

Church Wilne & Campion Hills WTW's water quality improvements at major works

by Kevin Gaunt, BEng (Hons), CEng, MIMechE

Severn Trent Water's Church Wilne water treatment works supplies water to 600,000 customers in the East Midlands. The works is located to the east of Derby and adjacent to the M1. Campion Hills water treatment works is located in Leamington Spa and supplies 150,000 customers in and around the town. Both sites have required investment in GAC treatment facilities during AMP3 in order to comply with a new THM standard of 100ug/l.



GAC Vessels at Campion Hills WTW (Photo: Stuart Blackwood Photography.Sneinton, Notts; courtesy Severn Trent Water).

Project

At **Church Wilne**, GAC treatment has been an integral part of the process since 1982 when a treatment plant incorporating 12 pressure vessels was commissioned. Additional GAC capacity is now required to increase ebct (empty bed contact time) for which the chosen solution is 4 open bed GAC filters. The treatment process also incorporates a lime dosing plant and sulphuric acid dosing plant for pH correction and both plants were identified as requiring replacement during AMP3. To avoid problems associated with the storage and handling of lime it was agreed to replace the lime plant with a *Kalic* installation, *Kalic* being a ready-made suspension of calcium hydroxide in water.

The existing process stream at **Campion Hills** also already includes GAC treatment. Once again, there is a need to increase ebct but this requirement is further complicated by the need to include Cryptosporidium control measures in the process. On this site, the chosen solution is to convert the existing GAC beds back to sand filters to provide the forward rinse to waste facilities and to provide a new GAC facility in the form of 8 pressure vessels. Additionally, the scope of this work includes a pumped wastewater return system.

Due to the similar nature of these projects a single Project Team was formed. Following a tendering exercise *Birse Water Ltd* was selected as main contractor with *Carlbro* appointed to provide

design capability and general technical expertise. Whilst the project managers from each of those parties all carry responsibility for project delivery, it was recognised that an overall co-ordinator would be needed. It was agreed that a *Birse* Project Director would undertake that role for these two projects and ensure that problems were jointly owned and solved using whatever resources were available within the team.

Programme

Construction commenced at **Church Wilne** in July 2002. The GAC installation is on track to be commissioned during June 2003, with the *Kalic* and acid installations following during July 2003. At **Campion Hills** work is also proceeding to programme and is due to be completed by September 2003.

Design issues

With the project team in place, design work commenced, particularly focusing on those areas where alternatives required further investigation. Of particular concern was the **Church Wilne** GAC installation for which various options had been identified based on pressure vessels or open concrete beds or a combination of the two. *Birse* and *Carlbro* worked closely together to develop accurate costings for these options which were then evaluated with particular focus on providing a robust hydraulic control system. Following this evaluation it was agreed to proceed with the option of 4 new open concrete beds which would be used in conjunction with the existing 18 pressure vessels.

The *Kalic* installation will be the largest *Kalic* lime dosing system to be installed at any WTW to date. The concrete storage tank has a capacity of 100 cu m to provide the required 28 day storage and the system is required to deliver *Kalic* at a rate of 2 cu l/min. *Kalic* is supplied to Severn Trent Water by *Buxton Lime* and their expertise has been a key input to the design process for that installation.

At **Campion Hills**, initial site investigation work suggested problems with the proposed location of the GAC installation due to the size of the required structure and its proximity to the site boundary and existing services. Due to the unacceptably high level of risk associated with that location, alternatives were considered and a preferred option identified that would eliminate those risks, provide improved access and interface better with the works process flow.

In a further attempt to reduce the risk of delays during construction, a 3-D pipework model of the GAC installation was developed to identify potential pipework clashes. HAZOP studies were also undertaken to assess and reduce or eliminate hazards and operational risks associated with the proposed process stream.

Supply chain considerations

The Project Team recognised that successful project delivery would be dependant on the performance of key suppliers and technical consultants. In respect of the latter, *Carlbro* developed close working relationships with the *Birse* process designers, *Faber Maunsell* (M & E consultants) and *Livingston Gunn* (pipework consultants) to ensure close integration of design activities.

Severn Trent Water has in place a Framework Agreement for pressure vessels with *ST Purification Services*. The vessel supplier was contacted at an early stage in the project and worked closely with the Project team to determine vessel design and delivery requirements. The same philosophy was adopted for *Saftronics* who were selected by Severn Trent Water to provide control panels for both sites. *Weir Pumps* are another of Severn Trent Water's framework suppliers with a major influence on required completion dates for both sites. Delivery requirements for their pumps were discussed with them by the whole project team and processes introduced to integrate those deliveries into the overall programme.

To minimise 'defects' and avoid re-work, *Birse* are liaising closely with their sub-contractors, particularly their principal mechanical sub-contractor (*Wheeler & Cook Engineering Services Ltd*). Focus of their efforts is in ensuring a common understanding of the standard of workmanship required and taking proactive steps to assist the tradesmen to avoid defects and get work "right first time". Any defects that do occur are identified by joint inspections and cleared promptly.

Health & Safety

The Project Team has a prime focus on providing a safe working environment for those working on site, both during construction and for those who will ultimately operate the plant. Designs have been risk assessed and designs amended to reduce identified risks. For example, revisiting the location of the **Campion Hills** GAC installation, as mentioned above.

The production of 'Method Statements' has been managed both in terms of quantity and quality. Accidents and near-misses have been recorded and analysed and appropriate action taken, particularly where a trend has been identified. As an example, it was identified that two individuals working for an electrical contractor had both suffered similar minor injuries. This was discussed with their supervisors and action taken to avoid a repeat of these accidents.

The agreed Target Price for these projects exceeds £7m and the work is being carried out within very tight timescales. As M & E installation commences the indications are that the required completion dates will be met and work completed within the Target Price. ■

Note: The author of this article, Kevin Gaunt, is Principal Engineer, Severn Trent Water.



Buxton Lime Industries Ltd

Tel: 01298 768444
Fax: 01298 768454

BLI

Buxton Lime Industries is the market leader in supply of lime products to UK Industry. Our unrivalled product range is supported by experienced Technical Service and Research capabilities which are unique in Britain. In addition to a comprehensive range of Quicklime grades and Limbux hydrated Lime we now offer:

- *Kalic* liquid Lime - High reactive stable suspension of calcium hydroxide offering greatly reduced plant costs with improved reliability and control.
- *Limbux Extra* - Enhanced purity rapid reacting hydrated lime offering improved control and easier handling.

Buxton Lime Industries, Tunstead House, Wormhill, Buxton, Derbyshire, SK17 8TG

BRITAIN'S LARGEST MANUFACTURER OF LIME PRODUCTS.

547