

SUMMARY OF EVENTS AND INCIDENTS 2017

Scottish Water is required to tell the Drinking Water Quality Regulator for Scotland (DWQR) about events that could affect water quality. DWQR assesses all events and categorises them in consideration of their impact on public confidence in the water supply. There are five categories used with the three most severe declared by DWQR to be incidents.

Category	Not Significant	Minor	Significant	Serious	Major
No. of Events	668	108	24	7	1

The following tables detail the significant, serious and major events declared as incidents. Each individual incident assessment can be viewed on the DWQR website: <http://dwqr.scot/regulator-activity/water-quality-incidents/2017-incidents/>

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Event Date, Duration & Classification	Area	Estimate of population	Nature and cause of the event	Main actions and findings from the DWQR investigation
4 Jan 2017 For 15 days Classification: Serious	Craigie zone, Aberdeenshire, East Region	67	Storage point failure – microbiology and discolouration	DWQR comments and findings: <ul style="list-style-type: none"> The incident was caused by a failure of the integrity of the Colpy service reservoir due to an improperly repaired fault which resulted in bacterial contamination of the water supply. Scottish water responded appropriately to the discolouration complaints but there was an unacceptable delay in carrying out follow-up sampling. Recommended providing guidance to staff to ensure urgent investigation of any contamination is supported by timely resampling of all failures of samples. Scottish Water actions: <ul style="list-style-type: none"> Installed a cross connection to remove the need for Colpy service reservoir and disconnected and isolated the service reservoir from the network. Produced an amended procedure to require joint inspections between engineering contractors, cleaning contractors and Scottish Water staff in relation to flood testing of service reservoir roofs.
25 Jan 2017 For 12 hours Classification: Significant	South Moorhouse WTW, Glasgow / East Renfrewshire, West Region	29,662	Treatment failure – aluminium	DWQR comments and findings: <ul style="list-style-type: none"> The incident was caused by Scottish Water's failure to return the raw water inlet valve to automatic following maintenance work which then prevented full shutdown of the works, combined with a fault with the alum dosing pump which caused it to fail to respond to the reduction in raw water flow. Recommended reviewing all automated processes at Scottish Water's assets and putting a process in place to ensure that operators are aware of all systems which have been switched to manual. Scottish Water actions: <ul style="list-style-type: none"> Established a process for ensuring correct handover of information to standby treatment operators. Reviewed the procedures for changing a system from automatic to manual operation. Investigated and replaced the pH probe and confirmed the pH value at the point of disinfection and altered the alum and lime pump low flow shutdown.

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25 Jan 2017 & 2 May 2017 For approx. 12 hours on each occasion Classification: Significant	North Hoy WTW, Orkney Islands, East Region	32	Treatment failure – loss of disinfection	DWQR comments and findings: <ul style="list-style-type: none"> • These incidents were caused by a fault with the disinfectant dosing pump due to an airlock. • It is disappointing that safeguards were not in place to prevent air locking of the disinfection system as this is a recognised risk. • While analysis of samples confirmed there was no microbiological contamination of the supply, chlorine levels and sampling times were not recorded in the sample database. • Recommended providing a final water chlorine monitor to ensure there is a clear record of chlorine levels in water put into supply. • Recommended that sample records are fully completed at time of sampling and that there is a robust means of transfer of paperwork with samples. Scottish Water actions: <ul style="list-style-type: none"> • Simulated loss of disinfection and ensured that the WTW shut down as intended • Installed sodium hypochlorite dosing pumps with de-gassing heads. • Amended the sodium hypochlorite batching process to ensure duty/standby arrangements are in place. • Carried out additional operator training to ensure a thorough understanding of WTW operation.
3 Feb 2017 For at least 6 months Classification: Significant	Bonnycraig WTW, Scottish Borders, South Region	8850	Treatment failure – repeated detections of <i>Cryptosporidium</i>	DWQR comments and findings: <ul style="list-style-type: none"> • This incident was caused by a number of issues with filter performance including the condition of the media, filter structure, backwash performance and the integrity of a number of valves. • Health professionals determined that oocysts were present at a concentration which was unlikely to constitute a danger to human health . • DWQR considers that Scottish Water acted appropriately to improve the treatment process and protect public health. Scottish Water actions: <ul style="list-style-type: none"> • Refurbished the filters and replaced the filtration media. • Resolved the issue of outlet valves not closing properly. • Installed ultra-violet treatment at the treatment works to neutralise any <i>Cryptosporidium</i> oocysts that pass through the filters.

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3 Feb 2017 For 11 days Classification: Significant	Kyle of Lochalsh WTW, Highland, North Region	2693	Treatment failure – pH	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> This incident was caused by the fitting of a replacement ball valve for which the required control changes were not adequately taken into account. In addition there was a failure to top up the media in the remin (remineralisation) vessel. The management of the incident was hindered by the lack of a treated water pH monitor after the monosodium phosphate dosing point. Sampling to check the effectiveness of pH corrective measures was inadequate Recommended installing recommended option for replacement of remin tank Recommended installing additional water quality monitors as identified below. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Reduced the post remin tank pH set point to create a safety margin in relation to the PCV (prescribed concentration or value) and reduce flows through tank. Reviewed options to address the issue of the undersized remin tank. Shared best practice regarding top–up of small volume media remin tanks. Reviewed the need for additional water quality monitoring of pH and phosphate (post addition of monosodium phosphate) and turbidity (post remin tank). Review the remin tank media level on a monthly basis and top this up to the required volume.
9 Feb 2017 For 5 days Classification: Significant	Bradan C zone , Ayrshire , West Region	3473	Network failure – turbidity, iron, manganese, aluminium and microbiology (coliforms)	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by discolouration due to a burst main which resulted in increasing flows in a second main, introducing discoloured water into a service reservoir. Scottish Water was well prepared for the original planned mains repair and the dislodging of a previous repair plug could not have been anticipated. Scottish Water responded rapidly and effectively with the repair and with tankering of alternative supplies. It is clear that Scottish Water staff were aware of the risk of discoloured water being supplied to consumers and so repaired, operated and monitored the system carefully as a result. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Reviewed potential transient generation within the affected network. Carried out a cleanliness index analysis of mains in the affected area.

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15 Feb 2017 For 15 hours Classification: Significant	Picketlaw WTW, East Renfrewshire, West Region	35,620	Treatment failure – aluminium	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by the failure of the SCADA (supervisory control and data acquisition) CPU (central processing unit). Scottish water acted quickly in locating and installing an alternative CPU at Picketlaw WTW. It is disappointing that there were no records of SCADA settings on the treatment works, and that Scottish Water had to resort to visual checks by the operator to set up the SCADA system. Had these records been available, the impact of the incident would likely have been minimised. Recommended that Scottish Water record SCADA settings at all of its sites in case of SCADA failure. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Recorded the SCADA control settings and ensured this is available at the site Reviewed critical spares for the SCADA system at Picketlaw WTW to ensure future serviceability of the works.
20 Apr 2017 For 3 days Classification: Significant	Kyle of Lochalsh WTW, Highland, North Region	2693	Treatment failure – ammonia	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by a control fault with the ammonium sulphate dosing pump that led to overdosing of ammonium. This went unnoticed due to a lack of a treated water ammonium monitor until the final water ammonium monitor triggered an alarm. In addition, the design of the tank caused streaming across the tank and therefore the assumed dilution effect within the clear water tank did not occur. Scottish Water have taken appropriate and necessary actions to prevent a recurrence of this incident. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Configured the ammonium monitor to read both treated and final water. Reviewed the mixing and streaming issue in the clear water tank and ensured all relevant operators were briefed and Scottish Water's Control Centre updated. Reinforced awareness of the procedure for managing out of specification water in clear water tanks and distribution service reservoirs with North Water operations escalation and team leaders.

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1 May 2017 For 6.5 hours Classification: Significant	Crathie WTW, Aberdeenshire, East Region	33	Treatment failure – loss of disinfection	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by a failure in the disinfection process due to a power outage in the mains electricity supply. There were significant shortcomings in management processes for problems at this site and the seriousness of these issues cannot be understated. Inaccurate descriptions of the treatment process and system configurations led to poor understanding of the importance of the telemetry alarms from the ultra-violet system, allowing their deferment for attention by field staff. Field staff failed to alert the Public Health Team to the failures leading to a failure to take water samples to monitor any impact on water quality. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Reinforced the <i>Cryptosporidium</i> procedure for 'Dealing with a Major Process Breakdown' to staff at Crathie WTW and updated the emergency manual procedure. Reinforced the sampling response during an ultra-violet failure at Crathie WTW. Briefed the Scottish Water Control Centre on the event circumstances and the impact of the failure to dispatch the alarm immediately. Investigated implementation of an emergency chlorinator at Crathie WTW. Determined a longer term solution to the risks posed by power outages.
28 May 2017 For 2 days Classification: Significant	Balmore Carron Valley zone, North Lanarkshire, South Region	25,570	Network failure – discolouration, iron and manganese	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by flow disturbance due to a large-scale burst on a main followed by disturbance of deposits when the mains were recharged. Both DWQR and the Health Board consider the delay in notifying Scottish Water's Public Health Team to be unacceptable as it prevented a timely notification of a potential health risk event to stakeholders. Recommended reviewing the approach to collecting water quality samples out of hours to ensure that an assessment of water quality can take place at all hours. Recommended documenting and disseminating any changes required to current procedures and practices. Recommended reviewing the effectiveness of communications between Scottish Water's Public Health Team and those sections of the company who may need to report incidents potentially affecting human health. Recommended implementing any changes necessary to ensure the Public Health Team are able to provide a consistently timely response.

Event Date, Duration & Classification	Area	Estimate of population	Nature and cause of the event	Main actions and findings from the DWQR investigation
3 Jun 2017 For 1 month Classification: Significant	Kyle of Lochalsh WTW, Highland, North Region	2693	Repeated detections of <i>Cryptosporidium</i>	DWQR comments and findings: <ul style="list-style-type: none"> The incident was caused by a combination of the failure of the membranes alongside the poor condition of the seals at Kyle WTW. Recommended ensuring that membrane “autopsies” are included in the incident review process. Recommended providing the results of the membrane “autopsies” to DWQR. Scottish Water actions: <ul style="list-style-type: none"> The incident report was reviewed by a Scottish Water Review Process which was considering monitoring solutions to identify membrane integrity issues. Reviewed the response to <i>Cryptosporidium</i> failures to identify whether a service level agreement should be derived for membrane investigation, repair and replacement works. Installed dedicated <i>Cryptosporidium</i> sampling point pipework on the clear water tank outlet to provide a Regulatory final Crypto sample point.
28 Jun 2017 For 1 day Classification: Serious	Rosebery A zone, East Lothian, South Region	20,173	Network failure – iron and manganese	DWQR comments and findings: <ul style="list-style-type: none"> The incident was most likely to have been caused by planned work at the Chalkieside Service Reservoir. Although Scottish Water had undertaken this same work on several previous occasions, this is the first time that these issues have been encountered. Although it is not entirely clear what was different about this occasion, it is possible that hydraulic changes to the system since the last time the work was undertaken had increased the risk. Scottish Water actions: <ul style="list-style-type: none"> Undertook a thorough investigation and considered a number of potential causes, with the most likely being that the increase in pressure when the reservoir was bypassed, and subsequent increase in water velocity, disturbed deposits in the trunk main that washed down into Musselburgh. Undertook work to modify the bypass arrangements at the Chalkieside Service Reservoir to prevent a recurrence of the incident.

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13 Jun 2017 For 9 days Classification: Major	Whalsay zone, Shetland Islands, East Region	769	Treatment failure – aluminium, iron, manganese and pH	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> • The incident was caused by failures in Scottish Water’s governance of the design of the new works processes; their process for appointment of appropriately qualified contractors; commissioning procedures; water quality testing of the new production stream and a basic lack of understanding of water chemistry and the impact of the new treated water on the wider water distribution system and consumers’ pipes. • The extent of sampling carried out within the distribution system following the change over to the new WTW and the analysis of the samples for key indicators associated with the type of water treatment introduced, were inadequate. • Recommended reviewing processes for alerting Operations and project teams to water quality contacts received from consumers. • Recommended establishing a specification for the minimum characteristics and the desirable or optimum contents of relevant substances in drinking water subject to processes resulting in demineralisation. • Recommended implementing appropriate monitoring programmes for commissioning of the above processes. • Recommended reviewing the extent and duration of sampling required at consumer taps and in distribution systems following changes to, or the introduction of new, water supply systems. • Recommended reviewing the sample analysis required for key indicators associated with processes resulting in demineralisation in drinking water. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> • Amended the complexity matrix to define projects that have new processes or changed processes to ensure appropriate touch points and level of sign off. • Reviewed the Whalsay WTW task schedule to ensure it is adequate for reverse osmosis treatment and also reviewed operator training. • Undertook an independent review of the incident. • Ensure reverse osmosis & limestone contact tank specifications are fit for purpose. • Introduced a requirement for designers to submit a compliance report for every project as part of the design acceptance process. • Ensure designers demonstrate their quality system has external accreditation and notify Scottish Water of any noncompliance / improvements / rectification actions. • Engage the contractor to fully understand the design challenges and ensure lessons are learned.

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25 Jul 2017 For at least 7 hours Classification: Significant	Bonnycraig WTW, Scottish Borders, South Region	8850	Network failure – aluminium and turbidity	DWQR comments and findings: <ul style="list-style-type: none"> The incident was caused by a problem that occurred in relation to planned work at Bonnycraig WTW. An increased pressure and velocity of water disturbed aluminium deposits in the filter pipework. It would have been prudent for Scottish Water to have checked the extent of aluminium deposits and undertaken cleaning prior to starting the work. Recommended that Scottish Water consider putting in place a means of disposing of poor quality water in the clear water tank in its investment process to improve resilience at the site. Scottish Water actions: <ul style="list-style-type: none"> Installed a hydrant and flushed the filter outlet pipework. Reviewed procedure for measuring bench aluminium on site and disseminated lessons learned to the water operations teams. Considered regular flushing of the coagulation contact pipe. Reviewed the WTW start-up procedure.
1 Aug 2017 For 8 days Classification: Serious	Corsehouse zone, Ayrshire, West Region	7,420	Network failure – manganese and organics (polycyclic aromatic hydrocarbons)	DWQR comments and findings: <ul style="list-style-type: none"> The incident was caused by a disturbance of manganese deposits in the network due an increase in water flow. There were two bursts on the network but Scottish Water has been unable to determine what caused these. Sampling in response to this incident was not carried out until the Public Health Team were notified of the incident five days after Scottish Water became aware of it. The delay in reporting this water quality incident to the Scottish Water PHT (Public Health Team) is unacceptable. Scottish Water took prompt and thorough actions to re-establish compliance. Recommended that Scottish Water review its criteria for reporting network events which impact on water quality in the West operational area to the PHT. Scottish Water actions: <ul style="list-style-type: none"> Carried out a Cleanliness index for Corsehouse Water Operational Area. Reviewed the burst history within the area of Rigg Street, Stewarton and promoted any investment needs. Agreed the scope of the cleanliness index work that could be carried out in the short term and promoted any longer term investment needs.

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Aug 2017 For approx. 2 months Classification: Significant	Carron Valley WTW, Falkirk, West Region	157,872	Algal toxin	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> • The incident was caused by the presence of high levels of geosmin, a substance produced by the decomposition of microorganisms, in the raw water reservoir. • It would appear that Scottish Water was unaware of a growing body of evidence that over a period of three weeks that there was an issue in the area supplied by Carron Valley WTW, due to deficiencies in the method of collating consumer contact data. • it is crucial that Scottish Water is able to adequately identify emerging issues from a common source, and should improve these processes accordingly as a matter of urgency. • Once Scottish Water was aware of the incident, operational staff acted in a systematic, well co-ordinated manner. • Comprehensive sampling across the water supply system was carried out, from the raw water, from different stages of the treatment works, and across the network, and logical actions were based on the analytical results. • Recommended sampling the Carron Valley WTW raw water for all risks identified by the DWSP, including nitrate and cyanotoxins. • Recommended developing an operational management plan for taste and odour related issues across Scotland. • Recommended Scottish Water review and revise sample point naming convention and sample locations for the Carron Valley drinking water system. • Recommended Scottish Water reduce the minimum levels at which phosphorus is recorded to ensure adequate monitoring and reporting of nutrients in raw surface waters. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> • Reviewed the raw water sampling programme to include routine measurements for total algae, chlorophyll a, geosmin and phosphorous. • Reviewed the agreed water quality event trigger values for small numbers of contacts across multiple DMAs (District Metered Areas) in a water supply zone. • Investigated and confirmed a permanent solution for PAC (powdered activated carbon) dosing at Carron Valley WTW. • Developed an operational management plan for taste and odour related issues at Carron Valley WTW.

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5 Sep 2017 For 2 days Classification: Significant	Tolsta Village Distribution Service Reservoir, Western Isles, North Region	450	Storage point failure – microbiology	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> No definitive cause was found for the <i>E. coli</i> detection was found during Scottish Water's investigation of this incident. It is unusual to find an <i>E. coli</i> detection without other coliforms or plate count detections which would be expected if environmental ingress was a factor. However, the service reservoir was found to be in poor condition. It failed a flood test and showed signs of ingress from cracks in the wall. Critical spare parts were not available on the Western Isles and had to be shipped in Scottish Water responded promptly and appropriately to the microbiological failure. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Emptied, cleaned and inspected the Tolsta SR (Service Reservoir). Investigated options to improve air valves drainage on the main supplying Tolsta SR Investigated the availability of relevant critical spares for Scottish Water's Western Isles assets. Arranged for a remedial investigation, immediate repairs and a scoping exercise for structural repairs for the Tolsta SR by an approved specialist contractor.
13 Sep 2017 For 5 days Classification: Serious	Shapinsay Distribution Service Reservoir, Orkney Islands, East Region	300	Storage point failure – microbiology	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> Scottish Water's investigation failed to identify conclusively the root cause of the sample failure. However, two issues were identified: firstly the possibility of sample contamination and secondly, problems with the integrity of the service reservoir which resulted in concerns that its condition might permit surface water ingress or insects and other contaminants to penetrate the storage space. Recommended ensuring there is a full and clear understanding of roles and responsibilities in the Scottish Waterborne Hazard Plan within Scottish Water staff and key stakeholders and agencies. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Carried out a flood test of the service reservoir roof and cleared the grass edge around the perimeter of the concrete roof slab. Confirmed the position of the leak under the service reservoir floor and sealed this. Investigated the suitability of the sample bottle transportation box. Sealed all the reinforced concrete core holes on the hatches.

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21 Sep 2017 For 12 hours Classification: Significant	Mannofield WTW, Aberdeen, East Region	286,597	Treatment failure – Turbidity	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by a restriction in the flow rate of the coagulant from one of the dosing pumps. Although the change in coagulant dose was small, the changing raw water quality and pH were key factors in triggering the loss of coagulation. Recommended ensuring key process monitor readings are reflective of SCADA (Supervisory Control And Data Acquisition) information during process failure and recovery investigations. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Reinforced the procedure to reduce WTW flows during loss of coagulation. Reinforced the need for clear communication between standby operators and the Public Health Team and ensure appropriate sampling is undertaken during events. Reviewed the water quality monitoring requirements at raw, final and service reservoirs outlets. Checked the integrity of the coagulant pump's dosing line and reviewed the coagulant dose level. Assessed a proposed detector's operability to give early warning of process change.
18 Sep 2017 For 18 days Classification: Serious	Turriff zone, Aberdeenshire East Region	3	Network failure – microbiology	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by the connection of a property to an untreated water main. The lack of control demonstrated over the internal process for provision of new connections, framework contractor and Scottish Water sub-contractors is of significant concern. Recommended putting in place quality checks to ensure any new connection provides drinking water of a quality reflective of that experienced in the supply zone. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Connected the customer to a HDPE (high-density polyethylene) potable main. Reinforced the process for advising of aborted connection attempts. Carried out refresher training to ensure awareness of track inspection requirements. Reviewed the case and made recommendations on service recovery to customers. Reminded all Scottish Water connection contractors that they must make reference to all drawings in their workpacks including GIS (Geographic Information System). Considered whether it is appropriate to sample new connections where raw water mains and potable mains of the same size / material exist in close proximity.

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28 Sep 2017 For at least 1.5 days Classification: Significant	Assynt zone , Highland, North Region	884	Network failure – turbidity and aluminium	DWQR comments and findings: <ul style="list-style-type: none"> The incident was caused by an NSO (Network Service Operator) who opened a valve too far when recharging a main without confirming this change with Scottish Water's Control Centre. The increased rate of flow scoured the main and the failure of an inlet valve on a downstream service reservoir further exacerbated the incident. Sampling was carried out on 28 and 29 September but no further samples were taken until the these results were received so the duration of the incident remains unknown. It cannot be demonstrated that the network was compliant until the resamples (which complied with regulatory standards) were taken on 4 October. Scottish Water actions: <ul style="list-style-type: none"> Ensured all North region NSOs attended Scottish Water's valve course and that they and Network team leaders are aware of the need to monitor flows during charging. Review the distribution competency framework assessment to ensure that valve operations by Asset and Field NSOs are covered. Reinforce the need for an approach to network operations in the North region that mitigates flow disturbance (including assessment & mitigation of discolouration risk).
12 May 2017 & 9 Jun 2017 For 4.5 months Classification: Significant	Greenock WTW, Inverclyde, West Region	79,673	Treatment failure – pH	DWQR comments and findings: <ul style="list-style-type: none"> The incident was caused by overdosing of sodium hydroxide due to a failure to adequately control and monitor caustic dosing. DWQR is concerned about the lack of procedures and governance surrounding the recording and reporting of water quality data from Greenock WTW. Record keeping & data verification were inadequate, failing samples were not investigated / reported. Recommended that Scottish Water ensures all events are reported to the relevant Health Boards and Local Authority Environmental Health teams as well as DWQR. Recommended that a thorough review is carried out into how tasks and water quality data for Greenock WTW are recorded and reviewed, how issues are escalated, and actions must be taken. Scottish Water actions: <ul style="list-style-type: none"> Investigated the failure to identify and record the inaccuracy of the controlling and monitoring pH meter through calibration and routine bench meter comparison. Reviewed the process involved in reviewing and escalating PCV breaches with respect to non-regulatory pH. Set up a project to monitor the pH of the water leaving Castlehill service reservoir.

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7 Oct 2017 For 7 hours Classification: Significant	Fort Augustus WTW, Highland, North Region	589	Treatment failure – loss of disinfection	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by a loose wire affecting both chlorine dosing pumps and insufficient programming to instigate an auto shutdown when both pumps failed simultaneously. Recommended ensuring that water treatment works with similar auto shutdown instrumentation do not fail on simultaneous loss of signal from both pumps. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Investigated the shutdown conditions and implemented the identified changes. Investigated the feasibility of installing additional water chlorine instrumentation. Interrogated the trends and event log to identify a potential timing discrepancy within the telemetry. Reinforced the need to adhere to the loss of infection escalation process. Reviewed and updated the treatment process diagram of Fort William WTW. Reviewed alarm set-points on telemetry and ensured correct implementation of this. Issued a reminder of the need to ensure sample bottles are within date. Ensure Escalation team leaders have undergone operator awareness training.
12 Nov 2017 For at least 2 days Classification: Significant	Camphill zone, Ayrshire, West Region	40,694	Network failure – manganese	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by the disturbance of manganese sediment in the network due to an increase in flow through the system, caused by the malfunction of the motorised inlet valve to an out-of-service tank at Giffordland Service Reservoir. Communications between Scottish Water teams led to effective decision making which minimised the impact of the incident to consumers. While comprehensive sampling was carried out, a significant number of samples did not have chlorine levels recorded; DWQR has therefore recommended staff training. Recommended that Scottish Water check that other service reservoirs that are abandoned or mothballed are adequately valved off or protected. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Fully closed the inlet spade valve to the out-of-service compartment at Giffordland service reservoir and locked this off. Arranged for the faulty inlet ball valve and rotork valve to be inspected by specialists. Investigated the feasibility of carrying out a cleanliness index survey and / or flushing of the network.

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27 Oct 2017 For approx. 10 hours Classification: Significant	Tarbert Argyll WTW, Argyll, North Region	1760	Treatment failure – aluminium	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> • The incident was caused by a PLC (Programmable Logic Controller) failure which in turn caused the failure of the Dissolved Air Flotation treatment process. This caused aluminium levels to rise and the treatment works began automatically to run to waste as it is programmed to do. • However, the run to waste facility has a long lag time which resulted in non-compliant water travelling beyond the run to waste point and continuing along the treatment pathway before being flushed through into the supply by a tankering operation. • The escalation team leader was seconded from a different part of Scottish Water and was unaware of where the tankered water was entering the supply and the impact this was having. • The incident was further compounded by issues with the aluminium monitor and discrepancies between online readings and readings obtained from bench monitors. • Due to a gap in sampling in the distribution system between 29 October and 2 November and the failure to analyse the sample of 2 November for aluminium, the duration of the incident and the length of time consumers' receive non-compliant drinking water remains unknown. • Recommended updating the process schematic for Tarbert WTW to include the position of the run to waster and tankering points. • Recommended identifying other sites where the chlorine contact tank is used for tankering and ensuring process schematics and disinfection strategies reflect this. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> • Investigated the installation of a run to waste facility to be added to flow filters to remove the potential organics spike following backwash. • Investigated discrepancies between bench and online instrumentation and lab samples. • Reviewed the emergency procedure for running the manganese contact tanks to waste on restart after a potential filter contamination event. • Reviewed the emergency procedure for the operation of the chlorine contact tank run to waste facility. • Reinforced the importance of water quality monitors and the need for associated tasks to be completed, particularly checking reagent levels. • Installed a permanent facility to tanker water directly to the clear water tank.

Event Date, Duration & Classification	Area	Estimate of population	Nature and cause of the event	Main actions and findings from the DWQR investigation
8 Nov 2017 For at least 4.5 hours Classification: Significant	Loch Calder WTW, Highland, North Region	26,862	Treatment failure – aluminium	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by a blockage in the polyelectrolyte dosing lines which was caused by a power blip which reversed the flow in the dosing line. The filter turbidities and aluminium began to rise as the floc broke down which caused them to go offline for backwashing. The high aluminium caused an automatic works shutdown. To produce enough water to backwash the filters the others had to be put back into production and the lack of run to waste means that the non-compliant water was put into supply. There is no run to waste at Loch Calder WTW, therefore it is essential that the required monitors and alarms are in place and correctly configured to prevent non-compliant water entering distribution. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Included “no flow” on polyelectrolyte dosing line shutdown logic and low flow alarm onto telemetry accounting for signal polarity. The Electrical & Mechanical Team investigated the effect of power cuts on flow meters. Reviewed and circulated the official escalation process of plant shutdowns to operators. Investigate options for installation of a run to waste facility. Review operational response & procedure for restarts following emergency shutdowns.
12 Dec 2017 For 19 hours Classification: Significant	Boardhouse WTW, Orkney Islands, East Region	4,851	Treatment failure – loss of disinfection	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by the draining down of the sodium hypochlorite drum which was substituting for the established chemical tanks in the standby disinfection process. There was no cognisance taken of the dose rate set on the emergency dosing system in relation to the quantity of sodium hypochlorite provided by the single drum and this was the cause of the unexpected emptying and cessation of dosing. Recommended reviewing task clearly set out a maintenance and testing regime within task scheduling to ensure that the system is maintained in a state of readiness. Recommended reviewing task scheduling arrangements to ensure the standby disinfection system is maintained in a condition where it can quickly be brought online. Recommended ensuring a means of obtaining water samples at all times from the SR. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Produced written procedures to follow when servicing chlorine analysers. Produced written procedures to follow when using the standby dosing system.

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16 Dec 2017 For 5 days Classification: Significant	Amlaird zone, Ayrshire, West region	10,585	Network failure – iron, manganese, aluminum and coliform	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by a burst trunk main. The burst was probably due to the age and condition of the pipe as well as ground movement due to heavy traffic and low temperatures. It is disappointing that the severity of the incident was not recognised. Its slow escalation led to a delay in the Incident Management Team being formed. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Updated the location of the burst main on Scottish Water's mapping system. Revised the Amlaird supply zone network contingency plans. Implemented Scotland-wide refresher training in the use of network contingency plans. Assessed whether the tankering resource capability is sufficient. Reviewed and disseminated the Water response learning points from the incident and the delay in sourcing materials, plant and fittings. Reviewed Scottish Water's current procedures for recharging mains in areas of significant mains sediment to assess whether these need to be amended. Surveyed the Amlaird zone's network valves and made these operable.
17 Dec 2017 For 29 hours Classification: Significant	Penwhirn WTW, Dumfries & Galloway, South region	19,536	Treatment failure – discolouration	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by failure of the battery operated uninterruptible power supply (UPS) to properly shutdown the WTW when the power failed. This prevented the standby generator starting and allowed some untreated water to continue to flow through partially closed valves. The disruption to the treatment process caused a temporary deterioration in water quality. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Increased the frequency of scheduled maintenance checks for the UPS. Checked that scheduled maintenance checks are in place for UPS / battery power packs at other South area sites. Simulated complete power failure following replacement of UPS batteries. Installed final water colour, turbidity and aluminium monitors and linked these to telemetry. Delivered a revised 'Toolbox Talk' to the South area treatment operators on "response to Comms failure". Reviewed the Drinking Water Safety Plan in the light of the above failures.

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26 Dec 2017 For 10 hours Classification: Serious	Carron Valley WTW, Falkirk, West Region	157,872	Treatment failure – loss of disinfection	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> • The incident was triggered by a power supply failure. However, the deteriorations in water quality and the failure to adequately disinfect the supply were caused by a failure of operational staff to follow site procedures and poor decision making. • Recommended Scottish Water advise DWQR of the steps it intends to take to prevent recurrence of the failure of operational staff to follow correct procedures. • Recommended updating the Drinking Water Safety Plan for the Carron Valley distribution system to correctly reflect the location of secondary disinfection in the distribution system. • Recommended reviewing aluminium, turbidity, and chlorine monitoring of Carron Valley WTW final water and ensuring these are made fit for purpose. • Recommended ensuring that online monitors are appropriately alarmed and connected to the SCADA (Supervisory Control and Data Acquisition) system. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> • Investigated the reliability of the power supply to Carron Valley WTW. • Re-issued a procedure that was not adhered to during the incident. • Investigated why the site-specific works and escalation procedures were not followed during this event. • Investigated the feasibility of linking final water turbidity monitoring to the SCADA (Supervisory Control and Data Acquisition) system recording the data. • Reviewed the current final aluminium water monitoring system to determine if there is an alternative to the system that is currently installed. • Reviewed the alarms associated with the chlorine dosing system to determine why these were missed by the operator and whether they can be enhanced.