Water Quality Report 2003

The Jersey New Waterworks Company Limited

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1. EXECUTIVE SUMMARY

In 2003 the Company treated and distributed some 7,301 Million litres of drinking water to supply the needs of our customers.

The laboratory staff have taken 7,110 samples of water from, streams, reservoirs, treatment works, treated water reservoirs, the distribution system and from consumers taps for analysis, to ensure the water we supply is safe to drink.

The Company is governed by the Water (Jersey) Law 1972, which is administered by the States of Jersey Environment & Public Services Committee (E&PS). In 2003 the Company and E&PS had a Memorandum of Understanding (MOU) on water quality which required the Company to comply with the England & Wales Water Quality Regulations, except for nitrate where a dispensation is allowed.

In 2003, 99.7% of parameters analysed complied with the England and Wales water quality regulations.

Some 84% of samples taken for nitrate in the distribution system complied with the 50 mg/l limit the maximum concentration recorded was 55 mg/l which was well below the 70 mg/l limit set out in the dispensation we have within the MOU. The dispensation allows up to 33% of samples taken for nitrate to be greater than 50 mg/l but less than 70.

From the 1st January 2004 an amendment to the Water (Jersey) Law 1972 came into effect which sets out the quality parameters and maximum allowable concentrations (MAC). The parameters and MAC are based on the Water Supply (Water Quality) Regulations 2000 for England & Wales. The Company has applied for and been granted a dispensation in respect of Nitrate which allows it to operate, for the next five years, to the limits set out in the MOU in force prior to the amendment to the law.

There were no herbicides and pesticides in the drinking water supplied above the MAC.

Over the past few years the Company has invested in the provision of on-line water quality monitoring systems at the outlet of the main reservoirs. These systems enable real-time information on 5 key water quality parameters (pH, nitrate, turbidity, dissolved oxygen and temperature) which allows our operational staff to choose the most suitable water for treatment.

The Company laboratory at Millbrook undertakes the majority of the physical, bacteriological and chemical analysis. The analysis of herbicides, pesticides, cryptosporidium, metals and radioactivity, which requires specialist analytical equipment, are undertaken by the Company's consulting analyst's laboratory in southern England.

Verification of water quality results are checked against duplicate samples analysed by the States of Jersey Analyst and the Company's Consulting Analyst's laboratory results.

The Company staff are subject to a strict code of hygiene to ensure the water we supply does not become contaminated. This code sets strict working rules for hygiene and also requires all employees who work within sensitive areas of the Company (treatment works, distribution and laboratory staff) to undergo regular medical checks to ensure they are not carriers of water-borne diseases. As a precautionary measure staff working in these areas, are not allowed to continue to work if they suffer from a gastric disorder or have travelled to a part of the world where water-borne disease is prevalent, until results from a medical check are known. Such meticulous attention to operational detail is a measure of the commitment made by the Company and its staff, to ensure that every effort is made to provide a safe and secure water supply.

Howard N Snowden

Managing Director & Engineer

2. THE WATER QUALITY TEAM

The Laboratory, Millbrook, St. Lawrence

The Company operates a comprehensive water quality laboratory facility at its Millbrook Depot, St Lawrence.

The team is headed by our Water Quality Manager, David Mayman who is a Chartered Chemist and a Member of the Royal Society of Chemistry. David is ably supported by an assistant, Anna Powell, and a laboratory technician Sarah Gavey. The two samplers, Keith Quemard and Bob Langford, collect some 7,000 samples each year, attend to customer queries and carry out sampling preparatory work in the laboratory.

The Laboratory staff from left to right;
Bob Langford, Keith Quemard, David Mayman,
Sarah Gavey and Anna Powell

The laboratory consists of a preparatory room with auto-claves for sterilisation of sample bottles and equipment, a bacteriological laboratory and chemical laboratory. The laboratory uses membrane type technology for bacteriological testing, which is more sensitive than the classic media type analytical process.

3. RAW WATER QUALITY

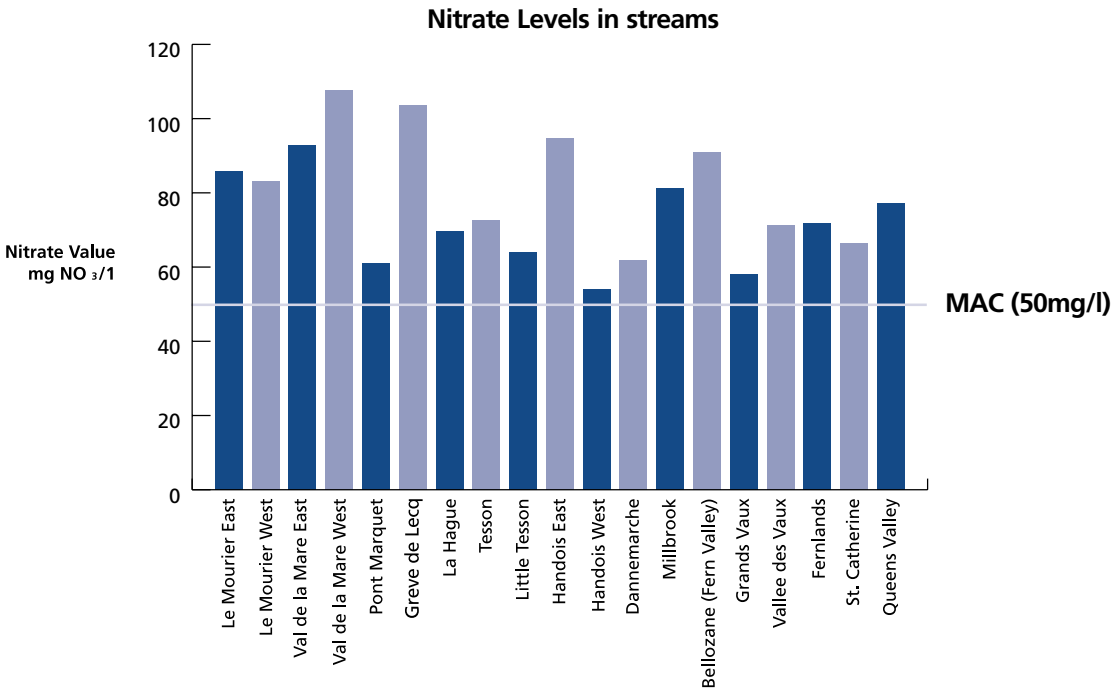
The Company derives the majority of its water from the collection of surface water streams. These streams either flow directly into the main reservoirs or are pumped from stream abstraction stations which are remote from the reservoirs.

Some 908 water samples were taken from stream sources and analysed for physical, bacteriological and chemical parameters. There were 24 herbicides and pesticides detected in water samples taken from the streams.

Val de la Mare Reservoir

Collecting water samples

The maximum levels of nitrates detected in streams are shown in the following graph.



4. TREATMENT WORKS & SERVICE RESERVOIR PERFORMANCE

Handois Treatment Works

The Company operates two treatment works located at Handois, St Lawrence and Augrés, Trinity. Both treatment works have identical treatment processes; a physio-chemical primary treatment system, which uses aluminium sulphate, followed by dual media rapid gravity filtration using sand and anthracite.

Disinfection is the key to a safe water supply. The use of chlorine in the water industry has been mandatory in England and Wales since 1945 and has resulted in the eradication of diseases which were caused by waterborne pathogens. Disinfection of the water in Jersey is carried out by the use of chlorine and ammonia. This process ensures a residual concentration of chlorine exists in the water throughout the relatively long and radial type distribution system to ensure bacteriological standards are maintained.

The results of analysis of water leaving the treatment works for key quality parameters and their respective Maximum Allowable Concentrations (MAC) are shown in the tables overfleaf.

Augrés Treatment Works

4. TREATMENT WORKS & SERVICE RESERVOIR PERFORMANCE CONTINUED

Compliance with Maximum Allowable concentrations (MAC)

Handois WTW

Parameter	Maximum concentration Detected	MAC	% compliance
E Coliform	0 (No.)	0	100
Coliforms	1 (No.)	0	99.9
Cryptosporidium	0 (No.)	1 oocyst in 10 litres	100
Turbidity	0.44 NTU	4.0 NTU	100
Chlorine	0.68 mg/l	*	100

Augrés WTW

Parameter	Maximum concentration Detected	MAC	% compliance
E Coliform	0 (No.)	0	100
Coliforms	0 (No.)	0	100
Cryptosporidium	0 (No.)	1 oocyst in 10 litres	100
Turbidity	0.47 NTU	4.0 NTU	100
Chlorine	0.48 mg/l	*	100

* There is no MAC for Chlorine. The World Health Organisation has a guideline value of 5mg/l.

The Company operates treated water reservoirs at Handois WTW, Augrés WTW and at Westmount Road, above St Helier. These reservoirs are provided to ensure adequate treated water is in-hand to supply our customers at periods of peak daily demand, which are normally 0700 to 0900 and 1700 to 1900 hours.

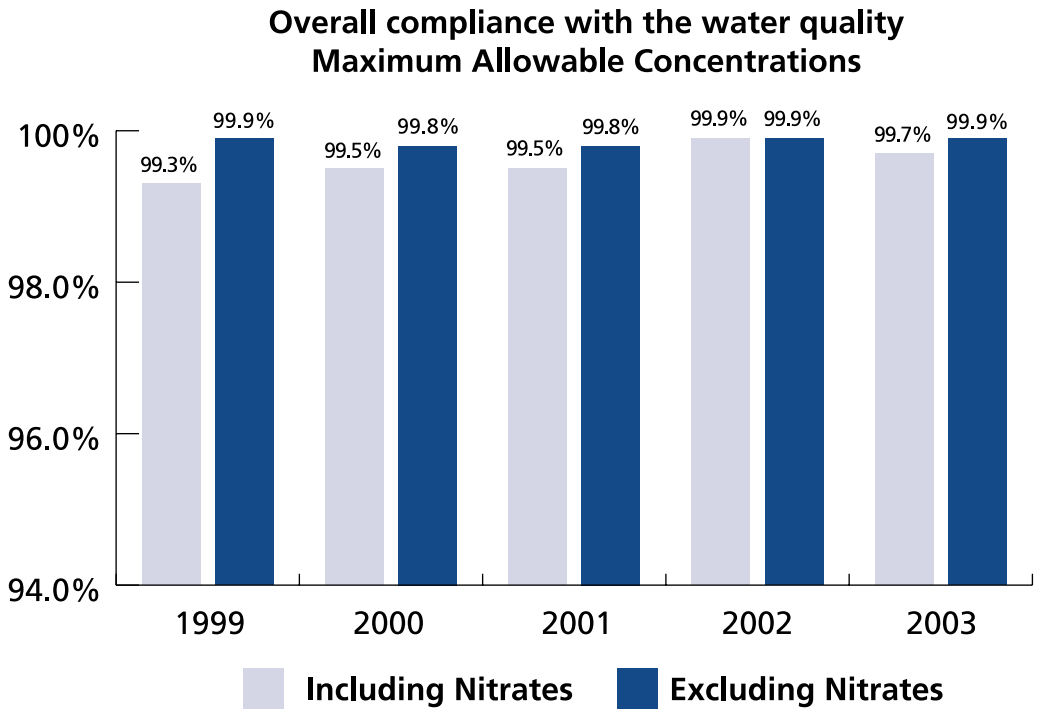
The bacteriological standards of water in the service reservoirs during 2003 is shown in the following table.

Service Reservoir	Total no of samples taken	MAC E Coli %	E Coli % compliance	MAC Coliforms %	Coliforms % compliance
Handois WTW	1,037	100	100	100	99.9
Augrés WTW	365	100	100	100	100
Westmount	347	100	100	95	100
Total	**1,749**		**100%**		**100**

5. WATER QUALITY IN THE DISTRIBUTION SYSTEM

In 2003 some 1,643 water samples were taken from all parts of the distribution system and analysed for physical, bacteriological and chemical standards. The following tables show the bacteriological results and the maximum, average, minimum, MAC concentrations and percentage compliance of samples taken from the distribution system.

Zone	No. of samples	% compliance with the Maximum Allowable Concentration (MAC)	
		Total coliforms	Faecal coliforms
Zone 1: East			
Random consumer taps	96	96.9%	99%
Fixed points	416	100%	100%
Total	**512**	**99.4%**	**99.8%**
Zone 2: West			
Random consumer taps	49	100%	100%
Fixed points	248	99.6%	100%
Total	**297**	**99.7%**	**100%**
Grand Total	**809**	**99.5%**	**99.9%**



PHYSICAL AND CHEMICAL QUALITY

Water in Distribution

Parameter	Maximum Allowable Concentration (MAC)	Concentration or value			No. of samples taken	% compliance with MAC
		Minimum	Mean	Maximum		
pH Value	6.5 – 9.5	7.0	7.4	8.3	210*f*	100%
Conductivity	1500 µSm/cm at 200C	464	596	690	131	100%
Turbidity	4 N.T.U.	0.11	0.32	1.12	131	100%
Nitrate *	50 mg NO_3/l	21.0	39.8	55.0	50	84%
Nitrite **	0.1 mg NO_2/l	0.001	0.025	0.238	132	93%
Ammonia	0.5 mg NH_4/l	<0.01	0.09	0.16	131	100%
Iron	200 µg Fe/l	<10	31	140	74	100%
Aluminium	200 µg Al/l	<20	<20	138	259	100%
Manganese	50 µg Mn/l	<20	<20	34.2	132	100%
Colour	20 Hazen Units	<0.69	4.3	5.0	131*f*	100%
Copper	3000 µg Cu/l	<4	61	632	74	100%
Lead	50 µg Pb/l	<1	5	36	74	100%
Zinc	5000 µg Zn/l	<6	30	152	74	100%
Chloride	400 mg Cl/l	50	72	110	131	100%
Dissolved Solids	1500 mg/l	270	409	483	131	100%
Oxidizability	5 mg O_2/l	0.10	0.37	0.71	127	100%
Total Hardness	mg $CaCO_3$/l no value	108	142	179	131	NA
Alkalinity	mg $CaCO_3$/l no value	44	60	86	131	NA
Residual Chlorine	mg Cl_2/l no value	<0.02	0.23	0.54	180*f*	NA

mg/l = milligrams per litre

µg/l = micrograms per litre

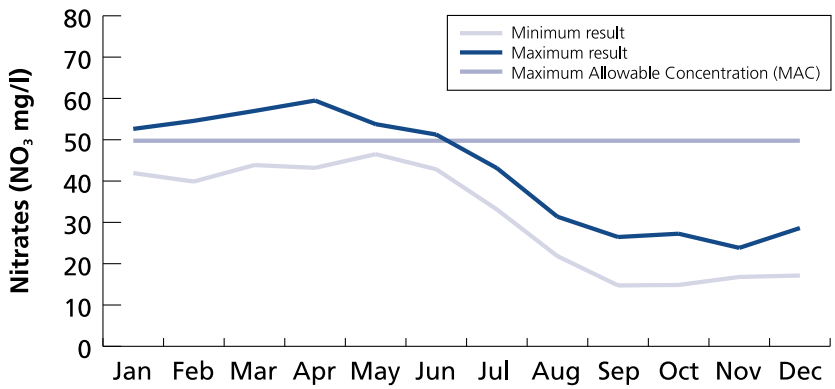
< = indicates the concentration is below the detection level of the test

f = in addition to the "compliance" chemical samples several hundred examinations were made for bacteriological and operational sampling purposes, all results were below the MAC.

*Nitrate: The MOU gives the Company a dispensation for nitrate of 33% of samples that can be over 50 mg/l, up to a limit of 70 mg/l.

**Nitrite: Provisional guideline of 3 mg NO2/l set by World Health Organisation Quality Guidelines 1995.

Nitrate Levels in Distribution 2003



PESTICIDE ANALYSIS

Water in Distribution

Parameter	Maximum Allowable Concentration (MAC)	Concentration or value			No. of samples taken	% compliance with MAC
		Minimum	Mean	Maximum		
Atrazine µg/l	0.1	<0.01	<0.01	0.012	8	100%
Simazine µg/l	0.1	<0.01	<0.01	0.011	8	100%
Propazine µg/l	0.1	<0.01	<0.01	0.028	8	100%
Terbuthylazine µg/l	0.1	<0.01	<0.01	0.021	8	100%
Cyanazine µg/l	0.1	<0.01	0.025	0.092	52	100%
Mecoprop µg/l	0.1	<0.01	<0.01	0.013	52	100%
Triclopyr µg/l	0.1	<0.01	<0.01	0.017	52	100%
Linuron µg/l	0.1	<0.01	<0.01	0.035	52	100%
Diuron µg/l	0.1	<0.01	0.010	0.074	52	100%
Carbetamide µg/l	0.1	<0.01	<0.01	0.018	52	100%
Dalapon µg/l	0.1	<0.01	0.013	0.047	9	100%

µg/l	=	micrograms per litre
<	=	indicates the concentration is below the detection level of the test.
UK	=	United Kingdom advisory limits quoted in "Water Quality Regulations 1989".
*UK	=	"likely advisory value", has been calculated by the Company consultants using a formula given in the "Water Regulations 1989". The calculations confirm the low toxicity of these particular pesticides.
WHO	=	advisory limits quoted in "World Health Organisation Quality Guidelines 1993".
NB		In addition to the above parameters, examinations were carried out for a further seventy one types of pesticides, the results of which were below the detection level of the tests.

6. WATER QUALITY COMPLAINTS

During 2003 we received some 144 queries from customers relating to water quality. The following table shows a break-down of these queries, from which it can be seen that there were 131 water quality complaints. The majority of these complaints were due to discolouration of the water resulting from old corroded steel and unlined cast iron pipes, some of which were privately owned pipe work which is not the responsibility of the Company.

All samples taken from customer queries undergo a full physical, bacteriological and chemical analyses, a detailed report is sent to the customer.

Type of query	Number	Bacteriological compliance %
Discoloured water	86	98.8
Taste/odour	24	91.6
Requests for analysis	13	100
Illness	3	100
Other	18	100
Total	144	97.8

Over the past three years the Company has committed increasing amount of funds to replace old unlined cast iron and steel pipe work in areas where water is becoming discoloured. In 2003 some 1.8 km of old water pipes were replaced with modern lined-pipes, which has improved water quality for customers in these areas.

The Company plans further investment in the renewal of old water pipes in future years.

The Laboratory team at work

7. NEW WATER MAINS

John Le Guilcher, Foreman Mainlayer (in the foreground) and his team laying a replacement 150mm diameter water main in Union Street, St Helier

Where new and replacement water mains are installed, they are disinfected, flushed and sampled to ensure that the pipe work is bacteriologically fit for operation. The water main is subjected to 3 separate samples, each 24 hours apart, to ensure bacteriological standards are satisfactory before the main is passed for operation.

In 2003 the laboratory took 232 samples from new and replacement water mains for analysis.

NOTES

The Jersey New Waterworks Company Limited

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WATER QUALITY

FOR THE YEAR ENDED 31 DECEMBER 2003

Microbiological quality

Water leaving treatment works

Supply point & average daily volume distributed from Works (Ml/d)	No. of samples	% compliance with the Maximum Allowable Concentration (MAC)	
		Total coliforms	Faecal coliforms
Handois (10.2 Ml/d)	1037	100%	100%
Augrès (9.7 Ml/d)	365	100%	100%
Total (19.9 Ml/d)	**1402**	**100%**	**100%**

Water in service reservoirs

Capacity of Reservoirs (Ml)	No. of samples	% compliance with the Maximum Allowable Concentration (MAC)	
		Total coliforms	Faecal coliforms
Westmount 9 Ml	347	100%	100%

Water in distribution

Zone	No. of samples	% compliance with the Maximum Allowable Concentration (MAC)	
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Total	**297**	**99.7%**	**100%**

Samples exceeding prescribed concentrations were immediately resampled for three consecutive days - recheck samples were clear.

WATER QUALITY CONTINUED

Physical and Chemical Quality

Water in Distribution

Parameter	Maximum Allowable Concentration (MAC)	Concentration or value			No. of samples taken	% compliance with MAC
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WATER QUALITY CONTINUED

Pesticides detected results in µg/litre

Water in Distribution

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