. The LOD has been adjusted for any dilution or concentration of the sample.
QR-07	The RPD/RSD value for the matrix duplicate/triplicate was outside of acceptance limits. Batch QC acceptable based on MS/MSD and/or LCS/LCSD RPD values within control limits.
QM-02	The MS and/or MSD recoveries outside acceptance limits, due to spike concentration less than 1 times the sample concentration. The batch was accepted based on LCS and LCSD recoveries within control limits and, when analysis permits, acceptable AS/ASD.
O-09	Total Solids are prepared at the same time as the preparation for the analyte(s) of interest in order to provide the most accurate dry mass correction.
O-04	This sample was analyzed outside of the recommended holding time.
E-01	Sample was preceded by a sample exceeding the calibration curve and was reanalyzed for confirmation.
E	The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate (CLP E-flag).
AS	This MS and/or MSD is an analytical spike and/or an analytical spike duplicate.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

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Amy Goodall, Project Manager

Appendix F

Tabulated Sediment Sample Results

Table F-1: Sediment Laboratory Results ¹

Sample ID	Units	PCS01/PCS01	PDS01A/PDS01D	PFS01A/PFS01D	PGS01A	PHS01A/PHS01D	PJX01A	PKS001A/PKS02	PLS01	PMS01/PMS02	PNS01/ PNS02	ANZECC Sediment Quality Guidelines ^{2,3}	
Sample Site Location		PCX	PDX	PFX	PGX	PHX	PJX	PKX	PLX	PMX	PNX		
Eurofins Laboratory ID		M16-Ap03571 M16-Ap02392	M16-Ap03794 M16-Ap02388	M16-Ap03565 M16-Ap02386	M16-Ap02372	M16-Ap03569 M16-Ap02384	M16-Ap03567	M16-Ap03796 M16-Ap02393	M16-Ap03564	M16-Ap03798 M16-Ap02374	M16-Ap03555 M16-Ap02375		
Sampling Date		12-Mar-16	8-Mar-16	8-Mar-16	9-Mar-16	9-Mar-16	10-Mar-16	10-Mar-16	10-Mar-16	11-Mar-16	13-Mar-16		
Sampling time (approximate)		16:30	15:00	17:00	9:00	16:00	8:00	11:45	14:30	16:00	13:00	ISQG-low ⁴	ISQG-high ⁵
Inorganic Elements													
Total Antimony	mg/kg	< 2	< 10	< 2	NA	3.0	24	17	33	37	37	2	25
Total Arsenic	mg/kg	29	2.8	22	NA	46	78	29	57	100	230	20	70
Toal Boron	mg/kg	< 5	< 10	< 5	NA	< 5	< 5	< 10	< 5	< 10	< 5	NGV	NGV
Total Cadmium	mg/kg	< 1	< 0.4	< 1	NA	1.4	< 1	< 0.4	< 1	< 0.4	< 1	1.5	10
Total Chromium	mg/kg	64	13	51	NA	62	96	33	46	14	39	80	370
Total Cobalt	mg/kg	44	< 5	21	NA	47	34	8.7	20	< 5	< 5	NGV	NGV
Total Copper	mg/kg	63	6.1	52	NA	76	94	21	70	11	36	65	270
Total Iron	mg/kg	62,000	9,500	27,000	NA	52,000	48,000	73,000	23,000	37,000	75,000	NGV	NGV
Total Lead	mg/kg	29	7.9	36	NA	53	45	6.3	33	< 5	15	50	220
Total Manganese	mg/kg	3200	120	240	NA	1,700	400	260	230	95	140	NGV	NGV
Total Mercury ⁶	mg/kg	0.1	0.2	0.2	NA	0.6	2.0	0.5	2.1	3.7	3.5	0.15	1
Total Mercury ⁷	mg/kg	0.0902	0.138	0.21	0.361	0.57	NA	0.462	NA	1.54	1.77	0.15	1
Methyl Mercury	mg/kg	0.000114	ND	0.0003	0.00281	0.00169	NA	ND	NA	0.00149	0.00113	NGV	NGV
Methyl Mercury/Total Mercury ⁸	%	0.13%	NA	0.16%	0.78%	0.30%	NA	NA	NA	0.10%	0.06%	NGV	NGV
Total Nickel	mg/kg	38	< 5	27	NA	33	42	8.6	26	5.5	9.0	21	52
Total Thallium	mg/kg	< 10	< 10	< 10	NA	< 10	< 10	< 10	< 10	< 10	< 10	NGV	NGV
Total Zinc	mg/kg	160	19	110	NA	220	100	27	88	22	27	200	410
AVS/SEM Hg													
Simultaneously Extracted Metals (SEM) - Mercury	mg/kg	0.09	NA	0.21	NA	1.2	3.2	NA	2.1	NA	1.9	-	-
Acid Volatile Sulfide (AVS)	%	< 0.001	NA	0.014	NA	0.001	0.006	NA	< 0.001	NA	< 0.001	-	-
Simultaneously Extracted Metals (SEM) - Mercury	µmol/kg	0.45	NA	1.05	NA	5.98	15.95	NA	10.47	NA	9.47	-	-
Acid Volatile Sulfide (AVS)	µmol/kg	< 293	NA	4,108	NA	293	1,761	NA	< 293	NA	< 293	-	-
SEM < AVS		No	NA	Yes	NA	Yes	Yes	NA	No	NA	No	-	-

Notes:

1. All results in mg/kg unless otherwise stated.
2. Criteria from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Environment and Conservation Council (ANZECC, 2000).
3. Guideline trigger values from Table 3.5.1 - Recommended sediment quality guidelines (primarily adopted from Long et al. (1995)).
4. Interim Sediment Quality Guideline Trigger value above which low range effects may be expected.
5. Interim Sediment Quality Guideline value above which median range effects may be expected, and at which further investigation is recommended.
6. Mercury determined by ICP-OES (with a detection limit of 0.1 mg/kg or 100 ng/g).
7. Mercury determined by purge and trap CV-AFS (with a detection limit of 0.01 mg/kg).
8. Methyl mecury expressed as a percentage of Total Mercury.

NGV	No Guideline Value available due to insufficient data.
ND	Non Detection of Contaminant.
NA	Contaminant Not Analysed.
21	Value exceeds ANZECC (2000) Trigger Values for ISQG low range effects.
52	Value exceeds ANZECC (2000) Trigger Values for ISQG median range effects.

Table F-1: Sediment Laboratory Results - Continued ¹

Sample ID	Units	POS/POS02	PQS/PQS02	PRS01/PRS02	PSS01/PSS02	PTS01/PTS02	PUS01/PUS02	PVS01/PVS02	PWS01/PWS02	PYS/PYS02	ANZECC Sediment Quality Guidelines ^{2,3}	
Sample Site Location		POX	PQX	PRX	PSX	PTX	PUX	PVX	PWX	PYX		
Eurofins Laboratory ID		M16-Ap03556 M16-Ap02376	M16-Ap03557 M16-Ap02377	M16-Ap03558 M16-Ap02378	M16-Ap03559 M16-Ap02379	M16-Ap03560 M16-Ap02380	M16-Ap03799 M16-Ap02381	M16-Ap03561 M16-Ap02382	M16-Ap03562 M16-Ap02383	M16-Ap03563 M16-Ap02394		
Sampling Date		11-Mar-16	11-Mar-16	12-Mar-16	12-Mar-16	12-Mar-16	13-Mar-16	11-Mar-16	12-Mar-16	10-Mar-16		
Sampling time (approximate)		7:45	13:30	15:45	15:30	9:00	9:30	15:45	11:00	16:00	ISQG-low ⁴	ISQG-high ⁵
Inorganic Elements												
Total Antimony	mg/kg	11	8.2	32	17	2.4	< 10	90	12	33	2	25
Total Arsenic	mg/kg	41	35	97	34	40	2.0	250	130	99	20	70
Total Boron	mg/kg	< 5	< 5	< 5	< 5	< 5	< 10	< 5	< 5	< 5	NGV	NGV
Total Cadmium	mg/kg	< 1	< 1	< 1	< 1	< 1	< 0.4	< 1	< 1	< 1	1.5	10
Total Chromium	mg/kg	23	41	56	160	94	38	36	87	39	80	370
Total Cobalt	mg/kg	< 5	5.7	18	44	20	7.5	9.3	16	19	NGV	NGV
Total Copper	mg/kg	17	38	49	110	57	19	270	61	48	65	270
Total Iron	mg/kg	43,000	80,000	55,000	110,000	66,000	150,000	56,000	66,000	34,000	NGV	NGV
Total Lead	mg/kg	19	14	30	41	36	8.3	60	38	37	50	220
Total Manganese	mg/kg	220	270	230	1200	290	290	370	320	600	NGV	NGV
Total Mercury ⁶	mg/kg	4.0	1.9	6.9	33	1.2	54	2.9	15	0.6	0.15	1
Total Mercury ⁷	mg/kg	1.94	0.65	45.1	51.3	3.98	74.9	1.79	2.71	0.619	0.15	1
Methyl Mercury	mg/kg	0.00073	0.00325	0.000922	0.00331	0.00431	0.00398	0.00653	0.00216	0.000504	NGV	NGV
Methyl Mercury/Total Mercury ⁸	%	0.04%	0.50%	0.00%	0.01%	0.11%	0.01%	0.36%	0.08%	0.08%	NGV	NGV
Total Nickel	mg/kg	5.4	6.8	18	50	27	13	11	23	20	21	52
Total Thallium	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NGV	NGV
Total Zinc	mg/kg	24	55	40	65	80	23	76	59	100	200	410
AVS/SEM Hg												
Simultaneously Extracted Metals (SEM) - Mercury	mg/kg	1.5	1.4	5.3	10	1.6	NA	2.0	0.67	0.66	-	-
Acid Volatile Sulfide (AVS)	%	0.006	< 0.001	0.002	< 0.001	< 0.001	NA	< 0.001	< 0.001	< 0.001	-	-
Simultaneously Extracted Metals (SEM) - Mercury	µmol/kg	7.48	6.98	26.42	49.85	7.98	NA	9.97	3.34	3.29	-	-
Acid Volatile Sulfide (AVS)	µmol/kg	1761	< 293	587	< 293	< 293	NA	< 293	< 293	< 293	-	-
SEM < AVS		Yes	No	Yes	No	No	NA	No	No	No	-	-

Notes:

1. All results in mg/kg unless otherwise stated.
2. Criteria from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Environment and Conservation Council (ANZECC, 2000).
3. Guideline trigger values from Table 3.5.1 - Recommended sediment quality guidelines (primarily adopted from Long et al. (1995)).
4. Interim Sediment Quality Guideline Trigger value above which low range effects may be expected.
5. Interim Sediment Quality Guideline value above which median range effects may be expected, and at which further investigation is recommended.
6. Mercury determined by ICP-OES (with a detection limit of 0.1 mg/kg or 100 ng/g).
7. Mercury determined by purge and trap CV-AFS (with a detection limit of 0.01 mg/kg).
8. Methyl mecury expressed as a percentage of Total Mercury.

NGV	No Guideline Value available due to insufficient data.
ND	Non Detection of Contaminant.
NA	Contaminant Not Analysed.
21	Value exceeds ANZECC (2000) Trigger Values for ISQG low range effects.
52	Value exceeds ANZECC (2000) Trigger Values for ISQG median range effects.

Table F-2: SPLP and TCLP Sample Results

Sample ID	Units	PFS01A		PJS01A		PLS01		PNS01		POS01		PQS		PRS01	
Field ID		PFX		PJX		PLX		PNX		POX		PQX		PRX	
Sample Type		SPLP	TCLP	SPLP	TCLP	SPLP	TCLP	SPLP	TCLP	SPLP	TCLP	SPLP	TCLP	SPLP	TCLP
Eurofins Laboratory ID		M16-Jn07925	M16-Jn07939	M16-Jn07926	M16-Jn07940	M16-Jn07927	M16-Jn07941	M16-Jn07928	M16-Jn07942	M16-Jn07929	M16-Jn07943	M16-Jn07930	M16-Jn07944	M16-Jn07931	M16-Jn07945
Sample Date		8-Mar-16		10-Mar-16		10-Mar-16		13-Mar-16		11-Mar-16		11-Mar-16		12-Mar-16	
Inorganic Elements															
Boron	mg/L	< 0.5	< 0.5	< 0.5	< 0.5	0.78	< 0.5	< 0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Heavy Metals															
Antimony	mg/L	< 0.005	< 0.05	0.021	< 0.05	0.012	< 0.05	< 0.005	< 0.05	0.010	< 0.05	< 0.005	< 0.05	< 0.005	< 0.05
Arsenic	mg/L	< 0.001	< 0.01	0.006	0.01	0.006	0.01	0.006	< 0.01	0.018	0.04	0.002	< 0.01	< 0.001	< 0.01
Cadmium	mg/L	< 0.0002	< 0.005	< 0.0002	< 0.005	< 0.0002	< 0.005	< 0.0002	< 0.005	< 0.0002	< 0.005	< 0.0002	< 0.005	< 0.0002	< 0.005
Chromium	mg/L	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.001	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01
Cobalt	mg/L	< 0.001	0.04	0.002	0.05	< 0.001	< 0.01	< 0.001	0.01	< 0.001	0.01	0.002	0.03	0.002	< 0.01
Copper	mg/L	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01
Iron	mg/L	1.7	7.7	0.30	0.53	0.05	0.06	0.20	0.08	4.2	56	0.10	0.16	0.24	0.14
Lead	mg/L	0.002	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01
Manganese	mg/L	0.008	4.1	0.19	3.8	0.042	0.86	0.025	0.71	0.13	1.8	0.14	2.0	0.034	0.13
Mercury	mg/L	< 0.0001	< 0.001	< 0.0001	< 0.001	< 0.0001	< 0.001	< 0.0001	< 0.001	< 0.0001	< 0.001	< 0.0001	< 0.001	< 0.00001	< 0.001
Nickel	mg/L	< 0.001	0.04	< 0.001	0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	0.001	0.01	0.003	< 0.01
Thallium	mg/L	< 0.005	< 0.05	< 0.005	< 0.05	< 0.005	< 0.05	< 0.005	< 0.05	< 0.005	< 0.05	< 0.005	< 0.05	< 0.005	< 0.05
Zinc	mg/L	< 0.001	0.08	< 0.001	0.03	< 0.001	< 0.01	< 0.001	0.02	< 0.001	< 0.01	< 0.001	0.03	0.002	0.02
USA Leaching Procedure															
Leachate Fluid		-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0
pH (Leachate fluid)	pH Units	-	5.1	-	5.1	-	5.1	-	5.1	-	5.1	-	5.1	-	5.1
pH (off)	pH Units	-	5.2	-	5.1	-	5.0	-	5.0	-	5.1	-	5.0	-	5.0

Sample ID	Units	PSS01		PTS01		PVS01		PWS01		PKS001		PMS001		PUS001	
Field ID		PSX		PTX		PVX		PWX		PKX		PMX		PUX	
Sample Type		SPLP	TCLP	SPLP	TCLP	SPLP	TCLP	SPLP	TCLP	SPLP	TCLP	SPLP	TCLP	SPLP	TCLP
Eurofins Laboratory ID		M16-Jn07932	M16-Jn07946	M16-Jn07933	M16-Jn07947	M16-Jn07934	M16-Jn07948	M16-Jn07935	M16-Jn07949	M16-Jn07936	M16-Jn07950	M16-Jn07937	M16-Jn07951	M16-Jn07938	M16-Jn07952
Sample Date		12-Mar-16		12-Mar-16		11-Mar-16		12-Mar-16		10-Mar-16		11-Mar-16		13-Mar-16	
Inorganic Elements															
Boron	mg/L	< 0.5	0.98	< 0.5	< 0.05	< 0.5	0.61	< 0.5	< 0.5	< 0.5	0.55	0.75	< 0.5	< 0.5	< 0.05
Heavy Metals															
Antimony	mg/L	< 0.005	< 0.05	< 0.005	< 0.05	< 0.005	< 0.05	0.024	< 0.05	0.007	< 0.05	0.007	< 0.05	< 0.005	< 0.05
Arsenic	mg/L	< 0.001	< 0.01	0.002	< 0.01	0.006	< 0.01	0.002	< 0.01	<0.001	< 0.01	0.007	< 0.01	< 0.001	< 0.01
Cadmium	mg/L	< 0.0002	< 0.005	< 0.0002	< 0.005	< 0.0002	< 0.005	0.0003	< 0.005	< 0.0002	< 0.005	< 0.0002	< 0.005	< 0.0002	< 0.005
Chromium	mg/L	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01
Cobalt	mg/L	0.006	< 0.01	< 0.001	0.05	0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	0.003	0.03
Copper	mg/L	< 0.001	< 0.01	< 0.001	< 0.01	0.01	0.04	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01
Iron	mg/L	0.36	0.24	0.47	0.13	0.18	4.7	0.70	0.16	< 0.05	< 0.05	0.25	0.08	0.60	0.29
Lead	mg/L	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01
Manganese	mg/L	0.20	0.31	0.071	2.7	0.079	0.60	0.012	0.07	< 0.005	0.12	0.024	0.67	0.14	1.6
Mercury	mg/L	< 0.0001	< 0.001	< 0.0001	< 0.001	< 0.0001	< 0.001	0.0003	< 0.001	< 0.0001	< 0.001	< 0.0001	< 0.001	< 0.0001	< 0.001
Nickel	mg/L	0.001	< 0.01	< 0.001	< 0.01	< 0.001	< 0.01	0.001	0.01	< 0.001	< 0.01	< 0.001	< 0.01	0.002	0.02
Thallium	mg/L	< 0.005	< 0.05	< 0.005	< 0.05	< 0.005	< 0.05	< 0.005	< 0.05	< 0.005	< 0.05	< 0.005	< 0.05	< 0.005	< 0.05
Zinc	mg/L	< 0.001	< 0.01	< 0.001	0.03	< 0.001	< 0.01	< 0.001	0.03	< 0.001	< 0.01	< 0.001	0.01	< 0.001	0.02
USA Leaching Procedure															
Leachate Fluid		-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0
pH (Leachate fluid)	pH Units	-	5.1	-	5.1	-	5.1	-	5.1	-	5.1	-	5.1	-	5.1
pH (off)	pH Units	-	5.0	-	5.0	-	5.0	-	5.0	-	5.0	-	5.0	-	5.0

Appendix G

Sediment Data Quality Evaluation
(OA/OC)

Appendix G: Sediment Data Quality Evaluation (QA/QC)

Quality Assurance/Quality Control procedures that were followed are detailed below:

- ∴ Field conditions, description of sediments, station locations, sampling method and handling and storage methods, date, time and identity of the sampler have been noted.
- ∴ Duplicate samples were collected at a rate of one per 10 samples.
- ∴ An NAFA and ISO/IEC 17025 accredited laboratory (or the equivalent of IANZ) was used for all chemical analysis.

Sediment Quality Sampling

Quality assurance and quality control (QA/QC) duplicate samples were collected as part of the monitoring programme. The data quality objectives of the QA/QC monitoring undertaken as part of this project are were $\pm 35\%$; the analytical results of the QA/QC testing are presented in **Table G-1**.

Table G-1: Sediment Quality Control/Quality Assurance Samples ¹

Sample Site Location	PDX			PFX			PJX			PGX			PHX		
Sample Site ID	PDS01A	PDS01B	% RPD ²	PFS01A	PFS01B	% RPD ²	PJX01A	PJX01B	% RPD ²	PGS01A	PGS01B	% RPD ²	PHS01A	PHS01B	% RPD ²
	PDS01D	PDS01E		PFS01D	PFS01E		-	-		-	-		PHS01D	PHS01E	
Eurofins Laboratory ID	M16-Ap03794	M16-Ap03795		M16-Ap03565	M16-Ap03566		M16-Ap03567	M16-Ap03568		M16-Ap02372	M16-Ap02373		M16-Ap03569	M16-Ap03570	
	M16-Ap02388	M16-Ap02389		M16-Ap02386	M16-Ap02387		-	-		-	- <td>M16-Ap02384</td> <td>M16-Ap02385</td>		M16-Ap02384	M16-Ap02385	
Sampling Date	8-Mar-16			8-Mar-16			10-Mar-16			9-Mar-16			9-Mar-16		
Sampling Time (approximate)	15:00			17:00			8:00			9:00			16:00		
Inorganic Elements															
Total Antimony	< 10	< 10	NC	< 2	< 2	NC	24	24	0%	-	-	-	3	< 2	NC
Total Arsenic	2.8	4.7	51%	22	25	13%	78	84	7%	-	-	-	46	32	36%
Toal Boron	< 10	< 10	NC	< 5	31	NC	< 5	< 5	NC	-	-	-	< 5	< 5	NC
Total Cadmium	< 0.4	< 0.4	NC	< 1	< 1	NC	< 1	< 1	NC	-	-	-	1.4	< 1	NC
Total Chromium	13	14	7%	51	16	104%	96	110	14%	-	-	-	62	41	41%
Total Cobalt	< 5	< 5	NC	21	11	63%	34	31	9%	-	-	-	47	36	27%
Total Copper	6.1	6	2%	52	59	13%	94	81	15%	-	-	-	76	50	41%
Total Iron	9,500	9,000	5%	27,000	21,000	25%	48,000	50,000	4%	-	-	-	52,000	31,000	51%
Total Lead	7.9	6.6	18%	36	9.6	116%	45	49	9%	-	-	-	53	37	36%
Total Manganese	120	100	18%	240	1500	145%	400	320	22%	-	-	-	1,700	1,200	34%
Total Mercury ³	0.2	0.2	0%	0.2	< 0.1	NC	2	2.5	22%	-	-	-	0.6	0.6	0%
Total Mercury ⁴	0.138	0.338	84%	0.21	0.217	3%	-	-	-	0.361	0.496	32%	0.57	0.568	0%
Methyl Mercury	ND	ND	NC	0.000344	0.000328	5%	-	-	-	0.00281	0.00273	3%	0.00169	0.00331	65%
Total Nickel	< 5	5.1	NC	27	18	40%	42	47	11%	-	-	-	33	23	36%
Total Thallium	< 10	< 10	NC	< 10	< 10	NC	< 10	< 10	NC	-	-	-	< 10	< 10	NC
Total Zinc	19	19	0%	110	94	16%	100	130	26%	-	-	-	220	150	38%

- Notes:
1. All results in mg/kg.
 2. RPD = Relative Percent Difference.
 3. Mercury determined by ICP-OES (with a detection limit of 0.1 mg/kg or 100 ng/g).
 4. Mercury determined by purge and trap CV-AFS (with a detection limit of 0.01 mg/kg).

	Indicates sample results differ by > 35% RPD.
NC	% RPD not calculated due to one or more results being below the laboratory level of detection.
ND	Element not detected.

Appendix H

Comparison Table of PDP and NRC Water
Sample Results

Table H-1: PDP vs NRC Surface Water Results ^{1, 2}

PDP Field ID	PUX		PVX		PLX		PJX	
	NRC Site 3	PDP	NRC Site 4	PDP	NRC Site 2	PDP	NRC Site 1	PDP
Sample ID	301205	PUW-1	301207	PVW-1	301203	PLW01	301201	PJW01
Sampling Date	2013-2014	13-Mar-16	2013-2014	11-Mar-16	2013-2014	10-Mar-16	2013-2014	10-Mar-16
Field Parameters								
pH	2.95-6.27	6.78	2.95-5.45	4.74	4.27-6.85	6.07	4.35-7.36	6.14
DO (mg/L)	7.8-9.9	3.23	7.4-9.3	8.49	7.4-9.3	9.58	8.6-10.1	8.69
DO (% Saturation)	78.0-91.1	32.8	73.1-88.2	87.1	74.5-88.8	105.4	87.1-94.1	92.4
Temperature °C	9.4-18.7	16.1	10-16.3	16.6	10.1-18.9	20	9.8-19.1	18.3
Heavy Metals								
Total Antimony	0.000039 ³	< 0.005	0.000899 ³	< 0.005	0.001137 ³	< 0.005	0.000676 ³	< 0.005
Total Arsenic	< 0.0001-0.0003	< 0.001	0.00095-0.0025	0.002	0.0027-0.014	0.003	0.00069-0.0023	0.002
Total Cadmium	< 0.00005	< 0.0002	< 0.00005	< 0.0002	< 0.00005	< 0.0002	< 0.00005	< 0.0002
Total Chromium	0.00052-0.0015	< 0.001	0.00019-0.0075	< 0.001	0.0004-0.0016	< 0.001	0.00031-0.0015	< 0.001
Total Copper	0.00024-0.0046	0.003	0.0015-0.014	0.006	0.00068-0.0021	0.002	0.0006-0.0029	0.001
Total Mercury	< 0.00005-0.00026	0.000277	< 0.00005-0.00007	0.00000729	< 0.00005-0.00005	0.0000154	< 0.00005-0.00042	0.000011
Total Nickel	0.0024-0.0075	0.004	0.0006-0.0031	0.003	0.00077-0.0018	< 0.001	0.0003-0.00095	< 0.001
Total Lead	< 0.0001-0.00037	< 0.001	< 0.0001-0.0002	< 0.001	< 0.0001-0.00047	< 0.001	< 0.0001-0.00043	< 0.001
Total Zinc	0.0014-0.11	0.007	0.0021-0.13	0.018	0.0028-0.12	0.008	0.0013-0.13	0.006

Notes:

1. All values are in mg/L unless otherwise stated .
2. NRC sample results from *Puhipuhi Water and Sediment - Heavy Metal Testing Programme 2013-2014 (NRC, 2015)* .
3. NRC sample results for antimony from *Contamination of waterways near the Puhipuhi mine site, Northland* (Webster-Brown, 2015).

	PDP results exceed or are below range of values obtained by NRC.
	PDP limit of detection is higher than value obtained by NRC.