Drinking water 2018

Quarter 2

April - June 2018

A report by the Chief Inspector of Drinking Water

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Public water supplies for England and Wales

Quarter 2
April – June 2018

Published by
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Foreword

Drinking water 2018 is the annual publication of the Chief Inspector of Drinking Water for England and Wales. It is published as a series of quarterly reports which cover public water supplies in England and Wales.

The report sets out to develop a source to tap approach in the supply of water, developing learning points from recent data, events and company strategies. It builds upon the strategic objective of DWI for wholesome and safe, clean drinking water to all consumers at all times.

In the Chief Inspector's Report this quarter, a summary from a series of audits at groundwater works has been included for wider learning. Boreholes are a vital source of water, providing 28 percent of supplies across England and Wales, and a considerably higher percentage in the South East. Professor Bouchier, in his third report of experts in 1998, was clear in his conclusion; 'Not all groundwater is consistently of high quality', as sources may be affected by the possibility of intermittent rapid transmission of water from the surface. This is particularly true when there is heavy rain or other changes which may impact on the surrounding environment. Such situations have been reported in previous CIRs, for instance: Matts Hill works (SRN) 2008 where rain led to turbidity in the borehole which shut the works down and the company knowingly restarted the works and compromised disinfection; in 2014 at Ivyfields Works (WSX), where the borehole headworks were below ground level, had become flooded, could not drain to the stream which was inundated after heavy rain and had ingress points on the borehole heads resulting in a rise of turbidity. In 2017 at Maindell works (PRT), a site which is artesian and known to be affected by heavy rain, *Cryptosporidium* was detected and no mitigation was in place.

With this learning available, the audits identified risk assessments which lacked information regarding on-site and close proximity risks including: dual-carriageway runoff, sewage treatment plants, pesticide applications and chemical hazards. Furthermore, the auditors found examples of inaccurate water quality monitors and monitors that were not in operation, preventing any mitigating action when a critical control point measure is unavailable. Critically, in one company an unrecorded cess pit was identified on-site and this was in a company which suffered from a wide-scale boil water notice in 2015 after asset contamination with *Cryptosporidium* (UUT). In the same company, a sheep shearing unit with veterinary products was noted in the field adjacent to one of the boreholes. This not been identified as part of a safety plan review carried out the day before the Inspectorate's visit.

It is concerning that there remain examples of sub-surface boreholes where points of ingress may present a risk or where there has been evidence of flooding. In one example the company has considered this to be an acceptable ongoing risk. If companies are to maintain water quality, asset improvement identified through risk assessment should be appropriately prioritised and scheduled in the long-term strategy. Risks considered tolerable now may not be so in years to come as environmental challenges and resource pressure increase. Planning now to schedule mitigation is a proactive way to avoid future incidents.

Like CIR 2018 Q1, coliform failures in assets remain evident. Of concern are failures which are linked to asset condition and failure to inspect sites in a risk prioritised way. Over twenty sites were identified this quarter which have not been internally inspected in the last 10 years. This policy is counterintuitive as reactive costs may exceed costs of inspection and in the long-term, deterioration may mean capital remediation may well be more significant. As is evidenced in this report, reactive investigation may not even be straight forward as a failure may originate at a deteriorating upstream asset resulting in prolonged investigations and remediation.

I am satisfied that some companies are taking proactive action, for example, work is planned at Hampton Loade to remediate taste and odour and microbiological detections. Equally, the increased microbiological surveillance by Severn Trent Water is considered proactive even though it will affect short-term outcome measures. Whilst this action by Severn Trent Water is resulting in a higher number of detections, the short-term acquisition of information permits long- term security for water quality and I would expect net gain in the future. The detection of a parameter should lead to robust investigations, root cause analysis and improvement including plans for future investment. It is not an opportunity to seek an excuse for the failure but to act on the information. A poorly taken sample should never be a reason but poor company training or equipment might well be identified as a result.

Lead and nickel figure significantly among the failures. Both of these parameters have public health implications and occurrence of the metals should be minimised. Included this quarter, are examples in both cases where these occur at public buildings. Where these are discovered by companies, inspection of premises and action to ensure public building owners remediate contributing materials in their distribution system is expected. Equally, the discovery of a private supply supplementing the building’s public supply should always be reported to the local authority and action taken collaboratively to protect the public supply and consumers alike.

Finally, in this report, an example of an event which directly affected consumers has been included for company learning. The case example reviews a serious event where water which was unwholesome was supplied to consumers. As every event is assessed in the public interest, the response and actions of the company were taken into account and this avoided further enforcement action. Better regulation looks for fair and proportionate responses by regulators and adoption of best case practices by companies for the benefit of consumers.

Groundwater Audit Programme

In 2018, 28 percent of water supplies across England and Wales were derived from ground water sources. Groundwater from deep and confined aquifers is usually of good microbiological quality, chemically stable and less easily influenced by direct contamination. However, shallow or unconfined aquifers can be subject to the same contamination risks as surface water as well as by gradual permeation of pollutants.

The Inspectorate carried out a series of audits at groundwater works during the second quarter of 2018 to examine how these sources are protected from contamination and to ensure that the treatment processes in place were appropriate for the source.

Risk Assessment

It is an important requirement for companies to carry out risk assessments in sufficient detail so that water supplies can be adequately protected from contamination. The Inspectorate found that some companies were either not aware of the risks to sources or had not fully addressed the risks identified.

At Southern Water's Falmer works a dual-carriageway running along the boundary was observed, but the drainage arrangements for surface runoff from this highway were not known by the company. The risk assessment was found to lack information regarding on-site and close proximity risks and led to the Inspectorate serving a Regulation 27(4) Notice to review and improve the catchment risk assessment.

During a visit to South Staffordshire Water's Churchill Borehole Pumping Station, in the West Midlands, two small sewage treatment plants we identified within the catchment that had not been appropriately considered as part of the risk assessment and the Inspectorate recommended the company review and update this.

There are several risks associated with arable farming at Severn Trent Water's Papplewick works, which is in an unconfined sandstone aquifer. The company were reluctant to approach local farmers to find out about the pesticides used in the catchment, despite a range of incentives and collaborative working practices. The Inspectorate recommended the risks associated with pesticides and other organic parameters were reviewed and appropriate action taken to mitigate them.

The Inspectorate welcomed that Thames Water had introduced 'ground truthing' to its risk assessment process, as observed at North Orpington works. The company's risk assessment had also identified a HAZCHEM site in the catchment but did not know the chemicals used at this site. The

Inspectorate recommended the company liaise with the site owners to rectify this.

At Northumbrian Water's Fowberry works, water quality risks associated with the use of turbidity overrides had not been assessed. Mitigation was reportedly under investigation to address risks associated with inaccurate water quality monitors and plans for their calibration and validation needed to be added to the improvement plan for the works. The Inspectorate served a Notice to address the risks of supplying sub-optimally disinfected water to the network from Fowberry works and to mitigate the residual risks in relation to water quality and disinfection at this site.

The audit completed at United Utilities' Adlington and Tytherington works identified shortcomings in the recording, frequency of review and management of groundwater risks. For example, two abandoned observation boreholes at United Utilities' Adlington works were not recorded in the Drinking Water Safety Plan and the company was not carrying out any recorded checks on these boreholes. The presence of a cess pit on site was not recorded either. A sheep shearing unit with veterinary products in the field adjacent to one of the boreholes had not been identified as part of a safety plan review carried out the day before the Inspectorate's visit. At Tytherington works, the site is reliant on one borehole to maintain supplies. This borehole has a lining in poor to moderate condition. A refurbished borehole on site had not been recommissioned. The company's Drinking Water Safety Planning System did not capture risks identified in catchment specific plans that pre-date the introduction of the current safety planning system. There did not appear to be a structured formal review process for the groundwater sites and there was no mechanism to add newly identified risks to the safety planning system. This seemed to be in contrast to the safety plans for surface water works, which appear to have taken priority. The Inspectorate served a Regulation 27(4) Notice to reassess the risks associated to water quality across all of United Utilities' groundwater sites and made recommendations to improve catchment reviews and carry out and record CCTV/geophysical surveys of boreholes at appropriate frequencies.

Source Protection

Contamination of good quality groundwater by surface ingress is a perennial risk and has been a contributory factor in several pollution and illness outbreaks worldwide. It was concerning to see a number of these risks had not been addressed on the groundwater sites visited. Companies are encouraged to reflect on the shortcomings identified below and ensure that these issues are not present at other sites. Particular attention should be paid to abandoned and observational boreholes to ensure their location

and conditions are known and that risks beyond the site boundary, within the source protection zones, are properly understood.

Severn Trent Water's Papplewick works is unusual in that the original well building has become a heritage site open to the public, who have the opportunity to see the original steam pump and, on special occasions, witness it in operation. This arrangement presents some challenges as there is little demarcation of the site into public and operational areas. The operational buildings were secure, but there are increased risks to the source from the public activity and the Inspectorate required the company to review the security arrangements. There was little control of the use of hazardous substances and it was found that the old well was not appropriately sealed to prevent contamination. Subsequently the Inspectorate served a Notice on the company to prevent contamination via this route.

Figure 1: Contamination Risks from the Old Well at Papplewick

The Inspectorate identified some potential contamination risks at Affinity Water's Dover Priory works where the pumps are suspended on a 'mezzanine' type platform approximately three metres below surface level. Whilst the secured well cover will offer a degree of protection, there is the potential for ingress at any point when the well cover is lifted as there are substantial gaps around the sides of the mezzanine floor. The Inspectorate recommended the company take steps to minimise the risk of ingress into this well, but the company chose not to take action as they considered the risk to be a bearable one as the pumps are located within a building.

Similarly at Connaught Well, in Dover, the Inspectorate found contamination risks to the wells, but the company considered the risks bearable due to geology, aquifer levels and the well being housed inside a building and are taking no action. Water companies bear the duty of determining the risk of hazards within their supply and equally the duty for wholesomeness. Where a risk is identified there is an expectation that it is periodically reviewed to determine if the risk remains tolerable or a plan is required to mitigate challenges. Were and incident to occur the absence of any determination in the risk assessment would be taken into consideration in decisions on enforcement.

Figure 2: Connaught Well direct access to the adit system - contamination risk.

Similarly, there is an open shaft, the ‘Winding Hole’ at Southern Water’s Falmer works. This is linked to the same adit as the active well. It is covered by metal security covers, but is not sealed and could constitute a risk of allowing contamination of the adit. A recommendation was made to adequately seal the covers and that these are sufficiently raised above ground level to prevent contamination. The Winding Hole is lower than the adjoining carpark which has a permeable surface. Car park users were not aware that oil or fuel spills should be reported to reception. The Inspectorate advised that additional control measures should be in place to prevent contamination.

At Southern Water's Patcham works the Inspectorate viewed abandoned wells that were decommissioned in the 1950s. The engineering to decommission the wells does not meet modern standards and poses a very high risk to the source water at this site. For example, one well that was located approximately 300m away up a reasonably steep incline, in a meadow. It was covered with a loose fitting concrete plinth and there was a significant amount of animal faecal matter on and around this plinth presenting an obvious ingress risk.

Figure 3: Patcham Works - Poorly protected abandoned well

Also at Patcham works, there was a 'dumb well' which was covered with an open grate. At first appearance this resembles a surface drain for the car park. The well is an open link to the adit and was known to site staff, however there were no short-term measures in place to mitigate the risks posed (controls), or to better understand those risks (monitoring). The Inspectorate served a Regulation 27(4) notice to review and improve the catchment risk assessment for Patcham works including the potential risks from sources of pollution in the immediate catchment area and the abandoned and dumb wells. Enforcement action was taken regarding the examination of the abandoned wells and other shafts linked to the adit such that appropriate measures should be implemented to protect the water source, maintain adequate monitoring and reduce the risk to consumers.

At South Staffs Water's Churchill works, the Inspectorate found that a section of the foul main from the treatment works domestic toilet was blocked and use of the facilities had been suspended as a mitigation measure for source protection and hygiene. Delays to repairs of these facilities can increase the risk of contamination or lead to persons on-site not following hygienic procedures and companies should seek to address these issues straight away. The company is also aware that there is a trial borehole in the grounds of the works, but the exact location is no longer known. The company had plans in place to carry out a geophysical survey of the general area in which it was thought the trial borehole was located, but this was not due for completion for some six months after the audit. The contamination risk to the works remains unknown until this is completed.

Risks were identified by the audit team on an observational borehole supplying Fowberry works. The lock on the observation borehole had been cut off, leaving the borehole at risk of contamination by unauthorised access.

Figure 4: Fowberry observation borehole without padlock

There is a watercourse near the observation borehole that can flood. The flooding may be exacerbated by the installation of the run-to-waste facility at Fowberry works, which will flow into this watercourse potentially contaminating the borehole. A recommendation was also made to assess the risks presented by the air valves on the raw water main which are not maintained and run through agricultural land.

At United Utilities' Adlington works, the two boreholes' headworks chambers were found to have several centimetres of standing water in them. Borehole 1, which was out of service, was seen to have tide marks in the chamber at the same height as an inspection hole gland that was not securely sealed. The position of the gland was the same height of the standing water, suggesting the borehole chamber water may be draining into the borehole or the artesian conditions have resulted in chamber flooding. The Inspectorate recommended the company ensures that the borehole headworks are sanitary sealed and kept dry at all times.

Water Treatment and Monitoring

As time progresses and new treatment processes are introduced companies should ensure that these developments are appropriately considered and the Inspectorate's guidance is followed. Some deficiencies were found related to disinfection to address Cryptosporidium. In other cases, evidence that water quality does not continuously meet the requirements of the regulations had not been acted upon.

Thames Water's North Orpington works uses ultrafiltration membranes as the main disinfection process and is therefore unlike most other works within the company. The company did not have a site-specific disinfection policy in place for the works, which the Inspectorate recommended the company address.

Shortlands works, near Bromley was the second of Thames Water's works that was visited. The site has a history of turbidity exceedances in compliance samples (three in 2017 and one in 2018 at the time of the audit). The latest exceedance was high iron and manganese. The works was taken out of supply in response. Investigation of these failings may have been hampered by limited turbidity data, which was only recorded every 15 minutes and the Inspectorate recommended data was captured more frequently to aid the investigation.

The aquifer supplying Severn Trent's Papplewick works is influenced by surface water and this is subject to further treatment in the form of blending at the nearby Papplewick service reservoir, primarily to mitigate nitrate and pesticide risks. The Inspectorate recommended an increase in monitoring for a specific pesticide (oxadixyl) present in notable

concentrations in the catchment and also recommended the company develop contingency procedures should the concentration of oxadixyl increase.

The company uses two nitrate monitors at Papplewick service reservoir to verify the blending, but there were discrepancies between the monitor readings that went uncorrected for seven weeks between January and March 2018. Contract staff rectified the faults, but the discrepancy soon reoccurred leaving low confidence in the accuracy of monitoring equipment on-site. Severn Trent Water were required to review and improve the maintenance regime for these monitors to ensure nitrate blending requirements were always met.

Disinfection at Papplewick works is enhanced by the presence of two UV reactors, replaced in 2016. While this is welcome, the Inspectorate required that the company improve its containment procedures in the event of lamp breakage. Similarly, the Inspectorate recommended a lamp breakage procedure was introduced at United Utilities' Adlington works.

At Northumbrian Water's Fowberry works, which supplies Berwick-upon-Tweed, Inspectors identified that the on-line turbidity monitors did not have a flow running through them resulting in a failure to verify the treatment process. Records for the online pH and chlorine monitors showed that calibration was completed sporadically and that instrument drift had not been appropriately acted upon. The company acknowledged this problem, and intend to add this to the improvement plan for Fowberry works. Recommendations were made to ensure on-line monitors are appropriately calibrated and at a frequency recommended by the instrument manufacturers. The treated water flowmeter at the works had never been calibrated, therefore the precision and accuracy of the flow meter could be questionable. This meter controls chemical dosing at this site, which could, therefore, be compromised.

E.coli was detected at Anglian Water's Dalton Piercy works, near Hartlepool. At the subsequent audit, the final water sample line was observed to be visibly soiled and leaking raising doubt over the representative nature of samples from this location. Recommendations were made related to its maintenance procedures, staff training and condition of other sampling facilities.

Restricted Operations

The prevention of contamination by operators and other site visitors is of paramount importance and the opportunity was taken at the Severn Trent Water audit to examine this in more detail.

Despite some minor discrepancies with records the company was able to demonstrate that National Water Hygiene training was up-to-date for all staff that had reason to visit Papplewick works. Since the audit the company have improved their 'Drinking Water Hygiene Code' to include appropriate employee questioning on their return to work to prevent those experiencing vomiting, diarrhoea or fever from working on restricted operations for a further 48 hours.

More work is needed for the company to comply fully with the Principles of Water Supply Hygiene, which requires advice to be sought from the company's medical advisor upon the return to work of individuals following periods of vomiting, diarrhoea or fever (greater than 72 hours), jaundice or any other illness that may have a bearing on their suitability to work on restricted operations.

It is important that companies ensure that they are doing all they can to protect the public from infection caused by its personnel and we remind companies that they should take robust steps to prevent contamination in this way. Companies should take this opportunity to review their compliance with best practice, including that laid down within the Principles of Water Supply Hygiene to ensure they can demonstrate the ongoing protection of public health that this provides.

Water quality at treatment works

In the second quarter of 2018, the Inspectorate's assessment of compliance data supplied by companies, included the reports of 16 microbiological compliance breaches at treatment works.

Review of compliance – microbiological failures at treatment works

Table 5: Q2: 2018 – Microbiological tests

The number of tests performed and the number of tests not meeting the standard

Parameter	Total Number of tests	Number of tests not meeting the standard
Water leaving water treatment works		
E.coli	42,831	0
Coliform bacteria	42,830	16

Pleasingly, there were no reported *E.coli* failures at treatment works, in the second quarter. However, there were 16 coliform breaches (SVT 5, SRN 4, AFW 1, ANH 1, DWR 1, SEW 1, TMS 1, UUT 1, YKS 1). This represents a pointedly poorer performance compared to the same period of 2017 (7 breaches). All five failures at Severn Trent Water's assets were subject to legal instruments and the actions taken by the company make a recurrence less likely. Following a coliform failure in March, there were three further failures at Southern Water's Testwood works in this quarter. These failures are attributable to the poor condition of the works and a Notice is in place to rebuild a significant proportion of the works.

A failing sample taken to demonstrate compliance with the regulations at United Utilities' Wybersley works, near Stockport was actually taken from a downstream service reservoir, due to the failure of the sample pump at the works. This is not appropriate and does not meet the definition set in the regulations for a works sample, it should therefore not be reported as such. A shortfall should be shown in the compliance record, where a company fails to take samples in accordance with the regulations and actions initiated to prevent a recurrence. Companies should ensure that they have sufficient equipment, spares and maintenance resource available to meet their regulatory requirements.

Following a coliform failure at Bray Pumping Station, (SEW) in June the Inspectorate recommended that South East Water remove the contact tank from service, for internal inspection. This site was previously inspected in 2016 and found to have ingress. The tank was eventually inspected in October 2018 and an inundation test carried out. This identified ingress via an unsealed cable entry point and damage to a concrete upstand on one of the access hatches. Both were rectified and the tank returned to service.

Following a detection of *Clostridium perfringens* in the final water at Hampton Loade works in June, South Staffs Water also reported the detection of C*ryptosporidium* in the final water on consecutive days. These detections coincided with a period of hot weather, high demand and an algal bloom affecting clarification and filtration performance at the works. Following the detections, the company took action to reduce flow and place temporary covers over the clarifiers to act as partial mitigation. The company have submitted plans to improve the treatment processes at Hampton Loade works and the Inspectorate made recommendations in relation to the management of treatment control processes and notification of health officials. A *Clostridium perfringens* detection at Southern Water's Sandown works coincided with a failure in polyacrylamide dosing. The company had no alarms in place to alert staff to the dosing failure and the Inspectorate made recommendations that this was rectified and considered as part of the company's hazard review process.

Water quality at service reservoirs and in distribution

Assessment of compliance

Table 6: Q2 – Microbiological tests

Parameter	Total Number of tests	Number of tests not meeting the standard
Water leaving service reservoirs		
E.coli	51,601	2
Coliform bacteria	51,601	20

During the second quarter of 2018, there were two *E.coli* failures at service reservoirs (PRT 1, TMS 1) and 20 coliform detections (ANH 3, UUT 3, DWR 2, SEW 2, TMS 2, WSX 2, BRL 1, NNE 1, PRT 1, SRN 1, SST 1, SVT 1). *E.coli* was detected at Thames Water's Hoddesdon reservoir in May, the subsequent investigation found that there was a leak on the roof/ wall joint and deficiencies in a mesh screen had allowed a number of woodlice to enter via an access hatch. A broken air valve on the inlet main was found in a flooded chamber. There were several occasions in the month before the failure where the reservoir level dropped sufficiently to allow ingress. *Appropriate maintenance of air valves is an ongoing problem across the industry and this failure should serve as an appropriate reminder for companies to ensure that the air valves are visited on a risk-based programme to ensure that they are operational and remain free from the risk of contamination.*

Portsmouth Water concluded that the *E.coli* detected at Whiteways Lodge reservoir was due to contamination from foliage surrounding the sample point because the sample was taken during a period of heavy rainfall. This improbable root cause would have been very unfortunate indeed. The company failed to remove the reservoir from service for internal inspection as would be good practice in these circumstances. The Inspectorate identified that stagnant water had entered supply and made recommendations for the company to improve its practices to manage stagnating water and improve its sampling processes.

Legal instruments are in place to address the coliform failures at three United Utilities' service reservoirs and one belonging to Severn Trent Water. Coliform failures at South East Water's Hourne Farm and Wych

Cross reservoirs in May and June respectively, highlighted difficulties in the company removing sites for internal inspection, due to available operational resources and repairs to other structures. At Wych Cross, all investigation samples taken proved satisfactory, however the upstream supplying reservoir Horsted Kenyes was inspected in October and ingress was observed. Remedial works included a new roof membrane.

The Inspectorate also identified over twenty sites that have not been internally inspected in the last 10 years, as is good practice. Following recommendations by the Inspectorate the company introduced a new policy to address these shortcomings.

Water quality at consumers' taps

The vast majority of samples taken at consumers' taps complied fully with regulatory requirements. From the samples taken to demonstrate compliance with a Directive or national standards, there were a total of 214 failures at consumers' taps in Q2 2018. For microbiological parameters, five samples contained *E.coli.* Investigations showed in all cases that poor tap hygiene was the cause. With regard to chemical parameters, the most prevalent detections were for iron (26) failures, taste and odour (30), lead (18) and nickel (9). The majority of investigations into the breaches and corrective actions taken by companies were satisfactory. Further commentary on exceptional breaches is provided below

Taste and Odour

14 Taste failures, 30 Odour failures

Repeated musty taste and odour failures were detected in Severn Trent Water's Willenhall and Bilston supply zones and South Staffs Water's West Bromwich supply zone. The root cause was identified as South Staffs Water's Hampton Loade works, which provides a bulk supply of water to Severn Trent Water. The Inspectorate took enforcement action on both companies to address this issue for their consumers. South Staffs Water plan to address this issue by upgrading the treatment process at Hampton Loade works, in the meantime both companies are reviewing short-term measures to mitigate the risks.

The Inspectorate made a recommendation for Severn Trent Water to provide appropriate advice to flush the tap to a consumer in Waveley Road supply zone and a recommendation was made to Southern Water to improve the short-term operation of its powdered activated carbon dosing plant to address musty odours in Rownhams-01 supply zone.

The Inspectorate investigated the apparent discrepancy between the number of taste and odour failures reported by companies to ensure that the monitoring carried out was appropriate and the number of failures were not being under reported. Several companies were identified where this discrepancy had occurred. Whilst for some companies, the reason for rejecting the sample for taste analysis was based upon risk to health, with others this was less clear cut. Whilst some companies had appropriate procedures to warn consumers where there was a risk to health (e.g. DWR and NNE), others were more reliant on the laboratory staff to decide for themselves whether there was a risk to health and this was not necessarily followed up with advice to consumers (e.g. ANH and YKS). *If companies consider there may be a risk to the health of their own staff or contractors carrying out taste testing, it is incumbent upon them that they take appropriate steps to protect consumers. The Inspectorate should be*

notified appropriately of any event that arises as per the requirements of the Water Industry (Suppliers Information) Direction.

Table 7: Odour failures where no taste test reported

	No of Odour Failures Where a Value for taste was not reported with the Same Sample	Odour Failures without an Accompanying Taste Value as % of Total Odour Failures
AFW	2	50
ANH	11	85
DWR	1	13
NNE	1	100
SVT	2	9
UUT	2	29
YKS	3	75
Grand Total	**22**	**30**

Lead – 18 failures

A failure at a public building supplied by Portsmouth Water lead to the Inspectorate considering enforcement action, however, the company belatedly issued a Section 75 Notice to ensure that the property owner took appropriate action to replace the lead service pipe. Companies are expected to minimise lead in public buildings by requiring action from the building owner.

Northumbrian Water have improvement actions in place as part of a Notice issued by the Inspectorate to improve its compliance for lead and address the two breaches seen in this quarter.

The Inspectorate made recommendations for United Utilities to improve its investigations into the cause and extent of lead failures in April and June. It had failed to undertake even basic fittings inspections to determine the location of the lead associated with the June breach and in April, the timeliness of its investigation and notification of the health risk to the consumer did not meet the regulatory requirement.

Nickel – 9 failures

The Inspectorate served a notice, under Regulation 21, to make Southern Water use its powers to rectify numerous plumbing issues associated with a Nickel failure at a primary school in its Star supply zone. Companies are under a duty to take action to remediate breaches in public buildings where the consumer fails to take appropriate action to rectify any identified problems themselves

Pesticide failures

Further detections of oxadixyl above the regulatory limit in Severn Trent Water's Papplewick borehole pumping station occurred in May and June. The company was able to blend the supply to reduce the concentration before the water was supplied to consumers. The Inspectorate made a recommendation to move the sampling location such that it was representative of the supply to consumers.

Iron – 26 failures

Whilst the Inspectorate was satisfied that Dŵr Cymru Welsh Water had taken appropriate steps to rectify the causes of an iron failure in the Holywell/ Mold supply zone in June, enforcement action will be considered should there be further breaches of the standard due to the frequency of samples failing for this parameter. United Utilities took action to replace a three inch cast iron main with a polyethylene one following an iron failure in its Barrowford supply zone in April.

Bromate - 1

Hafren Dyfrdwy were unable to identify a cause for a bromate failure downstream of its Boughton works in May. The company were unable to identify any possible treatment issues or pollution events that could have contributed to the failure and considered the result anomalous although there was no evidence provided of an investigation into the sampling or analysis to support this view.

Trichloroethene and Tetrachloroethene – 1

A breach of the standard for these solvents is rare, but following the failure in May, Thames Water identified that the supply the service pipe to the property, a cycle shop and dry cleaners, was contaminated. Do not drink advice was provided, whilst activities to replace the affected pipework were completed.

Ammonium – 1 failure

In May, Southern Water detected an ammonia exceedance in a sample from a cafeteria associated with a prison complex. Upon investigation, the company identified that the property had a supply from a borehole as well as the mains supply. The cafeteria manager, had been unaware of the dual supply arrangements. The sample was unrepresentative of the water supplied to the zone. The company took appropriate action to report this as an event, as required by the Water Industry (Suppliers Information) Direction 2017 and also informed the local environmental health department of the issue with the private supply. The discovery of a private supply in public buildings such as prisons and hospitals should always be

reported to the local authority as they present a higher risk to the consumers and to the public supply. QA fittings inspection should always be carried out to ensure backflow into the public supply is mitigated.

Event Case Example

The following event is included as an example of the outcome of repair work on a five inch main and which resulted in 254 properties receiving discoloured water with an unusual odour ('white spirit/petrol like'). As is often the case, this was an avoidable event that occurred primarily because records, communication, planning, risk assessment and execution of the task were deficient. Equally, and by no means unusually, the first the company were aware there was a problem was when it began to receive consumer complaints. In the first instance there were just two complaints overnight following the completion of work the evening before.

The source of the taste and odour was later identified as benzo(a)pyrene. It was detected at a level which may well be considered significant and this finding was indicative of historic 'coal tar' mains lining material. The source was stagnant water from a 'dead-leg' seven inch main, at a higher elevation to the repaired five inch main, which flowed by gravity into the local supply system during the repair operation and then into supply on the recharge of the mains.

This type of event is considered to be very significant and prosecution for the supply of unfit water would certainly be a consideration because the company's risk assessment of the mains repair was deficient. It did not factor in the length of stagnant main or the topography. The company's actions, in response to the circumstances, was several fold and included: Consultation with Public Health England; a written Restriction of Use (Do Not Use) advice notices and bottled water delivered to each property by customer representatives during the afternoon; mains flushing activity carried out in order to remove the affected water and about 20 plumbers were contracted by the company to conduct flushing activities within the affected properties in order to remove the affected water from hot and cold water supply systems.

As part of the investigation into this event and similar events, the views of consumers who are directly affected are often sought through questionnaires. The findings were that whilst there were four consumers who complained and were dissatisfied with the water supplied during the event, the remaining majority of 47, who returned the questionnaire, were either satisfied or praised the company in their response.

It is clear, the company should have done better by avoiding the event and have acknowledged this, but when it happened, the company reacted in

the public interest. To prevent future similar events, the company issued a technical briefing note to all of its distribution risk assessors using this event as an example to highlight the risks posed by dead-legs during network operations. Furthermore, the company reviewed its procedures for escalating water quality complaints received out of hours and the measures by which on-site observations from network technicians and water quality sampling staff can be best appraised during an unfolding event.

Public interest is a significant consideration and the action taken by the company and the views of the public has guided the regulatory assessment. This event was assessed and recommendations were made without further enforcement action as part of better regulation and considering public interest.

Legal Instruments

PR19 Water Quality Improvement Submissions

The Inspectorate has supported (or commended) 114 water quality schemes for AMP7 following assessment of the proposed schemes submitted. These schemes consisted of;

Table 8: Number of supported PR19 schemes by type

Type of scheme	Number received
Catchment	19
Catchment/Treatment	2
Treatment	69
Treatment/Distribution	11
Distribution	13

Annual progress reports

The Inspectorate's assessment of the annual progress reports submitted as part of companies requirements for each legal instruments (Notices under Regulation 28(4) of the Water Supply (Water Quality) Regulations 2016 or Regulation 29(4) of the Water Supply (Water Quality) Regulations 2010 (as amended) (Wales) and Undertakings accepted under section 19 of the Water Industry Act 1991) has now been completed.

In total, companies provided reports for 316 legal instruments by the deadline of 31 January however the Inspectorate was disappointed that despite a number of requests Bournemouth Water did not submit their reports until May 2018.

In the majority of cases, the submissions were of a good quality with most schemes on track to meet their completion dates. Only two submissions resulted in requests for further information from companies (DWR and UUT) and in both cases the company were able to submit the required information in response to the questions.

Table 9: Annual progress reports submitted and assessed

Company	Catchment	Treatment	Reservoirs	Distribution	Total
AFW	4	1	0	4	9
ANG	5	5	0	3	13
BRL	1	1	0	1	3
CAM	0	1	0	1	2
CHO	0	1	0	0	1
DVW	1	6	3	1	11
DWR	0	9	6	33	48
ESK	1	1	0	1	3
HPL	0	1	0	1	2
IWN	1	0	0	0	1
NNE	1	4	0	2	7
PRT	0	0	0	1	1
SBW	0	2	0	0	2
SEW	1	1	0	20	22
SRN	1	8	0	2	11
SSE	1	0	0	0	1
SST	1	2	0	1	4
SVT	2	13	5	24	44
SWT	0	4	0	13	17
TMS	2	2	2	4	10
UUT	2	9	6	59	76
WSX	0	18	0	1	19
YKS	3	5	0	1	9

New Legal Instruments Issued

In the first 6 months of 2018, the Inspectorate served 25 new legal instruments;

Notice under Regulation 28(4) - 2 DWR, 1 NNE, 12 SRN, 5 UUT, 1 YKS.
Notice under regulation 27(4) - 1 SRN
Enforcement Order under Section 18 of the Act - 2 SRN
Undertaking under Section 19 of the Water Industry Act – 1 SRN

Southern Water – New Legal Instruments

During the first half of 2018, the Inspectorate agreed a range of legal instruments with Southern Water which constitute the company's new transformation programme. This set of legal instruments represent a collaborative effort between the Inspectorate and the company aimed at transforming the water quality performance of the company and reducing the level of risk.

Part of this work included the revision of all catchment risk assessments, to ensure the company fully understands its catchments and the risks that are present. The company have already completed significant work in this area, with a new dedicated catchment team now in place.

All of the company's treatment works are required to undergo an in-depth hazard review (Hazrev) to identify all aspects on-site that could constitute a risk to water quality and public health. This includes (but is not limited to) design, mechanics, instrumentation, maintenance and process science. The output of these reviews will be a series of improvement programmes to address the risks identified. The programme is flexible to allow assets to be prioritised for review on the basis of risk. The company are also undertaking a major refurbishment of three critical surface water treatment works at Burham, Testwood and Otterbourne.

Storage assets can represent a significant risk to the wholesomeness of water if not sufficiently maintained. This has been highlighted by some significant water quality events across the industry involving the contamination of stored water. The Southern Water's transformation programme includes a service reservoirs Notice, which aims to reduce the inspection frequency for storage assets from 15 years to a risk-based inspection frequency, with a maximum of 5 years. This work includes the abandonment of obsolete assets and the construction of new ones.

Training and culture underpin everything that a company does. The training and culture Notice that forms part of this transformation programme requires the company to train their staff to an acceptable level in the disciplines required by their work areas and then to maintain that competence. A training plan for new entrants to roles is also being developed.

With regard to network management, in addition to the flushing already being undertaken, the company will be replacing large sections of mains in their worst performing supply areas for discoloured water. In addition to this, the company are trialling smart network technology to understand better the flow conditions within their network and the impact following network changes.

Finally, the Inspectorate has served an Order and accepted an Undertaking in respect of data reporting. The company have repeatedly had significant sample shortfalls and this Order seeks compliance with the basic requirements of the Water Industry (Suppliers Information) Direction 2017, whilst also building resilience and enhancing the data capture and reporting systems used by the company.

Closures in Total

The Inspectorate received 34 Closure Reports in the first six months of 2018 (2 AFW, 1 ANG, 1 CHO, 1 DVW, 4 DWR, 2 SEW, 2 SRN, 1 SST, 5 SVT, 1 SWT, 2 TMS, 10 UUT, 1 WSX, 1 YKS), with 13 of these being received in January in place of annual progress reports. Additional information had to be sought from companies in relation to five of these reports. Companies are reminded that the closure of legal instruments is not simply a paperwork exercise, but it is the formal evaluation when a scheme comes to an end of the success (or otherwise) of that scheme and a re-appraisal of the risks and the acceptance of those risks by the company. To that end, the Inspectorate requires evidence of satisfactory completion in order to be able to revoke a Notice or Order, or to close an Undertaking and the Inspectorate reminds companies that in order to close a legal instrument, a new signed declaration by a board member of the appropriate risk assessment reports must be submitted to the Inspectorate.

Change Applications

The Inspectorate received 27 change applications in the first half of 2018, 13 of these applications were submitted alongside companies' annual progress reports. While the Inspectorate acknowledges change applications may be submitted during this time, companies are reminded to engage with the Inspectorate at an early stage and not use the annual returns process as the first mechanism to submit change applications.

Milestones

128 milestone reports (independent of closure and annual progress reports) were submitted to the Inspectorate in the first two quarters of 2018.

Table 10: Milestone reports received in the first half of 2018

Company	Milestones Reports	Company	Milestones Reports
ANG	3	SVT	13
DWR	12	SWT	1
NNE	3	UUT	62
SEW	20	WSX	2
SRN	11	YKS	1

This number of milestone reports is significantly higher than would normally be expected. The high numbers of reports submitted by four companies (DWR, SEW, SVT and UUT) are associated with the first milestone reports for the discolouration Notices that the Inspectorate issued to these companies on the basis of poor network management and discolouration contact rates. Due to the number of Notices in place, where there is one legal instrument for each supply zone, it was agreed that a single milestone report could be submitted outlining the steps taken across a number of water supply zones.

Regulation 15 – Sampling: New Sources

During the first six months of 2018 the Inspectorate received three applications under Regulation 15 (1 SRN, 1 UUT and 1 WSX). The Inspectorate recognises the water resources pressures that some companies have been under due to the prolonged hot weather in the early part of the summer and has been aiming to respond to Regulation 15 requests as quickly as possible, and in over 95% of all emergency applications a response occurred within 48 hours. In the three cases mentioned above, the Inspectorate were able to respond within two weeks of the application where our standard service level is set at one month.

The Inspectorate has previously issued guidance on Regulation 15 submissions however as a general point companies should ensure that when presenting sample data in their submissions that this data is clear and can be properly interpreted with regard to the specified sampling requirements.

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