Bay of Plenty Marine Sediment Contaminants Survey 2012

Bay of Plenty Regional Council
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5 Quay Street
PO Box 364
Whakatāne 3158
NEW ZEALAND

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Bay of Plenty
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Prepared by Stephen Park, Senior Environmental Scientist

Cover Photo: Stormwater outfalls at Grace Road (Town Reach), Tauranga Harbour.

Acknowledgements

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Executive summary

This report presents sediment contaminant results (metals and organics) from the following surveys:

- Tauranga Harbour and Ōhiwa Harbour baseline sediment contaminant monitoring (2003 to 2012) – undertaken every three years.
- Coastal and estuarine ecology survey (2006 to 2012) – sediment sampling of harbours and estuaries for metals is undertaken annually in conjunction with the benthic macrofauna sampling.
- Targeted survey (2011/2012) of organic compounds focusing on herbicide and pesticides contaminants in sheltered sub-estuaries of Tauranga Harbour with significant horticultural/agricultural land use.

In 2012 the concentrations of polycyclic aromatic hydrocarbons (PAH's) and metals at 31 sites in Tauranga and 7 in Ōhiwa Harbour were very similar to those found in previous surveys. The highest PAH, lead and zinc concentrations were found in areas with the highest level of urban and commercial development. However, with the exception of mercury at the Matahui site, no contaminants exceed the ANZECC (2000) Interim Sediment Quality Guidelines (ISQG low) for the protection of aquatic life on a whole sample basis. At the Matahui site the 2012 result for mercury was 0.27 mg/kg dry weight compared to the ISQG low guideline value of 0.15 mg/kg. More sampling would be needed to establish the source and extent of mercury in the sediment at this location.

The heavy metals data from the coastal and estuarine ecology survey sites shows similar results to the contaminant monitoring sites. These sites extend the coverage of the contaminants monitoring as they tend to be located close to the low tide level in more open areas of the harbour. Combined the results of these two surveys show that there are some geographic/geological variations in the background concentrations of metals. For example, in Ōhiwa Harbour nickel concentrations are consistently higher than other areas while Rereatukahia and Uretara Estuary tend to have higher arsenic and chromium concentrations.

To date there are still too few surveys (data points) to show any statistically significant trends (increase/decrease) in sediment contaminant levels over time. Most sites appear to have relatively stable levels and only the Frazer Cove site (172) in Waimapu Estuary indicates a possible increase over time.

Analysis for trace levels of organic contaminants, particularly pesticides and herbicides shows only very low levels (ultra-trace) could be present. The only pesticide detected at trace levels was a breakdown product of DDT found at the Apata site. Given that the sites tested were expected to represent worst case, it indicates that there is not likely to be any lethal toxicity effects on benthic macrofauna occurring as a result of agrichemical contamination, particularly in the more open areas of the harbour.

Sixteen of the Tauranga Harbour sites have historic PAH data allowing an assessment of the impact of the Rena oil spill in October 2011. None of these sites showed any increase indicating that no wide-spread, long-term impact occurred from the small amount of oil that entered the harbour.

Contents

Part 1: Introduction

1.1 Scope

This report presents the results of sediment contamination surveys in harbours and estuaries throughout the Bay of Plenty. The surveys were undertaken to provide:

- Assessment of the level of environmental impact from contaminants.
- Investigation of sediment contamination trends over time.
- Provision of contaminant data for interpreting benthic macrofauna health trends.
- Assessment of contamination of pesticides and herbicides plus other organic compounds in sensitive sub-estuaries of Tauranga Harbour with high horticultural/agricultural land use.

The information is also expected to inform Bay of Plenty Regional Council in the effectiveness of its environmental management through the use of consents and plan rules or provisions, which seek to maintain a healthy and sustainable coastal environment.

1.2 Background

Accumulation of contaminants in sediments is a global problem. Rivers and streams carry a range of pollutants from developed catchments and because of chemical and physical processes these pollutants tend to accumulate in harbours and estuaries. Contaminants vary according to land use and come from both point and diffuse sources. Nutrients, pesticides and herbicides are common contaminants from agricultural use while urban areas often result in problems with the metals zinc, lead and copper or organic polycyclic aromatic hydrocarbons (PAH's) that are sourced from oil and combustion processes. When these compounds or metals accumulate to high levels they can have a wide range of effects on different species. The effects need not be lethal and if certain key species are affected there may also be marked flow on effects to the ecosystem as a whole.

Within New Zealand, monitoring by Auckland Council around Auckland provides a good example of impacts from developed catchments with zinc and copper concentrations steadily increasing over time (Timperley & Mathieson 2002). Lead levels are also high in sediment around Auckland's estuaries but have tended to decline since lead was reduced in petrol in 1996. Up to 2001, probability plots of Auckland zinc, lead and copper show that the ANZECC (2000) low guideline is exceeded for 20%, 30% and 8% of the data respectively (Williamson & Mills 2002).

Previous surveys in the Bay of Plenty (McIntosh 1994, Park 2003) have shown that contaminant concentrations in Tauranga Harbour reflect the degree of catchment development, but levels are below ANZECC guidelines. Other studies have looked at the impact of the historic sewage outfall at Otumoetai (Roper 1990), stormwater outfalls around Tauranga (Park 2009) and organic contaminants (Wilkins et al. 1992, Burgraaf et al. 1994).

This report covers the results of three monitoring surveys. The first arises from a recommendation of the earlier Tauranga Harbour sediment study (Park 2003) for regular monitoring of baseline sediment contaminant sites in Ōhiwa and Tauranga Harbours. To date the Tauranga sites have now been monitored four times and Ōhiwa sites three times, with sampling scheduled to occur every three years. The second relates to analysis of metals in sediments collected during the annual benthic macrofauna monitoring around the Bay of Plenty. The third is a study focusing on organic compounds and in particular herbicide/pesticides in some of the more sensitive and at risk sub-estuaries in Tauranga Harbour. This study also links into the Tauranga broad scale ecological survey which is a research project stemming from the MSI funded Manaaki Taha Moana project.

Part 2: Location and methods

2.1 Location

The Bay of Plenty region is located on the northeast coast of the North Island, New Zealand. It has similar oceanographic characteristics to the coast extending further north as this part of New Zealand's coast is strongly influenced by the East Auckland current. The Bay of Plenty has 259 km of open coast of which 74% is sandy shores and 26% is rocky. Harbours and estuaries in the Bay of Plenty have a total length of 369 km of which the majority is sandy shoreline.

2.1.1 Tauranga Harbour

Tauranga Harbour is the largest estuarine inlet in the region being impounded by a barrier island (Matakana Island) and two barrier tombolos, Mount Maunganui at the southern entrance and Bowentown to the north (Healy and Kirk 1981). The harbour is shallow and covers an area of 201 km^2 with 66% of its total area being intertidal.

The harbour catchment covers an area of approximately 1,300 km^2 and is well developed with extensive horticultural and agricultural use. At the southern end of the harbour, the city of Tauranga and surrounding area supports a large residential population (around 120,000). Near the southern entrance, the Mount Maunganui – Sulphur Point region of the harbour has been progressively developed for port facilities.

There are three main harbour basins with the northern basin having a total catchment area of 270 km^2 and a mean freshwater inflow of 4.1 m^3/s. The southern catchment has a total area of 1,030 km^2 and a mean freshwater inflow of 30.5 m^3/s. There are many small sub-estuaries around the harbour. At mean high water the northern basin has a volume of approximately 178 million m^3 and the southern basin a volume of 278 million m^3. In the northern harbour the freshwater inflow represents only 0.1% of the harbour volume per tidal cycle while the southern input represents 0.48%.

A more detailed and harbour wide breakdown of catchments and sub estuaries is presented in Park (2003). Below in Table 1, catchment data is provided for those estuaries in which the pesticide, herbicide and other organic contaminants were tested.

Table 1 Catchment and land use data of the estuaries in which the pesticide, herbicide and other organic contaminants were located in Tauranga Harbour.

Estuary	Catchment (Km^2)	Horticulture %	Urban %	Pasture %	Forest %	Sediment load (t/y)
Tuapiro	60	6.0	0.1	28.0	65.0	-
Uretara	48	9.0	0.8	32.0	58.0	-
Rereatukahia	29	10.0	0.4	35.0	54.0	-
Hunters Creek*	14.1	11.9	0.9	21.5	56.6	62
Apata*	12.4	19.7	4.6	66.4	7.4	5,212
Mangawhai*	9.6	18.0	15.5	59.6	6.3	1271
Te Puna*	28	12.5	4.3	57.7	24.4	4,676
Waikaraka*	11.6	30.8	8.4	44.3	15.7	453
Rangataua*	55.1	5.3	7.6	42.1	42.5	11,241

* Data from Hume *et. al* 2009

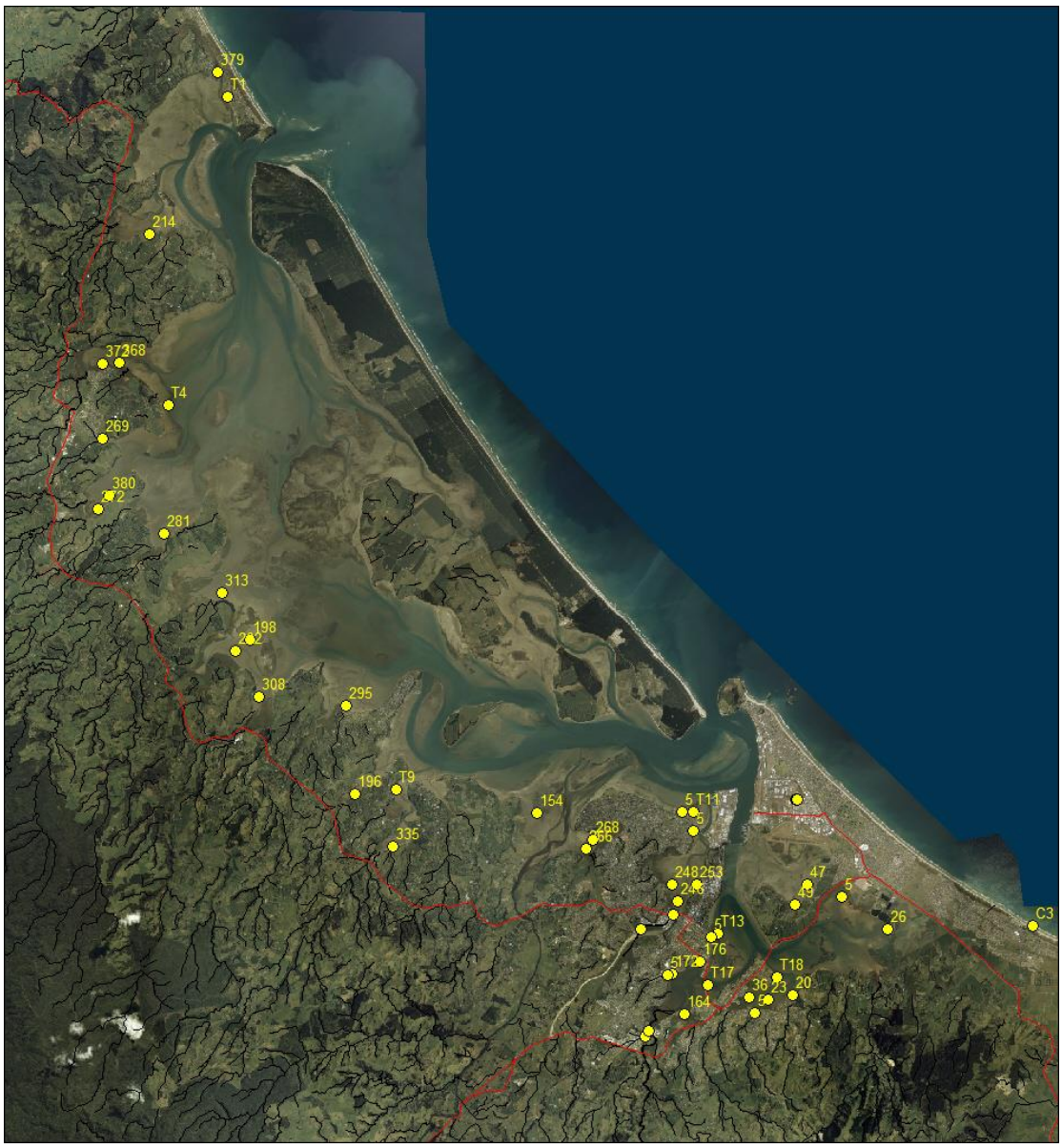

Figure 1 *Location of the sites in and around Tauranga Harbour sampled for contaminants between 2003 and 2012.*

2.1.2 Ōhiwa Harbour

Ōhiwa Harbour is a 26.4 km^2 estuarine lagoon enclosed by the Ōhope and Ōhiwa barrier spits. It is shallow with 83% of its area being exposed sand and mudflats at low tide. The harbour has a very low volume compared to the spring tidal compartment and is dominated by tidal currents. Residence time of water in the harbour is low and estimated to be 1-2 tidal cycles. The Nukuhou River with a median flow of 0.98 m^3/s is the main freshwater inflow to the harbour.

The harbour is a valley system drowned by the post-glacial rise in sea level between 6,500 and 18,000 years ago to form an open embayment. From 6,500 to 2,000 years ago the bay was enclosed by the Ōhope and Ōhiwa spits. The largest changes occurred over the last 2,000 years with the drift of sand around Whakatane Heads to the east. Over this period the Ōhope spit accreted laterally eastwards at an average rate of about 3 m/year. Ōhiwa spit at the same time has eroded, and there has been an accelerated infilling of Ōhiwa Harbour. The tidal compartment being reduced by 36% between 1878 and 1976 (Gibb 1977).

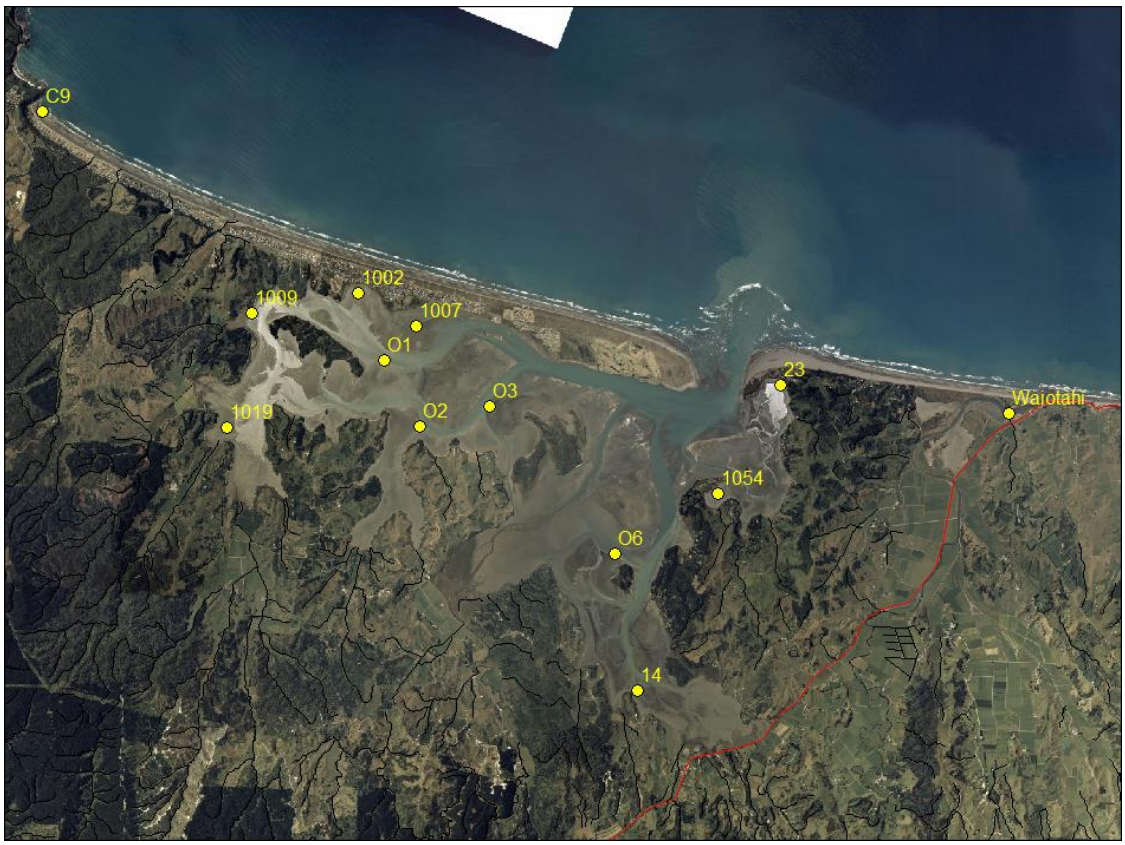

Figure 2 *Sites in and around Ōhiwa Harbour sampled for contaminants between 2006 and 2012.*

2.1.3 Maketū, Waihī and Waiotahi Estuaries

Maketū Estuary is the former outlet for the Kaituna River which was diverted directly to the sea at Te Tumu in 1956. It covers an area of approximately 2.3 km^2 and is very shallow with extensive tidal flats. The estuary is very dynamic with channels continually shifting and since the removal of the river it has been infilling with sand. Since 1996 flows from the river of around 100,000 m^3 per tidal cycle have been re-diverted back into the estuary.

Waihi Estuary covers an area of approximately 2.4 km^2 most of which dries at low tide. The estuary is impounded by a spit with extensive housing development. The main freshwater inflow is the Pongakawa Stream with a median flow of 4.6 m^3/s.

Waiotahi Estuary is very small (0.95 km^2) and the main freshwater flow comes from the Waiotahi River. The catchment of this estuary is predominantly comprised of agricultural and forest land use with no urban development.

Figure 3 *Sites in Maketū and Waihī Estuaries that have been sampled for contaminants between 2006 and 2012.*

2.2 Methods

2.2.1 Sediments samples

(a) Tauranga Harbour and Ōhiwa Harbour baseline monitoring

The 31 sites sampled in Tauranga Harbour as part of the three yearly contaminant survey programme correspond with sites previously sampled in June 2003 (reported in Park 2003). The latest survey of Tauranga sites took place in June 2012. The seven sites in Ōhiwa Harbour have only been sampled every third year since 2006 and last in June 2012.

Each survey involves locating and marking sites using GPS units. The protocol for collecting sediment consists of randomly taking 15 small replicate samples from the top 2 cm of sediment using a stainless steel trowel from within a 10 m radius from the marked site location. Replicate samples from each site are combined into a single sample and stored in labelled plastic bags. Analysis for contaminants and TOC (2006 survey) is based on the whole sediment sample size fractions as collected.

Sediment particle size analysis for samples from the three yearly survey was done using a “Malvern” laser particle size analyser at the University of Waikato to provide detail of the particle size range from 0.05 – 880 microns. This allowed the proportions of gravel, sand and mud (silt and clay) to be determined and presented as an indicator of particle size fractions.

(b) **Coastal and estuarine ecology survey**

Sediment samples collected as part of the coastal and estuarine ecology annual ecological survey occur over summer between November and February covering Tauranga, Ōhiwa, Maketū, Waihi and Waiotahi Estuaries. Each site is located by GPS and runs as a transect for 45 m along the shore (Park 2000). The protocol for collecting sediment consists of randomly taking 15 small replicate samples from the top 2 cm of sediment with a stainless steel trowel along the transect for the estuarine sites. Replicate samples from each site were combined into a single composite sample and stored in labelled plastic bags. At open coastal sites a single core sample to 25 cm depth is collected. Analysis for contaminants and TOC is based on the whole sediment samples.

Sediment particle size analysis is undertaken by use of dry sieving. All procedures follow standard methods except that carbonate (shell fragments) is not removed from the samples. Particle size is analysed using the Wentworth scale and graphical determination of mean, sorting and skewness.

(c) **Pesticide, herbicide and other organic compounds survey**

A survey of the impact of pesticides, herbicides, polycyclic aromatic hydrocarbons, polychlorinated biphenyls, phenols, plasticisers, haloethers and various other halogenated, semi-volatile and nitrogen containing organic compounds was undertaken in sheltered sub-estuaries of Tauranga Harbour. The nine sites surveyed were identified as having significant agricultural/horticultural land use in their catchments and provide a range of conditions across Tauranga Harbour. Percentage of key land use categories in the catchment of each site is given in Table 1. The sites also formed part of the Manaakii Taha Moana Tauranga Harbour Broad Scale Ecological survey. In total around 300 organic compounds were tested for at each site. The emphasis being on those potentially derived from horticultural and agricultural use.

Site locations are provided in Appendix I. At each site thirty small 2 cm deep core samples of sediment were bulked into a single sample which was thoroughly mixed and stored frozen in a cleaned glass container until analysed. In addition to the organic compounds tested, each sample was also analysed for Total Organic Carbon. A subsample was used to determine particle size of the sediment.

2.2.2 Contaminant analysis

Methods for contaminant analysis follows standard methods conducted by IANZ accredited laboratories[1].

[1] Total recoverable metals used nitric/hydrochloric acid digestion, ICP-MS (low level), USEPA 200.2. Total hydrocarbons by ASE or Sonication extraction, GC-FID Quantification USEPA 8015B/NZ OIEWG. PAH's by sonication extraction, silica gel clean-up, GC-MS selected ion monitoring quantification. USEPA 3540 and 3630. PCB's by sonication extraction, GPC/Florisil clean-up and GC-MS SIM USEPA 3540, 3611 and GC-MS SIM.

2.2.3 **Use of ANZECC environmental guidelines**

Results from the surveys are compared to the Australian and New Zealand Environment and Conservation Council (ANZECC) 2000 guidelines. These guidelines are referred to as the interim sediment quality guidelines (ISQG). There are two guideline values (low and high) which are not intended to be absolute guidelines to aim for but rather used to guide decision making and actions. The low value is a level at which sub-lethal effects may occur for sensitive species. Used correctly it provides a trigger level for further investigation to determine whether there may be toxicity issues and a need for remedial action. The high ISQG is a trigger level indicating that there is a need for further investigation and action to remediate the contaminant(s) due to potential toxicity. If environments have very high biological values then ideally there should be no increase in contaminant levels above background values.

Comparison of contaminant values against the guidelines is often made with a range of methodologies for analysis of sediment samples. Ideally metals results should be standardised to the <63 micron sediment particle size fraction. Also results are normally gained in terms of total metals which utilises a high strength acid digestion of the sample. The ANZECC guidelines point out that a milder digestion of samples would provide a more biologically relevant results which would normally mean lower detected metal levels.

Part 3: Results

3.1 Sediment contaminants

3.1.1 Tauranga Harbour and Ōhiwa Harbour baseline monitoring

Mean concentration of heavy metal and total polycyclic aromatic hydrocarbons (PAH's) contaminants in sediments from monitoring sites around Tauranga and Ōhiwa Harbours are presented in Table 2. The amount of mud and total organic carbon (TOC) are also presented as these indicate important characteristics of the sediment at each of the sites. Assessment of the sediment quality is achieved by comparing the metals concentrations against the guideline values (ISQG low and high) provided at the bottom of the table for the protection of sediment dwelling fauna. Based on whole sediment sample analysis, none of the metals exceed these guidelines.

Organic contaminants in sediments need to be normalised to 1% of the sediment organic carbon (TOC) for assessment against the guidelines. In Table 2 the PAH means have not been normalised, however all results are well below the guidelines. The highest normalised mean PAH result is 0.771 mg/kg dry weight of sediment recorded at site 253 on the eastern side of Waikareao Estuary. This site is near an industrial area and adjacent a busy roadway and urban area.

On the basis of standardising metal results to 100% mud (<63 micron particle size) there are several sites in Tauranga Harbour that would exceed the ISQG low value for zinc (shown as shaded in Table 2). Highest sediment zinc (Zn) values on both whole sample and standardised basis (399 mg/kg dry weight) is site 253 in Waikareao Estuary. Site 248 in Waikareao also had a high zinc value while site 176 in Waimapu Estuary had high values for zinc and lead (Pb). Sites around Katikati and Rereatukahia Estuaries tend to have the highest arsenic (As) and chromium (Cr) values on a whole sample basis and site 380 in Rereatukahia exceeds the ISQG low value for arsenic when standardised to mud content.

Mercury (Hg) levels in sediment in Tauranga and Ōhiwa Harbours are consistently low with the exception of Site 281 at Matahui. At this site the mean value (Table 2) over the four surveys nearly exceeds the ISQG low value on a whole sample basis while the 2012 survey result (Table 3) of 0.27 exceeds the guideline.

Overall, the results up to 2012 are very similar to those first recorded in 2003 (Park 2003). The areas with the highest PAH and zinc levels are Waimapu and Waikareao Estuaries while Katikati and Rereatukahia Estuaries tend to have higher arsenic and chromium levels. There are no sites that exceed the ISQG high value even on a standardised basis. With only four survey results for each of the Tauranga Harbour sites and three for Ōhiwa Harbour it is still unclear whether any sites have long-term trends in contaminant levels. Most appear to be stable with only site 172 in Waimapu Estuary (Fraser Cove) possibly showing an upward trend.

Table 2 *Mean concentration of total PAH's and metals (mg/kg dry weight) collected from sediment monitoring sites in Tauranga (2003, 6, 9, 12) and Ōhiwa (2006, 9, 12) Harbours based on whole sediment samples. Highlighted cells (red) indicate results that would exceed ISQG low if sample was standardised to 100% mud fraction.*

Tauranga Harbour	Site	Mud %	TOC g/100g	PAH	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
Rangataua Bay	5	18.0	0.39		2.1	0.04	1.7	1.3	2.4	0.02	0.7	11.6
Welcome Bay	20	24.1	0.43		2.4	0.05	2.2	2.3	3.6	0.07	0.8	20.7
Welcome Bay	23	29.2	0.55	0.004	4.0	0.07	3.1	3.0	5.7	0.04	1.3	32.2
Rangataua Bay	26	16.6	0.41	0.001	2.3	0.03	2.0	1.5	2.8	0.02	0.7	19.5
Welcome Bay	36	24.8	0.46		3.0	0.06	2.8	2.1	3.9	0.02	1.0	31.3
Waipu Bay	47	24.3	0.31		1.9	0.20	2.0	1.7	1.9	0.04	0.7	18.5
Waipu Bay	49	13.2	0.29	0.000	1.4	0.04	1.5	1.1	1.6	0.02	0.6	9.45
Wairoa	154	23.0	0.39		2.1	0.16	2.4	0.9	2.4	0.03	0.8	15.9
Waimapu	164	39.7	0.71	0.060	3.1	0.04	2.6	2.3	4.9	0.04	1.0	35.3
Waimapu	172	58.8	1.16	0.070	3.6	0.10	4.3	4.7	8.6	0.04	1.6	47.0
Waimapu	176	17.3	0.48	0.168	2.1	0.07	3.2	3.4	**10.3**	0.03	1.3	**33.9**
Mangawhai	196	43.4	0.47	0.011	3.1	0.03	2.8	1.4	3.3	0.02	1.1	16.8
Wainui Estuary	198	36.3	0.66		4.4	0.08	4.7	1.7	3.9	0.03	1.8	16.9
Wainui Estuary	202	66.5	1.27		6.4	0.12	7.1	3.1	7.0	0.05	2.7	30.3
Tuapiro Estuary	214	40.5	0.84	0.003	6.4	0.12	7.3	2.8	4.7	0.04	2.8	24.2
Waikareao	246	48.9	0.59	0.015	3.6	0.07	3.6	1.7	5.5	0.02	1.2	71.7
Waikareao	248	20.1	0.37		3.0	0.04	3.2	1.4	4.3	0.03	1.0	**50.0**
Waikareao	253	15.5	0.46	0.315	**3.4**	0.11	3.6	2.0	6.4	0.02	1.1	**61.3**
Wairoa	266	11.2	0.44		1.5	0.05	1.8	0.8	2.4	0.01	0.7	10.9
Wairoa	268	13.0	0.52	0.000	2.3	0.06	2.0	1.0	2.6	0.01	0.7	15.0
Rereatukahia	269	71.4	1.57	0.003	6.9	0.09	9.6	6.0	9.6	0.09	3.9	46.5
Rereatukahia	272	65.8	1.28		6.9	0.07	13.0	4.4	7.2	0.07	5.2	31.5
Matahui	281	48.1	0.69		6.0	0.10	8.6	2.7	4.9	0.14	3.8	32.7
Waipapa	295	15.6	0.42		1.9	0.05	2.1	1.0	2.2	0.01	0.9	9.35
Apata Estuary	308	61.7	0.66		4.6	0.08	5.4	3.2	4.8	0.04	2.2	25.2
Aongatete	313	37.4	0.55	0.000	4.3	0.07	5.4	1.8	3.8	0.04	2.2	20.5
Te Puna	335	55.0	1.53	0.000	5.4	0.08	5.2	4.1	6.4	0.05	2.1	26.9
Katikati	368	50.1	1.07	0.000	6.8	0.12	8.1	3.1	5.9	0.05	3.1	32.5
Katikati	372	48.9	1.19		8.8	0.10	9.1	3.8	6.4	0.05	3.5	37.8
Waiau Estuary	379	24.3	0.64		4.0	0.09	4.0	2.1	3.4	0.04	1.5	15.8
Rereatukahia	380	41.4	0.82	0.034	**8.1**	0.08	14.0	4.4	6.3	0.06	5.1	31.6
Ōhiwa Harbour												
Kuterere	14	54.1	0.67	0.030	6.0	0.03	7.7	6.5	6.6	0.07	5.6	36.8
Ōhiwa camp	23	65.7	0.55	0.011	5.6	0.04	7.3	6.3	5.9	0.06	5.2	31.9
Water ways	1002	28.7	0.34	0.03	4.3	0.01	4.4	3.6	3.7	0.03	3.3	20.6
North	1007	36.8	0.51	0.037	5.6	0.02	7.8	5.9	6.0	0.05	5.8	34.6
Oyster farm	1009	42.8	0.62	0.006	4.6	0.02	5.9	5.0	5.3	0.04	4.1	29.3
West	1019	32.6	0.44	0.002	3.2	0.02	4.8	4.5	4.4	0.04	3.7	24.0
East	1054	37.1	0.31	0.003	5.3	0.02	6.6	4.5	5.1	0.03	4.6	28.5
ISQG low				**4**	**20**	**1.5**	**80**	**65**	**50**	**0.15**	**21**	**200**
ISQG high				**45**	**70**	**10**	**370**	**270**	**220**	**1**	**52**	**410**

Table 3 Concentration of total PAH's and metals (mg/kg dry weight) collected from sediment monitoring sites in Tauranga and Ōhiwa Harbours in 2012 based on whole sediment samples.

Tauranga Harbour	Site	Mud %	TOC g/100g	PAH	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
Rangataua Bay	5	16.7	0.35		2.3	0.049	1.9	1.4	2.4	0.013	0.8	12.8
Welcome Bay	20	36.7	0.31		2.0	0.044	1.9	1.8	2.6	0.055	0.7	19.1
Welcome Bay	23	28.2	0.58	0.000	3.5	0.092	2.9	2.5	4.0	0.034	1.2	31.0
Rangataua Bay	26	14.9	0.44	0.004	2.8	0.033	2.2	1.7	3.1	0.012	0.8	19.2
Welcome Bay	36	30.0	0.47		3.2	0.06	3.0	2.3	3.9	0.023	1.1	36.0
Waipu Bay	47	24.4	0.36		2.1	0.197	2.5	2.3	2.4	0.040	0.9	21.0
Waipu Bay	49	12.6	0.30	0.0000	1.5	0.043	1.7	1.2	1.6	0.013	0.7	9.8
Wairoa	154	17.8	0.38		2.1	0.158	2.4	0.9	2.4	0.022	0.9	16.1
Waimapu	164	36.8	0.75	0.011	2.9	0.042	2.3	2.1	4.0	0.048	0.9	32.0.0
Waimapu	172	65.0	1.73	0.055	4.2	0.14	6.0	5.8	9.3	0.048	2.3	53.0
Waimapu	176	14.9	0.47	0.130	2.1	0.07	3.0	2.7	8.1	0.019	1.4	30.0
Mangawhai	196	36.9	0.53	0.000	3.6	0.026	3.4	1.4	3.6	0.018	1.4	18.0
Wainui Estuary	198	39.3	0.75		5.3	0.092	5.3	1.9	4.5	0.027	2.1	19.6
Wainui Estuary	202	58.1	1.15		6.0	0.119	7.1	2.8	6.6	0.043	2.8	29.0
Tuapiro Estuary	214	47.9	1.47	0.000	8.6	0.123	9.6	3.6	6.2	0.040	4.0	30.0
Waikareao	246	44.2	0.57	0.000	3.6	0.088	4.4	1.7	5.6	0.020	1.5	87.0
Waikareao	248	16.1	0.36		2.9	0.029	3.0	1.1	3.3	0.019	0.9	40.0
Waikareao	253	17.2	0.43	0.396	3.3	0.111	3.5	1.8	4.7	0.019	1.2	56.0
Wairoa	266		0.45		1.3	0.046	1.6	0.8	2.2	0.012	0.6	10.9
Wairoa	268	13.0	0.49	0.000	2.2	0.071	2.0	0.9	2.4	0.005	0.7	14.3
Rereatukahia	269	74.5	1.79	0.010	8.4	0.108	11.7	6.6	10.2	0.080	4.9	56.0
Rereatukahia	272	73.0	1.69		7.6	0.072	16.0	4.6	8.5	0.069	6.6	34.0
Matahui	281	48.5	0.68		6.2	0.091	9.5	2.7	5.0	0.270	4.4	33.0
Waipapa	295	25.5	0.50		2.4	0.057	3.1	1.4	2.8	0.019	1.3	12.4
Apata Estuary	308	55.1	0.60		4.4	0.082	6.1	1.9	4.5	0.026	2.5	22.0
Aongatete	313	31.4	0.71	0.000	5.7	0.111	8.8	2.7	5.0	0.067	4.1	32.0
Te Puna	335	65.1	3.20	0.000	9.3	0.134	9.4	6.5	11.3	0.089	4.0	41.0
Katikati	368	35.9	0.86	0.000	6.6	0.116	8.2	2.7	5.6	0.050	3.1	29.0
Katikati	372	46.8	1.12		9.8	0.091	10.3	4.1	6.5	0.054	4.3	42.0
Waiau Estuary	379	38.5	1.07		5.9	0.101	6.1	3.2	4.8	0.038	2.5	22.0
Rereatukahia	380	24.6	0.59	0.034	9.5	0.076	17.8	4.9	6.3	0.050	6.1	31.0
Ōhiwa Harbour												
Kuterere	14	62.8	0.70	0.040	6.2	0.03	7.8	7.0	7.0	0.072	6.0	37.0
Ōhiwa camp	23	77.1	0.51	0.010	5.7	0.038	7.1	6.4	6.0	0.057	5.3	31.0
Water ways	1002	39.6	0.36	0.004	4.4	0.017	4.4	3.8	3.9	0.033	3.4	19.8
North	1007	44.7	0.56	0.057	6.2	0.022	8.0	6.7	6.7	0.046	6.2	37.0
Oyster farm	1009	51.6	0.73	0.004	5.3	0.023	6.2	5.6	5.9	0.048	4.3	32.0
West	1019	50.9	0.55	0.003	4.0	0.025	5.8	5.6	5.4	0.052	4.3	28.0
East	1054	38.7	0.31	0.003	5.9	0.02	6.9	5.0	5.4	0.033	5.1	31.0
ISQG low				4	20	1.5	80	65	50	0.15	21	200
ISQG high				45	70	10	370	270	220	1	52	410

3.1.2 Coastal and estuarine ecology sites

The metal concentrations measured in surface sediment (2 cm depth) at the coastal and estuarine ecology monitoring sites are presented in Table 4. These are all low tide sites, generally located in more open sandy areas of the harbour. Results are presented as mean values for the period from 2006 to 2012. Not all sites have data for every year within that period. No sites exceed the ISQG low values on a whole sample basis and concentrations tend to be well below the guideline. Out of the Tauranga Harbour sites, Tau 17 (Waimapu Estuary) shows on average the highest levels of metals. Tau 1 (Pios' site near northern harbour entrance) shows on average the lowest metal concentrations.

Table 4 *Mean metal concentrations (mg/kg dry weight) from the annual Coastal and Estuarine Ecology monitoring sites for the period 2006 – 2012.*

	TOC g/100g	Mud %	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
Tau 1	0.24	1.4	1.5	0.03	3.62	0.76	1.50	0.025	0.98	8.6
Tau 4	0.27	1.7	2.6	0.04	5.70	0.90	1.84	0.029	1.98	9.0
Tau 9	0.46	11.3	3.6	0.12	6.80	1.54	3.40	0.040	2.72	22.3
Tau 11	0.35	0.8	2.5	0.04	4.20	0.80	1.88	0.026	1.36	11.9
Tau 13	0.34	5.5	2.6	0.08	4.12	2.10	4.10	0.037	1.68	27.3
Tau 17	0.86	12.4	3.8	0.10	5.58	3.73	6.40	0.065	2.28	40.2
Tau 18	0.57	9.0	3.7	0.11	5.37	2.82	5.07	0.044	2.17	32.7
Mak 1	0.16	0.9	3.7	0.04	5.05	0.90	2.17	0.035	2.30	20.1
Mak 2	0.19	0.5	4.0	0.03	3.83	1.10	2.24	0.031	1.22	20.3
Mak 3	0.19	0.9	4.4	0.03	3.13	0.90	2.06	0.034	1.58	15.4
Mak 4	0.15	0.2	4.5	0.02	3.10	1.00	2.07	0.028	1.43	15.8
Waihi	0.33	10.5	3.1	0.04	5.72	1.58	2.80	0.046	2.54	19.1
Ōhiwa 1	0.45	16.9	6.3	0.04	12.88	5.90	6.45	0.056	8.23	36.5
Ōhiwa 2	0.39	12.3	5.9	0.03	10.20	4.80	5.62	0.059	6.57	33.0
Ōhiwa 3	0.36	12.3	6.1	0.03	10.66	4.42	5.01	0.045	6.62	29.0
Ōhiwa 6	0.27	7.3	6.9	0.03	10.90	4.96	5.43	0.048	7.02	35.4
Waiotahi	0.15	1.0	6.3	0.035	7.53	5.43	5.78	0.050	5.80	36.5
ISQG low			20	1.5	80	65	50	0.15	21	200
ISQG high			70	10	370	270	220	1	52	410

Metals results In Table 2 and 4 show some geographical trends. Arsenic concentrations tend to be consistently high in the central and eastern Bay of Plenty sites compared to the total range in Tauranga Harbour. In Ōhiwa Harbour, chromium, copper and nickel concentrations appear to be marginally higher than average values shown in Tauranga Harbour.

For Tauranga Harbour, Waihī Estuary and Ōhiwa Harbour sites, annual results for copper, Lead and zinc concentration in the sediment (whole sample) have been graphed in Figures 4 – 6. Copper concentrations are well below the ISQG low value of 65 mg/kg dry weight of sediment and all sites appear to be relatively stable over the period of monitoring. Lead concentrations are also well below the ISQG low value of 50 mg/kg dry weight with Tauranga sites 9 (Te Puna) and 13 (Town Reach) showing a slight increase (Figure 5). These two sites are also the only ones to show a slight increase over time for zinc concentrations (Figure 6).

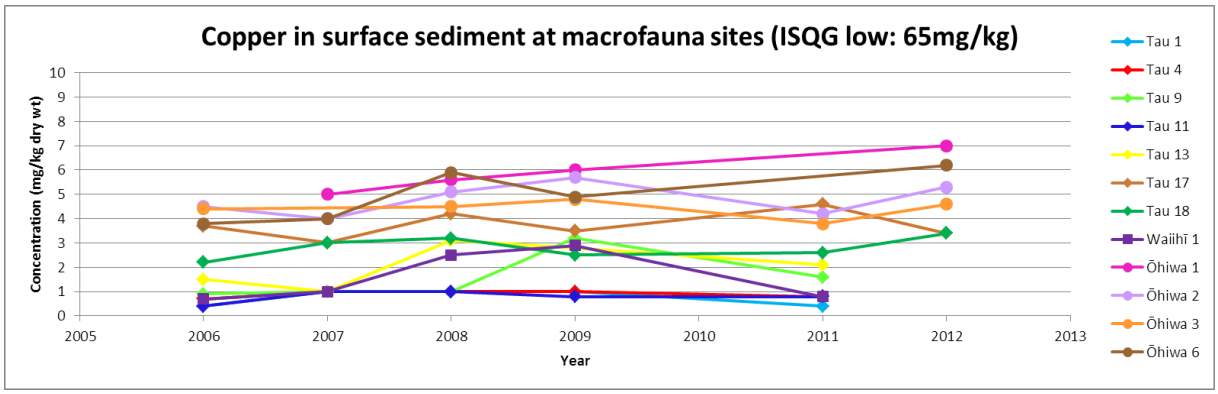

Figure 4 *Copper concentrations in surface sediment (2 cm depth) over time at each of the Coastal and Estuarine Ecology macrofauna monitoring sites in Tauranga, Waihī and Ōhiwa Harbours.*

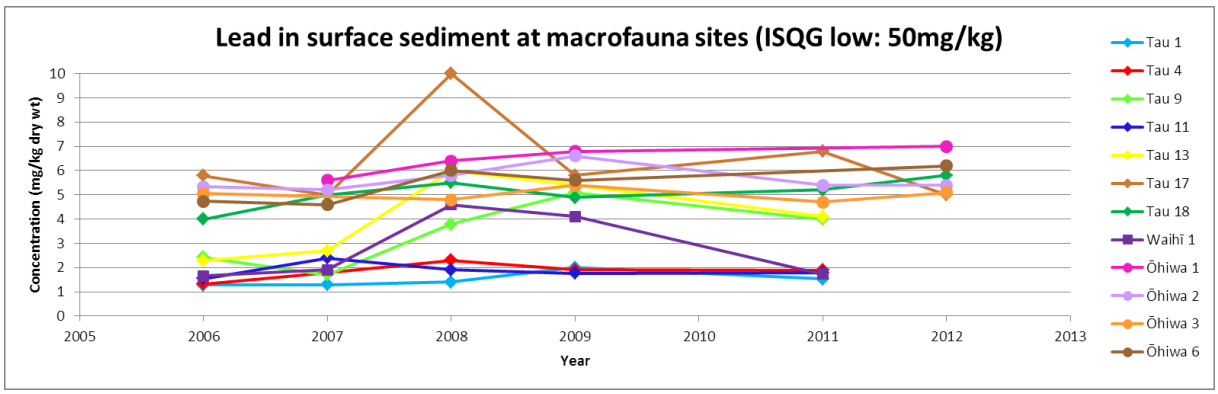

Figure 5 *Lead concentrations in surface sediment (2 cm depth) over time at each of the Coastal and Estuarine Ecology macrofauna monitoring sites in Tauranga, Waihī and Ōhiwa Harbours.*

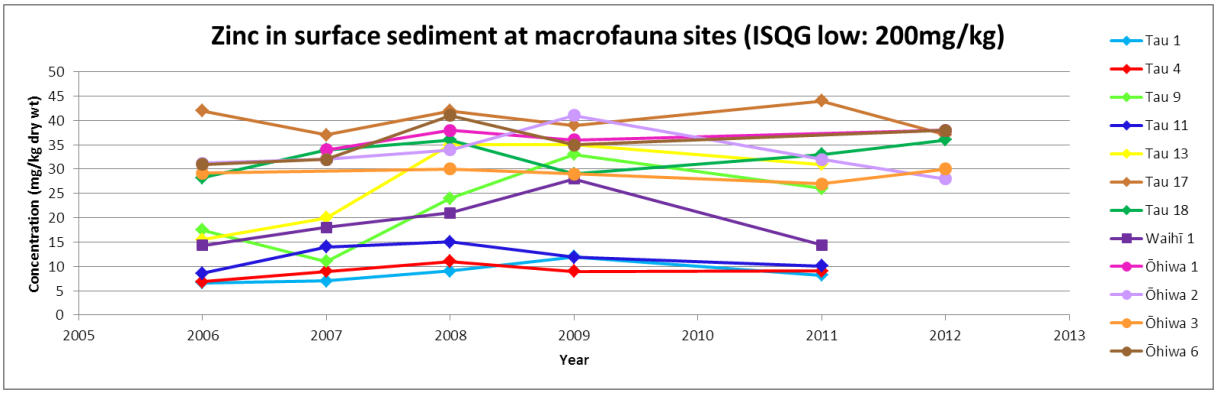

Figure 6 *Zinc concentrations in surface sediment (2 cm depth) over time at each of the Coastal and Estuarine Ecology macrofauna monitoring sites in Tauranga, Waihī and Ōhiwa Harbours.*

3.1.3 Pesticides, herbicides and other organics

Organic contaminant concentrations from the nine sheltered sub-estuary sites selected around Tauranga Harbour tended to have very low levels with most results below detection levels. This was despite trace level analysis for 141 pesticides, 86 herbicides, 35 polychlorinated biphenyls, 16 polycyclic aromatic hydrocarbons, 11 phenols, 7 plasticiser, 5 haloethers and 17 other halogenated, semi-volatile and nitrogen containing organic compounds being analysed.

Sediment mud, TOC, PAH-totals and common metal contaminant levels are presented below in Table 5. Mud and total organic carbon content (TOC) results for sediment samples reflects the enclosed and sheltered nature of these estuaries. It shows that all sites are relatively sensitive to deposition of fine sediment and contaminants as indicated by the relatively high mud content.

Polycyclic aromatic hydrocarbons were amongst the few organic contaminants detected although at low levels for the Apata and Te Puna Estuary sites. Low concentrations of phenols were detected in the Uretara, Apata, Mangawhai, Te Puna and Rangataua Bay samples. Full test results for all the organic compounds are provided in Appendix II.

Copper, lead and zinc concentrations measured in the samples were relatively low at all nine sites. Metals concentrations are shown in Table 5 along with the ANZECC interim sediment quality guidelines. Sites showing the most elevated concentrations are Te Puna and Uretara (Katikati) Estuaries, but results are well below the ISQG low concentration. Where there is a nearby contaminant baseline monitoring site, concentrations are similar between the two surveys.

Table 5 *Concentration of PAH's and heavy metals (mg/kg dry weight), mud, TOC levels in sediment sampled over summer 2011/2012 in sub-estuaries around Tauranga Harbour; based on whole sediment samples.*

Site	Mud %	TOC g/100g	PAH total	Cu	Pb	Zn
Tuapiro Estuary –MTM 7	10.2	0.64	<0.003	<1.0	<1.0	11
Uretara Estuary – MTM 10	30.9	0.99	<0.003	3.0	5.6	34
Rereatukahia Estuary – MTM 14	24.7	0.76	<0.003	2.4	4.6	26
Hunters Creek – MTM 29	16.2	0.29	<0.003	1.2	2.5	16
Apata Estuary – MTM 38	48.9	0.51	0.021	1.1	4.1	**21**
Mangawhai Estuary – MTM 47	29.2	0.5	<0.003	<1.0	3.3	**18**
Te Puna Estuary – MTM 48	76.4	1.49	0.011	6.1	13.3	46
Waikaraka Estuary – MTM 50	27.9	0.67	<0.003	2.0	4.2	34
Rangataua Bay – MTM 73	14.1	0.37	<0.003	1.2	2.7	19
ISQG low			4	65	50	200
ISQG high			45	270	220	410

Part 4: Summary and discussion

4.1 Contaminants survey – PAH's and metals

Results of the 2012 contaminants monitoring survey which includes sites from Tauranga and Ōhiwa Harbours now provides data on heavy metal and polycyclic aromatic hydrocarbons every third year since 2003 and 2006 respectively. Over this period there are no strong indications of any upward or downward trends in concentrations. However, even for Tauranga Harbour data there are only four data points, and hence it is difficult to show any statistical significance until a longer time series has been collected.

This raises the question of how much time lag is acceptable in determining change with respect to changes in regional plans and consenting which seek to protect the environment. One recommendation to address this issue would be to conduct annual monitoring of any sites which do appear to be deteriorating. One of the main sources of potential impact is stormwater and the new comprehensive consents and associated monitoring being put in place by Tauranga City Council will assist in interpreting changes over time.

The 2012 survey produced very similar results for concentrations to the previous years and no sites exceed the ISQG low concentration on a whole sample basis. Even assessing the results on a worst case basis by standardising the concentrations to the mud fraction, only a few sites exceed the ISQG low concentration for some metals. These sites were in Waimapu and Waikareao Estuaries for lead and zinc. There is a high level of urban and light industrial/commercial development in the catchment of these two estuaries and hence it can be assumed that the sediments show a low level of impact.

The emerging pattern of spatial impact related to development appears very similar to that found around Auckland where stormwater discharges of zinc and copper are still accumulating in the settlement zone of estuaries. Close attention and ongoing improvements in stormwater management will be needed to prevent sensitive areas of Tauranga Harbour becoming ecologically degraded.

In Uretara (Katikati) and Rereatukahia Estuaries, results for arsenic and chromium concentrations in the sediment have been consistently higher than most other sites in Tauranga and Ōhiwa Harbours. These two estuaries are adjacent each other so it is possible that concentrations of these two metals reflects a common geological source in the Kaimai Ranges rather than any anthropogenic impact.

High mercury concentrations in the sediment at the Matahui site in Tauranga Harbour standout as being unusual. The 0.27 mg/kg is higher in the 2012 survey than previous years and above the ISQG low concentration value of 0.15. Geological influences as a cause don't seem likely, as the catchments either side (Rereatukahia and Aongatete) have lower levels of mercury. Further sampling should be undertaken around this site to determine if the source of mercury is natural.

Polycyclic aromatic hydrocarbons are major component of the chemical impact of oil spills and the key contaminant analysis used in showing detectable impact of the October 2011 Rena oil spill on the coast. Oil from the Rena spill entered Tauranga Harbour in very small quantities, particularly the southern Mount entrance. To assess whether a measurable impact occurred, there are 16 Tauranga Harbour contaminant monitoring sites that include analysis of PAH's. Results show that none of the 2012 survey PAH sediment concentrations eight months after the oil spill are any higher than the previous three surveys. This indicates that there has been no widespread and long-lasting impact on sediments from the small amount of oil that entered the harbour.

4.2 Organics survey

Analysis of sediment from nine estuary sites from around Tauranga Harbour for low levels (trace) of organic herbicides and pesticides provides a valuable indication that agricultural and horticultural chemical use is not likely to be having an adverse impact (mortality) on benthic species in Tauranga Harbour. The only pesticide/herbicide detected was 4,4'-DDE (in Apata Estuary) which is the most common breakdown product of DDT. This organochlorine pesticide was extensively used historically but banned since 1989 due to its high persistence and bioaccumulation characteristics.

Detection limits for most of the herbicides and pesticides achieved at the trace level of analysis for this survey is close to or above the concentrations at which lethal toxicity effects would be expected to occur for many of the chemicals analysed. Although some pesticide guidelines for protection of benthic macrofauna could be below the detection levels achieved, if they were to be developed, it becomes very expensive to test for the lower levels. In terms of the wider harbour health, the survey sites selected and tested for are in catchments with significant agricultural/horticultural use and in locations within those receiving estuaries where the concentrations should be much higher than out in the more extensive open harbour environment. Hence it was assumed that the sites surveyed should be amongst the most heavily contaminated if pesticides/herbicides were going to be an issue.

The absence of pesticides/herbicides at the detection levels achieved does not guarantee that no ecological effects are being caused. Some chemicals are capable of having non-lethal effects at relatively low concentrations which can have flow on effects to ecological health. It is also possible for combinations of chemicals to exert synergistic effects at levels where the individual chemicals alone would have no impact. This highlights the need to monitor actual biological communities as well as contaminants.

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Appendices

Appendix 1 – Sediment sampling sites

Location	Survey	Site number	Hydro class	Easting	Northing
Tauranga	Contaminants 3 yearly	5	Marine	2793758	6385236
Tauranga	Contaminants 3 yearly	20	Marine	2792143	6381932
Tauranga	Contaminants 3 yearly	23	Marine	2791291	6381766
Tauranga	Contaminants 3 yearly	26	Marine	2795310	6384123
Tauranga	Contaminants 3 yearly	36	Marine	2790689	6381862
Tauranga	Contaminants 3 yearly	47	Marine	2792619	6385620
Tauranga	Contaminants 3 yearly	49	Marine	2792218	6384956
Tauranga	Contaminants 3 yearly	154	Marine	2783548	6388043
Tauranga	Contaminants 3 yearly	164	Marine	2788494	6381283
Tauranga	Contaminants 3 yearly	172	Marine	2788105	6382634
Tauranga	Contaminants 3 yearly	176	Marine	2789038	6383039
Tauranga	Contaminants 3 yearly	196	Marine	2777478	6388665
Tauranga	Contaminants 3 yearly	198	Marine	2773932	6393818
Tauranga	Contaminants 3 yearly	202	Marine	2773476	6393464
Tauranga	Contaminants 3 yearly	214	Marine	2770594	6407417
Tauranga	Contaminants 3 yearly	246	Marine	2788261	6385074
Tauranga	Contaminants 3 yearly	248	Marine	2788108	6385614
Tauranga	Contaminants 3 yearly	253	Marine	2788899	6385632
Tauranga	Contaminants 3 yearly	266	Marine	2785206	6386841
Tauranga	Contaminants 3 yearly	268	Marine	2785446	6387115
Tauranga	Contaminants 3 yearly	269	Marine	2768998	6400568
Tauranga	Contaminants 3 yearly	272	Marine	2768851	6398206
Tauranga	Contaminants 3 yearly	281	Marine	2771072	6397370
Tauranga	Contaminants 3 yearly	295	Marine	2777179	6391631
Tauranga	Contaminants 3 yearly	308	Marine	2774242	6391903
Tauranga	Contaminants 3 yearly	313	Marine	2773014	6395407
Tauranga	Contaminants 3 yearly	335	Marine	2778731	6386896
Tauranga	Contaminants 3 yearly	368	Marine	2769565	6403114
Tauranga	Contaminants 3 yearly	372	Marine	2769003	6403058
Tauranga	Contaminants 3 yearly	379	Marine	2772874	6412828
Tauranga	Contaminants 3 yearly	380	Marine	2769224	6398654
Ōhiwa	Contaminants 3 yearly	14	Marine	2873172	6343590
Ōhiwa	Contaminants 3 yearly	23	Marine	2875432	6348425
Ōhiwa	Contaminants 3 yearly	1002	Marine	2868756	6349893
Ōhiwa	Contaminants 3 yearly	1007	Marine	2869676	6349365
Ōhiwa	Contaminants 3 yearly	1009	Marine	2867074	6349563
Ōhiwa	Contaminants 3 yearly	1019	Marine	2866684	6347754
Ōhiwa	Contaminants 3 yearly	1054	Marine	2874447	6346712
Tauranga	Coastal & estuarine ecology -annual	T1	Marine	2773186	6411993
Tauranga	Coastal & estuarine ecology -annual	T4	Marine	2771215	6401692
Tauranga	Coastal & estuarine ecology -annual	T9	Marine	2778845	6388800
Tauranga	Coastal & estuarine ecology -annual	T11	Marine	2788794	6388056
Tauranga	Coastal & estuarine ecology -annual	T13	Marine	2789639	6383981
Tauranga	Coastal & estuarine ecology -annual	T17	Marine	2789290	6382265
Tauranga	Coastal & estuarine ecology -annual	T18	Marine	2791615	6382522
Maketū	Coastal & estuarine ecology -annual	M1	Marine	2813286	6377150
Maketū	Coastal & estuarine ecology -annual	M2	Marine	2813324	6377025
Maketū	Coastal & estuarine ecology -annual	M3	Marine	2813942	6376942

Location	Survey	Site number	Hydro class	Easting	Northing
Maketū	Coastal & estuarine ecology -annual	M4	Marine	2814331	6376969
Waihi	Coastal & estuarine ecology -annual	Waihi1	Marine	2816376	6376389
Ōhiwa	Coastal & estuarine ecology -annual	O1	Marine	2869163	6348822
Ōhiwa	Coastal & estuarine ecology -annual	O2	Marine	2869724	6347779
Ōhiwa	Coastal & estuarine ecology -annual	O3	Marine	2870838	6348092
Ōhiwa	Coastal & estuarine ecology -annual	O6	Marine	2872817	6345752
Waiotahi	Coastal & estuarine ecology -annual	Waiotahi	Marine	2879038	6347974

				NZTM grid ref	
Tuapiro Estuary	Organics contaminants	MTM-7	Marine	1860284	5846213
Uretara (Katikati) Estuary	Organics contaminants	MTM-10	Marine	1859660	5841668
Rereatukahia Estuary	Organics contaminants	MTM-14	Marine	1858852	5837443
Hunters Creek	Organics contaminants	MTM-29	Marine	1878451	5833584
Apata Estuary	Organics contaminants	MTM-38	Marine	1864248	5830678
Mangawhai Estuary	Organics contaminants	MTM-47	Marine	1867687	5827666
Te Puna Estuary	Organics contaminants	MTM-48	Marine	1868434	5825385
Waikaraka Estuary	Organics contaminants	MTM-50	Marine	1870026	5827281
Rangataua Bay	Organics contaminants	MTM-73	Marine	1883502	5821744

Appendix 2 – Sediment organics analysis results

Hill Laboratories
BETTER TESTING BETTER RESULTS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

ANALYSIS REPORT

Client:	Bay of Plenty Regional Council	**Lab No:**	986824	SPv1
Contact:	S Park	**Date Registered:**	13-Mar-2012	
	C/- Bay of Plenty Regional Council	**Date Reported:**	30-Mar-2012	
	PO Box 364	**Quote No:**	48403	
	WHAKATANE 3158	**Order No:**	143313	
		Client Reference:	2012/044 Sediments	
		Submitted By:	S Park	

Sample Type: Sediment						
Sample Name:		1571	1572	1573	1574	1575
Lab Number:		986824.1	986824.2	986824.3	986824.4	986824.5
Individual Tests						
Dry Matter	g/100g as rcvd	71	67	63	74	68
Total Organic Carbon*	g/100g dry wt	0.64	0.99	0.76	0.29	0.51
Acid Herbicides Trace in Soil by LCMSMS						
Bentazone	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Acifluorfen	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Bromoxynil	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Clopyralid	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Dicamba	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
2,4-Dichlorophenoxyacetic acid (24D)	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
2,4-Dichlorophenoxybutyric acid (24DB)	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Dichlorprop	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Fluazifop	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Fluroxypyr	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Haloxyfop	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
2-methyl-4-chlorophenoxyacetic acid (MCPA)	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
2-methyl-4-chlorophenoxybutanoic acid (MCPB)	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Mecoprop (MCPP; 2-methyl-4-chlorophenoxypropionic acid)	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Oryzalin	mg/kg dry wt	< 0.02	< 0.02	< 0.03	< 0.02	< 0.02
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Picloram	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Quizalofop	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
2,3,4,6-Tetrachlorophenol (TCP) *	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
2,4,5-trichlorophenoxypropionic acid (245TP,Fenoprop, Silvex)	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
2,4,5-Trichlorophenoxyacetic acid (245T)	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Triclopyr*	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Multiresidue Pesticides in Soil samples by GCMS						
Acetochlor	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Alachlor	mg/kg dry wt	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Atrazine	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Atrazine-desethyl	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

Sample Type: Sediment						
	Sample Name:	1571	1572	1573	1574	1575
	Lab Number:	986824.1	986824.2	986824.3	986824.4	986824.5
Multiresidue Pesticides in Soil samples by GCMS						
Atrazine-desisopropyl	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Azaconazole	mg/kg dry wt	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Azinphos-methyl	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Benalaxyl	mg/kg dry wt	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Bendiocarb	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Benodanil	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Bifenthrin	mg/kg dry wt	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Bitertanol	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Bromacil	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Bromophos-ethyl	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Bromopropylate	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Bupirimate	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Buprofezin	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Butachlor	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Captafol	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Captan	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Carbaryl	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Carbofenothion	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Carbofuran	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Carboxin	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Chlorfenvinphos	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Chlorfluazuron	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Chlorothalonil	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Chlorpropham	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Chlorpyrifos	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Chlorpyrifos-methyl	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Chlortoluron	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Chlozolinate	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Coumaphos	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Cyanazine	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Cyfluthrin	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Cyhalothrin	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Cypermethrin	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Cyproconazole	mg/kg dry wt	< 0.012	< 0.013	< 0.014	< 0.012	< 0.013
Cyprodinil	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	0.011
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Total DDT Isomers	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Deltamethrin	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Demeton-S-methyl	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Diazinon	mg/kg dry wt	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Dichlobenil	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Dichlofenthion	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Dichlofluanid	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009

Sample Type: Sediment						
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Lab Number:		986824.1	986824.2	986824.3	986824.4	986824.5
Multiresidue Pesticides in Soil samples by GCMS						
Dichloran	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dichlorvos	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Dicofol	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dicrotophos	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Difenoconazole	mg/kg dry wt	< 0.012	< 0.013	< 0.014	< 0.012	< 0.013
Dimethoate	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Dinocap	mg/kg dry wt	< 0.10	< 0.10	< 0.11	< 0.09	< 0.10
Diphenylamine	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Disulfoton	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Diuron	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Endrin Aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
EPN	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Esfenvalerate	mg/kg dry wt	< 0.012	< 0.013	< 0.014	< 0.012	< 0.013
Ethion	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Etrimfos	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Famphur	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Fenamiphos	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Fenarimol	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Fenitrothion	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Fenpropathrin	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Fenpropimorph	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Fensulfothion	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Fenthion	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Fenvalerate	mg/kg dry wt	< 0.012	< 0.013	< 0.014	< 0.012	< 0.013
Fluazifop-butyl	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Fluometuron	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Flusilazole	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Fluvalinate	mg/kg dry wt	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007
Folpet	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Furalaxyl	mg/kg dry wt	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Haloxyfop-methyl	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Hexaconazole	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Hexazinone	mg/kg dry wt	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Hexythiazox	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Imazalil	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indoxacarb	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Iodofenphos	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Iprodione	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Isazophos	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Isofenphos	mg/kg dry wt	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Kresoxim-methyl	mg/kg dry wt	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Leptophos	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Linuron	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Malathion	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Metalaxyl	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009

Sample Type: Sediment						
	Sample Name:	1571	1572	1573	1574	1575
	Lab Number:	986824.1	986824.2	986824.3	986824.4	986824.5
Multiresidue Pesticides in Soil samples by GCMS						
Methacrifos	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Methamidophos	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Methidathion	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Methiocarb	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.011	< 0.010	< 0.010
Metolachlor	mg/kg dry wt	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
Metribuzin	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Mevinphos	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Molinate	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Myclobutanil	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Naled	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrofen	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Nitrothal-isopropyl	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Norflurazon	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Omethoate	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Oxadiazon	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Oxychlordane	mg/kg dry wt	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Oxyfluorfen	mg/kg dry wt	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Paclobutrazol	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Parathion-ethyl	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Parathion-methyl	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Penconazole	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Pendimethalin	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Permethrin	mg/kg dry wt	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Phorate	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Phosmet	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Phosphamidon	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Pirimicarb	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Pirimiphos-methyl	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Prochloraz	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Procymidone	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Prometryn	mg/kg dry wt	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Propachlor	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Propanil	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Propazine	mg/kg dry wt	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Propetamphos	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Propham	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Propiconazole	mg/kg dry wt	< 0.006	< 0.007	< 0.007	< 0.006	< 0.007
Prothiofos	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Pyrazophos	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Pyrifenox	mg/kg dry wt	< 0.012	< 0.013	< 0.014	< 0.012	< 0.013
Pyrimethanil	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Pyriproxyfen	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Quintozene	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Quizalofop-ethyl	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Simazine	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Simetryn	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Sulfentrazone	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Sulfotep	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
TCMTB [2-(thiocyanomethylthio) benzothiazole,Busan]	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Tebuconazole	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Tebufenpyrad	mg/kg dry wt	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Terbacil	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Terbufos	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Terbumeton	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009

Sample Type: Sediment						
	Sample Name:	1571	1572	1573	1574	1575
	Lab Number:	986824.1	986824.2	986824.3	986824.4	986824.5
Multiresidue Pesticides in Soil samples by GCMS						
Terbuthylazine	mg/kg dry wt	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Terbuthylazine-desethyl	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Terbutryn	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Tetrachlorvinphos	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Thiabendazole	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Thiobencarb	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Thiometon	mg/kg dry wt	< 0.017	< 0.018	< 0.019	< 0.017	< 0.018
Tolylfluanid	mg/kg dry wt	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Triadimefon	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Triazophos	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Trifluralin	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Vinclozolin	mg/kg dry wt	< 0.009	< 0.009	< 0.010	< 0.009	< 0.009
Polycyclic Aromatic Hydrocarbons Trace in Soil						
Acenaphthene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	< 0.002
Acenaphthylene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	< 0.002
Anthracene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	< 0.002
Benzo[a]anthracene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	0.003
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	0.002
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	0.003
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	< 0.002
Benzo[k]fluoranthene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	< 0.002
Chrysene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	0.003
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	< 0.002
Fluoranthene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	0.005
Fluorene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	< 0.002
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	< 0.002
Naphthalene	mg/kg dry wt	< 0.010	< 0.011	< 0.011	< 0.010	< 0.010
Phenanthrene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	< 0.002
Pyrene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	0.005
Poychlorinated Biphenyls Trace in Soil						
PCB-18	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-28	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-31	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-44	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-49	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-52	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-60	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-77	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-81	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-86	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-101	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-105	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-110	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-114	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-118	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-121	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-123	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-126	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-128	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-138	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-141	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-149	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-151	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-153	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010

Sample Type: Sediment						
	Sample Name:	1571	1572	1573	1574	1575
	Lab Number:	986824.1	986824.2	986824.3	986824.4	986824.5
Poychlorinated Biphenyls Trace in Soil						
PCB-156	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-157	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-159	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-167	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-169	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-170	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-180	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-189	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-194	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-206	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
PCB-209	mg/kg dry wt	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0010
Total PCB (Sum of 35 congeners)	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Sulfonylureas in Soil samples by LCMS						
Bensulfuron-methyl	mg/kg dry wt	< 0.00015	< 0.00016	< 0.00017	< 0.00014	< 0.00016
Chlorimuron-ethyl	mg/kg dry wt	< 0.00015	< 0.00016	< 0.00017	< 0.00014	< 0.00016
Chlorsulfuron	mg/kg dry wt	< 0.00015	< 0.00016	< 0.00017	< 0.00014	< 0.00016
Cinosulfuron	mg/kg dry wt	< 0.00015	< 0.00016	< 0.00017	< 0.00014	< 0.00016
Flazasulfuron	mg/kg dry wt	< 0.00015	< 0.00016	< 0.00017	< 0.00014	< 0.00016
Foramsulfuron	mg/kg dry wt	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Halosulfuron-methyl	mg/kg dry wt	< 0.00015	< 0.00016	< 0.00017	< 0.00014	< 0.00016
Iodosulfuron-methyl	mg/kg dry wt	< 0.00015	< 0.00016	< 0.00017	< 0.00014	< 0.00016
Mesosulfuron-methyl	mg/kg dry wt	< 0.00015	< 0.00016	< 0.00017	< 0.00014	< 0.00016
Metsulfuron-methyl	mg/kg dry wt	< 0.00015	< 0.00016	< 0.00017	< 0.00014	< 0.00016
Nicosulfuron	mg/kg dry wt	< 0.00015	< 0.00016	< 0.00017	< 0.00014	< 0.00016
Oxasulfuron	mg/kg dry wt	< 0.00015	< 0.00016	< 0.00017	< 0.00014	< 0.00016
Primisulfuron-methyl	mg/kg dry wt	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Prosulfuron	mg/kg dry wt	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004
Pyrazosulfuron-ethyl	mg/kg dry wt	< 0.00015	< 0.00016	< 0.00017	< 0.00014	< 0.00016
Rimsulfuron	mg/kg dry wt	< 0.00015	< 0.00016	< 0.00017	< 0.00014	< 0.00016
Sulfometuron-methyl	mg/kg dry wt	< 0.00015	< 0.00016	< 0.00017	< 0.00014	< 0.00016
Thifensulfuron-methyl	mg/kg dry wt	< 0.00015	< 0.00016	< 0.00017	< 0.00014	< 0.00016
Triasulfuron	mg/kg dry wt	< 0.00015	< 0.00016	< 0.00017	< 0.00014	< 0.00016
Tribenuron-methyl	mg/kg dry wt	< 0.00015	< 0.00016	< 0.00017	< 0.00014	< 0.00016
Triflusulfuron-methyl	mg/kg dry wt	< 0.00015	< 0.00016	< 0.00017	< 0.00014	< 0.00016
Haloethers Trace in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
Nitrogen containing compounds Trace in SVOC Soil Samples, GC-MS						
3,3'-Dichlorobenzidine	mg/kg dry wt	< 0.8	< 0.8	< 0.9	< 0.8	< 0.8
2,4-Dinitrotoluene	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
2,6-Dinitrotoluene	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
Nitrobenzene	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
N-Nitrosodiphenylamine	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
alpha-BHC	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
beta-BHC	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
delta-BHC	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
gamma-BHC (Lindane)	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
4,4'-DDD	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16

Sample Type: Sediment						
Sample Name:		1571	1572	1573	1574	1575
Lab Number:		986824.1	986824.2	986824.3	986824.4	986824.5
Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS						
4,4'-DDE	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
4,4'-DDT	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
Dieldrin	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
Endosulfan I	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
Endosulfan II	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Endosulfan sulphate	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
Endrin	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
Endrin ketone	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
Heptachlor	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
Heptachlor epoxide	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
Hexachlorobenzene	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
Polycyclic Aromatic Hydrocarbons Trace in SVOC Soil Samples						
Acenaphthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
Benzo[k]fluoranthene	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
2-Chloronaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
Fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16
2-Methylnaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Naphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenols Trace in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
2-Chlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4-Dichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4-Dimethylphenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 0.4	< 0.4	1.0	< 0.4	< 0.4
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2-Nitrophenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Pentachlorophenol (PCP)	mg/kg dry wt	< 6	< 6	< 6	< 6	< 6
Phenol	mg/kg dry wt	< 0.4	0.7	< 0.4	< 0.3	0.5
2,4,5-Trichlorophenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
2,4,6-Trichlorophenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
Plasticisers Trace in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 0.7	< 0.7	< 0.7	< 0.6	< 0.7
Butylbenzylphthalate	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Diethylphthalate	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
Dimethylphthalate	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
Di-n-butylphthalate	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
Di-n-octylphthalate	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
Other Halogenated compounds Trace in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
1,3-Dichlorobenzene	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4

Sample Type: Sediment							
	Sample Name:	1571	1572	1573	1574	1575	
	Lab Number:	986824.1	986824.2	986824.3	986824.4	986824.5	
Other Halogenated compounds Trace in SVOC Soil Samples by GC-MS							
1,4-Dichlorobenzene	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4	
Hexachlorobutadiene	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4	
Hexachlorocyclopentadiene	mg/kg dry wt	< 0.8	< 0.8	< 0.9	< 0.8	< 0.8	
Hexachloroethane	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4	
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16	
Other SVOC Trace in SVOC Soil Samples by GC-MS							
Benzyl alcohol	mg/kg dry wt	< 1.6	< 1.6	< 1.7	< 1.5	< 1.6	
Carbazole	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16	
Dibenzofuran	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16	
Isophorone	mg/kg dry wt	< 0.16	< 0.16	< 0.17	< 0.15	< 0.16	

	Sample Name:	1576	1577	1578	1579	
	Lab Number:	986824.6	986824.7	986824.8	986824.9	
Individual Tests						
Dry Matter	g/100g as rcvd	69	56	63	72	-
Total Organic Carbon*	g/100g dry wt	0.50	1.49	0.67	0.37	-
Acid Herbicides Trace in Soil by LCMSMS						
Bentazone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
Acifluorfen	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
Bromoxynil	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
Clopyralid	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
Dicamba	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
2,4-Dichlorophenoxyacetic acid (24D)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
2,4-Dichlorophenoxybutyric acid (24DB)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
Dichlorprop	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
Fluazifop	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
Fluroxypyr	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
Haloxyfop	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
2-methyl-4-chlorophenoxyacetic acid (MCPA)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
2-methyl-4-chlorophenoxybutanoic acid (MCPB)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
Mecoprop (MCPP; 2-methyl-4-chlorophenoxypropionic acid)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
Oryzalin	mg/kg dry wt	< 0.02	< 0.02	< 0.02	< 0.02	-
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
Picloram	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
Quizalofop	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
2,3,4,6-Tetrachlorophenol (TCP) *	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
2,4,5-trichlorophenoxypropionic acid (245TP,Fenoprop, Silvex)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
2,4,5-Trichlorophenoxyacetic acid (245T)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
Triclopyr*	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	-
Multiresidue Pesticides in Soil samples by GCMS						
Acetochlor	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Alachlor	mg/kg dry wt	< 0.006	< 0.006	< 0.006	< 0.006	-
Aldrin	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
Atrazine	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Atrazine-desethyl	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Atrazine-desisopropyl	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Azaconazole	mg/kg dry wt	< 0.005	< 0.006	< 0.005	< 0.005	-
Azinphos-methyl	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Benalaxyl	mg/kg dry wt	< 0.005	< 0.006	< 0.005	< 0.005	-

Sample Type: Sediment						
	Sample Name:	1576	1577	1578	1579	
	Lab Number:	986824.6	986824.7	986824.8	986824.9	
Multiresidue Pesticides in Soil samples by GCMS						
Bendiocarb	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Benodanil	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
alpha-BHC	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
beta-BHC	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
delta-BHC	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
Bifenthrin	mg/kg dry wt	< 0.005	< 0.006	< 0.005	< 0.005	-
Bitertanol	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Bromacil	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Bromophos-ethyl	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Bromopropylate	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Bupirimate	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Buprofezin	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Butachlor	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Captafol	mg/kg dry wt	< 0.05	< 0.06	< 0.05	< 0.05	-
Captan	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Carbaryl	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Carbofenothion	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Carbofuran	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Carboxin	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
cis-Chlordane	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
trans-Chlordane	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	-
Chlorfenvinphos	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Chlorfluazuron	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Chlorothalonil	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Chlorpropham	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Chlorpyrifos	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Chlorpyrifos-methyl	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Chlortoluron	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Chlozolinate	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Coumaphos	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Cyanazine	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Cyfluthrin	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Cyhalothrin	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Cypermethrin	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Cyproconazole	mg/kg dry wt	< 0.013	< 0.015	< 0.014	< 0.012	-
Cyprodinil	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
2,4'-DDD	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
4,4'-DDD	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
2,4'-DDE	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
4,4'-DDE	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
2,4'-DDT	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
4,4'-DDT	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.06	< 0.06	< 0.06	-
Deltamethrin	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Demeton-S-methyl	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Diazinon	mg/kg dry wt	< 0.005	< 0.006	< 0.005	< 0.005	-
Dichlobenil	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Dichlofenthion	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Dichlofluanid	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Dichloran	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	-
Dichlorvos	mg/kg dry wt	< 0.010	< 0.011	< 0.010	< 0.010	-
Dicofol	mg/kg dry wt	< 0.05	< 0.06	< 0.05	< 0.05	-
Dicrotophos	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-

Sample Type: Sediment						
Sample Name:		1576	1577	1578	1579	
Lab Number:		986824.6	986824.7	986824.8	986824.9	
Multiresidue Pesticides in Soil samples by GCMS						
Dieldrin	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
Difenoconazole	mg/kg dry wt	< 0.013	< 0.015	< 0.014	< 0.012	-
Dimethoate	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Dinocap	mg/kg dry wt	< 0.10	< 0.12	< 0.11	< 0.10	-
Diphenylamine	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Disulfoton	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Diuron	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Endosulfan I	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
Endosulfan II	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
Endosulfan sulphate	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
Endrin	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
Endrin Aldehyde	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
Endrin ketone	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
EPN	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Esfenvalerate	mg/kg dry wt	< 0.013	< 0.015	< 0.014	< 0.012	-
Ethion	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Etrimfos	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Famphur	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Fenamiphos	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Fenarimol	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Fenitrothion	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Fenpropathrin	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Fenpropimorph	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Fensulfothion	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Fenthion	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Fenvalerate	mg/kg dry wt	< 0.013	< 0.015	< 0.014	< 0.012	-
Fluazifop-butyl	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Fluometuron	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Flusilazole	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Fluvalinate	mg/kg dry wt	< 0.007	< 0.008	< 0.007	< 0.006	-
Folpet	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Furalaxyl	mg/kg dry wt	< 0.005	< 0.006	< 0.005	< 0.005	-
Haloxyfop-methyl	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Heptachlor	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
Heptachlor epoxide	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
Hexachlorobenzene	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
Hexaconazole	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Hexazinone	mg/kg dry wt	< 0.005	< 0.006	< 0.005	< 0.005	-
Hexythiazox	mg/kg dry wt	< 0.05	< 0.06	< 0.05	< 0.05	-
Imazalil	mg/kg dry wt	< 0.05	< 0.06	< 0.05	< 0.05	-
Indoxacarb	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Iodofenphos	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	< 0.05	< 0.06	< 0.05	< 0.05	-
Iprodione	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Isazophos	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Isofenphos	mg/kg dry wt	< 0.005	< 0.006	< 0.005	< 0.005	-
Kresoxim-methyl	mg/kg dry wt	< 0.005	< 0.006	< 0.005	< 0.005	-
Leptophos	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Linuron	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Malathion	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Metalaxyl	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Methacrifos	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Methamidophos	mg/kg dry wt	< 0.05	< 0.06	< 0.05	< 0.05	-
Methidathion	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Methiocarb	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-

Sample Type: Sediment						
Sample Name:		1576	1577	1578	1579	
Lab Number:		986824.6	986824.7	986824.8	986824.9	
Multiresidue Pesticides in Soil samples by GCMS						
Methoxychlor	mg/kg dry wt	< 0.011	< 0.010	< 0.010	< 0.010	-
Metolachlor	mg/kg dry wt	< 0.006	< 0.006	< 0.006	< 0.006	-
Metribuzin	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Mevinphos	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	-
Molinate	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Myclobutanil	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Naled	mg/kg dry wt	< 0.05	< 0.06	< 0.05	< 0.05	-
Nitrofen	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Nitrothal-isopropyl	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Norflurazon	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Omethoate	mg/kg dry wt	< 0.05	< 0.06	< 0.05	< 0.05	-
Oxadiazon	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Oxychlordane	mg/kg dry wt	< 0.005	< 0.006	< 0.005	< 0.005	-
Oxyfluorfen	mg/kg dry wt	< 0.005	< 0.006	< 0.005	< 0.005	-
Paclobutrazol	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Parathion-ethyl	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Parathion-methyl	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Penconazole	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Pendimethalin	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Permethrin	mg/kg dry wt	< 0.003	< 0.003	< 0.003	< 0.003	-
Phorate	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Phosmet	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Phosphamidon	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Pirimicarb	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Pirimiphos-methyl	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Prochloraz	mg/kg dry wt	< 0.05	< 0.06	< 0.05	< 0.05	-
Procymidone	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Prometryn	mg/kg dry wt	< 0.005	< 0.006	< 0.005	< 0.005	-
Propachlor	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Propanil	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	-
Propazine	mg/kg dry wt	< 0.005	< 0.006	< 0.005	< 0.005	-
Propetamphos	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Propham	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Propiconazole	mg/kg dry wt	< 0.007	< 0.008	< 0.007	< 0.006	-
Prothiofos	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Pyrazophos	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Pyrifenox	mg/kg dry wt	< 0.013	< 0.015	< 0.014	< 0.012	-
Pyrimethanil	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Pyriproxyfen	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Quintozene	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Quizalofop-ethyl	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Simazine	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Simetryn	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Sulfentrazone	mg/kg dry wt	< 0.05	< 0.06	< 0.05	< 0.05	-
Sulfotep	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
TCMTB [2-(thiocyanomethylthio) benzothiazole,Busan]	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Tebuconazole	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Tebufenpyrad	mg/kg dry wt	< 0.005	< 0.006	< 0.005	< 0.005	-
Terbacil	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Terbufos	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Terbumeton	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Terbuthylazine	mg/kg dry wt	< 0.005	< 0.006	< 0.005	< 0.005	-
Terbuthylazine-desethyl	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Terbutryn	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Tetrachlorvinphos	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-

Sample Type: Sediment						
Sample Name:		1576	1577	1578	1579	
Lab Number:		986824.6	986824.7	986824.8	986824.9	
Multiresidue Pesticides in Soil samples by GCMS						
Thiabendazole	mg/kg dry wt	< 0.05	< 0.06	< 0.05	< 0.05	-
Thiobencarb	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Thiometon	mg/kg dry wt	< 0.018	< 0.03	< 0.019	< 0.017	-
Tolylfluanid	mg/kg dry wt	< 0.005	< 0.006	< 0.005	< 0.005	-
Triadimefon	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Triazophos	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Trifluralin	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Vinclozolin	mg/kg dry wt	< 0.009	< 0.011	< 0.010	< 0.009	-
Polycyclic Aromatic Hydrocarbons Trace in Soil						
Acenaphthene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	-
Acenaphthylene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	-
Anthracene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	-
Benzo[a]anthracene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	-
Chrysene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	-
Fluoranthene	mg/kg dry wt	< 0.002	0.003	< 0.003	< 0.002	-
Fluorene	mg/kg dry wt	< 0.002	0.003	< 0.003	< 0.002	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.002	< 0.003	< 0.003	< 0.002	-
Naphthalene	mg/kg dry wt	< 0.010	< 0.012	< 0.011	< 0.010	-
Phenanthrene	mg/kg dry wt	< 0.002	0.002	< 0.003	< 0.002	-
Pyrene	mg/kg dry wt	< 0.002	0.003	< 0.003	< 0.002	-
Poychlorinated Biphenyls Trace in Soil						
PCB-18	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-28	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-31	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-44	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-49	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-52	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-60	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-77	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-81	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-86	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-101	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-105	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-110	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-114	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-118	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-121	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-123	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-126	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-128	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-138	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-141	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-149	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-151	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-153	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-156	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-157	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-159	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-167	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-

Sample Type: Sediment						
Sample Name:		1576	1577	1578	1579	
Lab Number:		986824.6	986824.7	986824.8	986824.9	
Poychlorinated Biphenyls Trace in Soil						
PCB-169	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-170	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-180	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-189	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-194	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-206	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
PCB-209	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
Total PCB (Sum of 35 congeners)	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	-
Sulfonylureas in Soil samples by LCMS						
Bensulfuron-methyl	mg/kg dry wt	< 0.00016	< 0.00019	< 0.00017	< 0.00015	-
Chlorimuron-ethyl	mg/kg dry wt	< 0.00016	< 0.00019	< 0.00017	< 0.00015	-
Chlorsulfuron	mg/kg dry wt	< 0.00016	< 0.00019	< 0.00017	< 0.00015	-
Cinosulfuron	mg/kg dry wt	< 0.00016	< 0.00019	< 0.00017	< 0.00015	-
Flazasulfuron	mg/kg dry wt	< 0.00016	< 0.00019	< 0.00017	< 0.00015	-
Foramsulfuron	mg/kg dry wt	< 0.0002	< 0.0002	< 0.0002	< 0.0002	-
Halosulfuron-methyl	mg/kg dry wt	< 0.00016	< 0.00019	< 0.00017	< 0.00015	-
Iodosulfuron-methyl	mg/kg dry wt	< 0.00016	< 0.00019	< 0.00017	< 0.00015	-
Mesosulfuron-methyl	mg/kg dry wt	< 0.00016	< 0.00019	< 0.00017	< 0.00015	-
Metsulfuron-methyl	mg/kg dry wt	< 0.00016	< 0.00019	< 0.00017	< 0.00015	-
Nicosulfuron	mg/kg dry wt	< 0.00016	< 0.00019	< 0.00017	< 0.00015	-
Oxasulfuron	mg/kg dry wt	< 0.00016	< 0.00019	< 0.00017	< 0.00015	-
Primisulfuron-methyl	mg/kg dry wt	< 0.0002	< 0.0002	< 0.0002	< 0.0002	-
Prosulfuron	mg/kg dry wt	< 0.0004	< 0.0004	< 0.0004	< 0.0004	-
Pyrazosulfuron-ethyl	mg/kg dry wt	< 0.00016	< 0.00019	< 0.00017	< 0.00015	-
Rimsulfuron	mg/kg dry wt	< 0.00016	< 0.00019	< 0.00017	< 0.00015	-
Sulfometuron-methyl	mg/kg dry wt	< 0.00016	< 0.00019	< 0.00017	< 0.00015	-
Thifensulfuron-methyl	mg/kg dry wt	< 0.00016	< 0.00019	< 0.00017	< 0.00015	-
Triasulfuron	mg/kg dry wt	< 0.00016	< 0.00019	< 0.00017	< 0.00015	-
Tribenuron-methyl	mg/kg dry wt	< 0.00016	< 0.00019	< 0.00017	< 0.00015	-
Triflusulfuron-methyl	mg/kg dry wt	< 0.00016	< 0.00019	< 0.00017	< 0.00015	-
Haloethers Trace in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
Nitrogen containing compounds Trace in SVOC Soil Samples, GC-MS						
3,3'-Dichlorobenzidine	mg/kg dry wt	< 0.8	< 1.0	< 0.9	< 0.8	-
2,4-Dinitrotoluene	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
2,6-Dinitrotoluene	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
Nitrobenzene	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
N-Nitrosodiphenylamine	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
alpha-BHC	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
beta-BHC	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
delta-BHC	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
4,4'-DDD	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
4,4'-DDE	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
4,4'-DDT	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
Dieldrin	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
Endosulfan I	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-

Sample Type: Sediment						
Sample Name:		1576	1577	1578	1579	
Lab Number:		986824.6	986824.7	986824.8	986824.9	
Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS						
Endosulfan II	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Endosulfan sulphate	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
Endrin	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
Endrin ketone	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
Heptachlor	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
Heptachlor epoxide	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
Hexachlorobenzene	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
Polycyclic Aromatic Hydrocarbons Trace in SVOC Soil Samples						
Acenaphthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Acenaphthylene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Benzo[a]anthracene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
2-Chloronaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Chrysene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
Fluoranthene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Fluorene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
2-Methylnaphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Naphthalene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Phenanthrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Pyrene	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Phenols Trace in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
2-Chlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
2,4-Dichlorophenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
2,4-Dimethylphenol	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
2-Nitrophenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	-
Pentachlorophenol (PCP)	mg/kg dry wt	< 6	< 6	< 6	< 6	-
Phenol	mg/kg dry wt	0.6	0.7	< 0.4	< 0.3	-
2,4,5-Trichlorophenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
2,4,6-Trichlorophenol	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
Plasticisers Trace in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 0.7	< 0.8	< 0.7	< 0.6	-
Butylbenzylphthalate	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	-
Diethylphthalate	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
Dimethylphthalate	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
Di-n-butylphthalate	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
Di-n-octylphthalate	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
Other Halogenated compounds Trace in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
1,3-Dichlorobenzene	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
1,4-Dichlorobenzene	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
Hexachlorobutadiene	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-
Hexachlorocyclopentadiene	mg/kg dry wt	< 0.8	< 1.0	< 0.9	< 0.8	-
Hexachloroethane	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	-

Sample Type: Sediment						
Sample Name:		1576	1577	1578	1579	
Lab Number:		986824.6	986824.7	986824.8	986824.9	
Other Halogenated compounds Trace in SVOC Soil Samples by GC-MS						
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
Other SVOC Trace in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 1.6	< 2	< 1.7	< 1.5	-
Carbazole	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
Dibenzofuran	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-
Isophorone	mg/kg dry wt	< 0.16	< 0.2	< 0.17	< 0.15	-

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Sediment			
Test	**Method Description**	**Default Detection Limit**	**Samples**
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-9
Acid Herbicides Trace in Soil by LCMSMS*	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	-	1-9
Multiresidue Pesticides in Soil samples by GCMS	Sonication extraction, GPC cleanup, GC-MS analysis. Tested on as received sample, then results corrected to a dry weight basis using the separate Dry Matter result.	-	1-9
Polycyclic Aromatic Hydrocarbons Trace in Soil	Sonication extraction, SPE cleanup, GC-MS SIM analysis US EPA 8270C. Tested on as received sample	-	1-9
Poychlorinated Biphenyls Trace in Soil	Sonication extraction, SPE cleanup, GPC cleanup (if required), GC-MS analysis. Tested on dried sample	-	1-9
Sulfonylureas in Soil samples by LCMS	Solvent extraction, LC-MS analysis. Tested on as received sample	-	1-9
Semivolatile Organic Compounds Trace in Soil by GC-MS	Sonication extraction, GPC cleanup, GC-MS FS analysis. Tested on as received sample	-	1-9
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-9
Total Organic Carbon*	Acid pretreatment to remove carbonates if present, Elementar Combustion Analyser.	0.05 g/100g dry wt	1-9

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

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Ara Heron BSc (Tech)
Client Services Manager - Environmental Division