# Water Quality Report 2014

**Sampling under The Water Supply (Water Quality) Regulations, 2000, as amended**


## Written by:

**Mike de Carteret BSc (Hons)**
**Acting Quality & Risk Assurance Manager**



GuernseyWater
A DIVISION OF THE PUBLIC SERVICES DEPARTMENT

## FOREWORD...

Guernsey Water's mission:

***"To deliver to its customers a reliable supply of high quality drinking water in sufficient quantities that satisfy normal daily demand at the lowest cost, consistent with meeting a high level of customer service and confidence."***

In 2014, Guernsey Water provided 4,442 megalitres of water (over 4 times the volume of St Saviours Reservoir) to its customers.

The quality of water supplied with 99.91% of 6,990 analyses meeting the prescribed standards is excellent. The achievement of such a high compliance figure is due to the collective technical expertise of our staff that covers all aspects of the science and engineering of the public water supply.

Safe, clean drinking water is vital to public health and the wellbeing of our society. This is ever more important in the face of significant challenges to drinking water supplies from the impacts of climate change on the quality and availability of water resources. It is essential that good quality drinking water, and the investment by Guernsey Water necessary to achieve it, is maintained into the future.

2014 Water Quality Key Performance Indicators

- **Achieve 99.5% compliance for Maximum Admissible Concentrations at WTWs** 
- **Achieve 98% compliance for Maximum Admissible Concentrations at service reservoirs** 
- **Achieve 99% compliance for Maximum Admissible Concentrations at customer taps** 

Guernsey Water has achieved its 2014 water quality targets with 100% compliance recorded at the Service Reservoirs and WTWs for the first time to date and overall compliance at its 2nd highest level, being marginally lower than the 2013 result. Guernsey Water continues to provide high quality drinking water to the satisfaction of its customer's requirements.

**STEPHEN LANGLOIS**
**DIRECTOR OF WATER SERVICES**

## SUMMARY...

Tests taken from Guernsey Water's 3 operational treatment works, 3 service reservoirs, water tower and customers' taps in 3 water supply zones show that 99.91 per cent of the 6,990 analyses met all national and European Union standards. This shows a slight decrease compared to the 2013 overall compliance, which was 99.94 per cent and was the highest water quality compliance figure to date.

Guernsey Water is regulated by the Director of Environmental Health and Pollution Regulation (DEHPR), with the current standard by which water quality is measured taken from England and Wales in the form of The Water Supply (Water Quality) Regulations, 2000, as amended. The regulations set out the parameters to be analysed for (Appendix A) and the required frequency of testing.

In 2014 there were no breaches at Longue Hougue, Kings Mills or St Saviours water treatment works and measures to improve bacterial quality of the Island's service reservoirs has had a positive effect, with 100% compliance also being recorded at the 3 service reservoirs and the Water Tower. At the end of 2013 sampling kiosks were erected over the sampling taps for No2 East and No2 West service reservoirs to help prevent contamination during sampling in adverse weather conditions. This appears to have been a success as 2014 is the first year on record that has seen 100% compliance from all service reservoirs and the water tower.

Supply zones (customer tap samples) had 6 failures in total; 2 were for Coliform bacteria (1 in Longue Hougue Zone and 1 in No2 Zone) and 4 were Tri Halo Methane (THM) failures (1 in Longue Hougue Zone, 1 in No2 Zone and 2 in Tower Zone). Coliform bacteria are a naturally occurring indicator species that do not necessarily indicate ingress of contamination but that should be absent from treated water so their presence should be investigated. THMs are disinfection by-products formed primarily by reactions between chlorine and organic matter (measured as Total Organic Carbon). There are a number of factors which influence the formation of disinfection by-products and these include the type and concentration of disinfectant, the concentration of organic matter within the treated water, the temperature, pH and contact time/length of the distribution network.

The 2 Coliform failures were during the very hot weather experienced in July and following thorough investigation were attributed to regrowth within the water main due to exceptionally high summer temperatures. Both failures resulted in immediate investigation and prompted an increase in the chlorine residual leaving the Water Treatment Works. This increase in chlorine concentration along with the organic carbon levels in the treated water and the high summer water temperatures aided the formation of THM's in supply and resulted in the 4 THM failures. Measures are being taken to limit the precursors of disinfection by-product formation and further work will be undertaken in 2015 to further reduce THM formation as well as the introduction of UV disinfection at water treatment works lowering the level of chlorine required for disinfection. The UK Drinking Water Inspectorate (DWI) is however clear that *"at all times that actions taken to minimise disinfection by-product formation do not compromise the effectiveness of the disinfection process."*

Guernsey Water regularly analyses for 83 pesticides and of these only 7 were detected and no breaches of the 0.1 µg/l limit were observed.

Perfluorooctane sulphonate (PFOS) has been monitored on a fortnightly basis both in the raw water in St Saviours Reservoir and treated water leaving St Saviours water treatment works. The maximum result detected in the treated water analysis was 0.16$\mu$g/l (ppb) which is within tier 1 (<0.3$\mu$g/l) of the guidance issued by the UK DWI on PFOS (http://dwi.defra.gov.uk/stakeholders/information-letters/2009/10_2009annex.pdf). Categorisation as Tier 1 merely recognises that there may be a potential hazard which should as a minimum be considered by a risk assessment. Guernsey Water has gone much further than this to ensure the protection of drinking water quality by working closely with the DEHPR and other States of Guernsey Departments to actively

reduce PFOS levels found in raw water through the treatment of stream water from affected catchments as well as the removal and containment of contaminated soils. The affected catchments have also been closely monitored and measures put in place (such as stream diverts) to ensure that no contaminated water is collected and transferred to storage. This has had a positive effect with a drop in the maximum detected PFOS concentration recorded in the raw water stored at St Saviours Reservoir from 0.75$\mu$g/l in 2013 to 0.19$\mu$g/l recorded in 2014. There was an increase in the maximum PFOS concentration detected in samples collected from streams, from 8.5$\mu$g/l in 2013 to 20$\mu$g/l in 2014. This was within the Petit Bot catchment as a result of the mobilisation of groundwater during poor weather conditions. The rehabilitation works to remove and contain contaminated soil from the Forest Road site, which has now been completed, should help to show further improvements in the future.

There were a total of 136 water quality enquiries from customers in 2014, compared to 237 in 2013 (it should be noted however, that 78 enquiries relating to an earthy/musty taste & odour were received during a 3 week period in October 2013 as a consequence of an algal bloom die off in St Saviours Reservoir). Guernsey Water uses the same methodology for recording consumer contacts and enquiries regarding water quality as is used in England and Wales, whereby every contact is recorded and categorised and to enable comparison the contact rate per 1,000 population is calculated. The Acceptability of Water to Consumers categories had a total of 124 consumer contacts across all 3 supply zones for Guernsey Water during 2014, which equates to a contacts per 1,000 population rate of 1.97. This compares to the Industry Average (for England and Wales Water Companies 2013) rate of 1.91 and Jersey Water (2014) rate of 1.59.

**Mike de Carteret**
**Acting Quality & Risk Assurance Manager** **12th June 2015**

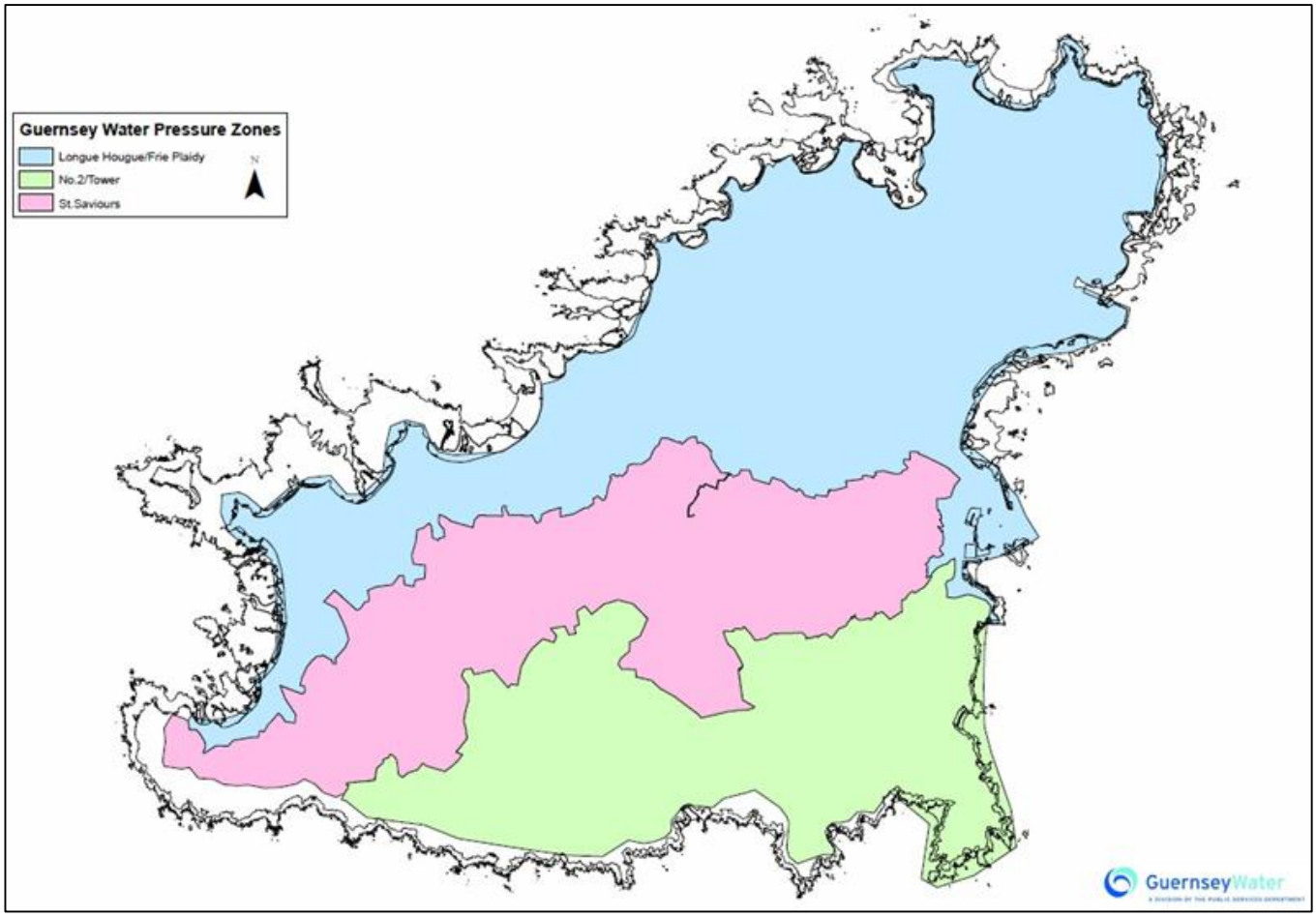
## CONTENTS...

## INTRODUCTION...

Treated Water

Guernsey Water operates using current Drinking Water Inspectorate regulations and guidance as best practice. This requires us to meet very high standards to satisfy our Regulator, the Director of Environmental Health and Pollution Regulation. Guernsey Water has 4 treatment works (3 in service and 1 standby plant), 3 service reservoirs, a water tower and 3 water supply zones.

The general rationale of water movement in Guernsey is: St Saviours water treatment works supplies water to No.2 East and West which then either goes into the Water Tower and onto the Tower Supply Zone (green in image below) or direct to No.2 Supply Zone (pink in image below). Longue Hougue water treatment works (or Kings Mills water treatment works when Longue Hougue is off line) supplies water direct into Longue Hougue Supply Zone (blue in image below) and into Frie Plaidy Service Reservoir.



Below is a breakdown of the compliance for 2014, as measured against The Water Supply (Water Quality) Regulations, 2000, as amended : -

**Water Treatment Works**

| | St Saviours | Juas | Kings Mills | Longue Hougue | Total |
|---|---|---|---|---|---|
| No of Breaches | 0 | 0 | 0 | 0 | 0 |
| No of Passes | 1706 | 0 | 1041 | 1633 | 4380 |
| No of Samples | 1706 | 0 | 1041 | 1633 | 4380 |
| **% Compliance** | **100%** | **0%** | **100%** | **100%** | **100%** |

**Service Reservoirs & Water Tower**

| | No.2 East | No. 2 West | Frie Plaidy | Tower | Total |
|---|---|---|---|---|---|
| No of Breaches | 0 | 0 | 0 | 0 | 0 |
| No of Passes | 204 | 208 | 204 | 208 | 824 |
| No of Samples | 204 | 208 | 204 | 208 | 824 |
| **% Compliance** | **100%** | **100%** | **100%** | **100%** | **100%** |

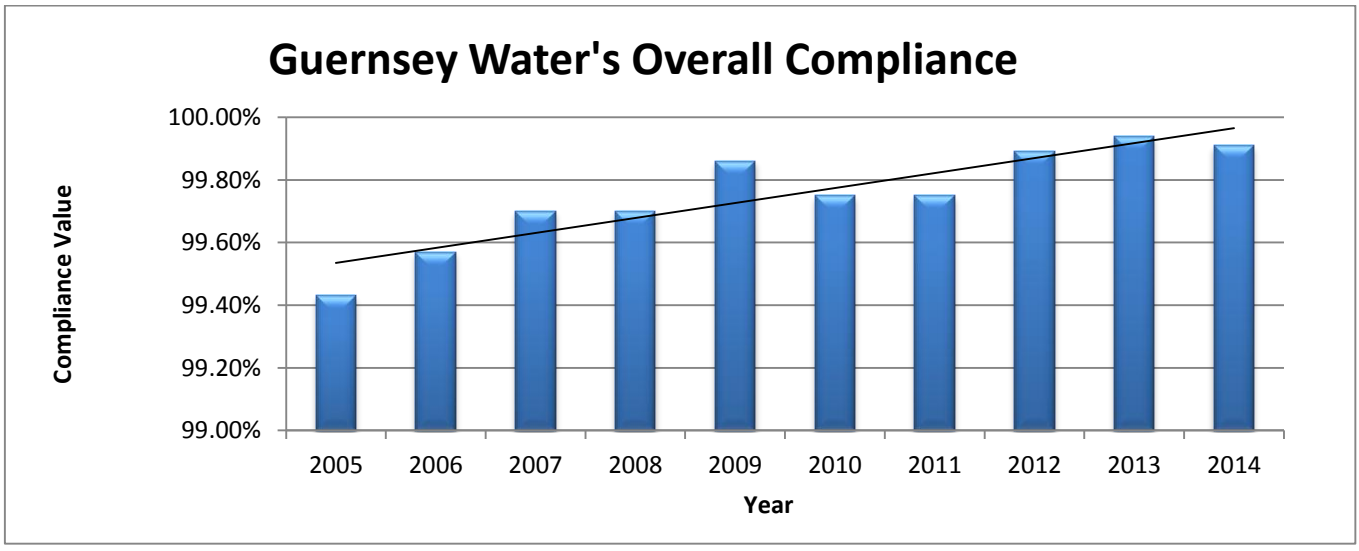
**Supply Zones**

| | Longue Hougue Zone | No.2 Zone | Tower Zone | Total |
|---|---|---|---|---|
| No of Breaches | 2 | 2 | 2 | 6 |
| No of Passes | 778 | 502 | 500 | 1780 |
| No of Samples | 780 | 504 | 502 | 1786 |
| **% Compliance** | **99.74%** | **99.60%** | **99.60%** | **99.66%** |

**Overall Total**

| | Total |
|---|---|
| No of Breaches | 6 |
| No of Passes | 6984 |
| No of Samples | 6990 |
| **% Compliance** | **99.91%** |

The graph below shows the historic trend of total compliance since the introduction of compliance sampling in line with The Water Supply (Water Quality) Regulations 2000, as amended, started in 2005.




Tables 1 to 11 have the breakdown of drinking water quality in the detailed format used by water companies in England and Wales and annually reported by the DWI.

Raw Water

With regard to the Island's water catchment area, Guernsey Water manages the legislation concerning pollution of this area. This has meant water quality that could potentially have an effect on drinking water has been managed through strict limits on discharges to the environment. This current function will be moved to fall under the jurisdiction of the Director of Environmental Health and Pollution Regulation as a result of Guernsey Water now managing the Island's wastewater infrastructure and in line with the recommendations agreed by the States of Guernsey in Billet d'Etat XX1 2012 (dated 31st October 2012).

Raw water quality is closely monitored with analyses of 21 streams and stored water in 17 quarries and reservoirs. Raw water quality determines if water is collected and stored; in turn stored water is transferred to water treatment works based on water quality parameters to ensure the best possible water is supplied to our customers.

Nitrate levels in some streams are at the upper acceptable limit but through careful blending and storage, levels are reduced to ensure compliance with the prescribed limit of 50 mg/l for the provision of wholesome drinking water.

Tables 12 and 13 show the raw water quality that was observed in 2014 in the Island's various streams and storage reservoirs.

## TREATED WATER 2014 DATA SUMMARY TABLES FOR GUERNSEY WATER...

These tables contain a summary of results of treated water monitoring undertaken by Guernsey Water in 2014.

**Notes relating to the interpretation of the tables: -**

Columns on the following tables that are headed '1 percentile representing a minimum' and '99 percentile representing a maximum' contain figures for the 1 percentile and 99 percentile sample results respectively except where less than 100 samples were taken, when the figures are the actual maximum and minimum results.

The symbol < indicates that the result was less than the limit of detection of the analytical method used.
The symbol > indicates that the result was above the recording range of the analytical method used.

**Table 1: Quality of water leaving treatment works – European Standards**

| Parameter | Prescribed Concentration or Value | Total number of tests | Tests failed | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) | No. of works with failures |
|---|---|---|---|---|---|---|
| Nitrite | 0.1 mg $NO_2$/l | 129 | 0 | <0.03 | <0.03 | 0 |
| **TOTAL** | - | **129** | **0** | - | - | - |

**Table 2: Quality of water leaving treatment works – National Standards**

| Parameter | Prescribed Concentration or Value | Total number of tests | Tests failed | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) | No. of works with failures |
|---|---|---|---|---|---|---|
| Coliform Bacteria | 0 number/100ml | 630 | 0 | 0 | 0 | 0 |
| Cryptosporidium | oocysts >1 in 10 litres | 12 | 0 | 0 | 0 | 0 |
| *E. coli* | 0 number/100ml | 630 | 0 | 0 | 0 | 0 |
| **TOTAL** | - | **1272** | **0** | - | - | - |

**Table 3: Quality of water leaving treatment works – Additional Monitoring Requirements**

| Indicator Parameter | Prescribed Concentration or Value | Total number of tests | Tests Exceeding Specification | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) |
|---|---|---|---|---|---|
| Colony Counts After 3 Days At 22°C | No abnormal change | 626 | n/a | 0 | 9 |
| Colony Counts After 48 Hours At 37°C | No abnormal change | 630 | n/a | 0 | 2 |
| Residual Disinfectant - Free | No abnormal change | 622 | n/a | 0.05 | 0.50 |
| Residual Disinfectant - Total | No abnormal change | 622 | n/a | 0.05 | 0.80 |
| Turbidity | 1 NTU | 622 | 0 | 0.01 | 0.48 |
| **TOTAL** | - | **3122** | **0** | - | - |

**Table 4: Quality of water leaving service reservoirs – National Standards**

| Parameter | Prescribed Concentration or Value | Total number of tests | Tests failed | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) | No. of reservoirs failing standard |
|---|---|---|---|---|---|---|
| Coliform Bacteria | 0 number/100ml | 206 | 0 | 0 | 0 | 0 |
| *E. coli* | 0 number/100ml | 206 | 0 | 0 | 0 | 0 |
| **TOTAL** | - | **412** | **0** | - | - | - |

**Table 5: Quality of water leaving service reservoirs – Additional Monitoring Requirements**

| Indicator Parameter | Prescribed Concentration or Value | Total number of tests | Tests Exceeding Specification | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) |
|---|---|---|---|---|---|
| Colony Counts After 3 Days At 22°C | No abnormal change | 206 | n/a | 0 | 60 |
| Colony Counts After 48 Hours At 37°C | No abnormal change | 206 | n/a | 0 | 27 |
| Residual Disinfectant - Free | No abnormal change | 206 | n/a | <0.05 | 0.25 |
| Residual Disinfectant - Total | No abnormal change | 206 | n/a | <0.05 | 0.4 |
| **TOTAL** | - | **824** | - | - | - |

**Table 6: Quality of water leaving bulk supply points – European Standards**

| Parameter | Prescribed Concentration or Value | Total number of tests | Tests failed | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) | No. of supply points with failures |
|---|---|---|---|---|---|---|
| 1,2 Dichloroethane | 3 µg/l | 11 | 0 | <0.12 | <0.12 | 0 |
| Benzene | 1 µg/l | 11 | 0 | <0.07 | <0.07 | 0 |
| Boron | 1 mg B/l | 13 | 0 | 0.053 | 0.00012 | 0 |
| Bromate | 10 µg $BrO_3$/l | 11 | 0 | <0.5 | 0.9 | 0 |
| Cyanide | 50 µg CN/l | 12 | 0 | <0.002 | 0.003 | 0 |
| Fluoride | 1.5 mg F/l | 17 | 0 | <0.1 | 0.12 | 0 |
| Mercury | 1 µg Hg/l | 13 | 0 | <0.002 | 0.034 | 0 |
| Tetrachloroethene/Trichloroethene | 10 µg/l | 11 | 0 | <0.07 | <0.07 | 0 |
| Pesticides (Dieldrin) | 0.1 µg/l | 13 | 0 | 0.002 | 0.003 | 0 |
| Pesticides (Diflufenican) | 0.1 µg/l | 13 | 0 | 0.002 | 0.003 | 0 |
| Pesticides (Hexachlorocyclohexane Gamma) | 0.1 µg/l | 13 | 0 | 0.001 | 0.003 | 0 |
| Pesticides (Mecoprop) | 0.1 µg/l | 13 | 0 | <0.01 | 0.011 | 0 |
| Pesticides (Propicaonazole) | 0.1 µg/l | 13 | 0 | 0.006 | 0.009 | 0 |
| Pesticides (Simazine) | 0.1 µg/l | 13 | 0 | 0.004 | 0.006 | 0 |
| Pesticides (Triclopyr) | 0.1 µg/l | 13 | 0 | <0.015 | 0.022 | 0 |
| Pesticides - Total Substances | 0.5 µg/l | 13 | 0 | 0.04 | 0.057 | 0 |
| **TOTAL** | - | **203** | **0** | - | - | - |

**Table 7: Quality of water leaving bulk supply points – National Standards**

| Parameter | Prescribed Concentration or Value | Total number of tests | Tests failed | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) | No. of supply point with failures |
|---|---|---|---|---|---|---|
| Tetrachloromethane | 3 µg/l | 11 | 0 | <0.07 | <0.07 | 0 |
| **TOTAL** | - | **11** | **0** | - | - | - |

**Table 8: Quality of water leaving bulk supply points – Additional Monitoring Requirements**

| Indicator Parameter | Prescribed Concentration or Value | Total number of tests | Tests Exceeding Specification | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) |
|---|---|---|---|---|---|
| Chloride | 250 mg Cl/l | 17 | 0 | 84.32 | 99.68 |
| *Clostridium perfringens* | 0 number/100ml | 129 | 0 | 0 | 0 |
| Conductivity | 2500 µS/cm | 132 | 0 | 522.62 | 623.07 |
| Radioactivity - Gross Alpha | 0.1 Bq/l | 13 | 0 | <0.02 | 0.048 |
| Radioactivity - Gross Beta | 1 Bq/l | 13 | 0 | 0.079 | 0.195 |
| Radioactivity - Tritium | 100 Bq/l | 13 | 0 | <10 | <10 |
| Sulphate | 250 mg $SO_4$/l | 17 | 0 | 50 | 90.72 |
| Total Organic Carbon (TOC) | No abnormal change | 618 | n/a | 1.917 | 5.366 |
| **TOTAL** | - | **952** | **0** | - | - |

**Table 9: Quality of water at consumer's tap (zones) – European Standards**

| Parameter | Prescribed Concentration or Value | Total number of tests | Tests failed | 1percentile (representing a minimum) | 99 percentile (representing a maximum) | No. of zones with failures |
|---|---|---|---|---|---|---|
| Antimony | 5 ug Sb/l | 24 | 0 | 0.335 | 1.652 | 0 |
| Arsenic | 10 ug As/l | 24 | 0 | 0.203 | 0.455 | 0 |
| Benzo(a)pyrene | 0.01 µg/l | 23 | 0 | <0.0005 | <0.01 | 0 |
| Cadmium | 5 ug Cd/l | 24 | 0 | <0.1 | <0.1 | 0 |
| Chromium | 50 ug Cr/l | 24 | 0 | <0.7 | <0.7 | 0 |
| Copper | 2 mg Cu/l | 24 | 0 | <0.01 | 0.124 | 0 |
| *E. coli* | 0 number/100ml | 168 | 0 | 0 | 0 | 0 |
| Enterococci | 0 number/100ml | 25 | 0 | 0 | 0 | 0 |
| Lead | 25 µg Pb/l | 24 | 0 | <5 | <5 | 0 |
| Nickel | 20 µg Ni/l | 24 | 0 | <0.8 | 1.806 | 0 |
| Nitrate | 50 mg $NO_3$/l | 24 | 0 | 15.815 | 40.226 | 0 |
| Nitrite | 0.5 mg $NO_2$/l | 24 | 0 | <0.03 | 0.03 | 0 |
| Nitrate/Nitrite Formula | 1mg $NO_2$/l | 24 | 0 | 0.326 | 0.815 | 0 |
| Polycyclic aromatic hydrocarbons (PAHs) | 0.1 µg/l | 23 | 0 | 0 | 0.0055 | 0 |
| Selenium | 10 µg Se/l | 24 | 0 | 0.249 | 0.567 | 0 |
| Trihalomethanes (THMs) | 100 µg/l | 24 | 4 | 41.465 | 111.248 | 3 |
| **TOTAL** | - | **384** | **4** | - | - | - |

**Table 10: Quality of water at consumer's tap (zones) – National Standards**

| Parameter | Prescribed Concentration or Value | Total number of tests | Tests failed | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) | No. of zones with failures |
|---|---|---|---|---|---|---|
| Aluminium | 200 µg Al/l | 84 | 0 | 18.98 | 144.38 | 0 |
| Colour | 20 mg/l Pt/Co scale | 84 | 0 | <5 | <5 | 0 |
| Hydrogen ion (pH) | 6.5 - 10 pH value | 84 | 0 | 6.918 | 7.564 | 0 |
| Iron | 200 µg Fe/l | 84 | 0 | <10 | 18.51 | 0 |
| Manganese | 50 µg Mn/l | 84 | 0 | <10 | 16.77 | 0 |
| Organoleptic Odour | 3 at 25°C dilution number | 84 | 0 | n/a | n/a | 0 |
| Organoleptic Taste | 3 at 25°C dilution number | 83 | 0 | n/a | n/a | 0 |
| Sodium | 200 mg Na/l | 24 | 0 | 55.23 | 63.77 | 0 |
| Turbidity | 4 NTU | 84 | 0 | 0.038 | 0.71 | 0 |
| **TOTAL** | - | **695** | **0** | - | - | - |

**Table 11: Quality of water at consumer's tap (zones) – Additional Monitoring Requirements**

| Indicator Parameter | Prescribed Concentration or Value | Total number of tests | Tests Exceeding Specification | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) |
|---|---|---|---|---|---|
| Ammonium | 0.5 mg $NH_4$/l | 84 | 0 | <0.01 | 0.022 |
| Coliform Bacteria | 0 number/100ml | 168 | 2 | 0 | 1 |
| Colony Counts After 3 Days At 22°C | No abnormal change | 86 | n/a | 0 | 249 |
| Colony Counts After 48 Hours At 37°C | No abnormal change | 86 | n/a | 0 | 18 |
| Conductivity | 2500 uS/cm | 84 | 0 | 524.49 | 617.17 |
| Hydrogen ion (pH) | <9.5 pH value | 84 | 0 | 6.918 | 7.564 |
| Residual Disinfectant - Free | No abnormal change | 84 | n/a | <0.05 | 0.167 |
| Residual Disinfectant - Total | No abnormal change | 84 | n/a | <0.05 | 0.276 |
| **TOTAL** | - | **760** | **0** | - | - |

## RAW WATER 2014 DATA SUMMARY TABLES FOR GUERNSEY WATER...

These tables contain a summary of results of raw water monitoring undertaken by Guernsey Water in 2014.

**Notes relating to the interpretation of the tables: -**

Columns on the following tables that are headed '1 percentile representing a minimum' and '99 percentile representing a maximum' contains figures for the 1 percentile and 99 percentile sample results respectively except where less than 100 samples were taken, when the figures are the actual maximum and minimum results.

The symbol < indicates that the result was less than the limit of detection of the analytical method used.
The symbol > indicates that the result was above the recording range of the analytical method used.

**Table 12: Quality of water in Island streams – Monitoring**

| Indicator Parameter | Units of Measure | Total number of tests | Minimum Result | Maximum Result |
|---|---|---|---|---|
| Hydrogen ion (pH) | pH value | 979 | 6.47 | 8.83 |
| Conductivity | uS/cm | 978 | 87 | 975 |
| Potassium | mg K/l | 978 | 2.1 | 21 |
| Nitrate | mg $NO_3$/l | 978 | 1.1 | 127 |
| Ammonium | mg $NH_4$/l | 978 | 0.01 | 4 |
| Nitrite | mg $NO_2$/l | 977 | 0.03 | 3.4 |
| Phosphate | mg P/l | 977 | 0.02 | 9 |
| Chloride | mg Cl/l | 978 | 10 | 190 |
| TOC | mg C/l | 977 | 1.1 | 22.1 |
| Coliform Bacteria | number/100ml | 490 | 0 | 100,000 |
| E.coli | number/100ml | 490 | 0 | 100,000 |
| Faecal streptococci | number/100ml | 485 | 0 | 100,000 |
| **TOTAL** | - | **10,265** | - | - |

**Table 13: Quality of stored water in quarries and reservoirs – Monitoring**

| Indicator Parameter | Units of Measure | Total number of tests | Minimum Result | Maximum Result |
|---|---|---|---|---|
| Hydrogen ion (pH) | pH value | 183 | 6.9 | 9.89 |
| Conductivity | uS/cm | 183 | 318 | 845 |
| Ammonium | mg $NH_4$/l | 183 | 0.01 | 1 |
| Nitrate | mg $NO_3$/l | 183 | 0.7 | 51 |
| Nitrite | mg $NO_2$/l | 183 | 0.03 | 0.54 |
| Phosphate | mg P/l | 183 | 0.02 | 0.68 |
| Chloride | mg Cl/l | 183 | 50 | 135 |
| Potassium | mg K/l | 183 | 3.8 | 12.2 |
| Silicate | mg $SiO_2$/l | 183 | 1.7 | 18.5 |
| TOC | mg C/l | 183 | 2.1 | 27.0 |
| **TOTAL** | - | **1,830** | - | - |

## PERFLUOROOCTANE SULFONATE (PFOS)...

Since 2007 PFOS has been monitored in raw and treated water in accordance with guidance from DWI who set the 'wholesomeness' value as 1.0 µg/l. Guernsey Water has used its available water resources to manage the levels of PFOS in water leaving St Saviours water treatment works. The Tables below provide a breakdown of the levels of PFOS observed in 2014 in drinking water from St Saviours water treatment works, St Saviour's reservoir and affected stream systems.

**Table 14: Quality of water leaving treatment works – PFOS**

| Indicator Parameter | Prescribed Concentration or Value | Total number of tests | Tests Exceeding Specification | Minimum Result | Maximum Result |
|---|---|---|---|---|---|
| Perfluorooctane sulfonate (PFOS) | 1.0 µg $C_8HF_{17}O_3S$/l | 28 | 0 | <0.01 µg | 0.16 µg |
| **TOTAL** | - | **28** | **0** | - | - |

**Table 15: Quality of stored water in St Saviours Reservoirs – PFOS**

| Indicator Parameter | Units of Measure | Total number of tests | Minimum Result | Maximum Result |
|---|---|---|---|---|
| Perfluorooctane sulfonate (PFOS) | µg $C_8HF_{17}O_3S$/l | 28 | 0.064 µg | 0.19 µg |
| **TOTAL** | - | **28** | - | - |

**Table 16: Quality of water in Island streams – PFOS**

| Indicator Parameter | Units of Measure | Total number of tests | Minimum Result | Maximum Result |
|---|---|---|---|---|
| Perfluorooctane sulfonate (PFOS) | µg $C_8HF_{17}O_3S$/l | 126 | <0.01 µg | 20 µg |
| **TOTAL** | - | **126** | - | - |

## 2014 WATER CATCHMENT AREA NITRATE LOADINGS...

The 2014 nitrate loadings have been evaluated to produce a nitrate map showing the level of nitrates in each catchment area.

Samples are taken from each catchment area every week and this data has been statistically analysed to give the range of 90% of the samples (the top and bottom 5% have been removed as outliers from the observed range).

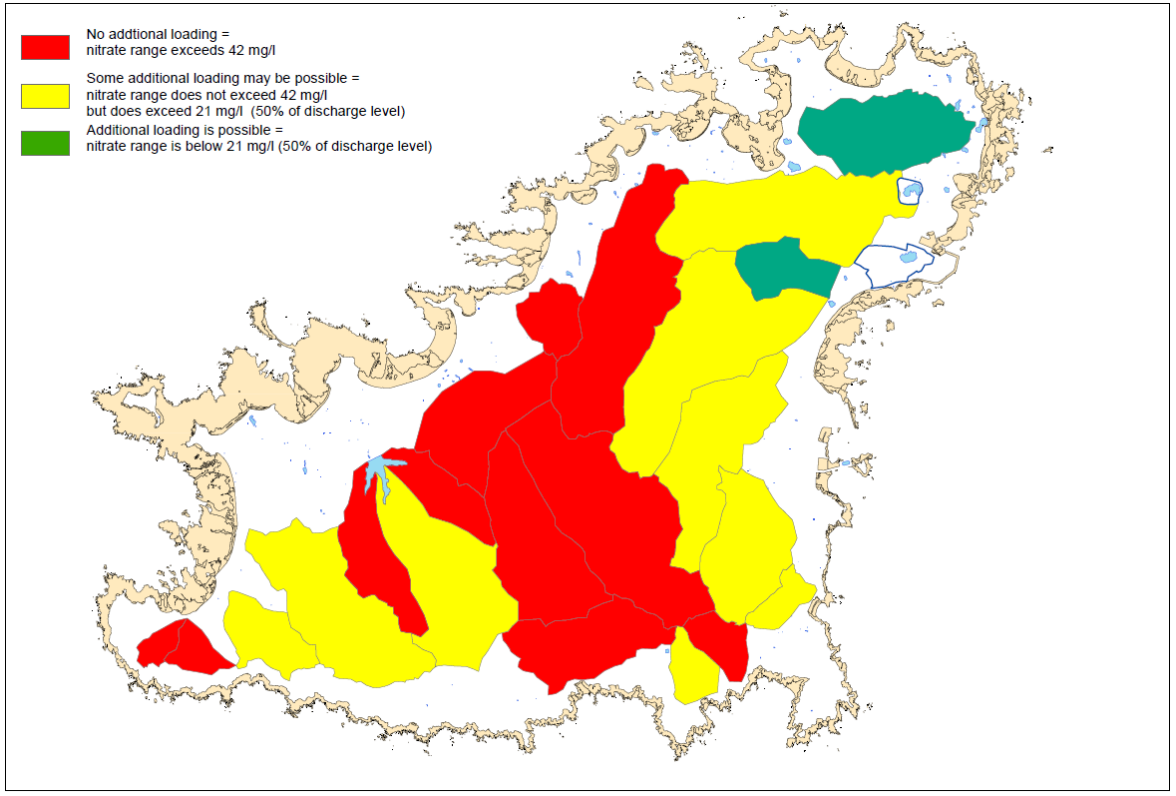
The Director of Environmental Health and Pollution Regulation submitted discharge standards for inclusion within Part VI of The Environmental Pollution (Guernsey) Law, 2004, to the States of Guernsey in Billet d'Etat XX1 2012 (dated 31st October 2012) and the proposed nitrate discharge level is recommended at 42 mg/l (as $NO_3$). The nitrate drinking water limit as prescribed in The Water Supply (Water Quality) Regulations 2000, as amended, is set at 50 mg/l.

To evaluate the ranges the following methodology was followed: -

- No additional loading = nitrate range exceeds 42 mg/l
- Some additional loading may be possible = nitrate range does not exceed 42 mg/l but does exceed 21 mg/l (50% of discharge level)
- Additional loading is possible = nitrate range is below 21 mg/l (50% of discharge level)

Figure 1 is the 95%ile data range and on the right is the map showing the colour coded catchment areas.

**Figure 1 – 2014 Nitrate Loadings**




GUERNSEY NITRATE LOADING (CATCHMENT) 2014

**Table 17: Quality of water in Island streams – Nitrate**

| 2014 Water Catchment Area Nitrate Loadings | | |
|---|---|---|
| **CATCHMENT AREA** | **5%ILE (MG/L)** | **95%ILE (MG/L)** |
| **Beau Valet** | 17.5 | 36.1 |
| **Charroterie** | 18.9 | 41.7 |
| **Choffins** | 41.8 | 65.7 |
| **Cobo** | 19.5 | 81.8 |
| **Fauxquets** | 40.7 | 74.1 |
| **Fermain** | 22.2 | 32.0 |
| **Grande Mare** | 4.0 | 57.9 |
| **Les Arquets** | 22.6 | 39.8 |
| **Les Clercs** | 14.1 | 32.2 |
| **Marais Sump** | 2.8 | 17.9 |
| **Marais Stream** | 5.2 | 25.5 |
| **Mare de Carteret** | 10.3 | 42.4 |
| **Moulin Huet** | 17.2 | 42.6 |
| **Old Marais** | 1.4 | 9.1 |
| **Padins** | 20.3 | 42.8 |
| **Petit Bot** | 18.2 | 122.7 |
| **Pleinmont East** | 26.1 | 58.6 |
| **Pleinmont West** | 21.9 | 47.6 |
| **Saints** | 19.1 | 41.3 |
| **Talbots** | 29.2 | 68.9 |
| **Vale Pond** | 6.2 | 24.6 |
| **Vrangue** | 10.6 | 34.5 |

## APPENDIX A...

**Table 18: Listed parameters Guernsey Water samples for and prescribed concentrations or values**

| Parameter | Prescribed Concentration or Value |
|---|---|
| **Bacteriology** | |
| *Clostridium perfringens* | 0 number/100ml |
| Coliform Bacteria | 0 number/100ml |
| Colony Counts After 3 Days At 22°C | No abnormal change |
| Colony Counts After 48 Hours At 37°C | No abnormal change |
| Cryptosporidium | oocyst >1 in 10 litres |
| *E. coli* | 0 number/100ml |
| Enterococci | 0 number/100ml |
| **Chemistry** | |
| 1,2 Dichloroethane | 3 µg/l |
| 2,3,6-TBA | 0.1 µg/l |
| 2,4,5-TCA | 0.1 µg/l |
| 2,4-DB | 0.1 µg/l |
| 2-4,D | 0.1 µg/l |
| Aldrin | 0.03 µg/l |
| Aluminium | 200 µg Al/l |
| Ammonium | 0.5 mg $NH_4$/l |
| Antimony | 5 µg Sb/l |
| Arsenic | 10 µg As/l |
| Atrazine | 0.1 µg/l |
| Azinphos-methyl | 0.1 µg/l |
| Benazolin | 0.1 µg/l |
| Bentazone | 0.1 µg/l |
| Benzene | 1 µg/l |
| Benzo(a)pyrene | 0.01 µg/l |
| Boron | 1 mg B/l |
| Bromate | 10 µg BrO3/l |
| Bromoxynil | 0.1 µg/l |
| Cadmium | 5 µg Cd/l |
| Carbendazim | 0.1 µg/l |
| Carbetamide | 0.1 µg/l |
| Carbophenothion | 0.1 µg/l |
| Chlordane (cis) | 0.1 µg/l |
| Chlordane (trans) | 0.1 µg/l |
| Chloride | 250 mg Cl/l |
| Chlorofenvinphos | 0.1 µg/l |
| Chloropropham | 0.1 µg/l |
| Chloropyriphos | 0.1 µg/l |
| Chlorothalonil | 0.1 µg/l |
| Chlorotoluron | 0.1 µg/l |
| Chlorthal | 0.1 µg/l |
| Chlorthal di methyl | 0.1 µg/l |
| Chromium | 50 µg Cr/l |
| Clopyralid | 0.1 µg/l |
| Colour | 20 mg/l Pt/Co scale |
| Conductivity | 2500 µS/cm |

**Table 18: continued**

| Parameter | Prescribed Concentration or Value |
|---|---|
| Copper | 2 mg Cu/l |
| Cyanazine | 0.1 µg/l |
| Cyanide | 50 µg CN/l |
| Cypermethrin | 0.1 µg/l |
| D.D.D. Op | 0.1 µg/l |
| D.D.D. Pp | 0.1 µg/l |
| D.D.E. Op | 0.1 µg/l |
| D.D.E. Pp | 0.1 µg/l |
| D.D.T. Op | 0.1 µg/l |
| D.D.T. Pp | 0.1 µg/l |
| Dalapon | 0.1 µg/l |
| Diazinon | 0.1 µg/l |
| Dicamba | 0.1 µg/l |
| Dichloroprop | 0.1 µg/l |
| Dichlorvos | 0.1 µg/l |
| Dieldrin | 0.03 µg/l |
| Diflufenican | 0.1 µg/l |
| Dimethoate | 0.1 µg/l |
| Diuron | 0.1 µg/l |
| Endrin | 0.1 µg/l |
| Fenitrothion | 0.1 µg/l |
| Fluoride | 1.5 mg F/l |
| Fluroxpyr | 0.1 µg/l |
| Glyphosate | 0.1 µg/l |
| Heptachlor | 0.03 µg/l |
| Heptachlor epoxide | 0.03 µg/l |
| Heptenophos | 0.1 µg/l |
| Hexachlorocyclohexane alpha | 0.1 µg/l |
| Hexachlorocyclohexane beta | 0.1 µg/l |
| Hexachlorocyclohexane Delta | 0.1 µg/l |
| Hexachlorocyclohexane gamma | 0.1 µg/l |
| Hydrogen ion (pH) | 6.5 - 9.5 pH value |
| Ioxynil | 0.1 µg/l |
| Iprodione | 0.1 µg/l |
| Iron | 200 µg Fe/l |
| Isodrin | 0.1 µg/l |
| Isoproturon | 0.1 µg/l |
| Lead | 10 µg Pb/l |
| Linuron | 0.1 µg/l |
| M.C.P.A. | 0.1 µg/l |
| M.C.P.B. | 0.1 µg/l |
| Malathion | 0.1 µg/l |
| Manganese | 50 µg Mn/l |
| Mecarbam | 0.1 µg/l |
| Mecoprop | 0.1 µg/l |
| Mercury | 1 µg Hg/l |
| Metaldehyde | 0.1 µg/l |
| Methabenzthiazuron | 0.1 µg/l |
| Monolinuron | 0.1 µg/l |

**Table 18: continued**

| Parameter | Prescribed Concentration or Value |
|---|---|
| Nickel | 20 µg Ni/l |
| Nitrate | 50 mg NO3/l |
| Nitrate/Nitrite Formula | 1mg NO2/l |
| Nitrite | 0.1 mg $NO_2$/l (treatment works) |
| Nitrite | 0.5 mg NO2/l (consumers' tap) |
| Organoleptic Odour | 3 at 25°C dilution number |
| Organoleptic Taste | 3 at 25°C dilution number |
| Oxamyl | 0.1 µg/l |
| Parathion-ethyl | 0.1 µg/l |
| Pendimethalin | 0.1 µg/l |
| Pentachlorophenol | 0.1 µg/l |
| Perfluorooctane sulphonate (PFOS) | 1 µg/l |
| Perfluorooctanoic acid (PFOA) | 10 µg/l |
| Pesticides: Total | 0.5 µg/l |
| Picloram | 0.1 µg/l |
| Pirimephos-methyl | 0.1 µg/l |
| Pirimicarb | 0.1 µg/l |
| Polycyclic aromatic hydrocarbons (PAHs) | 0.1 µg/l |
| Prometryne | 0.1 µg/l |
| Propazine | 0.1 µg/l |
| Propetamphos | 0.1 µg/l |
| Propiconazole | 0.1 µg/l |
| Propyzamide | 0.1 µg/l |
| Radioactivity - Gross Alpha | 0.1 Bq/l |
| Radioactivity - Gross Beta | 1 Bq/l |
| Radioactivity - Tritium | 100 Bq/l |
| Residual Disinfectant - Free | No abnormal change |
| Residual Disinfectant - Total | No abnormal change |
| Selenium | 10 µg Se/l |
| Simazine | 0.1 µg/l |
| Sodium | 200 mg Na/l |
| Sulphate | 250 mg SO4/l |
| Tebuconazole | 0.1 µg/l |
| Terbuthylazine | 0.1 µg/l |
| Terbutryn | 0.1 µg/l |
| Tetrachloroethene/Trichloroethene | 10 µg/l |
| Tetrachloromethane | 3 µg/l |
| Total Organic Carbon (TOC) | No abnormal change |
| Triadimefon | 0.1 µg/l |
| Triallate | 0.1 µg/l |
| Triazophos | 0.1 µg/l |
| Trichloroacetic acid | 0.1 µg/l |
| Trichorophenoxyacetic acid (2,4,5) | 0.1 µg/l |
| Triclopyr | 0.1 µg/l |
| Trietazine | 0.1 µg/l |
| Trihalomethanes (THMs) | 100 µg/l |
| Turbidity | 1 NTU (treatment works) |
| Turbidity | 4 NTU (consumers' tap) |