HYDROFLUX
WATER | SCIENCE | TECHNOLOGY

March 2019

NEWS FOR CUSTOMERS AND FRIENDS OF THE HYDROFLUX GROUP

Solution For Algal Removal In Water Supplies

FEATURE STORY

BY MITCHELL HASTINGS

In Australia, ponds, lagoons, rivers and lakes form a significant part of the industrial and municipal water cycle. These "surface water" systems are important parts of both the water supply and wastewater treatment stages of the cycle. In recycling and advanced water processes, surface water systems form part of both the water and wastewater treatment process. The relatively low cost to use surface water supplies, as well as the robust nature of pond/lagoon systems in wastewater treatment make surface water systems extremely popular.

A major drawback for existing plants is algal blooms. Wastewater ponds & lagoons for anoxic treatment and final waste stabilization are also regularly covered by algal blooms. Ineffective denitrification or chemical/biological phosphorus reduction within the ponds often leads to extensive algal blooms. Algal blooms then create significant operation and maintenance issues for filtration systems within potable water and wastewater recycling systems. Although algae are treated as simple plants, they pose a threat to all potable water and tertiary treatment systems because of "fouling" issues. Fouling is caused by algae's small spores which become lodged in the roughened surfaces found within packed media and membrane filtration systems. Over time, the filtration systems block from the build-up of cellular material on the filter media. This fouling rapidly reduces treatment plant performance. To exacerbate the issue, dead and decomposing algal cells provide the necessary nutrients for other forms of anoxic and anaerobic bacteria to thrive, leading to biofilm formation on filtration media and throughout the treatment plant. Replacement costs for membranes in potable and process water plants can be significantly reduced by the effective removal of algae in the feed water supply.

Some algal strains are more problematic than others. One particularly problematic type, found regularly throughout Australia is Blue-Green Algae (a type of cyanobacteria). Blue-Green Algaal blooms are harmful to human health, animals, and the environment. Disinfection of water through chlorination is regularly used to control the growth of microbiological organisms. Blooms of cyanobacteria generate toxic secondary metabolites called cyanotoxins during routine chlorination of treated water. Health impacts of exposure to cyanotoxins in drinking water include (but are not limited to) damage to the kidneys, liver and gastroenteritis.

Aside from cyanotoxins, by-products of chlorination include the production of trihalomethanes. Trihalomethanes (THMs) are compounds produced in the reaction between the chlorine used for disinfection and organic matter present in the water. If present in high concentration, THMs can lead to negative health effects like cancer. THMs are tightly regulated in many food industries, which often need high-grade process & potable water for production. The presence of algae in surface water supplies and subsequent THM increase can lead to product quality issues within production facilities.

Algal blooms are difficult to control. It may be impossible to reduce nutrients in the surface water system. Many surface water supplies are dogged by season blooms associated with nutrient run-off from agriculture which cannot be controlled. Similarly, the costs to upgrade ponds/lagoons to enhance their nitrogen or phosphorus removal rates may be prohibitive. In instances such as these, alternative treatment to remove algae from the water is required.

Dissolved Air Flotation (DAF), applied correctly, is highly effective in resolving the problem of algae accumulation. DAF is a treatment process which clarifies wastewater through the removal of suspended solids by modifying pollutant particle density through air bubble attachment. Removal is achieved through a process of releasing dissolved air in the water under

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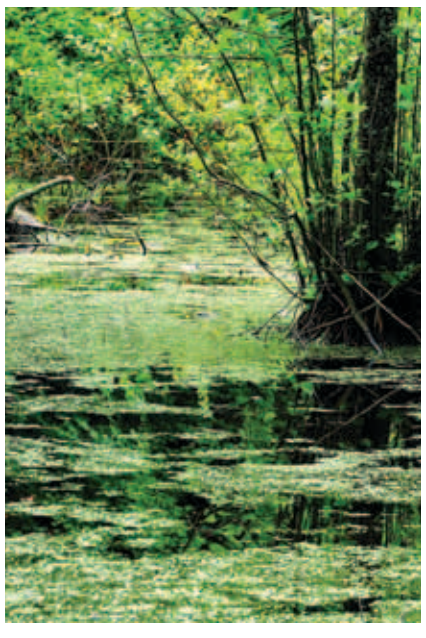

Deurbanisation. Planning For Sustainability

FEATURE STORY

BY ANDREW MILEY

Whilst the population of urban areas increases, every community, no matter how big or small or where they are located, needs to have an effective method of safely disposing of the sewage generated by the people living and working there to prevent environmental contamination.

Sewage treatment in remote locations poses more challenges. These areas need special attention as they are typically more environmentally sensitive than their urban counterparts. When untreated or inadequately treated wastewater is released into the environment it can have significant environmental, human health and socio-economic impacts.

Domestic sewage consists of household wastewater (from sources such as bathing/showering, dish-washing, laundry, toilet flushing, etc.) and human waste which can contain a wide range of chemical contaminants, as well as pathogenic microorganisms that can cause parasitic intestinal infestations and communicable diseases such as giardiasis, cholera, typhoid, dysentery and diarrhoea.

Domestic wastewater often contains a wide range of dissolved and suspended chemicals originating from detergents, as well as pharmaceuticals, cosmetics and personal care products — collectively known as 'emerging contaminants'. In addition, many soaps and household cleaning products contain high levels of nitrogen, potassium and phosphorus-plant nutrients that can cause an ecological imbalance if they accumulate in the environment.

The inadequate treatment and disposal of human waste can contaminate soil, groundwater and surface water bodies.

Inadequately treated sewage is not only unsightly, it can also be odourous. Discharged sewage can serve as a breeding ground for flies, which may also feed

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FROM THE CEO

Dear Readers,

Welcome and thank you for taking the time to read our latest newsletter.

Whether you're a potential customer with a challenging water or wastewater project ahead, a valued existing customer catching up on our latest news, or a partner, supplier or potential employee looking for new opportunities and challenges, I trust you'll find our newsletter interesting and informative.

At Hydroflux we have a clear vision of what we want to be – the regional leaders in sustainable water and wastewater treatment – and we are aggressively driving our business to that end through the continual acquisition of the very best water professionals, technology, and the rapid development of new product offerings.

The Hydroflux Group - now incorporating eleven integrated companies with offices in Sydney, Melbourne, Brisbane, Auckland NZ, Portsmouth UK and Suva Fiji – is continuing its regional and global expansion at a rapid pace.
The world is growing rapidly, creating new environmental problems; and to this end, Hydroflux will continue to strive to make a positive impact for our common future.

I hope you enjoy our newsletter and please feel free to contact your local Hydroflux office for information, advice or assistance, or if you would like to join us in this worthwhile endeavour.

Thanks again

Adrian Minshull
CEO

If You're Using Polymer in Your Wastewater Treatment Process, You May Want to Read This

BY BRUCE WILLIS

Polyacrylamide based polymers (sometimes referred to as flocculants) are used extensively in industrial water and wastewater treatment, and in food processing wastewaters, cationic polymers are the norm.

Choosing a suitable polymer for your wastewater plant is only half the battle. Assuming you have a suitable water treatment plant (DAF for instance), and assuming the myriad of important operational parameters are well managed (flow rate, pH, coagulant type and dose rate, dose locations etc.), your plant may still not be performing as expected. The reason for this may be as simple as having a poor polymer make-up system that is providing poor quality polymer solution.

Of all the chemicals used on a water treatment plant, the polymer can be the trickiest one to manage properly. Polymers are usually supplied as a product that needs further "manufacturing" before use. For instance, granular polymers (sometimes called powder polymers) need to be added to water, that is they need to be wetted, hydrated and uncoiled before use – a process that may take up to an hour to complete. Emulsion polymers need to be inverted first, then hydrated and uncoiled before use - and this may take as little as 5-10 minutes if appropriately managed.

Getting this "manufacturing" step right requires a highly evolved understanding of the physio-chemical processes taking place at this initial step where the granular or emulsion polymer is added to the water. This understanding allows the correct and suitable choice of equipment to help initially wet or invert the polymer before hydration so that uncoiling can occur.

As an example, for granular polymers poor wetting can lead to polymer clumping where the dry polymer is surrounded by a wet polymer sheath created when only the outside of the clump of polymer is wetted. The gel-like sheath protects the dry polymer inside so it never gets wetted or uncoils so it can't become a useful part of the polymer solution. No amount of mixing will undo this initial clumping, so the polymer solution is now weaker than expected. Not only is this a costly waste of polymer, but these lumps and clumps can become caught in and block pumps and pipework which compounds the problem of low plant performance.

For emulsion polymers, the initial 'flip' or inversion is critical. If the polymer is not inverted correctly, at the correct polymer-to-water ratio, whilst using a suitable amount of energy then the polymer may either be unavailable for use (wastage), or degraded by over-shear; where the long polymer chain is broken up or sheared into smaller, less useful polymer lengths.

The next part of the "manufacturing" process is the hydration step where at the molecular level the water molecules start to adsorb to the polymer chain. This process happens almost in tandem with the third step of uncoiling where the polymer chain itself starts to unwind (uncoil) and extend out in length. Depending on:

- **the polymer form (granular or emulsion);**
- **the polymer type (cationic, non-ionic or anionic);**
- **the degree of polymer branching;**
- **the polymer mol-charge (low, medium, high);**
- **the polymer chain length (molecular weight); and**
- **the strength of make-up (polymer to water ratio)**

the most suitable equipment and operating method for hydrating and uncoiling your particular polymer will vary. Design engineers and operators must play close attention to the type of mixing energy (stirrer or pump for instance), the amount of mixing energy and applied shear, and the mixing time.

Furthermore, make-up water quality will also play a role in determining the final polymer solution quality – parameters such as pH, salt level (TDS), iron content, chlorine levels, temperature etc.

So next time your plant is not performing as expected, have a look at your polymer make-up and dosing system and then ask Hydroflux to come along and provide simple solutions to complex problems.

FEATURED STORY: SOLUTION FOR ALGAL REMOVAL

Continued

pressure in a flotation tank. The advantage of DAF over other clarification technologies for algal removal is DAF's typical bubble size of 10 - 40µm which is perfect for attachment to the fine algae flocs.

Algae cells do not have sufficiently high density to naturally settle at a rate useful for clarification. To enable settling, the algal floc size must be several orders of magnitude larger in clarifiers than is necessary for DAF technology resulting in higher chemical costs. Due to DAF's relatively low particle density, only a small application of air is required to separate the algae from the wastewater. This means that footprint and capital costs for the DAF system are also relatively low.

For water treatment projects driven by financial returns, a typical DAF system can offer ROI's of less than 10 to 12 months due to significant savings in downstream treatment process operation and maintenance costs and higher overall treatment capacity.

The real challenge for wastewater treatment engineers is the management of the chemical addition process. Coagulants, and in some cases flocculants, are mixed with the water to enhance the removal rate of algae. The algal cells can be highly shear-sensitive if not treated carefully during the coagulation process, preventing any subsequent separation. Furthermore, excessive coagulant and flocculant chemical dosages used to compensate for the effect of shearing can have a detrimental effect on downstream membrane processes as well as unnecessarily increasing operating costs. Specialist DAF systems for algae removal, such as the HyDAF process have modified chemical injection techniques for optimising algal floc structure whilst minimizing chemical dose rates.

DAF also generates a more concentrated waste sludge stream. This sludge can then be dewatered further using HUBER Inclined Sludge Press. These solids are loaded with the nutrients taken up by the algal cells and are ideal for composting or use as a fertilizer.

As our finite water resources become more and more stretched, there is a growing need for alternative sources of water supply. Industry and the public will look further into the treatment of nutrient loaded surface water or wastewater to provide a reliable source for potable and process water. If these sources are to be safely and reliably treated the impact of algal blooms on treatment processes must be addressed.

Blue-Green Algae, a type of cyanobacteria, can be problematic if left untreated

MENA Water ultramodern wastewater technology – ideal for decentralised wastewater treatment

When to Consider Decentralised Wastewater Treatment

BY OROD ROOSTAEE

Lack of proper infrastructure is an obstacle faced by many developers. Whilst existing infrastructure is struggling to keep up with population growth, many development projects are being delayed, or even cancelled, because there is no sewage treatment in place to serve the development area.

Conventional wastewater treatment plants are expensive to build and can have a lengthy construction time. They are often not economical when they only serve a limited number of dwellings, and as environmental standards are tightened, older systems are sometimes unable to cope and require expensive upgrades for compliance.

These sewage treatment plants are usually built far from cities and towns so sewerage infrastructure can be a complex collection network with multiple lifting and transfer stations, all of which require routine inspection and maintenance.

For many small towns and cities with a population of less than 20,000 or for new residential development projects that cannot easily be connected to a sewerage network, a decentralised wastewater treatment plant is an ideal and economical solution.

For such situations, Hydroflux offers MENA Water's state of the art containerised MBR plants which have taken wastewater treatment package plants to the next level of cost reduction and simplicity in plant construction and operation.

MBR treatment technology is one of the most recent and advanced technologies for decentralised wastewater treatment. It occupies less than ⅓ of the area a conventional treatment plant might require and produces a very high quality treated effluent - suitable for recycling and reuse.

The membrane modules, the heart of the treatment plant, are housed in a standard ISO shipping container next to the plant machine room where the key mechanical equipment is located.

The plant control panel is fitted in the same container as well, inside an air-conditioned compartment. Raw sewage is pumped to the treatment plant inlet works where a screen removes coarse solid material from wastewater prior to a primary settling tank that further reduces the concentration of oil, grease, sand and other non-organic solids. Biological treatment occurs in underground tanks where dissolved organic contamination and nutrients such as Nitrogen and Phosphorus are removed. Finally, ultra-filtration membranes act as a physical barrier, separating the biomass from the wastewater to produce a very high-quality effluent virtually free of suspended solid material, microbes and viruses.

SITE ARRANGEMENT

The membrane container with all the items and equipment inside it, is a prefabricated and shop-tested unit ready for operation almost as soon as it arrives at installation site. The container is located at ground level and above the biological treatment tanks. This arrangement offers fast and easy access to the major critical components of the treatment plant.

> *"For many small towns and cities that have a population of less than 20,000, or for new residential development projects that cannot easily be connected to a sewerage network, a decentralised wastewater treatment plant is an ideal and economical solution"*

The treatment plant is controlled by the latest Siemens PLC and touch screen and a GSM modem allows operators to monitor the plant remotely via a PC, tablet or a smart phone whilst faults in the process alert plant operators or managers via SMS.

MENA Water is an engineering and manufacturing company and a member of the German Huber group. Their containerised MBR plants are designed and built based on German standards. German and European made equipment is used in fabrication of the units and all tanks and mechanical equipment in contact with wastewater are made of stainless steel.

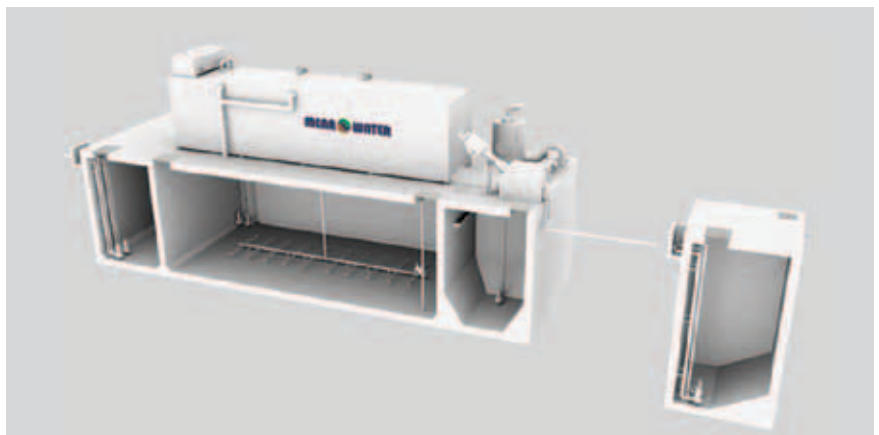


Diagram showing the MBR container mounted over the aeration tanks

Hydroflux launch into New Zealand

When Hydroflux was founded, the intention was to quickly establish Hydroflux as the "go to" company for anything associated with wastewater treatment in the municipal or industrial sector. "Now," claims Hydroflux Director, Andrew Miley, "that has been achieved!"

"We are very optimistic about the future. We have an increasing number of loyal customers who choose to work with us year after year and as our skills and capabilities in treatment plant design and construction improve, we are able take on ever more challenging projects." he said. "The continual growth that the company experiences enables us to invest in our people, regional expansion and design innovations."

Franz Heindl (HUBER), Atif Gafar (CEO, MENA Water) & Declan Creasy (Hydroflux Epco) at the signing of the exclusive Hydroflux Mena Water agreement.

It would have come as no surprise to many that opening a New Zealand office was the latest offering to provide a local presence to a niche market.

Orod Roostaee heads up the New Zealand companies as General Manager. The companies have been set up to provide equipment and process solutions to municipalities and industry.

In addition to the Hydroflux proprietary range of products, the NZ company has exclusive agreements with HUBER and MENA Water for the region. "I have been working with HUBER for over 20 years now and I am excited about cultivating HUBERs presence in another region" said John Koumoukelis, Hydroflux Director. MENA Water (which is 50% owned by HUBER) also opens doors for a high quality range of packaged water and sewage treatment plants.

OROD ROOSTAEE

Over the past 15 years, Orod has worked on numerous water and wastewater treatment projects in many different regions of the world. He has worked in many disciplines to expand his experience in roles as project engineer, design engineer, project manager and regional manager.

Orod brings to Hydroflux his vast experience working as a product development manager at MENA Water which provided a backbone for the development of the agency agreement between the Hydroflux Group and Mena Water throughout the Australia Pacific region. "I am looking forward to developing the NZ market with Hydroflux.

"I believe there are far better solutions and options available to many clients than what they may be aware of and I would like to introduce these advanced water and wastewater treatment processes to them" said Orod.

PNG is a very challenging logistical environment, often having to utilise boats and barges for site deliveries

The Papua New Guinea Legacy Continues

BY PAUL COBBIN

The Hydroflux Group prides itself on long term relationships with its customers, providing solutions that target their needs and their environment.

In Australia, Hydroflux Epco's relationships span six decades across multiple projects with companies such as John Holland, Monodelphous, SA Water, BHP and its subsidiaries just to name a few. Historically in fact, the vast majority of Epco's work is repeat business often spanning decades.

For Hydroflux Epco, the long term customer service perspective also extends to offshore markets such as Oman and Papua New Guinea (PNG).

In the case of PNG, Epco's heritage spans the entire nation, since 1962, from Bougainville in the East to Ok Tedi in the West. Epco's client base is a who's who of PNG mining from Bougainville Copper to Chevron, Ok Tedi, Oilsearch, BHP, Newcrest and Water PNG. The product star for these installations is the Hydroflux Epco RoadTRAIN® packaged sewage treatment plant ranging in size from a capacity of 100 persons at the Kope river port for Oilsearch to the 8000 person plant for the mining town of Tabubil for Ok Tedi.

PNG is a challenging environment to do business. Issues range from extremely remote logistics and unforeseen project risks to complex commercial conditions and of course there are the constant physical dangers of travelling in-country. Risks aside, customers in PNG have the same needs as anywhere else. Hydroflux understands those risks and so it comes back to the basic principles of providing good service and maintaining long term relationships.

One such example of a long term relationship is the recent commencement of the Kiunga project in the Western Province of PNG. The 1000 EP activated sludge plant for the township of Kiunga will be the ninth sewage treatment plant provided by Epco to the Ok Tedi Mining group. A few kilometres away from the Kiunga site lies the first Ok Tedi project, built in 1981, at the mineral process plant adjacent the Fly River. The river port Road-

> *"Papua New Guinea is a challenging environment to do business. Issues range from extremely remote logistics and unforeseen project risks to difficult commercial conditions and of course there is the constant physical dangers of travelling in-country."*

TRAIN® STP is still functioning thirty seven years later, providing sewage treatment for 500 people.

The start of the most recent PNG project was signified by a series of prestart meetings held over a week-long event on site in late September 2018. The event involved key stakeholders and subcontractors with Hydroflux Epco supporting the Ok Tedi Development Foundation (OTDF) as prime Contractor and technology provider.

Not only is this Epco's ninth project with Ok Tedi, but it also typifies Epco's long term commitment to supporting clients for growth. This ninth project provides stage one of five stages for the site to be augmented over the next ten years. The majority of Epco's PNG projects are executed this way.

Considering future growth at the design phase of a project takes effort and ranges from simple things such as blank flanges at the end of pipe manifolds to the sizing of the inlet works and sludge handling for the final future capacity. Site-specific considerations were also in play as the location of the latest project was a previously failed facultative lagoon system so the OTDF overall budget was also taken into account regarding bulk earthworks and orientation of the new project.

It is this legacy of attention to detail and long term commitment that will see Hydroflux Epco continue into the future as it builds upon it's fifty plus installation list of package sewage treatment plants throughout Papua New Guinea and it's regional total in excess of one hundred and forty sites throughout the Australasian region

Hydroflux Epco attending the Kiunga WWTP Stakeholder's Meeting in Western Province, Papua New Guinea

The end of primary sedimentation tanks in wastewater treatment plants?

BY JOHN KOUMOUKELIS

It was in the late 19th century when some cities began to utilise sedimentation systems to treat sewage and this remained the only means of treatment until the activated sludge process was invented in 1912.

Sedimentation systems, more commonly referred to as primary sedimentation tanks or clarifiers, are still in use today. They are still incorporated into the design concepts and planning for future sewage treatment plants as they enable an initial BOD reduction of approximately 40 percent, thus increasing the efficiency of the downstream secondary stage of treatment.

Now there is new technology available that can replace clarifiers and operate with much greater proficiency.

The HUBER LIQUID Drum was developed as part of a research project on alternative technologies contributing towards energy utilisation. The LIQUID technology is an extension of the popular ROTAMAT Screening Process, which is proven in over 4000 references. It is now distributed throughout Australia & New Zealand by Hydroflux Epco as an innovative alternative technology to primary clarifiers. It reduces the amount of space required for a clarifying tank by up to 90 percent whilst reducing energy use and high investment costs.

The system uses a fine mesh with 0.1 to 0.2 mm holes in a star pattern to increase the effective surface area of the drum which enables similar suspended solids removal rates when compared with conventional primary clarifiers.

The unique star shape provides a significant increase in screen surface area allowing a single drum to process 5 MLD in 15 m2 compared to the 200 m2 a primary clarifying tank requires.

The benefits of the HUBER LIQUID Drum include:

- freeing up space and land, with a 90 percent reduction in the space required compared to a clarifier;
- performance as good as, or better than sedimentation;
- major savings in capital costs for installation;
- gravity is used to capture sludge in a wash press for thickening by 4 to 6 percent without using polymer;
- existing clarifying tanks can be re-purposed. For example they could be reconfigured into aeration Basins.

HOW IT WORKS

The HUBER LIQUID Drum is an in-channel fine screen that uses a drum with mesh profile to separate fine solids from the sewage flow. It is typically installed in a concrete channel downstream of the inlet works. It is provided with a main frame, channel seal plate, covers, spray system and main drive.

As the fine solids accumulate on the screen face, the headloss gradually increases due to the blinding of the drum. At a pre-set headloss the drum is rotated through a wash recycle and the solids are washed into a trough and sluiced out of the machine for further processing. The mesh geometry provides low headloss values and the drum sizing and water levels are configured to reduce headloss values across the total screen. Spray water is used for washing the drum with low and high-pressure systems. Reclaimed effluent can be used for spray water.

The discharge of the screened sewage gravitates to the next process step. The solids washed from the drum are sluiced from an internal trough. Typically, these solids are pumped for digestion or can be thickened using a HUBER WAP LIQUID Press.

This technology is a breakthrough for sewage plant operators whose goals are to reduce operating costs. The technology is affordable, uses little space and provides a good return on investment.

Leachate - What is it & Why is it a Problem?

BY MATHEW PUGH

When you hear the word leachate, what comes to mind?

Many, perhaps, would imagine a small polluted stream of water. Others might immediately think of landfills and the problems caused by the unsustainable disposal of waste material for decades.

The latter, of course, is correct while the polluted stream may be true sometimes. Leachate is the term used for any liquid produced by the action of 'leaching'. Leachate is the water that has percolated through any permeable material.

Government data suggests that there are around 500 officially registered landfill sites in Australia and although the number is declining, the average size of landfill sites is increasing. Approximately 75% of garbage in Australia goes to just 38 sites. Thankfully, we are reducing our reliance on landfills, partly by recycling as much as we can and focussing more on the sustainable use of anaerobic digestion plants that are converting our waste to energy. We are also reducing the amount of non-biodegradable products we use. Coles and Woolworths recent ban on disposable plastic bags is one example of Australia's commitment to protecting our environment.

Released in 2016, the second edition of the New South Wales Environmental Protection Authority's Environmental Guidelines for Solid Waste Landfills, requires that (among many other regulations), all landfills are to have a leachate barrier to contain leachate and prevent the contamination of surface water and groundwater over the life of the landfill. However, even if all landfills met these requirements, leachate from old landfills still needs addressing as the problem lingers for many years.

It is not only landfills that generate leachate. There are many other problems associated with contaminated land in general. There are numerous sites throughout Australia where developers need to overcome leachate problems caused by historical industrial activity. There are many infamous cases in Sydney alone, where over the last few decades we have had to deal with far more severe pollutants than those found in conventional landfill operations, and there will certainly be a lot more cases in future.

WHAT ARE THE OPTIONS FOR HANDLING LEACHATE FROM LANDFILL SITES?

The options available include offsite disposal, discharge to sewers with or, possibly, without pretreatment or treatment onsite for environmental disposal or reuse. Offsite disposal is very uncommon due to prohibitive costs unless the landfill is very small.

Discharge to sewers may be possible depending on the site location, and infrastructure availability and capacity. The degree to which leachate has to be treated depends on local trade waste legislation.

Leachate from landfill sites contains a variety of different substances, although by far the most significant contaminant is ammonia. Ammonia and other forms of nitrogen occur naturally in the environment, but concentration levels in leachate can be alarming. Decomposition of plant, animal and human waste produces ammonia and many household and industrial cleaning products, including disinfectants, also contain ammonia.

Ammonia levels for discharge to sewers vary across Australia. For example, Sydney Water requires an ammonia concentration of less than 100 mg/L for sewer discharge whilst Urban Utilities in Queensland set 200 mg/L as a more lenient upper limit. However, with ammonia often present in concentrations in excess of 1000 mg/L in landfill leachate, discharging leachate to sewers will almost certainly require some form of pretreatment anywhere in Australia.

Naturally, discharging into the environment has far more stringent requirements. Due to ammonia's environmental effects, discharge concentrations are very low. In fact, 0.3 mg/L for freshwater and 0.5 mg/L for marine waters are the trigger levels established by the Australian and New Zealand Environment and Conservation Council (ANZECC).

WHAT LEACHATE TREATMENT METHODS ARE AVAILABLE?

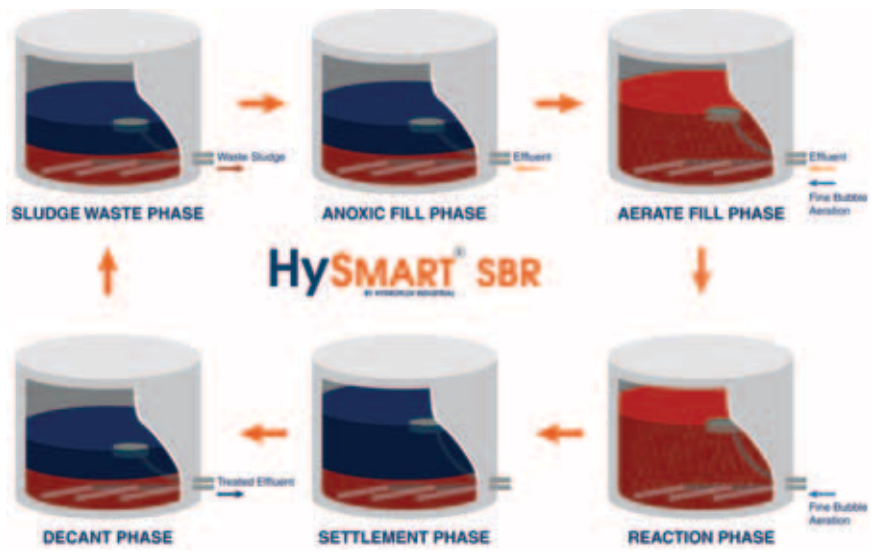
Ammonia concentrations in leachate can be reduced by air stripping, chemical treatment or biological processes.

Air stripping is not common practice as stripping towers are expensive with high operating costs due to high alkalinity, strong buffering and the need for large volumes of alkali to enable the process to work. Air stripping also releases large quantities of ammonia into the air resulting in air pollution, which is a major concern.

Research has also been conducted on chemical precipitation with some success and although sewer discharge limits may be achievable with this method, operational costs are high.

Biological processes are the preferred means of treatment of leachate and there are several types of aerobic biological processes that can be adapted for ammonia removal. Mixed Bed Biological Reactors (MBBR). Membrane Bioreactors (MBR), Activated Sludge, various fixed-film media processes and Sequential Biological Reactors (SBR). The preferred option for a particular situation generally comes down to cost, space requirements or simply personal choice.

Hydroflux has extensive experience in treating wastewater sources containing high ammonia loads and has experts in the fields of design, construction and operation of many different types of wastewater treatment plants. The Hydroflux HySMART®SBR can easily be configured for ammonia removal.



Hydroflux HySmart® Sequencing Batch Reactor (SBR) phases of operation

CoverSweep® – Launder Covers Increases Profit and Productivity for Wastewater Operations.

BY JOHN KOUMOUKELIS

Controlling the alarming growth of algae in the secondary clarifier effluent stream, specifically in the launder, is one of the challenges the modern wastewater treatment facilities is facing, particularly in Australia.

CoverSweep® Launder Covers inhibit the rapid growth of algae in the secondary clarifier effluent stream by preventing the direct contact of sunlight on an area highly-prone for intense growth of algae. The covers also prevent the entry of windblown debris like plastics, leaves and dust, etc.CoverSweep® Launder Covers can also trap the emitted gases and localised odours during the treatment procedures which can potentially cause irritation. This is a new feature only used by CoverSweep® and is one of the many features that make CoverSweep® highly-distinct from its counterparts.

Furthermore, CoverSweep® Launder Covers comprise numerous, highly durable parts fabricated to the outline of the clarifier. Each part is made to extend from the wall going inward over the weir and launder up to the scum baffle. These covers are resistant to corrosion and exhibit remarkable durability as they are fabricated from stainless steel or fiberglass reinforced plastic.

CoverSweep® Launder Covers ultimately increase profit and productivity for wastewater operations.

Completed Project - Likuliku Resort, Fiji

The Hydroflux Epco RoadTrain® installation at the exclusive Likuliku Lagoon Resort in Fiji is complete.

Likuliku Lagoon Resort is a haven of subtle luxury for guests. A wilderness island retreat, it is the first resort in Fiji with authentic over-water-bures located in a natural ocean lagoon, surrounded by a protected marine sanctuary. It is a unique and special place amidst a pristine environment, designed with integrity to Fijian cultural values, traditional designs and architecture, and is embraced by the renowned warmth of the Fijian people. It is this pristine location and the desire for its preservation that lead to discussions with Hydroflux for the supply of a suitable treatment plant.

The Hydroflux Epco RoadTrain® is undeniably the most robust sewage treatment plant available in the market, as it is specifically designed for operation in remote areas where simplicity is essential. It is not only designed to meet the demands of resorts but also ideal for isolated communities, mining and construction camps for the complete purification of domestic sewage to a quality allowing discharge to local water courses, irrigation or reuse.

The RoadTrain® is a pre-fabricated on-site sewage treatment system. These “plug-and-play” micro sewage treatment plants are available in three different sewage treatment process options and two modes of fabrication.

Apart from the simplicity of operation, it was the flexibility of fabrication methods that made the RoadTrain® a cut above the rest.

The Hydroflux Epco RoadTrain® installation for the Likuliku Resort in Fiji

As remote locations often have accessibility problems the advantage of being able to fabricate the RoadTrain® for packing in 20ft containers for simple assembly on site is a great benefit to all parties.

If logistics is not an issue, the RoadTrain® can be supplied as a completely welded and assembled system that requires minimal installation works.

The most commonly used RoadTrain® is based on the Extended Aeration Activated Sludge Process although Rotating Biological Contactors are also popular.

Hydroflux Committed to Protecting Fijian Water

Hydroflux Project Managers, Andrew Devlin & Stuart Petersen with a few of the local installation crew in Viti Levu

BY JAMES HALL

Hydroflux Pacific opened its doors in January 2017 following an influx of orders from resorts for containerised MBR’s and Hydroflux RoadTrains®. It now provides an important local presence in Fiji and the surrounding Pacific Islands.

Stuart Peterson is a Director of Hydroflux Pacific and is the local contact for the Pacific region. Born and raised in Fiji, Stuart has had a decade long career in the water treatment industry. “I’ve built up a solid foundation of experience and ability working with clients from a variety of industries across the Asia-Pacific region. I’ve developed specific expertise assisting clients with mining, boilers, cooling water, pre-treatment, wastewater and water reuse projects, where I’ve routinely provided strategic and innovative solutions to challenging issues” said Stuart.

There is a substantial number of ongoing and future water and wastewater projects happening in Fiji involving infrastructure, water and wastewater treatment plants, water distribution, automation, monitoring and sludge management. At the end of 2018, the Water Authority of Fiji is reporting over $200 million of ongoing projects.

One significant project recently completed in August 2018 was the Natadradave water project in Dawasamu, Tailevu. This was just one of the projects that Prime Minister Hon. Josaia Voreqe Bainimarama opened around that time stating “No family should wake up wondering where the water they need will come from. No family should be forced to make a long, arduous journey in times of drought. And every family should know that clean water is nearby, whenever they need it, and in whatever quantities they require. And I will not rest until that is the reality for every Fijian,”

Hydroflux is proud to be a part of the solution set to achieve Mr Bainimarama’s and Fiji’s goals.

Of course Hydroflux’s experience does not just extend to municipal works. The company has vast knowledge and skills in the design and construction of industrial wastewater treatment plants. The photo shows Andrew Devlin and Stuart Petersen with their installation team taking a well-earned break from the installation of a 1.5 ML/day wastewater treatment plant at a major food processing facility in Suva, Fiji.

Hydroflux Pacific is an active member of the Australia Fiji Business Council.

Featured story:
Deurbanisation.
Planning For Sustainability -
Continued

on any exposed decomposing matter, transmitting disease to humans they subsequently contact. Domestic animals and livestock such as dogs and pigs, as well as rats and other vermin, may also be attracted, spreading the human faeces, and potentially also disease-causing pathogens.

HEALTH THREATS

Domestic wastewater can contain high levels of excreted pathogens, many of which can cause gastroenteritis. The United Nations estimates that 1.45 million people die every year from diarrhoea, with children under the age of six being most vulnerable. Fifty-eight percent of these deaths are attributed to limited access to clean water and poor sanitation and hygiene. People can become infected if they come into direct contact with untreated wastewater, or indirectly if they swim in contaminated freshwater or coastal waters, or consume food or drink water contaminated by wastewater.

Filter feeders such as shellfish are particularly prone to contamination and can make a person ill if they are consumed. Some species of fish can accumulate toxins in their tissues, which become more and more concentrated over the course of their lifetime. When affected fish are consumed these toxins may pose grave health risks, particularly if they are eaten regularly, as these toxins may also accumulate in the body tissue of humans.

ENVIRONMENTAL IMPACTS

In addition to the human health risk, inadequately treated wastewater can have significant ecological impacts too. Studies have shown that pharmaceuticals released with human wastewater can disrupt the endocrine system of aquatic animals such as fish and frogs, feminizing males, which upsets the ecological balance and threatens biodiversity.

Nutrient loading can strip oxygen from the water, leading to hypoxic conditions in freshwater lakes and coastal bays, known as 'dead zones', which cannot support life. High nutrient loads also adversely affect the ability of coral reefs to withstand or recover from coral bleaching. An abundance of phytoplankton limits light penetration and provides a food source for the larvae of the predatory crown of thorns starfish

"Studies have shown that pharmaceuticals released with human wastewater can disrupt the endocrine system of aquatic animals such as fish and frogs, feminizing males, which upsets the ecological balance and threatens biodiversity."

and filter-feeding organisms, allowing them to thrive to the detriment of corals. In addition, flourishing algae, stimulated by the influx of nutrients, can out-compete and smother coral, inhibiting its ability to grow or recover. Eventually these environmental impacts can lead to significant health and economic impacts.

SOCIO-ECONOMIC IMPACTS

A reduction in biodiversity in both freshwater and marine ecosystems can adversely affect commercial fisheries, which in turn can lead to loss of income or job losses. Artisanal and subsistence fisheries may also be affected, resulting in the loss of the staple food source for communities that rely on seafood as their main source of protein. Degradation of habitat, such as coral reefs and freshwater lakes, which support recreational activities can lead to a drop in tourism, resulting in economic losses and job losses in both the tourism sector and industries/businesses that support these activities. In many regions, particularly remote islands, the fishing and tourism sectors are vital to the economy, providing the primary sources of employment so the socioeconomic implications are significant.

A Hydroflux Epco RoadTRAIN® treating wastewater from a remote village in Papua New Guinea

Contamination of groundwater and other sources of drinking water can be costly to rectify. Contaminated water will need to be purified to render it safe to drink, and this treatment can be expensive, especially in remote locations.

Sewage treatment options for remote locations

Sewage treatment systems fall into two groups:

1) on-site treatment systems; and

2) effluent or sewage treatment systems.

Due to the lack of infrastructure at remote locations, sewage is usually treated on-site. Commonly used onsite sewage treatment options include composting toilets and septic tanks.

However, because sludge removal is not available at remote locations, disposal remains a problem. Typically, a septic tank system with a soak pit is employed. But contaminants leach through soils to pollute groundwater and freshwater bodies, and ultimately coastal waters. A more efficient solution is required, particularly in ecologically sensitive areas.

One such solution is a turn-key pre-fabricated on-site sewage treatment system. The Hydroflux Epco RoadTRAIN® is a self-contained sewage treatment plant that is specifically designed for use in remote locations.

These 'plug and play' micro sewage treatment plants are available in three different sewage treatment process options:

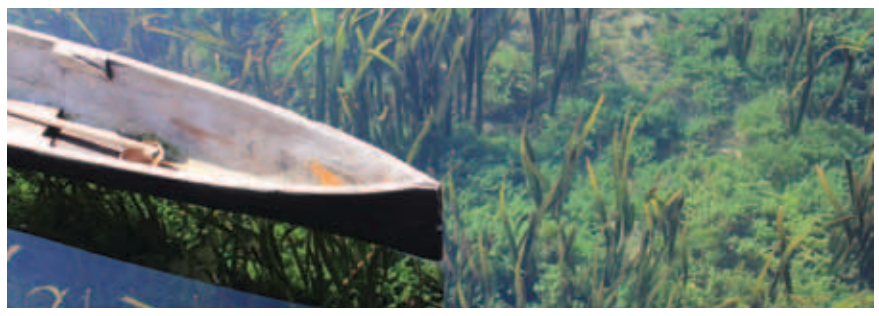
- Extended Aeration Activated Sludge Process
- Rotating Biological Contactor
- Membrane Bioreactor

The choice of the most appropriate sewage treatment process depends largely on the space available, the location of the site and the discharge requirements.

While sewage treatment at remote locations can be a logistical challenge, primarily due to labour constraints, costs, and site accessibility, it needn't be so.

These 'plug and play' units address some of the key challenges associated with sewage treatment in remote locations: they can be shipped anywhere as a flat-pack and bolted together onto a concrete slab on site; they are cost efficient to set up and operate and the treated effluent discharge is of high quality and can be treated further with optional tertiary systems for reuse if required. These factors combined with the fact that they are simple to operate and require very little maintenance make them ideal for treating sewage in remote locations.

While sewage treatment may not be a top priority in sparsely populated remote areas, it shouldn't be overlooked. The risk of groundwater contamination is the same as anywhere else, and the environmental, health and socioeconomic impacts may be much higher.



MBR containers are Ideal for permanent and temporary facilities and easily installed in 1 day

United Kingdom - Containerised MBR Systems Available

Hydroflux Ltd is the UK division of the Hydroflux Group. With a strong presence and expertise in the Food and Beverage Sector.

Hydroflux UK currently has a limited number of MBR containers in stock and available for immediate dispatch.

The systems are ideally suited to treat domestic sewage from resorts or camps and wastewater from small industrial applications. The system will produce effluent of very high quality, suitable for discharge to coastal, surface or brackish waterways, or to be reclaimed for irrigation.

Each MBR is designed to treat the wastewater generated by the equivalent of 250 persons (EP) however multiple units can be operated in parallel to treat higher flows using an integrated pump station and controls.

The systems use Kubota membranes and their performance is outstanding. A recent installation at an herb farm in North Eastern UK is reducing BOD in the wastewater down to <2 mg/L - well below the discharge requirements.

A number of MBR containers have been supplied to resorts in Fiji and Samoa, food processing applications in New Zealand and camps in Indonesia.

There are still a few of these second-hand, but unused, units available for a fraction of the cost of a new one. Please get in touch with your nearest office for more information.

Free Stainless Steel Straw

Building water, wastewater and recycling plants is one way of protecting our most valuable resource, but here at Hydroflux we like to go a little bit further. The European Parliament recently voted on an EU-wide ban on single-use plastics and with many countries already imposing a plastic straw ban, it is only a matter of time before single use plastics will be laid to rest.

For those who still enjoy drawing their favourite tipple though a tube, we have a solution for you. If you were lucky, you may have received a stainless steel straw with this copy of our newsletter, however if you didn't and you would like one, please send an email to newsletter@hydroflux.com.au with "send me a straw" as the title and one will be promptly mailed to you.

Advanced Odour Control

The Neutralox system is an odour treatment process ideally suited for the removal of odours from pump stations, tanks and buildings.

3500m³/per hour Neutralox system being delivered to a food processing plant

HOW IT WORKS

The Hydroflux NEUTRALOX® Photoionisation process is a physio-chemical off-gas treatment process for the control of odours originating from waste, sewage and sludge treatment processes. The technology is based on the application of UV-light and catalysts.

The raw untreated gas first passes through a dust filter, contained in an easily accessible compartment of the system, before passing through the UV-compartment where UV-light initiates catalytic enhanced chemical reactions The linkages of odour molecules are broken-up by the UV-light and the reaction between UV-light and naturally occurring constituents within the air also creates additional oxidants to further degrade or otherwise eliminate odours. Photocatalysts enhance the reaction and further degrade odorous compounds preventing the release of oxidants into the atmosphere.

The downstream fan ensures extraction of the polluted air from the odour source by keeping the whole system under negative pressure conditions.

BENEFITS

- **Effective treatment of all odour substances (not only H2S)**
- **Effective treatment of high odour concentrations**
- **Effective treatment of varying odour concentrations**
- **Very small footprint**
- **No waste products or chemicals required for operation**
- **Fully automated and low power demand**

HYDROFLUX QUIZ - DIFFICULTY: HARD

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1	7					9	5	
		9		6				
	5	8			7			
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		4			9			1
2				3				4
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HYDROFLUX
WATER | SCIENCE | TECHNOLOGY

The Hydroflux Group comprises eleven companies based in Australia, Fiji, New Zealand and the United Kingdom, providing design-and-build, equipment, process and operational services in water and wastewater treatment.

The group's skills and experience span across municipal and industrial water and wastewater treatment with full after sales support.

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