World Health Organization

WHO International Scheme to Evaluate Household Water Treatment Technologies

Laboratory report

Product name:	The Sydney 905 Filter
Manufacturer:	Sydney 905 Filters (Pty) Ltd 4 Strelitzia Road Southport KwaZulu-Natal 4230 Republic of South Africa
Evaluation procedure:	Abbreviated laboratory testing: seal integrity verification
WHO designated testing laboratory	KWR Watercycle Research Institute, the Netherlands
WHO Scheme identification number	24/1/2020/R3-17
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Abbreviations and acronyms

ATCC	American Type Culture Collection
cfu	colony forming units
CTW	Challenge Test Water
E. coli	*Escherichia coli*
EN	European Standards
GDWQ	WHO Guidelines for Drinking-water Quality
GTW	General Test Water
HWT	Household Water Treatment
ISO	International Organization for Standardization
L	Litre
mL	millilitre
NEN	the Royal Netherlands Standardization Institute
pfu	plaque forming units
QMRA	quantitative microbial risk assessment
TOC	total organic carbon
the Scheme	WHO International Scheme to Evaluate Household Water Treatment Technologies
UN	United Nations
WHO	World Health Organization

Summary

This report summarizes the results of laboratory testing of a membrane ultrafilter known by the tradename 'the Sydney 905 Filter', under Round III of the World Health Organization (WHO) International Scheme to Evaluate Household Water Treatment Technologies (the Scheme). The device was tested at a WHO-designated testing laboratory, KWR Watercycle Research Institute, in the Netherlands.

Evaluation of the Sydney 905 Filter was based on a review of existing data and an abbreviated laboratory test aimed at evaluating seal integrity. Laboratory testing followed the requirements of the WHO protocol for filtration technologies, and investigated its ability to reduce bacteria (*Escherichia coli)* and viruses *(*coliphages MS2 and phiX174*)* in microbiological challenge water. For size exclusion filters, the Scheme testing protocol allows for the protozoan pathogen reduction to be assigned based on the bacterial reduction achieved. As such, no testing against protozoan pathogens was conducted.

For the laboratory test, three sample units of the Sydney 905 Filter were operated according to the manufacturer's use instructions and tested in General Test Water, and samples were analysed in triplicate.

The Sydney 905 Filter achieved mean $\log_{10}$ reductions of 7.1 for *Escherichia coli*; 0.0 for MS2; and 0.0 for phiX174.

1 Introduction

1.1 Overview of the Scheme

The International Scheme to Evaluate Household Water Treatment Technologies (the Scheme) was established by the World Health Organization (WHO) to coordinate independent and consistent evaluation of the microbiological performance of household water treatment (HWT) technologies. The results of the evaluation are used to guide procuring United Nations (UN) agencies and Member States in the selection of these technologies.

Evaluation of HWT technologies under the Scheme is based on the performance criteria set forth in *Evaluating household water treatment options: health-based targets and microbiological performance specifications* (WHO, 2011), referred to as the HWT recommendations.

1.2 Test organisms and performance classification

The HWT recommendations evaluate microbial treatment efficacy against viruses, bacteria, and protozoan oocysts against three descending levels of performance (Table 1): ★★★ (three-star); ★★ (two-star); and ★ (one-star). Both three- and two-star products are classified as providing *Comprehensive protection* against all three microbial groups. One-star products are those that meet performance targets for only two of the three microbial groups, and are classified as providing *Targeted protection*. Performance that does not meet the minimum level is awarded no stars.

Table 1: WHO microbial performance recommendations for HWT technologies

Performance classification	Required $\log_{10}$ reduction			Interpretation (with correct and consistent use)
	Bacteria *Escherichia coli*	**Viruses** MS2 and phiX174	**Protozoa** *Cryptosporidium parvum*	
★★★	≥ 4	≥ 5	≥ 4	Comprehensive protection
★★	≥ 2	≥ 3	≥ 2	
★	Meets at least 2-star (★★) criteria for two classes of pathogens			Targeted protection
-	Fails to meet WHO performance criteria			Little or no protection

Note:
$\log_{10}$ reduction refers to the reduction in concentration of pathogens in drinking-water:
1 $\log_{10}$ = 90% reduction;
2 $\log_{10}$ = 99% reduction;
3 $\log_{10}$ = 99.9% reduction, etc.

These criteria were determined by applying the concept of tolerable burden of disease (acceptable risk) as set forth in the fourth edition of the WHO Guidelines for Drinking-water Quality (GDWQ) (WHO, 2017). Using quantitative microbial risk models described in the GDWQ and assuming background levels of reference pathogens in untreated water, reductions of pathogens were calculated to meet these health-based targets.

Based on the best available evidence and WHO's discretion, the microbial groups used in the performance evaluation may be reduced as outlined in the Harmonized Protocol (WHO, 2020). Filtration technologies based primarily on size exclusion are generally effective against protozoa, the largest in diameter of the targeted pathogen classes. For example, *Cryptosporidium parvum* is 3-5 microns in diameter, *Escherichia coli* (*E. coli)* is 0.25 microns in diameter and the phages MS2 and phiX174 are approximately 24 nm and, 27 nm, respectively, in diameter. Thus, if filters are able to physically remove the smaller viruses and bacteria, it can be logically assumed they will also

remove the relatively much larger protozoan microbes. Thus, for filters that are based solely on size exclusion therefore it may be acceptable to base the evaluation on the product's reduction performance for the bacteria and virus microbial groups only.

Each production unit should consistently meet or exceed the performance target for each microbial group, and in both General Test Water (GTW) and Challenge Test Water (CTW). However, a maximum deviation of 0.2 $\log_{10}$ is acceptable for 25% of sample points at the two-star performance tier, and 0.4 $\log_{10}$ at the three-star performance tier[1]. This means that for classification as a two-star product, up to three of the twelve sample points can achieve a reduction of 1.8 $\log_{10}$ for bacteria or protozoan cysts (instead of 2 $\log_{10}$), or 2.8 $\log_{10}$ for viruses (instead of 3 $\log_{10}$). Each phage is treated separately for evaluating acceptable allowance, and the overall claim for viruses is based on the lower performing phage.

1.3 Evaluation procedure

Evaluation under the Scheme is based on the voluntary submission of an expression of interest to WHO by the product manufacturer. WHO works with an Independent Advisory Committee (IAC)[2] to the Scheme in reviewing expressions of interest, developing testing protocols and reviewing testing results. Testing is conducted at WHO designated testing laboratories[3], according to WHO harmonized testing protocols. More information on the Scheme evaluation procedure can be found on the WHO website[4].

1.4 Product description

The Sydney 905 Filter is a 0.1 micron hollow-fibre membrane microfiltration device. The filter can be plumbed to a pressurized water supply, or connected to a raw water reservoir outlet such as a bucket or water tank and operated by gravity flow. The full product description, illustrations and use instructions can be found on the product website: www.safewater4u.com.

[1] These cut-off values were determined using QMRA modelling and selecting ranges that still resulted in appreciable health gains within a specific performance tier

[2] Terms of reference for the IAC can be found here: http://www.who.int/water_sanitation_health/water-quality/household/scheme-iac/en/

[3] Criteria for designated testing laboratories can be found here: http://www.who.int/water_sanitation_health/water-quality/household/testing-laboratories/en/

[4] http://www.who.int/water_sanitation_health/water-quality/household/scheme-household-water-treatment/en/

2 Methods and procedures

This report summarizes the laboratory testing of the Sydney 905 Filter. The laboratory testing of the Sydney 905 Purifier is summarized in a separate report.

The manufacturer, Sydney 905 Filters (Pty) Ltd submitted robust test data for the Sydney 905 Filter filtration media that allowed the Scheme testing to be abbreviated to a seal integrity test following the method detailed in the WHO Scheme *Testing Protocol for Filtration Technologies V 3.2*. This abbreviated testing procedure allows for verification of the product's sealing mechanisms that prevent untreated water from bypassing the filtration media.

A product specific test plan was developed based on the WHO *Testing Protocol for Filtration Technologies V 3.2 (2020)* and the WHO *Harmonized Testing Protocol: Technology Non-Specific Version 3.0 (2019)*. The product specific test plan was reviewed by WHO and the manufacturer prior to finalization and test initiation, and is attached as Appendix A.

2.1 Test organisms

The test organisms were *Escherichia coli* (*E. coli*), representing bacterial pathogens; and coliphages MS2 and phiX174 were used to represent viral pathogens. For size exclusion filters, the Scheme *Testing Protocol for Filtration Technologies* allows for the protozoan pathogen reduction to be assigned based on the bacterial reduction achieved. As such, no testing against protozoan pathogens was conducted.

2.2 System wetted components or product ingredients

Appendix B shows the information provided by the manufacturer on the device wetted components. Materials in contact with drinking water must comply with WHO Guidelines for Drinking-water Quality (2017). The responsibility of verifying compliance is outside the scope of this test and report, however the information in this report provides documentation of the exact formulation tested and unless further discussion is provided, the results held in this report shall only be considered appropriate for the exact formulation. Changes to these ingredients require review by WHO.

2.3 Test configuration

Figure 1 shows the filter cartridges and accessories.

Fig. 1: the Sydney 905 Filter as received

Figure 2 shows the test configuration, including the water meter.

Fig. 2: Test configuration

2.4 Product-specific test plan

A product specific test plan, based on the technology and use pattern relevant HWT Scheme technology test plan, was required to detail the exact testing procedures and required approval by the WHO prior to testing.

2.4.1 Test Procedure

Three sample units of the Sydney 905 Filter were selected for testing. The units were tested in General Test Water (GTW), simulating high quality groundwater with low turbidity. The second test water – Challenge Test Water (CTW) – specified in the WHO Scheme filtration protocol was not used for this test. Details on the test water specifications are provided in the WHO Scheme *Testing Protocol for Filtration Technologies V 3.2*, and the test water characteristics for the current test are attached as Appendix C.

The test units were plumbed to a supply line in the testing laboratory (see Fig. 2) and were operated according to the manufacturer's usage instructions. The test duration was one day. The filter units were saturated with water using minimum pressure, for 30 seconds. The volumes were measured with a water meter, except during seeding and sample taking when a measuring cup was used.

During the test the pressure on the system was constantly monitored, and the speed of the pump was adjusted to maintain a maximum pressure of 4.5 Bar. To prevent the water hammer exceeding normal use, the valve included by the manufacturer was used for each cycle. In addition, at the start of each test day and after backwashing the pump speed was increased gradually for each unit to prevent high pressures.

Pre-treatment and post-treatment water grab samples were analyzed using the methods identified in the WHO Scheme *Testing Protocol for Filtration Technologies*.

3 Results

3.1 Microbial inactivation data

The following tables provide the geometric mean of the triplicate samples for all samples and log reduction at each microbiological challenge sample collection point.

3.1.1 Bacteria inactivation data

E. coli

The *E. coli* (ATCC 11229) was prepared using the method specified in Asburg, E.D. Methods of Testing Sanitizers and Bacteriostatic Substances; in Disinfection, Sterilization, and Preservation (Seymour S. Block, ed. 1983). The samples were assayed in triplicate with m-Endo medium using Method 9222B in Standard Methods for the Examination of Water and Wastewater (APHA, 2012). Table 2 shows the *E. coli* reduction data.

Table 2: *E. coli* reduction data

Challenge point	Sample	*E. coli* (cfu/ mL)	Log reduction
GTW: test start	Influent	4.3×10^5	-
	Unit 1 effluent	0.02	7.3
	Unit 2 effluent	< 0.01	> 7.6
	Unit 3 effluent	5.8	4.9
GTW: test end	Influent	5.9×10^5	-
	Unit 1 effluent	< 0.01	> 7.8
	Unit 2 effluent	< 0.01	> 7.8
	Unit 3 effluent	0.05	7.1
Mean			**7.1**

The influent concentrations were slightly below the targeted 1×10^6, but were sufficient to allow for the demonstration of log reductions that exceeded the required minimum performance target. As such, the slightly lower pre-treatment challenge had no consequences on the results.

E. coli log reductions across the three units tested ranged from 4.9 to >7.8, with a mean log reduction of 7.1. Raw data are attached as Appendix D.

3.1.2 Virus reduction data

MS2

The coliphage MS2 (ATCC 15597-B1) was prepared and assayed using: NEN-EN-ISO 10705-1 (Detection and enumeration of bacteriophages Part 1: Enumeration of F-specific RNA bacteriophage). The host organism was *Salmonella typhimurium* (WG49). Table 3 shows the MS2 reduction data.

Table 3: MS2 reduction data

Challenge point	Sample	MS2 (pfu/ mL)	Log reduction
GTW: test start	Influent	3.3×10^5	-
	Unit 1 effluent	2.9×10^6	0.0*
	Unit 2 effluent	3.7×10^6	0.0*
	Unit 3 effluent	3.2×10^6	0.0*
GTW: test end	Influent	6.7×10^5	-
	Unit 1 effluent	1.3×10^6	0.0*
	Unit 2 effluent	2.2×10^6	0.0*
	Unit 3 effluent	2.4×10^6	0.0*
Mean			0.0*

[1]Influent challenge sufficient to demonstrate targeted log reduction

* Recorded values ranged from -1.0 to -0.3, and are reported as no reduction (0.0). The negative values are reflective of no microbial reduction and the error range inherent in the method.

None of the units demonstrated reductions in MS2. The mean log reduction was 0.0.

phiX174

The coliphage phiX174 (ATCC 13706-B1) was prepared and assayed using: NEN-EN-ISO 10705-2 (Detection and enumeration of bacteriophages Part 2: Enumeration of somatic coliphages). The host organism was *E. coli* ATCC 13706 (WG5). Table 4 shows the phiX174 reduction data. Raw data are attached as Appendix D.

Table 4: phi-X174 reduction data

Challenge point	Sample	phiX174 (pfu/ mL)	Log reduction
GTW: test start	Influent	2.2×10^5	-
	Unit 1 effluent	2.4×10^5	0.0
	Unit 2 effluent	2.2×10^5	0.0
	Unit 3 effluent	1.8×10^5	0.1
GTW: test end	Influent	1.9×10^5	-
	Unit 1 effluent	1.8×10^5	0.0
	Unit 2 effluent	2.4×10^5	0.0*
	Unit 3 effluent	2.4×10^5	0.0*
Mean			0.0*

[1]Influent challenge sufficient to demonstrate targeted log reduction

*Recorded values are -1.0, but are reported as no reduction (0.0). The negative values are reflective of no microbial reduction and the error range inherent in the method.

Overall, there were no reductions demonstrated with the exception of Unit 3, which showed a slight reduction at the start of the test. The mean log reduction was 0.0. Raw data are attached as Appendix D.

3.2 System flow, pressure and operation data

Table 5 shows the total volumes processed for each unit. The volumes were measured with a water meter, except during seeding and sample taking when a measuring cup was used.

Table 5: Flow rates and volumes processed

	Unit 1	Unit 2	Unit 3
Flow rate (L/min)	8.3	8.3	8.4
Volume processed (L)	100	100	100

The pressure on the system was constantly monitored during the test. The pressure at the beginning of the 2 min cycle (start pressure) was in some cases higher than later on. When the pressure was getting towards 4.5 Bar the pump speed was decreased as soon as possible. Detailed data on processed volumes and pressures are included in Appendix D.

3.3 Water chemistry data

The following methods of analysis were used:

- Chlorine (total): SM 4500-Cl G or UNE-EN ISO 7393-1
- pH: SM 4500 H+ B
- Turbidity: EPA 180.1
- Temperature: SM 2550
- TDS: SM 2540C
- Alkalinity: SM 2320-B
- TOC: humic or tannic acid addition to the test water volume is to be weighted out based on the carbon content of the humic or tannic acid and is calculated to be within the test water specification range. As an alternate, SM 5310C, in GTW (lower TOC) may be used.

3.3.1 Test water characteristics

All GTW characteristics were within specifications.

3.4 Controls

All controls were per the product-specific test plan and as required by ISO 17025. For all methods both test water blanks and product blanks were negative. Positive controls for *E. coli*, MS2 and PhiX174 phages all complied with the quality control requirements. Data on test water characteristics are attached as Appendix C.

4 Conclusion

Testing was completed in accordance with the product specific test plan (Appendix A), and the Evaluating household water treatment options: health-based targets and specifications (WHO, 2011). The Sydney 905 Filter achieved mean $\log_{10}$ reductions of 7.1 for *E. coli*; 0.0 for MS2; and 0.0 for phiX174.

Resources

WHO (2011). Evaluating household water treatment options: health-based targets and microbiological performance specifications. Geneva: World Health Organization (https://apps.who.int/iris/handle/10665/44693).

WHO (2017). Guidelines for drinking-water quality, fourth edition incorporating first addendum. Geneva: World Health Organization (https://apps.who.int/iris/handle/10665/254637).

WHO (2018) Procedure for evaluation: WHO International Scheme to Evaluate Household Water Treatment Technologies. Geneva: World Health Organization (https://www.who.int/tools/international-scheme-to-evaluate-household-water-treatment-technologies/how-it-works).

WHO (2019). Harmonized testing protocol: technology non-specific version 3.0. Geneva: World Health Organization (https://www.who.int/tools/international-scheme-to-evaluate-household-water-treatment-technologies/resources).

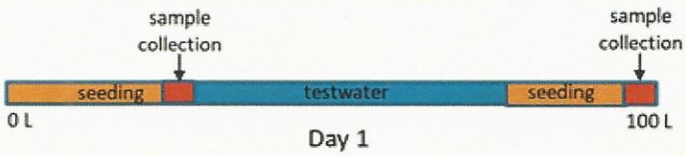
WHO (2020). Filtration Technology Testing Protocol. Geneva: World Health Organization (https://www.who.int/tools/international-scheme-to-evaluate-household-water-treatment-technologies/resources).

Appendix A: Product-specific test plan

Sydney 905 Filter 0,1 micron

ABBREVIATED

Points of attention	
HWT device	The 3 units will be installed in a pipe system, at the the end of the water supply feed using the supplied tap (see photo's installation).
Testing Water	To be prepared daily, during the running period and used for testing within 24 hours.
Daily Volume	100 L per day per unit or 2 hours of flowing, whichever is met first.
Testing	To be carried out on consecutive days. Test water will be hosed pumped into a pipe system with 3 tabs a water pressure and water volume meter. Units will be flowing one at the time.
on/off cycling	After/before seeding and sampling of units 1, 2 and 3, a cycling of 2 mins on (flowing). /1 minutes off (no flowing) will be manually applied, for the remaining daily volume for unit 1, 2 and 3.
Conditioning	Saturate the filters with water with minimum pressure for half a minute.
Seeding	2 L of test water will be used for seeding.
Sampling	A 3 L sample will be collected and subsampled for microbiological analyses.
Flow rate	Will be determined with a water meter
Pressure	The pressure on the pipe system will be +/- 2.8 bar when the taps are closed (not exceeding 4.5 bar). The pressure during flowing will be recorded at the start and end of cycling.
Log	Log must be kept per unit of replacements events.



Day 1

		GTW	
		Mo	
	Seeding	Sampling at the start	Sampling at the end
		⑤ *	
		❷ *	❷
UNIT 1	V	❶	❶
UNIT 2	V	❶	❶
UNIT 3	V	❶	❶
Total MB/day		4	4
Total chem/day		1	0

UNIT 1	Sydney 905 Filter

❶ Effluent sample
❷ Pre-treatment sample
⑤ Test Water Characteristics sample
* possible combined with 0,01 test

Parameters

	Treatment process	Microbiological Parameter *					Other	
		E. coli	MS-2	PhiX-174	Crypto Enumeration	Crypto Infectivity	Residual samples	total
	Gravity flow batch system, with ceramic filter	440 ml	8 ml	8ml				456 ml

* Volume for processing in triplicate and a retain volume (ml)

Microbiological samples:

For tested microorganisms (MO) see parameters table above.

❶ **Effluent sample**
To determine the efficiency of the tested system, concentration of MO to be compared with ❷

❷ **Pre-treatment sample**
To determine the influent or pretreatment concentration of MO in the spiked test water.
To be collected immediately after ❶ and stored in the dark at 5±3°C.

Chemical samples

③ **Test Water Characteristics sample**
After preparation of the test waters, it should be tested for Chlorine, pH, TOC Turbidity, Temp, TDS and Alkalinity.
This should meet the specifications as mentioned in het test water tables

0,1 MICRON (Abbriviated)

List of samples per type

	Microbiology	Spiked	Pre/Post treatment	GTW/CTW
❶	Effluent sample unit 1 Start	YES	POST	G
	Effluent sample unit 1 End	YES	POST	G
	Effluent sample unit 2 Start	YES	POST	G
	Effluent sample unit 2 End	YES	POST	G
	Effluent sample unit 3 Start	YES	POST	G
	Effluent sample unit 3 End	YES	POST	G
❷	Pre-treatment sample Start	YES	PRE	G
	Pre-treatment sample End	YES	PRE	G
	Chemical			
③	Test water Characteristics	NO	PRE	G

List of samples chronologically

Day		Samples	Spiked	Pre/Post treatment	GTW/CTW
1	③	Test water Characteristics	NO	PRE	G
	❷	Pre-treatment sample Start	YES	PRE	G
	❶	Pre-treatment sample End	YES	PRE	G
	❶	Effluent sample unit 1 Start	YES	POST	G
	❶	Effluent sample unit 1 End	YES	POST	G
	③	Effluent sample unit 2 Start	YES	POST	G
	❷	Effluent sample unit 2 End	YES	POST	G
		Effluent sample unit 3 Start	YES	POST	G
	❶	Effluent sample unit 3 End	YES	POST	G

Appendix B: System wetted components

SYSTEM WETTED AND PERFORMANCE IMPACTING COMPONENTS[1]				
Component	**Manufacturer**	**Model/Specifications**	**Material**	**WHO review** *(WHO to complete)*
Example: Gasket	Company XYZ	Model # 12345	FDA Silicone, 21 CFR.177.2600	
Inlet Casing			Homopolymer Polypropylene	
Outlet Casing			Homopolymer Polypropylene	
Hollow Fibre Module Case			ABS	
Hollow Fibres			Polyolefin/Polysulfone	
Hollow Fibre's Sheath			Polyester	
Hollow Fibre Potting Resin			Polyurethane	

[1]Changes to components or processing from that tested shall require review by the WHO for consideration of additional testing to qualify changed components in a tested system

Appendix C: Test water characteristics

Test water characteristics

Analysis	Units	GTW
		LMC-106808-SYNTH
		10-15-2020
pH	pH	6.9
Temperature (pH)	°C	20.0
TOC	mg C/l	1.2
Turbidity	FNE	<0.10
Total dissolved solids (TDS)	mg/l	225
Alkalinity	mg CaCO3/l	96

Appendix D: Raw data and bench sheets

Unit 1	Water meter	Water count (L)	Processed volume/ cycle (L)	Start pressure (Bar)	Pressure (Bar)
Seeding & sample taking (Start)		5	5		
Start	39	5	0	2,5	1
Cycle 1 (2 min)	57	23	18		1
Cycle 2 (4 min)	73	39	16		
Cycle 3 (6 min)	89	55	16		1,2
Cycle 4 (8 min)	105	71	16	4,5	1
Cycle 5 (10 min)	122	88	17	2	0,8
Final cycle	129	95	7		0,9
Seeding & sample taking (end)		100	5		
Avarage flow rate L/min 8,3					

Unit 2	Water meter	Water count (L)	Processed volume/ cycle (L)	Start pressure (Bar)	Pressure (Bar)
Seeding & sample taking (Start)		5	5		
Start	129	5	0	2,5	1
Cycle 1 (2 min)	146	22	17	3,5	0,6
Cycle 2 (4 min)	162	38	16	3	0,6
Cycle 3 (6 min)	179	55	17	3	0,9
Cycle 4 (8 min)	194	70	15	4	0,8
Cycle 5 (10 min)	212	88	18	4	0,6
Final cycle	219	95	7		
Seeding & sample taking (end)		100	5		
Avarage flow rate L/min 8,3					

Unit 3	Water meter	Water count (L)	Processed volume/ cycle (L)	Start pressure (Bar)	Pressure (Bar)
Seeding & sample taking (Start)		5	5		
Start	219	5	0	4	1
Cycle 1 (2 min)	236	22	17	4,3	0,6
Cycle 2 (4 min)	253	39	17	4	1
Cycle 3 (6 min)	269	55	16	3,5	0,6
Cycle 4 (8 min)	286	72	17	4,2	0,6
Cycle 5 (10 min)	303	89	17	4	0,6
Final cycle	309	95	6		
Seeding & sample taking (end)		100	5		
Avarage flow rate L/min 8,4					

MS2 Results 0,1 Micron

Positive control (pfu)	81
Complies with requirements	Yes

Description	Test water	Sample code	Dilution factor	Tested volume (ml)	pfu	pfu	pfu	pfu/ ml
Pre-treatment control start	GTW	106695	10000	1	28	40	32	3,3E+05
Pre-treatment control end		106696	10000	1	56	70	74	6,7E+05
Unit 1 start		106697	10000	1	310	281	278	2,9E+06
Unit 1 end		106698	10000	1	154	126	113	1,3E+06
Unit 2 start		106699	10000	1	291	306	512	3,7E+06
Unit 2 end		106700	10000	1	241	197	222	2,2E+06
Unit 3 start		106701	10000	1	286	344	336	3,2E+06
Unit 3 end		106702	10000	1	286	293	147	2,4E+06

PhiX-174 Results 0,1 Micron

Positive control (pfu)	91
Complies with requirements	Yes

Description Day 1	Test water	Sample code	Dilution factor	Tested volume (ml)	pfu	pfu	pfu	pfu/ ml
Pre-treatment	GTW	106695	10000	1	23	25	18	2,2E+05
Pre-treatment		106696	10000	1	24	17	20	1,9E+05
Unit 1 start		106697	10000	1	23	18	29	2,4E+05
Unit 1 end		106698	10000	1	12	19	16	1,8E+05
Unit 2 start		106699	10000	1	21	17	27	2,2E+05
Unit 2 end		106700	10000	1	37	27	21	2,4E+05
Unit 3 start		106701	10000	1	17	16	19	1,8E+05
Unit 3 end		106702	10000	1	33	22	26	2,4E+05

E.coli Results 0,1 Micron

Positive control (pfu)	56
Complies with requirements	Yes

Description	Test water	Sample code	Dilution factor	Tested volume (ml)	cfu	cfu	cfu	cfu/ml
Pre-treatment control start	GTW	106695	1000	0,1	51	30	47	4,3E+05
Pre-treatment control end		106696	1000	0,1	60	51	67	5,9E+05
Unit 1 start		106697	1	100	1	0	5	2,0E-02
Unit 1 end		106698	1	100	0	0	0	< 1,0E-02
Unit 2 start		106699	1	100	1	0	0	< 1,0E-02
Unit 2 end		106700	1	100	0	0	0	< 1,0E-02
Unit 3 start		106701	1	10	61	57	55	5,8E+00
Unit 3 end		106702	1	100	3	5	7	5,0E-02