

AFFCO NEW ZEALAND - RANGIURU

Pathogen Survey Report

Te Puke, Bay of Plenty

FINAL

Prepared for AFFCO New Zealand Limited

November 2019

AFFCO NEW ZEALAND LIMITED – RANGIURU

Pathogen Survey Report

Te Puke, Bay of Plenty

FINAL

Prepared for



By

argoenvironmental

May 2017

argoenvironmental

DOCUMENT REVISION SCHEDULE

Revision Status / Number	Revision Date	Description of Revision	Approved By
Rev0	May 2017	Final Draft	Luke Gowing (Director)
Rev1	November 2019	Final	Garry Venus (Director)

Statement of Limitations

This report is not to be used for purposes other than those for which it was intended.

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Environmental conditions change with time. Argo Environmental Ltd do not imply that the site conditions described in this report are representative of past or future conditions.

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Where this report is to be made available, either in part or in its entirety, to a third party, Argo Environmental Ltd reserve the right to review the information and documentation contained in the report and revisit and update findings, conclusions and recommendations.

ARGO ENVIRONMENTAL LIMITED

Auckland Office

Level 2, 10 O'Connell Street, Auckland Central, New Zealand

P.O. Box 105774, Auckland 1143, New Zealand

Tel +64 9 367 0631, Email: admin@argoenv.com.

EXECUTIVE SUMMARY

AFFCO New Zealand Limited operates a meat processing facility at Rangiuru in the Bay of Plenty. The facility discharges treated wastewater to the Kaituna River. AFFCO holds a consent relating to the wastewater discharge pursuant to Consent 02 4932 which is currently undergoing renewal.

Conventionally faecal coliforms and *E coli* present in the discharge are used as indicators of the possible presence of pathogenic bacteria. AFFCO consider that rather than rely on indicator species, a better approach is to verify whether pathogenic organisms are present in the treated wastewater to determine the level of risk to River users.

This report presents the results of an investigation of the key pathogenic organisms associated with the wastewater discharged by AFFCO Rangiuru to the Kaituna River from February 2014 to March 2017.

Pathogens in the untreated effluent are detectable in some cases, but are mainly present at very low concentrations. Treatment further reduces these pathogen levels to such low levels that the risk to water users is assessed as no more than minor, in light of the data collected, interpolated with the results of a mixing investigation in March 2019 and information obtained in respect of downstream recreational water use.

CONTENTS

1.	Introduction	1
2.	Methodology.....	1
3.	Results	1
4.	Discussion & Conclusions	5

APPENDICES

Appendix A	Eurofin ELS Laboratory Data
Appendix B	ESR Laboratory Data
Appendix C	Massey University Laboratory Data

1. Introduction

AFFCO Rangiuru is applying to renew their resource consents for the discharge of treated wastewater to the Kaituna River.

Conventionally faecal coliforms and *E coli* present in the discharge are used as indicators of the possible presence of pathogenic bacteria. Sampling conducted at other AFFCO treated wastewater discharges indicates that key pathogens are at levels too low to pose a risk to human health. AFFCO consider that rather than rely on faecal coliform and *E coli* as indicators, a better approach is to verify whether pathogenic organisms are present in the treated wastewater to determine the level of risk to River users.

This report presents the results of an investigation of the key pathogenic organisms associated with the wastewater discharged by AFFCO Rangiuru to the Kaituna River from February 2014 to March 2017.

2. Methodology

Table 2-1 summarises the sampling parameters and laboratories used to analyse the various key microbiological parameters. Samples of pre and post treatment effluent were collected on a quarterly basis. A range of other water quality variables were also collected at the time of pathogen sample collection.

Sampling protocols (including sample storage and transport procedures) provided by each laboratory (ELS, ESR and Massey University) followed for sample collection are provided in Appendix A. Following collection all samples were kept cool and prior to couriering placed in chillybins provided with frozen gel pads.

Table 2-2 presents a summary of the sampling programme undertaken including date and sample type collected.

Table 2-1: Laboratory, bottle type and parameters sampled

Type	Laboratory	Bottle Type	Parameter
1	ELS	100ml plastic bottle	Faecal Coliforms / <i>E coli</i> / Salmonella / Campylobacter
2	ESR	250ml glass bottle	Yersinia / <i>E coli</i> (O157)
3	Massey	5L plastic bottle	Giardia / Cryptosporidium

3. Results

Table 3-1 summarises the results for the 2014-2017 survey. The key points to note are:

- Pre and post treatment faecal coliform concentrations range from 8,730 to 208,000,000 cfu/100mL and 96 to 7,180 cfu/100mL respectively.
- Pre and post treatment *E. coli* concentrations range from 7,700 to >16,000,000,000 cfu/100mL to 64 to 7,200 cfu/100mL respectively.
- Pre-treatment campylobacter concentrations range from <2 to >1,600 MPN/100mL. Post-treatment concentrations are typically below detection limits of the analysis (i.e., <1 or <2 MPN/100mL in 12 of the 18 samples). Concentrations above detection are low ranging from 2 to 23 MPN/100mL. Subsequent serotyping of positive results identified primarily *Campylobacter coli* and *C. Lari*, which are known to be less infectious to humans. The

more thermotolerant species *Campylobacter jejuni* was identified in two of the samples (Table 3-2).

- Pre-treatment *Salmonella* concentrations range from 2 to >1,600 MPN/100mL. Post treatment concentrations range from <2 to 2 MPN/100L.
- Pre-treatment *Giardia* concentrations range from <1 to 15 / 5 or 10L. Post treatment concentrations range from <1 to 12 / 5 or 10L. Subsequent infectivity assays of the oocysts where isolated were found to be non-infectious.
- Pre-treatment *Cryptosporidium* concentrations range from <1 to 6 / 5 or 10L. Post treatment concentrations range from <1 to 4 / 5 or 10L. Subsequent infectivity assays on the oocysts where isolated were found to be non-infectious.
- *E. coli* (0157) were not isolated in either pre or post treatment samples in the majority of samples except for the last sampling round on January 2016 where it was isolated and detected in the pre-treatment sample only but not the post treatment sample.
- *Yersinia* sp. were isolated in most of the pre-treatment samples and a three post treatment samples (February 2015, February 2016 and September 2016) where the non – virulent strain *Yersinia enterocolitica* was detected. It could not be isolated by culture.

Table 2-2: Sampling programme

Type	1	2	3	Field parameters
20-02-14	✓	✓	✓	✓
14-05-14	Discharge only	Discharge only	Discharge only	✓
13-08-14	✓	✓	✓	✓
12-11-14	✓	✓	✓	✓
04-02-15	✓	✓	✓	✓
19-05-15	✓	✓	✓	✓
06-08-15	✓	✓	✓	✓
11-11-15	✓	✓	✓	✓
22-12-15	✓	✓	✓	✓
13-01-16	✓	✓	✓	✓
15-02-16	✓	✓	✓	✓
22-03-16	✓	✓	✓	✓
16-06-16	✓	✓	✓	✓
23-09-16	✓	✓	✓	✓
19-12-16	✓	✓	✓	✓
11-01-17	✓	✓	✓	✓
23-02-17	✓	✓	✓	✓
31-03-17	✓	✓	✓	✓

Table 3-1: Sampling results

Type	Date	Faecal Coliforms (cfu/100mL)	<i>E. coli</i> (cfu/100mL)	Campylobacter (MPN / 100mL)	Salmonella (MPN / L)	Giardia (# / 5 or 10L)	<i>Cryptosporidium</i> (# / 5 or 10L)	<i>Yersinia</i> sp. (CFU / 100 mL)	<i>E.coli</i> (0157) (CFU / 100 mL)
Pre-treatment	20/02/14	98,000,000	>16,000,000,000	<2	4.5	<1	2 ¹ /	DET	NI
	14/05/14	-	-	-	-	-	-	-	-
	13/08/14	208,000,000	210,000,000	>1600	3.7	<1	<1 ¹	ND	NI
	12/11/14	13,800,000	4,800,000	17	23	<1	4 ²	ND	NI
	04/02/15	188,000,000	190,000,000	48	50	<1	2 ¹	DET	NI
	19/05/15	8730	7700	<2	2	<1	2 ¹	ND	NI
	06/08/15	28,000,000	28,000,000	>1600	500	<1	3 ¹	DET	NI
	11/11/15	27,000,000	27,000,000	350	900	<1	2 ¹	ND	NI
	22/12/15	23,000,000	23,000,000	240	48	4 ¹	<1	DET	NI
	13/01/16	683,000,000	680,000,000	12	>1600	8 ¹	6 ¹	DET	DET
	15/02/16	22,000,000	22,000,000	6	<2	2	2 ¹	DET	NI
	22/03/16	16,000,000	16,000,000	>1600	170	5	4	DET	NI
	16/06/16	<4	<4	2	<2	4/	<2	ND	NI
	23/09/16	15,000,000	5,300,000	>1600	>1600	4 ¹ /	6 ¹	DET	NI
	19/12/16	119,000,000	10,000,000	<2	2.00	6 ¹	4 ¹	DET	NI
	11/01/17	29,000,000	26,000,000	540	33	4 ¹	<1	DET	NI
	23/02/17	93,000,000	71,000,000	-	-	15 ¹	<1	DET	NI
	31/03/17	2,300,000	1,500,000	<2	7.8	8 ¹	<1	DET	NI
Post-treatment	20/02/14	670	200	<2	<2	<1	<1 ¹	ND	NI
	14/05/14	350	320	<2	<2	<1	4 ¹	ND	NI
	13/08/14	7,180	7,200	8	<2	3	<1 ¹	ND	NI
	12/11/14	110	64	<2	<2	1	2 ¹	ND	NI
	04/02/15	230	230	<2	<2	<1	2 ¹	DET	NI

	19/05/15	96	96	<2	<2	<1	<1 ¹	ND	NI
	06/08/15	110	73	<2	2	<1	<1 ¹	ND	NI
	11/11/15	280	280	23	<2	<1	<1	ND	NI
	22/12/15	110	110	7.8	<2	21	<1	ND	NI
	13/01/16	300	100	2	<2	21	4 ¹	ND	NI
	15/02/16	290	290	<2	<2	<1	2 ¹	DET	NI
	22/03/16	130	120	8	<2	4	2	ND	NI
	16/06/16	350	350	<1	<2	<1	<2	ND	NI
	23/09/16	2,000	1,000	<2	<2	2 ¹	2 ¹	DET	NI
	19/12/16	<100	<100	<2	<2	3 ¹	<1	ND	NI
	11/01/17	160	140	<2	<2	2 ¹	2 ¹	ND	NI
	23/02/17	640	400	-	-	12 ¹	<1	ND	NI
	31/03/17	100	100	<2	<2	<1	<1	ND	NI

Notes: ¹Isolated oocysts found to be non-infectious. ²Isolated oocysts found to be infectious. NI / ND= Not isolated / Detected. DET = Detected but not isolated by culture. – no analysis undertaken. ³Viable.

Table 3-2: Type of Campylobacter species where presence detected

Date	Campylobacter Species
13/08/14	<i>C. jejuni</i> & <i>C. lari</i>
11/11/15	<i>C. jejuni</i> & <i>C. coli</i>
22/12/15	<i>C. coli</i> & <i>C. lari</i>
22/03/16	<i>C. lari</i>

4. Discussion & Conclusions

Analysis of the effluent pre and post treatment indicates a greater than 99% reduction in median faecal coliform and *E. coli* concentrations for samples collected at sites located before and after wastewater treatment.

Pathogens in the untreated effluent are detectable in some cases, but are mainly present at very low concentrations. Treatment further reduces these pathogen levels to such low levels that the risk to water users is assessed as no more than minor, in light of data collected to date, interpolated with the results of a mixing investigation in March 2019¹ and information obtained in respect of downstream recreational water use.

The March 2019 mixing studies indicate that full mixing occurs before 300 m downstream from the discharge point, and at that point the likely dilution ratio is estimated at 2,500:1. Accordingly, the likely fully mixed pathogen concentrations at that point are likely to be as indicated in Table 4-1 not allowing for bacterial die-off in the river.

Table 4-1: Indicative “fully –mixed” pathogen concentrations

Determinand	Wastewater Concentration (maximum recorded)	In-river after mixing (potential infective)
<i>Campylobacter</i> (per /100 mL)	23	0.009
<i>Salmonella</i> (per /100 mL)	2	0.0008
<i>Giardia</i> (per 5L)	12 ¹	0.005
<i>Cryptosporidium</i> (per 5L)	4 ¹	0.0016
<i>E coli</i> (0157) (per /100 mL)	0	0
<i>Yersinia</i> sp. (per /100 mL)	0 ¹	0

Notes: ¹ Subsequent infectivity assays on the oocysts where isolated were found to be non-infectious.

These concentrations are extremely low, particularly in comparison with recognised infectious dose information for various known pathogens. Literature indicates that the median infectious dose (“ID50”) for some *Salmonella* serovars (particularly *Enteritidis* and *Typhimurium*) can be in the range of 100 – 1000^{2,3}. Likewise the median infectious dose for *Campylobacter* is about 900⁴. However, for children it may be considerably lower. A 2005 examination of two outbreaks among children visiting farms and drinking raw (unpasteurised) milk indicates that the median infectious dose (for illness) is less than 5⁵.

At the recreational swimming point 1,500 m downstream from the discharge close to the confluence with the Pakipaki Stream, it would require ingestion of more than 5 litres of water by a susceptible person to achieve the indicated infectious dose even for the most infective bacterium. This is clearly unrealistic. It is therefore concluded that the public health risk associated with pathogens from AFFCO Rangioru is no more than minor.

¹ Argo 2019. Kaituna River Dilution Survey. Report prepared for AFFCO New Zealand Limited – Rangioru. August 2019.

² Bollaerts, K.; Aerts, M.; Faes, C.; Grijspeerdt, K.; Dewulf, J.; Mintiens, K. (2008). Human salmonellosis: estimation of dose-illness from outbreak data. *Risk Analysis* 28(2): 427–440.

³ Bambi, D.; McBride, G.; Miller, W.; Stott, R.; Wuertz, S. (2011). Final Report: Quantification of Pathogens and Sources of Microbial Indicators for QMRA in Recreational waters. Report by University of California (Davis), AMEC Earth and Environmental and NIWA to WERF (USA Water Environment Research Foundation) for the project PATH2R08. 375 p.

⁴ Medema, G.J.; Teunis, P.F.M.; Havelaar, A.H.; Haas, C.N. (1996). Assessment of dose-response relationship of *Campylobacter jejuni*. *International Journal of Food Microbiology* 30:101–111.

⁵ Teunis, P.; van den Brandhof, W.; Nauta, M.; Wagenaar, J.; van den Kerkhof, H.; van Pelt, W. (2005). A reconsideration of the *Campylobacter* dose-response relation. *Epidemiology and Infection* 133: 583–592.

Appendix A Eurofin ELS Laboratory Data

Argo Environmental Ltd
Level 3 Ballantyne House
101 Custom Street East
AUCKLAND 1143

Attention: Luke Gowing

Analytical Report

Report Number: 14/5515
Issue: 8
07 March 2014

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
14/5515-01	Miscellaneous Sample		20/02/2014 10:00	21/02/2014 10:45	0
Notes: Affco Rangiuru, Pond Influent					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	98,000,000	cfu/100ml	Maria Norris KTP		
M0111 E. coli by MPN	> 16000000000.00	MPN/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	4.50 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Yuemei Yu KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
14/5515-02	Miscellaneous Sample		20/02/2014 10:00	21/02/2014 10:45	0
Notes: Affco Rangiuru, Pond Discharge					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	670	cfu/100ml	Maria Norris KTP		
M0111 E. coli by MPN	200.00	MPN/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	<2 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Yuemei Yu KTP		

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Report re-issued.

Faecal Coliform results were swapped.

This report cancels and replaces report 14/5515-7. Please dispose of all previous versions.

Test Methodology:

Test	Methodology	Detection Limit
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml
E. coli by MPN	APHA 21st Edition, 9221F:2005	2 MPN/100mL
Salmonella by MPN	MIMM 13.2:2004	2 MPN/100mL
Campylobacter Species by MPN	MIMM 13.1:2008	2 MPN/100mL

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

All test methods and confidence limits are available on request. This report must not be reproduced except in full, without the written consent of the laboratory.



Report Released By
Sunita Raju



414
639



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AFFCO Rangioru
P.O. Box 132
Te Puke 3153
SP033
Attention: Kath Potaka

Analytical Report

Report Number: 14/14646
Issue: 1
21 May 2014

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
14/14646-01	AFFCO Rangioru		14/05/2014 10:00	15/05/2014 07:50	750
Notes: Pond Discharge					

Test	Result	Units	Signatory
M0102 Faecal Coliforms	350	cfu/100ml	Sunita Raju KTP
M0104 E. coli	320	cfu/100mL	Sunita Raju KTP
M0112 Salmonella by MPN	<2 *	MPN/100mL	Sunita Raju KTP
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Sunita Raju KTP

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml
E. coli	APHA 22nd Edition 9222 G:2012	1 cfu/100mL
Salmonella by MPN	MIMM 13.2:2004	2 MPN/100mL
Campylobacter Species by MPN	MIMM 13.1:2008	2 MPN/100mL

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

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Report Released By
Rob Deacon



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Argo Environmental Ltd
Level 3 Ballantyne House
101 Custom Street East
AUCKLAND 1143

Attention: Luke Gowing

Analytical Report

Report Number: 14/24077

Issue: 1

20 August 2014

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
14/24077-01	Miscellaneous Sample		13/08/2014 09:45	14/08/2014 07:50	0
Notes: Affco Rangiu - Pond Inflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	208,000,000	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	210,000,000	cfu/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	3.70 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	> 1600.00 *	MPN/100mL	Sunita Raju KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
14/24077-02	Miscellaneous Sample		13/08/2014 09:15	14/08/2014 07:50	0
Notes: Affco Rangiu - Pond Outflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	7,180	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	7,200	cfu/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	<2 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	8.00 *	MPN/100mL	Sunita Raju KTP		

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml
E. coli	APHA 22nd Edition 9222 G:2012	1 cfu/100mL
Salmonella by MPN	MIMM 13.2:2004	2 MPN/100mL
Campylobacter Species by MPN	MIMM 13.1:2008	2 MPN/100mL

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

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Report Released By
Rob Deacon



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Argo Environmental Ltd
Level 3 Ballantyne House
101 Custom Street East
AUCKLAND 1143

Attention: Luke Gowing

Analytical Report

Report Number: 14/33571

Issue: 1

25 November 2014

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
14/33571-01	Miscellaneous Sample		12/11/2014 09:00	13/11/2014 08:00	0
Notes: Affco Rangī, Pond Inflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	13,800,000	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	4,800,000	cfu/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	23.00 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	17.00 *	MPN/100mL	Sunita Raju KTP		
M1403 Microorganism Colony Identification	Campylobacter coli		Maria Norris KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
14/33571-02	Miscellaneous Sample		12/11/2014 09:00	13/11/2014 08:00	0
Notes: Affco Rangī, Pond Outflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	110	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	64	cfu/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	<2 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Sunita Raju KTP		

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml
E. coli	APHA 22nd Edition 9222 G:2012	1 cfu/100mL
Salmonella by MPN	MIMM 13.2:2004	2 MPN/100mL
Campylobacter Species by MPN	MIMM 13.1:2008	2 MPN/100mL
Microorganism Colony Identification	Bacterial cultures identified using biochemical rapid kits. Yeast culture confirmed by staining.	

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

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Rob Deacon



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Argo Environmental Ltd
Level 3 Ballantyne House
101 Custom Street East
AUCKLAND 1143

Attention: Luke Gowing

Analytical Report

Report Number: 15/3861

Issue: 1

17 February 2015

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
15/3861-01	AFFCo Rangiuru		04/02/2015 10:10	05/02/2015 08:15	0
Notes: Pond Outflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	230	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	230	cfu/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	<2 *	MPN/100mL	Yuemei Yu KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Yuemei Yu KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
15/3861-02	AFFCo Rangiuru		04/02/2015 10:10	05/02/2015 08:15	0
Notes: Pond Inflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	188,000,000	cfu/100ml	Yuemei Yu KTP		
M0104 E. coli	190,000,000	cfu/100mL	Yuemei Yu KTP		
M0112 Salmonella by MPN	50.00 *	MPN/100mL	Yuemei Yu KTP		
M0113 Campylobacter Species by MPN	48.00 *	MPN/100mL	Sunita Raju KTP		
M1403 Microorganism Colony Identification	Campylobacter jejuni and Campylobacter coli		Sunita Raju KTP		

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml
E. coli	APHA 22nd Edition 9222 G:2012	1 cfu/100mL
Salmonella by MPN	MIMM 13.2:2004	2 MPN/100mL
Campylobacter Species by MPN	MIMM 13.1:2008	2 MPN/100mL
Microorganism Colony Identification	Bacterial cultures identified using biochemical rapid kits. Yeast culture confirmed by staining.	

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

All test methods and confidence limits are available on request. This report must not be reproduced except in full, without the written consent of the laboratory.



Report Released By
Sunita Raju



414
639



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Argo Environmental Ltd
Level 3 Ballantyne House
101 Custom Street East
AUCKLAND 1143

Attention: Luke Gowing

Analytical Report

Report Number: 15/16227

Issue: 1

27 May 2015

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
15/16227-01	AFFCo Rangiuru		19/05/2015 10:30	20/05/2015 07:45	0
Notes: Pond inflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	8730	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	7,700 *	cfu/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	2.00 *	MPN/100mL	Yuemei Yu KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Yuemei Yu KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
15/16227-02	AFFCo Rangiuru		19/05/2015 10:30	20/05/2015 07:45	0
Notes: Pond outflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	96	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	96 *	cfu/100mL	Yuemei Yu KTP		
M0112 Salmonella by MPN	<2 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Yuemei Yu KTP		

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml
E. coli	APHA 22nd Edition 9222 G:2012	1 cfu/100mL
Salmonella by MPN	MIMM 13.2:2004	2 MPN/100mL
Campylobacter Species by MPN	MIMM 13.1:2008	2 MPN/100mL

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

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Report Released By
Rob Deacon



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Argo Environmental Ltd
Level 3 Ballantyne House
101 Custom Street East
AUCKLAND 1143

Attention: Luke Gowing

Analytical Report

Report Number: 15/25297

Issue: 1

19 August 2015

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
15/25297-01	AFFCo Rangioru		06/08/2015 10:00	07/08/2015 08:50	0
Notes: Pond Outflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	110	cfu/100ml	Maria Norris KTP		
M0104 E. coli	73	cfu/100mL	Maria Norris KTP		
M0112 Salmonella by MPN	2.00 *	MPN/100mL	Maria Norris KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Sunita Raju KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
15/25297-02	AFFCo Rangioru		06/08/2015 10:30	07/08/2015 08:50	0
Notes: Pond Inflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	28,000,000	cfu/100ml	Maria Norris KTP		
M0104 E. coli	28,000,000	cfu/100mL	Maria Norris KTP		
M0112 Salmonella by MPN	500.00 *	MPN/100mL	Maria Norris KTP		
M0113 Campylobacter Species by MPN	> 1600.00 *	MPN/100mL	Sunita Raju KTP		
M1403 Microorganism Colony Identification	Campylobacter jejuni and Campylobacter lari		Maria Norris KTP		

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml
E. coli	APHA 22nd Edition 9222 G:2012	1 cfu/100mL
Salmonella by MPN	MIMM 13.2:2004	2 MPN/100mL
Campylobacter Species by MPN	MIMM 13.1:2008	2 MPN/100mL
Microorganism Colony Identification	Bacterial cultures identified using biochemical rapid kits. Yeast culture confirmed by staining.	

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

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Report Released By
Rob Deacon



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Argo Environmental Ltd
Level 3 Ballantyne House
101 Custom Street East
AUCKLAND 1143

Attention: Luke Gowing

Analytical Report

Report Number: 15/37852

Issue: 1

26 November 2015

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
15/37852-01	AFFCo Rangioru		11/11/2015 10:15	12/11/2015 08:20	0
Notes: Pond Inflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	27,000,000	cfu/100ml	Maria Norris KTP		
M0104 E. coli	27,000,000	cfu/100mL	Maria Norris KTP		
M0112 Salmonella by MPN	900.00 *	MPN/100mL	Maria Norris KTP		
M0113 Campylobacter Species by MPN	350.00 *	MPN/100mL	Maria Norris KTP		
M1403 Microorganism Colony Identification	Campylobacter jejuni and Campylobacter coli		Maria Norris KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
15/37852-02	AFFCo Rangioru		11/11/2015 10:00	12/11/2015 08:20	0
Notes: Pond Outflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	280	cfu/100ml	Maria Norris KTP		
M0104 E. coli	280	cfu/100mL	Maria Norris KTP		
M0112 Salmonella by MPN	<2 *	MPN/100mL	Maria Norris KTP		
M0113 Campylobacter Species by MPN	23.00 *	MPN/100mL	Maria Norris KTP		
M1403 Microorganism Colony Identification	Campylobacter jejuni and Campylobacter coli		Maria Norris KTP		

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml
E. coli	APHA 22nd Edition 9222 G:2012	1 cfu/100mL
Salmonella by MPN	MIMM 13.2:2004	2 MPN/100mL
Campylobacter Species by MPN	MIMM 13.1:2008	2 MPN/100mL
Microorganism Colony Identification	Bacterial cultures identified using biochemical rapid kits. Yeast culture confirmed by staining.	

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

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Report Released By
Rob Deacon



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Argo Environmental Ltd
Level 3 Ballantyne House
101 Custom Street East
AUCKLAND 1143

Attention: Luke Gowing

Analytical Report

Report Number: 15/44224

Issue: 1

04 January 2016

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
15/44224-01	Effluent		21/12/2015 10:00	23/12/2015 08:15	0
Notes: Affco rangiuru Inflow					

Test	Result	Units	Signatory
M0102 Faecal Coliforms	23,000,000	cfu/100ml	Sunita Raju KTP
M0104 E. coli	23,000,000	cfu/100mL	Sunita Raju KTP
M0112 Salmonella by MPN	48.00 *	MPN/100mL	Maria Norris KTP
M0113 Campylobacter Species by MPN	240.00 *	MPN/100mL	Maria Norris KTP
M1403 Microorganism Colony Identification	Campylobacter coli and Campylobacter lari		Maria Norris KTP

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
15/44224-02	Effluent		21/12/2015 10:00	23/12/2015 08:15	0
Notes: Affco rangiuru Outflow					

Test	Result	Units	Signatory
M0102 Faecal Coliforms	110	cfu/100ml	Sunita Raju KTP
M0104 E. coli	110	cfu/100mL	Sunita Raju KTP
M0112 Salmonella by MPN	<2 *	MPN/100mL	Maria Norris KTP
M0113 Campylobacter Species by MPN	7.80 *	MPN/100mL	Maria Norris KTP
M1403 Microorganism Colony Identification	Campylobacter coli and Campylobacter lari		Maria Norris KTP

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml
E. coli	APHA 22nd Edition 9222 G:2012	1 cfu/100mL
Salmonella by MPN	MIMM 13.2:2004	2 MPN/100mL
Campylobacter Species by MPN	MIMM 13.1:2008	2 MPN/100mL
Microorganism Colony Identification	Bacterial cultures identified using biochemical rapid kits. Yeast culture confirmed by staining.	

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

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Report Released By
Rob Deacon



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Argo Environmental Ltd
Level 3 Ballantyne House
101 Custom Street East
AUCKLAND 1143

Attention: Luke Gowing

Analytical Report

Report Number: 16/1471

Issue: 1

02 February 2016

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
16/1471-01	Effluent		13/01/2016 08:00	14/01/2016 08:00	0
Notes: Affco Horotiu Pond Inflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	683,000,000	cfu/100ml	Maria Norris KTP		
M0104 E. coli	680,000,000	cfu/100mL	Maria Norris KTP		
M0112 Salmonella by MPN	> 1600.00 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Maria Norris KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
16/1471-02	Effluent		13/01/2016 08:00	14/01/2016 08:00	0
Notes: Affco Horotiu Pond Outflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	730	cfu/100ml	Maria Norris KTP		
M0104 E. coli	27 *	cfu/100mL	Maria Norris KTP		
M0112 Salmonella by MPN	<2 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Maria Norris KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
16/1471-03	Effluent		13/01/2016 11:00	14/01/2016 08:00	0
Notes: Affco Rangioru Pond Inflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	37,000,000	cfu/100ml	Maria Norris KTP		
M0104 E. coli	37,000,000	cfu/100mL	Maria Norris KTP		
M0112 Salmonella by MPN	> 1600.00 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	12.00 *	MPN/100mL	Sunita Raju KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
16/1471-04	Effluent		13/01/2016 11:00	14/01/2016 08:00	0
Notes: Affco Rangioru Pond Outflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	300	cfu/100ml	Maria Norris KTP		
M0104 E. coli	100	cfu/100mL	Maria Norris KTP		
M0112 Salmonella by MPN	<2 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	2.00 *	MPN/100mL	Sunita Raju KTP		

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml

Test	Methodology	Detection Limit
E. coli	APHA 22nd Edition 9222 G:2012	1 cfu/100mL
Salmonella by MPN	MIMM 13.2:2004	2 MPN/100mL
Campylobacter Species by MPN	MIMM 13.1:2008	2 MPN/100mL

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

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Report Released By
Sunita Raju



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Argo Environmental Ltd
Level 3 Ballantyne House
101 Custom Street East
AUCKLAND 1143

Attention: Luke Gowing

Analytical Report

Report Number: 16/6046

Issue: 1

04 March 2016

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
16/6046-01	AFFCo Rangiuru		15/02/2016 13:00	16/02/2016 08:30	0
Notes: Pond Inflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	22,000,000	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	22,000,000	cfu/100mL	Maria Norris KTP		
M0112 Salmonella by MPN	<2 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	6.00 *	MPN/100mL	Sunita Raju KTP		
M1403 Microorganism Colony Identification	Campylobacter coli		Sunita Raju KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
16/6046-02	AFFCo Rangiuru		15/02/2016 13:00	16/02/2016 08:30	0
Notes: Pond Outflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	290	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	290	cfu/100mL	Maria Norris KTP		
M0112 Salmonella by MPN	<2 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Maria Norris KTP		

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml
E. coli	APHA 22nd Edition 9222 G:2012	1 cfu/100mL
Salmonella by MPN	MIMM 13.2:2004	2 MPN/100mL
Campylobacter Species by MPN	MIMM 13.1:2008	2 MPN/100mL
Microorganism Colony Identification	Bacterial cultures identified using biochemical rapid kits. Yeast culture confirmed by staining.	

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

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Report Released By
Rob Deacon



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Argo Environmental Ltd
Level 3 Ballantyne House
101 Custom Street East
AUCKLAND 1143

Attention: Luke Gowing

Analytical Report

Report Number: 16/12113

Issue: 1

11 April 2016

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
16/12113-01	AFFCo Rangiuru		22/03/2016 10:30	23/03/2016 09:15	0
Notes: Pond Inflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	16,000,000	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	16,000,000	cfu/100mL	Yuemei Yu KTP		
M0112 Salmonella by MPN	170.00 *	MPN/100mL	Maria Norris KTP		
M0113 Campylobacter Species by MPN	> 1600.00 *	MPN/100mL	Sunita Raju KTP		
M1403 Microorganism Colony Identification	Campylobacter lari		Sunita Raju KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
16/12113-02	AFFCo Rangiuru		22/03/2016 10:00	23/03/2016 09:15	0
Notes: Pond Outflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	130	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	120	cfu/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	<2 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	8.00 *	MPN/100mL	Sunita Raju KTP		
M1403 Microorganism Colony Identification	Campylobacter lari		Sunita Raju KTP		

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml
E. coli	APHA 22nd Edition 9222 G:2012	1 cfu/100mL
Salmonella by MPN	MIMM 13.2:2004	2 MPN/100mL
Campylobacter Species by MPN	MIMM 13.1:2008	2 MPN/100mL
Microorganism Colony Identification	Bacterial cultures identified using biochemical rapid kits. Yeast culture confirmed by staining.	

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

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Report Released By
Rob Deacon



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Argo Environmental Ltd
Level 3 Ballantyne House
101 Custom Street East
AUCKLAND 1143

Attention: Luke Gowing

Analytical Report

Report Number: 16/23249

Issue: 2

28 June 2016

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
16/23249-01	AFFCo Rangiuru		16/06/2016 00:00	17/06/2016 08:00	0
Notes: Pond Inflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	< 4	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	< 4	cfu/100mL	Maria Norris KTP		
M0112 Salmonella by MPN	<2 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Maria Norris KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
16/23249-02	AFFCo Rangiuru		16/06/2016 00:00	17/06/2016 08:00	0
Notes: Pond Outflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	350	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	350	cfu/100mL	Maria Norris KTP		
M0112 Salmonella by MPN	<2 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Maria Norris KTP		

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Customer amended to Argo

This report cancels and replaces report 16/23249-1. Please dispose of all previous versions.

Test Methodology:

Test	Methodology	Detection Limit
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml
E. coli	APHA 22nd Edition 9222 G:2012	1 cfu/100mL
Salmonella by MPN	MIMM 13.2:2004	2 MPN/100mL
Campylobacter Species by MPN	MIMM 13.1:2008	2 MPN/100mL

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

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Report Released By
Rob Deacon



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Argo Environmental Ltd
Level 3 Ballantyne House
101 Custom Street East
AUCKLAND 1143

Attention: Luke Gowing

Analytical Report

Report Number: 16/36735

Issue: 1

29 September 2016

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
16/36735-01	AFFCo Rangiuru		23/09/2016 10:00	24/09/2016 10:00	0
Notes: Pond Outflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	2,000	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	1,000	cfu/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	<2 *	MPN/100mL	Maria Norris KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Sunita Raju KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
16/36735-02	AFFCo Rangiuru		23/09/2016 10:30	24/09/2016 10:00	0
Notes: Pond Inflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	15,000,000	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	5,300,000	cfu/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	> 1600.00 *	MPN/100mL	Maria Norris KTP		
M0113 Campylobacter Species by MPN	> 1600.00 *	MPN/100mL	Sunita Raju KTP		

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml
E. coli	APHA 22nd Edition 9222 G:2012	1 cfu/100mL
Salmonella by MPN	MIMM 13.2:2004	2 MPN/100mL
Campylobacter Species by MPN	MIMM 13.1:2008	2 MPN/100mL

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

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Report Released By
Rob Deacon



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Argo Environmental Ltd
Level 3 Ballantyne House
101 Custom Street East
AUCKLAND 1143

Attention: Luke Gowing

Analytical Report

Report Number: 16/49676

Issue: 1

03 January 2017

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
16/49676-01	Miscellaneous Sample		19/12/2016 13:00	22/12/2016 08:45	0
Notes: Affco Rangiutu, Pond Inflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	119,000,000	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	10,000,000	cfu/100mL	Maria Norris KTP		
M0112 Salmonella by MPN	2.00 *	MPN/100mL	Maria Norris KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Sunita Raju KTP		
M1403 Microorganism Colony Identification	Campylobacter lari		Sunita Raju KTP		
Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
16/49676-02	Miscellaneous Sample		19/12/2016 13:00	20/12/2016 08:45	0
Notes: Affco Rangiutu, Pond outflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	< 100	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	< 100	cfu/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	<2 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Maria Norris KTP		
Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
16/49676-03	Miscellaneous Sample		19/12/2016 09:00	20/12/2016 08:45	0
Notes: Affco Horotiu, Pond Inflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	6,550,000	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	5,700,000	cfu/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	15.00 *	MPN/100mL	Maria Norris KTP		
M0113 Campylobacter Species by MPN	5.60 *	MPN/100mL	Sunita Raju KTP		
M1403 Microorganism Colony Identification	Campylobacter lari		Sunita Raju KTP		
Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
16/49676-04	Miscellaneous Sample		19/12/2016 09:00	20/12/2016 08:45	0
Notes: Affco Horotiu, Pond outflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	96	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	84	cfu/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	<2 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Maria Norris KTP		

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml
E. coli	APHA 22nd Edition 9222 G:2012	4 cfu/100mL
Salmonella by MPN	MIMM 13.2:2004	2 MPN/100mL
Campylobacter Species by MPN	MIMM 13.1:2008	2 MPN/100mL
Microorganism Colony Identification	Bacterial culture identification by MALDI-TOF-subcontracted to NSH. Yeast culture confirmed by staining.	

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

All test methods and confidence limits are available on request. This report must not be reproduced except in full, without the written consent of the laboratory.



Report Released By
Rob Deacon



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Argo Environmental Ltd
Level 3 Ballantyne House
101 Custom Street East
AUCKLAND 1143

Attention: Luke Gowing

Analytical Report

Report Number: 17/11335

Issue: 1

26 January 2017

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/11335-01	Miscellaneous Sample		11/01/2017 11:00	12/01/2017 08:20	0
Notes: Affco Rangiuru Pond Inflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	29,000,000	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	26,000,000	cfu/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	33.00 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	540.00 *	MPN/100mL	Sunita Raju KTP		
M1403 Microorganism Colony Identification	Campylobacter jejuni and Campylobacter coli		Sunita Raju KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/11335-02	Miscellaneous Sample		11/01/2017 11:00	12/01/2017 08:20	0
Notes: Affco Rangiuru Pond Outflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	160	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	140	cfu/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	< 2.00 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Sunita Raju KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/11335-03	Miscellaneous Sample		11/01/2017 14:00	12/01/2017 08:20	0
Notes: Affco Horotiu Pond Inflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	102,000,000	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	92,000,000	cfu/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	> 1600.00 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Sunita Raju KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/11335-04	Miscellaneous Sample		11/01/2017 14:00	12/01/2017 08:20	0
Notes: Affco Horotiu Pond Outflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	32	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	28	cfu/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	< 2.00 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Sunita Raju KTP		

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml
E. coli	APHA 22nd Edition 9222 G:2012	4 cfu/100mL
Salmonella by MPN	MIMM 13.2:2004	2 MPN/100mL
Campylobacter Species by MPN	MIMM 13.1:2008	2 MPN/100mL
Microorganism Colony Identification	Bacterial culture identification by MALDI-TOF-subcontracted to NSH. Yeast culture confirmed by staining.	

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

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Report Released By
Rob Deacon



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Argo Environmental Ltd
Level 3 Ballantyne House
101 Custom Street East
AUCKLAND 1143

Attention: Luke Gowing

Analytical Report

Report Number: 17/18190

Issue: 1

27 February 2017

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/18190-01	Miscellaneous Sample		23/02/2017 00:00	24/02/2017 08:10	0
Notes: Affco Rangiuru, Pond Influent					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	93,000,000	cfu/100ml	Yuemei Yu KTP		
M0104 E. coli	71,000,000	cfu/100mL	Maria Norris KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/18190-02	Miscellaneous Sample		23/02/2017 00:00	24/02/2017 08:10	0
Notes: Affco Rangiuru, Pond Effluent					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	640	cfu/100ml	Yuemei Yu KTP		
M0104 E. coli	400	cfu/100mL	Maria Norris KTP		

Comments:

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml
E. coli	APHA 22nd Edition 9222 G:2012	4 cfu/100mL

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

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Report Released By
Rob Deacon



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Argo Environmental Ltd
Level 3 Ballantyne House
101 Custom Street East
AUCKLAND 1143

Attention: Luke Gowing

Analytical Report

Report Number: 17/23894

Issue: 1

18 April 2017

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/23894-01	Miscellaneous Sample		31/03/2017 00:00	01/04/2017 09:00	0
Notes: Affco Rangiuru - Pond inflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	2,300,000	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	1,500,000	cfu/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	<2 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	7.80 *	MPN/100mL	Sunita Raju KTP		

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/23894-02	Miscellaneous Sample		31/03/2017 00:00	01/04/2017 09:00	0
Notes: Affco Rangiuru - Pond outflow					
Test	Result	Units	Signatory		
M0102 Faecal Coliforms	100	cfu/100ml	Sunita Raju KTP		
M0104 E. coli	100	cfu/100mL	Sunita Raju KTP		
M0112 Salmonella by MPN	<2 *	MPN/100mL	Sunita Raju KTP		
M0113 Campylobacter Species by MPN	<2 *	MPN/100mL	Sunita Raju KTP		

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml
E. coli	APHA 22nd Edition 9222 G:2012	1 cfu/100mL
Salmonella by MPN	MIMM 13.2:2004	2 MPN/100mL
Campylobacter Species by MPN	MIMM 13.1:2008	2 MPN/100mL

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

All test methods and confidence limits are available on request. This report must not be reproduced except in full, without the written consent of the laboratory.



Report Released By
Rob Deacon



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Appendix B ESR Laboratory Data



FINAL REPORT

Job Number: CPH1490171

Page 1 of 2

12 March 2014

To: Argo Environmental Ltd
PO Box 105774
AUCKLAND 1143

Attention: Luke Gowing

Facsimile No:

From: ESR Public Health Laboratory

REPORT ON THE EXAMINATION OF WATER

Sampled by: Luke Gowing
Received: 21 February 2014 08:30
Tested: 21 February 2014 10:50
Temperature at Receipt: 20°C

Weather at sampling: Fine
Weather previous 2 days: Fine

Client No	Sample Type and Analytes	Analytical Results
	Water - Effluents/Wastewater - Pond influent, Sampled: 20/02/2014 10:00	
	- <i>Yersinia enterocolitica</i>	See Comment /25mL
	- <i>Escherichia coli</i> O157	Not Isolated /25mL
	Water - Effluents/Wastewater - Pond discharge, Sampled: 20/02/2014 11:00	
	- <i>Yersinia enterocolitica</i>	See Comment /25mL
	- <i>Escherichia coli</i> O157	Not Isolated /25mL

Job Number: CPH1490171

Page 2 of 2

COMMENTS

These samples were tested for *Yersinia* species by enrichment culture and multiplex PCR.

Yersinia enterocolitica containing virulence plasmid was detected in the "Pond influent" sample using multiplex PCR, but was not isolated by culturing methods.

A non virulent *Yersinia* species was detected on sample "Pond discharge" using multiplex PCR but was not isolated by culturing methods.

Yersinia pseudotuberculosis was not detected on either sample by culture or PCR.

Please interpret these results with caution as the method used is experimental and not validated for effluent.

The methods of analysis are available on request.
These results relate to the samples as received.
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Kirstin Thom
Microbiology Technician

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FINAL REPORT - PUBLIC HEALTH LABORATORY

6 June 2014

Attention: LUKE GOWING
To: ARGO ENVIRONMENTAL LTD

Copies To:

P.O. Box 105774
AUCKLAND

Date/Time Received:	15 May 2014 08:30	Client PO #/Ref:
Temperature at Receipt:	14°C	
Sampled By:	Luke Gowing	
Date/Time Tested:	15 May 2014 10:50	
Weather at Sampling:		
Weather previous 2 days:		

Client Sample Ref:		Zone code:
ESR Sample Ref:	14PH0077-001-0	Source/Type:
Collection Details:	14 May 2014 10:00	Treatment:
Sample Description:	Pond Discharge - Affco Rangioru	

Test:	Results:	
- <i>Escherichia coli</i> O157	Not Isolated	/25mL
- <i>Yersinia enterocolitica</i>	Not Isolated	/25mL
- <i>Yersinia pseudotuberculosis</i>	Not Isolated	/25mL
- <i>Yersinia</i> species	See Comment	/25mL

REPORT COMMENTS:

This sample was tested for *Yersinia* species by enrichment culture and multiplex PCR.
A non-virulent *Yersinia* species was detected by each of these methods.
Please interpret these results with caution as the method used is experimental and not validated for effluent.
These results relate to the samples as received.

Signature:

Reported By: Maurice Wilson
Senior Scientist
Public Health Laboratory

Enquiries: Maurice Wilson
Ph: 03 351 0081
Email: Maurice.Wilson@esr.cri.nz

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ESR Reference: 14PH0077

Page 1 of 1



FINAL REPORT - PUBLIC HEALTH LABORATORY

4 September 2014

Attention: LUKE GOWING
To: ARGO ENVIRONMENTAL LTD

Copies To:

P.O. Box 105774
AUCKLAND

Date/Time Collected:	13 August 2014 13:00	Client PO #/Ref:
Date/Time Received:	14 August 2014 08:30	
Temperature at Receipt:	11°C	
Sampled By:	Luke Gowing	
Date/Time Tested:	14 August 2014 10:30	

ESR Sample Ref:	14PH0246-001-0	Client Sample Ref:	AFFCO Horotiu
Sample Description:	Effluent - Pond Inflow		

<u>Test:</u>	<u>Result:</u>	
- <i>Escherichia coli</i> O157	Not Isolated	/25mL
- <i>Yersinia enterocolitica</i>	Not Isolated	/25mL
- <i>Yersinia pseudotuberculosis</i>	Not Isolated	/25mL
- <i>Yersinia</i> species	See Comment	/25mL

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ESR Reference: 14PH0246

Page 1 of 2

ESR Sample Ref: 14PH0246-002-0
Sample Description: Effluent - Pond Outflow

Client Sample Ref: AFFCO Horotiu

Test:

- *Escherichia coli* O157
- *Yersinia enterocolitica*
- *Yersinia pseudotuberculosis*
- *Yersinia* species

Result:

Not Isolated /25mL
Not Isolated /25mL
Not Isolated /25mL
See Comment /25mL

REPORT COMMENTS:

These samples were tested for *Yersinia* species by enrichment culture and multiplex PCR.
A non-virulent *Yersinia* species was detected by both of these methods on both effluent samples.

Please interpret these results with caution as the method used is experimental and not validated for effluent.

These results relate to the samples as received.

Signature:



Reported By: Maurice Wilson
Senior Scientist
Public Health Laboratory

Enquiries: Maurice Wilson
Ph: 03 351 0081
Email: Maurice.Wilson@esr.cri.nz

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ESR Reference: 14PH0246

Page 2 of 2

Attention: LUKE GOWING
To: ARGO ENVIRONMENTAL LTD

P.O. Box 105774
AUCKLAND

Date/Time Received: 13 November 2014 08:30 **Client PO #/Ref:**
Temperature at Receipt: 15.2°C
Sampled By: Luke Gowing
Date/Time Tested: 13 November 2014 15:05
Weather at Sampling:
Weather previous 2 days:

Client Sample Ref: AFFCO Rangiuuru - Inflow **Zone code:**
ESR Sample Ref: 14PH0509-001-0 **Source/Type:**
Collection Details: 12 November 2014 09:30 **Treatment:**
Sample Description: AFFCO Rangiuuru - Pond Inflow
Test: **Result:**
- *Escherichia coli* O157 Not Isolated /25mL
- *Yersinia enterocolitica* Not Isolated /25mL
- *Yersinia pseudotuberculosis* Not Isolated /25mL

Client Sample Ref: AFFCO Rangiuuru - Outflow **Zone code:**
ESR Sample Ref: 14PH0509-002-0 **Source/Type:**
Collection Details: 12 November 2014 09:30 **Treatment:**
Sample Description: AFFCO Rangiuuru - Pond Outflow
Test: **Result:**
- *Escherichia coli* O157 Not Isolated /25mL
- *Yersinia enterocolitica* Not Isolated /25mL
- *Yersinia pseudotuberculosis* Not Isolated /25mL

Report comments

AMENDED REPORT: This replaces the report issued earlier today. Sample site identification details have been corrected.

These samples were tested for pathogenic *Yersinia* species by enrichment, culture and multiplex PCR. Please interpret these results with caution as the method used is experimental and not validated for effluent.

These results relate to the samples as received.

Reported by: Maurice Wilson
Senior Scientist
Public Health Laboratory

Enquiries: Maurice Wilson
Phone: 03 351 0081
Email: Maurice.Wilson@esr.cri.nz

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ESR Reference: 14PH0509

Page 1 of 1

Attention: LUKE GOWING
To: ARGO ENVIRONMENTAL LTD

P.O. Box 105774
AUCKLAND

Date/Time Received: 5 February 2015 08:30 **Client PO #/Ref:**
Temperature at Receipt: 19.6°C
Sampled By: Jennifer Leslie
Date/Time Tested: 5 February 2015 10:00
Weather at Sampling:
Weather previous 2 days:

Client Sample Ref: AFFCO Rangioru **Zone code:**
ESR Sample Ref: 15PH0060-001-0 **Source/Type:**
Collection Details: 4 February 2015 10:10 **Treatment:**
Sample Description: Effluent - Pond Inflow

Test: **Result:**
- *Escherichia coli* O157 Not Isolated /25mL
- *Yersinia enterocolitica* DETECTED /25mL (See Comment)
- *Yersinia pseudotuberculosis* Not Isolated /25mL

Client Sample Ref: AFFCO Rangioru **Zone code:**
ESR Sample Ref: 15PH0060-002-0 **Source/Type:**
Collection Details: 4 February 2015 10:10 **Treatment:**
Sample Description: Effluent - Pond Outflow

Test: **Result:**
- *Escherichia coli* O157 Not Isolated /25mL
- *Yersinia enterocolitica* DETECTED /25mL (See Comment)
- *Yersinia pseudotuberculosis* Not Isolated /25mL

Report comments

These samples were tested for pathogenic *Yersinia* species by enrichment, culture and multiplex PCR. Please interpret these results with caution as the method used is experimental and not validated for effluent.

Yersinia enterocolitica was detected in these samples by multiplex PCR. The organism was not, however, isolated by culture.

These results relate to the samples as received.

Reported by: Maurice Wilson
Senior Scientist
Public Health Laboratory

Enquiries: Maurice Wilson
Phone: 03 351 0081
Email: Maurice.Wilson@esr.cri.nz

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ESR Reference: 15PH0060

Page 1 of 1

Attention: LUKE GOWING
To: ARGO ENVIRONMENTAL LTD

P.O. Box 105774
AUCKLAND

Date/Time Received: 20 May 2015 08:30 **Client PO #/Ref:**
Temperature at Receipt: 15.6°C
Sampled By: Jennifer Leslie
Date/Time Tested: 20 May 2015 13:30
Weather at Sampling:
Weather previous 2 days:

Client Sample Ref: **Zone code:**
ESR Sample Ref: 15PH0267-001-0 **Source/Type:**
Collection Details: 19 May 2015 10:20 **Treatment:**

Sample Description: Effluent - AFFCO Rangiora - Pond Inflow

<u>Test:</u>	<u>Result:</u>	
- <i>Escherichia coli</i> O157	Not Isolated	/25mL
- <i>Yersinia enterocolitica</i>	Not Isolated	/25mL
- <i>Yersinia pseudotuberculosis</i>	Not Isolated	/25mL

Client Sample Ref: **Zone code:**
ESR Sample Ref: 15PH0267-002-0 **Source/Type:**
Collection Details: 19 May 2015 10:20 **Treatment:**

Sample Description: Effluent - AFFCO Rangiora - Pond Outflow

<u>Test:</u>	<u>Result:</u>	
- <i>Escherichia coli</i> O157	Not Isolated	/25mL
- <i>Yersinia enterocolitica</i>	Not Isolated	/25mL
- <i>Yersinia pseudotuberculosis</i>	Not Isolated	/25mL

Report comments

These samples were tested for pathogenic *Yersinia* species by enrichment culture and multiplex PCR. Please interpret these results with caution as the method used is experimental and not validated for effluent.

The methods of analysis are available on request.
These results relate to the samples as received.

Reported by: **Maurice Wilson**
Senior Scientist
Public Health Laboratory

Enquiries: **Maurice Wilson**
Phone: 03 351 0081
Email: Maurice.Wilson@esr.cri.nz

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ESR Reference: 15PH0267

Page 1 of 1

Attention: LUKE GOWING
To: ARGO ENVIRONMENTAL LTD

P.O. Box 105774
AUCKLAND

Date/Time Received: 7 August 2015 08:30 **Client PO #/Ref:**
Temperature at Receipt: 12.8°C
Sampled By: Jennifer Leslie
Date/Time Tested: 7 August 2015 09:45
Weather at Sampling:
Weather previous 2 days:

Client Sample Ref: **Zone code:**
ESR Sample Ref: 15PH0411-001-0 **Source/Type:**
Collection Details: 6 August 2015 09:45 **Treatment:**

Sample Description: AFFCO Rangiuru - Effluent Inflow

<u>Test:</u>	<u>Result:</u>		
- <i>Escherichia coli</i> O157	Not Isolated	/25mL	
- <i>Yersinia enterocolitica</i>	DETECTED	/25mL	(See Comment)
- <i>Yersinia pseudotuberculosis</i>	Not Isolated	/25mL	

Sample Comments

Yersinia enterocolitica was detected in this sample by multiplex PCR. The organism was not, however, isolated by culture.

Client Sample Ref: **Zone code:**
ESR Sample Ref: 15PH0411-002-0 **Source/Type:**
Collection Details: 6 August 2015 09:45 **Treatment:**

Sample Description: AFFCO Rangiuru - Effluent Outflow

<u>Test:</u>	<u>Result:</u>		
- <i>Escherichia coli</i> O157	Not Isolated	/25mL	
- <i>Yersinia enterocolitica</i>	Not Isolated	/25mL	
- <i>Yersinia pseudotuberculosis</i>	Not Isolated	/25mL	

Report comments

These samples were tested for pathogenic *Yersinia* species by enrichment, culture and multiplex PCR. Please interpret these results with caution as the method used is experimental and not validated for effluent.

These results relate to the samples as received.

Reported by: **Maurice Wilson**
Senior Scientist
Public Health Laboratory

Enquiries: **Maurice Wilson**
Phone: 03 351 0081
Email: Maurice.Wilson@esr.cri.nz

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ESR Reference: 15PH0411

Page 1 of 1

Attention: LUKE GOWING
To: ARGO ENVIRONMENTAL LTD

P.O. Box 105774
AUCKLAND

Date/Time Received:	12 November 2015 08:00	Client PO #/Ref:
Temperature at Receipt:	12°C	
Sampled By:	Luke Gowing	
Date/Time Tested:	12 November 2015 10:20	
Weather at Sampling:	Sunny, Fine	
Weather previous 2 days:	Sunny, Fine	

Client Sample Ref:	AFFCO Rangioru	Zone code:
ESR Sample Ref:	15PH0622-001-0	Source/Type:
Collection Details:	11 November 2015 10:00	Treatment:
Sample Description:	Effluent - AFFCO Rangioru Pond Outflow	

Test:	Result:	
- <i>Escherichia coli</i> O157	Not Isolated	/25mL
- <i>Yersinia enterocolitica</i>	Not Isolated	/25mL
- <i>Yersinia pseudotuberculosis</i>	Not Isolated	/25mL

Client Sample Ref:	AFFCO Rangioru	Zone code:
ESR Sample Ref:	15PH0622-002-0	Source/Type:
Collection Details:	11 November 2015 10:15	Treatment: Untreated
Sample Description:	Effluent - AFFCO Rangioru Pond Inflow	

Test:	Result:	
- <i>Escherichia coli</i> O157	Not Isolated	/25mL
- <i>Yersinia enterocolitica</i>	Not Isolated	/25mL
- <i>Yersinia pseudotuberculosis</i>	Not Isolated	/25mL

Report comments

These samples were tested for pathogenic *Yersinia* species by enrichment, culture and multiplex PCR. Please interpret these results with caution as the method used is experimental and not validated for effluent.

These results relate to the samples as received.

Reported by: Maurice Wilson
Senior Scientist
Public Health Laboratory

Enquiries: Maurice Wilson
Phone: 03 351 0081
Email: Maurice.Wilson@esr.cri.nz

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ESR Reference: 15PH0622

Page 1 of 1

Attention: LUKE GOWING
To: ARGO ENVIRONMENTAL LTD

P.O. Box 105774
AUCKLAND

Date/Time Received: 23 December 2015 08:00 **Client PO #/Ref:**
Temperature at Receipt: 20°C
Sampled By:
Date/Time Tested: 23 December 2015 10:00
Weather at Sampling:
Weather previous 2 days:

Client Sample Ref: **Zone code:**
ESR Sample Ref: 15PH0725-001-0 **Source/Type:**
Collection Details: 22 December 2015 10:00 **Treatment:**

Sample Description: Effluent - Affco Rangioru Pond Inflow

<u>Test:</u>	<u>Result:</u>		
- <i>Escherichia coli</i> O157	Not Isolated	/25mL	
- <i>Yersinia enterocolitica</i>	DETECTED	/25mL	(See Comment)
- <i>Yersinia pseudotuberculosis</i>	Not Isolated	/25mL	

Sample Comments

Yersinia enterocolitica was detected in this sample by multiplex PCR. The organism was not, however, isolated by culture.

Client Sample Ref: **Zone code:**
ESR Sample Ref: 15PH0725-002-0 **Source/Type:**
Collection Details: 22 December 2015 10:00 **Treatment:**

Sample Description: Effluent - Affco Rangioru Pond Outflow

<u>Test:</u>	<u>Result:</u>		
- <i>Escherichia coli</i> O157	Not Isolated	/25mL	
- <i>Yersinia enterocolitica</i>	Not Isolated	/25mL	
- <i>Yersinia pseudotuberculosis</i>	Not Isolated	/25mL	

Report comments

These samples were tested for pathogenic *Yersinia* species by enrichment, culture and multiplex PCR. Please interpret these results with caution as the method used is experimental and not validated for effluent.

These results relate to the samples as received. (**NOTE:** The containers used for these samples were non-sterile)

Reported by: **Maurice Wilson**
Senior Scientist
Public Health Laboratory

Enquiries: **Maurice Wilson**
Phone: 03 351 0081
Email: Maurice.Wilson@esr.cri.nz

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ESR Reference: 15PH0725

Page 1 of 1

Attention: LUKE GOWING
To: ARGO ENVIRONMENTAL LTD

P.O. Box 105774
AUCKLAND

Date/Time Received: 14 January 2016 08:30 **Client PO #/Ref:**
Temperature at Receipt: 20.6°C
Sampled By: Luke Gowing
Date/Time Tested: 14 January 2016 11:00
Weather at Sampling: Sunny
Weather previous 2 days: Sunny

Client Sample Ref: RANGIURU INFLOW **Zone code:**
ESR Sample Ref: 16PH0016-001-0 **Source/Type:**
Collection Details: 13 January 2016 11:00 **Treatment:**

Sample Description: Effluent - AFFCO Rangioru - Pond Inflow

<u>Test:</u>	<u>Result:</u>		
- <i>Escherichia coli</i> O157	ISOLATED	/25mL	(stx2, eae and EHEC <i>HlyA</i> genes detected; stx1 gene not detected)
- <i>Yersinia enterocolitica</i>	DETECTED	/25mL	
- <i>Yersinia pseudotuberculosis</i>	Not Isolated	/25mL	

Sample Comments

Yersinia enterocolitica was detected in this sample by multiplex PCR. The organism was not, however, isolated by culture.

Client Sample Ref: RANGIURU OUTFLOW **Zone code:**
ESR Sample Ref: 16PH0016-002-0 **Source/Type:**
Collection Details: 13 January 2016 11:00 **Treatment:**

Sample Description: Effluent - AFFCO Rangioru - Pond Outflow

<u>Test:</u>	<u>Result:</u>	
- <i>Escherichia coli</i> O157	Not Isolated	/25mL
- <i>Yersinia enterocolitica</i>	Not Isolated	/25mL
- <i>Yersinia pseudotuberculosis</i>	Not Isolated	/25mL

Report comments

These samples were tested for pathogenic *Yersinia* species by enrichment, culture and multiplex PCR. Please interpret these results with caution as the method used is experimental and not validated for effluent.

These results relate to the samples as received.

Reported by: Maurice Wilson
Senior Scientist
Public Health Laboratory

Enquiries: Maurice Wilson
Phone: 03 351 0081
Email: Maurice.Wilson@esr.cri.nz

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ESR Reference: 16PH0016

Page 1 of 1

Attention: LUKE GOWING
To: ARGO ENVIRONMENTAL LTD

P.O. Box 105774
AUCKLAND

Date/Time Received:	16 February 2016 08:30	Client PO #/Ref:	AFFCO Rangioru
Temperature at Receipt:	23°C		
Sampled By:	Luke Gowing		
Date/Time Tested:	16 February 2016 10:00		
Weather at Sampling:	Overcast		
Weather previous 2 days:	Fine		

Client Sample Ref:	RANGIURU INFLOW	Zone code:	
ESR Sample Ref:	16PH0086-001-0	Source/Type:	
Collection Details:	15 February 2016 13:00	Treatment:	
Sample Description:	Effluent - Rangioru Inflow		
Test:	Result:		
- <i>Escherichia coli</i> O157	Not Isolated	/25mL	
- <i>Yersinia enterocolitica</i>	DETECTED	/25mL	
- <i>Yersinia pseudotuberculosis</i>	Not Detected	/25mL	

Client Sample Ref:	RANGIURU OUTFLOW	Zone code:	
ESR Sample Ref:	16PH0086-002-0	Source/Type:	
Collection Details:	15 February 2016 13:00	Treatment:	
Sample Description:	Effluent - Rangioru Outflow		
Test:	Result:		
- <i>Escherichia coli</i> O157	Not Isolated	/25mL	
- <i>Yersinia enterocolitica</i>	DETECTED	/25mL	
- <i>Yersinia pseudotuberculosis</i>	Not Detected	/25mL	

Report comments

These samples were tested for pathogenic *Yersinia* species by multiplex PCR.

Please interpret these results with caution as the method used is experimental and not validated for effluent.

These results relate to the samples as received.

Reported by: Maurice Wilson
Senior Scientist
Public Health Laboratory

Enquiries: Maurice Wilson
Phone: 03 351 0081
Email: Maurice.Wilson@esr.cri.nz

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ESR Reference: 16PH0086

Page 1 of 1

Attention: LUKE GOWING
To: ARGO ENVIRONMENTAL LTD

P.O. Box 105774
AUCKLAND

Date/Time Received: 23 March 2016 08:30 **Client PO #/Ref:**
Temperature at Receipt: 23.6°C
Sampled By: Luke Gowing
Date/Time Tested: 23 March 2016 09:00
Weather at Sampling:
Weather previous 2 days:

Client Sample Ref: **Zone code:**
ESR Sample Ref: 16PH0189-001-0 **Source/Type:**
Collection Details: 22 March 2016 10:10 **Treatment:**
Sample Description: Effluent - Affco Rangioru, Pond Inflow
Test: **Result:**
- *Escherichia coli* O157 Not Isolated /25mL
- *Yersinia enterocolitica* DETECTED /25mL
- *Yersinia pseudotuberculosis* Not Detected /25mL

Client Sample Ref: **Zone code:**
ESR Sample Ref: 16PH0189-002-0 **Source/Type:**
Collection Details: 22 March 2016 10:10 **Treatment:**
Sample Description: Effluent - Affco Rangioru, Pond Outflow
Test: **Result:**
- *Escherichia coli* O157 Not Isolated /25mL
- *Yersinia enterocolitica* Not Detected /25mL
- *Yersinia pseudotuberculosis* Not Detected /25mL

Report comments

These samples were tested for pathogenic *Yersinia* species by multiplex PCR.

Please interpret these results with caution as the method used is experimental and not validated for effluent.

The methods of analysis are available on request.

These results relate to the samples as received.

Reported by: **Maurice Wilson**
Senior Scientist
Public Health Laboratory

Enquiries: **Maurice Wilson**
Phone: 03 351 0081
Email: Maurice.Wilson@esr.cri.nz

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ESR Reference: 16PH0189

Page 1 of 1

Attention: LUKE GOWING
To: ARGO ENVIRONMENTAL LTD

P.O. Box 105774
AUCKLAND

Date/Time Received: 17 June 2016 08:30 **Client PO #/Ref:**
Temperature at Receipt: 13°C
Sampled By:
Date/Time Tested: 17 June 2016 01:04
Weather at Sampling:
Weather previous 2 days:

Client Sample Ref: **Zone code:**
ESR Sample Ref: 16PH0363-001-0 **Source/Type:**
Collection Details: 16 June 2016 **Treatment:**
Sample Description: AFFCO Rangiuru; Inflow
Test: **Result:**
- *Escherichia coli* O157 Not Isolated /25mL
- *Yersinia enterocolitica* Not Detected /25mL
- *Yersinia pseudotuberculosis* Not Detected /25mL

Client Sample Ref: **Zone code:**
ESR Sample Ref: 16PH0363-002-0 **Source/Type:**
Collection Details: 16 June 2016 **Treatment:**
Sample Description: AFFCO Rangiuru; Outflow
Test: **Result:**
- *Escherichia coli* O157 Not Isolated /25mL
- *Yersinia enterocolitica* Not Detected /25mL
- *Yersinia pseudotuberculosis* Not Detected /25mL

Report comments

These samples were tested for pathogenic *Yersinia* species by multiplex PCR.

Please interpret these results with caution as the method used is experimental and not validated for effluent.

These results relate to the samples as received.

Reported by: **Maurice Wilson**
Senior Scientist
Public Health Laboratory

Enquiries: **Maurice Wilson**
Phone: 03 351 0081
Email: Maurice.Wilson@esr.cri.nz

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ESR Reference: 16PH0363

Page 1 of 1

Attention: LUKE GOWING
To: ARGO ENVIRONMENTAL LTD

P.O. Box 105774
AUCKLAND

Date/Time Received: 24 September 2016 10:00 **Client PO #/Ref:**
Temperature at Receipt: 15.2°C
Sampled By: Luke Gowing
Date/Time Tested: 24 September 2016 10:20
Weather at Sampling:
Weather previous 2 days:

Client Sample Ref: Pond Outflow **Zone code:**
ESR Sample Ref: 16PH0574-001-0 **Source/Type:**
Collection Details: 23 September 2016 10:00 **Treatment:**

Sample Description: Effluent - Affco Rangioru, Pond Outflow

<u>Test:</u>	<u>Result:</u>	
- <i>Escherichia coli</i> O157	Not Isolated	/25mL
- <i>Yersinia enterocolitica</i>	Not Detected	/25mL
- <i>Yersinia pseudotuberculosis</i>	Not Detected	/25mL

Client Sample Ref: Pond Inflow **Zone code:**
ESR Sample Ref: 16PH0574-002-0 **Source/Type:**
Collection Details: 23 September 2016 10:30 **Treatment:**

Sample Description: Effluent - Affco Rangioru, Pond Inflow

<u>Test:</u>	<u>Result:</u>	
- <i>Escherichia coli</i> O157	Not Isolated	/25mL
- <i>Yersinia enterocolitica</i>	DETECTED	/25mL
- <i>Yersinia pseudotuberculosis</i>	Not Detected	/25mL

Report comments

These samples were tested for pathogenic *Yersinia* species by multiplex PCR.

Please interpret these results with caution as the method used is experimental and not validated for effluent.

These results relate to the samples as received.

Reported by: Maurice Wilson
Senior Scientist
Public Health Laboratory

Enquiries: Maurice Wilson
Phone: 03 351 0081
Email: Maurice.Wilson@esr.cri.nz

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ESR Reference: 16PH0574

Page 1 of 1

P.O. Box 105774
AUCKLAND

Date/Time Received:	20 December 2016 12:15	Client PO #/Ref:	AFFCO
Temperature at Receipt:	20.4°C		
Sampled By:	Luke Gowing		
Date/Time Tested:	20 December 2016 14:00		
Weather at Sampling:			
Weather previous 2 days:			

Client Sample Ref:		Zone code:
ESR Sample Ref:	16PH0816-001-0	Source/Type:
Collection Details:	19 December 2016 13:00	Treatment:

Sample Description: Pond Inflow - Affco Rangiuru

<u>Test:</u>	<u>Result:</u>	
- <i>Escherichia coli</i> O157	Not Isolated	/25mL
- <i>Yersinia enterocolitica</i>	DETECTED	/25mL
- <i>Yersinia pseudotuberculosis</i>	Not Detected	/25mL

Client Sample Ref:		Zone code:
ESR Sample Ref:	16PH0816-002-0	Source/Type:
Collection Details:	19 December 2016 09:00	Treatment:

Sample Description: Pond Outflow - Affco Rangiuuru

<u>Test:</u>	<u>Result:</u>
- <i>Escherichia coli</i> O157	Not Isolated /25mL
- <i>Yersinia enterocolitica</i>	Not Detected /25mL
- <i>Yersinia pseudotuberculosis</i>	Not Detected /25mL

Client Sample Ref:		Zone code:
ESR Sample Ref:	16PH0816-003-0	Source/Type:
Collection Details:	19 December 2016 13:00	Treatment:

Sample Description: Pond Inflow - Affco Horotiu

<u>Test:</u>	<u>Result:</u>
- <i>Escherichia coli</i> O157	Not Isolated /25mL
- <i>Yersinia enterocolitica</i>	Not Detected /25mL
- <i>Yersinia pseudotuberculosis</i>	Not Detected /25mL

Client Sample Ref:		Zone code:	
ESR Sample Ref:	16PH0816-004-0	Source/Type:	
Collection Details:	19 December 2016 09:00	Treatment:	
Sample Description:	Pond Outflow - Affco Horotiu		

<u>Test:</u>	<u>Result:</u>	
- <i>Escherichia coli</i> O157	Not Isolated	/25mL
- <i>Yersinia enterocolitica</i>	Not Detected	/25mL
- <i>Yersinia pseudotuberculosis</i>	Not Detected	/25mL

Report comments

Please interpret these results with caution as the method used is experimental and not validated for effluent.

These samples were tested for pathogenic *Yersinia* species by multiplex PCR.

These results relate to the samples as received.

Reported by: **Kirstin Thom**
Senior Technician
Public Health Laboratory

Enquiries: **Maurice Wilson**
Phone: 03 351 0081
Email: Maurice.Wilson@esr.cri.nz

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ESR Reference: 16PH0816

Page 2 of 2

Attention: LUKE GOWING
To: ARGO ENVIRONMENTAL LTD

P.O. Box 105774
AUCKLAND

Date/Time Received:	12 January 2017 08:30	Client PO #/Ref:	AFFCO
Temperature at Receipt:	22.8°C		
Sampled By:	Luke Gowing		
Date/Time Tested:	12 January 2017 11:35		
Weather at Sampling:	Fine		
Weather previous 2 days:			

Client Sample Ref:		Zone code:	
ESR Sample Ref:	17PH0018-001-0	Source/Type:	
Collection Details:	11 January 2017 11:00	Treatment:	
Sample Description:	Pond Inflow - Affco Rangioru		
Test:		Result:	
- <i>Escherichia coli</i> O157			Not Isolated
- <i>Yersinia enterocolitica</i>			DETECTED
- <i>Yersinia pseudotuberculosis</i>			Not Detected

Client Sample Ref:		Zone code:	
ESR Sample Ref:	17PH0018-002-0	Source/Type:	
Collection Details:	11 January 2017 11:00	Treatment:	
Sample Description:	Pond Outflow - Affco Rangioru		
Test:		Result:	
- <i>Escherichia coli</i> O157			Not Isolated
- <i>Yersinia enterocolitica</i>			Not Detected
- <i>Yersinia pseudotuberculosis</i>			Not Detected

Client Sample Ref:		Zone code:	
ESR Sample Ref:	17PH0018-003-0	Source/Type:	
Collection Details:	11 January 2017 14:00	Treatment:	
Sample Description:	Pond Inflow - Affco Horotiu		
Test:		Result:	
- <i>Escherichia coli</i> O157			Not Isolated
- <i>Yersinia enterocolitica</i>			Not Detected
- <i>Yersinia pseudotuberculosis</i>			Not Detected

Client Sample Ref:		Zone code:	
ESR Sample Ref:	17PH0018-004-0	Source/Type:	
Collection Details:	11 January 2017 14:00	Treatment:	
Sample Description:	Pond Outflow - Affco Horotiu		

<u>Test:</u>	<u>Result:</u>
- <i>Escherichia coli</i> O157	Not Isolated
- <i>Yersinia enterocolitica</i>	Not Detected
- <i>Yersinia pseudotuberculosis</i>	Not Detected

Report comments

Please interpret these results with caution as the method used is experimental and not validated for effluent.

These samples were tested for pathogenic *Yersinia* species by multiplex PCR.

These results relate to the samples as received.

Reported by: **Kirstin Thom**
Senior Technician
Public Health Laboratory

Enquiries: **Maurice Wilson**
Phone: 03 351 0081
Email: Maurice.Wilson@esr.cri.nz

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ESR Reference: 17PH0018

Page 2 of 2

Client Sample Ref:		Zone code:	
ESR Sample Ref:	17PH0122-004-0	Source/Type:	
Collection Details:	23 February 2017 09:30	Treatment:	
Sample Description:	Pond Inflow - AFFCO Horotiu		
<u>Test:</u>	<u>Result:</u>		
- <i>Escherichia coli</i> O157	Not Isolated		/25mL
- <i>Yersinia enterocolitica</i>	Not Detected		/25mL
- <i>Yersinia pseudotuberculosis</i>	Not Detected		/25mL

Report comments

These samples were tested for pathogenic *Yersinia* species by multiplex PCR.

Please interpret these results with caution as the method used is experimental and not valid for effluent.

These results relate to the samples as received.

Reported by: **Kirstin Thom**
Senior Technician
Public Health Laboratory

Enquiries: **Maurice Wilson**
Phone: 03 351 0081
Email: Maurice.Wilson@esr.cri.nz

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ESR Reference: 17PH0122

Page 2 of 2

Attention: Luke GOWING
To: ARGO ENVIRONMENTAL LTD

P.O. Box 105774
AUCKLAND 1143

Date/Time Received: 1 April 2017 10:30 **Client PO #/Ref:** AFFCO - Rangiuru
Temperature at Receipt: 18.9°C
Sampled By: Luke Gowing
Date/Time Tested: 2 April 2017 13:20
Weather at Sampling:
Weather previous 2 days:

Client Sample Ref: POND INFLOW **Zone code:**
ESR Sample Ref: 17PH0206-001-0 **Source/Type:**
Collection Details: 31 March 2017 11:00 **Treatment:**
Sample Description: Effluent - Affco Rangiuru; Pond Inflow

Test: **Result:**

- <i>Escherichia coli</i> O157	Not Isolated	/25mL
- <i>Yersinia enterocolitica</i>	DETECTED	/25mL
- <i>Yersinia pseudotuberculosis</i>	Not Detected	/25mL

Client Sample Ref: POND OUTFLOW **Zone code:**
ESR Sample Ref: 17PH0206-002-0 **Source/Type:**
Collection Details: 31 March 2017 11:00 **Treatment:**
Sample Description: Effluent - Affco Rangiuru; Pond Outflow

Test: **Result:**

- <i>Escherichia coli</i> O157	Not Isolated	/25mL
- <i>Yersinia enterocolitica</i>	Not Detected	/25mL
- <i>Yersinia pseudotuberculosis</i>	Not Detected	/25mL

Report comments

These samples were tested for pathogenic *Yersinia* species by multiplex PCR.

Please interpret these results with caution as the method used is experimental and not validated for effluent.

These results relate to the samples as received.

Reported by: Maurice Wilson
Senior Scientist
Public Health Laboratory

Enquiries: Maurice Wilson
Phone: 03 351 0081
Email: Maurice.Wilson@esr.cri.nz

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ESR Reference: 17PH0206

Page 1 of 1

Appendix C Massey University Laboratory Data



Results/Detection Sheet

Received from: Affco Rangiuru
C/- Argo Environmental Ltd
P O Box 105774
AUCKLAND 1144

Date sample collected: 20 February 2014
Date sample received: 21 February 2014

MicroAquaTech Test No.	Location Site	Volume of Sample
2376	Pond Influent	5L
2377	Pond Discharge	5L

MicroAquaTech is not responsible for the sampling and hence the sampling information is reported on an as received basis

Specific Description of Tests:

MicroAquaTech Test No.	2376	2377
Test Description	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection
Pellet Volume	3mL	2mL
Percentage of Pellet Analysed	100%	100%

<i>Giardia</i> Confirmed (/10L)	<1/10L	<1/10L
--	--------	--------

<i>Cryptosporidium</i> Confirmed (/10L)	2/10L	1/10L
--	-------	-------

Result Sheet For MicroAquaTech Test No: 2376, 2377

Notes

Confirmed results:

-Oo/cysts with apple green fluorescence, showing typical size and shape.

-Oo/cysts with 1-4 nuclei showing under DAPI stain.

-Confirmation of internal structures under Differential Interference Contrast (DIC) microscopy.

	<u>2376</u>	<u>2377</u>
ColorSeed recovery rates for <i>Giardia</i> in sample water:	24%	22%
ColorSeed recovery rates for <i>Cryptosporidium</i> in sample water:	20%	23%

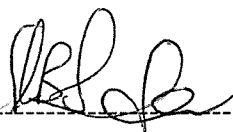
This report may not be reproduced except in full.

Methodology: USEPA 1623 (modified) Filta-Max filtration/ Immunomagnetic Separation/Fluorescent Antibody Detection.

Additional comments:

Infectivity assay completed on *Cryptosporidium* oocysts isolated and these were found to be non-infectious to HCT-8 cell-line used.

MicroAquaTech Laboratory Manager



Anthony Pita, NZCS

Date: 13 March 2014



Results/Detection Sheet

Received from: AFFCO Wairoa
C/- Argo Environmental Limited
P O Box 105774
AUCKLAND 1143

Date sample collected: 14 May 2014
Date sample received: 15 May 2014

MicroAquaTech Test No.	Location Site	Volume of Sample
2400	Affco Rangiruru – Pond Discharge	10L

MicroAquaTech is not responsible for the sampling and hence the sampling information is reported on an as received basis

Specific Description of Tests:

MicroAquaTech Test No.	2400
Test Description	Filta-Max Filtration/Immunomagnetic Separation/Fluorescent Antibody detection
Pellet Volume	1mL
Percentage of Pellet Analysed	100%

<i>Giardia</i> Confirmed (/10L)	<1/10L
--	--------

<i>Cryptosporidium</i> Confirmed (/10L)	4/10L
--	-------



Result Sheet For MicroAquaTech Test No: 2400

Notes

Presumptive results:

- Oo/cysts with apple green fluorescence, showing typical size and shape.
- Oo/cysts with 1-4 nuclei showing under DAPI stain.

Confirmed results:

- Oo/cysts with apple green fluorescence, showing typical size and shape.
- Oo/cysts with 1-4 nuclei showing under DAPI stain.
- Confirmation of internal structures under Differential Interference Contrast (DIC) microscopy.

ColorSeed recovery rates for *Giardia* in sample matrix: 27%

ColorSeed recovery rates for *Cryptosporidium* in sample matrix: 20%


This report may not be reproduced except in full.

Methodology: Filta-Max Filtration/ Immunomagnetic Separation/Fluorescent Antibody Detection.

Additional comments:

Infectivity assay completed on *Cryptosporidium* oocysts isolated and these were found to be non-infectious to HCT-8 cell-line used.

MicroAquaTech Laboratory Manager



Anthony Pita, NZCS

Date: 11 June 2014



Results/Detection Sheet

Received from: Argo Environmental Limited
P O Box 105774
AUCKLAND 1143

Order No:

Date sample collected: 13 August 2014
Date sample received: 14 August 2014

MicroAquaTech Test No.	Location Site	Volume of Sample
2422	Affco Rangiuru – Pond Inflow	5L
2423	Affco Rangiuru – Pond Outflow	5L

MicroAquaTech is not responsible for the sampling and hence the sampling information is reported on an as received basis

Specific Description of Tests:

MicroAquaTech Test No.	2422	2423
Test Description	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection
Pellet Volume	3mL	1mL
Percentage of Pellet Analysed	100%	100%
<i>Giardia</i> Confirmed (/10L)	<1/10L	3/10L**
<i>Cryptosporidium</i> Confirmed (/10L)	<1/10L	<1/10L

Result Sheet For MicroAquaTech Test No: 2422, 2423

Notes

Confirmed results:

-Oo/cysts with apple green fluorescence, showing typical size and shape.

-Oo/cysts with 1-4 nuclei showing under DAPI stain.

-Confirmation of internal structures under Differential Interference Contrast (DIC) microscopy.

	<u>2422</u>	<u>2423</u>
ColorSeed recovery rates for <i>Giardia</i> in sample water:	23%	26%
ColorSeed recovery rates for <i>Cryptosporidium</i> in sample water:	21%	20%

This report may not be reproduced except in full.

Methodology: USEPA 1623 (modified) Filta-Max filtration/ Immunomagnetic Separation/Fluorescent Antibody Detection.

Additional comments:

**Infectivity assay completed on *Giardia* cysts isolated and these were found to be non-infectious to HCT-8 cell-line used.

MicroAquaTech Laboratory Manager



Anthony Pita, NZCS

Date: 29 August 2014

Results/Detection Sheet

Received from: Argo Environmental Limited
P O Box 105774
AUCKLAND 1143

Order No:

Date sample collected: 13 November 2014
Date sample received: 14 November 2014

MicroAquaTech Test No.	Location Site	Volume of Sample
2455	Affco Rangiuru – Pond Inflow	5L
2456	Affco Rangiuru – Pond Outflow	5L

MicroAquaTech is not responsible for the sampling and hence the sampling information is reported on an as received basis

Specific Description of Tests:

MicroAquaTech Test No.	2455	2456
Test Description	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection
Pellet Volume	4mL	1mL
Percentage of Pellet Analysed	100%	100%

<i>Giardia</i> Confirmed (/10L)	<1/5L	<1/5L
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<i>Cryptosporidium</i> Confirmed (/10L)	4/5L*	2/5L**
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Result Sheet For MicroAquaTech Test No: 2455, 2456

Notes

Confirmed results:

-Oo/cysts with apple green fluorescence, showing typical size and shape.

-Oo/cysts with 1-4 nuclei showing under DAPI stain.

-Confirmation of internal structures under Differential Interference Contrast (DIC) microscopy.

	<u>2455</u>	<u>2456</u>
ColorSeed recovery rates for <i>Giardia</i> in sample water:	22%	28%
ColorSeed recovery rates for <i>Cryptosporidium</i> in sample water:	19%	27%

This report may not be reproduced except in full.


Methodology: USEPA 1623 (modified) Filta-Max filtration/ Immunomagnetic Separation/Fluorescent Antibody Detection.

Additional comments:

*Infectivity assay completed on *Cryptosporidium* oocysts isolated and these were found to be infectious to HCT-8 cell-line used.

**Infectivity assay completed on *Cryptosporidium* oocysts isolated and these were found to be non-infectious to HCT-8 cell-line used.

MicroAquaTech Laboratory Manager



Anthony Pita, NZCS

Date: 1 December 2014

Results/Detection Sheet

Received from: Argo Environmental Limited
P O Box 105774
AUCKLAND 1143

Order No:

Date sample collected: 4 February 2015
Date sample received: 5 February 2015

MicroAquaTech Test No.	Location Site	Volume of Sample
2462	Affco Rangiuru – Pond Inflow	5L
2463	Affco Rangiuru – Pond Outflow	5L

MicroAquaTech is not responsible for the sampling and hence the sampling information is reported on an as received basis

Specific Description of Tests:

MicroAquaTech Test No.	2462	2463
Test Description	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection
Pellet Volume	5mL	1mL
Percentage of Pellet Analysed	100%	100%

<i>Giardia</i> Confirmed (/10L)	<1/5L	<1/5L
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<i>Cryptosporidium</i> Confirmed (/10L)	2/5L**	2/5L**
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Result Sheet For MicroAquaTech Test No: 2462, 2463

Notes

Confirmed results:

- Oo/cysts with apple green fluorescence, showing typical size and shape.
- Oo/cysts with 1-4 nuclei showing under DAPI stain.
- Confirmation of internal structures under Differential Interference Contrast (DIC) microscopy.

	<u>2462</u>	<u>2463</u>
ColorSeed recovery rates for <i>Giardia</i> in sample water:	20%	25%
ColorSeed recovery rates for <i>Cryptosporidium</i> in sample water:	21%	23%

This report may not be reproduced except in full.

Methodology: USEPA 1623 (modified) Filta-Max filtration/ Immunomagnetic Separation/Fluorescent Antibody Detection.

Additional comments:

****Infectivity assay completed on *Cryptosporidium* oocysts isolated and these were found to be non-infectious to HCT-8 cell-line used.**

MicroAquaTech Laboratory Manager



Anthony Pita, NZCS

Date: 24 February 2015



Results/Detection Sheet

Received from: Argo Environmental Limited
P O Box 105774
AUCKLAND 1143

Order No:

Date sample collected: 19 May 2015
Date sample received: 21 May 2015

MicroAquaTech Test No.	Location Site	Volume of Sample
2499	Affco Rangiuru – Pond Inflow	5L
2500	Affco Rangiuru – Pond Outflow	5L

MicroAquaTech is not responsible for the sampling and hence the sampling information is reported on an as received basis

Specific Description of Tests:

MicroAquaTech Test No.	2499	2500
Test Description	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection
Pellet Volume	5mL	1mL
Percentage of Pellet Analysed	100%	100%

<i>Giardia Confirmed (/10L)</i>	<1/5L	<1/5L
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<i>Cryptosporidium Confirmed (/10L)</i>	2/5L**	<1/5L
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Result Sheet For MicroAquaTech Test No: 2499, 2500

Notes

Confirmed results:

- Oo/cysts with apple green fluorescence, showing typical size and shape.
- Oo/cysts with 1-4 nuclei showing under DAPI stain.
- Confirmation of internal structures under Differential Interference Contrast (DIC) microscopy.

	<u>2499</u>	<u>2500</u>
ColorSeed recovery rates for <i>Giardia</i> in sample water:	22%	24%
ColorSeed recovery rates for <i>Cryptosporidium</i> in sample water:	19%	20%

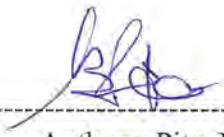
This report may not be reproduced except in full.

Methodology: USEPA 1623 (modified) Filta-Max filtration/ Immunomagnetic Separation/Fluorescent Antibody Detection.

Additional comments:

**Infectivity assay completed on *Cryptosporidium* oocysts isolated and these were found to be non-infectious to HCT-8 cell-line used.

MicroAquaTech Laboratory Manager



Anthony Pita, NZCS

Date: 9 June 2015



Results/Detection Sheet

Received from: Argo Environmental Limited
P O Box 105774
AUCKLAND 1143

Order No:

Date sample collected: 5 August 2015
Date sample received: 7 August 2015

MicroAquaTech Test No.	Location Site	Volume of Sample
2520	Affco Rangiuru – Pond Inflow	5L
2521	Affco Rangiuru – Pond Outflow	5L

MicroAquaTech is not responsible for the sampling and hence the sampling information is reported on an as received basis

Specific Description of Tests:

MicroAquaTech Test No.	2520	2521
Test Description	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection
Pellet Volume	5mL	2mL
Percentage of Pellet Analysed	100%	100%

<i>Giardia Confirmed (/10L)</i>	<1/5L	<1/5L
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<i>Cryptosporidium Confirmed (/10L)</i>	3/5L**	<1/5L
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Result Sheet For MicroAquaTech Test No: 2520, 2521

Notes

Confirmed results:

-Oo/cysts with apple green fluorescence, showing typical size and shape.

-Oo/cysts with 1-4 nuclei showing under DAPI stain.

-Confirmation of internal structures under Differential Interference Contrast (DIC) microscopy.

	<u>2520</u>	<u>2521</u>
ColorSeed recovery rates for <i>Giardia</i> in sample water:	21%	19%
ColorSeed recovery rates for <i>Cryptosporidium</i> in sample water:	20%	18%

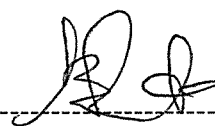
This report may not be reproduced except in full.

Methodology: USEPA 1623 (modified) Filta-Max filtration/ Immunomagnetic Separation/Fluorescent Antibody Detection.

Additional comments:

**Infectivity assay completed on *Cryptosporidium* oocysts isolated and these were found to be non-infectious to HCT-8 cell-line used.

MicroAquaTech Laboratory Manager



Anthony Pita, NZCS

Date: 10 September 2015



Results/Detection Sheet

Received from: Argo Environmental Limited
P O Box 105774
AUCKLAND 1143

Order No:

Date sample collected: 11 November 2015
Date sample received: 12 November 2015

MicroAquaTech Test No.	Location Site	Volume of Sample
2546	Affco Rangiuru – Pond Inflow	5L
2547	Affco Rangiuru – Pond Outflow	5L

MicroAquaTech is not responsible for the sampling and hence the sampling information is reported on an as received basis

Specific Description of Tests:

MicroAquaTech Test No.	2546	2547
Test Description	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection
Pellet Volume	5mL	2mL
Percentage of Pellet Analysed	100%	100%

<i>Giardia</i> Confirmed (/10L)	<1/5L	<1/5L
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<i>Cryptosporidium</i> Confirmed (/10L)	2/5L**	<1/5L
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Result Sheet For MicroAquaTech Test No: 2546, 2547

Notes

Confirmed results:

- Oo/cysts with apple green fluorescence, showing typical size and shape.
- Oo/cysts with 1-4 nuclei showing under DAPI stain.
- Confirmation of internal structures under Differential Interference Contrast (DIC) microscopy.

	<u>2546</u>	<u>2547</u>
ColorSeed recovery rates for <i>Giardia</i> in sample water:	22%	25%
ColorSeed recovery rates for <i>Cryptosporidium</i> in sample water:	23%	20%

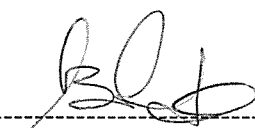
This report may not be reproduced except in full.

Methodology: USEPA 1623 (modified) Filta-Max filtration/ Immunomagnetic Separation/Fluorescent Antibody Detection.

Additional comments:

**Infectivity assay completed on *Cryptosporidium* oocysts isolated and these were found to be non-infectious to HCT-8 cell-line used.

MicroAquaTech Laboratory Manager



Anthony Pita, NZCS

Date: 2 December 2015



Results/Detection Sheet

Received from: Argo Environmental Limited
P O Box 105774
AUCKLAND 1143

Order No:

Date sample collected: 21 December 2015
Date sample received: 23 December 2015

MicroAquaTech Test No.	Location Site	Volume of Sample
2559	Affco Rangiuru – Pond Inflow	5L
2560	Affco Rangiuru – Pond Outflow	5L

MicroAquaTech is not responsible for the sampling and hence the sampling information is reported on an as received basis

Specific Description of Tests:

MicroAquaTech Test No.	2559	2560
Test Description	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection
Pellet Volume	6mL	1mL
Percentage of Pellet Analysed	100%	100%

<i>Giardia</i> Confirmed (/10L)	4/5L**	2/5L**
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<i>Cryptosporidium</i> Confirmed (/10L)	<1/5L	<1/5L
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Result Sheet For MicroAquaTech Test No: 2559, 2560

Notes

Confirmed results:

- Oo/cysts with apple green fluorescence, showing typical size and shape.
- Oo/cysts with 1-4 nuclei showing under DAPI stain.
- Confirmation of internal structures under Differential Interference Contrast (DIC) microscopy.

	<u>2559</u>	<u>2560</u>
ColorSeed recovery rates for <i>Giardia</i> in sample water:	20%	19%
ColorSeed recovery rates for <i>Cryptosporidium</i> in sample water:	22%	21%

This report may not be reproduced except in full.

Methodology: USEPA 1623 (modified) Filta-Max filtration/ Immunomagnetic Separation/Fluorescent Antibody Detection.

Additional comments:

**Infectivity assay completed on *Giardia* cysts isolated and these were found to be non-infectious to HCT-8 cell-line used.

MicroAquaTech Laboratory Manager



Anthony Pita, NZCS

Date: 14 January 2016



Results/Detection Sheet

Received from: Argo Environmental Limited
P O Box 105774
AUCKLAND 1143

Order No:

Date sample collected: 13 January 2016
Date sample received: 14 January 2016

MicroAquaTech Test No.	Location Site	Volume of Sample
2566	Affco Rangiuru – Pond Inflow	5L
2567	Affco Rangiuru – Pond Outflow	5L

MicroAquaTech is not responsible for the sampling and hence the sampling information is reported on an as received basis

Specific Description of Tests:

MicroAquaTech Test No.	2566	2567
Test Description	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection
Pellet Volume	6mL	1mL
Percentage of Pellet Analysed	100%	100%

<i>Giardia Confirmed (/10L)</i>	8/5L*	2/5L*
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<i>Cryptosporidium Confirmed (/10L)</i>	6/5L**	4/5L**
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Result Sheet For MicroAquaTech Test No: 2566, 2567

Notes

Confirmed results:

- Oo/cysts with apple green fluorescence, showing typical size and shape.
- Oo/cysts with 1-4 nuclei showing under DAPI stain.
- Confirmation of internal structures under Differential Interference Contrast (DIC) microscopy.

	<u>2566</u>	<u>2567</u>
ColorSeed recovery rates for <i>Giardia</i> in sample water:	24%	22%
ColorSeed recovery rates for <i>Cryptosporidium</i> in sample water:	19%	20%

This report may not be reproduced except in full.

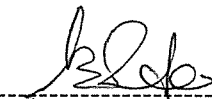
Methodology: USEPA 1623 (modified) Filta-Max filtration/ Immunomagnetic Separation/Fluorescent Antibody Detection.

Additional comments:

*Infectivity assay completed on *Giardia* cysts isolated and these were found to be non-infectious to HCT-8 cell-line used.

**Infectivity assay completed on *Cryptosporidium* oocysts isolated and these were found to be non-infectious to HCT-8 cell-line used.

MicroAquaTech Laboratory Manager



Anthony Pita, NZCS

Date: 1 February 2016



Results/Detection Sheet

Received from: Argo Environmental Limited
P O Box 105774
AUCKLAND 1143

Order No:

Date sample collected: 15 February 2016
Date sample received: 16 February 2016

MicroAquaTech Test No.	Location Site	Volume of Sample
2586	Affco Rangiuru – Pond Inflow	5L
2587	Affco Rangiuru – Pond Outflow	5L

MicroAquaTech is not responsible for the sampling and hence the sampling information is reported on an as received basis

Specific Description of Tests:

MicroAquaTech Test No.	2586	2587
Test Description	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection
Pellet Volume	5mL	2mL
Percentage of Pellet Analysed	100%	100%
<i>Giardia</i> Confirmed (/10L)	2/5L*	<1/5L
<i>Cryptosporidium</i> Confirmed (/10L)	2/5L**	2/5L**

Result Sheet For MicroAquaTech Test No: 2586, 2587

Notes

Confirmed results:

- Oo/cysts with apple green fluorescence, showing typical size and shape.
- Oo/cysts with 1-4 nuclei showing under DAPI stain.
- Confirmation of internal structures under Differential Interference Contrast (DIC) microscopy.

	<u>2586</u>	<u>2587</u>
ColorSeed recovery rates for <i>Giardia</i> in sample water:	24%	27%
ColorSeed recovery rates for <i>Cryptosporidium</i> in sample water:	19%	23%

This report may not be reproduced except in full.


Methodology: USEPA 1623 (modified) Filta-Max filtration/ Immunomagnetic Separation/Fluorescent Antibody Detection.

Additional comments:

****Infectivity assay completed on *Cryptosporidium* oocysts isolated and these were found to be non-infectious to HCT-8 cell-line used.**

***Infectivity assay completed on *Giardia* cysts isolated and these were found to be non-infectious to HCT-8 cell-line used.**

MicroAquaTech Laboratory Manager



Anthony Pita, NZCS

Date: 16 March 2016



Results/Detection Sheet

Received from: Argo Environmental Limited
P O Box 105774
AUCKLAND 1143

Order No:

Date sample collected: 22 March 2016
Date sample received: 23 March 2016

MicroAquaTech Test No.	Location Site	Volume of Sample
2621	Affco Rangiuru – Pond Inflow	5L
2622	Affco Rangiuru – Pond Outflow	5L

MicroAquaTech is not responsible for the sampling and hence the sampling information is reported on an as received basis

Specific Description of Tests:

MicroAquaTech Test No.	2621	2622
Test Description	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection
Pellet Volume	5mL	1mL
Percentage of Pellet Analysed	100%	100%

Giardia Confirmed (/10L)	5/5L**	4/5L**
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Cryptosporidium Confirmed (/10L)	4/5L*	2/5L*
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Result Sheet For MicroAquaTech Test No: 2621, 2622

Notes

Confirmed results:

- Oo/cysts with apple green fluorescence, showing typical size and shape.
- Oo/cysts with 1-4 nuclei showing under DAPI stain.
- Confirmation of internal structures under Differential Interference Contrast (DIC) microscopy.

	<u>2621</u>	<u>2622</u>
ColorSeed recovery rates for <i>Giardia</i> in sample water:	23%	21%
ColorSeed recovery rates for <i>Cryptosporidium</i> in sample water:	20%	19%

This report may not be reproduced except in full.

Methodology: USEPA 1623 (modified) Filta-Max filtration/ Immunomagnetic Separation/Fluorescent Antibody Detection.

Additional comments:

**Infectivity assay completed on *Giardia* cysts isolated and these were found to be non-infectious to HCT-8 cell-line used.

*Infectivity assay completed on *Cryptosporidium* oocysts isolated and these were found to be non-infectious to HCT-8 cell-line used.

MicroAquaTech Laboratory Manager



Anthony Pita, NZCS

Date: 15 April 2016



Results/Detection Sheet

Received from: Argo Environmental Limited
P O Box 105774
AUCKLAND 1143

Order No:

Date sample collected: 16 June 2016
Date sample received: 17 June 2016

MicroAquaTech Test No.	Location Site	Volume of Sample
2723	Affco Rangiuru – Pond Inflow	5L
2724	Affco Rangiuru – Pond Outflow	5L

MicroAquaTech is not responsible for the sampling and hence the sampling information is reported on an as received basis

Specific Description of Tests:

MicroAquaTech Test No.	2723	2724
Test Description	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection
Pellet Volume	4mL	1mL
Percentage of Pellet Analysed	100%	100%

<i>Giardia</i> Confirmed (/10L)	4/10L**	<1/10L
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<i>Cryptosporidium</i> Confirmed (/10L)	2/10L**	<1/10L
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Result Sheet For MicroAquaTech Test No: 2723, 2724

Notes

Confirmed results:

- Oo/cysts with apple green fluorescence, showing typical size and shape.
- Oo/cysts with 1-4 nuclei showing under DAPI stain.
- Confirmation of internal structures under Differential Interference Contrast (DIC) microscopy.

	<u>2723</u>	<u>2724</u>
ColorSeed recovery rates for <i>Giardia</i> in sample water:	20%	28%
ColorSeed recovery rates for <i>Cryptosporidium</i> in sample water:	19%	24%

This report may not be reproduced except in full.

Methodology: USEPA 1623 (modified) Filta-Max filtration/ Immunomagnetic Separation/Fluorescent Antibody Detection.

Additional comments:

**Infectivity assay completed on *Cryptosporidium* oocysts isolated and these were found to be non-infectious to HCT-8 cell-line used.

MicroAquaTech Laboratory Manager



Anthony Pita, NZCS

Date: 6 July 2016



Results/Detection Sheet

Received from: Argo Environmental Limited
P O Box 105774
AUCKLAND 1143

Order No:

Date sample collected: 23 September 2016
Date sample received: 24 September 2016

MicroAquaTech Test No.	Location Site	Volume of Sample
2882	Affco Rangiuru – Pond Outflow	5L
2883	Affco Rangiuru – Pond Inflow	5L

MicroAquaTech is not responsible for the sampling and hence the sampling information is reported on an as received basis

Specific Description of Tests:

MicroAquaTech Test No.	2882	2883
Test Description	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection
Pellet Volume	2mL	6mL
Percentage of Pellet Analysed	100%	100%

<i>Giardia Confirmed (/10L)</i>	2/10L**	4/10L**
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<i>Cryptosporidium Confirmed (/10L)</i>	2/10L**	6/10L**
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Result Sheet For MicroAquaTech Test No: 2882, 2883

Notes

Confirmed results:

- Oo/cysts with apple green fluorescence, showing typical size and shape.
- Oo/cysts with 1-4 nuclei showing under DAPI stain.
- Confirmation of internal structures under Differential Interference Contrast (DIC) microscopy.

	<u>2882</u>	<u>2883</u>
ColorSeed recovery rates for <i>Giardia</i> in sample water:	29%	23%
ColorSeed recovery rates for <i>Cryptosporidium</i> in sample water:	22%	20%

This report may not be reproduced except in full.

Methodology: USEPA 1623 (modified) Filta-Max filtration/ Immunomagnetic Separation/Fluorescent Antibody Detection.

Additional comments:

**Infectivity assay completed on *Cryptosporidium*/*Giardia* oo/cysts isolated and these were found to be non-infectious to HCT-8 cell-line used.

MicroAquaTech Laboratory Manager



Anthony Pita, NZCS

Date: 28 October 2016



Results/Detection Sheet

Received from: Argo Environmental Limited
P O Box 105774
AUCKLAND 1143

Order No:

Date sample collected: 19 December 2016
Date sample received: 21 December 2016

MicroAquaTech Test No.	Location Site	Volume of Sample
3022	Affco Rangiuru – Pond Inflow	5L
3023	Affco Rangiuru – Pond Outflow	5L

MicroAquaTech is not responsible for the sampling and hence the sampling information is reported on an as received basis

Specific Description of Tests:

MicroAquaTech Test No.	3022	3023
Test Description	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection
Pellet Volume	5mL	1mL
Percentage of Pellet Analysed	100%	100%
<i>Giardia Confirmed (/5L)</i>	6/5L**	3/5L**
<i>Cryptosporidium Confirmed (/5L)</i>	4/5L**	<1/5L

Result Sheet For MicroAquaTech Test No: 3022, 3023

Notes

Confirmed results:

- Oo/cysts with apple green fluorescence, showing typical size and shape.
- Oo/cysts with 1-4 nuclei showing under DAPI stain.
- Confirmation of internal structures under Differential Interference Contrast (DIC) microscopy.

	<u>3022</u>	<u>3023</u>
ColorSeed recovery rates for <i>Giardia</i> in sample water:	24%	32%
ColorSeed recovery rates for <i>Cryptosporidium</i> in sample water:	21%	27%


This report may not be reproduced except in full.

Methodology: USEPA 1623 (modified) Filta-Max filtration/ Immunomagnetic Separation/Fluorescent Antibody Detection.

Additional comments:

**Infectivity assay completed on *Cryptosporidium* and *Giardia* oo/cysts isolated and these were found to be non-infectious to HCT-8 cell-line used.

MicroAquaTech Laboratory Manager



Anthony Pita, NZCS

Date: 27 January 2017



Results/Detection Sheet

Received from: Argo Environmental Limited
P O Box 105774
AUCKLAND 1143

Order No:

Date sample collected: 11 January 2017
Date sample received: 14 January 2017

MicroAquaTech Test No.	Location Site	Volume of Sample
3074	Affco Rangiuru – Pond Inflow	5L
3075	Affco Rangiuru – Pond Outflow	5L

*MicroAquaTech is not responsible for the sampling and hence the
sampling information is reported on an as received basis*

Specific Description of Tests:

MicroAquaTech Test No.	3074	3075
Test Description	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection
Pellet Volume	4mL	1mL
Percentage of Pellet Analysed	100%	100%
Giardia Confirmed (/5L)	4/5L**	2/5L**
Cryptosporidium Confirmed (/5L)	<1/5L	2/5L**

Result Sheet For MicroAquaTech Test No: 3074, 3075

Notes

Confirmed results:

-Oo/cysts with apple green fluorescence, showing typical size and shape.

-Oo/cysts with 1-4 nuclei showing under DAPI stain.

-Confirmation of internal structures under Differential Interference Contrast (DIC) microscopy.

	<u>3074</u>	<u>3075</u>
ColorSeed recovery rates for <i>Giardia</i> in sample water:	27%	29%
ColorSeed recovery rates for <i>Cryptosporidium</i> in sample water:	25%	24%

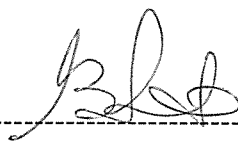
This report may not be reproduced except in full.

Methodology: USEPA 1623 (modified) Filta-Max filtration/ Immunomagnetic Separation/Fluorescent Antibody Detection.

Additional comments:

**Infectivity assay completed on *Cryptosporidium* and *Giardia* oo/cysts isolated and these were found to be non-infectious to HCT-8 cell-line used.

MicroAquaTech Laboratory Manager



Anthony Pita, NZCS

Date: 17 February 2017



Results/Detection Sheet

Received from: Argo Environmental Limited
P O Box 105774
AUCKLAND 1143

Order No:

Date sample collected: 23 February 2017
Date sample received: 24 February 2017

MicroAquaTech Test No.	Location Site	Volume of Sample
3148	Affco Rangiuru – Pond Inflow	5L
3149	Affco Rangiuru – Pond Outflow	5L

MicroAquaTech is not responsible for the sampling and hence the sampling information is reported on an as received basis

Specific Description of Tests:

MicroAquaTech Test No.	3148	3149
Test Description	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection
Pellet Volume	4mL	1mL
Percentage of Pellet Analysed	100%	100%

<i>Giardia</i> Confirmed (/5L)	15/5L*	12/5L*
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<i>Cryptosporidium</i> Confirmed (/5L)	<1/5L	<1/5L
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Result Sheet For MicroAquaTech Test No: 3148, 3149

Notes

Confirmed results:

- Oo/cysts with apple green fluorescence, showing typical size and shape.
- Oo/cysts with 1-4 nuclei showing under DAPI stain.
- Confirmation of internal structures under Differential Interference Contrast (DIC) microscopy.

	<u>3148</u>	<u>3149</u>
ColorSeed recovery rates for <i>Giardia</i> in sample water:	24%	25%
ColorSeed recovery rates for <i>Cryptosporidium</i> in sample water:	20%	22%

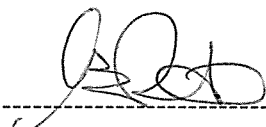
This report may not be reproduced except in full.

Methodology: USEPA 1623 (modified) Filta-Max filtration/ Immunomagnetic Separation/Fluorescent Antibody Detection.

Additional comments:

**Infectivity assay completed on *Giardia* oo/cysts isolated and these were found to be non-infectious to HCT-8 cell-line used.

MicroAquaTech Laboratory Manager



Anthony Pita, NZCS

Date: 17 March 2017

Results/Detection Sheet

Received from: Argo Environmental Limited
P O Box 105774
AUCKLAND 1143

Order No:

Date sample collected: 31 March 2017
Date sample received: 3 April 2017

MicroAquaTech Test No.	Location Site	Volume of Sample
3216	Affco Rangiuru – Pond Inflow	5L
3217	Affco Rangiuru – Pond Outflow	5L

MicroAquaTech is not responsible for the sampling and hence the sampling information is reported on an as received basis

Specific Description of Tests:

MicroAquaTech Test No.	3216	3217
Test Description	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection	FiltaMax/Immunomagnetic Separation/Fluorescent Antibody detection
Pellet Volume	5mL	1mL
Percentage of Pellet Analysed	100%	100%

Giardia Confirmed (/5L)	8/5L*	<1/5L
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Cryptosporidium Confirmed (/5L)	<1/5L	<1/5L
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Result Sheet For MicroAquaTech Test No: 3216, 3217

Notes

Confirmed results:

- Oo/cysts with apple green fluorescence, showing typical size and shape.
- Oo/cysts with 1-4 nuclei showing under DAPI stain.
- Confirmation of internal structures under Differential Interference Contrast (DIC) microscopy.

	<u>3216</u>	<u>3217</u>
ColorSeed recovery rates for <i>Giardia</i> in sample water:	22%	31%
ColorSeed recovery rates for <i>Cryptosporidium</i> in sample water:	19%	26%


This report may not be reproduced except in full.

Methodology: USEPA 1623 (modified) Filta-Max filtration/ Immunomagnetic Separation/Fluorescent Antibody Detection.

Additional comments:

**Infectivity assay completed on *Giardia* oo/cysts isolated and these were found to be non-infectious to HCT-8 cell-line used.

MicroAquaTech Laboratory Manager



Anthony Pita, NZCS

Date: 12 May 2017

ARGO ENVIRONMENTAL LIMITED

Auckland Office (New Zealand)

Level 2, O'Connell Street, Auckland Central, Auckland 0101

PO Box 105774, Auckland 1143, New Zealand

Tel +64 9 367 0631, Email: admin@argoenvironmental.com, Web www.argoenvironmental.com