

Southern Water Mains Flushing

the flushing of water pipes to remove iron deposits and other unwanted material, is essential to maintaining clear water for customers

by Geoff Keam

Many of the water distribution systems in the UK were first laid down more than a century ago. In general, this is not a significant problem, however sometimes the older pipes can start to rust, and rust in the water can discolour it. If this occurs, customers are likely to receive this discoloured water, causing them alarm. While this water is harmless to their health, it is definitely an unpleasant experience.



Metered standpipe and turbidity monitor - Courtesy of Atkins

Background

The flushing of water pipes removes iron deposits and other unwanted material from the water network which may have accumulated over many years. This freshens the system up and ensures that customers continue to receive water that is clear. Many of the water companies in the UK currently have a mains cleaning programme that includes flushing. It is a regular and accepted practice both here and abroad and perfectly routine.

But are there better ways to flush?

Water companies are tested against customer complaints, and discolouration of the water accounts for up to 60% of these calls. Any method that can be used to reduce water discolouration is therefore of interest to the water companies.

Southern Water mains flushing

The Southern Water Mains Flushing project is being undertaken by Atkins, with the company acting as both consultant and contractor for the project.

The distribution pipes are cleaned by inducing a flow of water through the system, via the opening and closing of hydrants. The flow rate is controlled so Atkins know that the network is being cleaned properly, since there are optimal flows for cleaning pipes.

On the inside of the pipe, material collects from corroded pipes that are elsewhere in the network. As the water slows, this material can start to come out of suspension, thus depositing itself on the inside of the pipes. Flushing is all about forcing the water through the system at the right speed so that it removes this material in

a controlled manner, and allowing disposal of this water in the correct manner. If flushing was not carried out, and the flow rate started to increase due to an unplanned change to the network, for example if someone decided to fill their swimming pool, then the system dynamics might be altered to the extent that the unplanned event dislodges material and causes discolouration.

The aim of the Mains Flushing Project is to remove and dispose of this material in a controlled manner before such an event occurs, and by managing the system, customers' tap water will continue to run clear.

There are many other techniques to cleaning a water network, though this is one of the simpler and cheaper methods. While it is not as aggressive in cleaning the pipework as some other methods, it does allow the water companies to use their budgets more efficiently, by either cleaning more of the system at any one time, or to carry out the cleaning process for a particular area more frequently.

Portable turbidity monitors

Flushing is a routine part of the work for most water companies. What differs about this scheme is the use of specialist equipment such as portable turbidity monitors, usually found on the walls at Water Treatment Works.

In partnership with a leading supplier of water quality monitoring products, easily-transportable equipment has been developed that can be deployed on a temporary basis to measure and view the turbidity levels of the flushed water in real time. This information will be used to further develop Southern Water's Discolouration Management model and improve the targeting of mains to be flushed in future programmes.

Systematic approach

Atkins is taking a systematic approach to the network, looking at the turbidity of the flushed water as it leaves the system. This is done by shining a light through the water and seeing how much of that light is picked-up by a sensor.

Using a turbidity monitor in this way is extremely unusual. The equipment, which normally does not move, has been fitted in a mobile box with its own power, so it can be taken from location to location; at times being moved up to 20 times a day.

Readings

The distribution of deposits will vary depending on a number of factors including the internal flows at each point and the operation of the treatment works upstream. Readings from the turbidity monitors give an indication of how clean the flushed water is, and this information can be used that to obtain a picture of the relative cleanliness of the whole distribution system.



Information from the turbidity monitor goes into a model that Atkins produced for Southern Water. This allows the company to predict what water mains might be in the same situation and hence extrapolate, thus enhancing the planning for future programmes and targeting the right mains for cleaning.

Other applications

Atkins believes that there are also applications for real-time monitoring of the water system. There is room to extend the project, perhaps to use the equipment in a slightly different way, such as finding ways to prevent incidents from occurring in the first place.

For example, Atkins has already discussed how changes to the distribution system can cause discoloured water if the appropriate measures are not undertaken. There are times when water companies need to alter their system, such as when they are taking a reservoir temporarily out of service so that it can be cleaned. This may force more water going through certain parts of the system and hence start stirring up sediment.

By using the monitor at key points, the network can be screened in real-time to make sure that the suspension of this material is kept to a minimum. If there seems to be a problem, people upstream can be notified to cease the work temporarily, thus allowing the system to stabilise before recommencing with the work. This approach prevents customers downstream of the reservoir from experiencing discoloured water.

Progress

The current Southern Water Mains Flushing Programme aims to flush around 1,266km of pipework which services around 100,000 people. This is roughly the distance between London and Prague, so any way to make future programmes more efficient is obviously worth looking at.

Over 800km of this programme had been completed, until it was temporarily halted earlier this year due to the drought restrictions coming into place.

At the time of writing, Southern Water had just lifted these restrictions, allowing customers to use their hosepipes once again. As a result, Atkins is ramping up its team in order to complete the remaining section of pipework left in the programme.

During the short break, Atkins took the opportunity to service all of the equipment on the project and so are ready to continue the cleaning works once again.

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