Helping a utility company clean up in the water supply industry.

In many developed countries in the world, we are fortunate enough to take clean drinking water for granted. Sadly, this is not the case throughout the world.

In those countries lucky enough to enjoy clean water on tap, one of the first of the several steps that water companies use to prepare water for distribution is to get it as clear and particulate-free as possible. Raw water often holds tiny suspended particles that are very difficult for filters to catch.

To overcome this, the water is treated by adding the coagulant Aluminium Sulphate , commonly called Alum, which serves as a Flocculant. The addition of Alum reacts with the water and results in positively charged Ions. This causes the suspended particles to clump together so that they can settle out of the water or be easily trapped by a filter.

The use of Alum as a coagulant by the Romans was mentioned in around 77 AD. By 1757, Alum was being used for coagulation in municipal water treatment in England.

Available in either liquid form with a concentration of 8.3%, or in dry form with a concentration of 17%, Alum is injected into the raw incoming water at a rate of 18 to 24 parts per million. Adding the right amount of Aluminium Sulphate has to be carefully judged. There must not be more than 15 mg dm−3 left in the treated water. Concentrations above this are a health hazard.

In a flash mix chamber, the Alum is added to the water and mixed violently for less than a minute. Then, in the flocculation tank, the water is gently stirred for 30 to 45 minutes to give the chemicals time to act and to promote flocculant formation. The flocculant then settles out in a sedimentation tank.

The efficiency of the coagulation-flocculation process is dependent on many variables. For a particular water these may include:

- Type of coagulant used
- Coagulant dosage
- Final pH
- Coagulant feed concentration
- Type and dosage of chemical additives other than primary coagulant (e.g. polymers)
- Flocculate retention time
- Type of stirring device used
- Flocculator geometry

Optimising the flocculation process to ensure maximum effectiveness requires that the volumes of water being treated is known. By combining the dimensions of the flocculation tank with an accurate and reliable water level measurement, will provide precision water volumes to permit the correct dosage of Alum to be added. Not only does this mean that the water company can provide water to the highest quality but do so while keeping its processing costs to the minimum.

A purification plant in North America was looking for a water level sensor that would provide them with the necessary accuracy to optimise quality performance while reducing their coagulant costs. Additionally, by adding only the required amount of coagulant ensures that excess flocculant is not generated which, in itself, is very expensive to extract and dispose of.

However, this provided some challenges that they were finding difficult to resolve. The fact that the water contained both suspended particles, floc and coagulant meant that float-type sensors were prone to jam up or corrode. Combined with that, the constant agitation of the water creates a turbulent water surface with some foaming which can inhibit the accuracy and dependability of measurements from ultrasonic sensors, a common technology in the water treatment industry.

With tanks between 18 to 25ft deep, the plant engineers were also confronted with the issue of the ultrasonics conical beam width. As the water level drops, the sensed surface area increases – sometimes up to 8ft. diameter - making accurate level readings difficult. The ultrasonic sensors can also respond to 'false echoes' when the beam gets near the walls of the tank.

Instead they are utilising the Gill 7014 conductive liquid level sensor. With a non-stick FEP coating on the sensor probe, it has no holes, cavities or moving parts that will lead to clogging or jamming. The FEP coating is also unaffected by the coagulants and flocculant and does not require cleaning or repeated recalibration.

Available in long probe lengths, the sensor is engineered to withstand the lateral forces imposed upon it by the water agitation. With a very compact installation footprint, the level measurement is consistent and repeatable over the full depth measurement range with no degradation at shallow water levels. The sensor comes with tank profiling functionality as standard, providing the user with a true volumetric measurement rather than just a level output.

The Gill sensor has provided the engineers' with a reliable and accurate sensor, where they previously did not have a sensor capability. Visit **gillsc.com/water** to find out how we can help you.