guardians of drinking water quality

DRINKING WATER INSPECTORATE
Area 7e
9 Millbank c/o Nobel House
17 Smith Square
London SW1P 3JR

Enquiries: 030 0068 6400

E-mail [redacted]
DWI Website: http://www.dwi.gov.uk

DWI Ref: 2012/3288

Date 22 October 2014

[redacted]
Seven Trent Water Ltd
PO Box 5309
Coventry
CV3 9FH

Dear [redacted]

DRINKING WATER QUALITY EVENT Boil water advice issued to the village of Broadway, Worcestershire, 21 November- 3 December 2012

Executive Summary

Precautionary boil water advice was issued to over 4000 consumers living in the village of Broadway, Worcestershire from 23 November to the 3 December 2012, following detection of *E.coli* and *Cryptosporium* oocysts in drinking water along with reports of discoloured water, unusual tastes and odours. [redacted]. Heavy rain and the proximity of cow slurry on saturated ground next to the reservoir, allowed contamination to enter the drinking water supplied to the village.

The Company was slow to recognise the cause of the consumer calls and gave misleading and inaccurate advice to consumers prior to issuing advice to boil drinking water. Remedial actions were slowed by the Company's inaccurate records of its pipes and valves, its failure to assess the risk posed by sources of contamination adjacent to the reservoir and failure to learn from published outbreaks of water borne infections in the UK.

The Company pleaded guilty on 20 January 2014 at Coventry magistrates' court to 11 specimen changes of supplying water unfit for human consumption in contravention of its duties under section 70 of the Water Industry Act 2001and was fined £ 66,000 and ordered to pay costs and a victim support surcharge totalling £ 26,070.

Inspectorate's Conclusions:

- The Company's asset data records of pipework routes and valve status was deficient for Broadway Service Reservoir and the Company must satisfy the inspectorate that this is not a systemic problem with all of its other assets.

- The Company's training of water quality issues for staff that speak to consumers is deficient. This deficiency is the consequence of inadequate training, poor technical support and weak management, for anything other than routine water quality matters.

- The Company's asset planning/strategy and operational staff have not applied the lessons from "the Badenoch" report to Broadway service reservoir site and did not follow industry best practice for asset operation, maintenance and data records.

- The Company's Regulation 27 risk assessment (SEV13 RSA) for Broadway was inadequate but has now been resubmitted to better reflect the risks posed by the surrounding farmland.

- Untreated water entered the treated water system through a broken 3 inch Asbestos Cement main. The exact date of the pipe failure is not known but from 23 November 2012 faecal indicator organisms and *Crypstosproium bovis* were detected in water samples and a boil water advice was issues to the Village of Broadway. This resulted in 608 water quality consumer contacts during the following 11 days.

- The Company failed to ensure that wholesome water was supplied at all times through appropriate contingency and mitigation arrangements pertaining to the interdependency of water sources, service reservoirs works and network critical points.

Inspectorate's Recommendations to prevent a reoccurrence:

- The Company reviews and updates all of its advice to consumers about water quality matters to avoid misleading advice being given in error

- The Company reviews the training of call centre staff in water quality and public health matters and tests their competence to advise consumers

- The Company seeks to raise the competency of its entire staff dealing with drinking water assets: in the context of its duties to supply wholesome water that is fit for human consumption.

- The Company includes basic advice from network modellers in the future management of any similar scenario involving potentially live mains whose physical integrity has been compromised.

- The Company reviews its control of valve status and pipework routes at all of its assets to prevent inaccurate record keeping.

- The Company makes a physical inspection of all of its reservoir assets and resubmits its regulation 28 risk assessments where necessary.

1. Introduction

1.1. The purpose of this letter is to inform you of the conclusions and recommendations arising from the Inspectorate's assessment of the event involving the supply of aesthetically displeasing water containing *E.coli* and *Cryptosporidium bovis* to the village of Broadway; and the issuing of advice to boil drinking water to the village issued by the Company on 23 November 2012. This has been classified using a risk-based approach as a **serious** event.

1.2. When notified of an event, the Inspectorate gathers information considered to be relevant and assesses this in conjunction with information provided by the Company about the circumstances and any actions taken. The Inspectorate then considers the way in which the event was handled and whether any breaches or offences occurred. The Company notified the Inspectorate of this event on 23 November 2012. I have set out my conclusions and recommendations below.

2. Overview of the event

2.1. Precautionary boil water advice was issued to consumers living in the village of Broadway, Worcestershire from 23 November to the 3 December 2012, after *E.coli* and *Cryptosporium* oocysts were detected in the treated water along with reports of discoloured water, unusual tastes and odours from consumers' drinking water.

2.2. Severn Trent Water (SVT) began receiving complaints from consumers in the village of Broadway during the evening of November 21 2012; some of whom had noticed their drinking water had an unusual appearance and/or an unpleasant taste, and smell. Some of the complaints reported illness and odd colours like green water. The results from investigative samples collected by the Company on 22 November, found the presence of faecal contamination as *E.coli* was detected in 3 samples collected from Broadway service reservoir outlet and from 5 consumer houses which were supplied by the service reservoir. [redacted]

2.3. *Cryptosporidium bovis* a parasite found in the gut of cows was confirmed in samples collected from Broadway reservoir on 24 and 26 of November. On Friday 23 November SVT issued advice to boil mains water before using it to 4218 consumers in the village of Broadway. This advice remained in place until it was lifted on 3 December. Prior to which the Company had taken actions to investigate the potential sources of contamination, remediated the situation and when further investigative sample results showed that supplies were free of contamination.

[redacted]

2.4. [redacted].

3. Actions taken by the Company

3.1. In response to the complaints received during the evening of the 21 and early into the 22 November the Company initially thought this caused by mains disturbance and decided to let the system "settle overnight". There was no activity in the village of Broadway that could account for this disturbance that the Company was aware of. When asked, it advised all customers that the water was safe to drink.

3.2. Complaints persisted into the next day and so the Company then took investigative samples on 22-23 November. **I am critical** of the Company's reassurances in the absence of any evidence to confirm them. I requested recordings of the 16 calls made by consumers on 21-22 November. I was provided with a sample of 8 calls as not all were retained by the Company. **I conclude** that the advice given by call centre staff to consumers on 21 and 22 November was misleading. The scripts used to advise consumers require review. **I am highly critical** of the training given to these staff, who were unable to recognise when the situation required escalation to more experienced colleagues with better knowledge of water quality and public health matters. The default position was to reassure consumers that water was "safe to drink" and classify calls into a single cause, this did not reflect all the colours, smells, tastes seen and reported by consumers in their water supply. Blanket reassurances that these were caused by "naturally occurring" sediments and that the water was "100% safe to drink" are misleading. **I suggest** that those staff whose responsibility includes advising consumers and their line managers listen to these recordings to understand the degree of ineptitude displayed. **I further suggest** that such recordings are kept and periodically audited to establish training needs for front line staff. I **conclude** the fault lies not with the front line staff who answer calls about water quality, but with their management and training for this vital task.

3.3. I **further conclude** that the competency of the front line staff that take such calls is inadequate **and I recommend** that the Company reviews and updates: all of its advice to consumers about water quality matters, the training of call centre staff in water quality and public health matters, the support provided to these staff and routes to escalation to staff with specialist knowledge in water quality and public health matters. **I further recommend** the Company undertakes the witness and audit of compliance with new advice for a number water quality calls during events in each year at its call centre. The frequency and the risk based approach to selection of calls for audit shall be written in Company policy. **I further suggest** that the Company conducts a root and branch review of how it handles water quality complaints/enquires.

[redacted]

[redacted]

3.7. During their investigation on 23 November the Company found that when the level in Broadway Service reservoir fell low enough to trigger the supply pumps [redacted]. Reservoir 2 was being drained and was out of supply at the time for cleaning.

3.8. [redacted] **I Recommend** that the Company calibrates hydraulic models adequately to allow challenge and validation of risk based decisions and that it seeks to conduct contemporaneous scenario planning during events to better inform its risk assessments and sampling programmes to comply with Regulations 10, 17 and 18.

3.9. The Company investigated the site's current water mains schematic layout and found that [redacted] The Company put the pumps [redacted] into manual control and when the pumps were directed to run the first flush of water was sent to waste until on site turbidity readings were acceptable. The supply was then directed into the service reservoir. The abandoned main was cut and capped but when pumps ran turbidity and discolouration was still observed.

3.10. The Company then turned its attention to another 3 inch asbestos cement (AC) main that had been uncovered during further excavation of the reservoir 2 inlet valve site. This main was also not recorded on site schematic diagrams. I am **highly critical** of the Company's asset record keeping. The inspectorate has been critical of the Company's asset record data on previous occasions (DWI 2010-2907 Dunchruch and 2012-3507 Tenbury Wells). **I now am minded to initiate enforcement action** to require that the Company to review all of its asset records in accordance with Water UK's Principles of Water Supply Hygiene, specifically guidance note 5 that deals with abandoned assets. This requires that all abandoned assets recorded, associated mains are cut off and capped, valves on such mains are should be removed where possible, but as a minimum they should be fitted with a blanking plate, buried in a closed position and the surface box removed and that all of these details are recorded on the Company's asset database.

[redacted]

[redacted]

[redacted] **I recommend** that that Company reviews its control of valve status at all of its assets to prevent inaccurate record keeping [redacted]

3.13. Once the 3 inch AC main was disconnected and capped, the pumps were run and water entering the reservoir was seen to run clear. After repeating this process three times the Company was confident that it had found the cause of the discoloured water. **I note** that a decision was made by the Company to find the hydraulic route of this pipework at a later date to allow it to focus on dealing with the event unfolding. It was later confirmed in January 2013 that there was a linkage between the old contact tank (cell 1) and the 3 inch AC main, and that a break in this main had occurred.

3.14. In the absence of accurate records the Company had to draw conclusions on site using its beliefs and on site guesswork about the system layout. It believed that when the supply pumps [redacted] ran, that a pressure wave caused the abandoned 3 inch AC main to fracture at some time during November after their work at the reservoir site. This then allowed contaminated water from the surrounding land to enter the drinking water supplies through a break in the abandoned main located in the reservoir compound, when the pumps first ran. Whilst this is a plausible causal hypothesis there is no evidence to substantiate it. The "live" abandoned 3 inch AC main was very shallow and was uncovered during excavations at the site [redacted]. It is possible that it may have been broken by the weight of the excavator moving around on site or by freezing conditions present during late November on exposure, however again there is no clear evidence for this. What is clear however is that when the break in this main occurred, it provided a route of ingress of surface runoff, into the treated water supply system. **I conclude** that the inaccuracies of the Company's records of mains route and valve status directly contributed to the event and the extended time taken to resolve it. See figure 3 below

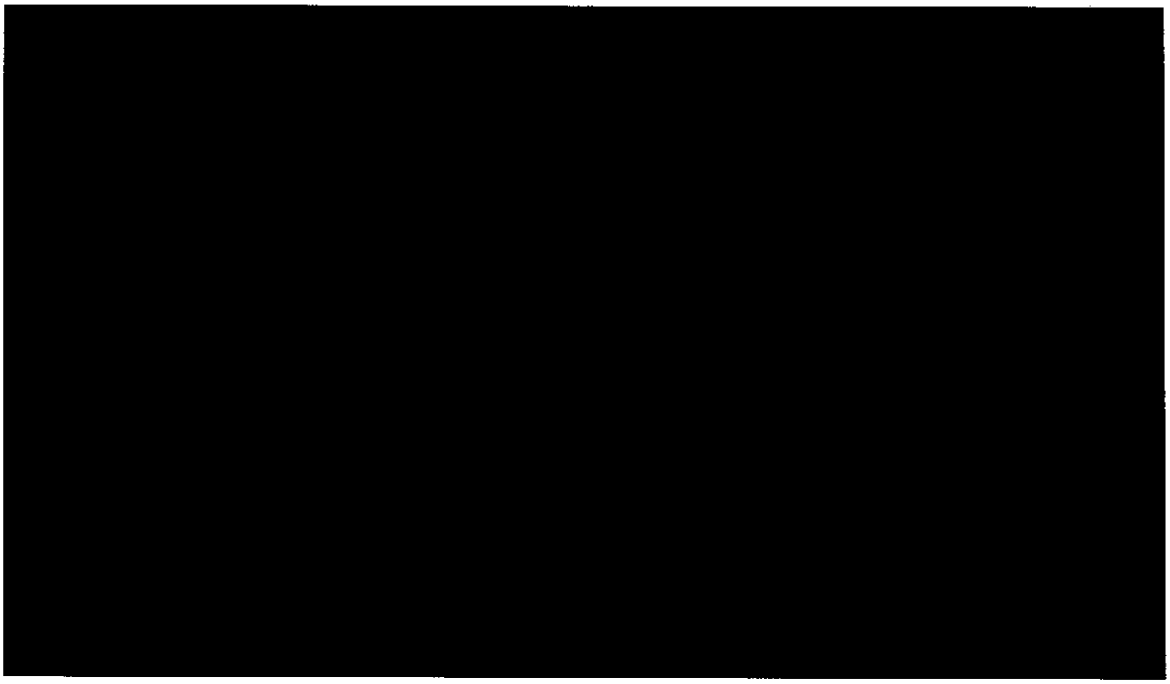


Figure 3 was taken on site on 23 November (by SVT) – Valve Y is the inlet valve to reservoir 2, Valve N was the first main cut and capped, the 3" AC main is shown to be nearer the surface of the excavation in this picture

3.15. Conditions in the reservoir compound were very wet and staff observed standing water at the site during November 2012. Local rainfall records from two gauged stations in the local area show the 15-30 mm of rain fell each day from 20-25 November. The distribution manager reported that water was running into the site from nearby farmland.

3.16. A concrete plinth that had been previously used to allow access by tanker to the abandoned spring source was inspected by the DWI during its visit to the Broadway site on 6 December 2012. This area is now used by a local cattle farmer as a holding area with a cattle crush nearby to allow inspection and vaccination of his herd. This is some 5-10 meters from the boundary of the reservoir site and approximately 2 metres above in elevation from the far end of the site and approximately three metres higher than the lowest point on site, thus, allowing a possible route of runoff to the reservoir site. This area was found to be thick and running with cow manure/slurry. A spring fed cattle trough in the fenced holding area was overflowing onto the concrete plinth as the supply to it was an uncontrolled spring source and the whole area has been subject to a period of heavy rainfall in the time preceding the DWI visit. This allowed run off to enter a land drain at the site boundary that was partially blocked with straw, soil and faeces. See Photos 4, 5,6,7,8,

Figure 4: Picture taken from the reservoir site boundary behind cell 1, with a view of the cattle holding area and the concrete plinth taken on 6 December 2012

Figure 5: showing the uncontrolled flow to the spring fed cattle trough in the cattle holding area on the concrete plinth Taken on 6 December 2012.

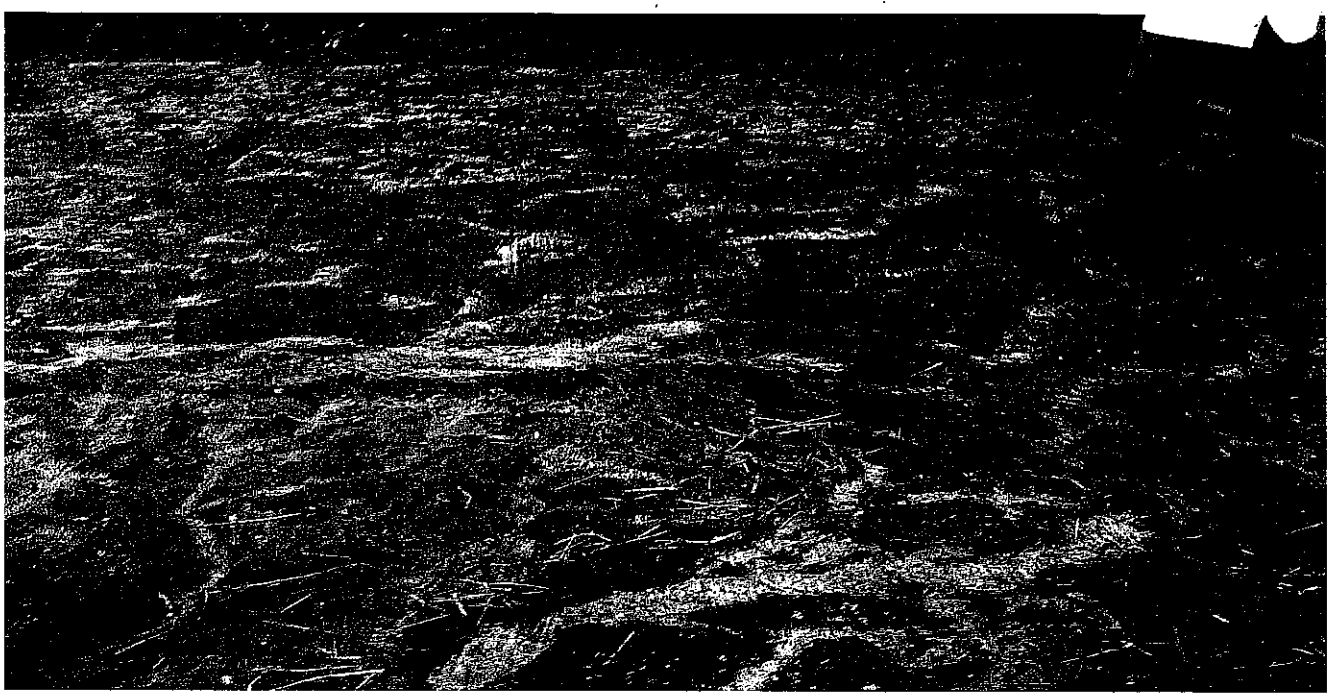
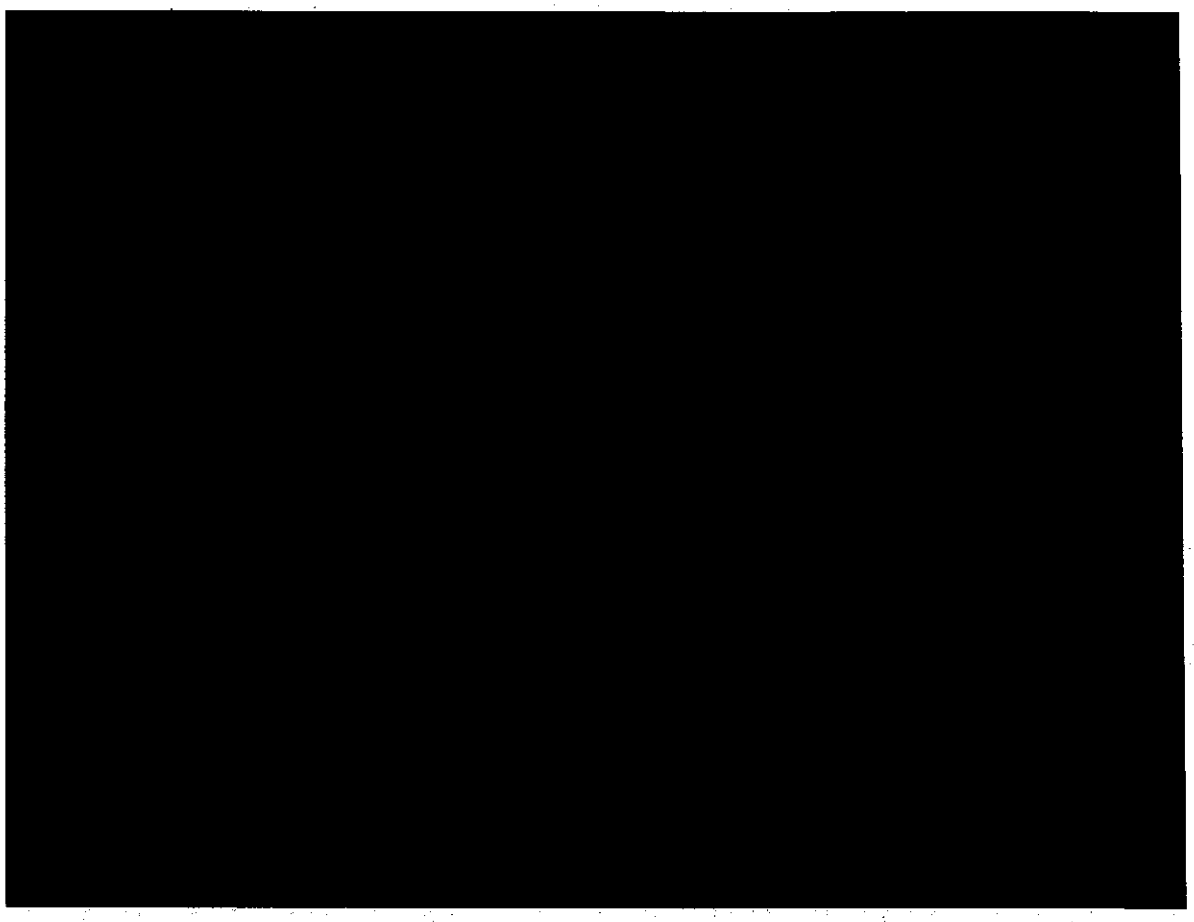


Figure 6: Ground conditions on the concrete plinth - faecal material, soil and straw taken 6 December 2012.

Figure 7: Site Boundary showing the location of the concrete plinth above and behind the two figures and the vicinity of the made ground over the burst 3" AC main following its cut and capping. taken 6 December 2012



3.17. The Company looked for, found and disconnected the abandoned 3 inch AC main. They cleaned both cells of the storage reservoir, flushed the mains supplies and tested the water until they were confident it was clear of contamination. For a period of 11days the Company supplied bottled water to consumers in the area before lifting the advice to boil notice on December 3.

3.18. The Company used its web site and also delivered notices to consumers advising them to boil their water with bottled water. **I conclude** that the Company acted responsibly once it had realised the extent of contamination, however **I suggest** that it should seek feedback from residents of the village of its performance during the event to better understand what was successful and what was not.

4. Contraventions of the Water Supply (Water Quality) Regulations

4.1. On 23 November the Company took the decision to issue advice to consumers in the village of Broadway after receiving results from samples collected on 22 November Broadway service reservoir (SR) 09:30hrs 52 coliform and 20 E.coli, Broadway SR 15:00hrs 3 coliform and 0 *E.coli*, and 5 distribution samples contained both coliform bacteria and *E.coli*.

4.2. During the event 203 samples were collected from the area, including upstream works [redacted] and consumer properties in Broadway. 8 samples failed the standard for *Escherichia.coli* (Max 20 per./100ml), 3 samples failed for *Enterococci* (max 2 per/100ml, 8 samples failed for *Clostridium perfringens*, (max 36 per/100ml), 4 showed elevated Turbidity, (Max 6.6 NTU), 12 samples failed the standard for Iron (max 1680 µg/l) and 2 failed for Aluminium (Max 326 µg/l).

4.3. In addition 4 samples contained *Cryptosporidium* oocysts in the range 3-4 oocysts/l and 2 in the range 5-6 oocysts/l. During the event the oocysts were sent to the national reference laboratory for typing *Cryptosporidium bovis* a parasite found in the gut of cows was confirmed in samples collected from Broadway reservoir on 24 and 26 of November. All of the detections in excess of the regulatory standard are in breach of Regulation 4(2)(a, b and c). Consequently, I **conclude** that the Company has breached Regulation 4(1) of The Water Supply (Water Quality) Regulations 2000 as amended and that these contraventions are not trivial.

5. Regulation 28 Risk assessment

5.1. The Company has an obligation under regulation 27 to assess possible risks to water quality and their mitigation for every water treatment works and water supply system supplying water for Regulation 4 purposes (i.e. wholesome water). It has a duty under regulation 27(2) "to establish whether there is a significant risk of supplying water from those works or supply system that would constitute a potential danger to human health".

5.2. The Company submitted a revised risk assessment in accordance with this regulation 28 for this area (SEV13 RSA) on 14 November 2012. The runoff from the farmland holding area on the perimeter of the site was not cited as a potential risk. It emerged that the risk assessment submitted was not undertaken after a visit to the site. **I am highly critical if this omission and consider it poor practice**.

5.3. The reservoir has been visited by Company staff at least once every week for the past 24 years for sample collection to comply with the regulations, in addition, process staff have dosed treatment chemicals at the site every week. **I am shocked** that no one thought that the presence of cattle and sheep in the immediate vicinity of the reservoir was worthy of comment in the risk assessment. **I conclude** that the awareness of staff who routinely visited the site of potential public health risks is deficient. The similarities of this event to the 1989 "Ayreshire" outbreak as reported in " Cryptosporidium in Water Supplies" 1990 Chaired by Sir John Badenoch are striking. **I conclude** that the Company has not learned from the published lessons from history. It has not followed the Water Industry's own technical guidance in the management of this asset. **I conclude** that this casts significant doubt over the entire approach pursued to comply with regulation 28 and points to a systemic weakness in the public health awareness of its staff at all levels from mess room to board room. **I recommend** that the Company seeks to raise the competency of its entire

staff dealing with drinking water assets: asset planning, water quality risk assessments, water quality complaints, drinking water production, supply and sampling; of the risks posed by faecal contamination of supplies in the context of its duties to supply wholesome water that is fit for human consumption.

5.4. **I note** that since the event the Company has submitted a revised risk assessment specifically for the Broadway service reservoir site on 18 June 2013, recognising some risk to the site from the catchment. **I recommend** that the Company makes a physical inspection of all of its reservoir assets and resubmits its regulation 28 risk assessments where necessary.

5.5. During the event the DWI served a legally binding notice under Regulation 28(4) SVT 3214 to carry out enhanced water quality motoring at the site and require the Company to take actions to identify all underground assets at the site and identify and remediate the source of the contamination. **I conclude** that the Company has complied with this notice.

6. Notification

6.1. The Company notified West Midland West Health Protection Unit and Worcestershire Regulatory Services on 22 November. The Company informed the Consumer Council for Water on 23 November. **I therefore conclude** that the Company met the notification requirements of Regulation 35 of The Water Supply (Water Quality) Regulations 2000 as amended.

6.2. The Company notified the Inspectorate on 23 November and provided associated reports by the agreed dates. I therefore **conclude** that the Company met the notification and reporting requirements of Paragraph 9 of the Water Industry (Suppliers' Information) Direction 2012.

7. Offences

7.1. Water may be regarded as being unfit for human consumption if either, when drunk it would be likely to, or did in fact, cause injury to the consumer or, where by reason of its appearance or smell, it was of such quality that it would cause a reasonable consumer of firm character to refuse to drink it or use it in the preparation of food.

7.2. The Inspectorate sent out sent out 26 consumer questionnaires to some of those affected and living in Broadway. All 26 questionnaires were returned to the Inspectorate we have never had a 100% return rate when investigating an event (we have sent out questionnaires on over 100 occasions). All 26 consumers rejected the water for one or a combination of aesthetic grounds therefore 100 % of the total questionnaires returned showed rejection by consumers.

7.3. On 5 March 2013 the Drinking Water Inspectorate made visits to some of these consumers to take statements regarding their experiences at the time of the

event. All of the 11 the consumers we spoke to rejected the water for one or more uses, and they expressed concerns regarding its safety. Some consumers requested water quality samples, but have not heard from the Company as to the results. **I suggest** the Company shares and interprets the results of water quality samples it collected during the event from consumers' houses in response to concerns about drinking water quality as a matter of both good practice and courtesy. **I further suggest** that it should do this in all subsequent events where consumers are concerned about their water quality and the Company collects a water quality sample from their premise.

7.4. The sample results described in paragraphs 4.1-4.3 above constitute an offence under Regulation 70 (water unfit). After carefully assessing all the circumstances, I **concluded** that there was evidence that water unfit for human consumption was supplied during this incident and that there were grounds for the Chief Inspector to consider instituting a prosecution under Section 70 of the Water Industry Act 1991.

7.5. The Company admitted supplying water unfit for human consumption in breach of Section 70 of the Water Industry Act 1991, to consumers in Broadway between 21 and 24 November 2012. The Company pleaded guilty at Coventry Magistrates Court on 20 January 2014 to 11 counts of supplying water unfit for human consumption. The Company was fined £ 6000 for each count. It was ordered to pay costs and surcharges of £ 26,070.

8. Other relevant matters

8.1. I should be grateful for a response to my recommendations and suggestions in paragraphs 3.2,3.3, 3.8, 3.10, 3.12, 3.18, 5.3 and 5.4 within 20 working days. Please don't hesitate to contact me if you have any queries regarding this letter.

8.2. I am copying this letter to [redacted] Please do not hesitate to contact me if you have any queries regarding this letter.

Yours sincerely

[redacted]