



guardians of drinking water quality

DRINKING WATER INSPECTORATE

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Dear

WATER QUALITY EVENT

Location: Copeland area: Consumer concern about drinking water quality
Nature: Change of water quality characteristics causing loss of consumer confidence
Date of event: From 7 June 2017

1. Executive Summary

- 1.1 This event occurred in Cumbria affecting consumers supplied by Ennerdale treatment works operated by United Utilities. The affected areas included the towns of Workington and Whitehaven and surrounding areas, mainly within Copeland Borough Council's (BC) area. Some consumers in Allerdale District Council's (DC) area were also affected.
- 1.2 This was a serious event which resulted in large numbers of consumers contacting United Utilities because of concerns about noticeable changes to their drinking water quality, in particular the hardness of the water and unacceptable tastes and odours. Many consumers also complained about health effects. 85 consumers made direct contact with the Drinking Water Inspectorate to express their concern. Copeland BC and the local Member of Parliament were inundated with contacts from concerned consumers.
- 1.3 The event was caused when United Utilities made a planned change to the supply from Ennerdale works, introducing a 50:50 blend with local borehole

sources without any prior engagement with consumers or stakeholders, and without warning consumers about the possible changes they might notice affecting the quality of their tap water. This led to widespread anxiety, with many consumers rejecting the water for consumption.

- 1.4 Public Health England (PHE) undertook surveillance for illness in the community, and concluded that there were no cases of illness that could be linked to the water supply.
- 1.5 The Inspectorate investigated the event and consulted with consumers and other stakeholders.
- 1.6 The Inspectorate has made 9 recommendations.

2. Introduction

- 2.1 The purpose of this letter is to inform you of the conclusions and recommendations arising from the Drinking Water Inspectorate's (DWI's) assessment of the event which involved large numbers of consumers living in and around Copeland Borough Council's area contacting United Utilities to complain about the quality of their tap water. The event generated significant press and social media coverage, and led to the local Member of Parliament for Copeland becoming involved. This has been classified using a risk-based approach as a **serious** event.
- 2.2 The Inspectorate's investigation of this event considered the information provided by the company under paragraph 9 of the Water Industry (Suppliers' Information) Direction 2017, together with additional information provided. Our investigation has focussed on whether statutory requirements for drinking water quality were met; the steps taken to restore consumers' confidence; whether current good practice in water supply matters was demonstrated; any lessons to be learned; and whether follow-up action is required to mitigate a recurrence of this type of event
- 2.3 The Inspectorate was formally notified of the event, as required by the Information Direction, on **30 June 2017**. This was in response to the Inspectorate contacting the company and suggesting that formal notification should be considered, because of the media coverage and consumers contacting the Inspectorate directly about the issue. From the information subsequently provided by the company, consumers began contacting United Utilities expressing concern about a change to their drinking water quality in early June 2017, with the first recorded contact on 7 June.

3. Overview of the event

- 3.1 Ennerdale water treatment works (WTW) supplies between 15 and 25 million litres per day (ML/day) to approximately 67,000 consumers inhabiting the water supply zones Ennerdale North (WSZ 031) and Ennerdale South (WSZ 032),

which include the towns of Whitehaven, Workington, Seascale and surrounding areas. The treatment works has until recently supplied water abstracted entirely from Ennerdale Impounding Reservoir (IR), which is also known as Ennerdale Lake. A map showing the area supplied is in Figure 1:



Figure 1 – Map showing Ennerdale North and Ennerdale South water supply zones (pink boundary). Local authority boundaries are in red. The River Ehen is shown in dark blue.

3.2 Treatment at Ennerdale WTW consists of membrane micro-filtration followed by the addition of hexafluorosilicic acid for fluoridation, sodium hypochlorite for disinfection, sodium hydroxide for pH correction and sodium orthophosphate for plumbosolvency control, before final chlorine contact. The water supplied from Ennerdale IR, being an upland surface water source, is characteristically very

soft¹, with a total hardness typically below 30mg/l as calcium carbonate (CaCO₃). Results of samples taken by the company on 30 May and 1 June 2017 were between 7 and 8mg/l as CaCO₃. Until May 2017, consumers supplied from the works were accustomed to receiving this very soft water.

- 3.3 Water companies abstract water from designated sources under licence, regulated and administered by the Environment Agency. In 2009 United Utilities' licence allowing the abstraction of water from Ennerdale IR was reviewed by the Agency, with a consequential reduction in the maximum permitted amount of abstracted water, until March 2022 when the licence will be entirely revoked. These changes were made by the Agency to comply with European environmental directives, including the Habitats Directive, because the flow of water out of Ennerdale IR is important to support flow in the River Ehen, which is designated as a European Special Area of Conservation for freshwater pearl mussels and Atlantic salmon, and also as a Site of Special Scientific Interest.
- 3.4 To compensate for losing the licence to abstract from Ennerdale IR, United Utilities is planning to build a pipeline to bring water from Thirlmere Reservoir (east of Ennerdale) to supply the area. As an interim measure, whilst this scheme is being completed, the company has been granted a combined licence to abstract up to 11 ML/day from four boreholes south of Egremont to support the flow from Ennerdale works and allow the amount of water abstracted from Ennerdale IR to be reduced when the flow in the River Ehen is below 220 ML/day. Four boreholes – Gulley Flatts, Black Ling, Kellhead and Merry Hill – were constructed in 2010 and 2011. The borehole water is transferred from each individual borehole to a blending chamber at Gulley Flatts, where there is an aeration stage to allow precipitation of soluble metals, in particular iron. The blended groundwater is then pumped to Ennerdale WTW. The upland and groundwater sources are blended on site at Ennerdale and treated by the existing membrane works with modified pH control.
- 3.5 Public drop-in sessions and displays were organised in 2012 and 2013 to inform consumers about the South Egremont borehole project, and a local BBC article was published in 2014 about the Thirlmere pipeline proposal. More recently, in February 2017, the company issued a press statement about the Thirlmere scheme, reported locally by the BBC, but there was no mention of the imminent plan to introduce borehole water into the public supply, nor any information about potential water quality changes.
- 3.6 Before introducing water from these boreholes into the public supply network the company took samples, as required by regulation 15 of the Water Supply (Water Quality) Regulations 2000 (which were in force at the time), and used the data obtained to update the risk assessment for Ennerdale works. As required by regulation 15, the company submitted a risk assessment to the Inspectorate in December 2015, before the sources were used, to satisfy the Inspectorate that water supplied from Ennerdale works would continue to be wholesome, when the boreholes were used as permitted under the terms of the

¹ Twort's Water Supply, 6th edition, Butterworth-Heinemann, 2009.

licence (i.e. when the flow in the River Ehen was below 220 ML/day). The company did not, at this time, identify any risks that were likely to cause the blended treated water supplied from Ennerdale works to be unwholesome.

- 3.7 The company subsequently revised the risk assessment for the Ennerdale supply system, as required by regulation 27 of the Regulations, and submitted an updated report to the Inspectorate in March 2016. There is no legal upper or lower limit for total hardness in drinking water, and the company did not identify any risks associated with a change in water hardness in the revised risk assessment for the supply system. From July 2016 the company began abstracting small amounts of water from these boreholes, blended with water from Ennerdale IR, until May 2017.
- 3.8 On 25 May 2017, a commissioning trial commenced which involved operating the boreholes at their maximum licensed output for 24 hours a day producing a 50:50 blend with water from Ennerdale IR. This trial commenced without any prior communication with consumers supplied from Ennerdale works, or the Inspectorate. This commissioning trial continued into August 2017, with the company operating Ennerdale works with similar blend ratios throughout. Daily samples were taken from the individual boreholes, Ennerdale IR and Ennerdale final water for a range of parameters, excluding total hardness. The hardness of the final blended water, based on samples taken in early June at consumers' properties, was in the region of 70mg/l as CaCO₃, which is normally classified as "soft"ⁱ (compared with the "very soft" water from Ennerdale IR), although the measured level is some 10 times that of the unblended Ennerdale IR water (see paragraph 3.2). The maximum hardness of the blended supply in the zones supplied reached around 120mg/l as CaCO₃ (classified as "slightly hard"^j) in late June – a level of 15 times that of water in Ennerdale IR.
- 3.9 The company recorded its first contact from a consumer expressing concern about a change to their tap water quality on 7 June 2017. It appears, from calls made to the company around this time, that there was significant activity on social media by concerned consumers, who were alarmed by noticeable changes to their tap water quality. It is clear from recordings made of these telephone contacts, that United Utilities was unaware of this at this time.
- 3.10 Between 7 June and 30 June, when the company notified the Inspectorate, the company recorded 152 telephone contacts from consumers expressing concern about a change to their tap water quality. The most common reason for consumers contacting the company was because they had noticed a change in the hardness of the water, with effects such as "popping" and exploding kettles, very black tea, inability to obtain a lather when using soap and detergent, oily film on the top of hot drinks, scum appearing in sinks and washbasins. Many consumers also noticed a change to the taste and/or smell of their tap water, with descriptions such as "dry", "chalky", "metallic", "chemical", "bitter", with some consumers reporting foul or sewage-like odours. A significant number of consumers reported health effects, ranging from dry skin, skin rashes, sore eyes and mouth ulcers to diarrhoea and vomiting.
- 3.11 In short, the changes that consumers were noticing to their water quality were

causing widespread alarm and anxiety, which gained momentum as coverage on social media and by the local press, television and radio, increased. Consumers were angered that United Utilities had not informed them in advance of the planned changes to their water supply. The local authorities in the affected areas, principally Copeland Borough Council (BC), and the local Member of Parliament, received numerous contacts from residents complaining about their tap water and requesting that something be done to restore normality. A petition was established in support of forcing the company to stop using borehole water in the Ennerdale supply.

- 3.12 United Utilities was obliged to begin a belated communication exercise, publishing statements to explain the reasons for the change, and tried to reassure consumers that the water was safe to drink. The company took investigational samples from Ennerdale works and in the distribution system to support these statements.

4 Actions taken by the company

- 4.1 As required by the Water Industry (Suppliers Information) Direction 2017, the company provided an interim report on the event to the Inspectorate on 5 July 2017, and a final report on 28 July 2017. An updated final report was provided on 22 September 2017. The company also provided recordings of the first 50 telephone contacts from consumers.
- 4.2 The company started to investigate the cause of the consumers' complaints by taking samples from the raw waters supplying Ennerdale works, the final water and from service reservoirs and consumers' taps in the zones supplied by the works. The company included results for 869 samples in its updated final report, taken between 15 May and 20 September 2017, from the treatment works and sampling points in the distribution network. Parameters analysed included microbiological parameters indicative of faecal contamination; pH; colour; turbidity; taste; odour; nitrate; nitrite; common metals likely to be present in the source water such as iron, manganese and aluminium; metals associated with plumbing systems - copper, lead and nickel; organic parameters, including solvents and pesticides; radioactivity parameters; toxic metals such as arsenic, antimony, boron and cadmium, and parameters that indicate mineral content such as total hardness, alkalinity, calcium, magnesium, sodium, potassium, chloride and sulphate.
- 4.3 None of the sample results indicated a failure of a prescribed regulatory limit or other health-related limit that might indicate a risk to public health, and the company concluded that the primary cause of consumers' concern was the change in hardness of the water supplied from Ennerdale works.
- 4.4 The company escalated the issue internally to the level of an incident on 12 June 2017, but did not notify the Inspectorate at this time. Ennerdale treatment works was investigated and it was found that the works was operating normally and that water quality was within operational targets. No issues were identified with disinfection or fluoridation, and online water quality monitor trends for

chlorine, turbidity, pH and fluoride were normal and within operational limits.

- 4.5 Customer advisors (call centre staff) were briefed and provided with written information and question and answer documents to enable them to explain the reasons for the changes to consumers.
- 4.6 Between 12 June and 27 July the company received 89 complaints of illness. Samples were taken from some, but not all, of these consumers' properties, the company concluding that the water supply was not likely to be the cause. This conclusion was based on evidence from sample results.
- 4.7 Consumers requesting more detailed information about the background to the operational changes made at Ennerdale works, or requesting that their complaint was escalated to a senior level, were contacted directly by an appropriate company representative, depending on the nature of the enquiry.
- 4.8 The Inspectorate's press and external affairs officer was informed on 14 June 2017, of the "potential" press and media coverage associated with the change in hardness in water supplied to consumers in the Borough of Copeland and surrounding areas. It was not until 30 June 2017, after prompting by the Inspectorate, that the Inspectorate was notified as required by the Information Direction.
- 4.9 In July 2017, United Utilities organised drop in sessions for local residents in Egremont, Whitehaven, Harrington and Gosforth to provide more information to local consumers about the changes to their water supply arrangements and the reasons for the changes in quality that consumers were noticing. Two of these sessions were attended by representatives from the Environment Agency. The arrangements were advertised on the company's website and in the local media, and the company reports that the sessions were well-attended.
- 4.10 The company began posting information about the water supply changes on its website from 21 June 2017, along with a question and answer document, and continued to keep the information updated. This was supplemented with press releases, responding to local newspaper reports and providing statements where necessary.
- 4.11 The information published by the company did not allay consumers' concerns to any great extent, and on 16 August 2017 the local Member of Parliament arranged a meeting with the company, with representatives from Copeland BC, the Mayor of Copeland, the Environment Agency and the Inspectorate to establish the cause of the consumer dissatisfaction and actions that the company was planning to take to restore consumers' confidence in the company and in the quality of their tap water.
- 4.12 The company reported the situation to Public Health England (PHE - Cumbria Health Protection Team) and the Public Health department of Cumbria County Council, both of whom provided statements confirming that there was no evidence of any significant risk to health associated with the water supply. PHE confirmed in an email to the company that, from surveillance of cases of

reported illness in the affected area, there was no identified increase in the number of reported cases of illness associated with *Giardia* or *Cryptosporidium*, nor any increase in the number of people presenting at GPs' surgeries with gastric illness, compared with normal background levels for the time of year.

- 4.13 Following a meeting with the Member of Parliament on 16 August (with the Mayor of Copeland and representatives from the Inspectorate, the Environment Agency and Defra also in attendance), the company reduced the blend ratio of the water supply to approximately 80% Ennerdale / 20% borehole water, with a total hardness of around 50mg/l as CaCO₃ ("soft" ¹). The company has also given a commitment not to increase the percentage of borehole water in the blend unless drought trigger 2 is reached, which would result in a blend ratio of around 50:50.
- 4.14 United Utilities wrote to consumers to explain these actions, and posted a copy of the letter on the company's website.

5 Actions taken by the Drinking Water Inspectorate

- 5.1 Around the time that the Inspectorate was first contacted by United Utilities about the potential for media interest, the Inspectorate was beginning to receive contacts from consumers in the Copeland area concerned about their drinking water quality. This event resulted in a large number of consumers making direct contact with the Inspectorate complaining about their drinking water quality and their interactions with United Utilities. The Inspectorate also received one request for information under the Freedom of Information Act.
- 5.2 In accordance with the Inspectorate's duties conferred by section 86(2) of the Water Industry Act 1991 (as amended), the DWI commenced an investigation into the event. This involved scrutinising the company's reports, water quality data and other information provided, and also obtaining information from affected consumers and other organisations involved.
- 5.3 Because of the widespread public concern about the water quality in the Copeland area, the Inspectorate arranged for a set of samples to be taken from the boreholes and Ennerdale works for independent analysis. The samples were taken on 26 July 2017, and the suite of analysis included microbiological parameters indicative of faecal contamination; pH; electrical conductivity (a measure of dissolved solids); colour; turbidity; taste; odour; nitrate; nitrite; common metals likely to be present in the source water such as iron, manganese and aluminium; screening for organic parameters; radioactivity parameters; arsenic; chromium; nickel; fluoride and parameters that indicate mineral content such as total hardness, alkalinity, calcium, magnesium, sodium, potassium, phosphate, chloride and sulphate. There were no results that exceeded any statutory or other health-related limit, or gave an indication of any risk to human health. The taste analysis conducted on Ennerdale final water returned a result of dilution number 1, description "dry" or "bitter". This result was consistent with some consumers' description of the taste they were experiencing.

- 5.4 The Inspectorate also arranged for a Langelier Index to be calculated from the analysis performed. Langelier Index is a measure of aggressiveness of the water supply and its potential to pick up metals such as copper, lead and nickel from consumers' plumbing systems. The result was normal for a treated water supply and did not indicate that the water was abnormally aggressive.
- 5.5 The Inspectorate sent 196 questionnaires to consumers affected by the incident. The majority were sent to consumers who contacted United Utilities, and around 25 were sent in response to a direct request to the DWI. 115 completed questionnaires were returned, which is a notably high response rate for the Inspectorate. The information given by consumers in the returned questionnaires is summarised in Table 1 below:

Table 1 – Analysis of Consumer Questionnaires Returned to DWI

Issue	No.	Percentage	Comments
Noticing change in hardness	103	90%	Includes kettle popping/scum on tea & coffee/tea turning black immediately/stained crockery/stained sanitary ware
Noticing change in taste/odour	103	90%	A number of respondents reported a “dry” taste (also described as chalky by one person), and feeling of thirst not being quenched. Others reported metallic taste.
Noticing discolouration/change to appearance of tap water	15	13%	Includes black bits/cloudiness. Excludes change to appearance of tea & coffee.
Reporting gastric effects	31	27%	Includes vomiting, diarrhoea, cramps
Reporting skin/eye/mouth effects	39	34%	Includes itchiness, skin rashes, sore eyes, mouth ulcers, dry skin
Using bottled water/water filter	57	50%	

- 5.6 A large majority of respondents noticed a change to the hardness characteristics of the water supply and/or an unacceptable taste or odour, with the change noticed before it was widely reported on social media and elsewhere. Most respondents who replied to the question noticed the change in late May or early June.
- 5.7 The most common concern raised was that United Utilities should have communicated with consumers before the change was made to the water supply. Many respondents indicated a significant loss of confidence in the water company, with 50% of respondents indicating that they had stopped drinking water straight from the tap and were buying bottled water or using a filter.
- 5.8 A number of consumers reported that United Utilities denied the problem at first. This is supported from recordings of telephone contacts made to United Utilities in early June, where it is clear that customer advisers were unaware of the problem - they did not deliberately mislead, but they were uninformed. This is despite the apparent existence of a significant level of commentary on social media, mentioned by some consumers in these telephone contacts. The

consequence of this was further loss of consumers' confidence, with some consumers expressing a view that the company was being secretive or devious.

- 5.9 A significant number of respondents were concerned about the quality of the Egremont boreholes, citing concerns such as possible contamination with radioactivity from Sellafield, contamination from historic iron ore mining in the area or that United Utilities was deliberately adding noxious chemicals to the water. Other concerns raised included a range of health effects such as anaphylaxis, headaches, worms and other issues such as residual radiation from Chernobyl, fluoride, pet fish dying and pet animals being made ill and refusing to drink the water. There is no evidence to support any of these concerns as genuinely being associated with the tap water.
- 5.10 DWI Inspectors visited 12 consumers who returned questionnaires, and obtained written statements from these consumers. The statements confirmed the level of anxiety and concerns about the water supply experienced by all the consumers who returned questionnaires.
- 5.11 Following receipt of the company's interim report on 5 July, and later from the independent analysis commissioned by the Inspectorate, the Inspectorate explained to consumers making direct contact that there was no evidence from the information available of any potential risk to human health associated with the water supply. A press statement was issued on 11 July.
- 5.12 The Inspectorate sent questionnaires to PHE, Copeland BC and Allerdale DC to obtain the views of these organisations on the event and the company's management of the problem, and for an independent professional view on any actual health effects. Replies were received from Copeland BC and PHE. Copeland BC reported that as of 11 August, some 200 complaints about the drinking water had been received directly, with a total of 9,000 communications (including social media contacts) with local residents about the issue – a substantial number. PHE concluded that there were no cases of illness in the community likely to be associated with the water supply.
- 5.13 A representative from the Inspectorate attended the meeting on 16 August organised by the Member of Parliament for Copeland.
- 5.14 In September 2017, the Inspectorate carried out a follow-up telephone survey of 32 consumers who had returned questionnaires. The results indicated the following:
- 27 (84%) were still concerned about their drinking water quality.
 - 22 (69%) were still not using their tap water for one or more consumption purposes (hot drinks, cold drinks, food preparation, preparing infant formula where applicable, teeth brushing).
 - 18 (56%) confirmed that they had received a letter from United Utilities explaining actions taken by the company to improve drinking water quality in the area.

6 The Inspectorate's Conclusions and Recommendations

- 6.1 When assessing an event notifiable under the provisions of the Information Direction, the Inspectorate has a duty to establish whether the company breached any requirement of the Water Supply (Water Quality) Regulations 2016 (the Regulations), in particular, whether the company supplied water that was unwholesome, as defined by regulation 4, and whether any other regulatory requirements were contravened.
- 6.2 **In respect of drinking water quality during the event**, water suppliers have a statutory duty to supply water used for domestic purposes, including drinking, cooking, food preparation and washing, that is wholesome. Wholesomeness is defined in regulation 4 as water that does not contain concentrations or values of the parameters listed in Schedule 1 of the Regulations that exceed or otherwise do not meet the prescribed concentration or value. Water must also not contain any microorganism, parasite or substance at a concentration that is a potential danger to human health. There is no regulatory limit for hardness in drinking water, and hard water is not a risk to human health². Communities in many parts of England are supplied with hard water, and there is no known association with acute health effects.

Many consumers reported health effects as a consequence of the changes to their water supply (see Table 1). These health effects covered a wide variety of symptoms. PHE instigated surveillance of illness in the community and concluded that there was no evidence of any cases of illness caused by the water supply and nothing to indicate that there was a significant risk to human health associated with the quality of the drinking water supplied.

The majority of samples taken by United Utilities in connection with this event were compliant with regulatory limits (see paragraph 4.3). The results of the samples commissioned by DWI were consistent with the company's sample data, apart from the Ennerdale final water taste result, which had a taste described as dry or bitter, at a dilution level of 1. 90% of questionnaire respondents reported an unacceptable taste and/or odour. A smaller proportion of respondents reported an unacceptable appearance to their tap water, and 50% of respondents confirmed that they were rejecting the water for consumption purposes. The regulatory standards for taste and odour in water supplied to consumers are that it must be acceptable to consumers with no abnormal change.

I conclude that United Utilities supplied unwholesome water by virtue of the introduction of water from boreholes located south of Egremont into the water supply, which imparted a noticeable change to the taste and odour of the water

² Guidelines for Drinking Water Quality, World Health Organization, 4th edition, 2011

which consumers did not find acceptable. This was in contravention of the Water Supply (Water Quality) Regulations 2016 Schedule 1, Table B, Part II: National Parameters. Respondents to the Inspectorate's follow-up survey indicate that consumers remain concerned about their drinking water quality.

I recommend, therefore, that the company consults with consumers in the affected areas to establish whether there is still widespread concern about unacceptable aesthetic characteristics, and takes steps to restore consumers' confidence (Ref. 2017/0254).

I further recommend that the company informs consumers in advance of any plans to increase the proportion of borehole water in the supply from Ennerdale treatment works (Ref. 2017/0255).

- 6.3 **On the cause of the event**, I am satisfied that the planned changes made by United Utilities to the water supplied from Ennerdale treatment works, by blending water from the Egremont boreholes with water from Ennerdale IR, prior to treatment and onward supply to consumers, caused widespread anxiety and concern to consumers resident in the two water quality zones supplied from the works. The anxiety and concern was caused by noticeable changes to drinking water quality, without any explanation or warning from United Utilities before the changes were made.

I conclude that United Utilities should have consulted with consumers and other stakeholders before implementing the operational changes at Ennerdale works on 25 May 2017, and warned consumers about the change to hardness that would result, and the likely effects of this change.

It has been well-documented over the years in the annual Chief Inspector's report, that consumers should be informed in advance of any planned changes to their water supply, because of the potential for consumers to become alarmed by a change to the taste or odour, appearance or hardness. This can have serious consequences for consumers. **I recommend**, therefore, that the company reviews its approach and ensures that consumers are informed in advance of planned changes, and are made aware of the possible effects that might be noticeable (Ref. 2017/0256).

- 6.4 **On the introduction of water from the Egremont borehole sources into the water supplied from Ennerdale treatment works**, the company submitted a report to the Inspectorate in December 2015 requesting approval to use water from the Egremont boreholes for public supply purposes, up to a maximum combined volume of 11ML/day when the flow in the River Ehen is 220ML/day or below. The boreholes had not previously been used for public water supply purposes, and therefore regulation 15(1)(a) applied, which required the company to take samples from each source to establish that water supplied was not likely to be unwholesome and to confirm that treatment in place was sufficient to ensure continuous compliance with regulation 4. The Inspectorate approved the use of the four sources in March 2016. The hardness of the individual borehole sources was not a consideration at this time because there is no legal limit for hardness in drinking water and it is not, in itself, a public

health or wholesomeness concern.

To ensure continued compliance with the requirements of regulation 15, the company operated the sources at very low flows from June 2016 until May 2017 when the pumping trials were planned. The company did not confirm in its final report on this event that the boreholes were needed at this time because of low flow in the River Ehen.

I conclude, therefore, that whilst there is no evidence of a failure to comply with regulation 15 of the Regulations, the conditions under which the Inspectorate approved the application did not apply when the pumping trials commenced on 25 May 2017, because the flow in the River Ehen had not fallen below 220ML/d. The company should have informed the Inspectorate in advance of commencing the trial, to allow the Inspectorate to discuss with the company any likely changes to final water quality and make recommendations as deemed appropriate.

I recommend that in future, when the company is planning to introduce a new source or sources into supply previously covered by a regulation 15 application, the company informs the Inspectorate of the date the supply is to be made and details of the risk assessment conducted to ensure that the water supply remains wholesome and is not likely to affect consumers' confidence in their drinking water (Ref. 2017/0257).

- 6.5 On the company's risk assessment of the planned changes to the blend of water supplied from Ennerdale treatment works**, water suppliers are required by regulation 27 to carry out a risk assessment of each of its treatment works and connected supply system in order to establish whether there is a significant risk of supplying water that could constitute a potential danger to human health or is likely to be unwholesome. These risk assessments must be kept under continuous review, and under the requirements of regulation 28, suppliers must inform the Inspectorate of any new risks likely to cause a risk to public health or unwholesome water to be supplied.

United Utilities failed to carry out a risk assessment of the change to the hardness characteristics of water supplied from Ennerdale works, and the potential impact on consumers. There was no prior consultation with consumers and no advance warning given about the effects that consumers might notice – for example popping kettles, changes to the colour of tea, and potential changes to taste and odour.

I conclude that the company failed to comply with the requirements of both regulations 27 and 28.

I recommend that the company reviews its approach to risk assessment of planned changes to water supplies, to ensure that aesthetic characteristics are considered as part of the risk assessment (Ref. 2017/0258).

- 6.6 On the company's investigational sampling response**, the company instigated investigational sampling from consumers' taps in the affected area on

12 June 2017. Some consumers complaining about being made ill were visited for samples to be taken. The company modified its sampling response after submission of the interim report such that a greater proportion of consumers' properties were sampled.

Given that there was no indication of a risk to public health from water quality data available at the time of the first contacts and the company's investigations of the treatment works, **I conclude** that the company's investigational sampling response was adequate.

- 6.7 **Regarding management of consumer contacts**, aside from the lack of prior consultation with consumers about planned operational changes at Ennerdale works, it is clear from the recordings of telephone contacts that some customer advisers were unaware of the issue until after 12 June 2017. The company had clearly not taken steps to inform call centre staff in advance of the changes at Ennerdale and the water quality effects that consumers might notice.

A consumer calling on 11 June (file reference 8004762316) referred to a Facebook page called *Rant and Rave Copeland*. Despite the existence of this Facebook page and other social media activity, the company did not respond by informing its call centre advisers about the issue until several days after the first contact.

These issues raise concerns about the company's ability to respond promptly to consumers raising concerns about drinking water quality, especially when the cause is unknown, as was the case here. The company initially failed to make a connection between the consumer contacts and the operational changes at Ennerdale. The issue was escalated internally to the level of an incident on 12 June. From around 14 June customer advisers were provided with a script to explain the cause of the issue to consumers, but it is evident from some of the recordings that the adviser struggled to put the information across in a confident manner, and the consumer's concerns were not allayed. The lack of customer advisers' knowledge about the cause of the consumer concern contributed to the widespread perception (confirmed by questionnaire respondents) that the company was hiding something.

I conclude that the company's initial handling of consumer contacts about the changes to their drinking water quality was wholly inadequate. The company should have risk-assessed the changes at Egremont, consulted with consumers and stakeholders (e.g. PHE and local authorities) beforehand and provided information to consumers and customer-facing employees about the reasons for the change and potential water quality effects **before** the pumping trials commenced on 25 May 2017. From questionnaire responses received, **I conclude** that it would have significantly reduced the potential for consumers' anxiety and rejection of their tap water, had they known in advance that the primary factor was a change to the hardness of the water, with no predicted health effects.

I also note that there are errors in the way that some of the consumer contacts are categorised in the spreadsheet file of the first 50 telephone contacts. For

example, during the telephone recording referenced 8004764860, the consumer is complaining about an exploding kettle and black tea, yet the description of the complaint is recorded as aerated/white water. This suggests that some customer advisers are not adequately trained to identify the nature of a consumer contact correctly, which may lead to an inappropriate response to a consumer's contact, and inaccurate reports submitted to DWI.

I recommend that the company ensures that customer-facing staff are fully briefed about planned changes to water supplies, in advance of the changes being made, and the potential consequences of the change to drinking water quality and effects that consumers are likely to notice (Ref. 2017/0259).

I also recommend that the company reviews the adequacy of its arrangements for technical staff to support call centre staff when clusters of drinking water quality contacts about the same or similar issue are identified (Ref. 2017/0260).

I further recommend that the company carries out refresher training for customer contact staff to ensure that they are fully competent to understand the nature of a consumer's concern, and respond appropriately (Ref. 2017/0261).

6.8 **Regarding media and communications generally**, whilst the company made great efforts to issue statements and place information on the website about the cause of the water quality issues, and the background to the changes, it was essentially too little too late, because of the significant loss of consumer confidence, which developed into lack of trust. United Utilities has much work to do to repair this damage to its reputation.

6.9 **Regarding Notification of the Event**, under the requirements of regulation 35(6), water suppliers are required to notify the Inspectorate as soon as possible after an event that is likely to give rise to a significant risk to human health. PHE and local authority Environmental Health departments must also be notified. This requirement is supplemented by the requirements of paragraph 9 of the Water Industry (Suppliers' Information) Direction 2017, which requires suppliers to notify the Inspectorate of any matter relating to the supply of water that has attracted or, in the opinion of the supplier, is likely to attract local or national publicity; and/or has caused or, in the opinion of the supplier, is likely to cause concern to persons to whom water is supplied.

United Utilities informed Cumbria and Lancashire Health Protection Team (PHE), Copeland BC and Allerdale DC on 12 June 2017. The Inspectorate was notified under the provisions of the Information Direction on 30 June 2017.

The consumer concern generated led many consumers to reject their tap water for consumption. The Inspectorate considers that rejection of water by consumers is, in itself, a risk to public health. It appears that this was not explained to PHE or the local authorities when United Utilities informed these organisations on 12 June. Additionally, the Inspectorate should have been notified at this time.

I conclude that the requirements of regulation 35(6) and the Information

Direction were not met.

I recommend that in future the company ensures that it complies fully with the notification requirements of regulation 35(6) and the Information Direction (Ref. 2017/0262).

7 Enforcement

7.1 I am satisfied that, whilst there is evidence to support the conclusion that unwholesome water was supplied as a consequence of this event (see paragraph 6.2), the actions the company has taken to reduce the proportion of Egremont borehole water in the blended supply from Ennerdale treatment works is sufficient to prevent a recurrence, provided that this blend ratio is maintained. Therefore I consider that enforcement action is not necessary at this time. This will be kept under review by the Inspectorate.

8 Offences

8.1 After carefully assessing all the circumstances of the event, there is sufficient evidence to establish that consumers rejected their tap water for consumption on the basis of taste and hardness, and therefore this may constitute evidence that water supplied may have been unfit for human consumption under section 70 of the Water Industry Act 1991. I am not, however, recommending proceeding with a prosecution on the basis that:

- The company initially established that water arising from the boreholes was not likely to be unwholesome, and the event arose as a result of the hardness of drinking water which is not, in itself, a public health or wholesomeness concern.
- The company failed to carry out a risk assessment of the effects that a change to the hardness may have on the acceptability of the water supply to consumers, prior to the introduction of the boreholes. Whilst the Inspectorate concludes that the company was negligent in not undertaking such a risk assessment, it does not meet the minimum criteria for a first offence of this type.

9 Other relevant matters

9.1 Please respond to the recommendations made in this letter **by 21 December 2017**.

9.2 I am copying this letter to the organisations listed in paragraph 6.9 above.

Please contact me if you have any queries regarding this letter.

Yours sincerely

Principal Inspector



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06 September 2017

ANALYTICAL REPORT: WATER SAMPLES (INTERIM)

Client: DWI

Date Received: 27 July 2017

Dates Tested: Various

Report

The samples were analysed using in-house methods
ENV/C1-0001 Determination of Gross Alpha and Gross Beta Activity.
ENV/C1-0002 Determination of Aqueous Tritium.
ENV/C1-0026 Determination of Gamma Emitting Radioisotopes.
ENV/C1-0030 Determination of Total Activity against ^3H , ^{14}C and ^{90}Sr by liquid scintillation counting.
ENV/C1-1012 Determination of Colour in Waters.
ENV/C1-1013 Determination of the Turbidity of Waters.
ENV/C1-1014 Determination of pH values.
ENV/C1-1015 Measurement of Electrical Conductivity of Waters.
FCS-019 Inductively Coupled Plasma Optical Emission Spectrometry (ICP OES)
INS/A1-0013 Inductively Coupled Plasma-Mass Spectrometry

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Environment, Safety & Food Services

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Results

Client Reference	LGC Reference	Time and date of Sampling
Ennerdale Raw	1184198	26/07/2017 14:46
Ennerdale Final	1184199	26/07/2017 15:17
Gulley Flatts	1184200	26/07/2017 16:16
Kell Head	1184201	26/07/2017 16:42
Merry Hill	1184202	26/07/2017 17:02
Black Ling	1184203	26/07/2017 17:35

Radiochemistry

Where appropriate, the samples are decay-corrected to the time and date of sampling.

LGC Reference	Gross Alpha Activity (as ²⁴² Plutonium) Bq/L	Gross Beta Activity (as ⁴⁰ Potassium) Bq/L	Aqueous Tritium Bq/L	Total Activity* (as ³ H/ ¹⁴ C/ ⁹⁰ Sr) Bq/L
1184198	< 0.020	< 0.025	< 10	< 25
1184199	< 0.020	< 0.025	< 10	< 25
1184200	0.042 ± 0.016	0.058 ± 0.010	< 10	32 ± 2.6
1184201	0.047 ± 0.017	0.062 ± 0.010	< 10	34 ± 2.7
1184202	0.052 ± 0.019	0.081 ± 0.014	< 10	49 ± 3.9
1184203	< 0.020	0.053 ± 0.009	< 10	27 ± 2.1

*Total activity is an emergency screen (Not UKAS accredited).

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Sample Number	1184198	1184199	1184200	1184201
	Bq/L	Bq/L	Bq/L	Bq/L
⁴⁰ Potassium	< 6.0	< 6.0	< 6.0	< 6.0
⁵⁴ Manganese	< 0.5	< 0.5	< 0.5	< 0.5
⁵⁷ Cobalt	< 0.5	< 0.5	< 0.5	< 0.5
⁵⁸ Cobalt	< 0.5	< 0.5	< 0.5	< 0.5
⁵⁹ Iron	< 1.0	< 1.0	< 1.0	< 1.0
⁶⁰ Cobalt	< 0.5	< 0.5	< 0.5	< 0.5
⁶⁵ Zinc	< 1.0	< 1.0	< 1.0	< 1.0
⁹⁵ Niobium	< 0.5	< 0.5	< 0.5	< 0.5
⁹⁵ Zirconium	< 0.5	< 0.5	< 0.5	< 0.5
⁹⁹ Molybdenum	< 1.0	< 1.0	< 1.0	< 1.0
¹⁰³ Ruthenium	< 0.5	< 0.5	< 0.5	< 0.5
¹⁰⁶ Ruthenium	< 5.0	< 5.0	< 5.0	< 5.0
^{110m} Silver	< 0.5	< 0.5	< 0.5	< 0.5
¹¹³ Tin	< 0.5	< 0.5	< 0.5	< 0.5
¹²⁴ Antimony	< 1.0	< 1.0	< 1.0	< 1.0
¹²⁵ Antimony	< 1.0	< 1.0	< 1.0	< 1.0
¹³¹ Iodine	< 0.5	< 0.5	< 0.5	< 0.5
¹³⁴ Caesium	< 0.5	< 0.5	< 0.5	< 0.5
¹³⁷ Caesium	< 0.5	< 0.5	< 0.5	< 0.5
¹⁴⁴ Cerium	< 2.0	< 2.0	< 2.0	< 2.0
¹⁵⁴ Europium	< 0.5	< 0.5	< 0.5	< 0.5
¹⁵⁵ Europium	< 1.0	< 1.0	< 1.0	< 1.0
¹⁹² Iridium	< 0.5	< 0.5	< 0.5	< 0.5
²²⁸ Actinium (²²⁸ Radium)	< 2.0	< 2.0	< 2.0	< 2.0
²²⁸ Thorium	< 25	< 25	< 25	< 25
²²⁴ Radium	< 15	< 15	< 15	< 15
²¹² Lead	< 1.0	< 1.0	< 1.0	< 1.0
²¹² Bismuth	< 5.0	< 5.0	< 5.0	< 5.0
²⁰⁸ Thallium	< 1.0	< 1.0	< 1.0	< 1.0
²³⁴ Thorium	< 20	< 20	< 20	< 20
²²⁶ Radium	< 10	< 10	< 10	< 10
²¹⁴ Lead	< 1.0	< 1.0	3.0 ± 0.6	1.3 ± 0.4
²¹⁴ Bismuth	< 1.0	< 1.0	3.2 ± 0.6	0.6 ± 0.4
²³⁵ Uranium	< 1.0	< 1.0	< 1.0	< 1.0
²²⁷ Thorium	< 2.0	< 2.0	< 2.1	< 2.0
²²³ Radium	< 2.0	< 2.0	< 2.0	< 2.0
²⁴¹ Americium	< 3.0	< 1.0	< 1.0	< 1.0

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Sample Number	1184202	1184203
	Bq/L	Bq/L
⁴⁰ Potassium	< 7.0	< 15
⁵⁴ Manganese	< 0.5	< 0.5
⁵⁷ Cobalt	< 0.5	< 0.5
⁵⁸ Cobalt	< 0.5	< 0.5
⁵⁹ Iron	< 1.0	< 1.0
⁶⁰ Cobalt	< 0.5	< 1.0
⁶⁵ Zinc	< 1.0	< 1.1
⁹⁵ Niobium	< 0.5	< 0.6
⁹⁵ Zirconium	< 0.5	< 1.0
⁹⁹ Molybdenum	< 2.0	< 2.0
¹⁰³ Ruthenium	< 0.5	< 0.5
¹⁰⁶ Ruthenium	< 5.0	< 5.0
^{110m} Silver	< 0.5	< 0.5
¹¹³ Tin	< 0.5	< 0.6
¹²⁴ Antimony	< 1.0	< 1.1
¹²⁵ Antimony	< 1.0	< 1.2
¹³¹ Iodine	< 0.5	< 1.0
¹³⁴ Caesium	< 0.5	< 0.5
¹³⁷ Caesium	< 0.5	< 0.5
¹⁴⁴ Cerium	< 2.0	< 4.0
¹⁵⁴ Europium	< 0.5	< 1.0
¹⁵⁵ Europium	< 1.0	< 2.0
¹⁹² Iridium	< 0.5	< 0.5
²²⁸ Actinium (²²⁸ Radium)	< 2.0	< 3.0
²²⁸ Thorium	< 25	< 30
²²⁴ Radium	< 20	< 30
²¹² Lead	< 1.0	< 2.0
²¹² Bismuth	< 6.0	< 10
²⁰⁸ Thallium	< 1.0	< 1.0
²³⁴ Thorium	< 20	< 20
²²⁶ Radium	< 10	< 15
²¹⁴ Lead	2.2 ± 0.6	< 2.0
²¹⁴ Bismuth	2.2 ± 0.6	< 2.0
²³⁵ Uranium	< 1.0	< 1.0
²²⁷ Thorium	< 3.0	< 5.0
²²³ Radium	< 2.0	< 5.0
²⁴¹ Americium	< 1.0	< 1.0

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Non radioactive parameters

LGC Reference	pH	Conductivity ($\mu\text{s}/\text{cm}$) 20°C	Turbidity (NTU)	Colour (Hazen)
1184198	7.20	30	0.26	< 5
1184199	7.47	184	< 0.20	< 5
1184200	7.17	471	0.93	< 5
1184201	7.42	433	0.27	< 5
1184202	7.80	442	0.57	< 5
1184203	7.20	449	0.50	< 5

ICP OES

LGC Reference	Ca mg/L	K mg/L	Mg mg/L	Na mg/L
1184198	1.79	0.267	0.630	3.59
1184199	21.3	0.821	5.39	12.0
1184200	82.0	1.88	3.98	18.3
1184201	66.1	1.78	10.9	17.8
1184202	55.4	1.90	19.4	17.5
1184203	70.5	1.74	7.43	18.6

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ICP MS

LGC Reference	Al µg/L	Cr µg/L	Mn µg/L	Fe µg/L	Ni µg/L	As µg/L
1184198	28.7	< 0.5	3.14	13.3	0.13	0.18
1184199	19.6	< 0.5	0.63	4.83	0.19	0.59
1184200	3.09	< 0.5	2.27	32.3	0.87	1.03
1184201	5.74	< 0.5	0.23	6.30	0.17	0.97
1184202	15.1	< 0.5	0.81	11.8	0.54	1.64
1184203	5.34	< 0.5	2.66	33.7	0.42	1.10



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Subcontracted Results (Eurofins UK)

Microbiological

LGC Reference	Total Aerobic Colony Count 37°C	Total Aerobic Colony Count 22°C	Total Coliforms cfu/100ml	Escherichia coli cfu/100ml
1184198	Not Tested	Not Tested	Not Tested	Not Tested
1184199	0	0	0	0
1184200	Not Tested	Not Tested	Not Tested	Not Tested
1184201	Not Tested	Not Tested	Not Tested	Not Tested
1184202	Not Tested	Not Tested	Not Tested	Not Tested
1184203	Not Tested	Not Tested	Not Tested	Not Tested

LGC Reference	Total Chloride mg/L Cl	Sulphate mg/L SO ₄	Fluoride mg/L F	Total Phosphate mg/L PO ₄	Total Alkalinity mg/L CaCO ₃
1184198	4.55	< 3.5	< 0.05	< 0.200	< 12
1184199	15.6	5.57	1.04	3.03	68.8
1184200	36.9	21.5	0.165	0.255	154
1184201	29.3	9.08	0.127	0.239	200
1184202	30.9	14.1	0.190	< 0.200	198
1184203	29.9	12.2	0.137	0.270	180

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LGC Reference	Total Hardness* mg/L CaCO ₃	Calcium Hardness* mg/L CaCO ₃	Langelier Index* @15°C	Langelier Index* @60°C
1184198	6.74	3.98	-2.56	-1.96
1184199	73.9	51.8	-1.03	-0.43
1184200	224	206	-0.28	0.31
1184201	215	167	0.08	0.67
1184202	228	143	0.42	1.01
1184203	212	179	0.06	0.66

*Tests not UKAS accredited

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