Attacking Plumbosolvency through Alliancing

"Plumbo" scheme - excellent example of successful alliancing

The collaborative delivery model used by Dwr Cymru Welsh Water for AMP3 comprised a set of alliances that were assembled from "best in class" providers. These partners were required to deliver major elements of the AMP3 programme, and had to achieve challenging efficiency and timescale targets. The successful outcome of Welsh Water's AMP3 programme is a testament to the success of this model, which has been advanced even further in AMP4 to a single Alliance that includes the Asset Owner, the Asset Operators and the Asset Investment Partners.

Plumbosolvency: New Orthophosphoric acid bulk storage at Bontgoch WTW *photo courtesy DwrCymru Welsh Water*

An excellent example of the successful alliancing model was the "Plumbo" scheme, which was directed at meeting stringent new regulations for concentrations of lead at customers taps. The project involved the upgrade of 15 existing dosing systems, the installation of 14 new dosing systems, the abandonment of four treatment works, and the laying of 20km of new mains. Achieving this drew on the skills of diverse partners in a coordinated effort that was managed as a single team.

The challenge

To comply with the Water Supply (Water Quality) Regulations 2000 (the 2000 Regulations) Directive, the following requirements for lead concentrations at customer's taps had to be achieved.

All new and further plumbosolvency treatment measures required to attempt to meet the 10 µg/l standard must be installed and commissioned by 31 December 2002 and optimised for 10 µg/l by 25 December 2003.

Where necessary, existing plumbosolvency treatment measures must be optimised for 10 µg/l by 31 December 2002.

After plumbosolvency treatment has been optimised, any strategic lead pipe replacement required to meet 25 µg/l must be completed by 25 December 2003.

The final standard of 10 µg/l is to be achieved by 25 December 2013.

The approach

The conventional means of reducing plumbo solvency in water is to dose orthophosphate into the treated water. This can be expensive in terms of both capital investment and operating cost. The team sought first therefore, to find alternative means of achieving the regulatory targets, mainly through alternative raw water sources, or through strategic abandonment of assets, which allowed water quality zones to be fed from different water treatment works with lower plumbosolvency propensities.

For assets with existing Orthophosphoric acid dosing facilities, upgrades were generally found to be appropriate, but for those where new installations were required there were some choices to be made. Two types of orthophosphate dosing chemicals were considered namely:

* Orthophosphoric Acid;
* Kalipol 32 (mono sodium di-hydrogen orthophosphate).

The choice of which chemical to dose was driven by the capability of existing pH correction facilities to meet the requirements imposed by the introduction of ortho-phosphoric acid and the difference in orthophosphate chemical product cost.

The cost of Kalipol 32 is approximately 7 times that of 75% orthophosphoric acid, in order to provide an equivalent concentration of orthophosphate. Therefore, the cost of upgrading existing pH correction facilities were compared to the increased operational cost associated with the introduction of Kalipol 32 in comparison to ortho-phosphoric acid.

The Functional design specification of the orthophosphate units were standardised, the only variations included maximum dose rate of dosing pumps, size of storage tank, pipework diameters and type of orthophosphate chemical. The standardised design of the new installations was enhanced by analysis of the existing installations, allowing best practice to be built in.

The team

The delivery team assembled for the scheme was typical of the collaborative approach engendered within the Alliance, with work being allocated based on “best person for the job” (e.g. splitting upgrade and new installation work between the operator and the investment partners). United Utilities Operational Services (the operator) carried out plant upgrades, and co-ordinated a huge sampling and analysis regime. Laing O’Rourke carried out the infrastructure work required to enable abandonments, while Black & Veatch carried out the new dosing installations. Chandler KBS and EC Harris provided project and cost management, and Welsh Water was directly involved with the core team to manage the regulatory interface.

The project was managed by a “Core Team” comprised of key staff from the partners. The Core Team established and deployed strategy for the scheme, monitored cost and progress and managed risk.

A key part of the strategy was to engage the supply chain at an early stage, so that the most effective design could be employed for new installations. Following a competitive tendering process, Gee & Co were appointed to the team and participated in a design and value engineering exercise that took in the needs and views of operators from all regions.

The outcome

The immediate result of the collaborative strategy was that all of the upgrades,abandonments and new installations were completed on time, at numerous sites but within a tight timescale. The use of a standardised design ensured that the end users knew what would be installed, and contributed to keeping the scheme well within budget.

The optimisation programme has followed from the delivery phase, and has been commended by DWI as being amongst the most comprehensive. ■

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