DRINKING WATER QUALITY REGULATOR

FOR SCOTLAND

Drinking Water Quality in Scotland 2017

Private Water Supplies

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EXECUTIVE SUMMARY

The Drinking Water Quality Regulator for Scotland (DWQR) is required to ensure that local authorities are meeting their regulatory duties in regard to the quality of private water supplies. DWQR also regulates the quality of water supplied by Scottish Water. The role of DWQR was created by the Water Industry (Scotland) Act 2002 ("the Act"), which gives the Regulator powers to obtain information. This report fulfils the requirement under the Act that the DWQR publishes a report on the exercise of the Regulator's functions during the previous year. This report relates to the calendar year 2017 and is for private water supplies. A similar report on the quality of water supplied by Scottish Water was published on 2 August 2018.

Private water supplies (PWS) are drinking water supplies which are not the responsibility of Scottish Water but of their owners and users. Private water supplies regulations are enforced by local authorities, and the DWQR supervises this enforcement. The regulations were revised over the course of 2017 with The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017, coming into force on 27 October 2017. These cover the provisions for large or commercial supplies. For the purposes of reporting, however, the requirements of The Private Water Supplies (Scotland) Regulations 2006 ("the 2006 Regulations") were continued to the year end.

The sources of PWS are many and varied, and a large number of householders and businesses depend on them for their drinking water supplies. In 2017 local authorities reported to DWQR that there were 22,269 registered PWS in Scotland, 2,494 Type A and 19,775 Type B. Type A supplies are those which supply 50 or more people, or 10m^3 water or more a day, and any PWS which is used in a commercial or public activity. The Type B classification relates to smaller, domestic supplies. Around 3.6% of Scotland's population relies on PWS for their drinking water, but a significant number of others, for example visitors and tourists, will also use these supplies.

Environmental Health teams from local authorities review risk assessments and sample Type A PWS annually. In 2017, just over 93% of Type A supplies had either a completed or reviewed risk assessment. A total of 46,470 tests were carried out on samples taken from Type A PWS to check for a range of contaminants. In total, 95% of tests complied with the standards. The smaller Type B supplies fall outwith the prescribed monitoring regime but some are sampled at the request of users, grant applications or as part of public health investigations. Of those sampled, 13,432 tests were undertaken, of which just under 88% met the required standard.

E. coli, which has the potential to cause illness and provides an indication that faecal contamination of the supply has occurred, is one of the parameters for which tests are undertaken. It was detected in 11% of Type A supply samples taken across Scotland. This is almost unchanged from the previous year. The presence of *E. coli* indicates that the supplies

or properties served by them, are either not receiving the appropriate amount of treatment before use, or that the existing treatment is not being satisfactorily managed and maintained. Given the potential risks to public health, all failures are thoroughly investigated by the local authority. Where there is a need for immediate action to safeguard their health in the short term, users are advised to boil water for human consumption or to use an alternative supply, including bottled water. Users will also be informed of any required improvement works and the timescales in which these works must be carried out and enforcement work is initiated with the owners/users, where necessary, to improve the supply.

In 2017, as in 2016, only one improvement notice was served by a local authority across the whole of Scotland, as local authorities work with users to secure improvements through discussion or the use of improvement grants. In view of the number of supplies failing to meet the drinking water quality standards over a prolonged period this is a surprisingly low number. Although responsibility for private supplies rests with owners and users, local authorities are urged to continue to provide appropriate advice and DWQR expects them to make full use of the enforcement powers available to tackle deliver improvements. It is expected that the new suite of enforcement options introduced by new Regulations for private supplies in 2017 will see an increase in formal enforcement action.

Results confirm that, at a national level, the quality of Type A private water supplies is broadly constant and has not improved since 2010 in spite of ongoing efforts by local authorities and the availability of a Scottish Government-funded grant to encourage improvements. In addition to *E.coli,* other parameters with significant numbers of failures on private water supplies included coliforms, colour, hydrogen ion (pH), iron, manganese and lead.

The Scottish Government provides financial support for owners and users of PWS to support improvements through the provision of a non-means tested grant of up to £800 per property. These are available from local authorities to all who own or use a PWS. In 2017/18, £429,968 was awarded for PWS improvements. According to the data provided by local authorities this funding improved 347 supplies.

In addition, a considerable amount of work is being undertaken by local authorities and also through Scottish Government initiatives such as the VTEC/*E. coli* O157 Action Plan with the aim of reducing the risk to health for consumers and securing lasting improvements to the quality of private water supplies.

During 2017 the DWQR comprehensively revised the information available to owners, users and local authorities resulting in the Scottish Government setting up a new internet based PWS Information Hub.

1 TYPES OF PRIVATE WATER SUPPLIES IN SCOTLAND

Private water supplies (PWS) are drinking water supplies which are not provided by Scottish Water and are the responsibility of the owners and users of the supplies.

In 2017, the data provided to the Drinking Water Quality Regulator for Scotland (DWQR) by local authorities showed that there are 22,269 private supplies in Scotland. This data confirms that around 195,961 people (3.6% of Scotland's population) live or work in premises that rely daily on a private water supply. This figure, however, does not take into account the large numbers of people including visitors and tourists who may use premises with a private water supply.

In Scotland PWS fall into one of two categories. Those which supply 50 or more people, provide 10 cubic metres of water a day or more, or, regardless of the number of people served or the volume supplied, are supplying premises that are part of a commercial or public activity and were formerly known as Type A supplies. These supplies serve a variety of premises e.g. holiday lets, B&Bs, hotels, caravan parks/campsites, schools, community halls and a range of other facilities. Type B supplies are all other domestic PWS, many of which serve single properties. **Figure 1** illustrates the data reported to DWQR for 2017 for the two different categories of supply.

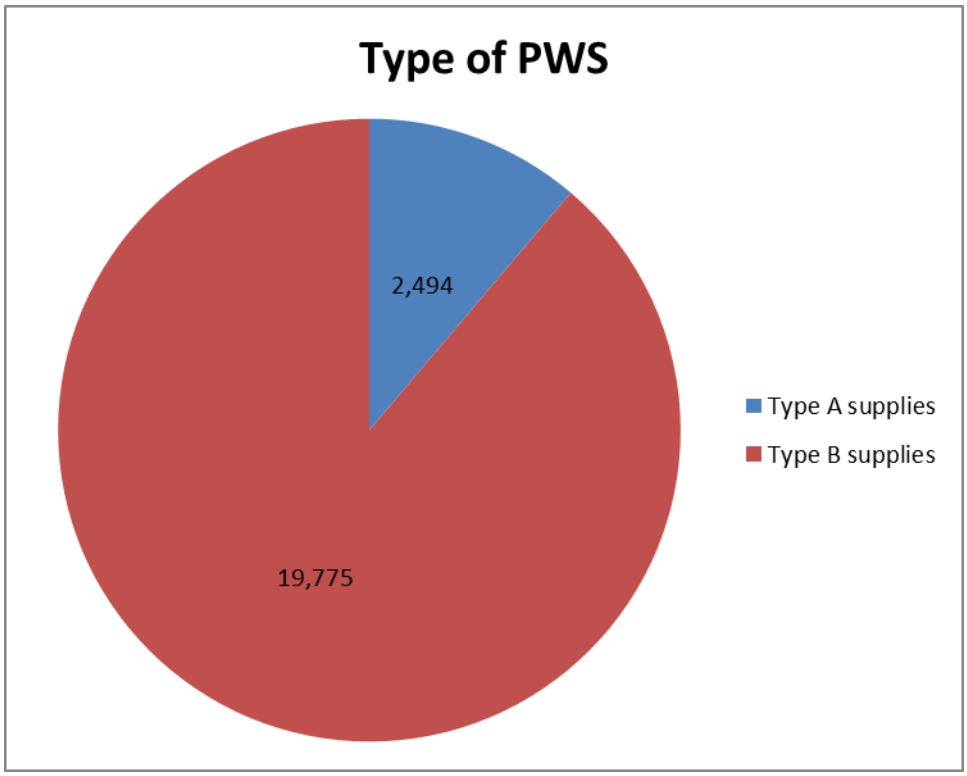

Figure 1 Private Water Supplies by Type

Water sources for private supplies vary greatly in their size and nature. These range from springs and boreholes serving single dwellings to larger boreholes or surface water supplies supplying a community. The majority of private water supplies are located in rural areas. Some are located in areas where there is a public supply of water available. **Table 1** provides a summary of private water supplies in each local authority area, and the population reliant upon them.

Table 1 Summary of Private Water Supplies by Local Authority Area

Local Authority	Number of Type A supplies	Number of Type B supplies	% of Population served by PWS
Aberdeen City	0	54	0.1
Aberdeenshire	239	7,654	13.0
Angus	43	405	2.9
Argyll and Bute	509	2,849	32.7
City of Edinburgh	1	16	0.0
Clackmannanshire	4	22	0.6
Comhairle nan Eilean Siar	13	40	1.8
Dumfries and Galloway	169	1278	14.3
Dundee City	0	1	0.0
East Ayrshire	1	207	0.7
East Dunbartonshire	1	18	0.2
East Lothian	6	34	0.5
East Renfrewshire	5	130	1.4
Falkirk	2	8	0.0
Fife	31	304	1.1
Glasgow City	0	0	0
Highland	747	1690	14.0
Inverclyde	7	55	1.7
Midlothian	6	60	0.5
Moray	95	733	5.1
North Ayrshire	14	261	1.8
North Lanarkshire	0	15	0.0
Orkney Islands	26	212	10.7
Perth and Kinross	286	1328	20.1
Renfrewshire	4	122	0.4
Scottish Borders	159	1293	13.5
Shetland Islands	2	56	0.7
South Ayrshire	24	208	1.0
South Lanarkshire	12	299	0.5
Stirling	71	362	6.4
West Dunbartonshire	7	13	0.2
West Lothian	10	48	0.3
SCOTLAND	**2,494**	**19,775**	**3.6**

Whilst on average 3.6% of the population in Scotland use a private water supply, this can vary significantly between local authority areas, for example, a very small proportion of the population in Aberdeen City (0.1%) are reliant on a PWS compared to almost 33% in Argyll and Bute.

The pie chart shown in **Figure 2** sets out those local authority areas with the greatest proportion of PWS. Almost 83% of the population served by private water supplies in Scotland are contained in six local authority areas.

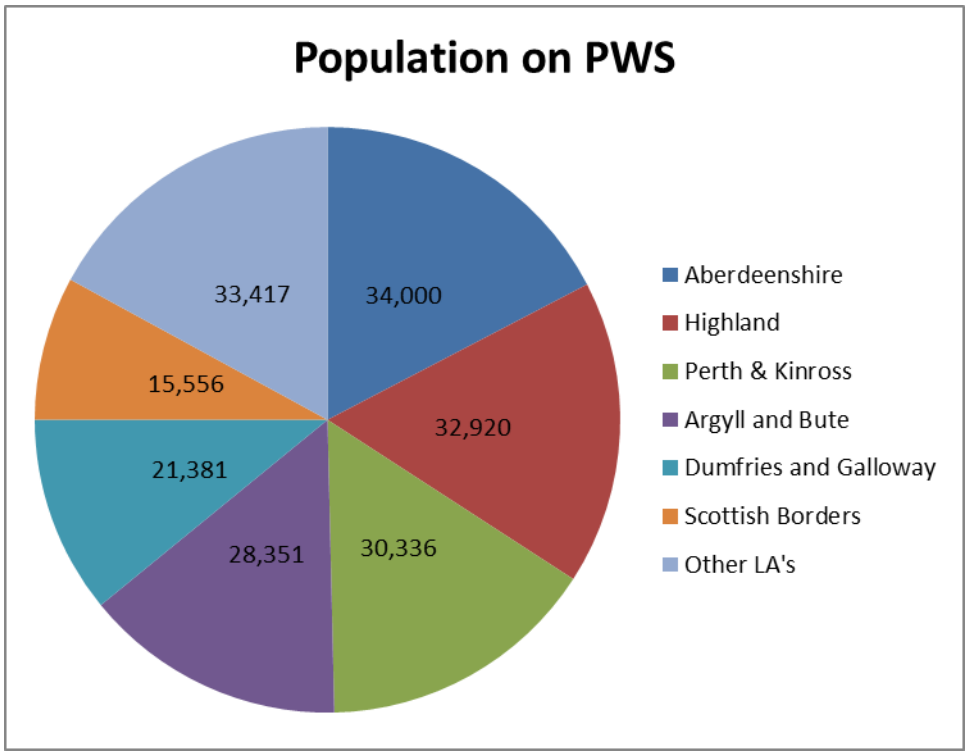

Figure 2 Distribution of Population on Private Supplies across Scotland

2 RISK ASSESSMENT AND SAMPLING

Risk Assessment

Regulations place a duty on local authorities to carry out risk assessments on all supplies serving more than fifty people or which supply a commercial or public activity and to review these risk assessments annually. Additionally, local authorities must provide, on request, advice and assistance on risk assessments to those responsible for Type B supplies. These risk assessments should determine whether the supply poses a potential risk to health and, if so, the action required to safeguard health in the short term and improve the supply in the longer term.

Table 2 below shows that in 2017, just over 93% of Type A supplies had a completed or reviewed risk assessment. This is unchanged from the position in 2016.

For those with Type A supplies in their area, just over half of local authorities completed or reviewed risk assessments on all of these supplies, with 15 reporting 100% completion. A further eight authorities achieved assessment of 90% of their supplies. Five local authorities – East Dunbartonshire, Inverclyde, Orkney Islands, Scottish Borders and Stirling, completed less than 90%. The table shows that seven authorities improved on their 2016 position, 10 had a poorer performance and 11 showed no change.

DWQR considers the risk assessment process to be a vital part of the management of private water supplies. Whilst analysis of water samples is a useful tool, this only provides an indication of the water quality at the time a sample is collected. A comprehensive and regularly updated risk assessment is a means of examining all the challenges to a supply and provides the opportunity to discuss specific issues and improvements with users of supplies. It is also the first step towards the creation of a drinking water safety plan to comprehensively manage those risks.

Table 2 Risk Assessment of Type A Supplies

Local Authority	Number of Type A Supplies	Type A Risk Assessment or Review	% Risk Assessment Compliance	Comparison with 2016 Compliance
Aberdeen City	0	-	-	
Aberdeenshire	239	239	100.0	No Change
Angus	43	43	100.0	Up
Argyll and Bute	509	487	95.7	Down
Clackmannanshire	4	4	100.0	Up
Dumfries and Galloway	169	161	95.3	Down
Dundee City	0	-	-	
East Ayrshire	1	1	100.0	No Change
East Dunbartonshire	1	0	0	Down
East Lothian	6	6	100.0	No Change
East Renfrewshire	5	5	100.0	No Change
City of Edinburgh	1	1	100.0	No Change
Comhairle nan Eilean Siar	13	13	100.0	Up
Falkirk	2	2	100.0	No Change
Fife	31	30	96.8	Down
Glasgow City	0	-	-	
Highland	747	732	98.0	Down
Inverclyde	7	0	0	Down
Midlothian	6	6	100.0	No Change
Moray	95	94	99.0	Up
North Ayrshire	14	14	100.0	No Change
North Lanarkshire	0	-	-	
Orkney Islands	26	21	80.8	Up
Perth and Kinross	286	281	98.3	Down
Renfrewshire	4	4	100.0	No Change
Scottish Borders	159	80	50.3	Up
Shetland Islands	2	2	100.0	No Change
South Ayrshire	24	22	91.7	Down
South Lanarkshire	12	12	100.0	No Change
Stirling	71	49	69.0	Down
West Dunbartonshire	7	7	100.0	Up
West Lothian	10	9	90.0	Down
Scotland	**2,494**	**2,325**	**93.2**	

Sampling

Local authorities are required by Regulations to sample all supplies which serve more than fifty people or where commercial or public activity is undertaken in premises in their area at least once a year. Type B supplies must be sampled by local authorities within 28 days of being requested by the owner or user of the supply and are not subject to routine annual monitoring.

Table 3 shows the number of Type A supplies that were tested for at least one parameter during the year, broken down by local authority. In 2017, across Scotland, 87% of supplies were sampled. This is markedly less than the 94% in 2015 and the poorest performance over the past five years. Fourteen local authorities sampled more than 90% of their Type A supplies, which is five fewer than last year and of these, ten achieved 100% compliance. Of the local authorities with large numbers of supplies, only Aberdeenshire and Argyll and Bute were able to sample 95% or more of their Type A supplies.

Scottish Borders Council (SBC) has made progress to improve its sampling and risk assessment compliance, but its performance compared with other authorities remains poor, and there is still much improvement needed. DWQR has discussed progress with SBC and understands that plans are in place to ensure these activities are adequately resourced. DWQR will continue to maintain close contact with SBC over the coming year to monitor progress with improving their sampling programme.

In 2017 a total of 59,902 tests were carried out on PWS: 46,470 on Type A supplies; and 13,432 on Type B supplies.

Table 3 Type A Supply Sampling Compliance

Local Authority	Number of Type A Supplies	Supplies Sampled	% 2017 Compliance	% 2016 Compliance
Aberdeen City	0	-	-	-
Aberdeenshire	239	227	95	*99*
Angus	43	31	72	*84*
Argyll and Bute	509	484	95	*99*
Clackmannanshire	4	4	100	*100*
Dumfries and Galloway	169	142	84	*96*
Dundee City	0	-	-	-
East Ayrshire	1	1	100	*0*
East Dunbartonshire	1	0	0	*100*
East Lothian	6	5	83	*100*
East Renfrewshire	5	4	80	*100*
Edinburgh City of	1	1	100	*100*
Comhairle nan Eilean Siar	13	9	69	*67*
Falkirk	2	0	0	*100*
Fife	31	30	97	*97*
Glasgow City	0	-	-	-
Highland	747	660	88	*87*
Inverclyde	7	7	100	*100*
Midlothian	6	6	100	*100*
Moray	95	93	98	*97*
North Ayrshire	14	14	100	*100*
North Lanarkshire	0	-	-	-
Orkney Islands	26	21	81	*52*
Perth & Kinross	286	246	86	*87*
Renfrewshire	4	4	100	*100*
Scottish Borders	159	83	52	*38*
Shetland Islands	2	2	100	*50*
South Ayrshire	24	21	88	*93*
South Lanarkshire	12	10	83	*0*
Stirling	71	57	80	*97*
West Dunbartonshire	7	7	100	*100*
West Lothian	10	10	100	*100*
SCOTLAND	**2,494**	**2,179**	**87**	***88***

3 THE QUALITY OF PRIVATE WATER SUPPLIES

Many private water supplies suffer from inadequate treatment and poor or variable raw water quality. Consequently, compliance with the standards for drinking water quality is much lower than for Scottish Water's public supplies.

Type A Private Water Supplies

Table 4 shows some of the key parameters that Type A supplies are monitored for and how supplies are complying with the relevant standards.

Table 4 Type A Private Water Supply Compliance for Key Parameters

Parameter	No. Type A Samples	No. Type A Samples Failed	Type A % Samples Failed	Type A % Compliance
All Parameters	**46,470**	**2,280**	**4.91**	**95.09**
Coliform Bacteria	2,256	497	22.03	77.97
E. coli	2,256	260	11.52	88.48
Colour	2,188	378	17.28	82.72
Turbidity	2,221	32	1.44	98.56
Hydrogen ion (pH)	2,226	375	16.85	83.15
Aluminium	921	18	1.95	98.05
Iron	1,132	122	10.78	89.22
Manganese	987	62	6.28	93.72
Lead (10)	643	30	4.67	95.33

Overall, based on the number of samples taken, Type A compliance increased slightly, from 94.6% last year to this year's 95.09%. **Figure 3** shows percentage compliance for Type A supplies over the past 7 years.

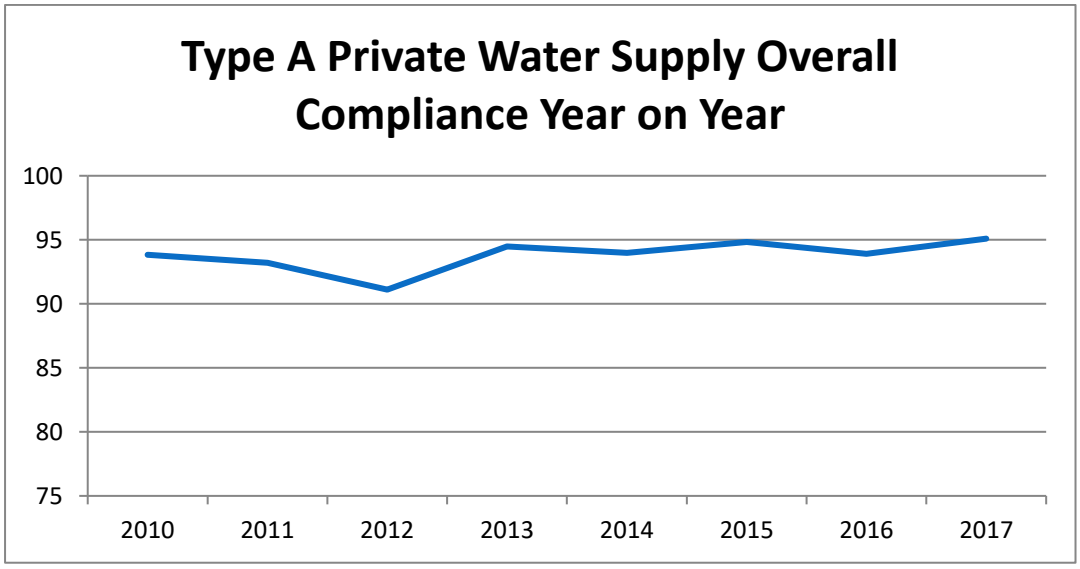

Figure 3 Type A Private Water Supply Overall Compliance Year on Year

These results suggest that, at a national level at least, the quality of Type A private water supplies is broadly constant and has not improved overall since 2010, in spite of ongoing efforts by local authorities and the availability of a Scottish Government-funded grant to incentivise improvements.

Compliance rates for individual parameters also show little change that could be considered significant. Of the key microbiological parameters, *E.coli* and coliform bacteria compliance deteriorated slightly.

Simple, but well installed and managed Type A PWS

Metals

Many Type A private water supplies in Scotland do not comply with the standards for a number of metals. Iron (10.8% of samples failing), manganese (6.3% of samples failing) and aluminium (2.0% of samples failing) are mainly naturally occurring, and many private water supplies have no treatment process capable of removing them. In many cases, simple filtration is all that is required, although in some cases a pre-oxidation stage is also needed.

Iron can also be derived from corroding iron pipework and fittings within the private water supply itself.

The effect of these metals is mostly aesthetic, although they can clog filters and coat ultra-violet disinfection lamps, rendering these ineffective and potentially exposing the users to unseen microbiological hazards.

Compliance for lead and other metals found in plumbing systems, such as copper, is poor. These metals can dissolve into water where the water is corrosive. 4.6% of samples from Type A supplies failed the standard for lead, which is an improvement of 1.9% on last year, potentially reflecting efforts by local authorities to raise awareness of the problem. Lead is a very important parameter and the standard is set for health based reasons because exposure to lead can have serious implications, particularly for young children. Compliance for copper has also improved, with 3.7% of samples taken from Type A supplies in 2017 not meeting the standard, compared with a 4.9% failure rate in 2016 with a similar sampling rate. On a similar theme, 2.6% of nickel samples failed to meet the standard, also likely to be related to plumbing.

Many Scottish waters are naturally soft and corrosive to metals without further treatment and conditioning. This is an essential but often neglected part of the treatment process, and many private water supplies do not have any adequate water conditioning stage to reduce the corrosive nature of the water. The compliance data for hydrogen ion (pH) shows that 16.9% of samples were outside the permitted range for this parameter, although this reflects an improvement of just over 2% on 2016.

In order to prevent dissolution of plumbing metals, soft waters need to have their alkalinity increased, which, in simple terms, means the pH and the concentration of dissolved minerals needs to be increased so that the water no longer has a tendency to corrode metals. This can be achieved simply and at low cost through the use of a filter containing a suitably alkaline medium such as limestone chips, although its success is dependent on the specific supply and raw water quality.

This issue can additionally be controlled through careful design of the plumbing system and use of the appropriate, approved, materials. Knowledge and control of the materials used in the distribution of private water supplies is often poor, and a thorough water safety plan for a supply should aim to document all materials used in the system and assess any potential impact they might have on water quality. It is worth noting that, currently, even some metal alloy fittings that are approved for water use may contain quantities of lead, so care should be taken in product selection.

The improvement in hydrogen ion (pH) compliance suggests that local authorities may be starting to have some success at improving this aspect of PWS, with a corresponding beneficial impact on compliance for the plumbing metals copper and lead.

Microbiology

In 2017, nearly 78% of samples taken from Type A private water supplies across Scotland did not contain any coliforms. This leaves 22% (497 samples) that contained at least one coliform, indicating that the disinfection process may not be operating effectively or that water was being contaminated after disinfection.

The percentage of water supplies failing for *E. coli* has deteriorated since 2016, with 11.5% of samples containing *E. coli*. *E. coli* can cause illness in humans, and it is concerning that compliance for this parameter is not improving. Another faecal indicator organism, *Enterococci*, was present in 8.9% of Type A water supplies, mirroring the deterioration seen for *E.coli*. This is unacceptable, given that Type A supplies are those most likely to be consumed by members of the public visiting a commercial enterprise or staying in tourist accommodation. In public health terms, it is standard practice by local authorities to inform users on unsatisfactory supplies where *E. coli* is isolated as a precaution and to implement appropriate controls to minimise any risk to health. These measures could include a notice to boil water for human consumption or to use an alternative supply. As part of these investigations, consideration is given to additional monitoring and sampling; discussion on the availability of grant; and potential enforcement action to secure improvements.

Table 5 shows compliance for *E. coli* by local authority. It is difficult to compare compliance results between local authorities due to the wide disparity in the numbers of supplies between local authorities and the number of different factors which may influence sample results.

Table 5 Sample Compliance for *E. coli* – Type A Supplies

Local Authority	Number of Type A Tests	Number of Type A Fails	Compliance (%)
Aberdeen City	-	-	-
Aberdeenshire	229	16	93
Angus	30	8	73
Argyll and Bute	505	74	85
Clackmannanshire	10	0	100
Dumfries and Galloway	165	19	88
Dundee City	-	-	-
East Ayrshire	1	0	100
East Dunbartonshire	0	-	-
East Lothian	8	0	100
East Renfrewshire	4	0	100
City of Edinburgh	1	0	100
Comhairle nan Eilean Siar	9	1	89
Falkirk	0	0	-
Fife	30	1	97
Glasgow City	-	-	-
Highland	660	70	89
Inverclyde	7	1	86
Midlothian	6	1	83
Moray	93	7	92
North Ayrshire	17	1	94
North Lanarkshire	-	-	-
Orkney Islands	21	1	95
Perth and Kinross	266	36	86
Renfrewshire	7	1	86
Scottish Borders	83	8	90
Shetland Islands	2	0	100
South Ayrshire	20	2	90
South Lanarkshire	9	2	78
Stirling	57	8	86
West Dunbartonshire	6	2	67
West Lothian	10	1	90
Scotland	**2,256**	**260**	**88**

As in previous years, DWQR met with local authorities to discuss private water supplies that have recorded *E. coli* failures for a number of years in succession. These discussions have identified that fluctuating raw water quality, inadequate or inconsistent treatment processes and poor or no maintenance of treatment systems are common causes of failure. With Type A supplies serving multiple properties, the requirement to take a representative sample of the supply invariably results in some samples being taken from properties where the water

may be untreated or treated to a lower quality than the standard of treatment in the commercial properties on the supply. The discussions will seek to understand the reasons for the recurring failures and what the local authority has done in an effort to improve the quality of the supply. Where other measures have not succeeded and little progress is being made, local authorities are being encouraged to make full use of their enforcement powers.

Although the quality of private supplies is a complex area and improvements are not always easy to achieve or maintain, DWQR and local authorities believe that owners and users must take greater responsibility for the quality of their private supplies, especially where the parameters failing are of significance for health, such as *E. coli*.

Enforcement and Outcomes

Once a local authority has identified that a supply has quality or quantity issues and poses a risk to health, action is taken by local authorities to ensure that all users are informed and given appropriate advice to safeguard their health in the short term (e.g. boil water for human consumption). Users must also be informed of any required improvement works and the timescales in which these works must be carried out. Local authorities will provide advice in relation to cleaning and disinfecting storage tanks, replacing UV (ultraviolet) tubes or filter cartridges or cleaning out the supply intake. In many instances, local authorities work with users of the supply to achieve improvement and only where this is unsuccessful is a formal Improvement Notice issued.

DWQR is of the opinion that when local authorities' efforts to bring about improvements through the provision of advice and support for owners and users have failed, then lasting improvements must be achieved by putting in place a Notice formally setting out the requirements. The benefit of a Notice compared to informal advice is that if there is any disagreement about the need for a supply to be improved or who is responsible for carrying out the work, there is a formal legal process in place and the relevant person(s) is under a legal duty to carry out the necessary improvements. It also ensures any required works are carried out in a suitable timescale, as this is determined by the local authority based on the risk to health and the extent of the improvement works required.

In 2017, as in 2016, only one Notice was served across the whole of Scotland for a failing supply. DWQR finds this surprising and very disappointing considering the number of supplies failing to meet drinking water quality standards. From discussions with local authorities, it is clear that enforcement action is initiated as a last resort. However, improvement notices are an important tool that should be used in circumstances where other approaches have been attempted and a supply continues to fail water quality standards, potentially with health consequences for those drinking the water. It is expected that the new suite of enforcement options introduced by new Regulations for private supplies in 2017 will see an increase in formal enforcement action.

Type B Private Water Supplies

Table 6 shows some of the key parameters that Type B supplies are monitored for and how supplies are complying with the relevant standards.

Table 6 Type B Private Water Supply Compliance for Key Parameters

Parameter	No. Type B samples	No. Type B Samples Failed	Type B % Samples Failed	Type B % Compliance
All Parameters	Total	13,432	1,629	12.13
Coliform Bacteria	1,027	442	43.04	56.96
E. coli	1,028	241	23.44	76.56
Colour	244	64	26.23	73.77
Turbidity	905	52	5.75	94.25
Hydrogen ion (pH)	957	280	29.26	70.74
Aluminium	134	11	8.21	91.79
Iron	561	105	18.72	81.28
Manganese	515	70	13.59	86.41
Lead	798	65	8.15	91.85

Type B PWS are monitored mainly at the request of the owner or user of the supply. Consequently, the supplies from which samples are taken are different each year and a direct comparison of the data is difficult. For most of the main parameters, the smaller Type B supplies show a similar trend to the Type A supplies, although compliance is worse, reflecting a tendency for there to be minimal treatment and management of the supply. This is especially true with microbiological compliance where just over 23% of samples contained *E. coli* and 43% contained coliforms, a deterioration on an already poor compliance for 2016. This suggests that disinfection of these supplies is only present and consistently effective in less than two thirds of supplies, and a significant proportion of users may be placing themselves at risk by consuming the water.

Compliance against the regulatory standards fell in 2017, with almost every parameter being significantly worse than in 2016.

As in previous years, source type appears to have a significant bearing on microbiological quality of both Type A and Type B supplies. **Table 7** shows compliance of scheduled samples for microbiological parameters (in this instance, comprising coliforms, *E. coli, Clostridium perfringens, Enterococci*) by water source type, regardless of any treatment present on the supply. This clearly shows that groundwater sources, especially boreholes, are far less likely to suffer from microbiological contamination than surface water sources. Having said this, they are not completely compliant and it should not be assumed that underground waters are immune from contamination. In Scotland many groundwater supplies are heavily influenced by surface water, so are vulnerable to faecal contamination and consequently require robust treatment. Further contamination may also occur between the point of abstraction and the point at which the water is consumed.

Table 7 Microbiological Compliance by Source Type

Source Type	Compliance %	
	Type A	Type B
Groundwater Borehole	95	87
Groundwater Spring	88	71
Groundwater Well	85	73
Surface Water Loch	85	72
Surface Water Rainwater	100	-
Surface Water Watercourse	85	71

PWS intake in upland area, showing screen to filter debris

4 PRIVATE WATER SUPPLY GRANT

The Scottish Government introduced a grant scheme in conjunction with the 2006 Regulations to assist owners and users of private supplies to bring their supplies up to modern standards. The scheme is non-means tested and available to domestic households and businesses. The maximum grant which may be awarded is £800 per property. However the local authority may pay in excess of £800 where they are satisfied that the eligible person could not, without undue hardship, finance the expense of the approved works without such a grant.

The scheme is intended to assist with the one-off capital cost of installing treatment to help ensure the provision of safe drinking water. It does not cover the ongoing maintenance and disinfection of a private supply which is the responsibility of the user.

In the 2017-2018 financial year £429,968 was awarded directly for PWS improvements which improved 347 supplies.

An example of where grant funding has made a significant difference to the consumers of a private supply is at a farmyard conversion in West Lothian. The farm had been converted into seven residential units served from a private water supply. The developer had installed a shared water treatment system. Over time householders experienced a number of issues with the supply ranging from sediment in the water to, ultimately, a failure to meet the chemical and microbiological criteria in the PWS Regulations.

The homeowners used the services of a property management company for maintenance and communal repairs. The property management company engaged water engineers to report on the installation and identify repairs/upgrades necessary. This report was discussed with environmental health and the management company applied for grant aid, on behalf of the homeowners, to improve the supply. A total of £5600 was paid in grant, at the completion of works, towards a total spend on the project of over £10,000. Subsequent samples from the supply were satisfactory and no concerns have been received from any of the users on the supply.

The homeowners pooling their resources, and organising the work through their management agent, allowed them to install a more effective treatment system than would have been provided if each had installed point of entry treatment into their own houses.

5 DWQR ACTIVITY AND RESEARCH

DWQR Activity

DWQR continues to engage with other professionals, including environmental health, to review and identify areas for action to secure the outcome of improved drinking water quality in private water supplies. During 2017 DWQR staff were involved in a number of activities and strands of work involving private supplies.

This includes:

Verotoxigenic *E.coli* (VTEC) Action Group

Following *E. coli* outbreaks in Scotland a multi-agency group was formed to consider ways to disrupt the transmission of VTEC/ *E. coli* O157 from source to humans. The resulting Action Plan comprises 86 recommendations designed to tackle VTEC/ *E. coli* O157 infection in Scotland. An Implementation Group oversees the progress on implementation of the recommendations and is expected to formally report on progress with the Action Plan in 2018. A number of the recommendations relate to drinking water and DWQR is represented on the public and private water supply sub-groups, which report to the Implementation Group.

Rural Provision

DWQR are working with the Scottish Government Rural Provision Group to support the delivery of the Scottish Government priorities in rural communities, in particular with a view to improving water and sewerage provision in rural areas.

Communication

In 2017 the Scottish Government set up a PWS Information Hub specifically for owners and users which is regularly updated: https://www.mygov.scot/housing-local-services/water-supplies-sewerage/private-water-supplies/ and all information previously on the DWQR website for owners and users has been transferred to this site.

As a result of this change, the DWQR website www.dwqr.scot/private-supply/ now focuses on assisting local authorities and includes guidance to the new 2017 regulations.

Citizens Advice Scotland researched the accessibility of information for private supplies in 2017 and found that our information was simple, clear and detailed, and they supported the development of the Information Hub https://www.cas.org.uk/publications/testing-waters-assessing-information-private-water-supplies-and-sewerage-facilities.

Lead

Lead in drinking water arises mostly from plumbing in buildings: from lead pipes, lead tanks, lead solder on copper pipes or inferior quality brass fittings and taps. The Scottish Government, with support from DWQR, has established a project to review policy to drive achievement of a reduction of exposure to lead in drinking water, both in private and public supplies. The project is looking to identify enablers and to strengthen or introduce mechanisms with a range of stakeholders and influencers for the removal of lead services pipes and plumbing. The project update can be found at http://dwqr.scot/media/14148/research-current-dwqr-lead-in-drinking-water-project-briefing.pdf.

Current and Completed Research

During 2017 DWQR contributed to and supported a number of research projects commissioned either by the Scottish Government or other agencies, which relate to private water supplies. Completed research papers are available either on our website: http://dwqr.scot/information/research/previous-research-projects/ or on the Centre of Expertise for Waters (CREW) website: http://www.crew.ac.uk/publications.

Epidemiological Impact of Private Water Supplies

This project started in 2015 and aims to assess the health risks from exposure to a range of microbiological contaminants commonly found in private water supply source waters. The study will also examine existing water quality data and reported cases of illness in order to quantify the potential disease burden from untreated private water supplies. This project is due to report during 2018.

Private Water Supply Risk Areas

We worked with CREW to develop risk assessments for a range of contaminants to identify where the risk of contamination is greatest.

http://www.crew.ac.uk/publication/private-water-supply-risk-areas

Support Systems for People Reliant on Private Water Supplies

DWQR and the Consumer Futures Unit of Citizens Advice Scotland commissioned a report by Ipsos MORI to look at the consumer experience and support systems that were available for people supplied by a PWS, and identify appropriate support mechanisms for these communities. The report is due to be published in late 2018.

ANNEX A THE REGULATORY FRAMEWORK

The regulatory standards for drinking water quality in Scotland largely stem from European Directives. These standards are based on guidelines developed by the World Health Organisation to protect public health.

Our key domestic water quality legislation includes:

Water (Scotland) Act 1980 (as amended)

- Scottish Water must supply wholesome water for domestic purposes. It is a criminal offence to supply water unfit for human consumption;
- Scottish Ministers must take enforcement action against Scottish Water if it fails in its duty to supply wholesome water (as defined in the relevant regulations) unless the failure is trivial or Scottish Water is complying with a legally binding undertaking to remedy the matter;
- Local authorities must take appropriate steps to keep themselves informed about the wholesomeness of public water supplies in their area and notify Scottish Water if not satisfied; and
- Local authorities are required to secure improvements to private water supplies if they consider them necessary.

Water Industry (Scotland) Act 2002

- Created the post of Drinking Water Quality Regulator for Scotland (DWQR);
- Set out responsibility for enforcing The Water Supply (Water Quality) (Scotland) Regulations 2001;
- Defines DWQR's independent status;
- Defines DWQR power to obtain information, power of entry or inspection and power of enforcement; and
- DWQR also has emergency power to require a water supplier to carry out works to ensure quality of water supplied is safe for public consumption.

The Private Water Supplies (Scotland) Regulations 2006

- Define wholesomeness in accordance with the EC Drinking Water Directive 98/83/EC;
- Require local authorities to classify private supplies according to size and use, Type A or Type B;
- Require local authorities to monitor, risk assess and report on private supplies in their area according to classification and risk; and
- Require local authorities to provide advice to private supply owners and ensure improvements are carried out.

The Private Water Supplies (Grants) (Scotland) Regulations 2006

- Provide for grants to be paid to eligible persons to enable them to improve their private water supply; and
- Are administered by local authorities and provide for non-means tested grants of up to £800 per property.

The Private and Public Supplies (Miscellaneous Amendments) (Scotland) Regulations 2015

- Add radon as an indicator parameter; and
- Move colour, taste and odour and pH from national parameters to indicator parameters.

The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017

These Regulations came into force on 27 October 2017 replacing (and partly re-enacting with modifications) the provisions of The Private Water Supplies (Scotland) Regulations 2006 with respect to the formerly defined Type A supplies. They apply to:

- Any supply which supplies 50 or more persons or more than $10m^3$ per day;
- Any supply which forms part of a commercial or public activity, or where the water is used in a commercial or public activity or where water is supplied to the public; and
- They clarify that domestic rented premises fall into the scope of commercial activity.

ANNEX B PWS INFORMATION LETTERS ISSUED DURING 2017

There were no Information Letters issued during 2017 in relation to private water supplies.

Copies of letters issued are available on the DWQR website:

www.dwqr.scot

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