

Waterwatch Victoria

**QA/QC on Mystery Physico-Chemical
and Macroinvertebrate Samples**



July 2005

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Front Cover Photograph: *Antiporus bakewelli* (Family: Dytiscidae)

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1 Background

Waterwatch Victoria is a statewide community water quality monitoring organisation that aims to increase understanding of waterway issues and form networks throughout catchments. The monitoring program involves regional coordinators and a range of community monitors collecting water quality data from their local creeks and rivers. In order for coordinators to be confident in the data they and their monitors report, a statewide Quality Assurance and Quality Control (QA/QC) program is undertaken annually. Analysis of quality controlled samples ("Mystery Samples") ensures confidence in the proficiency of coordinators and monitors' collection of accurate and precise data.

This report summarises the data from physico-chemical and macroinvertebrate "Mystery Samples" tested by Waterwatch Victoria coordinators and monitors from across the state between 20th June and 24th June 2005. Similar QA/QC programs have been undertaken in 1998, 1999, 2000, 2001, 2002, 2003 and 2004. In this report, results have been analysed as per 2004 for all participants and separately for monitors and coordinators.

2 Methods

Reference water samples for parameters pH, electrical conductivity (EC), turbidity and Orthophosphate, along with reference macroinvertebrate samples of known taxonomic composition were prepared by Ecowise Environmental according to Waterwatch Victoria specifications. One hundred and twenty sets of physico-chemical “Mystery Samples” and eighty macroinvertebrate “Mystery Samples” were provided to Waterwatch Victoria to be sent to coordinators and monitors for testing. The results from the coordinators and monitors data analysis sheets were collated and evaluated by Ecowise Environmental.

Physico - chemical parameters

For each parameter tested there were two concentrations provided. The physico-chemical “Mystery Samples” set comprised of six bottles. The pH and EC parameters were combined in one bottle, while turbidity and Orthophosphate samples were provided in separate bottles. The reference values for the parameters tested are presented in Table 1.

Table 1 Reference values for “Mystery Sample” parameters.

Parameter	Mystery Sample 1 value	Mystery Sample 2 value
pH	6.5	7.5
EC ($\mu\text{S}/\text{cm}$)	470	2800
Turbidity (NTU)	25	80
Orthophosphate mg/L as P	0.083	0.240

Acceptable upper and lower quality control limits for each parameter tested were chosen to encompass the wide array of equipment used by Waterwatch coordinators and monitors, and to determine compliance with quality standards. These limits, as determined by Waterwatch Victoria, are presented in Table 2. According to equipment sensitivity, different limits are applicable to different equipment, with broader quality control limits for less sensitive equipment. pH was measured with either pH strips (paper) or pH meters, turbidity was determined using a turbidity tube or turbidity meter, and orthophosphate was determined with a variety of visual comparators or a colorimeter.

Waterwatch coordinators and monitors provided multiple responses, using different equipment and these responses have been designated with a, b, c & d following the sampler code. In cases where a range was given for a particular answer, the medium of the numbers was used in the results analysis (eg. 6-7 given a value of 6.5). Additionally where a qualifier was included, the value without the qualifier was analysed (eg. <80 was given a value of 80). Waterwatch coordinators and monitors tested for parameters that were relevant for their monitoring aims, therefore not all parameters were tested by all individuals.

Table 2 Quality limits and upper and lower limits for physico - chemical parameters.

Parameter	Quality Limits	Mystery Sample 1			Mystery Sample 2		
		Reference Value	Lower Limit	Upper Limit	Reference Value	Lower Limit	Upper Limit
pH paper	± 0.5	6.5	6.0	7.0	7.5	7	8
pH meter	± 0.3	6.5	6.2	6.8	7.5	7.2	7.8
EC (µS/cm)	± 10%	470	420	520	2800	2500	3100
Turbidity (NTU) tube	± 20% (MS1) ± 25% (MS2)	25	20	30	80	60	100
Turbidity (NTU) meter	± 20%	25	20	30	80	64	96
Orthophosphate mg/L as P – comparator or colorimeter	± 20%	0.083	0.066	0.100	0.240	0.192	0.288

- The range for pH paper is broader than the pH meter to reflect the decreased sensitivity of the pH strips.
- The range for electrical conductivity for Mystery Sample 1 was rounded to the nearest ten (ie. 423 was rounded to 420, 517 was rounded to 520). The range electrical conductivity for Mystery Sample 2 was rounded to the nearest hundred (ie. 2520 was rounded to 2500, 3080 was rounded to 3100).
- The quality limit for the turbidity tube for Mystery Sample 2 is broader than Mystery Sample 1 to allow the range to include the nearest marked increments on the tube.

Macroinvertebrates

Macroinvertebrate “Mystery Samples” were used to test coordinators and monitors identification skills, to family level taxonomic resolution. Macroinvertebrate “Mystery Samples” consisted of six macroinvertebrates (Table 3) identified by a qualified aquatic ecologist, and identified at the class, order, family and common name level. Analysis of results was carried out on the order, family and common name level. When tallying results, a non-attempt was interpreted as a row on the results sheet with all blank spaces and recorded as “No response”. An error included a misidentification or a blank space in a row where a partial identification attempt had been made (eg. common name recorded but blank space in family column). The term “% no response” is defined as the percentage of the total respondents.

Table 3 Macroinvertebrate “Mystery Sample” taxa list.

Class	Order	Family	Common Name
Insecta	Diptera	Chironomidae	Non biting midge
Insecta	Ephemeroptera	Caenidae	Mayfly
Insecta	Trichoptera	Leptoceridae	Caddisfly
Crustacea	Decapoda	Atyidae	Shrimp
Insecta	Hemiptera	Notonectidae	Back Swimmer
Insecta	Coleoptera	Dytiscidae	Diving Beetle

Results

Physico - chemical

One hundred and fifty results sheets were received by Ecowise Environmental. The combined coordinator and monitor "Mystery Sample" results for each parameter are presented in Appendices A to H.

A summary of physico-chemical "Mystery Sample" results for all participants is presented in Table 4. For pH, a higher percentage compliance was achieved using a pH meter as opposed to pH strips. Median values for Mystery Sample 1 and Mystery Sample 2 for both pH strips and pH meters were within the acceptable range of values.

High compliancy was evident for EC. Mystery Sample 2 (90%) had a higher percentage compliance than Mystery Sample 1 (80%). Both median values fell within the accepted range. A number of the "fails" for this parameter were results of 400EC, that were predominantly tested with high range instruments with a resolution of 100 EC, and do not easily fall within the acceptable range.

Turbidity tubes were more commonly used than turbidity meters, with slightly better pass percentages observed using the meters. A slightly higher percentage compliance was achieved for Mystery Sample 2 compared to Mystery Sample 1, using a tube or meter. All median values fell within the acceptable range.

There was no clear differentiation in percentage compliance between orthophosphate comparators and colorimeters, comparators were used more than colorimeters. Median values for comparators and colorimeters fell within the acceptable ranges for both Mystery Samples.

Coordinators

A summary of physico-chemical "Mystery Sample" results for Waterwatch coordinators is presented in Table 5.

Median values for all parameters fell within the acceptable range of values. Overall the percentage compliance was high for all parameters. The highest percentage compliance for the coordinators was for the parameter Orthophosphate Mystery Sample 2 using a colorimeter with a 100% pass rate. The lowest percentage compliance was for turbidity Mystery Sample 1 using a turbidity tube (72%).

For pH a high percentage compliance (>90%) was achieved using meters, and also using pH strips for Mystery Sample 2. Percentage compliance was lower for Mystery Sample 1 using pH strips (75)%. Coordinator percentage compliance was similar for both EC Mystery Samples. Turbidity meter testing by coordinators resulted in a higher percentage compliance than using a turbidity tube. Higher percentage compliance was achieved for Mystery Sample 2 orthophosphate using both comparators and colorimeters than Mystery Sample 1.

Monitors

A summary of the results of Waterwatch monitor physico-chemical "Mystery Sample" are presented in Table 5. The majority of median values fell within the acceptable ranges. The exception was for both Mystery Samples using pH paper (strips). The highest percentage compliance was for the parameter EC Mystery Sample 2 (92.1%). The lowest percentage compliance was for pH Mystery Sample 2, using pH strips (33.3%).

There was a substantial difference in the percentage compliance for different pH equipment. The use of pH paper achieved a low (<40%) percentage compliance compared to greater than 80% compliance when using a pH meter. Results for the parameter EC were similar for both Mystery Samples. With Mystery Sample 2 having a higher percentage compliance. Similarly, a higher percentage pass rate was evident for turbidity Mystery Sample 2, regardless of instrument used. The results for monitor orthophosphate are variable. For Mystery Sample 1, the use of a colorimeter (83.3%) provided a higher percentage compliance than using a comparator (68.2%). For Mystery Sample 2, the use of a comparator (83.1%) provided a higher percentage pass than a colorimeter (66.7%).

Overall, Waterwatch coordinators generally achieved a higher percentage compliance than monitors, the exceptions being pH Mystery Sample 1 (meter), EC Mystery Sample 2 and orthophosphate Mystery Sample 1 (colorimeter). The most notable difference between coordinator and monitor results was the percentage compliance when using pH strips, with the monitor results having a much lower percentage compliance than the coordinators.

Table 4 Physico - chemical “Mystery Samples,” all participants.

Parameter	No. tested	No. passed	% passed	Reference value	Minimum value recorded	Median value recorded	Maximum value recorded
pH 1 paper	32	19	59.4	6.5	5	6	7
pH 1 meter	103	83	80.6	6.5	5.6	6.5	7.2
pH 2 paper	32	17	53.1	7.5	6	7	8
pH 2 meter	101	89	88.1	7.5	6.9	7.4	8.5
EC 1	150	120	80	470	370	470	600
EC 2	134	122	91	2800	2400	2700	3600
Turbidity 1 tube	125	72	57.6	25	3.1	30	125
Turbidity 1 meter	17	14	82.4	25	7	25	33
Turbidity 2 tube	126	112	88.9	80	8	80	300
Turbidity 2 meter	17	16	94.1	80	5	83.7	89
Orthophosphate 1 comparator	94	66	70.2	0.083	0.010	0.080	0.150
Orthophosphate 1 colorimeter	11	9	81.8	0.083	0.068	0.078	0.164
Orthophosphate 2 comparator	92	78	84.8	0.240	0.010	0.240	0.500
Orthophosphate 2 colorimeter	11	9	81.8	0.240	0.110	0.220	0.270

Table 5 Physico - chemical “Mystery Samples,” coordinators.

Parameter	No. tested	No. passed	% passed	Reference value	Minimum value recorded	Median value recorded	Maximum value recorded
pH 1 paper	11	10	90.9	6.5	5.5	6.5	7
pH 1 meter	32	24	75	6.5	5.7	6.4	7
pH 2 paper	11	10	90.9	7.5	6.5	7.5	8
pH 2 meter	31	29	93.5	7.5	7.1	7.3	7.9
EC 1	48	40	83.3	470	400	466	600
EC 2	45	40	88.9	2800	2400	2700	3600
Turbidity 1 tube	25	18	72	25	20	30	40
Turbidity 1 meter	12	11	91.7	25	16	25	28
Turbidity 2 tube	25	23	92	80	60	87	150
Turbidity 2 meter	12	12	100	80	69	82	89
Orthophosphate 1 comparator	28	21	75	0.083	0.050	0.080	0.110
Orthophosphate 1 colorimeter	5	4	80	0.083	0.070	0.080	0.11
Orthophosphate 2 comparator	27	24	88.9	0.240	0.200	0.250	0.500
Orthophosphate 2 colorimeter	5	5	100	0.240	0.220	0.240	0.270

Table 6 Physico - chemical “Mystery Sample,” monitors.

Parameter	No. tested	No. passed	% passed	Reference value	Minimum value recorded	Median value recorded	Maximum value recorded
pH 1 paper	21	8	38.1	6.5	5	5.5	7
pH 1 meter	71	59	83.1	6.5	5.6	6.5	7.2
pH 2 paper	21	7	33.3	7.5	6	6.5	8
pH 2 meter	70	61	87.1	7.5	6.9	7.4	8.5
EC 1	102	80	78.4	470	370	470	600
EC 2	89	82	92.1	2800	2401	2730	3200
Turbidity 1 tube	100	54	54	25	3.1	30	125
Turbidity 1 meter	5	3	60	25	7	24.2	33
Turbidity 2 tube	101	89	88.1	80	8	80	300
Turbidity 2 meter	5	4	80	80	5	71	79.3
Orthophosphate 1 comparator	66	45	68.2	0.083	0.010	0.080	0.150
Orthophosphate 1 colorimeter	6	5	83.3	0.083	0.068	0.078	0.164
Orthophosphate 2 comparator	65	54	83.1	0.240	0.010	0.220	0.300
Orthophosphate 2 colorimeter	6	4	66.7	0.240	0.110	0.205	0.231

Macroinvertebrates

Ecwise Environmental received a total of 70 Macroinvertebrate “Mystery Sample” results sheets (Appendix I and Appendix J). In a number of cases, both coordinators and monitors either missed, lost or misidentified the smaller, cryptic specimens for the families Chironomidae and Caenidae. This is reflected in the results, at all levels of identification (order, family and common name) in Table 7, Table 8 and Table 9. Sixteen participants correctly identified all macroinvertebrates at all taxonomic levels. Thirteen respondents that correctly identified all taxonomic levels used a microscope, two used hand lens and eye, one did not indicate which method was used for identification.

A summary of the macroinvertebrate results for all participants is presented in Table 7. At the order level, the percentage of correct responses was high at around or above 90%. At the family level, the percentage of correct responses was high, excepting Caenidae at 47.2%. The highest correct response percentage at the family level was “Athyidae” (81.4%). The highest percentage correct response at the common name level was for “Caddisfly” (100%) .

Table 8 summarises the coordinator macroinvertebrate results and Table 9 presents the monitor results. The percentage correct response for coordinators was as high or higher for all levels of identification than monitors.

Table 10 presents misidentifications at the family level. For all families, except Notonectidae, the highest percentage of misidentification was for a “No answer”. The families Notonectidae and Dytiscidae were mis-identified as Corixidae, in 57.9% and 16.7% of cases respectively.

Table 7 Macroinvertebrate “Mystery Samples,” all participants.

Order	%Correct	%Incorrect	Number No response	Family	%Correct	%Incorrect	Number No response	Common name	%Correct	%Incorrect	Number No response
Diptera	94.1	5.9	19	Chironomidae	78.4	21.6	19	Non biting midge	76.5	23.5	19
Ephemeroptera	94.3	5.7	17	Caenidae	47.2	52.8	17	Mayfly	92.5	7.5	17
Trichoptera	95.7	4.3	1	Leptoceridae	73.9	26.1	1	Caddisfly	100	0	1
Decapoda	90	10	0	Atyidae	81.4	18.6	0	Shrimp	98.6	1.4	0
Hemiptera	92.4	7.6	4	Notonectidae	71.2	28.8	4	Back Swimmer	77.3	22.7	4
Coleoptera	89.2	10.8	5	Dytiscidae	72.3	27.7	5	Diving Beetle	70.8	29.2	5

Number respondents = 70.

Table 8 Macroinvertebrate “Mystery Sample,” coordinators.

Order	%Correct	%Incorrect	Number No response	Family	%Correct	%Incorrect	Number No response	Common name	%Correct	%Incorrect	Number No response
Diptera	100	0	7	Chironomidae	96.2	3.8	7	Non biting midge	88.5	11.5	7
Ephemeroptera	96.6	3.4	4	Caenidae	62.1	37.9	4	Mayfly	96.6	3.4	4
Trichoptera	100	0	0	Leptoceridae	81.8	18.2	0	Caddisfly	100	0	0
Decapoda	93.9	6.1	0	Atyidae	90.9	9.1	0	Shrimp	100	0	0
Hemiptera	97.0	3.0	0	Notonectidae	84.8	15.2	0	Back Swimmer	87.9	12.1	0
Coleoptera	93.9	6.1	0	Dytiscidae	84.8	15.2	0	Diving Beetle	84.8	15.2	0

Number of coordinator respondents = 33.

Table 9 Macroinvertebrate “Mystery Samples,” monitors.

Order	%Correct	%Incorrect	Number No response	Family	%Correct	%Incorrect	Number No response	Common name	%Correct	%Incorrect	Number No response
Diptera	88	12	12	Chironomidae	60.0	40.0	12	Non biting midge	64	36	12
Ephemeroptera	91.7	8.3	13	Caenidae	29.2	70.8	13	Mayfly	87.5	12.5	13
Trichoptera	91.7	8.3	1	Leptoceridae	66.7	33.3	1	Caddisfly	100	0	1
Decapoda	86.5	13.5	0	Atyidae	73.0	27.0	0	Shrimp	97.3	2.7	0
Hemiptera	87.9	12.1	4	Notonectidae	57.6	42.4	4	Back Swimmer	66.7	33.3	4
Coleoptera	84.4	15.6	5	Dytiscidae	59.4	40.6	5	Diving Beetle	56.3	43.8	5

Number monitors respondents = 37.

Table 10 Family Level Misidentification, all participants.

Family	Misidentification (% misidentified)	Misidentification (% misidentified)	Misidentification (% misidentified)	Misidentification (% misidentified)
Chironomidae	No answer (63.6)	Ceratopogonidae (27.3)	Nematoda (9.1)	
Caenidae	No answer (32.1)	Leptophlebiidae (32.1)	Baetidae (21.4)	Oniscigastridae, Isosticidae, Austrocerca, Notonemouridae (all 3.6)
Leptoceridae	No answer (66.7)	Calocidae/Helicophidae (22.2)	Hydrobiosidae (5.6)	Stem case (5.6)
Atyidae	No answer (61.5)	Talitridae (15.4)	Anostraca, Paracalliopiidae, Palaemonidae (all 7.7)	
Notonectidae	Corixidae (57.9)	No answer (42.1)		
Dytiscidae	No answer (61.1)	Corixidae (16.7)	Haliplidae (11.1)	Janiridae, Hydrophilidae (all 5.6)

Appendices

A Physico - chemical “Mystery Samples” results, all participants - pH paper.

Code	Date	pH instrument	MS1 result	Met	MS 2 result	Met
051	24/06/2005	Strips	6	Yes	7	Yes
052	24/06/2005		5.5	No	6.5	No
054	24/06/2005	Strips	6.00	Yes	7	Yes
065	24/06/2005	Merk pH 0-14 Indicator strips	6.0	Yes	7.5	Yes
070	20/06/2005	pH Strips fix 4.5 - 10.00	6.5	Yes	7	Yes
071	20/06/2005	pH Strips fix 4.5 - 10.00	6.5	Yes	7	Yes
072	20/06/2005	Machere Strip	6.5	Yes	7	Yes
080	17/06/2005	pH Strips	6.5	Yes	8	Yes
081	20/06/2005	Strip 4.5 - 10.00	6.5	Yes	7.5	Yes
082	20/06/2005	Strips	6.5	Yes	7.5	Yes
083	21/06/2005	Paper	6.5	Yes	7.5	Yes
084	22/06/2005	pH strips	7.0	Yes	7.5	Yes
089	24/06/2005	pH Strips	6.5	Yes	7.5	Yes
131	29/06/2005	pH Strips	7	Yes	8	Yes
139	24/06/2005	pH Strips	6.5	Yes	7.5	Yes
140	21/06/2005	Merck Neutralit 5-10 Strips	5.5	No	6.5	No
142a	30/06/2005	Merk pH 0-14	6	Yes	7	Yes
144	21/06/2005	Merck Neutralit 5-10 strips	5	No	6	No
145	21/06/2005	Neutralit 5-10 Merck strips	5.5	No	6	No
146		Merck Neutralit strips 5-10	5.5	No	6	No
147	21/06/2005	Merck Neutralit pH 5-10	5.5	No	6	No
148	21/06/2005		5.5	No	6.5	No
150	24/06/2005	Strips	5.5	No	6.5	No
151	June	Merck strips	5.5	No	6	No
152	June	Strips	5.5	No	6.5	No

Code	Date	pH instrument	MS1 result	Met	MS 2 result	Met
153	28/06/2005	Merck Neutralit 5-10 (+-0.5)	5.5	No	6.5	No
154	June	Strips	5.5	No	6.5	No
156	23/06/2005	Merk pH 0-14 Indicator strips	6.5	Yes	6	No
157	26/06/2005	Merk pH 0-14	5.5	No	6	No
162	30/06/2005	M.N D-52348 DOREN Machery-Nagel	6	Yes	6	No
167	1/07/2005	Machery-Nagel Strips	7	Yes	8	Yes
168	1/07/2005	Machery-Nagel Indicator sticks	7	Yes	8	Yes

B Physico - chemical “Mystery Samples” results, all participants - pH meter

Code	Date	pH instrument	MS 1 result	Met	MS 2 result	Met
010	24/06/2005	EUTECH pH Scan 2	6.4	Yes	7.4	Yes
011a	24/06/2005	pH Scan 2 tester	5.6	No	7.2	Yes
011b	24/06/2005	EUTECH pH Scan 2	6.3	Yes	7.4	Yes
012	24/06/2005	EUTECH pH Scan 2	6.2	Yes	7.5	Yes
014	24/06/2005	EUTECH pH Scan 2	6.0	No	6.9	No
020	28/06/2005	EUTECH pH Scan 2	6.6	Yes	7.3	Yes
021a	17/06/2005	EUTECH pH Scan 2	6.6	Yes	7.4	Yes
021b	17/06/2005	EUTECH pH Scan 2	6.3	Yes	7.1	No
022a	20/06/2005	EUTECH pH Scan 2	6.6	Yes	7.5	Yes
022b	20/06/2005	EUTECH pH Scan 2	6.5	Yes	7.3	Yes
023a	20/06/2005	EUTECH pH Scan 2	6.9	No	7.4	Yes
023b	20/06/2005	EUTECH pH Scan 2	6.8	Yes	7.4	Yes
024a	20/06/2005	EUTECH pH Scan 2	6.5	Yes	7.4	Yes
024b	22/06/2005	HACH pH/Temp meter	6.4	Yes	7.3	Yes
025a	22/06/2005	EUTECH pH Scan 2	6.4	Yes	7.2	Yes
026a	20/06/2005	a pH Scan 1 green	6.2	Yes	7.3	Yes
026b	20/06/2005	pH Scan 1 red	6.4	Yes	7.3	Yes
026c	20/06/2005	pH Scan 2 blue	6.3	Yes	7.3	Yes
026d	20/06/2005	pH Scan 2 WP WW	6.4	Yes	7.3	Yes
026e	24/06/2005	pH Scan 2 WP YSC	6.6	Yes	7.3	Yes
027a	20/06/2005	pH Scan 2	6.4	Yes	7.4	Yes
027b	20/06/2005	pH Scan 2	6.5	Yes	7.7	Yes
027c	20/06/2005	pH Scan 2 WP	6.5	Yes	7.6	Yes
027d	20/06/2005	pH Scan 2	6.4	Yes	7.7	Yes
027e	25/06/2005	pH Scan 2 WP	6.4	Yes	7.2	Yes
028a	22/06/2005	pH Scan 2 WP	6.5	Yes	7.4	Yes

Code	Date	pH instrument	MS 1 result	Met	MS 2 result	Met
028b	22/06/2005	pH Scan 2 WP	6.4	Yes	7.4	Yes
029a	23/06/2005	pH Scan 2 WP	6.4	Yes	7.4	Yes
029b	23/06/2005	pH Scan 2WP	6.5	Yes	7.3	Yes
029c	23/06/2005	pH Scan 2 WP	6.2	Yes	7.4	Yes
030a	23/06/2005	pH Scan 2 WP	6.5	Yes	7.4	Yes
030b	24/06/2005	pH Scan 2 WP	6.3	Yes	7.3	Yes
031a	24/06/2005	pH Scan 2 WP	6.5	Yes	7.6	Yes
031b	24/06/2005	pH Scan 2 WP	6.3	Yes	7.6	Yes
032a	24/06/2005	pH Scan 2	6.4	Yes	7.2	Yes
032b	24/06/2005	pH Scan 2 WP	6.5	Yes	7.4	Yes
032c	24/06/2005	pH Scan 2	6.4	Yes	7.2	Yes
032d	25/06/2005	pH Scan 2 WP	6.3	Yes	7.2	Yes
033	21/06/2005	pH Scan 2	6.5	Yes	7.4	Yes
034a	21/06/2005	pH Scan 2	6.6	Yes	7.5	Yes
034b	23/06/2005	pH Scan 2	6.7	Yes	7.5	Yes
035	21/06/2005	pH Scan 2	6.6	Yes	7.3	Yes
036		pH Scan 2	7.2	No	7.8	Yes
037	23/06/2005	pH Scan 2	6.5	Yes	7.4	Yes
038	23/06/2005	pH Scan 2	6.4	Yes	7.6	Yes
039a	28/06/2005	pH Scan 2	6.6	Yes	7.3	Yes
039b	28/06/2005	pH Scan 2	6.7	Yes	7.3	Yes
039c	28/06/2005	pH Scan 2	6.5	Yes	7.2	Yes
040	23/06/2005	pH Scan 2	6.5	Yes	7.4	Yes
041	24/06/2005	EUTECH pH Scan 2 No. 5	6.6	Yes	7.3	Yes
044	27/06/2005	Combo High pH & EC 98130	6.7	Yes	7.2	Yes
045	27/06/2005	pH Scan 2	6.5	Yes	7.1	No
055	23/06/2005	(Duel) Hanna Probe	6.5	Yes	7.25	Yes
060c	16/06/2005	Aqua - Cond/pH TBS meter	6.28	Yes	7.12	No
062	20/06/2005	Hanna HI 8314 membrane pH meter	6.14	No	7.15	No

Code	Date	pH instrument	MS 1 result	Met	MS 2 result	Met
064	23/06/2005	Hanna HI 98127	6.0	No	7.4	Yes
066	23/06/2005	pH Scan 2	6.2	Yes	7.3	Yes
067	24/06/2005	WTW pH 315i	5.7	No	7.25	Yes
069	28/06/2005	WTW pH 315i	6.5	Yes	7.3	Yes
085	23/06/2005	Hanna pH EC HI98107	6.6	Yes	7.2	Yes
086	23/06/2005	pH Scan 2	6.6	Yes	7.4	Yes
087	23/06/2005	pHep by HANNA	6.5	Yes	7.6	Yes
090	17/06/2005	Hanna pH/EC/TDS no 145	6.87	No	7.87	No
091	17/06/2005	Hanna Combo meter H198130	6.98	No	7.8	Yes
092	20/06/2005	Hanna Combo	6.11	No	7.36	Yes
094a	21/06/2005	TDS MC81	6.3	Yes	7.35	Yes
094c	21/06/2005	Hanna Combo Low	6	No	7.2	Yes
095		WP 81 TPS pH-Cond-Salinity meter	6.42	Yes	7.38	Yes
096a	23/06/2005	EUTECH Waterproof pH Scan 2	6.5	Yes		
097			6.4	Yes	7.3	Yes
099		pH Scan 2	6.4	Yes	7.0	No
101	29/06/2005	Waterproof pH C/F Hanna HI 98127	6.7	Yes	7.3	Yes
102	27/06/2005	Hanna pH meter	6.0	No	7.3	Yes
103	27/06/2005	pHep by Hanna	6.3	Yes	7.0	No
105	21/06/2005	pH Scan 2	6.5	Yes		
106	21/06/2005	pHep	6.0	No	7.5	Yes
107	21/06/2005	pHep MP kit 02	6.5	Yes	7.5	Yes
108	21/06/2005	MP kit C	6.5	Yes	7.6	Yes
109	21/06/2005	pHep	6.6	Yes	8.0	No
110	21/06/2005	pHep by Hanna	6.5	Yes	7.7	Yes
112	21/06/2005	pHep	7.1	No	7.9	No
114		pHep by Hann	6.7	Yes	7.6	Yes

Code	Date	pH instrument	MS 1 result	Met	MS 2 result	Met
115			6.5	Yes	7.3	Yes
116	27/06/2005	pH/TDS Hanna pHep	6.3	Yes	7.4	Yes
117a	27/06/2005	Lamotte 266m Colorimeter	6.1	No	7.1	No
117b	27/06/2005	Hanna Combo pH & EC	6.5	Yes	7.5	Yes
119a	18/06/2005	pH Scan 2			7.3	Yes
120	22/06/2005	pH Scan 2	5.8	No	8.5	No
121	26/06/2005	La Motte Smart Colorimeter	6.3	Yes	7.4	Yes
122a	26/06/2005	pH Scan	6.1	No	7.8	Yes
122b	26/06/2005	pH Scan2	6.4	Yes	7.6	Yes
122c	25/06/2005	Smart	6.3	Yes	7.7	Yes
123a	22/06/2005	pH Scan	6.6	Yes	7.7	Yes
124	21/06/2005	pH Scan 2	6.5	Yes	7.3	Yes
125	22/06/2005	pH Scan 2 COY Y72922	6.6	Yes	7.6	Yes
127	23/06/2005	pH Scan 2	6.6	Yes	7.4	Yes
128	17/06/2005	pH Scan 2	6.9	No	7.4	Yes
129a	22/06/2005	pH Scan 2	6.3	Yes	7.3	Yes
129b	22/06/2005	pH Scan 2	6.5	Yes	7.4	Yes
130	21/06/2005	pH Scan 2	6.5	Yes	7.3	Yes
134	22/06/2005	meter pH Scan 2	6.5	Yes	7.3	Yes
139	24/06/2005	Vendart pH Scan 2	6.3	Yes	7.4	Yes
142b	30/06/2005	Hach Sencion 156 CAL: 15/6/05 Hanna Instruments pHep HI98127-	6.9	No	7.4	Yes
161	30/06/2005	HI98128	6	No		

C Physico – chemical “Mystery Sample” results, all participants – EC.

Code	Date	EC instrument	MS 1 result	Met	MS 2 result	Met
010	24/06/2005	EUTECH TD Scan 3 / EUTECH EC Scan High	440	Yes	2900	Yes
011a	24/06/2005	EC Scan	480	Yes		
011b	24/06/2005	EUTECH TD Scan 3 / EUTECH TD Scan High	460	Yes	2800	Yes
012	24/06/2005	EUTECH TD Scan 20	472	Yes	2440	No
014	24/06/2005	EUTECH TD Scan 20	429	Yes	2557	Yes
020	28/06/2005	EUTECH EC Scan Low (sample 1) EUTECH TD Scan 4 (sample 2)	460	Yes	2600	Yes
021a	17/06/2005	EUTECH TD Scan High	400	No	2800	Yes
021b	17/06/2005	EUTECH TD Scan High			2700	Yes
022a	20/06/2005	EUTECH EC Scan High	400	No	2700	Yes
022b	20/06/2005	EUTECH EC Scan High	500	Yes	2600	Yes
023a	20/06/2005	EUTECH EC Scan High	400	No	2900	Yes
023b	20/06/2005	EUTECH EC Scan High	400	No	2600	Yes
024a	20/06/2005	EUTECH EC Scan High	400	No	2700	Yes
024b	22/06/2005	EUTECH TD Scan 4	400	No	2700	Yes
025a	22/06/2005	EUTECH EC Scan Low	480	Yes	2760	Yes
026a	20/06/2005	TD Scan 4 green	500	Yes	2700	Yes
026b	20/06/2005	TD Scan 4 red	500	Yes	2800	Yes
026c	20/06/2005	TD Scan 4 yellow	500	Yes	2500	Yes
026d	20/06/2005	EC Scan Low	500	Yes		
026e	20/06/2005	TD Scan 4 WP YSC	500	Yes	2600	Yes
027a	20/06/2005	TD Scan 4	400	No	2600	Yes
027b	20/06/2005	EC Scan high WP	500	Yes	2700	Yes
027c	20/06/2005	EC Scan high	500	Yes	2700	Yes
027d	20/06/2005	EC Scan high	500	Yes	2700	Yes
027e	25/06/2005	EC Scan high	400	No	2700	Yes

Code	Date	EC instrument	MS 1 result	Met	MS 2 result	Met
028a	22/06/2005	EC Scan low	490	Yes		
028b	22/06/2005	EC Scan low	490	Yes		
029a	23/06/2005	EC Scan high	500	Yes	2800	Yes
029b	23/06/2005	EC Scan high	500	Yes	2800	Yes
029c	23/06/2005	TPS LC 81	470	Yes	2750	Yes
030a	23/06/2005	TD Scan 4	500	Yes	2700	Yes
030b	24/06/2005	EC Scan low	510	Yes		
031a	24/06/2005	EC Scan high	400	No	2800	Yes
031b	24/06/2005	TD Scan 20	465	Yes	2770	Yes
032a	24/06/2005	TD Scan 4	500	Yes	2700	Yes
032b	24/06/2005	EC Scan high	500	Yes	2700	Yes
032c	24/06/2005	EC Scan high	500	Yes	2800	Yes
032d	25/06/2005	EC Scan High	500	Yes	2700	Yes
033	21/06/2005	EC Scan low	500	Yes	2900	Yes
034a	21/06/2005	0 to 1990 μ S EC Scan low	480	Yes	3000	Yes
034b	23/06/2005	0 to 1990 μ S EC Scan low	500	Yes	2980	Yes
035	21/06/2005	EC Scan low	470	Yes	3040	Yes
036		EC Scan Low	500	Yes		
037	23/06/2005	EC Scan low	450	Yes	2600	Yes
038	23/06/2005	EC Scan low 0 to 1990 μ S	530	No	2920	Yes
039a	28/06/2005	EC Scan low 0 to 1990 μ S	510	Yes	OR	
039b	28/06/2005	EC Scan low	490	Yes	OOR	
039c	28/06/2005	EC Scan low	490	Yes	OR	
040	23/06/2005	EC Scan Low EC Scan High	470	Yes	2600	Yes
041	24/06/2005	Sample 1 - EUTECH TD Scan 3 Sample 2 - EUTECH EC Scan High (No. 6)	520	Yes	3000	Yes

Code	Date	EC instrument	MS 1 result	Met	MS 2 result	Met
039b	28/06/2005	EC Scan low	490	Yes	00R	
039c	28/06/2005	EC Scan low	490	Yes	OR	
040	23/06/2005	EC Scan Low EC Scan High	470	Yes	2600	Yes
041	24/06/2005	Sample 1 - EUTECH TD Scan 3 Sample 2 - EUTECH EC Scan High (No. 6)	520	Yes	3000	Yes
044	27/06/2005	Combo High pH & EC 98130	410	No	2600	Yes
045	27/06/2005	EC Scan low 0 to 1990 µS	480	Yes	2880	Yes
050	20/06/2005	Tracer	446	Yes	2480	No
051	24/06/2005	Tracer	445	Yes	2660	Yes
052	24/06/2005	Tracer	438	Yes	2590	Yes
053	24/06/2005	Tracer	452	Yes	2730	Yes
054	24/06/2005	Tracer	469	Yes	2710	Yes
055	23/06/2005	Tracer	450	Yes	2700	Yes
060a	20/06/2005	TD Scan 20 (No. 114)	465	Yes	2700	Yes
060c	16/06/2005	60a Aqua - Cond/pH TBS meter	480	Yes	2750	Yes
060d	16/06/2005	60b TD Scan 20	470	Yes	2700	Yes
062	20/06/05 EC Turb & pH 25/06/05 Ortho P	LaMotte Pocket tester TRACER handheld EC meter	462	Yes	2780	Yes
063a		JENCO Model 103 Digital Conductivity Meter	480	Yes	2710	Yes
063b		LaMotte Pocket Tester TRACER hand held EC meter	479	Yes	2740	Yes
064	23/06/2005	Hanna HI 98312	450	Yes	2610	Yes
065	24/06/2005	TRACER Pocket tester	425	Yes	2430	No
066	23/06/2005	Jenco Model 103	460	Yes	2600	Yes
060d	16/06/2005	60b TD Scan 20	470	Yes	2700	Yes

Code	Date	EC instrument	MS 1 result	Met	MS 2 result	Met
062	20/06/05 EC Turb & pH 25/06/05 Ortho P	LaMotte Pocket tester TRACER handheld EC meter	462	Yes	2780	Yes
063a		JENCO Model 103 Digital Conductivity Meter	480	Yes	2710	Yes
063b		LaMotte Pocket Tester TRACER hand held EC meter	479	Yes	2740	Yes
064	23/06/2005	Hanna HI 98312	450	Yes	2610	Yes
065	24/06/2005	TRACER Pocket tester	425	Yes	2430	No
066	23/06/2005	Jenco Model 103	460	Yes	2600	Yes
067	24/06/2005	TRACER Pocket Tester	468	Yes	2750	Yes
069	28/06/2005	WTW 315	467	Yes	2790	Yes
070	20/06/2005	ES Scan Low Microprocessor series	470	Yes	3600	No
071	20/06/2005	ES Scan Low Microprocessor series	480	Yes	3600	No
072	20/06/2005	EC Scan	460	Yes	3600	No
080	17/06/2005	TRACER	458	Yes	2500	Yes
081	20/06/2005	TD Scan 20	480	Yes	2670	Yes
082	20/06/2005	Tracer	408	No	2470	No
083	21/06/2005	TDS Scan 20 meter	445	Yes	2780	Yes
084	22/06/2005	TD Scan	464	Yes	2630	Yes
085	23/06/2005	Tracer Pocket Tester CE 103340	536	No	2640	Yes
086	23/06/2005	TD Scan 20	550	No	2700	Yes
087	23/06/2005	Tracer Pocket Tester	472	Yes	2655	Yes
088	23/06/2005	TD Scan	470	Yes	2750	Yes
089	24/06/2005	TD Scan 20	465	Yes	2630	Yes
090	17/06/2005	Hanna pH/EC/TDS no 145	450	Yes	2670	Yes
091	17/06/2005	Hanna Combo meter H198130	440	Yes	2670	Yes
092	20/06/2005	Hanna Combo High Range	490	Yes	2720	Yes
094	20/06/2005		457	Yes	2900	Yes
094a	21/06/2005	TPS MC 81	410	No	2460	No

Code	Date	EC instrument	MS 1 result	Met	MS 2 result	Met
094b	21/06/2005	EC Scan 1 High	400	No	2610	Yes
094c	21/06/2005	TD Scan 20	470	Yes	2590	Yes
094d	21/06/2005	EC Scan 2 High	400	No	2400	No
094e	21/06/2005	Hanna Combo Low	446	Yes	2630	Yes
095		WP 81 TPS pH-Cond-Salinity meter	455	Yes	2730	Yes
096a	23/06/2005	Eutech TD Scan 20	480	Yes		
097			469	Yes	2693	Yes
098a		TD Scan 20	420	Yes	2500	Yes
098b	21/06/2005	TD Scan 20	410	No	2700	Yes
099		EC Scan High	500	Yes	2800	Yes
101	29/06/2005	EUTECH EC Scan high	500	Yes	2900	Yes
102	27/06/2005	EC Scan high	500	Yes	2900	Yes
103	27/06/2005	EC Scan 0 to 19.90 mS	500	Yes	3000	Yes
105	21/06/2005	WTW Multiline P4	461	Yes	2750	Yes
106	21/06/2005	EC Scan high	460	Yes	2600	Yes
107	21/06/2005	EC Scan high MP kit 02	400	No	2900	Yes
108	21/06/2005	MP kit C	500	Yes	3200	No
109	21/06/2005	EC Scan high	600	No	3200	No
110	21/06/2005	EC Scan high	500	Yes	2800	Yes
112	21/06/2005	EC Scan high	400	No	2800	Yes
114		EC Scan high	500	Yes	2700	Yes
115			500	Yes	2600	Yes
116	27/06/2005	Eutech (EC Scan low)	480	Yes	2840	Yes
117a	27/06/2005	TD Scan 4	600	No	2900	Yes
117b	27/06/2005	Hanna Combo pH & EC	444	Yes	2401	No

Code	Date	EC instrument	MS 1 result	Met	MS 2 result	Met
119a	18/06/2005	EC Scan lo	440	Yes	2700	Yes
120	22/06/2005	EC Scan lo	430	Yes	2600	Yes
121	26/06/2005	EUTECH TD Scan 20	452	Yes	2640	Yes
122a	26/06/2005	EC ScanLo	460	Yes	3000	Yes
122b	26/06/2005	TDSscan3	470	Yes	2700	Yes
122c	25/06/2005	EC Scan Lo	480	Yes	2780	Yes
123	20/06/2005	EC low meter 0-1990 μ S/cm	460	Yes	Or no reading	
123a	22/06/2005	TD Scan 4 (VZ2922) TD Scan 3	500	Yes	2700	Yes
123b	22/06/2005	TD Scan 4 (VZ2922) TD Scan 3	480	Yes		
124	21/06/2005	TD Scan 3 low reading	460	Yes	Over range	
125	22/06/2005	TD Scan 4 COY V72922	450	Yes	2800	Yes
127	23/06/2005	TD Scan 3	460	Yes	Over range	
128	17/06/2005	TD Scan 4 Moreland kit	400	No	2700	Yes
129a	22/06/2005	TD Scan 4 0-19.90 mS	450	Yes	2700	Yes
129b	22/06/2005	TD Scan 3	470	Yes	Over range	
130	21/06/2005	EC Scan high 0-	400	No	2700	Yes
130	21/06/2005	TD Scan 3	440	Yes		
131	29/06/2005	TD Scan 2 old type	600	No	2900	Yes
134	22/06/2005	EC Scan high 0 to 19.90 mS	400	No	2700	Yes
139	24/06/2005	Vendart EC Scan high	400	No	2700	Yes
140	21/06/2005	TD Scan 20 Glenelg Waterwatch	473	Yes	2680	Yes
142a	30/06/2005	Eutech EC Scan High 0 - 19.90	500	Yes	2800	Yes
142b	30/06/2005	Hach Senscion 156 CAL: 15/6/05	465	Yes	2740	Yes
144	21/06/2005	TD Scan 20	468	Yes	2640	Yes
145	21/06/2005	Hanna dis T 6 EC meter G12	520	Yes	2910	Yes
146		Hanna dis T 6 EC meter	470	Yes	2780	Yes
147	21/06/2005	TD Scan 20 Port b	466	Yes	2820	Yes

Code	Date	EC instrument	MS 1 result	Met	MS 2 result	Met
148	21/06/2005	EC Scan high	500	Yes	2900	Yes
150	24/06/2005	E Scantow (200ec) 1430 (old cal.)	490	Yes	2840	Yes
151	June	EC Scan high	400	No	2700	Yes
152	June	TD Scan 20	455	Yes	2790	Yes
153	28/06/2005	TD Scan 20	450	Yes	2800	Yes
154	June	TD Scan 3	400	No	2800	Yes
156	23/06/2005	EUTECH EC Scan high 0-19.90mS	500	Yes	2800	Yes
157	26/06/2005	EUTECH low range EC Scan high. Low range sample 1, high range sample 2.	480	Yes	2800	Yes
161	30/06/2005	EUTECH Instruments EC Scan 0- 1990uS	370	No		
162	30/06/2005	TD Scan 20	455	Yes	2650	Yes
167	1/07/2005	Waterproof EC Scan High range	500	Yes	2900	Yes
168	1/07/2005	Eutech Waterproof EC Scan High	500	Yes	2900	Yes

D Physico - chemical “Mystery Sample” results, all participants - turbidity tube.

Code	Date	Turbidity instrument	MS 1 result	Met	MS 2 result	Met
010	24/06/2005	Turbidity tube	40	No	150	No
011a	24/06/2005	Tube	17	No	65.7	Yes
011b	24/06/2005	Turbidity tube	37	No	120	No
012	24/06/2005	Turbidity tube	22	Yes	40	No
014	24/06/2005	Turbidity tube	25	Yes	80	Yes
020	28/06/2005	Tube	32	No	88	Yes
021a	17/06/2005	Tube	31	No	92	Yes
021b	17/06/2005	Tube	40	No	100	Yes
022a	20/06/2005	Tube	22	Yes	64	Yes
022b	20/06/2005	Tube	33	No	91	Yes
023a	20/06/2005	Tube	25	Yes	85	Yes
023b	20/06/2005	Tube	33	No	85	Yes
024a	20/06/2005	Tube	33	No	75	Yes
024b	22/06/2005	Tube	27	Yes	90	Yes
025a	22/06/2005	Tube	32	No	64	Yes
027b	20/06/2005	Tube	38	No		
027c	20/06/2005	Tube			100	Yes
027d	20/06/2005	Tube	38	No	100	Yes
027e	25/06/2005	Tube	40	No	150	No
028a	22/06/2005	Tube	32	No	90	Yes
029a	23/06/2005	Tube	33	No	95	Yes
029b	23/06/2005	Tube	40	No	100	Yes
029c	23/06/2005	Tube	24	Yes	57	No
030a	23/06/2005	Tube	35	No	100	Yes
030b	24/06/2005	Tube	32	No	80	Yes
031a	24/06/2005	Tube	35	No	100	Yes

Code	Date	Turbidity instrument	MS 1 result	Met	MS 2 result	Met
032a	24/06/2005	Tube	34	No	90	Yes
032b	24/06/2005	Tube	33	No	88	Yes
032c	24/06/2005	Tube	33	No	125	No
032d	25/06/2005	Tube	30	Yes	90	Yes
033	21/06/2005	Tube	125	No	300	No
034a	21/06/2005	Tube	25	Yes	70	Yes
034b	23/06/2005	Tube	30	Yes	80	Yes
035	21/06/2005	Tube	23	Yes	70	Yes
036		Turbidity tube	35	No	87	Yes
037	23/06/2005	Tube	25	Yes	70	Yes
038	23/06/2005	Tube	31	No	60	Yes
039a	28/06/2005	Tube	60	No	175	No
039b	28/06/2005	Tube	70	No	200	No
039c	28/06/2005	Tube	80	No	65	Yes
040	23/06/2005	Tube	25	Yes	75	Yes
041	24/06/2005	Turbidity Tube	20	Yes	70	Yes
044	27/06/2005	Tube	40	No	100	Yes
045	27/06/2005	Tube	40	No	100	Yes
050	20/06/2005	Tube	30	Yes	80	Yes
051	24/06/2005	Tube	25	Yes	80	Yes
052	24/06/2005	Tube	25	Yes	78	Yes
053	24/06/2005	Tube	25	Yes	80	Yes
054	24/06/2005	Tube	20	Yes	55	No
055	23/06/2005	Tube	20	Yes	80	Yes
060a	20/06/2005	Tube	28	Yes	82	Yes
060b	20/06/2005	Tube	29	Yes	85	Yes
061a		Tube	36	No	84	Yes

Code	Date	Turbidity instrument	MS 1 result	Met	MS 2 result	Met
063a		Tube	22	Yes	66	Yes
063b		Tube	25	Yes	70	Yes
064	23/06/2005	Turbidity tube C/O Kirsten	27	Yes	70	Yes
065	24/06/2005	Turbidity tube	27	Yes	80	Yes
066	23/06/2005	Turbidity Tube	27.5	Yes	80	Yes
070	20/06/2005	Turbidity Tube	26	Yes	75	Yes
071	20/06/2005	Turbidity Tube	26	Yes	75	Yes
072	20/06/2005	Tube	25	Yes	78	Yes
080	17/06/2005	WW Tube	30	Yes	90	Yes
082	20/06/2005	Tube	35	No	105	No
083	21/06/2005	Tube	19	No	68	Yes
084	22/06/2005	Tube	22	Yes	67	Yes
085	23/06/2005	Tube	30	Yes	90	Yes
086	23/06/2005	Tube	28	Yes	70	Yes
087	23/06/2005	Tube	27	Yes	80	Yes
089	24/06/2005	Tube	29	Yes	87	Yes
091	17/06/2005	Turb Tube	35	No	100	Yes
092	20/06/2005	Turbidity tube	20	Yes	70	Yes
094	20/06/2005	Tube	28	Yes	88	Yes
094a&b	21/06/2005	Tube	35	No	95	Yes
096a	23/06/2005	Turbidity Tube	25	Yes	60	Yes
097		Tube	31	No	90	Yes
098a		Tube			80	Yes
098b	21/06/2005	Tube	21	Yes	60	Yes
099		Turbidity tube	25	Yes	70	Yes
101	29/06/2005	NTU Tube	31	No	90	Yes

Code	Date	Turbidity instrument	MS 1 result	Met	MS 2 result	Met
102	27/06/2005	Turbidity tube	34	No	79	Yes
103	27/06/2005	Tube	38.3	No	76.6	Yes
105	21/06/2005	Tube (MCME's)	20	Yes	60	Yes
106	21/06/2005	Tube	21	Yes	65	Yes
107	21/06/2005	NTUS tube	33	No	60	Yes
109	21/06/2005	Tube	10	No	10	No
110	21/06/2005	Tube	32	No	80	Yes
112	21/06/2005	Tube	27	Yes	62	Yes
114		Turbidity tube	3.1	No	8	No
115		Tube	35	No	85	Yes
116	27/06/2005	Turbidity tube	27	Yes	70	Yes
117b	27/06/2005	Tube	26	Yes	68	Yes
118a	17/06/2005	Tube	30	Yes	80	Yes
118b	17/06/2005	Tube	28	Yes	80	Yes
118c	17/06/2005	Tube	30	Yes	85	Yes
118d	17/06/2005	Tube	26	Yes	80	Yes
118e	17/06/2005	Tube	30	Yes	80	Yes
119a	18/06//2005	Tube	24.2	Yes	79.3	Yes
120	22/06/2005	Tube	28	Yes	80	Yes
122a	26/06/2005	Tube	34	No	100	Yes
123a&b	22/06/2005	Turbidity tube	30	Yes	80	Yes
124	21/06/2005	Turbidity Tube	30	Yes	60	Yes
125	22/06/2005	Turbidity Tube	30	Yes	80	Yes
126	23/06/2005	Turbidity Tube	30	Yes	80	Yes
127	23/06/2005	Turbidity tube	30	Yes	60	Yes

Code	Date	Turbidity instrument	MS 1 result	Met	MS 2 result	Met
128	17/06/2005	Turbidity tube (new)	30	Yes	80	Yes
129a	22/06/2005	Turbidity tube	30	Yes	80	Yes
129b	22/06/2005	Turbidity tube	20	Yes	60	Yes
130	21/06/2005	Tube	30	Yes	100	Yes
134	22/06/2005	Tube	30	Yes	90	Yes
139	24/06/2005	Turbidity tube No 22	40	No	100	Yes
142a	30/06/2005	Turbidity tube	20	Yes	80	Yes
144	21/06/2005	Tube	31	No	75	Yes
145	21/06/2005	Tube	35	No	100	Yes
146		Tube	24	Yes	88	Yes
147	21/06/2005	Tube	25	Yes	75	Yes
148	21/06/2005	Turbidity tube	25	Yes	83	Yes
150	24/06/2005	Tube	20	Yes	60	Yes
151	June	Tube	40	No	100	Yes
152	June	NTU Tube	50	No	150	No
153	28/06/2005	Tube	30	Yes	100	Yes
154	June	Tube	40	No	60	Yes
156	23/06/2005	Turbidity tube	30	Yes	80	Yes
157	26/06/2005	Turbidity tube	20	Yes	60	Yes
161	30/06/2005	Turbidity tube	32	No	80	Yes
162	30/06/2005	Tube	23	Yes	70	Yes
167	1/07/2005	Turbidity tube	30	No	100	Yes
168	1/07/2005	Tube	30	Yes	100	Yes

E Physico-chemical “Mystery Sample” results, all participant results - Turbidity meter.

Code	Date	Turb instrument	MS 1 result	Met	MS2 result	Met
060c	16/06/2005	Hach 2100P Turbid Meter	28	Yes	87	Yes
062	20/06/05 EC Turb & pH 25/06/05 Ortho P	Merck Turbiquant 1000 IR Turbidity Meter	25.09	Yes	81	Yes
066	23/06/2005	2100 Turbidimeter	25	Yes	84	Yes
067	24/06/2005	Hach Turbidimeter	27	Yes	83.9	Yes
069	28/06/2005	HACH 2100P	25.8	Yes	83.7	Yes
080	17/06/2005	Turbiquant 1000	26.5	Yes	82	Yes
081	20/06/2005	Turbiquant 1001R	26.2	Yes	82	Yes
090	17/06/2005	Merck Turbiquant 10001R	25	Yes	80	Yes
095		Hach 2100 P Turbidimeter	24	Yes	80	Yes
102	27/06/2005	Smart 2 Colorimeter	23	Yes	79	Yes
117a	27/06/2005	Lamotte Smart 26617 Colorimeter	7	No	5	No
119a	18/06/2005	DC 1600	24.2	Yes	79.3	Yes
121	26/06/2005	LaMotte Smart Colorimeter	33	No	71	Yes
122b	26/06/2005	Smart	22	Yes	69	Yes
122c	25/06/2005	Smart	25	Yes	65	Yes
131	29/06/2005	DR 890 Colorimeter	16	No	89	Yes
140	21/06/2005	Eutech TN - 100/ T-100 Portable meter	22.5	Yes	73.4	Yes

F Physico-chemical “Mystery Samples” results, all participants - Orthophosphate comparator.

Code	Date	Equipment Type	MS 1 result	Met	MS 2 result	Met
010	24/06/2005	Visocolor HE Phosphat test 0.01 - 0.25 mg/LP	0.05	No	0.25	Yes
011a	24/06/2005	Visocolor HE Phosphat Test (DEV)	0.15	No	0.25	Yes
011b	24/06/2005	Visocolor HE 0.01 - 0.25 mg/LP	0.07	Yes	0.25	Yes
012	24/06/2005	Visocolor HE 0.01 - 0.25	0.07	Yes	0.25	Yes
014	24/06/2005	Visocolor HE 0.01 - 0.25	0.15	No	0.25	Yes
020	28/06/2005	Macherey- Nagez Visocolor	0.1	Yes	0.25	Yes
020	28/06/2005	Orthophosphate Kit PO-19	0.06	No	0.2	Yes
021a	17/06/2005	Macherey-Nagel Viocolor	0.1	Yes	0.25	Yes
021b	17/06/2005	Macherey-Nagel Viocolor	0.1	Yes	0.25	Yes
022a	20/06/2005	Macherey-Nagel Viocolor	0.07	Yes	0.2	Yes
022b	20/06/2005	Macherey-Nagel Viocolor	0.1	Yes	0.25	Yes
023a	20/06/2005	Macherey-Nagel Viocolor	0.1	Yes	0.25	Yes
023b	20/06/2005	Macherey-Nagel Viocolor	0.1	Yes	0.2	Yes
024a	20/06/2005	Macherey-Nagel Viocolor	0.1	Yes	0.25	Yes
025a	22/06/2005	Macherey-Nagel Viocolor	0.1	Yes	0.2	Yes
029b	23/06/2005	Visocolour	0.1	Yes	0.25	Yes
029c	23/06/2005	Visocolour	0.1	Yes	0.25	Yes
030b	24/06/2005	Visocolour	0.07	Yes	0.2	Yes
031a	24/06/2005	Visocolour	0.01	No	0.1	No
032d	25/06/2005	Visocolor	0.1	Yes	0.25	Yes
033	21/06/2005	Visocolou HE 0.01-0.25mg/L	0.1	Yes	0.25	Yes
034a	21/06/2005	Visocolor HE (DEV*) 0.01 - 0.25 mg/LP	0.125	No	0.25	Yes
034b	23/06/2005	Visocolour HE 0.01 - 0.25 mg/L	0.1	Yes	0.25	Yes
035	21/06/2005	Visocolour Phosphate test	0.095	Yes	0.25	Yes
036		HE Visicolor 0.01 - 0.25 mg/L P	0.03	No	0.2	Yes

Code	Date	Equipment Type	MS 1 result	Met	MS 2 result	Met
037	23/06/2005	HE Visicolor 0.01 - 0.25mg/L P	0.07	Yes	0.15	No
038	23/06/2005	Visocolour HE Phosphate (DEV)	0.1	Yes	0.2	Yes
039a	28/06/2005	HE Visicolor 0.01 - 0.25mg/L P			0.2	Yes
039b	28/06/2005	HE Visicolor 0.01 - 0.25mg/L P			0.2	Yes
039c	28/06/2005	HE Visicolor 0.01 - 0.25mg/L P			0.2	Yes
040	23/06/2005	Visocolor HE 0.01 - 0.25 mg/LP	0.1	Yes	0.25	Yes
041	24/06/2005	Visocolor HE Phosphat Test (DEV)	0.1	Yes	0.25	Yes
044	27/06/2005	Visocolor 0.01 - 0.25	0.07	Yes	0.2	Yes
045	27/06/2005	Visocolor 0.01 - 0.25mg/L P	0.07	Yes	0.2	Yes
050	20/06/2005	Visocolor HE Low range	0.06	No	0.175	No
051	24/06/2005	Visocolor	0.03	No	0.25	Yes
052	24/06/2005	Visocolor	0.05	No	0.1	No
053	24/06/2005	Visocolor	0.1	Yes	0.25	Yes
054	24/06/2005	Visocolor Low range	0.07	Yes	0.25	Yes
055	23/06/2005	Visocolor HE	0.05	No	0.25	Yes
061a		Merck Aquaquant kit range 0.015 - 0.14 mg/L P	0.08	Yes	0.22	Yes
062	25/06/05	Merk Aquaquant 1.14445.0001 Phosphate Test Colorimetric PMP Ortho P				
065	24/06/2005	0.015-0.04 mg/L P Test Kit	0.11	No	0.22	Yes
066	24/06/2005	Merk 1.14445.0001 Phosphate test	0.06	No	0.22	Yes
066	23/06/2005	Aqua Merk	0.08	Yes	0.5	No
066	23/06/2005	Aqua quant	0.08	Yes	0.27	Yes
070	20/06/2005	P Merck Colorimetric PMB	0.08	Yes	0.3	No
071	20/06/2005	P Merck Colorimetric PMB	0.08	Yes	0.3	No
072	20/06/2005	Visocolor	0.085	Yes	0.25	Yes
080	17/06/2005	Merk kit	0.08	Yes	0.22	Yes

Code	Date	Equipment Type	MS 1 result	Met	MS 2 result	Met
081	20/06/2005	Merck	0.08	Yes	0.22	Yes
082	20/06/2005	Merck kit	0.08	Yes	0.28	Yes
083	21/06/2005	Merck	0.11	No	0.28	Yes
084	22/06/2005	Merck kit	0.08	Yes	0.28	Yes
085	23/06/2005	Merck Phosphat test OC239740	0.045	No	0.22	Yes
086	23/06/2005	Merck kit	0.06	No	0.22	Yes
087	23/06/2005	merk kit	0.08	Yes	0.22	Yes
089	24/06/2005	Merck kit	0.08	Yes	0.28	Yes
090	17/06/2005	Merck Aquaquant	0.11	No	0.28	Yes
091	17/06/2005	Merck Aquaquant kit	0.05	No	0.24	Yes
092	20/06/2005	Merck aququant low range kit	0.08	Yes	0.22	Yes
094	20/06/2005		0.08	Yes	0.28	Yes
094a	21/06/2005	Merck low	0.08	Yes	0.2	Yes
096a	23/06/2005	Merck Aquaquant lit	0.08	Yes		
097			0.08	Yes	0.22	Yes
098a		Merk low range			0.22	Yes
098b	21/06/2005	Waterwatch Phosphorus Test kit	0.08	Yes		
099		Merck Phosphate Colour Comparator	0.015	No	0.14	No
101	29/06/2005	2.9	0.07	Yes	0.15	No
103	27/06/2005	Visocolor HE Phosphate	0.05	No	0.1	No
106	21/06/2005	Visocolor comparison kit	0.1	Yes	0.2	Yes
107	21/06/2005	Visocolor HE 08 2005 - 0137 MP kit 02	0.1	Yes	0.25	Yes
108	21/06/2005	MP kit C	0.1	Yes	0.25	Yes
109	21/06/2005	Visocolor HE Colour comparison kit			0.25	Yes
110	21/06/2005	Visocolor wheel	0.1	Yes	0.2	Yes
112	21/06/2005	Visocolor comparison wheel	0.1	Yes	0.2	Yes
114		Visocolor Phosphate test (DEV)	0.1	Yes		
115			0.03	No	0.25	Yes

Code	Date	Equipment Type	MS 1 result	Met	MS 2 result	Met
116	27/06/2005	Visicolor colour comparator	0.06	No	0.2	Yes
123	20/06/2005	Visicolor HE Phosphate (DEV) 0.01-0.25 mg/L P	0.02	No	0.01	No
130	21/06/2005	Merck Aquaquant	0.08	Yes	0.22	Yes
134	22/06/2005	Merck aquaquant	0.08	Yes	0.22	Yes
139	24/06/2005	Merck Aquaquant	0.08	Yes	0.225	Yes
140	21/06/2005	Merck Aquaquant Low Range	0.08	Yes	0.28	Yes
142a	30/06/2005	Merk 0.015 - 0.14 1.14445 - 00001 low range kit	0.08	Yes		
145	21/06/2005	Merck Aquaquant Low range	0.08	Yes	0.22	Yes
146		Merck Aquaquant Low range	0.11	No	0.28	Yes
147	21/06/2005	Merck Aquaquant Low range	0.06	No	0.28	Yes
148	21/06/2005	Aquaquant Merck Phosphate test	0.08	Yes	0.22	Yes
150	24/06/2005	Merck Exp: 11/06	0.08	Yes	0.24	Yes
151	June	Merck Aquaquant	0.08	Yes		
152	June	Merck Aquaquant	0.08	Yes	0.24	Yes
153	28/06/2005	Merck Aquaquant1:14445.0001	0.08	Yes	0.22	Yes
154	June	Merck Aquaquant	0.08	Yes	0.18	No
156	23/06/2005	Merk 0.015-0.14 1.14445.0001 Low range kit	0.08	Yes		
157	26/06/2005	Merk 0.015-0.14 1.14445.0001 Low range	0.08	Yes		
161	30/06/2005	Machery-Nager 0.01-0.25mg/LP	0.03	No	0.1	No
162	30/06/2005	M.N D-52313 DUREN	0.1	Yes	0.3	No
167	1/07/2005	Machery-Nagel Phosphate test 0.01-0.25	0.02	No	0.25	Yes
168	1/07/2005	Machery-Nagel Phosphate test 0.01-0.25 mg/L P	0.05	No	0.25	Yes

G Physico-chemical “Mystery Samples” results, all participants - Orthophosphate colorimeter.

Code	Date	Reactive-P instrument	MS 1 result	Met	MS 2 result	Met
066	23/06/2005	DR 700	0.08	Yes	0.24	Yes
069	28/06/2005	HACH DR 700	0.075	Yes	0.27	Yes
095		Hach 2000 Direct Reading Speetrophob meter	0.07	Yes	0.22	Yes
119a	18/06/2005	DC 1600	0.078	Yes	0.11	No
120	22/06/2005	Smart 2	0.078	Yes	0.21	Yes
121	26/06/2005	LaMotte Smart Colorimeter	0.07	Yes	0.21	Yes
122b	26/06/2005	Smart	0.086	Yes	0.22	Yes
122c	25/06/2005	Smart	0.164	No	0.231	Yes
129a	22/06/2005	LaMotte Smart Colorimeter	0.0913	Yes	0.1891	No
129b	22/06/2005	LaMotte Smart Colorimeter test 33-phosphate L	0.068	Yes	0.2	Yes
131	29/06/2005	DR 890 Colorimeter	0.11	No	0.25	Yes

H Physico - chemical comments.

Code	Date	Waterwatcher comments
010	24/06/2005	
011b	24/06/2005	
020	28/06/2005	NB. Two tests completed for Ortho-Phosphate, as suggested
026a-c	20/06/2005	
026d-e	20/06/2005	
032d	25/06/2005	Kit 30 Ortho Phosphorus at 17.3C after >24 hrs to come to room temperature this was all it reached. ie below range of > 18C for this kit
040	23/06/2005	pH & EC Scans calibrated prior to testing
041	24/06/2005	
044	27/06/2005	
055	23/06/2005	
060c&d	16/06/2005	EC meter calibrated on day of testing using 1413 us/cm standards. pH meter calibrated just prior to testing using pH 7 and pH 4 standard. Aqua meter 2 yrs old, TD scan - 7 years old.
062	20/06/05 EC Turb & pH 25/06/05 Ortho P	For Ortho P sample No 2, Diluted 10mL sample to 10mL deionised H2O (1:1), getting 0.11mg/L P. Multiplied by factor of 2 to get 0.22 mg/L P. pH meter calibrated to buffer 4 & buffer 7 on 20/06/05. EC meter calibrated to EC standard 1413uS/cm on 20/06/05. Turbidity meter calibrated to 4 formazin standards on 20/06/05.
064	23/06/2005	Both meters calibrated prior to tests conducted. Meters also cleaned in water prior to each sample being tested.
066	23/06/2005	Recent employment as Waterwatch (Drainwatch) Facilitator. Additional Turbidity Tube training completed in this session. Note: present system for Drainwatch phosphorus monitoring is with the aqua merck solution. Colour match using the chart is open to variation due to the drain water samples having high turbidity in the range 100-400 NTU and other contaminants
067	24/06/2005	
069	28/06/2005	
070	20/06/2005	Calibration done with standard solution 1413uS. Sample 2: phosphorus diluted 10:100 (1:10). Sample 2: EC diluted 1:10
071	20/06/2005	Sample 2 phosphorus diluted 10:100 (1:10). Sample 2 EC diluted 1:10 10:100
072	20/06/2005	Diluted EC sample 2 x10 2nd Ortho was last reading on kit, but pretty close
080	17/06/2005	
081	20/06/2005	MS 2 Diluted x2
089	24/06/2005	
090	17/06/2005	Diluted sample 2 Ortho P 1:1

Code	Date	Waterwatcher comments
091	17/06/2005	Diluted PO4 sample 2 2:1
092	20/06/2005	Ortho P 1:1 dilution = 0.11x2 Hi Sara, We have no working low range meters at the moment, that is why I have used high range for both EC values. We keep having problems with these meters.
094a&b	21/06/2005	
094c,d&e	21/06/2005	
095		
105	21/06/2005	pH scan suspect
122b	26/06/2005	EC sample 2 required 1:2 dilution. Both pH and EC probes had new probe ends and batteries. New glass vials used. EC, pH and phosphate results were averages of duplicates.
123a&b	22/06/2005	pH calibrated at 7.0 *(reading unstable). EC calibrated at 1410uS
130	21/06/2005	Ortho P dilution 1:1 0.11 mg P/L x dilution factor = 0.11x2. We usually use a HACH DR890 Colorimeter to measure P, DO and turbidity...But it is being serviced at present. My initial readings for turbidity was a range - I hadn't read the instructions properly - so I redid it and chose the best match.
131	29/06/2005	Calibrated EC meter with 2000EC standard. Tested orthophosphate stds 0.02mg/L std read 0.04mg/L. 0.30mg/L std read 0.34mg/L
134	22/06/2005	Ortho P sample 2 diluted 1:1. Reading given as 0.11 multiplied by 2 = 0.22
139	24/06/2005	All scans calibrated using correct technique. Mystery sample 2 (ortho phosphorus) diluted 1:5 then multiplied by 5. Turbidity readings were all done outside.
140	21/06/2005	Phosphorus solution just out of the range.
142a	30/06/2005	
142b	30/06/2005	
168	1/07/2005	Water temp 12.2 sample 1. Water temp 12.7 sample 2. ortho-phosphorus in low range-colour variation very difficult to read due to completely different blues.
011a	24/06/2005	Ortho P: not perfect match. Difficult to decide between 0.10 & 0.15.
012	24/06/2005	
014	24/06/2005	
021a	17/06/2005	
021b	17/06/2005	
022a	20/06/2005	
022b	20/06/2005	
023a	20/06/2005	
023b	20/06/2005	

Code	Date	Waterwatcher comments
024a	20/06/2005	
024b	22/06/2005	
025a	22/06/2005	EC sample 2 - dilution
027a	20/06/2005	Equipment: Jeparit PS
027b	20/06/2005	Sample 2 Ph done before Sample 1 Equipment: Jeparit Waterwatch
027c	20/06/2005	Equipment: Kit 32 Ophos kit tested by J.Clark with Kit 30. Sample 2 pH done before Sample 1
027d	20/06/2005	Equipment: Kit 33 Sample 2 pH done before Sample 1
027e	25/06/2005	Equipment: Kit 30
028a	22/06/2005	Equipment: Kit 27
028b	22/06/2005	Equipment: Kit 31
029a	23/06/2005	Equipment: 26
029b	23/06/2005	Ortho P-after 6 hrs still 16C ie. below range>18C. Kit 29
029c	23/06/2005	Ortho P-after 6 hrs still 16C ie. below range>18C. Kit 26
030a	23/06/2005	Equipment: Walkers kit
030b	24/06/2005	Ortho P after bottles being left out for >24 hrs, temp still only 14C, ie below range of kit Equipment: Kit 28
031b	24/06/2005	Equipment: BPS nb. EC-pH sample at room temperature = 11C. Sample 2 pH done before sample 1
032a	24/06/2005	Equipment: Antwerp L/C
032b	24/06/2005	Equipment: Kit 34
032c	24/06/2005	Equipment: Kit 35
033	21/06/2005	EC & pH meters calibrated before tests
034a	21/06/2005	Calibrated equipment 21/6/05. EC set at 1.41, pH set at 7.0. EC Sample 2 diluted by 1/2, eg 20 ml sample, 20 ml distilled water. Turbidity till "just see point.
034b	23/06/2005	Turbidity depends on eyesight. Equip. Calibrated. Dilution by half for EC
035	21/06/2005	pH meter battery may soon need replacing. pH & EC meters calibrated prior to testing
036		
037	23/06/2005	EC sample 2 dilution of 1 in 2

Code	Date	Waterwatcher comments
038	23/06/2005	Turbidity taken until can't distinguish 'waves' separately, rather than when they begin to get fuzzy.
039a	28/06/2005	
039b	28/06/2005	Turbidity always very subjective
039c	28/06/2005	Equipment: 19
045	27/06/2005	Equipment: Kit 11 EC sample 2 cut once
050	20/06/2005	Old PO4 colour wheel
051	24/06/2005	
052	24/06/2005	
053	24/06/2005	
054	24/06/2005	
060a	20/06/2005	EC meter has played up in the past, has new batteries & was calibrated on morning of test. Monitor has not used the tube for a few months as they have had no water to test!
060b	20/06/2005	Retired long term monitor
061a		Ortho P dilution x 2. $0.11 \text{ mg l} \times 2 = 0.22$. Monitor does not normally see turbidity readings higher than 10, so may struggle at higher readings. Also don't normally have much phosphorus in samples.
063b		EC meter calibrated to EC standard 1413 us/cm on 22/6/05. This was the first time this monitor had ever used a turbidity tube, but he is about to get one of his own to use, so we put him to the test.
064	23/06/2005	Both meters calibrated prior to tests conducted. Meters also cleaned in water prior to each sample being tested.
065	24/06/2005	Ortho P calculated from 1:2 dilution
082	20/06/2005	
083	21/06/2005	
084	22/06/2005	
085	23/06/2005	
086	23/06/2005	
087	23/06/2005	Ortho P: 2×0.110
088	23/06/2005	
094	20/06/2005	$0.14 \times 2 = 0.28$
096a	23/06/2005	Sample 1 turbidity - used all that was in the sample bottle. EC meter sometimes won't zero, reads 10. Did read 0 on this occasion.
097		

	Date	Waterwatcher comments
098a		
098b	21/06/2005	
099		
101	29/06/2005	EC Meter will not calibrate using the +inc-dec buttons ERR comes up. Calibrate solution 1413uS. Amy 97852007. Do not have OAL solution 12880uS.
102	27/06/2005	
103	27/06/2005	
106	21/06/2005	Anja-new monitor- has done 3-5 testing sessions in field.
107	21/06/2005	New monitor, has done 3-5 sessions in field only.
108	21/06/2005	
109	21/06/2005	New monitors 2-3 sessions
110	21/06/2005	New Group - basic level 1 only 2-3 tests done in field. Sample 1 -phosphorus 0.10 was closest colour match but not exactly the same colour.
112	21/06/2005	New monitor (1-2 tests done in field so far).
114		New group -only monitored 2-3 times as yet!
115		
116	27/06/2005	New group-just starting out.
117a	27/06/2005	
117b	27/06/2005	New group
118a	17/06/2005	
118b	17/06/2005	
118c	17/06/2005	
118d	17/06/2005	

Code	Date	Waterwatcher comments
109	21/06/2005	New monitors 2-3 sessions
110	21/06/2005	New Group - basic level 1 only 2-3 tests done in field. Sample 1 -phosphorus 0.10 was closest colour match but not exactly the same colour.
112	21/06/2005	New monitor (1-2 tests done in field so far).
114		New group -only monitored 2-3 times as yet!
115		
116	27/06/2005	New group-just starting out.
117a	27/06/2005	
117b	27/06/2005	New group
118a	17/06/2005	
118b	17/06/2005	
118c	17/06/2005	
118d	17/06/2005	
118e	17/06/2005	
119a	18/06/2005	Battery for pH meter is showing low but no spare batteries. Sample two for conductivity needed to be diluted 1:2 to get reading in range
120	22/06/2005	pH Scan 2 was calibrated using pH 7 & 10 solutions
121	26/06/2005	
122a	26/06/2005	LaMotte MC1600 fried - batteries put in wrong way and burnt relay.
122c	25/06/2005	EC sample 2 required 1:2 dilution
123	20/06/2005	Equipment not regularly calibrated. Phosphorus was out of data - very suspect!

Code	Date	Waterwatcher comments
124	21/06/2005	
125	22/06/2005	EC measured using TD Scan 4 (0-19.90mS)
126	23/06/2005	
127	23/06/2005	
128	17/06/2005	Both equipment were calibrated pH read 6.9 then 7. EC read 1.3 then
129a	22/06/2005	EC meter calibrated from 1.30-1.40.
129b	22/06/2005	pH meter calibrated 22/6/05 8pm. TD Scan 3 calibrated 22/6/05 8.10pm, the reading while calibrating was unstable. The instruction sheet for the orthophosphate measurement was missing-from memory I still did the measurement as follows: measured sample blank (10mL), added 1mL of phosphate acid reagent, capped and mixed, added 0.1g of phosphate reducing agent (using spoon), capped and mixed until dissolved, waited about 5 minutes then took sample measurement.
144	21/06/2005	Tested turbidity INSIDE under florescent lights, may not have mixed/shaken turbidity solution adequately. This monitor teste "a" sample for P which was NOT the P solution. Sorry
145	21/06/2005	
146		
147	21/06/2005	Came out of fridge, had to warm up water. 2nd phosphorus test was off the chart0-tested again diluting the sample. This is our first time we've done the dilutions.
148	21/06/2005	
150	24/06/2005	Diluted EC & Phos samples by 1/2 & 1/4 respectively in order to take measurements
151	June	Calibrated at 3000 EC using 2765 μ S/cm
152	June	Calibrated using 1413 μ S/cm. 25% dilution of sample 2 phosphorus.
153	28/06/2005	TD Scan 20 calibrated at 280 with 2765 μ S/cm std. P Sample 2 5.00 mL by syringe diluted to mark.
154	June	
156	23/06/2005	
157	26/06/2005	
161	30/06/2005	
162	30/06/2005	
167	1/07/2005	Phosphorus was difficult to read.

I Macroinvertebrate “Mystery Samples” results.

QA/QC Code	Sample Number	Macroinvertebrate 1			Macroinvertebrate 2			Macroinvertebrate 3		
		Order	Family	Common Name	Order	Family	Common Name	Order	Family	Common Name
		Diptera	Chironominae	Non-biting midge	Ephemeroptera	Caenidae	Mayfly	Trichoptera	Leptoceridae	Caddisfly
Coordinators										
010	Jun-05	Y	Y	Bloodworm	Y	Y	Y	Y	Y	Y
011	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
020	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
32d	Jun-05	Y	Y	Y	Plecoptera	Notonemouridae	Stonefly Nymph	Y	Y	Y
040	Jun-05	Y	Y	Y	Y	Leptophlebiidae	Y	Y	Hydrobiosidae	Y
041	Jun-05	Y	Y	Y	Y	Leptophlebiidae	Y	Y	Y	Y
044	Jun-05	Y	N	True Flies				Y	N	Y
055	Jun-05	Y	Y	Bloodworm	Y	Y	Y	Y	Y	Y
060c&d	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
062	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
067	Jun-05	Y	Y	Y				Y	Y	Y
070	Jun-05				Y	Baetidae	Y	Y	Y	Y
071	Jun-05				Y	Baetidae	Y	Y	Y	Y
072	Jun-05				Y	Baetidae	Y	Y	Y	Y
080	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
089	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
081	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y

QA/QC Code	Sample Number	Macroinvertebrate 1			Macroinvertebrate 2			Macroinvertebrate 3		
		Order	Family	Common Name	Order	Family	Common Name	Order	Family	Common Name
		Diptera	Chironominae	Non-biting midge	Ephemeroptera	Caenidae	Mayfly	Trichoptera	Leptoceridae	Caddisfly
090	Jun-05	Y	Y	Y	Y	Baetidae	Y	Y	Y	Y
091	Jun-05							Y	Calocid/Helicop hid	Y
092	Jun-05	Y	Y	Y	Y	Leptophlebiidae	Y	Y	Calocid/Helicop hid	Y
093	Jun-05							Y	Calocid/Helicop hid	Y
094a	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
105	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
122b	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
123	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
124	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
130	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
131	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
134	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
139	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
140	Jun-05	Y	Y	Y	Y	Oniscigastridae	Y	Y		Y

QA/QC Code	Sample Number	Macroinvertebrate 1			Macroinvertebrate 2			Macroinvertebrate 3		
		Order	Family	Common Name	Order	Family	Common Name	Order	Family	Common Name
		Diptera	Chironominae	Non - biting midge	Ephemeroptera	Caenidae	Mayfly	Trichoptera	Leptoceridae	Caddisfly
141	Jun-05				Y	Leptophlebiidae	Y	Y	Y	Y
142	Jun-05				Y	Leptophlebiidae	Y	Y	Y	Y
Monitors										
021c	Jun-05				Y	Leptophlebiidae	Y	Y	Y	Y
021d	Jun-05				Y	Leptophlebiidae	Y	Y	Y	Y
021e	Jun-05	Y	Y	Y	Y	N	Y	Y	Y	Y
021f	Jun-05	Y	N	Y	Y	N	Y	Y	N	Y
021g	Jun-05	Y	N	Y	Y	N	Y	Y	N	Y
021h	Jun-05	Y	N	Y	Y	N	Y	Y	N	Y
027e	Jun-05	True flies	Y	Bloodworm	Notonemouridae	Austrocerca	Stonefly Nymph	N	Y	Y
061	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
065	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
083	Jun-05	Y	Y	Y	Y	Isostictidae	Y	Y	Y	Y
96a	Jun-05				Y	Y	Y	Y	Calocidae/Helicophidae	Y

QA/QC Code	Sample Number	Macroinvertebrate 1			Macroinvertebrate 2			Macroinvertebrate 3		
		Order	Family	Common Name	Order	Family	Common Name	Order	Family	Common Name
		Diptera	Chironominae	Non - biting midge	Ephemeroptera	Caenidae	Mayfly	Trichoptera	Leptoceridae	Caddisfly
101	Jun-05	Y	Ceratogoedae	Y	Y	Leptophlebiidan	Y	Y	Y	Y
102	Jun-05	Y	Y	Y				Y	Y	Y
103	Jun-05	Y	Ceratopoginidae	Y	Y	Leptophlebiidae	Y	Y	Y	Y
106	Jun-05	N	Nematode	Worm-like				Y	N	Y
107	Jun-05	Y	Y	N	Y	N	Y	Y	N	Y
108	Jun-05	Y	N	Mosquito larvae				Y	N	Y
109	Jun-05							Y	N	Y
110	Jun-05	Y	Ceratopogonidae	midge larvae				Y	Y	Y
112	Jun-05	N	N	Mosquito larvae				N	N	Y
113	Jun-05	Y	N	Midge				Y	N	Y
114	Jun-05							Y	Y	Y
115	Jun-05				Y	N	Y	Y	Y	Y
116	Jun-05							N	N	Y
117a	Jun-05							Y	Y	Y
117b	Jun-05							Y	Y	Y

QA/QC Code	Sample Number	Macroinvertebrate 1			Macroinvertebrate 2			Macroinvertebrate 3		
		Order	Family	Common Name	Order	Family	Common Name	Order	Family	Common Name
		Diptera	Chironominae	Non - biting midge	Ephemeroptera	Caenidae	Mayfly	Trichoptera	Leptoceridae	Caddisfly
118a	Jun-05	Y	Y	True Flies	Y	N	N	Y	Y	Y
119b	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
118e	Jun-05	Y	Y	Y	Y	N	N	Y	Y	Y
121	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
122a	Jun-05	Y	Y	Y				Y	Y	Y
122c	Jun-05				Y	Y	Y	Y	Y	Y
124	Jun-05							Y	Stem case	Y
125	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
128	Jun-05				N	N	Y			
129a	Jun-05	Y	Y	Y	Y	Baetidae	Y	Y	Y	Y
129b	Jun-05	Y	Y	Y	Y	Baetidae	Y	Y	Y	Y

QA/QC Code	Sample Number	Macroinvertebrate 4			Macroinvertebrate 5			Macroinvertebrate 6		
		Order	Family	Common Name	Order	Family	Common Name	Order	Family	Common Name
		Decapoda	Atyidae	Shrimp	Hemiptera	Notonectidae	Back Swimmer	Coleoptera	Dytiscidae	Diving Beetle
Coordinators										
010	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
011	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
020	Jun-05	Y	Y	Y	Y	Corixidae	Water Boatman	Y	Y	Y
32d	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
040	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
041	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
044	Jun-05	Y	N	Y	N	N	Y	Y	N	Y
055	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
060c&d	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
062	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
067	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
070	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
071	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
072	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
080	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
089	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
081	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	beetle

QA/QC Code	Sample Number	Macroinvertebrate 4			Macroinvertebrate 5			Macroinvertebrate 6		
		Order	Family	Common Name	Order	Family	Common Name	Order	Family	Common Name
		Decapoda	Atyidae	Shrimp	Hemiptera	Notonectidae	Back Swimmer	Coleoptera	Dytiscidae	Diving Beetle
090	Jun-05	Y	Y	Y	Y	Corixidae	Water boatman	Y	Y	Y
091	Jun-05	Amphipoda	Talitridae	Y	Y	Y	Y	Hemiptera	Corixidae	Water Boatman
092	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
093	Jun-05	Amphipoda	Talitridae	Y	Y	Y	Y	Hemiptera	Corixidae	Water Boatman
094a	Jun-05	Y	Y	Y	Y	Y	Y	Y	Hydrophilidae	Scavenger Water Beetle
105	Jun-05	Y	Y	Y	Y	Y	Y	Y	Haliplidae	Crawling Water Beetle
122b	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
123	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
124	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
130	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
131	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
134	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
139	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
140	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y

QA/QC Code	Sample Number	Macroinvertebrate 4			Macroinvertebrate 5			Macroinvertebrate 6		
		Order	Family	Common Name	Order	Family	Common Name	Order	Family	Common Name
		Decapoda	Atyidae	Shrimp	Hemiptera	Notonectidae	Back Swimmer	Coleoptera	Dytiscidae	Diving Beetle
141	Jun-05	Y	Y	Y	Y	Corixidae	Water boatman	Y	Y	Y
142	Jun-05	Y	Y	Y	Y			Y	Y	Y
Monitors										
021c	Jun-05	Y	Y	Y	Y	Corixidae	Water boatman			
021d	Jun-05	Y	Y	Y	Y	Corixidae	Water boatman			
021e	Jun-05	Y	Y	Y						
021f	Jun-05	Y	Y	Y	Y	Y	Water boatman	Y	Y	Y
021g	Jun-05	Y	Y	Y	Y	Y	Water boatman	Y	Y	Y
021h	Jun-05	Y	Y	Y	Y	Y	Water boatman	Y	Y	Y
027e	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
061	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
065	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
083	Jun-05	Y	Palaemonidae/Atyidae	Y	Y	Y	Y	Y	Y	Y
96a	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y

QA/QC Code	Sample Number	Macroinvertebrate 4			Macroinvertebrate 5			Macroinvertebrate 6		
		Order	Family	Common Name	Order	Family	Common Name	Order	Family	Common Name
		Decapoda	Atyidae	Shrimp	Hemiptera	Notonectidae	Back Swimmer	Coleoptera	Dytiscidae	Diving Beetle
101	Jun-05	Y	Y	Y	Y	Y	Y	Y	Corixidae	Beetle
102	Jun-05	Y	Y	Y	Y	Y	Y	Y	N	Beetle
103	Jun-05	Y	Y	Y	Y	Corixidae	Aquatic Bugs	Y	Y	Beetle
106	Jun-05	N	Y	Y	N	Y	Y	N	N	Beetle
107	Jun-05	Y	N	Y	Y	N	Y	Y	N	Beetle
108	Jun-05	Y	N	Y	Y	N	Y	Hemiptera	N	Water Boatman
109	Jun-05	Y	N	Y				Y	N	Y
110	Jun-05	Y	N	Y	Coleoptera	N	Water scavenger	Y	N	Y
112	Jun-05	N	N	Y	N	N	Y	N	N	Boatman
113	Jun-05	Y	N	Y	Y	N	Y	Y	N	Beetle
114	Jun-05	Amphipoda	Paracalliopiidae	Side Swimmer	Y	Corixidae	Water Boatman	Y	Y	Y
115	Jun-05	Y	Y	Y	Y	N	Y	Y	Y	Y
116	Jun-05	Y	Y	Y				N	N	Beetle
117a	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
117b	Jun-05	Y	Y	Y	Y	N	Y			

QA/QC Code	Sample Number	Macroinvertebrate 4			Macroinvertebrate 5			Macroinvertebrate 6		
		Order	Family	Common Name	Order	Family	Common Name	Order	Family	Common Name
		Decapoda	Atyidae	Shrimp	Hemiptera	Notonectidae	Back Swimmer	Coleoptera	Dytiscidae	Diving Beetle
118a	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Beetle
119b	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
118e	Jun-05	Y	Y	Y	Y	Y	Y	Y	N	Beetle
121	Jun-05	Y	Y	Y	Y	Y	Y	Y	Halipidae	Crawling Water Beetle
122a	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
122c	Jun-05	Y	Y	Y	Y	Corixidae	Water Boatman	Isopoda	Janiridae	Freshwater slater
124	Jun-05	N	Anostraca	Y	N	Corixidae	Water Boatman	Y	Y	Y
125	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
128	Jun-05	N	N	Y						
129a	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y
129b	Jun-05	Y	Y	Y	Y	Y	Y	Y	Y	Y

J Methods, comments and references used in macroinvertebrate identification.

QA/QC Code	Reference Code	ID Method	Comments
Coordinators			
010	2,3	microscope, eye	
011b	1,2,3	microscope	
020	2,3,4,5	microscope, eye	
32d	1,2,4	microscope, eye, hand lens	Atyidae: No pincers on 2nd set of front legs = not prawn. Leptoceridae: alternating b/w stripes in a twig = Triplectides genus. Necterosma genus. Anisops genus. Chironomidae: very small. See through, smooth thin. Caenidae: too tiny. Max size 2mm! Not visible to eye as more than blob. Can't distinguish shape or legs with hand lens still too small but a pointed end, 6 legs, no antennae, large rounded head on side add 2 tail extensions. Note: Supplementary sheet: Plecoptera: Under 100x magnification 1.5mm . Only 1 antennae and it was folded under the body-hence confusion with diving beetle larvae under hand lens.
040		eye	Trichoptera: Specimen did not come out of case easily and was badly damaged.
041		eye	
044		eye	
055	1	hand lens	Atyidae: Tasty. Leptoceridae: Hard to get out of case!! Not as tasty. Caenidae: Tiny! I hope they were gill covers. Very hard to key out without microscope. This was hard without a microscope (for the beetle mostly, rest were ok.
060c&d	1,3	microscope	Caenidae: enlarged gill square shape on abdominal 2 segment. Chironomidae: paired sclerotised head capsule. Leptoceridae: couldn't find antennae.
062	1,2,3	AIS Optical Stereo Microscope WF 10x20 eyepieces	Atyidae: Signal grade 3 - used colour web Guide. Notonectidae: Signal Grade 1 - used colour web guide. Caenidae: Signal Grade 4 - used colour web guide. Dytiscidae: used the Waterbug book for ID. Leptoceridae: Signal grade 6 - used colour web guide. Chironomidae: Used the Waterbug book for ID.
067	3,5	microscope	
070		eye	Ephemeroptera: Difficult to identify
071		eye, hand lens	
072		eye	
080		microscope	
081		microscope, eye	
089		microscope	
090	1	microscope	

QA/QC Code	Reference Code	ID Method	Comments
091	1,2	microscope	
092		microscope, eye	
093	1,2		
094a		microscope	
105	1,5	microscope, eye	Atyidae: I didn't know they went white when dead.
122b	1,2	eye, handlens	Caenidae: What's the size? I can barely see it? Dytiscidae: F. Haliplidae?
123	1		Caenidae: nymph. Dytiscidae: adult. Chironomidae: family, Chironominae - subfamily. This was missing from or lost from my sample. I took and cross referenced to others. Springtail also present in sample Isopoda-Collembola (class). Primary microscope. 123-129.
124		microscope	
130	1,2,3	microscope, eye	Leptoceridae: maybe genus triplectides. Caenidae: Very tiny animal. Mouth parts and gills hard to see.
131	1,2,3	microscope, eye	Caenidae: Very small & difficult to id.
134	2,3	microscope, eye	Caenidae: ID was difficult specimen too small
139	1,2,3	microscope	
140	2	microscope	Dytiscidae: no swimming hairs. Trichoptera: sample got too dry & brittle to get out of case. Shall continue to key out next week-ran out of time.
141	1,2	microscope	Leptoceridae: Back end missing..
142	1,2	microscope	
Monitors			
021c	4,5	microscope, eye, hand lens	Atyidae: easy to identify. Ephemeroptera: body twisted, possibly 1 tail broken. Hemiptera: easy to identify.
021d	1,4,5,6	microscope, eye, hand lens	Hemiptera: a little hard because of colour deterioration. Ephemeroptera: possible broken tail. Inability to see legs.
021e	4	microscope, eye, hand lens	Atyidae: easy to identify. Ephemeroptera: was hard to identify coz didn't know if had wings.
021f		microscope, eye, hand lens	
021g	5	microscope, eye	
021h	5	microscope, eye	

QA/QC Code	Reference Code	ID Method	Comments
027e	2	microscope, eye, hand lens	Id'd by eye from own knowledge as common name, worked back on Col 2-4 from common names using hawking and Smith. Altered after use of 100x microscope. Nb. Age 9-first time looking at Latin names and trying to copy them. "Stonefly" original "eye" id damsefly nymph. Chironomidae: original "eye" id midge larvae.
061	1,2,4	microscope	viewed under lit microscope
065		microscope	crustacea cladocera Daphniidae waterflea-badly damaged?was this one of the mystery bugs?
083		microscope	
96a	1	microscope	No 6th sample?
101		eye	
102	4		
103	4	eye, hand lens	
106		eye	New group. Coolart Blue kit.
107		eye	Balnarring Wetlands Bluekit.
108		eye, hand lens	New Group
109		eye, hand lens	New Group. Manton & Stony Creek Blue kit.
110			New Group. We had 2 of these (Trichoptera).
112		microscope, eye	New Group. Shrimp: x 3, 5. Backswimmer: x 3, 4. Caddisfly: x 3, 7. Boatman: x 3, 4. Mosquito larvae: x 3, 2. Balcombe Ck (MEAFEC)
113		eye, hand lens	New monitor (macros only @ this stage. Not competent enough to do phys/chem QA/QC this year yet! Balcombe Creek = "Briars Park". Colorimeter kit Smart II
114		hand lens	Dytiscidae: maybe a small whirlygig? Difficulty with smaller specimens needed microscope and more directional light.
115	1	hand lens	We only had 5 beasties in our bottle. 97736521.
116		microscope	
117a	2		Notonectidae: Anisops

QA/QC Code	Reference Code	ID Method	Comments
117b		microscope, eye	New group
118a	1	hand lens	Dytiscidae: Maybe Haliplidae - need stronger lens. Microscope needed due to sample being so small.
119b	1	eye, hand lens	Atyidae: looks like a female with eggs. Leptoceridae: use part of reed as case.
118e	1,2	eye, had lens	Ephemeroptera: microscope needed due to sample being so small.
121	3	hand lens	Chironomidae: Sub family Orthoclaadiinae
122a	1	eye, hand lens	Monitors names: Su Dempsey, Elaine, Anne Payne, Annette Pohlmann. No 6th bug in vial.
122c		eye, hand lens	Monitors names: Barry Robinson, Tanya Haynes-Ford and Jack Luke. 6th bug not found.
124		microscope, eye	Trichoptera:Triplectides
125	1	microscope	Chironomidae: larva. Leptoceridae: larva. Diving beetle: adult. Caenidae: nymph.
128			
129a		microscope	
129b		eye, hand lens	Some identification tricky without microscope

Reference Key
1 The Waterbug Book, Tsyrlin & Gooderham.
2 Colour guide to Invertebrates of Australian Inland Waters, Hawking & Smith.
3 Colour Web guide, Hawkins.
4 Know Your Beasties, Waterwatch.
5 Freshwater Invertebrates, Ralph Miller.
6 Wimmera Community Waterwatch field guide.