

Groundwater asset management

Groundwater boreholes are a key component for commercial operations where large volumes of water are required, as part of the manufacturing process, to service buildings, for agricultural or irrigation purposes. For manufacturers like Yuasa Batteries and world famous sporting venue Aintree Racecourse, high levels of operational efficiency and service availability must be achieved all year round. Planned borefield maintenance programmes have now become an essential part of their professional groundwater asset management, with proven benefits in terms of operational cost savings and continuity of pumping.

Mineral contamination or residue build up within a water extraction system are two of the biggest problems face by maintenance teams, both of which can have significant operational implications. Encrustation and clogging resulting from contamination

can lead to reduction in the yield and capacity of the bore, deterioration of water quality, motor burn out of the submersible pump, and encrustation on the pump, column, bore casing, screens and reticulation systems. Failure to implement a scheduled bore and pump maintenance programmes can result in servicing on a breakdown only basis so that underlying but significant contamination and operational problems fail to be addressed. Over time the contamination can become so serious that a well has to be decommissioned.

The most effective type of maintenance programmes appear to be those that incorporate a monitoring and measuring management plan alongside a regular chemical treatment. One such programme, which has been developed over the last ten years and which incorporates the BoreSaver range of treatments, has achieved some notable success-

es. The goal of the BoreSaver borehole management programme is to return borehole production to as close to the original drilled capacity as possible and to help maintain a continual, problem-free water supply.

The BoreSaver management programme combines downhole camera surveys with an analysis of key parameters that are compared against historical data for each well and wellfield. The type of pump, rising main and system control equipment is also considered so that plant recommendations can be included in the process.

A purpose built rehabilitation rig and BoreSaver, a range of approved borehole rehabilitation treatments used successfully in more than fourteen countries worldwide, is used for the necessary maintenance of the wells. The products have been through a rigorous testing and approval process, in the UK and in America. In the UK,

BoreSaver Ultra C, Liquid Enhancer and IKL Pro have been approved by the Secretary of State under Regulation 31 of the Water Supply (Water Quality) Regulations 1989 for use in potable water applications.

The chemical treatment for iron bacteria and iron oxide contamination is BoreSaver Ultra C, a solid with a main active ingredient of oxalic acid dehydrate, with various secondary ingredients. BoreSaver Ultra C dissolves and loosens deposits by processes of reduction and complex formation in mildly acidic conditions, and the iron III (insoluble Fe³⁺) is converted to iron II (soluble Fe²⁺). By-products of the process are carbon dioxide and water. Residual components of BoreSaver Ultra C readily biodegrade to harmless inorganic ions and compounds during the flushing process. Research by Houben carried out in 2003 has shown that the



key component of BoreSaver is one of the most effective at dissolving iron contamination.

Aintree Racecourse

Establishing and optimising an independent water supply brings considerable benefits to sporting venues, particularly in horse racing where effective going-management is vital to minimising the risk of injury to horses and jockeys and the maximising of racing performance. For a course such as Aintree, home of the Grand National Steeple Chase, the 'going' condition is paramount. A report issued by Cranfield University in 2007 on improved irrigation of racecourses acknowledged that achieving more effective use of our increasingly scarce water resources in England and Wales must be a priority for horseracing.

BoreSaver has been part of Aintree's maintenance programme for the last three seasons and a significant increase in yield has been achieved as well as a noticeable decrease in operational problems. One of Geoquip's approved installers, Welltherm Drilling, was called into Aintree in March 2011 following problems with the borehole pump and panels tripping out and a falling yield. A downhole CCTV survey revealed extensive iron bacteria contamination which had clogged the pumps, screens as well as the irrigators and sprinklers round the entire racecourse. Welltherm recommended treating the system with BoreSaver Ultra C to remove the build-up of deposits and iron bacteria followed by an annual maintenance programme to control the iron bacteria contamination. Aintree now uses BoreSaver on an annual basis and yield has improved significantly and all pumps can be used at the same time to maximise output. There has also been a significant reduction in operational problems.

Andrew Tulloch, Regional Head of Racing NW and Clerk of the Course at Aintree said, "we have tried a number of different solutions over the years but BoreSaver is the treatment that appears to returned the yield to the original output whilst reducing any operational problems with the water supply to an absolute minimum. It is

now an annual part of our course and systems maintenance programme."

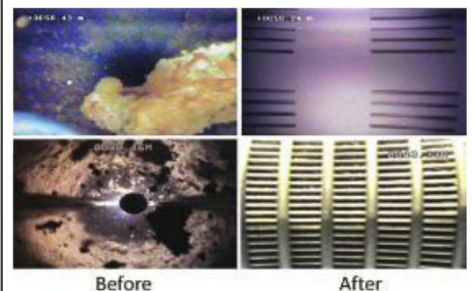
Yuasa Batteries

Yuasa Batteries has been using BoreSaver as part of their maintenance programme for the last six years. Yuasa is a world leader in valve regulated lead acid battery design and manufacturing. Their plant in Ebbw Vale, South Wales produces over 500,000 batteries a year. The plant employs around 350 people and Yuasa use their boreholes to supply drinking water for the staff, dionised water in their batteries as well as the plant's showers and fire mains.

Two boreholes supply the water for the plant, 75m and 90m deep respectively, which were drilled ten years ago. The plant is in a heavy ironstone area and in 2007 iron oxide contamination was starting to cause operational problems and a significant reduction in the specific capacity, down from 32 m³/hr/m to 15 m³/hr/m. Geoquip recommended treating the system with BoreSaver Ultra C to remove the build-up of deposits on the screens and pumps and regular use of BoreSaver Liquid to control the iron bacteria contamination. Yuasa have been carrying out an annual maintenance programme for the last five years and use BoreSaver Liquid every fortnight to maintain the system. Specific capacity is back up to 32 m³ an hour with a corresponding reduction in operational problems.

Whilst BoreSaver has played a crucial part in the rehabilitation processes in these case studies, there is no doubt that equally crucial is the implementation of an effective monitoring and maintenance programme. For organisations where there is a need for continual flow to maintain operations, limiting bore and pump maintenance to a breakdown only basis often have huge financial implications. Regular, proactive maintenance can increase or restore specific capacity and it is now becoming common to build in such a programme at the design stage rather than waiting until operations commence and a problem occurs."

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