

CLEAN WATER

News From GURNEY ENVIRONMENTAL — Water & Wastewater Treatment Solutions
FROM WATER SUPPLY TO WATER RE-USE

Low Energy, Highly Sustainable Raw Water 'Source Management' Solutions for Water Supply Reservoirs Prove Themselves in UK.

Gurney Environmental provides technology that offers superior performance & problem resolution.



ResMix Control of Contamination

Contamination of water supplies can occur due to several microorganisms including algae, bacteria and fungi. These organisms are capable of imparting tastes, odours and toxic compounds into the water. Algal toxins, taste and odour problems mostly arise from blooms of cyanobacteria or blue-green algae (BGA), and from the presence of metallic ions in solution such as manganese and iron.

Natural convection generally occurs throughout the water column if the water surface is cooler than the lower levels. However, in summer this natural convection generally stops and re-aeration from the atmosphere occurs only in the top few metres of the water column, mixed only by wind shear.

Addressing the Degradation of Water Quality

At the bottom level of an impoundment, decomposition of organic material occurs with both biological oxygen demand (BOD) and chemical oxygen demand (COD) gradually depleting dissolved

oxygen, thus leaving the lower levels of the water body stagnant, anoxic and effectively dead except for the gas-producing anaerobic bacterial activity. Several problems can result from this stagnation and oxygen depletion.

The WEARS ResMix 'Source Management' System can eliminate problems related to both strati-

fication and low dissolved oxygen, and can reduce blooms of cyanobacteria in lakes and reservoirs. Pumping at low flow velocities and using a draft tube to force top-to-bottom exchange, the system is very economical operating at up 90% less than conventional horizontal flow systems.

How ResMix Works

The top layer of reservoirs heat up becoming less dense and forming a warm, oxygen-rich buoyant layer on top of the reservoir. This warmer layer



prevents mixing with the deeper water due to the thermocline which creates thermal and dissolved oxygen (DO) stratification.

The ResMix systems circulate large volumes of water at a low velocity with low energy consumption to remove the thermocline. This dispersion overcomes the stratified stagnant zones that previously reduced the water quality and result in excessive use of sterilisation controls.

Example UK Project: Welsh Water's Pontsticill Reservoir Project

In 2014, Gurney Environmental accomplished one more "First" for the WEARS Australia ResMix 'Source Management' System with the first Northern Hemisphere installation of the largest 5000cc system for Welsh Water,

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Pontsticill Reservoir, Wales

Watch the Video on our website!



ResMix 5000cc

The ResMix Systems are easy to install and use far less energy to reoxygenate and destratify the water reservoir/lake/impoundment as compared to other options. Water quality is improved thus lowering total treatment costs.

the very first ResMix system for the Water Company.

Pontsticill was the first application of the larger ResMix 5000cc in both the Northern Hemisphere and in the UK. The ResMix 5000cc is a sustainable, low energy system for reservoir 'Source Management' providing water quality improvements and maintenance, but using only 10 kW of energy to influence very large water bodies.

The ResMix 5000cc consists of two counter rotating, surface-mounted, large axial mixers, each with 5 m diameter impellers. The units are able to transfer 20 tonnes of water from the surface to the bottom of a reservoir every second. This significant transfer of surface water not only evens out water temperature, thus preventing thermal stratification, but also increases net dissolved oxygen levels throughout the water column of the reservoir, thereby addressing many water quality issues.

Pontsticill Reservoir was also the first ResMix system for Welsh Water, having been selected after a 4 year evaluation of options for reservoir management by Welsh Water and their consultants, Black and Veatch. Welsh Water thereby joined a growing list of ResMix users worldwide.

Project Information

- Pontsticill reservoir is located in the Brecon Beacons, north of Merthyr Tydfil
- Holds more than 15 billion litres of water
- Serves 106,000-plus customers in the Merthyr area and other parts of the South Wales Valleys.

Innovative Raw Water "Supply Management"

Welsh Water's capital delivery manager for south-east Wales said: "We are very pleased to be using this innovative management system in the reservoir at Pontsticill. This investment will improve the water quality for customers in the area and ensure they continue to receive a top quality supply of drinking water long into the future."

The project was fast tracked for installation in August 2014. Gurney Environmental, WEARS Aus-



tralia and Welsh Water worked together to streamline the procurement and delivery process so that this could be achieved. ►►

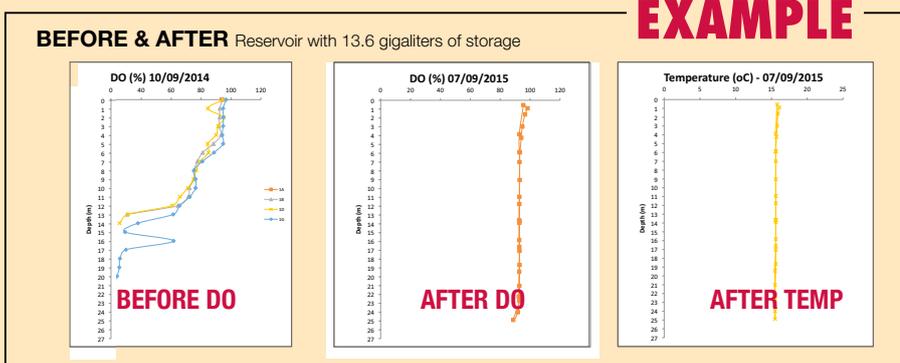
BENEFITS
of the WEARS ResMix Systems

- Oxidises metals
- Reduces or eliminates taste or odour problems
- Minimises algal blooms
- Increases fish habitat
- Restores the condition of the degraded storage
- Drastically reduces energy and treatment costs
- Prevents autumn turnover

Artificial destratification involves mixing the water body to dissipate thermal layers, with the aim of achieving a uniform temperature and oxygen gradient over the depth of the storage.

ADDITIONAL BENEFITS ARE:

- Autumn turnover is eliminated and, therefore, anoxic and toxic water prevented from mixing through the water column.
- Water is made to be of uniform quality.
- Makes it less expensive to treat at the water treatment plant.
- Blue-green algae is controlled and the use of dangerous chemicals eliminated.
- Metals such as manganese (Mn) and iron (Fe) are oxidised out of the water.
- Fish habitat is increased.
- Reduction of cold water with low DO being released from the lower levels of a dam, which typically can upset fish migration patterns down-stream.
- Ecological balance of a degraded storage impoundment is restored.
- Greenhouse gas reduction.



Water storage reservoirs receive oxygenation through both photosynthesis and atmospheric absorption. However, in warm weather, the upper, oxygen-rich layer can become more buoyant and form a thermocline or stratification of the water column. Decomposition in the lower depths cause an oxygen depletion and a degradation of the overall water quality. The ResMix System can break the stratification and deliver oxygen to lower depths.



Welsh Water Follows On in 2016 With 2nd Installation of WEARS ResMix 5000cc at Llangdeffed Reservoir.

Based on performance at Pontsticill Reservoir, Welsh adds 2nd 5000cc 'Source Management' System.

In July 2016, Gurney Environmental installed a second installation of the ResMix 5000cc 'Source Management' system for Welsh Water at Llangdeffed Reservoir in Wales.

The system was delivered to the site and underwent final assembly before being lifted by helicopter to its pre-determined location in the reservoir.

The order of a second ResMix 5000cc 'Source Management' system came almost exactly two years after the installation of the first ResMix 5000cc system for Welsh Water at Pontsticill Reservoir near Merthyr Tydfil.

The original installation of the ResMix 5000cc at Pontsticill was the first for the 5000cc model in

the UK. The ResMix 'Source Management' system has rapidly become the preferred choice amongst many water utility companies as a means to improve and manage raw water quality before treat-



By creating better water quality in the raw water source reservoir, costs for treatment at the treatment works downstream can be significantly reduced.

ment. The ResMix system provides top down broad flow circulation (bfc) in storage reservoirs saving significant OPEX costs at the WTP. Iron, manganese, nutrients, blue green algae, taste and odour forming compounds have all been reduced or eliminated after the installation of ResMix, resulting in less treatment required at the WTP.

Cost effective, simple to install and with very low energy consumption, ResMix provides truly sustainable source management for the first time. The ResMix 5000cc consists of two counter rotating, surface-mounted, large axial flow mixers, each with 5m diameter impellers. The units are able to transfer 20 tonnes of water from the surface to the bottom of a reservoir every second. This significant transfer of surface water not only evens out water temperature, thereby preventing thermal stratification, but also increases net dissolved oxygen levels throughout the water column of the reservoir, thus addressing numerous water quality issues. ▶▶



Scottish Water Adds Additional ResMix Installations

Gurney Environmental have received follow-on orders from Scottish Water for additional ResMix 'Source Management' systems following 7+ years of successful use of these systems by the water utility company. Scottish Water were the first UK water utility company to adopt the Australian-made WEARS ResMix 'Source Management' system over 8 years ago.

Successfully adopted by Scottish Water in multiple locations across Scotland, recent additional



Scottish Water
Always serving Scotland

orders for ResMix systems are being used in two additional reservoirs and come following a lengthy evaluation process by the company and their consultants, Jacobs.

The ResMix 'Source Management' system improves and maintains water quality in the reservoir with the benefit of downstream savings at the water treatment works, which has made it the first choice for many water utilities. ▶▶



The ResMix Vital is a system that can be simply installed and operational in a few hours. It's energy efficient, requires minimal scheduled maintenance (3 yearly) and has an operational lifespan of over 25 years.

Quickly Resolve Potable Water Storage Quality Issues With Easy-to-Use and Install ResMix Vital.

Within a few hours, the Vital can be operational, improving water quality.

One of the biggest concerns for water operators is being able to provide a water supply of consistent quality. WEARS Australia have been working with water authorities in Australia, the Middle East and elsewhere to achieve this by successfully stabilising chlorine residuals in treated water reservoirs.

To achieve this stabilisation, WEARS Australia have been installing the ResMix Vital, a highly efficient system incorporating an optional chlorine dosing system, requiring only 10 percent of the energy used by alternatives, and the only water management solution capable of preventing dead spots and short circuiting while generating homogenised conditions in the water column.

Achieving Reservoir Stability

WEARS Australia recently presented a paper on "Maintaining Chlorine Residuals for High

Quality Water Supply," citing the 12 months of performance of the ResMix Vital system at the Trangie Reservoir for the Narromine Shire Council in Australia.

12 Months of Performance

With ResMix Vital installed and the reservoir stabilised, instances of free chlorine exceeding minimum or maximum control points were reduced to 3% of readings, thus providing a consistent and stable reservoir with almost no sediment build-up or chlorine atomisation.

Doug Moorby, Manager of Engineering Operations for Narromine Shire Council noted, "there is no doubt about it, the ResMix system works! Having started with a volatile and inconsistent chlorine residuals in our supply, we are now using the WEARS product to mix and dose our



tanks. We are not alone in our experiences here. All I can say is that the results speak for themselves."

The Resmix Vital In The UK

Gurney Environmental, WEARS UK partner, is working with water companies to demonstrate the benefits of this system for use in the UK and have achieved DWI Reg 31 Registration for use in Potable Water reservoirs.

Covered Reservoirs

The ResMix Vital uses a patented locking system that allows the unit to swing open, thus giving it the ability to fit into enclosed-top reservoirs. Potable water reservoirs can suffer from stale water — water that is no longer at its optimum.

Disinfectants such as chlorine can settle out and not provide the benefits required for storage and transmission of fresh water through mains. The ResMix Vital unit can be installed through the

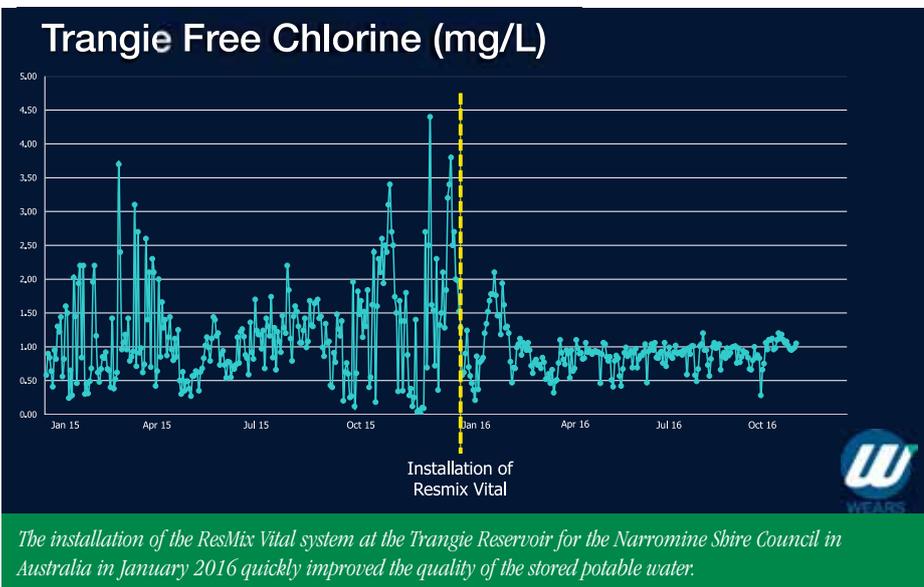


hatch of a closed-top reservoir, thereby providing a very cost effective method of maintaining maximum potable water quality while in storage.

The ResMix Vital will create a top-down circulation of the storage reservoir with little energy or maintenance. The units can float with the ever-changing water levels, thereby accommodating a wide range of capacity situations.

Drinking Water Approved

The ResMix Vital is DWI (Drinking Water Inspectorate) registered. ►►



The installation of the ResMix Vital system at the Trangie Reservoir for the Narromine Shire Council in Australia in January 2016 quickly improved the quality of the stored potable water.

Wessex Water Utilises ResMix 'Source Management' System

Wessex Water has joined the growing list of ResMix users in the UK. Following a lengthy evaluation process by the company and their consultants, MWH, the ResMix 'Source Management' System was installed in 2015.

The system took into account the unique bathymetry of the reservoir, ensuring maximum epilimnion-to-hypolimnion exchange, but without disturbing the base of the reservoir during low water levels.





ResMix 3000cc

Southern Water Joins Growing List of UK ResMix ‘Source Management’ Users.

In 2016 Gurney Environmental embarked on a programme of ResMix installations across the UK, the first of which in 2016 saw a new ResMix 3000cc ‘Source Management’ system installed for Southern Water at Weir Wood Reservoir in East Sussex. Southern Water joined the ever-growing list of ResMix ‘Source Management’ users that includes many of the UK’s water utility companies.



The ResMix ‘Source Management’ system is rapidly becoming the preferred choice for many of its users as a means to improve and manage raw water quality before treatment. The ResMix system provides top-down *Broad Flow Circulation* (BFC) in storage reservoirs, saving significant OPEX costs at the WTP. Iron, manganese, nutrients, blue-green algae, taste and odour-forming compounds



have all been reduced or eliminated after the installation of ResMix, resulting in less treatment required at the WTP. Cost effective, simple to install with very low energy consumption, ResMix provides sustainable source management for the first time.

Learn more about the ResMix ‘Source Management’ Systems and download brochures on the Gurney Environmental website. ►►





ResMix 1000

Jersey Water has not only saved operating costs but also improved water quality at two reservoirs with ResMix.

Jersey Water Adds WEARS ResMix 1000 'Source Management' Systems in 2016, 2017 and 2018.

Success with first order in 2016 followed by orders in 2017 and 2018.

Gurney Environmental completed the installation of a ResMix 1000 'Source Management' system for Jersey Water at their Val de la Mare reservoir in the spring of 2016. Based on the success of that initial installation, a second ResMix 1000 'Source Management' system was installed at their Grande Vaux Reservoir in summer of 2017, and a third order was placed in early 2018 for two more reservoirs.

Cost Savings & Water Quality Improvements

Jersey Water saw the benefits of adopting the ResMix system at Val de la Mare and enjoyed significant savings in energy and treatment costs. These cost savings and water quality improvements led the water utility to add a similar system at one of their other reservoirs, Grande Vaux, the next year.

In Jersey Water's 2016 *Water Quality Report* Executive Summary, the Chief Executive Officer, Helier Smith included reference to the ResMix system:



Jersey Water's Grande Vaux Reservoir benefits from the summer 2017 installation of the model 1000 ResMix 'Source Management' system. The installation followed the success of the same system at Val de la Mare.

"In order to better control the quality of the water stored in Val de la Mare Reservoir, a reservoir mixer was installed in March 2016 to replace the compressed air bubble mixer. Based upon the first year of operation, the 'ResMix' has shown a stabilisation in raw water quality at reduced electricity costs of the previous mixer. It

is planned to install a similar mixer at Grand Vaux Reservoir in 2017."

Both installations demonstrated that the simple, low-cost installation of the ResMix system could not only pay for itself in energy savings versus other options, but would also reduce costs for treatment at the works by pretreating the raw water supply.

Proven Worldwide and Throughout the UK.

At the bottom level of a reservoir, decomposition of organic material occurs with both biological oxygen demand (BOD) and chemical oxygen demand (COD) gradually depleting dissolved oxygen, thus leaving the lower levels of the water body stagnant, anoxic and effectively dead except for the gas-producing anaerobic bacterial activity. Several problems can result from this stagnation and oxygen depletion.

The WEARS Res-Mix 'Source Management' System can eliminate problems related to both stratification and low dissolved oxygen, and can reduce blooms of cyanobacteria in lakes and reservoirs. Pumping at low flow velocities and using



The smaller model 1000 ResMix system is an inexpensive and easy-to-install unit for smaller reservoirs/impoundments.

a draft tube to force top-to-bottom exchange, the system is very economical operating at up 90% less than conventional horizontal flow systems.

The ResMix 'Source Management' system improves and maintains water quality in the reservoir with the benefit of downstream savings at the water treatment works, which has made it the first choice for many water utilities. ▶▶

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