

# Incident Assessment

Savalbeg WTW,  
Lairg  
Elevated Aluminium  
1 April 2014

DWQR Inspector:  
Matt Bower

Event No. 5921

**Event Category: Significant**

## Summary of Incident

Savalbeg is a small water treatment works serving the area around Lairg in Sutherland. The treatment process is relatively unusual in that it consists of two fluidised filters known as Dynasands. The plant operates effectively and water quality is generally very good, although water demand is an issue and the plant operates at the very top end of its design capacity. The plant uses an aluminium flocculant and, following successes with the alternative polyaluminium chloride flocculant (PACL) on similar plants elsewhere in Scotland, it was decided to trial running the works using this.

Following preliminary work to establish chemical doses and install new sodium carbonate pumps, three process scientists arrived on site to commence work to change the flocculant to PACL. Unexpectedly, no plant operators were on site as they had been called out during the previous night, yet the scientists continued with the work in their absence.

During the flocculant changeover, aluminium concentrations increased rapidly, leading to the abandonment of the work and the running of the works to waste. Unfortunately the procedure to run to waste was not entirely effective and did not prevent concentrations of aluminium in the water supplied to consumers from exceeding the regulatory standard. However, the next day, with the plant back on line, the trial was recommenced. Aluminium concentrations again exceeded the regulatory standard, and the trial was stopped once again, with the plant diverted to waste. It was also found that the incorrect coagulant dose had caused blocking of the Dynasand filter media, necessitating work to restore them.

There was a delay in reporting the issue to Scottish Water's Public Health Team so that it could be properly escalated and any risks assessed.

## DWQR Assessment of Cause of Incident

Although of an unusual design, Savalbeg WTW usually performs reasonably well in terms of water quality, partly thanks to the diligence of site operators. The intention of the trial was to change to PACL flocculant to improve performance and, potentially, enable the Dynasands to operate in parallel rather than series, so increasing the throughput of the works.

The project was initiated by Scottish Water's *Managed Delivery* team, with the support of Operations. A project plan was produced, which identified the steps to be taken during the changeover. The work was due to commence in March, and a pre-start meeting took place, at which it was agreed the actions to be taken for the trial. The action plan did not detail exactly who was to undertake each task, nor was there a risk assessment produced which could have highlighted potential problems and mitigating actions. Scottish Water acknowledges that this fell short of an acceptable approach to risk management.

The process scientists essentially followed the action plan, incomplete though it was. When it was found that the works operators were unable to be on site they should have postponed the trial. It is apparent that too much autonomy was given to, or assumed by, the scientists, with them making adjustments to the treatment process that it was not in their remit to make, including bringing the plant back online after the first failed trial.

There were a number of causes that combined to cause or exacerbate the incident:

- Lack of clarity as to who was responsible for the various tasks involved in the trial and which part of Scottish Water had overall responsibility for the project;
- Unrepresentative samples taken from confusingly labelled sample taps in the works laboratory, which yielded spurious results for the various parameters required to monitor the trial;
- Reliance on incorrect assumptions as to the correct pH and flocculant dose settings required due to a failure to undertake adequate testing, including jar tests, immediately prior to commencing the trial;
- Inability of sodium carbonate pumps to consistently achieve the required dose for optimal coagulation;
- Failure to monitor final water quality during the trial to establish the effect on water supplied to consumers (this would have alerted staff to the partially ineffective run to waste)

## DWQR Assessment of Actions Taken by Scottish Water

Once it was realised that aluminium concentrations in treated water were rising rapidly there was a delay of 45 minutes in diverting the flow to waste. Consequently water containing higher aluminium concentrations passed into the clear water tank. Even after the works was running to waste, it is evident that some water was still running into the clear water tank. It has later been determined that the valve operations used to divert the flow were only partially effective and an additional valve, the inlet to the clear water tank, should also have been closed.

The trial was abandoned and work commenced to stabilise the treatment process. Around 3-4 hours later, one of the process scientists put the plant back into supply. No operators were on site at the



time, although this was done following prior discussion with them and apparently with their prior agreement. DWQR is of the opinion that it is not appropriate for process optimisation scientists, however experienced, to bring treatment works in and out of supply and that such work should only be done by suitably authorised works operators.

It is beyond comprehension that the trial was briefly re-commenced a day later on the 2 April with no further tests or investigation as to why the previous day's trial had failed. On this occasion, site operators were present. Once it became apparent that optimal flocculation pH could not be achieved and aluminium concentrations again started rising, the trial was promptly stopped, avoiding a significant impact on treated water aluminium. One of the Dynasand filters was later found to be overflowing due to blocking of the filter by excessive flocculant dosed during the trials. This necessitated a further shut down of the works and extensive efforts by operators to restore the filters.

To summarise, this incident was completely avoidable and raises a number of issues around the governance process for non-routine operations on Scottish Water's treatment works, especially where several parts of the organisation are involved. The impact of the incident was made worse by Scottish Water's inadequate response to the issue and failure to completely abandon the trial. No sampling in distribution was undertaken to determine the extent of any impact on consumers. Finally, partly because the full impact of the incident was not recognised at the time, reporting to Scottish Water's Public Health Team was unacceptably inaccurate and delayed.

DWQR considers that it is vital that Scottish Water learns from this incident to ensure that its internal procedures relating to non-routine project work are improved significantly and communicated to staff across Scotland.



The event has been categorised as significant. Scottish Water has identified a number of actions and DWQR accepts that these are appropriate, **on the condition that Action 2 includes a requirement for completion of a full risk assessment and adequate water quality monitoring (including final water) before, during and after any water treatment process trial.** DWQR will be monitoring to ensure they are completed prior to signing off the incident:

Action Number	Action Description
1	Review and clarify processes and procedures to ensure full Managed Delivery governance is applied to all projects and/or clear project handovers are defined and agreed.
2	Review authorisation process for the carrying out of process related trials or proposed process changes on live assets.
3	Review the requirements / guidance for jar testing prior to process changes on WTWs.
4	Prepare and implement a revised procedure for running to waste at Savalbeg WTW.
5	Operator awareness training – rollout of refresher training to Ops and Process team, in particular reinforce the requirement to escalate WQ issues to Public Health Team.
6	Re-label laboratory sample points at Savalbeg WTW for current WTW setup.
7	Review and update Drinking Water Safety Plan in light of incident root causes and conclusions .
8	Copy of the incident report to be circulated to all Water Operations Managers for information.

In addition, DWQR has one further recommendation to make:

Action	Action Description
DWQR 1	Scottish Water will review the systems in place to control and authorise the access of individuals to treatment processes and implement a formal “licence to operate” system if none exists, reporting to DWQR on the outcome.

