

SUMMARY OF EVENTS AND INCIDENTS 2015

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	588	122	26	9	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/2015-incidents/>

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Event Date, Duration & Classification	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
<p>17 Jan 2015</p> <p>For 3 days</p> <p>Classification: Significant</p>	<p>Craighead WTW, Aberdeenshire, East Region</p>	<p>4,862</p>	<p>Treatment failure – aluminium and <i>Clostridium perfringens</i></p>	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> • The incident was caused by problems with an inlet valve and freezing and blockage of the raw water intake affecting the rate of flow of water through the works; • Craighead WTW is identified in Scottish Water’s investment plan to be replaced within the next five years but until that time DWQR expects Scottish Water to ensure the current works is operated and maintained to ensure drinking water quality standards are met. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> • Cleaned and inspected the clear water tank; • Investigated and improved the coagulation process; • Investigated current opportunities to limit the discharge of non-compliant water into the network; • Investigated potential improvements to the operation, control and monitoring of the works. •

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18 Jan 2015 For 1 day Classification: Significant	Back Tolsta WTW, Western Isles, North Region	1,431	Treatment failure - aluminium	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by failure of the coagulant dosing pump following a blown fuse, combined with alarm failures due to incorrect settings; Record keeping at the works was found to be unsatisfactory; The incorrect changes to alarm settings were due to human error but there was no site record of these changes being made. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Rectified incorrect alarm settings and carried out remedial work on telemetry system; Reinforced to the WTW operational team the importance of escalation and of good record keeping; Reviewed the change control process for site configured alarms and plant shutdowns; Investigated how to improve sample flow to coagulant pH monitor; Ensured plant shutdowns operate as intended and installed a phase failure relay on alum dosing system so that a fuse failure actuates plant shutdown.
25 Jan 2015 For 11 hours Classification: Significant	Mannofield WTW, Aberdeen, East Region	286,349	Treatment failure – aluminium and turbidity	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by failure of the coagulant dosing pumps due to chemical scaling and crystallisation restricting flow; The actions taken by Scottish Water staff were key in arresting what could have been a far more serious water quality incident; Recommended investigating options for works shut-down or diversion of untreated water to avoid contamination of already treated water. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Replaced pipework and parts to remove a build-up of chemical scaling that was causing flow restrictions in dosing lines; Investigated the cause of the build-up of chemical scaling; Produced a report on the coagulant dosing system identifying actions; Reviewed whether re-introduction of coagulant carrier water system was required; Investigated whether coagulation pH monitor was fit for purpose.

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27 Jan - 5 Feb 2015 For 10 days Classification: Serious	Rosebery WTW, Midlothian, South Region	133,458	Repeated detections of <i>Cryptosporidium</i>	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was due to a deterioration in raw water quality and increased flow overloading the water purification apparatus; DWQR was critical of Scottish Water in that the works had no reliable system for monitoring raw water colour and turbidity and recommended the installation of raw water quality monitors; Recommended upgrading the monitoring and control system and that Scottish Water should review the works' performance data on a monthly basis until that upgrade has been completed; Recommended producing a procedure for the shutdown/start-up of the raw water mains, including steps to minimise impacts on raw water quality. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Sealed all potential ingress points in treatment buildings and tanks; Installed additional <i>Cryptosporidium</i> monitors on inlets to the works and additional sampling to monitor filter performance; Reviewed performance of instrumentation and investigated options for potential replacement of instrumentation if necessary; Reviewed and investigated optimum raw water blends; Currently improving catchment management to minimise the number of oocysts entering raw water supplies.
3 Feb 2015 For 1 day Classification: Significant	Helensburgh Low CWT, Argyll & Bute, West Region	11,000	Loss of supply and discoloured water due to a burst main	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The action taken to repair the burst was prompt and well organised but the log sheets were not completed to a satisfactory standard; Scottish Water's Incident Management Team facilitated satisfactory internal communications throughout the event and anticipated potential problems which kept disruption to a minimum. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Reviewed and revised network contingency; Investigated and reported on the impact of a pressure spike on the burst; Inspected, serviced and re-commissioned the pressure regulation valve, checked the pressure meter for errors and considered additional air valves; Reissued instructions on tankering paperwork requirements to Scottish Water staff and contractors involved in tankering operations.

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19 Feb 2015 For 16 days Classification: Significant	Glenlatterach WTW, Moray, East Region	1,466	Treatment failure – aluminium and turbidity	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by a software problem affecting the pH control process, compounded by incorrect alarm settings. Had the standby pH control system been available, it is likely the software problem would have been identified earlier; Recommended reassessing the urgency assigned to repair of key process equipment to limit the risk of overall process failure. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Checked and confirmed all alarms were correctly activated; Investigated the operation of the inlet valve in relation to the incident; Investigated whether the duplicate lime slurry systems could operate fully as duty standby to both dosing pumps; Investigated works ramp down and diversion to waste sequence in the event of a water quality failure; Investigated potential for contingency within the pH control system; Reviewed the installation of coagulation pH measuring electrode.
23 Feb 2015 For 14 days Classification: Significant	Graemsay SR, Orkney Islands, East Region	26	Loss of supply due to a burst in a sub-sea pipeline	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> DWQR was content with Scottish Water's incident response and remedial actions. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Maintained and checked supplies through tankering operations and bottled water; Repaired the leak in the pipeline, swabbed and flushed it and analysed water samples to check it was clear of any contamination; Reviewed maintenance schedule and contingency plans for the Graemsay / Hoy sub-sea pipeline; Identified all potable water sub-sea pipelines in use by Scottish Water and reviewed inspection and maintenance plans for these;

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11 Mar 2015 For 2 days Classification: Significant	Bradán C Zone, Ayrshire, West Region	4	Laboratory analysis error	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by an analytical error that led to the issuing of a boil water notice and provision of an alternative supply; Recommended highlighting expectations on staff in relation to handling process failures more widely than the Microbiology Team. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Emphasised expectations on staff regarding handling process failures to the individual concerned and also the entire Microbiology Team.
11 Mar 2015 For 10 months Classification: Serious	Glenfarg WTW, Fife, East Region	216,000	Management process failure – lead	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by the switching off of orthophosphate dosing pumps which remained off-line for ten months due to problems with integrity of the acid tank bund; Scottish Water is required to ensure that interruptions to dosing are minimised and of short duration but in this instance failed to put in place temporary measures to provide continuity of this protection; A more rigorous approach to the continual maintenance and optimisation of orthophosphate dosing should be taken in future; Notice was given to Scottish Water that enforcement action was being considered on the provisions to achieve compliance with the lead standard. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Reviewed and rolled out a process for optimisation of plumbo-solvency control; Rolled out orthophosphate dosing alarms process to Operations teams; Clarified the requirement to report interruptions to orthophosphate dosing of more than seven days to DWQR; The measures put in place to ensure the requirements of the regulations are met provided reassurance that the deficiencies in procedures have been addressed and a more rigorous approach to the continual maintenance and optimisation of orthophosphate dosing should now be taken.

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17 Mar 2015 For 1 day Classification: Serious	Stoneybridge WTW, South Uist, Western Isles, North Region	1,558	Loss of supply due to issue with raw water main	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by ineffective air valves on the raw water supply main following re-charge after maintenance work; Recommended that Scottish Water develop a policy for air valve maintenance and replacement. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Checked and replaced existing air valves on raw water main and added new valves where required; Corrected scaling on clear water tank levels and associated alarms; Repaired remote monitoring outstation at Lochboisdale; Cleaned clear water tanks and service reservoirs; Working to improve planning, contingency development, escalation and communications when undertaking operationally delivered planned work.
30 Mar 2015 For 4 days Classification: Significant	Glenconvinth WTW, Highland, North Region	5,483	Treatment failure – ammonium	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by failure of a dosing pump which allowed ammonium to siphon through the dosing line; On becoming aware of the problem, Scottish Water responded appropriately and took the necessary steps to contain the situation; Had ammonium alarms been connected to the monitoring system, the problem would have been detected more quickly; Recommended ensuring that direct feed properties are considered for all future reactive sampling plans. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Connect the ammonium monitor to the monitoring and control systems at Glenconvinth WTW and set appropriate alarm levels for the monitor; Revised onsite equipment isolation procedure to include valved hydraulic isolation of dosing pumps; Checked and serviced the ammonium dosing pumps and loading valves and repaired these as required; Fitted valves to the ammonium dosing lines as additional protection Trialled a bench test for total ammonium.

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3 Apr 2015 For 1 day Classification: Significant	Ringford WTW, Dumfries & Galloway, South Region	4,557	Disinfection process failure	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by a blown fuse within the chlorine controller, resulting in dosing pumps shutting down and consequent failure of the chlorine alarm system; Ringford WTW does not supply any properties directly and the chlorine levels at the Muirhead service reservoir were not unduly affected by this incident. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Shut down the works, replaced the blown fuse and reinstated chlorine dosing; Modified the system so that an alarm can be generated from the chlorine controller or from the chlorine sensors; Installed and tested a new low chlorine shutdown system.
25 Apr 2015 For 3 days Classification: Significant	Durcha SR, Sutherland, North Region	170	Disinfection process failure	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by syphoning from a chlorine storage drum during operation of the reservoir by-pass; Recommended that all Scottish Water assets with the same or similar bypass flow control valve be configured to prevent syphoning in worst case bypass conditions; Recommended Scottish Water establish a robust procedure to ensure all event outcomes are notified to DWQR and other stakeholders within a suitable and prompt timescale. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Replaced the loading valve in line with manufacturer's installation recommendations and improved signage in relation to flow control valve; Reviewed sampling kits, protocols and training for tanker drivers in relation to taking chlorine residual readings; Introduced signage at all similar bypass valves and process for liaison with treatment staff; Investigated upgrading the secondary chlorine dosing unit; Installed a pressure gauge to allow valve operating pressure to be accurately ascertained and set it to prevent syphoning;

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20 May 2015 For 3 days Classification: Significant	Clatto WTW, Dundee, East Region	179,600	Treatment failure – turbidity	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by the failure of the mixing and diffusion; apparatus for the coagulant dosing unit and a subsequent significant reduction in applied coagulant dose; Scottish Water staff responded quickly to the initial alarm and took appropriate action to restore coagulant dosing; <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Replaced the coagulant dosing mixing and diffusion unit; Changed aluminium sulphate flexible tubing supply lines; Produced procedure to ensure standby dosing system is tested before taking the coagulant dosing mixing and diffusion unit offline; Investigated and reported on the potential for automatic works shut down and provision of an automatic standby dosing system when the coagulant dosing mixing and diffusion unit fails; Investigated whether an alarm can be activated from the dosing and mixing unit.
1 Jun 2015 For 3 days Classification: Serious	Daer Camps B Zone, Lanarkshire, South Region	18,363	Discoloured water	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by a combination of high water flows which led to disturbance of pipeline deposits; Scottish Water showed a disregard for the magnitude and effect of the inlet flow to the service reservoir and there was a lack of rigour in checking the system following the commencement of filling. DWQR considers this incident to have been entirely avoidable; Recommended review of procedures relating to reservoir cleaning and to repair and maintenance of flow control valves; Recommended review of procedures relating to communications in monitoring asset performance following maintenance interventions. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Identified and clearly marked, both in records and onsite, the nature and 'direction of closure' of the non-standard scour valve; Delivered the 'check, actuate, listen, and monitor' initiative to the South Region network service operators.

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17 Jun 2015 For 3 days Classification: Major	Balmore C Zone, Lanarkshire, South Region	15,000	Contamination of mains network by hydrocarbons and discolouration	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> DWQR has made a report to the Procurator Fiscal and will publish a full report on the incident once any legal action has concluded. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Implemented a 'don't drink, cook or wash' restriction on areas impacted by hydrocarbon contamination; Issued notifications and leaflets warning consumers of the water contamination; Supplied bottled water to affected customers; Investigated the source of the contaminants.
1 Jul 2015 For 3 days Classification: Significant	Ullapool WTW, Highland, North Region	1,702	Contamination of tankered water – coliforms including <i>E. coli</i>	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> A shutdown of the WTW due to a lightning strike necessitated the use of tankered water to maintain supply. The source of the contamination has not been established but it may be due to the fact that the tankers were not equipped with sealed boxes to protect the inlet/outlet couplings from contamination; Recommended consideration of sampling at consumers' taps during prolonged tankering operations to validate sampling from tankers; Recommended review of tankering procedures relating to sample failures and reintroduction of tankers to service following sample failure; Recommended review of requirements for sampling at reservoirs and clear water tanks during prolonged tankering operations. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Highlighted to Operational team leaders the need to ensure that records and log sheets are completed properly and any non-compliances logged; Highlighted to tankering contractors the need to record actions during an incident; Ensured that replacement tankers have a sealed box covering all inlet and outlet couplings which protect them from contamination.

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29 Jul 2015 For 9 hours Classification: Significant	Coulter WTW, Lanarkshire, South Region	27,550	Treatment failure - aluminium	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by a deterioration of raw water quality which was not detected early enough due to a lack of alarmed instrumentation and resulted in a loss of optimisation of the coagulation process; There was an unacceptable breakdown in document control in relation to the procedure for dealing with raw water turbidity or colour alarms; Recommended installation of alarmed raw water turbidity and final water aluminium monitors at Coulter WTW; Recommended review of alarm settings for the raw and flocculated water pH monitors at Coulter WTW; Recommended review of all procedures relating to water quality at Coulter WTW including their governance and document control. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Installed raw water colour monitoring and alarm; Reviewed alarm settings
10 Aug 2015 For 1 day Classification: Significant	Milngavie WTW, West Region	509,000	Treatment failure – aluminium	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by an air-lock restricting flow to the water pH meters which increased lime dosing, affecting the coagulation process; Subsequent use of a faulty handheld pH probe resulted in the lime overdose and readings on aluminium monitors being disregarded; DWQR recommended that training should be provided in the use of handheld pH probes. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Replaced the bench pH meter probe and reviewed the frequency of, and developed a procedure for, replacing bench pH meter probes; Replaced conditioned water sample pumps to prevent air locking and replaced the sample pumps' common flow switch; Reviewed the frequency of cleaning of the conditioned water sample line suction filter; Reviewed the use of the standardisation procedure for pH sensors; Investigated whether pH sensor impedance can be used to determine the longevity / effectiveness of the bench probe.

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11 Aug 2015 For 2 months Classification: Significant	Corsehouse Zone, Ayrshire, West Region	7,104	Catchment activity – contamination of reservoir by a herbicide	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by spraying of a herbicide for controlling growth of rushes in the catchment for the Corsehouse reservoir; The herbicide was applied appropriately, well away from water-courses, but high summer rainfall probably contributed to increased run-off into the reservoir; Corsehouse WTW lacks a treatment process to remove the herbicide from drinking water; Recommended reviewing the procedure for notification of health boards and local authorities in the event of distribution zone failures. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Changed the source water blend at Corsehouse to reduce the quantity of raw water intake from the Corsehouse catchment; Continued to monitor the event until water quality had returned to normal; Researched alternative rush control methods and discussed these with landowners within the Corsehouse WTW catchments; Reviewed the Corsehouse pesticide risk score and monitoring plan.
7 Aug 2015 For 7 days Classification: Significant	Turret A Zone, Stirlingshire, West Region	3,484	Loss of supply and discoloured water due to a burst main	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by a tanker driver failing to open a valve causing low flow in the network and subsequent disturbance of pipeline deposits when the main was recharged following the repair; Scottish Water responded appropriately to the initial burst and took appropriate and timely action to resolve the event. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Provided tankered water and bottled water to affected customers; Reminded tanker drivers of requirement to follow set procedures for opening fire hydrants; Reviewed the Turret Zone burst contingency plans; Assessed the condition of the valves on the trunk main; Determined the scope of the assessment required to determine the condition of the affected trunk main.

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20 Aug 2015 For 1 day Classification: Significant	Tullich WTW, Argyll, North Region	12,340	Treatment failure – trihalomethanes	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by low flow through the water cooling pumps serving the ozone system which resulted in the ozone generators shutting down and a resultant exceedance of the trihalomethanes standard; No samples were taken at consumers' taps – it is likely these would have shown trihalomethane failures at consumers' taps; An Undertaking is in place for Tullich WTW to ensure compliance with the standard for trihalomethanes by 2017; Recommended briefing the Public Health Team on the importance of ensuring timely samples are obtained from consumers' taps in the event of any treatment process failure. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Replaced all cooling water pumps and checked all cooling water flows and air flows; Displayed sheets showing correct coolant flows at each gauge; Ensured task schedules for ozone cooling pumps include flow checks; Installed and optimised aeration and monitored parameter closely.
26 Aug 2015 For 4 days Classification: Serious	Black Esk Zone, Dumfries & Galloway, South Region	40	Contamination of mains network by third party – coliforms including <i>E. coli</i>	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by the existence of an illegal cross connection between a pumped private farm borehole supply and the public supply network resulting in significant microbial contamination; Scottish Water carried out appropriate investigation and sampling of the supply in the distribution system to establish the extent of the problem and to confirm its resolution. They also ensured timely and appropriate notifications were provided to health and regulatory stakeholders. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Delivered a 'don't drink, cook or wash' notice to affected properties; Carried out sampling on the mains supply; Permanently disconnected the illegal cross connection from the public water mains; Flushed and disinfected the mains to remove contaminants; Considered preparing a prosecution case for byelaws contraventions.

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28 Aug 2015 For 6 days Classification: Serious	Callanish DSR, Western Isles, North Region	385	Contamination due to a faulty tank repair - coliforms including <i>E. coli</i>	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> • This incident was caused by the structural integrity of the service reservoir due to a poor repair which allowed ingress of water collecting on the roof surface of the tank; • While the less than optimal chlorine levels leaving the WTW did not significantly contribute to the failure, the incident has highlighted the need for better control of chlorine residuals across the distribution system; • There should be thorough inspections of any repairs prior to sign off. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> • Issued boil water notices and bottled water to affected properties; • Bypassed and drained Callanish service reservoir and reviewed options for its repair; • Adjusted chlorine dosing at West Lewis WTW to ensure stable dosing above a certain level; • Reviewed total chlorine levels following installation of a new chlorine probe at West Lewis WTW and determined whether further adjustment was required; • Undertook a full operational and process review of West Lewis WTW to optimise the treatment process. • Stressed the importance of adequate chlorine control to West Lewis WTW operatives

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3 Sep 2015 For 5 days Classification: Significant	Bridge of Horn SR, Sutherland, North Region	12	Coliforms including <i>E. coli</i> – probable contamination of final water sample tap	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The likely cause of this incident was contamination of the final water sample tap located in a grazing area containing animal droppings; The sampling team failed to pick up the potential for contamination at this site despite a procedure for this being in place; Investigations in the elevated colony counts are ongoing. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Delivered boil water notices and bottled water to affected properties; Installed a new tap having greater protection against contamination at an alternative location; Develop a process for regular review of bacterial colony counts at the treatment works and service reservoirs; Undertake super chlorination of both cells of the service reservoir and reviewing water quality after this is carried out; Continue to monitor water quality across the whole Backies water supply system.
3 Sep 2015 For 2 days Classification: Serious	Balmore Carron Valley Zone, Lanarkshire, South Region	29,307	Loss of supply and discoloured water	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> The incident was caused by a burst main and consequent disturbance to sediments within the network; Scottish Water responded promptly to the notification of loss of supplies and took appropriate steps to maintain and restore supplies but there were deficiencies in relation to the extent of sampling including a failure to measure the chlorine residual in the mains repair sample; Recommends staff should be reminded of sampling procedures in relation to measurement of chlorine and in relation to resampling response to sample failures occurring during water quality incidents so that restoration of water quality may be demonstrated. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> Determined the scope of assessment required to determine condition of affected trunk main; Reviewed Balmore Carron Valley Zone burst contingency plan.

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3 Sep 2015 2 months Classification: Significant	Teangue Skye Zone, North Region	69	Treatment failure – trihalomethanes	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> • The incident was caused by the naturally high organic content of the source water which exceeded the capacity of the WTW to cope with this. It was compounded by the activated carbon filters which remove organics being taken offline for cleaning; • Due to the high likelihood of formation of trihalomethanes, it is important that Scottish Water develops a sound understanding of the extensive distribution network served by Teangue WTW. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> • Halved the volume of water stored in the clear water tank; • Updated the WTW schematic to include activated carbon filters and air diffusers; • Cleaned the Tarskavaig service reservoir and confirmed plan for cleanliness index work on Teangue water supply zone; • Assessed the condition of apparatus in the network and flushing feasibility within Tarskavaig; • Install chloramination at the WTW; • Review the Drinking Water Safety Plan.

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23 Sep 2015 For 3 days Classification: Significant	Suainaval Western Isles Zone, North Region	346	Contamination due to failures in integrities of tanks – coliforms including <i>E. coli</i>	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> • It is likely this incident was due to failures in the integrities of the clear water and balancing tanks at Suainaval WTW; • Storage tank cleaning had been carried out on an ad hoc basis rather than according to a routine scheduled maintenance plan; • Prior to the event, the works had been operating with a low chlorine contact time so disinfection may have been compromised; • Scottish Water has been asked to provide disinfection strategies for all their treatment works to ensure deficiencies are addressed using a risk assessed basis; • Recommended that flap valves should be fitted to tank overflows; • Recommended investigating the need for flap valves on overflow outlets to minimise ingress in exposed locations. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> • Issued a 'boil water' notice to affected properties and bottled water to vulnerable consumers; • Dosed clear water tank at the WTW and the service reservoirs with chlorine and increased the chlorine set point; • Reactivated auto shutdown for low chlorine levels; • Installed mesh protection on the clear water tank and all associated service reservoir tank overflows; • Repair the balancing tank and then clean and inspect the balancing, clear water and service reservoir tanks; • Ensure regular inspections of the clear water tank; • Develop a process for regular review of colony counts at WTWs and service reservoirs; • Review frequency and content of service reservoir maintenance scheduled tasks to ensure regular checks are undertaken.

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<p>11 Oct 2015</p> <p>For 30 hours</p> <p>Classification: Significant</p>	<p>Torridon WTW, Highland, North Region</p>	<p>67</p>	<p>Disinfection process failure</p>	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> • The incident was caused by an airlock in the disinfection dosing line combined with failure of the back-up processes designed to safeguard chlorine dosing or shutdown the WTW in the event of a chlorine dosing failure; • Despite the chlorine dosing pump being offline for four months, a replacement had not been ordered. It is crucial that maintenance requests for critical pieces of equipment are reported and escalated promptly; • It is inexplicable that the automatic shutdown failsafe was disabled since this is a vital mechanism in a treatment works. This indicates an issue with training and supervision; • All microbiology tests results were satisfactory; • Recommended investigating the cause of the airlocks on the chlorine dosing line; • Recommended implementing a system of regular checking for disabled alarms and auto shutdowns. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> • Reactivated auto shutdown alarm for low chlorine levels; • Installed standby chlorine dosing pump; • Investigated installation of an alarm to indicate if auto shutdown has been disabled; • Reviewed and restructured the local Operational team; • Reinforced to Operational teams the importance of following the process for reporting issues with process critical equipment; • Reviewed the turbidity emergency action level sheet.

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<p>12 Oct 2015</p> <p>For 8 days</p> <p>Classification: Serious</p>	<p>Kyle of Lochalsh WTW, Highland, North Region</p>	<p>2,683</p>	<p>Disinfection process failure</p>	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> • The incident was caused by a failure to reset the ammonium dosing system to automatic following completion of scheduled maintenance but was compounded by numerous further errors resulting in the chloramination failure at the works going undetected for seven days; • There were no breaches of the microbiological standard; • It is likely that there may have been failures for trihalomethane disinfection by-products but these were not tested for; • Recommended that operator staffing levels should be reviewed; • Recommended that further investigations be conducted into the reasons for the failure; • Recommended ensuring alarms are correctly programmed and linked to the monitoring system when new monitors are installed; • Recommended checking that all similar flow meters at other sites are not set to show a flow when idle or offline. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> • Checked and serviced the flow meters on the ammonium dosing pumps and updated site task schedules to include weekly checks on flow meter operation throughout the process; • Configured alarm to show if an ammonium dosing pump is left on manual; • Trained operators on the use and calibration of ammonium and chlorine monitors and reminded them of the importance of site task schedule completion; • Fitted a new post ammonium free chlorine probe; • Set the site ammonia monitor set points on telemetry to align with emergency action level sheets.

Event Date, Duration & Classification	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
<p>19 Oct 2015</p> <p>For 10 days</p> <p>Classification: Significant</p>	<p>Suainaval WTW, Uig, Western Isles, North Region</p>	<p>346</p>	<p>Treatment failure – ammonium</p>	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> • The incident was caused by closure of the clear water balancing tank outlet which allowed the clear water pumps to run dry. The resultant vacuum, combined with failure of the ammonium sulphate loading valve, allowed ammonium to siphon into the pumped main and up to the clear water tank; • Recommended ensuring the ammonium monitor is linked to the overall monitoring system and that appropriate alarm levels are set; • Recommended scoping and planning installations of final water ammonium monitors at works where ammonium sulphate is dosed; • Recommended identifying sites where ammonium sulphate is dosed on the suction side of clear water tank pumps and determining the scope of work required to rectify the potential associated risks. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> • Replaced the loading valve on the ammonium dosing system; • Installed an ammonium monitor; • Labelled tank valves to include the valve position and reinforced the need to check valve status before carrying out valving operations; • Relocated dosing line injection point to the delivery side of the pumps; • Reinforced requirement to complete all parts of maintenance schedule tasks; • Produce an on-site procedure covering draining down of clear water balancing tanks.

Event Date, Duration & Classification	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
<p>20 Oct 2015</p> <p>For 6 days</p> <p>Classification: Serious</p>	<p>Aultbea WTW, Highland, North Region</p>	<p>629</p>	<p>Treatment failure – pH</p>	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> • The incident was caused by incorrect limestone dosing combined with a subsequent alarm failure. The pH fault went unnoticed and there was a consequent failure to escalate the problem which shows a considerable lack of staff awareness and training; • The absence of a procedure for replenishing limestone in the contactors is unacceptable; • The chlorine contact time, which is crucial to ensuring the water is adequately disinfected, fell below the minimum requirements as set out in Scottish Water's Disinfection Policy for a period of three days; • Recommended that all monitor labelling at Aultbea WTW should be reviewed and updated. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> • Placed a 'do not use for drinking/cooking' restriction on the supply and delivered bottled water to affected properties; • Developed and implemented a formal procedure for changing pH correction media; • Reviewed task scheduling to include check on depth of pH correction media on membrane plants; • Investigated alarm annunciation at Aultbea WTW to ensure all alarms are highlighted on site and visible to operators; • Reviewed procedure for escalation of final water alarms; • Reviewed operator training requirements and competencies including the working onsite procedure; • Reinforced the operational escalation process and procedure Scotland-wide.

Event Date, Duration & Classification	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
<p>15 Nov 2015</p> <p>For 2 days</p> <p>Classification: Significant</p>	<p>Balmichael WTW, Arran, West Region</p>	<p>3,986</p>	<p>Treatment failure – manganese and iron</p>	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> • The incident was caused by high turbidity levels in raw water entering the works and creating high cross membrane pressures resulting in reduced production. A decision was taken to bypass membrane treatment and allow unfiltered water to enter distribution for over twenty-nine hours; • No contingency plan was in place to anticipate this event; • The decision to bypass the membrane filtration system was not escalated in accordance with set procedures. This resulted in a failure to implement the correct protocols and to communicate with, and gain advice from, the public health team. This highlights major deficiencies in training and compliance with procedures; • Recommended reviewing the capacity of the clear water tank and downstream storage to ensure sufficient resilience. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> • Reviewed training requirements for operators and identified and addressed gaps in training; • Developed a contingency plan for this type of event; • Reminded staff to ensure chlorine data is recorded against bacto samples and included with sampling paperwork; • Replaced generic membrane alarm with appropriate individual alarms so that faults may be diagnosed and resolved correctly; • Reviewed alarms on loss of Ultra Filtration modules; • Investigate raw water quality and determine capability of WTW; • Identify appropriate instrumentation and controls to allow assessment and management of raw water quality; • Ensure staff are fully briefed on requirements for procedure for bypassing solid-liquid separation process; • Commenced handheld turbidity monitoring on each borehole.

Event Date, Duration & Classification	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
6 Dec 2015 For 3 days Classification: Significant	Acharacle WTW, Highland, North Region	415	Loss of supply and storage point failure – turbidity	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> • The incident was caused by a power failure at the treatment works combined with the absence of a power failure alarm; Draining and refilling of the clear water tank disturbed sediment in the tank; • There were no breaches of the microbiological standard; • Scottish Water failed to properly investigate and follow up this event as the treatment works appeared to be operating normally due to malfunctioning of the monitoring system; • Scottish Water staff should have realised they were not receiving data from remote monitoring of the works. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> • Cleaned the clear water tank; • Investigated why no mains power failure alarm was received; • Reviewed the procedures around receipt of alarms and ensured staff awareness of new monitoring / response procedures; • Reviewed and revised Scottish Water failure response strategy • Reiterated to operator the importance of undertaking and recording onsite bench tests to monitor water quality following process reinstatement; • Briefed staff on the circumstances of this event and the functionality of system alarms.

Event Date, Duration & Classification	Area	Estimate of population affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
<p>8 Dec 2015</p> <p>For 3 days</p> <p>Classification: Significant</p>	<p>Clatto East RSZ, Dundee, East Region</p>	<p>30,855</p>	<p>Discoloured water</p>	<p>DWQR comments and findings:</p> <ul style="list-style-type: none"> • The incident was caused by the opening of a backfeed supply during maintenance work on the mains and the resultant high flow rates causing disturbance to deposits; • Insufficient flushing of the mains was carried out prior to opening the valve and insufficient sampling was carried out to monitor the extent of the problem within the distribution system; • It is clear there was an underlying incomplete understanding of the operation of this particular distribution system; • There was a failure to record valve closures and notifications in breach of Scottish Water procedure, an issue highlighted by DWQR in the past. However, Scottish Water has now introduced a new process to address these concerns and DWQR is reassured that this should bring greater rigour to control over mains intervention work; • DWQR recommended that Scottish Water should review their sampling response to discolouration events and provide refresher training for Operations, Public Health and Sampling teams. <p>Scottish Water actions:</p> <ul style="list-style-type: none"> • Conducted cleanliness testing to determine if a planned network flushing programme should be extended to cover the affected areas; • Considered which network investigations might confirm why there was restricted flow from the trunk main; • Reinforced requirement to complete post operational review section of the Distribution, Operations and Maintenance Strategy impact assessment form and share learning points with staff.