

Incident Summary

Camphill RSZ (Gorbals PS) pH Exceedances December 2022 - May 2023 **Event Category: Significant**

DWQR Inspector:
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Event No. 13305

On the 24th March 2023 a routine scheduled sample from in the Gateside Water Supply Zone (WSZ) failed the upper pH standard, and another sample in the Milngavie Gorbals WSZ also failed on the 28th March. Two resamples in the Gateside WSZ on the 29th March also failed, prompting Scottish Water's Public Health Team (PHT) to check pH sample data in other parts of the network supplied by Gorbals treated water pumping station (Gorbals Drumboy TWP). It was found that there had been a total of eight pH failures between December 2022 and March 2023.

The water supply system in the areas affected has been developed to give greater resilience for continuity of supply, and work in this area is ongoing. To facilitate this ongoing work, Gorbals Drumboy TWP was taken offline for planned shutdowns between the 9th September and the 6th December 2022 and again between the 6th January and the 2nd March 2023. During these times, the service reservoirs that were usually supplied from Gorbals Drumboy TWP were fed by Whinpark TWP, which is supplied by Bradan WTW. After the 2nd March, Gorbals and Whinpark TWPs were frequently removed from and returned to service depending on the requirements of the resilience project. All of the eight pH failures from December 2022 to March 2023 occurred when the Gorbals Drumboy TWP was supplying the areas where the samples were failing. Gorbals Drumboy TWP has sodium hypochlorite and ammonium sulphate dosing systems for chloramination, and sodium hydroxide (caustic) for pH correction.



The PHT notified Treatment Operations and Network staff of their findings, and on the 4th and 6th of April, Operations and Process Science staff carried out investigations which found:

- Online pH monitors were giving incorrect pH results; these were acid washed and calibrated and they then worked properly.
- A sample was taken and sent off site to Scottish Water's laboratory – it was pH 9.7, the value that the site should automatically shut down at.
- When the pumping station was shut down, there was a delay in sodium hydroxide dosing stopping.
- The water supplied to the pumping station from Milngavie WTW was at a higher pH than when the pumping station had originally been commissioned due to process optimisation at Milngavie WTW. While the pumping station sodium hydroxide dosing system should have been able to automatically adjust for this, the pH monitors were reading too low a value, causing excess sodium hydroxide to be dosed, leading to high pH levels.
- The pH setpoint was set high at 9.2 to reduce potential risk of taste and odour complaints, and the trigger for site auto shutdown on pH was 9.7 (since reduced to pH 9.2).
- Sodium hydroxide usage had unknowingly increased as the sodium hydroxide pump stroke had increased from 15% to 35%.
- There was no emergency action level (EAL) sheet for the site.
- There were insufficient procedures for instrumentation.
- There was insufficient documentation detailing the site settings and alarms from the commissioning of the site.
- pH signals on the site were inhibited when sodium hydroxide dosing was switched off so pH levels could only be viewed when sodium hydroxide dosing was active.

Sodium hydroxide dosing was switched off by Operations staff, and a sampling programme showed that as water moved through the network, pH levels dropped to within regulatory limits. There have been no issues in the network as a result of dosing being stopped.

A further four samples taken by Scottish Water contractors when repair work was being carried out at a nearby Scottish Water tank were found to have also failed the pH standard between December 2022 and January 2023. These failures were not investigated by Scottish Water as they were registered as external commercial samples at the laboratory and as such were not reported to the PHT.



The cause of the incident was overdosing of sodium hydroxide at Gorbals Drumboy TWP.

This was caused by:

- Inaccurate pH readings from the site.
- No sample point at the site and no laboratory verification of water quality.
- No response to the initial four sample failures by Scottish Water contractors.
- Inadequate risk assessment of the supply system.

The event has been categorised as significant. Scottish Water has identified fifteen actions which DWQR accepts are appropriate and will monitor to ensure they are completed prior to signing off the incident. DWQR made five additional recommendations.

