

Incident Summary

Muirdykes Zone (Royal Alexandria Hospital, Paisley) Discolouration 10 August 2016

DWQR Inspector:
Moira Malcolm

Event No. 7789

On Monday 8th August 2016, staff in several wards at the Royal Alexandria Hospital (RAH) in Paisley reported brown-tinged water to their operational estates team, who responded by flushing taps periodically until the water ran clear.

The following day, further reports of discoloured water were reported, which was escalated via the Licensed Provider (Anglian Water) to Scottish Water. As requested, bottled water was delivered to the hospital.

On Wednesday 10th August discoloured water was again reported, which flushing appeared to clear, however subsequently the situation became significantly worse with theatre staff describing the water as “black”. The event was escalated and staff from Scottish Water were sent to the site to liaise directly with NHS operational estates staff and an Incident Management Team was formed. Sampling across the site was increased with bottled water and tankers delivered to site; further flushing instigated; and the main network on the site appeared to be running clear by the evening (so tankering was not utilised).

However the discolouration returned again on the 11th and water restrictions were put in place at the hospital (a ‘Don’t Drink, Don’t Cook, Don’t Bathe’ Notice). The on-site storage tank was cleaned and flushing throughout the internal hospital network continued. The main system appeared to improve, but the maternity unit (which was served by a different incoming main) remained dirty with sediment. Tankering into the storage tank commenced, mixed with water from the mains supply; flushing of the internal network continued as did increased sampling. Bottled water delivery continued. To alleviate pressure on the hospital, NHS Greater Glasgow and Clyde Health Board (GGCHB) decided to cancel elective surgeries and divert emergencies to other hospitals to reduce any clinical risk.

In the early hours of Friday 12th August it was noted that manganese levels at the storage tank outlet were still high, so tankering replaced the incoming mains water to reduce the risk of manganese from the mains supply entering the hospital network. From this point manganese readings improved and the water supply was observed to run clear at various points throughout the hospital. By the afternoon the restrictions were relaxed with water used for cleaning and bathing, however the

decision was taken to continue tankering and the 'Don't Drink, Don't Cook' restriction (with bottled water supplied) remained in place over the weekend, with full mains supply reinstatement and the removal of use restrictions finally agreed on the morning of Monday 15th.

Following the incident permanent turbidity monitors have been installed at the hospital to allow for an early response to escalating issues. These detected higher turbidity on 2nd September (peaking at 4.0NTU) with staff noticing discoloured water. The peaks of turbidity correlate with increased flow rates which suggest that a surge in flow can pick up sediment from the mains network, the hospital's internal network, or a combination of both.

The Prescribed Concentration or Value (PCV) for manganese is 50µg/l, which was breached throughout the incident, with values dropping as the incident resolved. The PCV is set at this level primarily for aesthetic reasons, with the Short-term Health Risk Action Values for Scotland (SHRAVs) set at 1000µg/l for both 24hr and 10 day limits. This was breached in one sample during the incident, when the water supply was not in use. Manganese levels in the wider network breached the PCV on several occasions in July, prompting the decision to undertake flushing activity.

Several factors lead to the initial cause of the event and prolonged the incident. The water supplied to Muirdykes water treatment works (WTW) is naturally high in manganese, which peaks in the summer months between May and August. There is no manganese removal at Muirdykes WTW and the levels are currently managed by optimising existing treatment processes and managing the raw water sources, The WTW is subject to an Undertaking to Scottish Ministers to install a manganese removal stage which shall be in service in April 2017. The historic level of manganese in the supply from this treatment works has led to a build-up of manganese sediment in the network. This is managed by Scottish Water by regular flushing programmes throughout the mains network. In the weeks prior to and at the time of the incident Scottish Water were experiencing elevated levels of manganese in supply which were causing increased numbers of consumer complaints and had notified DWQR of this. They had not notified the Licenced Providers of this. At the time of the incident no unusual flow patterns occurred in Scottish Water's network which could have contributed to the increased manganese within the RAH.

The water network within the grounds of RAH dates from its construction in 1986 and detailed current drawings of the network are not available, so the full extent of the network – including any possible dead legs – are not known. The main storage tank has two chambers – one of which was cleaned prior to the incident. It is not known if the network is subject to regular flushing programmes to remove any manganese sediment. It is likely that the lack of maintenance contributed to the incident. When the discolouration was noted, operational estates staff began some flushing activity and the tank was drained. This increased flow scoured sediment from the tank and network and contributed to the discolouration. This fast draining of the tank and network flushing suggests that operational estate staff did not completely understand that their actions would contribute to the problem and indicates that further training is required.

Poor communication and a lack of pre-planning by Scottish Water, GGCHB and the Licensed Provider lead to confusion and resulted in an uncoordinated response in the first instance. A tailored and effective emergency plan would have led to a significantly smoother response by the organisations involved.

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

