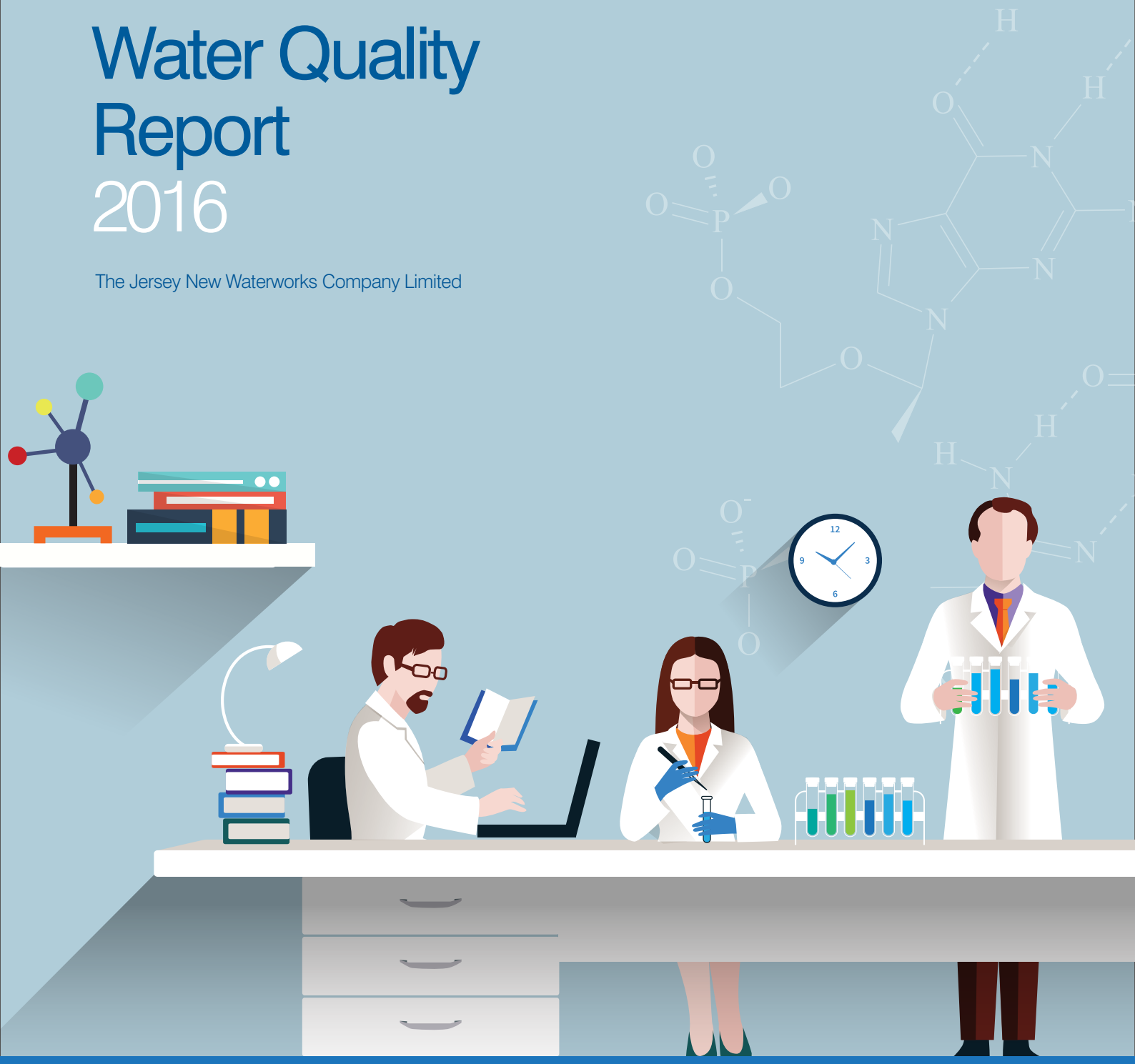
Water Quality Report 2016

The Jersey New Waterworks Company Limited



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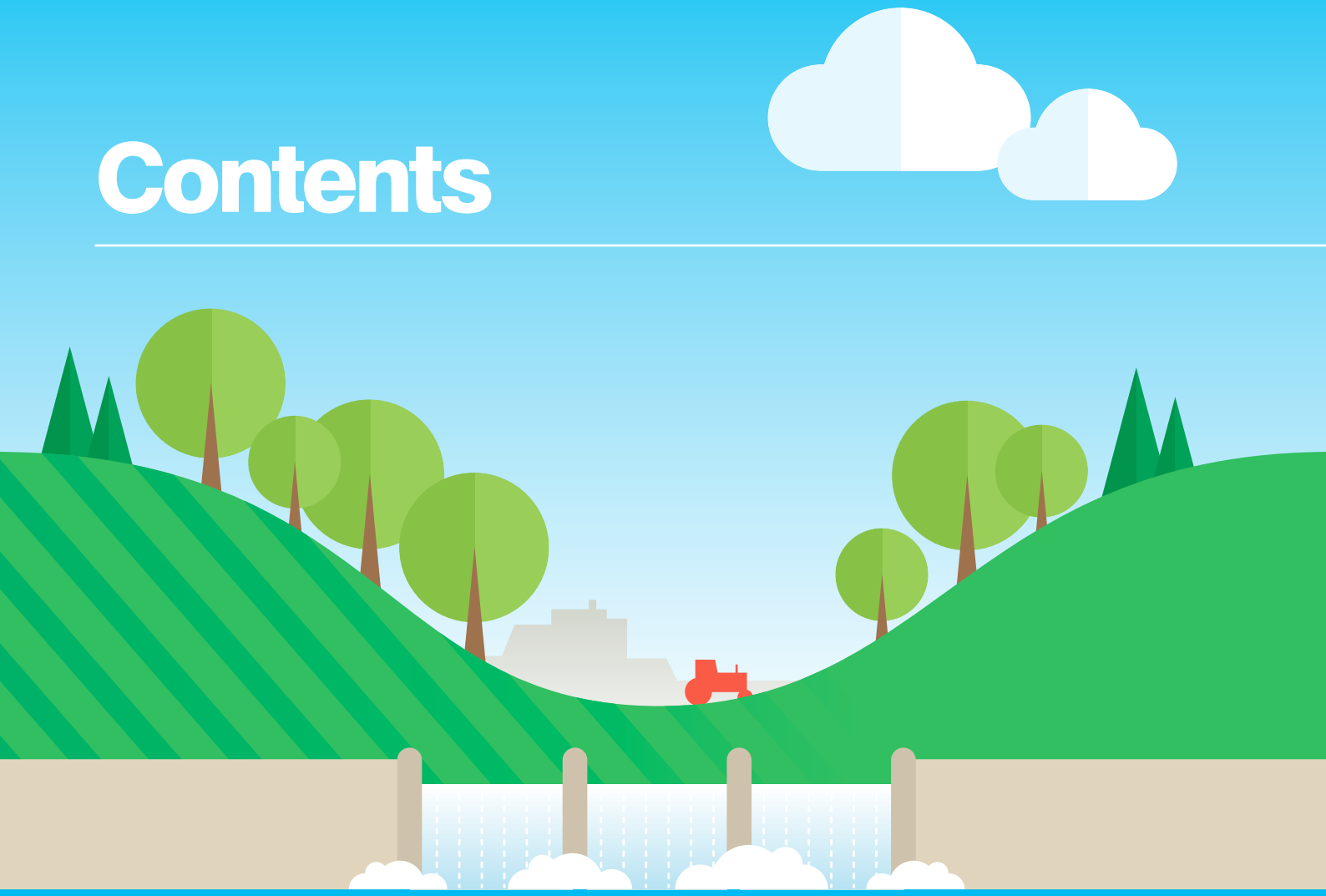


Executive summary

The quality of the treated water supplied by the Company during 2016 remained very high, despite the challenges with untreated water quality in the year. The rate of compliance with the water quality requirements of the Water (Jersey) Law 1972 was 99.99%, in line with the previous two years. The bacteriological compliance of water leaving the treatment works was 100% (2015: 100%). We completed 19,997 regulatory analyses on treated water in 2016 and just two were outside of their regulatory parameter but posed no risk to health.

As reported in the 2015 accounts, in early 2016 Jersey Water identified the presence of Oxadixyl, a pesticide last used in Jersey in 2003, and three other pesticides in raw water requiring Val de la Mare reservoir to be taken out of service for 15 weeks. Oxadixyl was found in water resources across the Island with the highest concentrations in the west and north-west. Readings taken at the treatment works indicate that concentrations reached a maximum of 0.1008ug/l at Handois Water Treatment Works in February 2016; just over the regulatory limit of 0.1ug/l and presenting no risk to health. Since then we have managed Oxadixyl concentrations by careful blending of resources and removal through existing treatment processes and there have been no further exceedances of the limits to date.

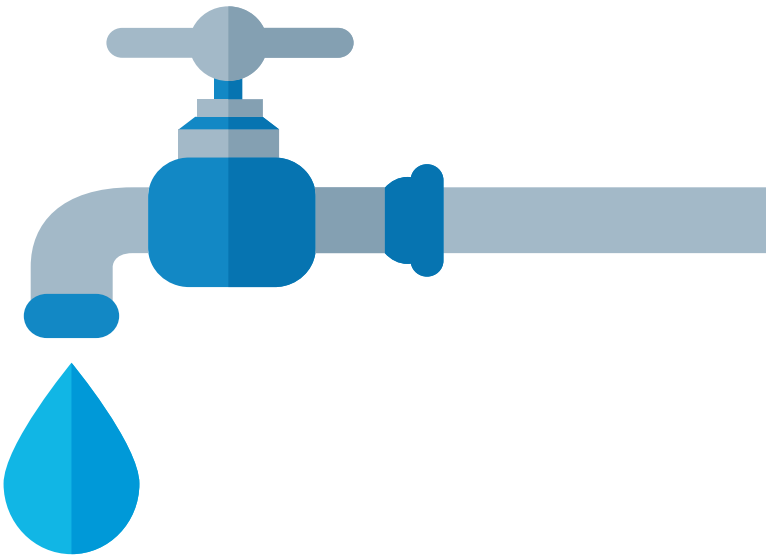
Given the prevalence of Oxadixyl in the Island's ground and surface water, the Company was granted a precautionary dispensation under the Water (Jersey) Law 1972, which increases the permitted regulatory limit for Oxadixyl from 0.1ug/l to 0.3ug/l (one hundredth of the health based limit) for a period of three years. During the dispensation period we will complete a review to better understand the behaviour of Oxadixyl in the Island's water resources and identify and implement a suitable treatment solution as necessary. The dispensation for Oxadixyl has not been used to date.

Throughout 2016 and for the third consecutive year, nitrates in the treated water supply complied with the regulatory limit of 50mg/l. The maximum concentration of nitrates in treated water during 2016 was 40.7mg/l. Weather patterns and water resources in 2014, 2015 and 2016 meant that the Company was able to manage resources to avoid any instances where concentrations of nitrates in supply exceeded the limit of 50mg/l. This is despite the levels of nitrates in streams and raw water sources exceeding the 50mg/l during part of the year.

Throughout 2016 and for the third consecutive year, nitrates in the treated water supply complied with the regulatory limit of 50mg/l.

Nitrate concentrations in raw water sources are mainly dependent on the volume and timing of the application of fertiliser during the potato growing season and of rainfall in the winter and summer months; factors over which we have no control. Jersey Water has dispensations for nitrates under the Water (Jersey) Law 1972, which allows for a maximum concentration of 65mg/l and places additional restrictions on the number of samples exceeding the 50mg/l limit. The existing dispensation expired on 31 December 2016. The dispensation was renewed for a period of five years, under the same terms, by the Minister for Planning and Environment in December 2016.

The Company has been working closely with the Environment Department and representatives from the farming sector as part of the Nitrate Working Group (recently renamed as the Action for Cleaner Water Group). During 2016, the work of the Group focussed on the appropriate response to the pesticide issues identified during 2016 and resolving the ongoing nitrates problem. During the year, the States of Jersey published the Water Plan for Jersey and the Rural Economy Strategy, both containing recommendations by the Group for reductions in the application of fertilisers and pesticides, improving raw water quality and the ongoing protection of water resources.



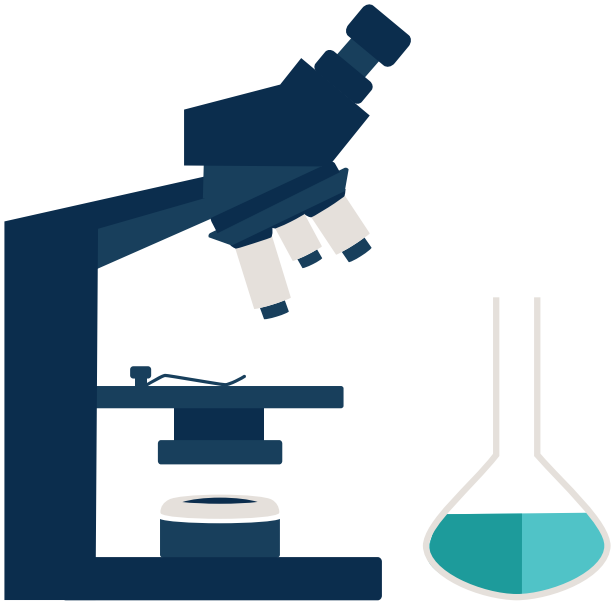
Executive summary

For the last two decades, Jersey Water has been advocating the use of catchment management measures to reduce the application of fertilisers on the land and reduce the risk of applied fertilisers entering streams and reservoirs. Whilst there have been a number of initiatives and working groups looking at the nitrates problem over that period, there hasn't, until now, been a comprehensive plan by the States of Jersey as to how the quality of the Island's untreated water could be improved to an acceptable standard. We therefore support and endorse the States of Jersey Water Management Plan and the water quality improvement measures set out in the Rural Economy Strategy.

The work of the Action for Cleaner Water Group has also been productive in three other significant areas:

1. The introduction of voluntary measures in the potato-growing sector to risk assess the pesticides that are used to grow potatoes in the Island's water catchment areas. There is now a voluntary arrangement that prescribes which substances may or may not be used in each catchment.
2. The voluntary trials by the Jersey Royal Company of GPS guided precision fertiliser applicators which may see a reduction in fertiliser use of 15 to 20%.
3. The sharing of information between the farming sector and Jersey Water is such that we now know which pesticides are being used in the Island so that we can tailor our sampling regime accordingly.

The effectiveness of these measures will be borne out by water quality sampling in our streams and reservoirs in 2017 and beyond. Whether entirely successful or not they represent a step change for the better in the management of water quality risks in the Island.



In order to better control the quality of the water stored in Val de la Mare Reservoir, a reservoir mixer was installed in March 2016 to replace the compressed air bubble mixer. Based upon the first year of operation the "Resmix" has shown a stabilisation in raw water quality at reduced electricity costs of the previous mixer. It is planned to install a similar mixer at Grand Vaux Reservoir in 2017.

With the purpose of enhancing treatment works filter performance, individual filter turbidity meters have been installed at Handois Water Treatment Works. The instruments have enabled the optimisation of filter restarts and provide a continuous monitor of water quality to demonstrate effective treatment prior to UV and chemical disinfection.

To foster a better understanding of the supply of water in Jersey, an open day was held in August for the farming community and the general public at our treatment works at Handois. The event, which was fully subscribed, proved very popular and included guided tours of the treatment works by our engineering team.

During 2016, there were 117 contacts (2015: 131) from customers relating to concerns about the quality of water supplied, and 45 contacts (2015: 27) requesting information. Approximately 50% of contacts related to incidences of discoloured water which, whilst aesthetically displeasing, presents no risk to health. Discoloured water generally occurs when rust sediments from unlined cast iron and galvanised water mains are disturbed as a result of planned works or bursts. The primary purpose of the Company's mains renewal programme is the replacement of pipework that causes this discoloration.

In 2016, the Company Water Regulations Enforcement Officer undertook 558 inspections (2015: 483) of new and existing plumbing installations to assess and advise on compliance with the Water Fittings Byelaws. During 2016, a total of 4 rectification notices were issued (2015: 27).

Helier Smith
16 March 2017

An open day was held in August for the farming community and the general public at our treatment works at Handois.

Supply points and supply zone regulatory results

Jersey Water adopts a risk based water quality monitoring programme, consistent with other water suppliers in Europe and elsewhere. This approach is consistent with the Company's Water Safety Plan, where potential risks are evaluated and water quality testing is designed to help manage those risks.

We examine samples from supply points (comprising our two treatment works and three service reservoirs) and the supply zone (distribution network) for compliance purposes at regular intervals throughout the year.

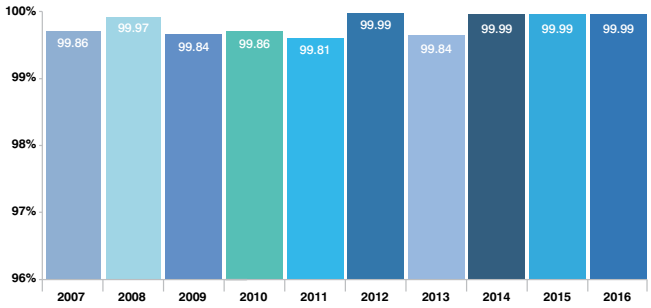
The company is required to undertake two kinds of regulatory water quality monitoring - check and audit monitoring.

Check monitoring is more frequent and is designed to ensure the treatment works are operating as expected and that the water in distribution is suitable for supply. Audit monitoring is performed less frequently and is designed to test the quality of the water supplied against the full requirements of the Water (Jersey) Law 1972.

Overall compliance

Water quality in 2016 was high with only two non-compliant regulatory analyses identified out of 19,997 analyses taken for compliance purposes. Neither presented any risk to human health. Overall water quality compliance for 2016 was 99.99%, in line with the result for 2015 where a compliance rate of 99.99% was recorded following one instance of non-compliance.

Percentage compliance



Treatment works and service reservoir performance (supply points)

The company samples water leaving the treatment works to ensure that it complies with regulatory parameters before it enters the mains network. During 2016, the company took 2,167 samples throughout the year and tested them against 105 physical, bacteriological and chemical parameters. Of the 16,969 analyses only 2 failed the regulatory limit, both linked to the use of agricultural chemicals in the catchments, one historic and one current. Neither presented any risk to health.

Parameter	Date	Analysis type	Concentration recorded	Regulatory limit	Note
Oxadixyl	09/02/16	Audit analysis	0.1008µg/l	0.1µg/l	This was the only incident during 2016 where Oxadixyl exceeded the regulatory limit.
Cyanide	13/06/16	Audit analysis	141.1µg CN/l	50µg CN/l	Well within the heath based limit of 250ug/l. Linked to the spill of the pesticide Cymoxanil, following a road traffic accident involving an agricultural vehicle carrying the substance.

Detailed supply point results are set out in Appendix 1, 2 and 3.

Water quality in the distribution system (supply zone)

Sampling of water throughout the distribution network is undertaken in accordance with a risk-assessed programme to ensure the water we supply meets physical, bacteriological and chemical standards. During 2016, 414 water samples were taken from all parts of the distribution system. All of the 3,028 analyses were compliant with regulatory limits, an improvement on 2015 where 2 samples were outside of the permitted range.

Detailed supply zone results are set out in Appendix 4 and 5.

Consumer contacts and enquiries

Jersey Water compiles consumer contacts and enquiries in the same format as water companies in England and Wales, which enables the company to compare its performance to them. Every contact is recorded and categorised whether or not they entail a visit to rectify an issue. This method was continued into 2016 and they are listed on the table below:

Consumer contacts & enquiries by sub-category

Informing consumers

	Total	Consumer enquiries - sub categories (section 4.2)				
		Fluoride	Water hardness	Water quality report	Other information	
Total consumer enquiries (definition 3.1.1)	21	2	3	2	14	
		Consumer contact (drinking water quality concern) - sub categories (section 4.6)				
		Pets & other animals	Lead & other analysis	Incident related	Campaigns	Lifestyle
Total contacts drinking water quality concern (definition 3.1.5)	24	1	20	2	0	1
Zone total	45					
Zone rate (contact per 1,000 population)	0.50					

E&W Industry average 2015: 4.45

Acceptability of water to consumers

	Total	Consumer contact (appearance) - sub categories (section 4.3)						
		Discoloured - black/brown/ orange	Discoloured - blue/green	Particles	White - air	White - chalk	Animalcules	General condition
Total contacts appearance (definition 3.1.2)	74	55	1	5	8	2	0	3
		Consumer contact (taste and odour) - sub categories (section 4.4)						
		Chlorine	Earthy/musty	Petrol/ diesel	Other taste or odour			
Total contacts taste and odour (definition 3.1.2)	33	9	4	0	20			
		Consumer contact (illness) - sub categories (section 4.5)						
		Gastroenteritis	Oral	Skin	Medical opinion			
Total contacts illness (3.1.4)	10	5	1	3	1			
Zone total	117							
Zone rate (contact per 1,000 population)	1.30	E&W Industry average 2015: 1.64						

The table shows that Jersey Water has fewer consumers contacting the Company on both enquiries and water quality issues compared to the England and Wales industry averages. Of particular note, there was a reduction in the total number of contacts, relating to the acceptability of water to consumers from 131 in 2015 to 117 in 2016. This represents a zone rate (number of contacts per 1,000 consumers) of 1.30, which is over 20% less than the latest England and Wales Industry average.

As in previous years, discoloured water caused by rust is the most common issue consumers contact the Company about, with 34% of all contacts being in this sub category (Bl/Br/Or). This however is a big drop in comparison to 2015, from 84 to 55 - a 35% decrease.

There were more contacts for water quality information, rising from 27 to 45 in 2016 representing a 67% rise in consumer enquiries. They covered a range of topics from dishwasher settings related to water hardness to fluoride dosing (Jersey Water do not add fluoride to the water but there is a small amount naturally occurring in our streams and reservoirs, typically 0.1mg/l).

Bacteriological and chemical samples were taken at the premises where the consumer had suspected the water supply to be causing illness. Examinations showed the supply to meet quality standards.

In total, 115 bacteriological samples were taken during the investigation of consumer contacts that the Jersey Water inspectors visited, one was not compliant bacteriologically due to a contaminated storage tank.

Raw water quality

For operational reasons, Jersey Water regularly tests the quality of water from streams, reservoirs and the inlet to the treatment works. This enables our operational staff to select the most suitable water to be taken for treatment and informs our risk based assessment of challenges to water quality. The quality of raw water in our catchments is variable and during 2016 was affected by two main factors, pesticides and nitrates.

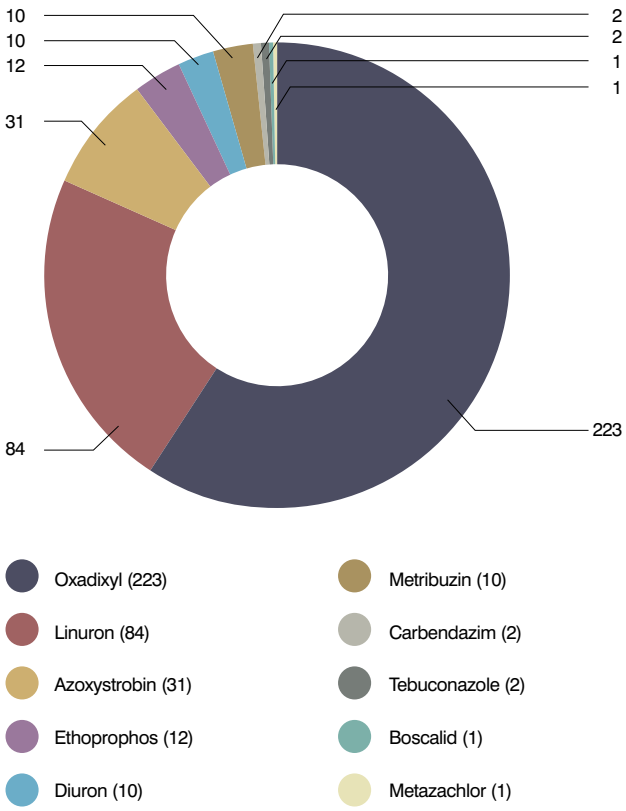
There are no statutory or regulatory quality requirements that apply to untreated water entering our reservoirs. Accordingly, Jersey Water assesses the quality of the water relative to the standards for treated drinking water. The Company reports all "breaches" for pesticides where the concentration in raw water exceeds 0.1ug/l and nitrates, where the concentration exceeds 50mg/l.

Pesticides

Following the discovery of Oxadixyl in January 2016, the frequency of sampling for pesticides was increased by a factor of six. During the year, over 37,000 analyses were undertaken for pesticides in the streams and reservoir outlets across our catchments. Of these, 376 were above the 0.1 µg/l limit compared to 14 out of 3358 samples in 2015. Over 60% of these were due to pesticides no longer used in the Island, Oxadixyl and Diuron. The balance were in respect of pesticides in current use in agriculture during 2016, principally Linuron, Azoxystrobin, Ethoprophos and Metribuzin. The presence of Oxadixyl and these other pesticides resulted in the closure of Val de la Mare Reservoir and presented the operational challenge of maintaining a fully compliant water supply during the period in which these pesticides were present.

The closure of Val de la Mare and identification of pollution caused by pesticides currently in use prompted a number of actions by the States of Jersey, the farming community and Jersey Water to reduce the likelihood of a reoccurrence in subsequent years. These include, as described on page 3, the implementation of the Water Plan for Jersey, the adoption of voluntary measures by the farming community and improved information sharing. In addition, Jersey Water is currently planning to implement reservoir bypass arrangements for Val de la Mare and Queen's Valley Reservoirs. An interim review of the effectiveness of the measures that have been implemented on raw water quality will be undertaken after the end of the 2017 potato-growing season.

2016 Number of Breaches in Streams and Reservoirs by Type of Pesticide



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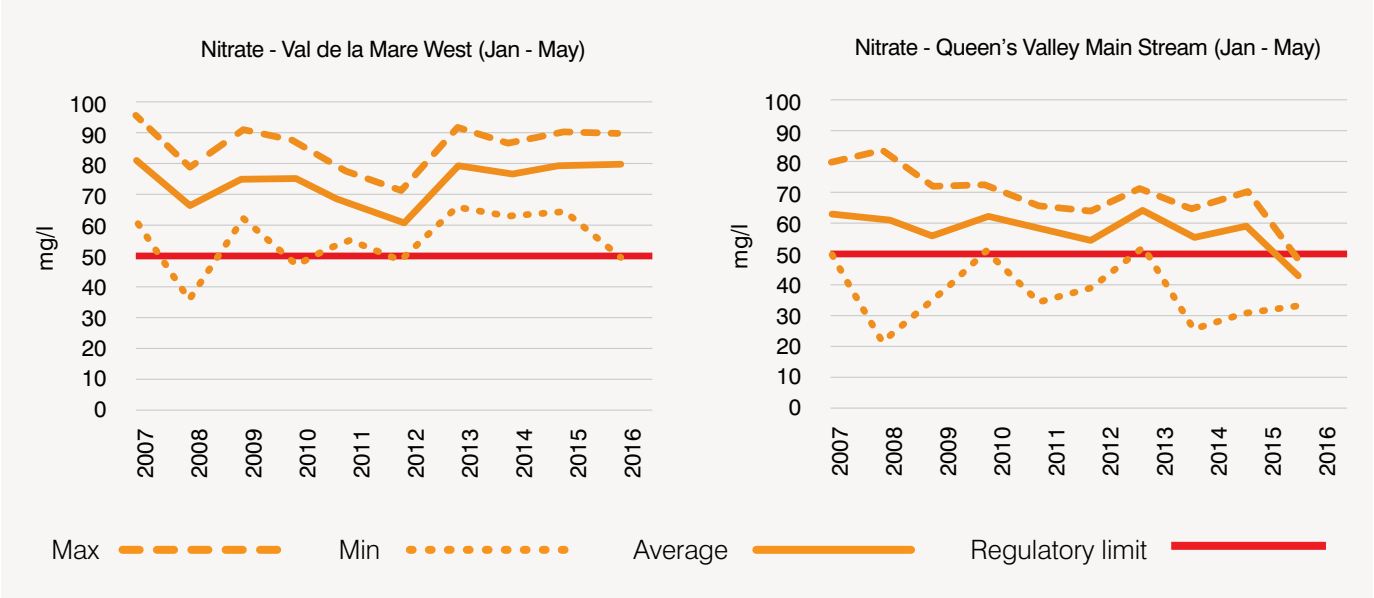
Raw water quality

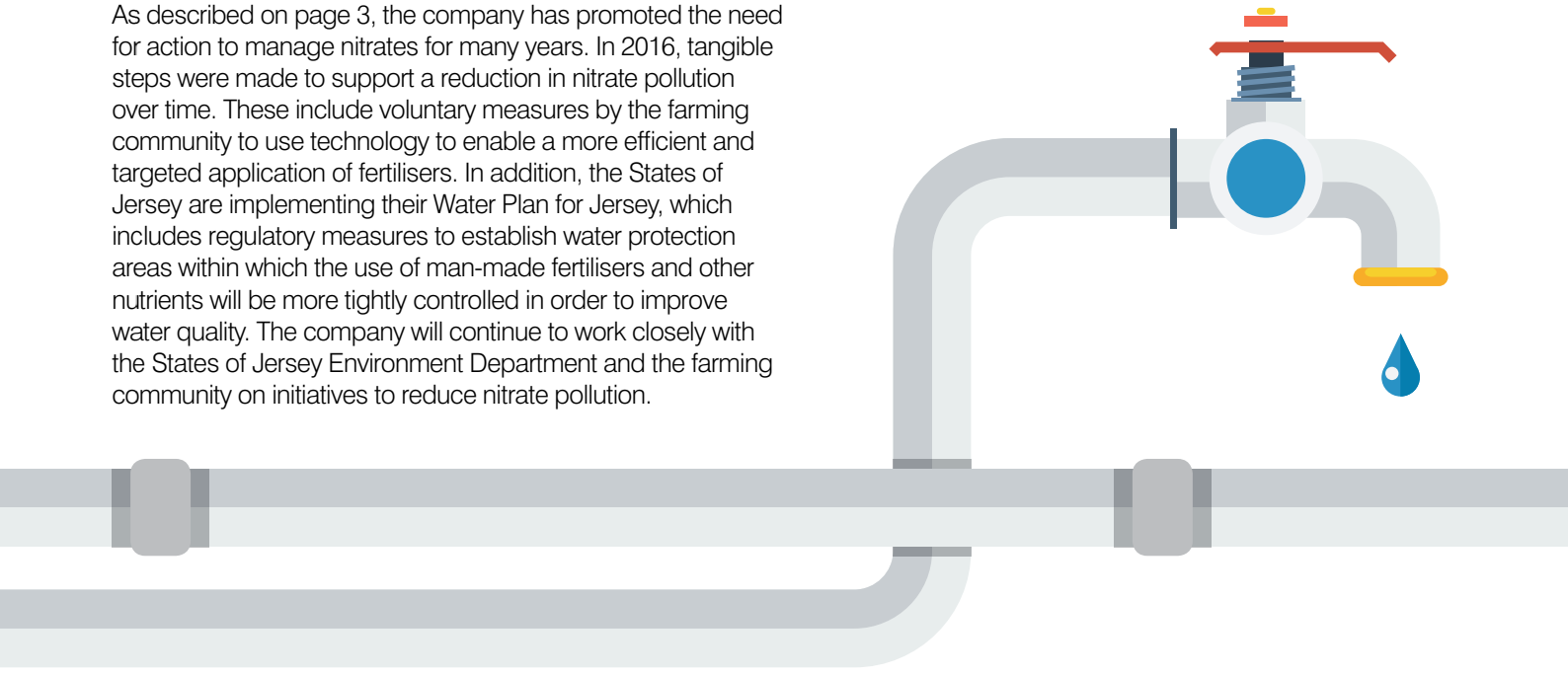
Nitrates

There have been no nitrate breaches in treated water since May 2013 and the maximum recorded during 2016 was 40.7mg/l in May 2016. The absence of a breach during the last three years should not be mistaken as an amelioration of the nitrate situation in Jersey. Due to the ongoing diffuse pollution of Jersey's surface (streams, reservoirs, etc) and ground water resources (boreholes, wells, etc) with nitrates, treated water supplies remain vulnerable to regulatory exceedances.

As an example, the graph below shows the maximum, mean and minimum nitrate concentrations entering Val de la Mare West inlet and Queen's Valley, our two largest reservoirs. The graphs show that the situation in Queen's Valley stream appears to be improving. However, average concentrations in both streams during the growing season are consistently above 50mg/l until 2016[1]. Peak concentrations are in excess of 50mg/l in all years. The situation in Val de la Mare shows no sign of improvement. Concentrations of nitrates in raw water peaked at 169.4mg/l in January 2016 in the Queen's Valley Side Stream catchment and averaged 52.1 mg/l across the Island during the year.



As described on page 3, the company has promoted the need for action to manage nitrates for many years. In 2016, tangible steps were made to support a reduction in nitrate pollution over time. These include voluntary measures by the farming community to use technology to enable a more efficient and targeted application of fertilisers. In addition, the States of Jersey are implementing their Water Plan for Jersey, which includes regulatory measures to establish water protection areas within which the use of man-made fertilisers and other nutrients will be more tightly controlled in order to improve water quality. The company will continue to work closely with the States of Jersey Environment Department and the farming community on initiatives to reduce nitrate pollution.



[1] One should note that 2016 was unusual due to heavy rainfall during the growing season diluting stream flows and reducing nitrate concentrations.

Understanding test results

This summary may help you better understand the 2016 test results on the following pages.

Regulatory Analyses

The Water (Jersey) Law 1972 as amended requires two types of monitoring at the treatment works and service reservoir outlets and in the distribution system.

- **Check monitoring**
  Tests performed on a frequent basis to ensure that the treatment works and the water in distribution is suitable for supply.
- **Audit monitoring**
  Testing performed less frequently than check monitoring and which is designed to test the quality of the water supplied against the full requirements of the Water (Jersey) Law 1972.

The regulations require that samples are taken from every outlet of a treatment works. There are therefore three sets of results from Handois Treatment Works and one set for Augrès Treatment Works.

Key Terms

Term	Description
Substances and parameters	The item we are testing for.
Specific concentration or value (maximum) or state	The maximum or range of values allowed by law in the water supply (regulatory limit).
mg/l	Milligrams per litre or parts per million, equivalent to 1p in £10,000.
µg/l	Micrograms per litre or parts per billion, equivalent to 1p in £10,000,000.
µS/cm	The unit of measure commonly used for electrical conductivity in water, microSiemens/cm.
Sample Point	The location where the sample was taken.
Min	The minimum or lowest result produced for that test.
Mean	The average value of all the results produced for that test.
Max	The maximum or highest result produced for that test.
% Compliance	The percentage of the results that comply with the regulatory limit.
What it means	A description of what it is we are looking for and what it possibly indicates.

Appendix 1 - 2016 treatment works & service reservoir performance - check monitoring

Substances and parameters	Specific concentration or value (maximum) or state	Sample point	Min	Mean	Max	No. samples	% compliance	What it means
E.coli	0 per 100ml	Handois 12”	0	0	0	313	100	Bacteria which are indicative of faecal pollution.
		Handois 18”	0	0	0	313	100	
		Handois PS	0	0	0	313	100	
		Augrès Tank	0	0	0	313	100	
		Les Platons East SR	0	0	0	305	100	
		Les Platons West SR	0	0	0	305	100	
		Westmount SR	0	0	0	305	100	
Coliform bacteria	0 per 100ml	Handois 12”	0	0	0	313	100	These bacteria are widely distributed in the environment and provide a sensitive measure of microbiological quality. They are removed during the treatment process.
		Handois 18”	0	0	0	313	100	
		Handois PS	0	0	0	313	100	
		Augrès Tank	0	0	0	313	100	
	0 per 100ml (95% of samples)	Les Platons East SR	0	0	0	305	100	
		Les Platons West SR	0	0	0	305	100	
		Westmount SR	0	0	0	305	100	
Colony counts	No abnormal change	Handois 12”	No abnormal change			313	100	A range of harmless bacteria that may be present in water supplies. These are monitored to ensure the efficiency of the treatment process and the cleanliness (increasing trends in the distribution system are investigated).
		Handois 18”				313	100	
		Handois PS				313	100	
		Augrès Tank				313	100	
		Les Platons East SR				305	100	
		Les Platons West SR				305	100	
		Westmount SR				305	100	

Appendix 1 - 2016 treatment works & service reservoir performance - check monitoring continued

Substances and parameters	Specific concentration or value (maximum) or state	Sample point	Min	Mean	Max	No. samples	% compliance	What it means
Nitrite	0.1 mg NO_2/l	Handois 12"	<0.003	0.004	0.012	104	100	Nitrite may be associated with nitrate or with the use of ammonia in water disinfection.
		Handois 18"	<0.003	0.004	0.011	104	100	
		Handois PS	<0.003	0.004	0.009	104	100	
		Augrès Tank	<0.003	0.004	0.011	104	100	
Residual disinfectant	No value mg Cl_2/l	Handois 12"	0.42	0.52	0.62	313		Chlorine is added to our water along with ammonia to form a stable chloramine disinfectant compound, to ensure that there are no harmful bacteria in the water we supply.
		Handois 18"	0.42	0.52	0.58	313		
		Handois PS	0.42	0.52	0.62	313		
		Augrès Tank	0.34	0.45	0.54	313		
Turbidity	1 NTU	Handois 12"	0.08	0.13	0.24	251	100	The Standard requires that there should be no haziness caused by fine particles.
		Handois 18"	0.08	0.12	0.24	251	100	
		Handois PS	0.08	0.13	0.23	251	100	
		Augrès Tank	0.06	0.11	0.21	251	100	
Conductivity	2500 μS/cm at 20ºC	Handois 12"	446	496	537	52	100	A measure of the ability of the water to conduct an electric current and therefore a measurement of the mineral salts dissolved in the water.
		Handois 18"	448	496	538	52	100	
		Handois PS	448	497	537	52	100	
		Augrès Tank	430	505	562	52	100	
		Les Platons East SR	448	499	537	52	100	
		Les Platons West SR	435	497	538	52	100	
		Westmount SR	437	505	557	52	100	

Appendix 2 - 2016 treatment works & service reservoir performance - audit monitoring

Substances and parameters	Specific concentration or value (maximum) or state	Sample point	Min	Mean	Max	No. samples	% compliance	What it means
Benzene Bromate 1,2 dichloroethane Trichloroethene &} Tetrachloroethene} Tetrachloromethane	1.0 µg/l 10 µg BrO_3/l 3.0 µg/l 10 µg/l 3 µg/l	Handois 12”	All results were below limit of detection from all the sample points.			Varied between 1 and 8 samples per annum, dependent on assessed risk.	100	Benzene may be introduced into source water by industrial effluents or atmospheric pollution. Bromate can be associated with industrial pollution or can occur as a by-product of the disinfection process. The other compounds are all organic solvents, their presence is an indication of industrial pollution.
		Handois 18”					100	
		Handois PS					100	
		Augrès Tank					100	
		Les Platons East SR					100	
		Les Platons West SR					100	
		Westmount SR					100	
Boron	1.0 mg B/l	Handois 12”		0.096		1	100	Very low levels may occur naturally, but higher amounts could be associated with industrial pollution. The standards are health related but have a large built-in safety factor.
		Handois 18”		0.076		1	100	
		Handois PS		0.071		1	100	
		Augrès Tank		0.076		1	100	
		Les Platons East SR		0.074		1	100	
		Les Platons West SR		0.074		1	100	
		Westmount SR		0.077		1	100	
Cyanide	50 µg CN/l	Handois 12”	<2.00	<2.00	<2.00	8	100	Very low levels may occur naturally, but higher amounts could be associated with industrial pollution. The standards are health related but have a large built-in safety factor. See explanation of single exceedance on page 4.
		Handois 18”	<2.00	<2.00	<2.00	8	100	
		Handois PS	<2.00	<2.00	<2.00	8	100	
		Augrès Tank	<2.00	<2.00	<2.00	8	100	
		Les Platons East SR	<2.00	17.6	141.1	8	87.5	
		Les Platons West SR	<2.00	<2.00	<2.00	8	100	
		Westmount SR	<2.00	<2.00	<2.00	8	100	

Appendix 2 - 2016 treatment works & service reservoir performance - audit monitoring continued

Substances and parameters	Specific concentration or value (maximum) or state	Sample point	Min	Mean	Max	No. samples	% compliance	What it means
Fluoride	1.5 mg F/l	Handois 12”		0.061		1	100	Occurs naturally in many water sources. The standard is set to ensure no adverse effects. Jersey Water does not artificially fluoridate the water supplies.
		Handois 18”		0.077		1	100	
		Handois PS		0.053		1	100	
		Augrès Tank		0.023		1	100	
		Les Platons East SR		0.069		1	100	
		Les Platons West SR		0.030		1	100	
		Westmount SR		0.082		1	100	
Chloride	250 mg Cl/l	Handois 12”	51	56	59	8	100	Occurs naturally in most water sources. Levels above the standard could give rise to taste issues and contribute to corrosion.
		Handois 18”	51	56	60	8	100	
		Handois PS	51	56	60	48	100	
		Augrès Tank	46	53	58	48	100	
		Les Platons East SR	51	56	60	8	100	
		Les Platons West SR	51	57	60	8	100	
		Westmount SR	48	54	58	8	100	
Sulphate	250 mg SO_4/l	Handois 12”	70	80	91	8	100	Dissolves in water after contact with certain mineral deposits. Excess levels can contribute to corrosion.
		Handois 18”	68	80	90	8	100	
		Handois PS	67	80	92	48	100	
		Augrès Tank	62	85	99	48	100	
		Les Platons East SR	68	80	89	8	100	
		Les Platons West SR	70	82	91	8	100	
		Westmount SR	73	85	92	8	100	

Appendix 2 - 2016 treatment works & service reservoir performance - audit monitoring continued

Substances and parameters	Specific concentration or value (maximum) or state	Sample point	Min	Mean	Max	No. samples	% compliance	What it means
Total Organic Carbon	No abnormal change	Handois 12”	1.80	1.93	2.10	8	100	This parameter assesses the organic content of the water.
		Handois 18”	1.60	1.89	2.20	8	100	
		Handois PS	1.60	1.94	2.50	8	100	
		Augrès Tank	1.40	1.75	2.00	8	100	
		Les Platons East SR	0.60	1.75	2.80	8	100	
		Les Platons West SR	1.80	1.93	2.10	8	100	
		Westmount SR	1.40	1.78	2.20	8	100	
Gross Alpha	0.1 Bq/l	Handois 12”	<0.010	<0.010	<0.010	4	100	These parameters are measured as part of screening for radioactivity.
		Handois 18”	<0.010	<0.010	<0.010	4	100	
		Handois PS	<0.010	<0.010	0.014	4	100	
		Augrès Tank	<0.010	<0.010	<0.010	4	100	
		Les Platons East SR	<0.010	<0.010	<0.010	4	100	
		Les Platons West SR	<0.010	<0.010	<0.010	4	100	
		Westmount SR	<0.010	<0.010	0.015	4	100	
Gross Beta	1.0 Bq/l	Handois 12”	<0.100	<0.100	0.195	4	100	
		Handois 18”	<0.100	<0.100	0.220	4	100	
		Handois PS	<0.100	<0.100	0.276	4	100	
		Augrès Tank	<0.100	<0.100	0.244	4	100	
		Les Platons East SR	<0.100	<0.100	0.220	4	100	
		Les Platons West SR	<0.100	<0.100	0.211	4	100	
		Westmount SR	<0.100	<0.100	0.200	4	100	

Appendix 3 - 2016 treatment works pesticide analysis - audit monitoring

A suite of 85 pesticides have been analysed during 2016 at the treatment works outlets, the following table shows the ones that were detected - there were 66 substances that were not.

Substances and parameters	Specific concentration or value (maximum) or state	Sample point	Min	Mean	Max	No. samples	% compliance
2,4-D	0.1 µg/l	Augrès Tank	<0.005	<0.005	0.009	47	100
		Handois PS	<0.005	<0.005	0.006	46	100
Atrazine Desethyl	0.1 µg/l	Augrès Tank	<0.001	<0.001	0.005	42	100
		Handois PS	<0.001	<0.001	0.005	42	100
Atrazine Desisopropyl	0.1 µg/l	Augrès Tank	<0.001	0.005	0.010	39	100
		Handois PS	<0.001	0.005	0.008	40	100
Azoxystrobin	0.1 µg/l	Augrès Tank	<0.005	0.006	0.012	47	100
		Handois PS	<0.005	<0.005	0.011	46	100
Bentazone	0.1 µg/l	Augrès Tank	<0.005	<0.005	0.007	47	100
		Handois PS	<0.005	<0.005	0.006	46	100
Boscalid	0.1 µg/l	Augrès Tank	<0.005	<0.005	0.008	47	100
		Handois PS	<0.005	<0.005	0.008	46	100
Carbendazim	0.1 µg/l	Augrès Tank	<0.005	<0.005	0.006	47	100
		Handois PS	<0.005	<0.005	0.005	46	100
Clopyralid	0.1 µg/l	Augrès Tank	<0.005	0.015	0.031	47	100
		Handois PS	<0.005	0.015	0.039	46	100
Diuron	0.1 µg/l	Augrès Tank	<0.005	<0.005	0.008	47	100
		Handois PS	<0.005	<0.005	0.006	46	100
Ethofumesate	0.1 µg/l	Augrès Tank	<0.001	0.002	0.010	42	100
		Handois PS	<0.001	0.002	0.010	42	100

Appendix 3 - 2016 treatment works pesticide analysis - audit monitoring continued

Substances and parameters	Specific concentration or value (maximum) or state	Sample point	Min	Mean	Max	No. samples	% compliance
Ethoprophos	0.1 µg/l	Augrès Tank	<0.001	0.003	0.028	42	100
		Handois PS	<0.001	0.004	0.011	42	100
Linuron	0.1 µg/l	Augrès Tank	<0.005	0.006	0.015	47	100
		Handois PS	<0.005	<0.005	0.019	46	100
MCPA	0.1 µg/l	Augrès Tank	<0.005	<0.005	0.005	47	100
		Handois PS	<0.005	<0.005	0.008	46	100
Mecoprop (MCPP)	0.1 µg/l	Augrès Tank	<0.005	<0.005	0.005	47	100
		Handois PS	<0.005	<0.005	0.008	46	100
Metazachlor	0.1 µg/l	Augrès Tank	<0.005	<0.005	0.012	47	100
		Handois PS	<0.005	0.007	0.026	46	100
Metribuzin	0.1 µg/l	Augrès Tank	<0.001	0.003	0.020	42	100
		Handois PS	<0.001	0.005	0.030	42	100
Oxadixyl	0.1 µg/l	Augrès Tank	0.009	0.036	0.063	47	100
		Handois PS	0.010	0.052	0.1008	46	98
Pendimethalin	0.1 µg/l	Augrès Tank	<0.005	<0.005	0.007	47	100
		Handois PS	<0.005	<0.005	0.005	46	100
Pirimicarb	0.1 µg/l	Augrès Tank	<0.001	0.001	0.005	42	100
		Handois PS	<0.001	0.001	0.005	42	100
Total Pesticides	0.5 µg/l	Augrès Tank	0.011	0.059	0.117	47	100
		Handois PS	0.012	0.072	0.128	46	100

Appendix 4 - 2016 water quality in the supply zone - check monitoring

Substances and parameters	Specific concentration or value (maximum) or state	Min	Mean	Max	No. samples	% compliance	What it means
E.coli	0 per 100ml	0	0	0	414	100	Bacteria which are indicative of faecal pollution.
Coliform bacteria	0 per 100ml	0	0	0	414	100	These bacteria are widely distributed in the environment and provide a sensitive measure of microbiological quality. They are removed during the treatment process.
Residual disinfectant	No value mg Cl_2/l	<0.02	0.10	0.54	414		Chlorine is added to our water along with ammonia to form a stable chloramine disinfectant compound, to ensure that there are no harmful bacteria in the water we supply.
Aluminium	200 μg Al/l	<20	<20	33	76	100	Occurs naturally in many water resources. Aluminium compounds are also used at some water treatment works to remove impurities, but are themselves removed in the process.
Ammonium	0.50 mg NH_4/l	<0.01	0.03	0.14	76	100	May be naturally present in some waters and is not harmful.
Colony counts	No abnormal change	No abnormal change			414	100	A range of harmless bacteria that may be present in water supplies. These are monitored to ensure the efficiency of the treatment process and the cleanliness (increasing trends in the distribution system are investigated).
Colour	20 mg/l Pt/Co	0.27	1.54	2.78	76	100	Water should be clear and bright but natural organic matter or pipework corrosion products may occasionally impart a slight tint. The standard is set for reasons of appearance and requires the water to be virtually colourless.
Conductivity	2500 μS/cm at 20^{o}C	444	503	549	76	100	A measure of the ability of the water to conduct an electric current and therefore a measurement of the mineral salts dissolved in the water.

Appendix 4 - 2016 water quality in the supply zone - check monitoring continued

Substances and parameters	Specific concentration or value (maximum) or state	Min	Mean	Max	No. samples	% compliance	What it means
Hydrogen ion	10.0 pH value 6.5 (min)	7.16	7.52	7.96	76	100	A measure of acidity or alkalinity. Excessively acidic or alkaline water can contribute to corrosion of pipes and fittings.
Iron	200 μg Fe/l	<4	14.4	162.3	76	100	Iron may be associated with the corrosion of old iron mains. The standard has been set for aesthetic reasons as levels persistently above the standard can give rise to discoloured water.
Manganese	50 μg Mn/l	<20	<20	21.6	76	100	Occurs naturally in many water sources. The standard is set for aesthetic reasons as black deposits of manganese dioxide can give rise to discoloured water.
Nitrate	50 mg NO_3/l	19.0	31.6	40.7	76	100	Nitrate arises from the use of fertilizers in agriculture and may be minimised by good practices and appropriate controls.
Nitrite	0.5 mg NO_2/l	<0.003	0.022	0.360	76	100	Nitrite may be associated with nitrate or with the use of ammonia in water disinfection.
Nitrate/Nitrite ratio[1]	1.000	0.393	0.640	0.825	76	100	The regulations specify that the ratio according to the following formula must not exceed 1, [nitrate]/50 + [nitrite]/3, where the square brackets signify the concentrations in mg/l for nitrate (NO3) and nitrite (NO2) respectively.
Taste & Odour	Acceptable to consumers and no abnormal change	0	0	0	76	100	The water is examined for unpleasant taste or odour for aesthetic reasons.
Turbidity	4 NTU	0.09	0.14	0.42	76	100	The Standard requires that there should be no haziness caused by fine particles.
Cyanide	50 μg CN/l	<2.0	<2.0	9.5	76	100	Very low levels may occur naturally, but higher amounts could be associated with industrial pollution. The standards are health related but have a large built-in safety factor.

Appendix 5 - 2016 water quality in the supply zone - audit monitoring

Substances and parameters	Specific concentration or value (maximum) or state	Min	Mean	Max	No. samples	% compliance	What it means
Antimony	5.0 µg Sb/l		0.260		1	100	Very low levels may occur naturally, but higher amounts could be associated with industrial pollution. The standards are health related but have a large built-in safety factor.
Arsenic	10 µg As/l		<0.5		1	100	
Cadmium	5.0 µg Cd/l		<0.08		1	100	
Chromium	50 µg Cr/l		<0.5		1	100	
Benzene	1.0 µg/l		<0.02		1	100	Benzene may be introduced into source water by industrial effluents or atmospheric pollution.
Boron	1.0 mg B/l		0.054		1	100	Very low levels may occur naturally, but higher amounts could be associated with industrial pollution. The standards are health related but have a large built-in safety factor.
Copper	2000 µg Cu/l	<4	<4	11	8	100	Any significant amount of copper is likely to come from corrosion of customers' pipes or fittings. Excess amounts can cause a metallic taste.
1,2 dichloroethane	3.0 µg/l	<0.04	<0.04	<0.04	8	100	The presence of this organic solvent is an indication of industrial pollution.
Enterococci	0 per 100ml	0	0	0	80	100	Bacteria which are indicative of faecal pollution.
Lead	10 µg Pb/l	<0.5	<0.5	<0.5	8	100	Absent in water entering supply but variable concentrations of lead may be found in water at the customer's tap in older properties built at a time when lead was commonly used in domestic plumbing systems. The standard recognises that the intake of lead should be minimised for health reasons.
Nickel	20 µg Ni/l		1.40		1	100	Very low levels may occur naturally, but higher amounts could be associated with industrial pollution. The standards are health related but have a large built-in safety factor.

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