

Incident Summary

Afton WTW Orthophosphoric acid dosing December 2020

DWQR Inspector:
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Event No. 11482

Event Category: Significant

On 24 December 2020, the standby Operator for Afton WTW was called to the site by the Intelligent Control Centre (ICC) at 22:00, as both the duty and standby orthophosphoric acid dosing pumps had failed. It was found that the pressure switch feeding the pumps, which is designed to stop dosing if pressure drops, was faulty. The Operator could not restart the dosing pumps without a repair to the pressure switch, so the Operator put the pressure switch 'off scan' on the SCADA (computer display) system. This tricked the control system into seeing the pressure switch as healthy, thereby allowing the orthophosphoric acid dosing to restart. A note was made in the site diary of the 'off scanning'.

On Sunday 27 December at 10:00 there was a power failure at the site, and so the treatment works was run from the generator until mains power was restored. The power failure caused the transfer sequence of orthophosphoric acid from the bulk storage tank to the day tank to revert from automatic to manual – the standby Operator was aware of this and returned the transfer sequence to automatic. However, the transfer sequence did not start as expected and dosing did not restart. A manual restart was required, which the standby Operator was unaware of as it had not happened before, and there were no signals on SCADA to indicate that there was an issue. The transfer pumps only run for three minutes every evening at 18:00, and since the pumps dosing orthophosphoric acid into supply were operational, no alarms were triggered on SCADA. The transfer of orthophosphoric acid from the bulk to the day tank could not happen from this point, unknown to the Operators. It has been estimated that there is a capacity for 2-3 days of dosing in the day tank.

The standby Operator informed the daily site Operator on Tuesday 29 December that the pressure switch had been 'off scanned' five days previously. The Operators set up a local alarm on the SCADA system for low flow on the orthophosphoric acid dose rate flow meter, but the alarm was not tested. Since no acid was being transferred from the bulk tank to the day tank, once the day tank had been emptied, no further dosing could take place. The local alarm that had been set up by the Operators did not work, and since the pressure switch had been 'off scanned', the dosing pumps continued to run, although they were running dry. The day tank level sensor alarm was later found to be faulty. From site flow trends, dosing of orthophosphoric acid into supply stopped at 13:30 on Tuesday 29 December.

On Thursday 14 January 2021 at 11:00, the site Operator conducted a phosphate bench test on the final water which showed that there was no phosphate in the supply. The transfer and dosing pumps were reset, and dosing was started – the situation was escalated at this stage. There had been no orthophosphoric acid dosing for 16 days.



The root cause of the incident was a failure to repair the pressure switch on the orthophosphoric acid dosing system, inadequate alarming of the system and a failure to monitor phosphate levels from the site or the network.

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

