

Water & Sanitation Africa

Complete water resource and wastewater management

APE PUMPS & MATHER+PLATT DRIVING INNOVATION, FUELLING GROWTH

**INNOVATION, PERSEVERANCE,
AND A BOTTLE OF BRANDY:
JÜRGEN MENGE'S WATER
REUSE STORY**

*Is your water
second-hand?*
THE REALITY OF
DE FACTO REUSE



Closing the loop:
WASTE, WATER AND A SUSTAINABLE FUTURE

**FIGHTING
FIRE WITH
WATER
DURING A
WATER
CRISIS**



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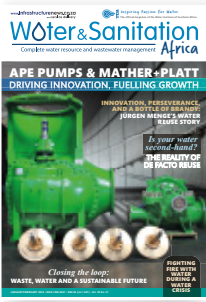
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ON THE COVER

APE Pump's global holding company – WPIL Limited – have had a busy year. They have acquired a 100% shareholding of MISA (Italy), a 100% shareholding of Eigenbau (South Africa) as well as a pending (subject to Competition Commission approval) 55% shareholding of process engineering and turnkey contracting company. **P6**

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SUPERIOR FILTRATION

PIONEERING WATER FILTRATION SINCE 1984



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Inspiring passion for water

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- Anaerobic Sludge Processes
- Industrial Water
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- Innovation for Water Supply & Sanitation
- Mine Water Lead
- Process Controllers
- Small Wastewater Treatment Works
- Water Distribution
- Water Reuse Division
- Modelling and Data Division

EMPOWERMENT PLATFORMS

- Women In Water
- Young Water Professionals



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Groundhog day for the water sector

The phrase 'Groundhog Day', has come to describe a tedious, repetitive cycle of events, a situation in which events that have happened before happen again. The phrase comes from the 1993 film starring Bill Murray, where a TV weatherman is trapped in a time loop, reliving February 2nd endlessly.

As editor of WISA, I receive, on an almost daily basis, photos of pollution in our rivers. I receive press releases, on an hourly basis that has the phrase 'water crisis' in it and I speak to experts, again almost daily that mention the devastating consequences that a decline in the quantity and quality of water has for businesses, the environment and communities.

And yet, the situation remains largely unchanged. Year after year, we hear the same warnings and see the same disturbing images. Like Bill Murray's character in *Groundhog Day*, we seem trapped in an endless cycle where the problems are well understood, solutions are known, and yet, nothing fundamentally shifts.

The evidence is overwhelming. Our water infrastructure is crumbling, pollution levels are rising, and many communities still lack access to clean drinking water. Droughts and floods, exacerbated by climate change, add further pressure to an already strained system. Despite countless reports, task forces, and promises of intervention, the same challenges persist.

So, what will break this cycle? How do we move past this endless loop of discussions and into real action?

Firstly, accountability must be at the forefront. Stricter enforcement of existing water regulations and harsher penalties for non-compliance are necessary. Polluters must face real consequences, not just slaps on the wrist. Transparency in how water resources are managed is equally important – government,

municipalities, and corporations must be held to account for their decisions.

Secondly, investment in infrastructure is critical. Decaying water treatment plants, outdated pipelines, and failing sewage systems cannot sustain growing populations and industrial demands. Financial commitments need to translate into tangible upgrades that benefit both urban and rural communities.

Thirdly, there needs to be a shift in public and political will. The water crisis should not just be a topic for World Water Day press releases; it must be an ongoing priority that commands action across all levels of society. Public pressure can influence policy, and informed citizens can demand better stewardship of water resources.

Finally, innovation and sustainable solutions should be embraced. Water recycling, better agricultural practices, and improved conservation techniques all exist but require commitment and funding to be implemented effectively. Collaboration between the public and private sectors can accelerate these solutions.

We cannot afford to keep reliving the same day, over and over, while our water resources diminish. It is time to step out of this loop and create a future where access to clean water is not a crisis, but a given. The cycle can be broken – but only if action replaces words. ●

Kirsten



COVER OPPORTUNITY

In each issue, **Water & Sanitation Africa** offers companies the opportunity to get to the front of the line by placing a company, product or service on the front cover of the magazine. Buying this position will afford the advertiser the cover story and maximum exposure. For more information, contact Sindi Moni on +27 (0)82 212 4574, or email sindi@infrastructurenews.co.za.

You said it in WASA

The opinions and statements shared by thought leaders in the water industry to **Water&Sanitation Africa**.



"APE Pump's global holding company – WPIL Limited – have had a busy year. They have acquired a 100% shareholding of MISA (Italy), a 100% shareholding of Eigenbau (South Africa) as well as a pending (subject to Competition Commission approval) 55% shareholding of process engineering and turnkey contracting company." **John Montgomery, GM of APE Pumps and Mather + Platt**

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"Modern water treatment technologies—such as membrane filtration, biological or physico-chemical treatment, clarification, evaporation, disinfection, demineralisation and advanced oxidation—make reuse not only viable but beneficial. Wastewater can be safely treated for use in cooling systems, irrigation, process water, and even groundwater recharge. However, technological feasibility alone is insufficient. Stakeholder trust must be cultivated to drive acceptance of reuse strategies." **Dr Harrison Pienaar, chairman, WISA**

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"Many of our existing customers require expertise and solutions in both water and waste management, as these areas often fall under their broader sustainability strategies. In some cases, water—specifically effluent—is classified as waste and must be treated before being discharged. By incorporating water management into our portfolio, we are enhancing our service offering and providing clients with a more comprehensive, sustainable solution." **Dean Thompson, CEO, EnviroServ**

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"There are some serious skills gaps in the sector and our training centre aims to address this. We consistently have conversations and training sessions with people throughout the entire value chain; from people installing plants to our end customers on trends in Europe, auto cleaning, verification, calibration, monitoring and maintenance. We also provide customised training, depending on the people who attend our course." **Bernhard Klöss, MD, Endress+Hauser South Africa**

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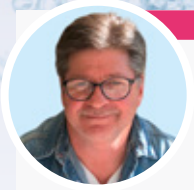
"We need to assist in creating a technical support system, where for instance, local plumbers can fix these new sanitation systems themselves and have ready access to basic parts. We need to extend our view from merely implementing sanitation technology to supporting and maintaining it. Further to this, we have started a conversation with the technology developers and providers about the creation of a forum where more support can be developed to satisfy the market demands." **Randhir Rawatlal, director of the UKZN WASH R&D Centre**

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"Reclaimed water has relieved the pressure on Windhoek's groundwater supplies. Windhoek cannot survive without water reclamation. We have provided 55 years of data and evidence of safe direct potable water reuse practice that has helped convince regulators worldwide that it is a safe and economically viable long term augmentation option." **Jürgen Menge, a recent recipient of the WISA senior fellow award**

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"Our drinking treatment plants were not designed to treat poor quality water, and are mostly only equipped for conventional water treatment processes. To allow for the poor quality of source water where this occurs, their process configurations should therefore also include advanced treatment technologies to ensure removal of all unwanted pollutants from the incoming water."

Chris Swartz, Lead: Water Reuse Division Western Cape Chapter, WISA

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"Our water reuse programme is one of our priority programmes and seeks to recover and repurpose valuable water resources that are currently lost in rivers and oceans. In addition to recovering water from wastewater, the opportunity exists to extract maximum value from a "waste" resource by generating energy and processing sludge for beneficial use, thereby creating new revenue streams to help finance these projects. We focus on resource recovery and assist municipalities in maximising and scaling reuse opportunities in the country. Wastewater can be treated to potable standards or used at a certain quality for industrial and agricultural purposes."

Johann Lübke, head: Water Partnerships Office, DBSA

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"Different stakeholders should coordinate to tackle the issue of pollution. There should also be cross-department efforts between the Departments of Environment, Fisheries and Forestry and Human Settlements. We should work together to implement the reforms in Operation Vulindlela or the Medium-Term Development Plan. If there is no coordination amongst us as government to address the reforms at a local level including the issues of pollution, we will not achieve anything."

Deputy Minister, Sello Seitholo, Department of Water and Sanitation

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"Water is the most important industry in the world. Everything needs water. In South Africa, water requires our attention as it is central to the well-being of its citizens and the economy. I have met design and project engineers and end users across a range of industries and applications. These experiences broadened my perspective and allowed me to incorporate new insights into our product development. It is interesting and fulfilling work. Typically, filtration is a small yet critical component of a plant. A malfunction can have devastating financial and reputational consequences."

Peter Walker, founder of Superior Filtration

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"Maintenance and servicing of fire hydrants used to fall under the fire department's responsibility. But in the early 2000s, the responsibility was removed from the fire department, and it now sits directly with municipal services. I estimate that there should be close to 2.5 million fire hydrants in a metro like Johannesburg. However, many fire hydrants are simply not operational; they are either flooded or have bees or hornets in them. Furthermore, they are not clearly marked. Pillar fire hydrants should be marked, and clearly visible and underground fire hydrants should have blue cat eye reflector markers on the road to help identify where they are. This is seldom the case. I have even come across incorrectly installed fire hydrants that are impossible to access."

Wynand Engelbrecht, the Chief Fire Officer at Fire Ops SA

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"Regulations, climate change, demand and supply, market pressures as well as augmentation plans impact each other, making water risk profiling an extremely complex task. Furthermore, water risks are dynamic and can change on a weekly, daily or even hourly basis. Fortunately, Talbot uses data-driven solutions that provide a more dynamic analysis of future water risks. All of the data and information that we use is extremely granular and localised, so businesses in the same catchment area may have entirely different risk profiles. Similarly, a multi-site business will have a different set of risks per location."

Mike Smith, director, Talbot

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DRIVING INNOVATION, FUELING GROWTH

APE Pump's global holding company – WPIL Limited – have had a busy year. They have acquired a 100% shareholding of MISA (Italy), a 100% shareholding of Eigenbau (South Africa) as well as a pending (subject to Competition Commission approval) 55% shareholding of process engineering and turnkey contracting company.



Every member of the Group is a highly valued team player who contributes to the company's collective success

Originally established as Johnston Pumps India in 1952, WPIL Limited was founded in 1996 and has since built a strong global presence through its leading original equipment manufacture (OEM) subsidiaries. These include Sterling Pumps (Australia), Mathers Foundry Limited (United Kingdom), Gruppo Aturia (Italy) and APE Pumps and Mather+Platt (South Africa). Specialising in the design, fabrication, commissioning, and servicing of pumps and related systems, these companies drive WPIL's expansion across Asia, Europe, Oceania and Africa.

African footprint

"While APE Pumps was founded in 1952, WPIL acquired the entity in 2012. We have been designing, developing, manufacturing and refurbishing pumps for over seven decades – and many of these pumps are placed throughout the African continent," says John Montgomery, the GM of APE Pumps and Mather + Platt (the Group).

Montgomery attributes the Group's remarkable growth to its strong local presence, while capitalising on the benefits of being part of a global network. "As a South African OEM, the Group is not dependent on

imports from overseas territories. Every pump component needed is made at our factory in South Africa. This creates quicker turnaround times for delivery, guaranteed quality and better customer service. Whatever the age or date of installation, APE has the ability to design, fabricate and retrofit."

The Group has a Projects Division that takes responsibility for mechanical, electrical and civil works,

John Montgomery, GM of APE Pumps and Mather + Platt



Thorne Zurfluh, a mechanical engineer at APE Pumps



and is currently graded as an 8 ME contractor by the Construction Industry Development Board. "APE Pumps is far more than an OEM, which is why we have embarked on an acquisition drive to further expand our capabilities and product range and find specialist contractors to support our project build plans," adds Montgomery.

MISA

WPIL Limited's acquisitions have added to the Group's product and service offering. For instance, they have recently acquired 100% shareholding of MISA through its subsidiary – Gruppo Aturia. MISA is a leading Italian company in the business of large pumping station projects and supply of pumps and hydro turbines and has a large reference list across Europe and North Africa. The acquisition further strengthens competencies in the supply of large pumps for water, irrigation and drainage with the addition of an excellent product range.

"MISA have a large range of axial flow pumps that are supplied for bulk water and desalination customers," explains Montgomery.



The Group has a Projects Division that takes responsibility for mechanical, electrical and civil works, and is currently graded as an 8 ME contractor by the Construction Industry Development Board. One of the many examples of successful turnkey projects was the La Mercy Pump Station

Eigenbau

Late last year, APE Pumps finalised the acquisition of 100% shares of Eigenbau. Providing turnkey solutions for the clean water and wastewater sectors, Eigenbau has multidisciplinary project experience which includes the construction and operation of modular treatment plants.

"Their performance-driven culture, expert team, and comprehensive turnkey approach – including inhouse component fabrication – made them the ideal partner. We've been in discussions with their directors for several years, and we're thrilled to have finalised the deal. The synergies and opportunities ahead are truly exciting," says Montgomery.

Eigenbau's experience ranges from large scale water and wastewater works, through to run of river hydro power stations where they have undertaken the challenging process of diverting rivers through to the power houses that are constructed by their staff. They currently hold a CIDB rating of 8CE (civil engineering works), 8ME (mechanical engineering works) and 7EP (electrical engineering works - infrastructure)

APE Pumps has been designing, developing, manufacturing and refurbishing pumps for over seven decades – and many of these pumps are placed throughout the African continent

and are a member of the South African Federation of Civil Engineering Contractor with a BBBEE grading of 3.

Investing in technology

In addition to its acquisitions, APE Pumps continue to invest in technology. They have purchased a process scanner that can track the movement of all incoming and outgoing parts within their factory. This is done to improve efficiencies, identify potential bottle necks and to give customers up to date information on the status of their new pump or repair.

APE Pumps is currently constructing a dedicated 3D scanning room, equipped with large screens for viewing and comparing measurements, models, and drawings. This will serve as the primary workspace for their 3D scanner, except when it is transported to a site for on-location use.

"At APE, 3D scanning is used over and above the traditional quality control methods. It is an additional aid to prevent the misalignment of pumps by

APE Pumps is currently constructing a dedicated 3D scanning room, equipped with large screens for viewing and comparing measurements, models, and drawings





verifying pump geometries (concentricity, parallelism, perpendicularity and shaft runouts) during manufacturing, assembly and even commissioning. All pump parts (new and old) are scanned and measured, to confirm that they are to the manufacturing drawings and are feasible to reuse. The 3D scans are also used to generate digital reports indicating that the pump and pump parts meet (or do not meet) OEM specifications and tolerances. These reports are often supplied to customers. The 3D scanner can even identify a high spot on a bearing housing. Pumps can be scanned at the APE premises or on-site. APE Pumps' investment in 3D scanning technology ensures absolute precision and innovation. We can now verify the final machined tolerances with 100% accuracy

The Group has also bought a new 3D printer that can print various pump parts in different plastics, even carbon fibre reinforced plastic

against an original design," explains Thorne Zurfluh, a mechanical engineer at APE Pumps.

Last year, the company scanned an entire pump station using a 3D geosystem laser scanner, where the model of the pump that was to be installed was attached to the 3D point-cloud data. This put the pump in a virtual setting, and allowed APE to make sure that any interfacing issues (between newly supplied pump and existing site based and pipework) were resolved. The scanner also helped to plan how the pump would be installed. This is a value-add for clients, who do not have up-to-date as-build drawings of their pump stations.

The Group has also bought a new 3D printer that can print various pump parts in different plastics, even carbon fibre reinforced plastic. This assists with rapid prototyping, where pump designs can be easily modified without expensive tooling. Impellers, veins and casings can be optimised for better efficiencies and material waste can be reduced.

Furthermore, the company is extending it already significant factory and erecting a 30-tonne crane in addition to its two existing 10 tonne cranes in order to build and refurbish larger pumps. The working height will be up to 9 metres high. They are also building a testing bay in the near future to conduct performance tests in-house.

APE Pumps is extending its already significant factory. They are also building a testing bay in the near future to conduct performance tests in-house



Other recent significant technological investments include:

- A centre lathe equipped to handle jobs ranging in lengths of up to 8 m and in varying diameters for components such as columns, shafts, and impellers (specifically for circulating water pumps)
- A key slotter for keyway cutting (a drive system feature on one of the group's impeller-lines to enable rotation around the shaft)
- A 12-ton CNC horizontal boring machine for the final machining of larger impellers, which typically measure around 3m in diameter
- A vertical boring machine for the machining of larger components with a Ø3500

"All of this technology must be used and operated by people. Clearly, no pump engineer, specialist technician or artisan is born overnight. The baseline skills are essential, but the experiential, applied learning is what defines master craftsmen, engineers and project managers in all our interrelated disciplines. That is why our business is dedicated to attracting and mentoring the best talent available. We like a two-way mentorship approach, where the old teach the young and vice versa, in modern versus tried and tested techniques. Every member of the group is a highly valued team player who contributes to our collective success. We have exceptionally high employee commitment levels, which is why so many of our staff stay with us through to retirement," explains Montgomery.

He adds that their 100% acquisition of Eigenbau and future 55% acquisition of process engineering and turnkey contracting company will only add to the already high level of skills within the Group. While both companies will continue to operate independently, APE Pumps will now have a phenomenal talent pool to consult when tackling challenges on behalf of their clients. "APE Pumps is not just a pump company, we deliver end-to-end solutions that go beyond manufacturing to include design, refurbishment, and installation, ensuring long-term value for our clients," Montgomery concludes. ●





REGULATION 3630: RAISING THE BAR FOR BETTER PUBLIC SERVICES

Improving local governance isn't some distant bureaucratic goal – it's about making our everyday lives better. Imagine living in a community where the streets are clean, public services run smoothly, and you feel genuinely heard by your local councillors. **By Dr Lester Goldman, CEO, WISA**

That's the power of accountability and effective governance. When these elements are strong, trust blossoms between us and those who make decisions on our behalf. But when they falter, frustration grows, and communities can become disheartened.

At the heart of making this work within the water sector are the people we often don't see: the process controllers. They're like the unsung heroes ensuring everything functions as it should. Regulation 3630 is all about raising the standards for these crucial roles. It's not just bureaucratic red tape – it's about ensuring these individuals are well-equipped, ethical, and continuously learning to serve us better.

Think of accountability as the foundation of a house. Without a solid foundation, everything built on top is unstable. When local officials are transparent, responsive, and act with integrity:

- 1 We feel valued:** Our concerns are heard and addressed.
- 2 Trust grows:** We believe in the decisions made on our behalf.
- 3 Communities thrive:** Collaboration leads to better outcomes for everyone.

By enhancing the standards for process controllers through Regulation 3630, we're strengthening this foundation. Here's how:

1 Higher Qualifications: Making sure they have the right skills and knowledge.

2 Continuous Training: Keeping them up to date with the latest best practices.

3 Ethical Guidelines: Ensuring they operate with integrity.

It's like servicing your bakkie – the better each part works, the smoother the journey. When process controllers perform at their best, policies are implemented effectively, transparency increases, and trust is rebuilt. This creates a positive cycle that boosts the overall well-being of the community.

Of course, this isn't without challenges. Change can be hard, and there are hurdles like:

1 Limited Resources: Budget constraints can make training and development tough.

2 Resistance to Change: It's natural for people to stick to what they know.

3 Measuring Success: It can be tricky to track progress in governance. But tackling these obstacles is essential. It's about prioritising what's important and recognising that the effort we put in now pays off in the long run.

In the end, improving local governance through enhanced accountability and by empowering process controllers isn't just a policy – it's a commitment to ourselves and our neighbours. It's about creating a place where we all feel connected and confident in the systems that support us.

On a side note, exploring how other communities have implemented similar changes could offer valuable insights. Learning from successful cases – perhaps looking at initiatives in places like Cape Town and their Day Zero efforts – might provide ideas on how to navigate the challenges and make Regulation 3630 even more effective. After all, governance is about people coming together to make things better, and every step forward counts. ●





TRUST AND TECHNOLOGY: THE TWIN PILLARS OF WATER REUSE

The adoption of water reuse hinges on scalable infrastructure, strong governance, and technological innovation to ensure sustainable, equitable water management for all.

By Dr Harrison Pienaar, chairperson, WISA

Water reuse is a necessity, not an option, in a country where water resources are under increasing pressure. However, for reuse interventions to be successful, scalability must be a priority. Tailor-made solutions require institutional cooperation, with clear roles and responsibilities for key stakeholders such as the Department of Water and Sanitation (DWS), water boards, municipalities, and catchment management agencies. Without this, regulatory and technical oversight will remain fragmented, limiting progress.

South Africa's diverse water users – from industry to agriculture to municipalities – face unique challenges, especially governance risks. Poor oversight leads to inefficiencies, undermining trust in water reuse initiatives.

To address this, robust comparative analysis of current water

use practices is needed. Transparent, well-communicated governance will encourage end-users to support and adopt reuse interventions.

Modern water treatment technologies – such as membrane filtration, biological or physico-chemical treatment, clarification, evaporation, disinfection, demineralisation and advanced oxidation – make reuse not only viable but beneficial. Wastewater can be safely treated for use in cooling systems, irrigation, process water, and even groundwater recharge. However, technological feasibility alone is insufficient. Stakeholder trust must be cultivated to drive acceptance of reuse strategies.

Sectoral approaches offer additional opportunities. Industries can integrate water reuse into production processes, while municipalities can convert wastewater treatment plants into biorefineries, producing valuable by-products like biopolymers and thermal energy. Such innovations not only reduce water dependence but also create economic opportunities.

The three Rs

Water reuse is only part of the solution. A broader commitment to the 3Rs – Reduce, Reuse, Recycle – is essential. Industrial waste should be reduced with

a greater volume of materials recycled and reused. These interventions are not only a means to promote optimal and effective water use, but it equally provides options for coping with climate variability.

The global water reuse market is growing and evolving, with opportunities that can be categorised into three areas: Reduce, Remediate, Reuse. Several innovations can be investigated: reducing raw water dependence, achieving discharge compliance, wastewater treatment (remediation), and water use efficiency.

Challenges like tighter water quality standards, new wastewater discharge regulations and issues surrounding scarce water resources impact nearly every industry. This means that there are now major opportunities to offer cost-effective, innovative solutions designed to reduce water use through improved efficiency. South Africa must seize this moment to lead in water reuse innovation, ensuring long-term water security for future generations.

Water reuse is not just an environmental imperative – it is an economic and social one. By strengthening institutional frameworks, investing in technology, and fostering collaboration, we can transform water reuse into a national priority. ●





INNOVATORS IN WASTEWATER MANAGEMENT

The WISA Gauteng Branch, in collaboration with UNISA, hosted a seminar titled **Innovations in Wastewater Management: Strategies for Building Water Resilience.**
By Gina Martin, Communications Leads, WISA Gauteng Branch



Guest speakers from the Department of Water and Sanitation, Johannesburg Water, the CSIR and the Auditor General of South Africa discussed challenges and opportunities within the wastewater reuse and recover sector. Their presentations reflected on the status of wastewater management in South Africa and the importance of building wastewater resilience. Case studies on wastewater recycling and reuse were presented by Sasol, Veolia and eThekweni Metropolitan Municipality. Another highlight was a presentation by Professor Magne Sydnnes of the University of Bergen as he showed stimulating research on the possibility of utilising photodecomposition to reduce pharmaceuticals in wastewater.

Innovation in wastewater management

The seminar celebrated innovators in wastewater management. These pioneers, all proudly South African, presented technologies for sustainable reclamation and recovery of waste streams.

Here is a summary of each innovator's technology and its application:

Green UltraPure™ Hydrogen Peroxide generation

MatiTech Solutions is a South African company specialising in onsite Green

UltraPure™ Hydrogen Peroxide generation, utilising only water and electricity as inputs to replace conventional oxidation chemistry. Their UltraPure™ Hydrogen Peroxide decomposes into oxygen and water after an oxidation reaction, leaving no harmful byproducts. When powered by renewable energy, this green solution achieves a carbon-neutral footprint. By combining Ultraviolet (UV) disinfection, the process delivers a sustainable and environmentally friendly Advanced Oxidation Process (AOP). The AOP generates hydroxyl radicals (OH), which break down a wide range of water contaminants including but not limited to:

- Pharmaceuticals and Personal Care Products (PPCP's)
- Pesticides and Herbicides
- Industrial Chemicals
- Volatile Organic Compounds

Inorganic Pollutants:

- Ammonia
- Nitrate

Microbial Contaminants:

- Bacteria
- Viruses
- Protozoa and parasites
- Fungi

Endocrine Disrupting Compounds:

- Bisphenol A.
- Phthalates
- Nonylphenol and Octylphenol

This method is highly effective in degrading harmful complex molecular





structures into smaller, less toxic forms. AOP is a versatile, efficient, and powerful technique for treating various environmental contaminants. It has broad applications in water and wastewater treatment, water recycling, contaminant degradation in groundwater and surface water, potable water treatment, as well as in the pharmaceutical, chemical, food and beverage, and agricultural industries.

*For more information, please contact: Theuns Botha, **MatiTech Solutions** (tbotha@matiafrica.com)*

Advanced anaerobic digestion – thermal hydrolysis process

Advanced anaerobic digestion has emerged over recent time as a proven solution to shift from linear disposal practice towards circular economy practices. The Thermal Hydrolysis Process (THP) is the industry leader in the range of advanced anaerobic digestion applications due to its robust and all-round performance in effectively converting a range of organic material feedstock. In comparison to other approaches, THP has been found to

reduce anaerobic mesophilic digestion retention times while increasing biogas production and improving dewaterability of digestate while eliminating pathogenic content. THP assists in delivering a Class A1 complaint sludge according to the microbiological and stability criteria of the South African sludge guidelines. This has recently been re-confirmed in studies conducted in India, including THP's effectiveness in converting waste activated sludge (WAS) to an effective digestible feedstock. THP is applicable in both greenfield applications where significant digester build savings are typical or in brownfield upgrades where existing digesters present additional treatment capacity once integrated with THP, introducing regionalisation of sludge handling and the ability to then co-digest, allowing for the diversion of organics from landfilling. Carbon footprint reduction is achieved and the possibilities to enter carbon credit trading are made possible.

*For more information, please contact: Gary Brown, **Dikubu Water Solutions Pty Ltd** (gary@dikubu.co.za)*

Beneficiation of wastewater sludge to a commercially marketable registered fertilizer product

Agriman was founded in 1988 to process and beneficially utilise wastewater sludge. Agriman is currently performing sludge management functions ranging from the operation of dewatering plants to the final blending and marketing of fertilisers in the agricultural sector. This is testament to Agriman's development of the full value chain for the beneficiation of wastewater sludge as a commercial registered fertiliser product.

Agriman utilises natural processes and accelerated solar drying techniques to process and dry sludge to a 90% solid content in its final product state. The final product is a registered granular organic fertiliser (Act 36/1947), classified as type A1a sludge. Development was done in partnership with commercial farmers and farming equipment manufacturers to ensure that the product is suitable for commercial farming practices and attractive to the market.

Agronomy is trending towards the increased use of carbon rich organic materials to enhance soil health in a precision agricultural practice environment. Biosolids (sewage sludge) is a perfect fit, and with Agriman's product that complies in both physical and chemical properties, the product is in high demand.

*For more information, please contact: Francois Burger, **Agriman** (francois@agriman.co.za) ●*



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Closing the loop: **WASTE, WATER AND A SUSTAINABLE FUTURE**

Water and waste are essential services that are vital for environmental sustainability and community well-being. Dean Thompson (DT), CEO of EnviroServ, provides insights into both the water and waste management sectors.

**EnviroServ is now a SUEZ company.
How does this benefit your customers?**

DT: The acquisition has added water capabilities to EnviroServ's portfolio. Present on the African continent since the construction of the Sherbine Water Treatment Plant in Egypt in 1948, SUEZ has built more than 500 drinking water and wastewater plants that service over 80% of all major cities in Africa.

SUEZ saw an opportunity in South Africa from an infrastructure perspective to use EnviroServ as a platform to launch water activities locally. EnviroServ now offers efficient, circular and innovative solutions to ensure that water resources are managed responsibly. We cover the entire water value chain.

Many of our existing customers require expertise and solutions in both water and waste management, as these areas

often fall under their broader sustainability strategies.

In some cases, water – specifically effluent – is classified

as waste and must be treated before being discharged. By incorporating water management into our portfolio, we are enhancing our service offering and providing clients with a more comprehensive, sustainable solution.

As a SUEZ company, EnviroServ has gained even more intellectual property, skills and knowledge in the waste and water sectors. We have access to global references and broader expertise.

What in your opinion are some of the most pressing issues that the water sector is facing?

The first issue is water scarcity. More than half of the population in Sub-Saharan Africa lack access to safe drinking water and an estimated 160 million people across the African continent live under water scarcity conditions. South Africa ranks as one of the 30 driest countries in the world, with an average rainfall of about 40% less than the annual world average rainfall. Climate change and population growth will continue to put pressure on the resource.

In South Africa, aging infrastructure is another issue. Water and wastewater treatment plants, supply pipes, and drainage systems have been neglected and are aging without adequate maintenance. This results in pollution, deteriorating water quality and water losses.

Then there are the rising levels of non-revenue water (NRW). According to the latest No Drop Report, NRW increased from the 35% recorded in 2015 to 46.4% in June 2022, and has even further deteriorated since then.



Dean Thompson, CEO, EnviroServ



With the support of our shareholder, SUEZ, we are well positioned to assist with the water crisis and can partner with government through public private partnerships (PPPs) to build new and improve upon existing infrastructure.

We offer expertise in desalination, and can design, build and operate water and wastewater treatment plants. We have technologies that can improve drinking water quality and reduce pollution as well as leak detection tools for distribution networks, thereby reducing NRW and making water an

economically viable resource for the public sector. We also have proprietary technologies around smart metering.

Are there any proud achievements you want to mention? And what are EnviroServ's plans for the upcoming year?

SUEZ acquired EnviroServ in October 2022, and we have successfully integrated with them from a human resource, operational and commercial perspective. That has been a massive undertaking and as mentioned before, is a positive move; both for EnviroServ itself and the local waste and water industry.

Due to the nature of our activities, health and safety are key priorities

We offer expertise in desalination, and can design, build and operate water and wastewater treatment plants. We have technologies that can improve drinking water quality and reduce pollution as well as leak detection tools for distribution networks, thereby reducing NRW and making water an economically viable resource for the public sector. We also have proprietary technologies around smart metering."



for our company. EnviroServ won the SUEZ Health and Safety Award last year.

We are now working within the water sector, we have created a strategy and placed the necessary resources in place to deliver on that strategy.

Another key focus area for us are our waste to energy solutions, particularly within the municipal space that makes a positive difference by freeing up air space in landfills while increasing energy supply.

What excites you about EnviroServ?

EnviroServ creates economic, environmental, and social value by delivering sustainable solutions that benefit both people and the planet. Our commitment to environmental responsibility drives us to build a better future for generations to come. Being part of a company with such a meaningful purpose is truly inspiring. ●





FROM SWITZERLAND TO SOUTH AFRICA: 40 YEARS OF FAMILY VALUES AND INNOVATION

Endress+Hauser – a Swiss family-owned business – is a global leader in measurement instrumentation. **Kirsten Kelly** asks the Endress+Hauser South Africa MD, **Bernhard Klöss (BK)**, a few questions.

Last year, Endress+Hauser South Africa celebrated its 40th birthday. What has changed? What has stayed the same?

BK: There have been a number of significant changes in terms of acquisitions, revenue growth, and

product development. But our family culture – which is the backbone of the company – has remained the same. At Endress, we take pride in the longevity of our team, with the majority of employees having been with us for 5-10 years, and several celebrating long service milestones of 20, 25 and even 30 years. This contributes towards the sustainability of the company.

How important is the water and wastewater sector to Endress+Hauser?

We have seven core industries:

- Food and beverage
- Oil and gas
- Life sciences
- Chemical
- Power & energy
- Mining, minerals and metal
- Water and wastewater

As water is used in every industry, water and wastewater is one of our largest and most important core industries. Endress+Hauser's origins lie in flow meters.

Our portfolio helps to ensure the availability and sustainable management of the entire water cycle. Our measurement, analysis and maintenance solutions assist our

clients in reaching a high degree of compliance and process efficiency.

South Africa is one of Endress+Hauser's many subsidiaries around the world. Is there anything that South Africa can learn from other countries? And how do you ensure that your offering is relevant to African markets?

Europe's certification systems have long been recognised as one of its most influential exports, shaping global industries, fostering trust, and ensuring quality and safety. We are always learning from our European subsidiaries, but a key focus for us as a South African subsidiary is to adapt the Endress+Hauser service and product offer to African markets.

One of the key focus areas for Endress+Hauser South Africa is training and skills development. We have accredited training courses in basic-advanced instrumentation. We also have courses that are web based and designed to simulate a real process environment.

There are some serious skills gaps in the sector and our training centre aims to address this. We consistently have conversations and training sessions with people throughout the entire value chain; from people



Bernhard Klöss,
MD, Endress+Hauser South Africa

installing plants to our end customers on trends in Europe, auto cleaning, verification, calibration, monitoring and maintenance. We also provide customised training, depending on the people who attend our course.

Endress+Hauser South Africa differentiates itself from its competitors by going the extra mile in helping its customers to select the correct instrumentation as well as operating and maintaining it. We believe in selling a solution to a problem, and this solution may have all the bells and whistles and tech attached to it, or it may be more rudimentary. We consult with our customers to make sure that we understand what they need and from there, we provide them with several options. There is also an increased interest in service level agreements as many of our customers realise that they are not experts in instrumentation and would rather outsource these services and focus on their core business.

Our subsidiaries in China and India often deal with the same challenges experienced in African countries. We therefore work closely together to find fit for purpose solutions for our customers.

How does Endress+Hauser operate in Africa?

Before we create a formal Endress+Hauser subsidiary in an African country, we form a partnership with local partners. It is important to us that the economic, cultural and legislative conditions in each country is understood and that local people, who have a permanent presence in that country and have knowledge of these conditions are involved. We train these people to ensure that they can add value from a product selection and services perspective. This is key and ensures that our business in every country is sustainable.

What are some of the trends in the world of instrumentation?

The integration of smart sensors and Internet of Things (IoT) technologies is a major driver in modern instrumentation. Sensors can now communicate wirelessly, provide real-time data, and offer predictive analytics.

There is an increase in IO-Link products for the more basic communication of data. Endress+Hauser has a complete portfolio of IO-Link products.

The requirement for ethernet communication on the device will increase in the future and we are well positioned for this.

What excites you about Endress+Hauser?

I am very proud of Endress+Hauser South Africa's BBBEE level 3 status – we are now working hard to maintain and then further improve that where possible.

Corporate social responsibility is incredibly important to us. One of the facets of our corporate social responsibility is to annually provide ten to 15 technicians with a wholistic training experience that includes basic process instrumentation training (PMI).

The family culture has created a long term view for the company, with an incredible product portfolio. We have also made an exciting joint-venture with German sensor company - SICK Clean Industries – that will further increase our basket of products and access into the relevant customers.

Currently, South Africa has an improved economic outlook. Investor sentiment and domestic confidence is better than previous years and Endress+Hauser is well positioned to take advantage of that. ●



BRIDGING THE SANITATION GAP: TECHNOLOGY, RESEARCH AND COMMUNITY IMPACT

Randhir Rawatlal (RR), director of the UKZN WASH R&D Centre, answers questions about sanitation technology and the future of the centre.

The Pollution Research Group was established in the 1970s and then the UKZN WASH R&D Centre was formed in 2020. You have been operating for over 50 years. What has changed over the years and what has remained the same?

RR: We originally focussed on wastewater recovery and water reuse. Over time, this has grown to include the non-sewered sanitation challenges that affect half the global population. With the emergence of the 4th Industrial Revolution (4IR), machine learning and Geographic Information Systems (GIS), we have new tools to tackle spatially distributed problems and basic service delivery.

Throughout our history, we have had a strong focus on community impact, providing solutions that affect large societal problems. Our approach has been multi-disciplinary to address the complex issues comprehensively.



Randhir Rawatlal, director of the UKZN WASH R&D Centre

We have always used mathematical modelling.

You are currently re-positioning the UKZN WASH R&D Centre to support the sanitation tech developers to better access the anticipated larger market as a result of legislative changes. What support can you give developers in the sanitation space?

Historically, the WASH R&D Centre has assessed many different sanitation technologies.

While sanitation technology developers are also conducting their own research and development, our involvement introduces greater rigour in their work to the extent that they can publish and present at international conferences and scientific journals. We anticipate this may help promote the excellent work by our South Africa technology developers and providers locally and internationally.

Through these interactions, we are aware of shifts in legislation. Most recently, the changes in legislation imply that there is a much larger sanitation market on the horizon, which we need to gear up to support.

In addition to making recommendations to these developers on how to improve their sanitation technology, the UKZN WASH R&D Centre aims to help developers engineer those recommendations. This includes the physical design and maintenance requirements. We need to assist in creating a technical support system, where for instance, local plumbers can fix these new sanitation systems

themselves and have ready access to basic parts. We need to extend our view from merely implementing sanitation technology to supporting and maintaining it. Further to this, we have started a conversion with the technology developers and providers about the creation of a forum where more support can be developed to satisfy the market demands.

Research into WASH is so broad – how do you encourage collaboration between different fields of science?

We have a relatively large staff and student complement with diverse backgrounds and interests. This year we have organised our team into four major research areas:

- water management
- sanitation technology testing and development
- circular economy
- one health

These research areas will drive a fully integrated circular economy, linking waste processing, food production, and human and environmental health through multi-stakeholder collaboration – building climate resilience. Cutting across these core research areas, are social assessments to monitor the impact on communities, the development of training and capacity building programmes, a bio-processing engineering laboratory, and the use of smart technology.

Key associate members come from engineering, social, agricultural and pure sciences. We are also in contact with other research groups within the University of Kwa-Zulu Natal and other South African universities.

When projects are identified where we don't necessarily have the expertise or it is not a growth area



for us, we pass along the interest. We are saying 'No' to work that is not central to our vision, but we do try to connect people and keep informed as to how things are progressing. We also maintain a regular seminar programme through which we keep abreast of other developments.

What are some of the challenges experienced by the WASH sector?

The first challenge is our growing population. Around 30% of people living in South Africa do not have access to hygienic and safe sanitation facilities. There is a real challenge in making sanitation technologies accessible.

The second challenge is turning our waste into a resource. For example, there is a global phosphorus shortage that will have a severe negative impact on food production in the future. However, wastewater contains vast amounts of phosphorus, and various projects around urine diversion and biochar can return phosphorus to the soil. There is a challenge in creating a circular economy.

What are some of KZN WASH's most recent achievements?

We have supported a large body of tech developers, that has

culminated into a recent event attended by representatives from the Gates Foundation, the eThekweni Municipality, the Mayor's office and leadership from the Department of Water and Sanitation. The UKZN WASH R&D Centre has played a role in having those sites functional and developing the technologies to their various stages. We are proud to see these tech developers and community sites being recognised at such a high level.

The WASH R&D Centre has also contributed significantly to the development of ISO standards for the testing and accreditation of sanitation technologies. Not only have we provided input on a global level, but are also contributing to the development of standards on a national level in South Africa, and the formulation of a framework for municipal bylaws to guide municipalities in the implementation of alternative sanitation technologies.

We are also proud to note the graduation of our postgrad students as well as several publications in scientific journals.

In a recent presentation to eThekweni Municipality, we presented our findings in respect of three pieces of technology which were at various stages of development.

This was a comprehensive piece of work where the science, innovation and community support were all integrated in one place. I was impressed with the high level of rigour and level of thought that goes into the sanitation technology before it is accepted. I don't think that there are many places around the world that evaluate sanitation technology to this level. It is a great example of what can be done to support the reception of effective sanitation and hygiene and promote the health in our society.

What excites you about UKZN WASH R&D Centre?

There is so much passion in the sanitation sector.

Every person who is part of the UKZN WASH R&D Centre is aware of the societal impact of our work. The Centre brings together research from different fields and far-flung places. It is also a privilege to play a small role in achieving the vision of the much loved and respected Prof Chris Buckley, with whom I had many conversations about his challenges in the field and with integration with the university. It is his legacy that has given a strong foundation for the UKZN WASH R&D Centre upon which to build. ●

LESS WASTE, MORE IMPACT IN THE DAIRY INDUSTRY

Woodlands Dairy, a local fresh milk processor, produces and packages high-quality dairy products. Committed to sustainability, the company aims to minimize its environmental impact by enhancing energy efficiency, optimising waste management, and reducing emissions and resource consumption.



Through their Environmental Management System (EMS), Woodlands Dairy identified the recycling of their medium to high-strength wastewater as a priority to improve their environmental impact. The most significant challenges identified included liquid effluent management, waste management and recycling, as well as water consumption.

The solution

Milk is rich in proteins and numerous essential nutrients. Therefore, four skids, each equipped with 26 Pentair® X-Flow TMCompact33V Helix Membrane Elements were installed to concentrate or remove these proteins and nutrients.

The membranes support the separation of biological sludge where a high-quality effluent is required. The pore size of the membranes deliver a permeate free of suspended solids.

Pentair's Helix technology is purposefully designed to meet the challenges of purifying heavily fouled wastewater, specifically designed to handle high levels of Biological Oxygen Demand (BOD) in the wastewater stream.

The results

Pentair X-Flow skids helped Woodlands Dairy achieve its sustainability initiatives by complying with legislation and reducing the plant's environmental impact.

HELIX

BENEFITS OF PENTAIR HELIX TECHNOLOGY

- Prevents fouling in high-solids ultrafiltration (UF).
- Designed for wastewater treatment where there is high BOD.
- Increases flow and saves energy by introducing turbulence at the membrane wall.
- Reduces the need to operate at high cross-flow velocities, which saves energy.

Over 60% of the dairy wastewater is now recycled, significantly reducing effluent discharge. More importantly, in an arid climate with dwindling water reserves, this results in a 60% decrease in the demand for fresh water.

The incoming feed stream with about 20 000 ppm of Chemical Oxygen Demand (COD) is turned into a high-quality effluent with less than 100 ppm.

Biogas is a welcome bonus in this energy-intensive operation to heat the on-site boilers. With the Pentair X-Flow Skids, the facility has transformed into a Resource Recovery Plant (RRP). Previously, all effluent flowed into a combined effluent sump.

The new system processes 1.5 Mℓ/day with plans to upgrade to 2 Mℓ/day. ●



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INNOVATION, PERSEVERANCE, AND A BOTTLE OF BRANDY: JÜRGEN MENGE'S WATER REUSE STORY

Jürgen Menge, a recent recipient of the WISA senior fellow award, talks about his career and involvement in the world's first potable water reclamation plant.

By Duncan Nortier and Kirsten Kelly



Menge grew up on a farm near Grootfontein, Namibia, and studied at the University of Stellenbosch on a bursary. "I was a 'social academic student' and took six years to complete my Bachelor of Science (BSc) degree – one year for academics, one year for social activities, and so on. I played soccer, took part in mountain climbing and boxing, enjoyed partying, and unfortunately did not whole-heartedly focus on academics. When I applied to do an Honours degree, my lecturer advised that I start to work instead," states Menge.

Membrane research

Fortunately, during those six years, Menge did part-time work with the then Dr Ron Sanderson, who was involved in membrane research and would later become a well-respected professor in polymer chemistry. At the time, the Water Research Commission (WRC) was developing membrane rigs and focusing on mechanics at the Durban Technical University, while Stellenbosch University was working on the chemistry side doing the membrane research. Ed Jacobs (later Professor Jacobs) was completing his PhD and was working under Dr Sanderson.

"I worked under Ed Jacobs as a student research employee. We had a large research team of 12 and 15 students, who were either undergrads or working on their MSc or PhD. I met some extremely clever people among them and developed a love for research in the membrane field," adds Menge.

On completion of his degree, Menge took his lecturer's advice to heart and started to look for a job. "I promised to give a bottle of brandy to the person at Polymer Chemistry who would provide me with a solid job advertisement. This happened within three weeks. I applied for a microbiologist position advertised by the City of Windhoek and was successful. The City of Windhoek employed me for the next 35 years, during which I was promoted from microbiologist to chief scientist."

First water reclamation plant in the world

Working for the Windhoek Municipality proved to be a positive experience for Menge. Windhoek became the first city in the world to produce drinking water directly from municipal wastewater.

The original Goreangab Water Reclamation Plant in Windhoek was developed by the National Institute for

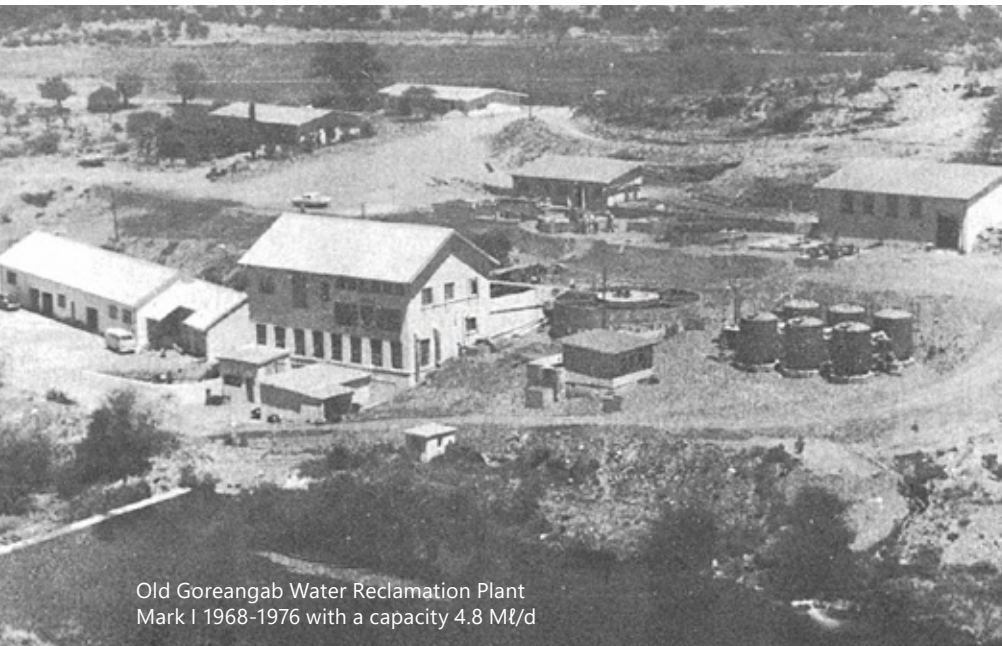
Water Research (NIWR) of the Council for Scientific and Industrial Research (CSIR) during the 1960s. The design and operation was based on the results of a pilot plant operated by the NIWR in Windhoek over the period 1964 to 1968 located at the Gammams Wastewater Treatment Plant.

In 1971, the WRC immediately embarked on an ambitious research programme at the Stander Reclamation Demonstration Plant in Pretoria, to expedite the development of the technology of water reclamation and to study the health effects of such water. Successful research was then implemented in Windhoek. In 1976 the Windhoek plant was upgraded and extended.

At the inauguration ceremony Dr Stander, chairman of the WRC, stressed

Surface and groundwater could not sustain Windhoek





Old Goreangab Water Reclamation Plant Mark I 1968-1976 with a capacity 4.8 Mℓ/d

the significance and the value of the ground-breaking research at Windhoek. "In this same year that saw science and engineering land a human on the face of the moon, science and engineering also brought direct water reuse into reality. The question is, which event will have more intimate impact on our lives and those of our children?"

Importance of reclamation to Windhoek

In 1988 Namibia prepared for its independence and with that the WRC, the CSIR, and the Department of Health all withdrew from Namibia. This meant that all the research and quality monitoring responsibility fell on the technical staff of the City of Windhoek.

"I wasn't senior enough to attend the final meeting, but during that final meeting between us and the organisations leaving Namibia it was identified that Windhoek would run out of water in the year 1990," explains Jürgen.

This prediction was accurate. Namibia is the driest country in southern Africa,

receiving an average of 280 mm of rain each year, 83% of which is lost to evaporation and a further 14% absorbed by plants. Namibia experienced severe drought events in the early 1990s. It became clear that surface and groundwater could not sustain Windhoek. The only solution available was to increase the reclamation capacity of the Goreangab plant. That decision was taken during a strategic meeting with the Department of Water Affairs in 1992. In 1994 the capacity of the plant was extended from 7.2 Mℓ/d to 14.4 Mℓ/d. This upgrade treated dam and wastewater in one process train. Until then there had been two separate treatment trains.

Fortunately, Namibia still received substantial technical support and assistance from international sources for its water reclamation efforts. Even though Namibia was independent from South Africa, both the CSIR and WRC still worked closely with Namibia due to the strategic importance of water reuse.

"When looking back at all the work done at the Goreangab Water Reclamation Plant, it was a huge team effort. No one can say 'I did this', including myself, it was a large group of us working together. I was fully devoted to the project but so were many others," explains Menge.

New processes

In 1987 Prof Willi Grabow advised Menge to study for an honours degree in Water Utilisation at the University of Pretoria, under the late Professor At Pretorius. Although he never completed the course, he was able to connect with experts across the water sector and discovered new technologies for water reclamation. This was a turning point in Jürgen's career. Prof Grabow taught him an important lesson: personal knowledge is limited, being well connected provides unlimited access to knowledge.

"It was an exciting part of my career, where I was part of what I call the second generation of researchers working on water reclamation. The first generation built the foundation, but the second generation of researchers had to go beyond simply maintaining the original research."

Since the commissioning of the first reclamation plant in 1968, a huge amount of new information on various aspects of water treatment became known. During these years the experience of the various experts and engineers was documented and published by the Water Research Commission in two separate manuals. Experience obtained from the old plant, information from pilot plant studies and knowledge of current technologies had to be integrated into a process design for the new plant.

Menge explains that the original plant was expensive to operate. "Adjustments were needed to make the plant economically viable. For instance, there

Inauguration of the first reclamation plant in 1969



were a number of chlorination steps in the process.

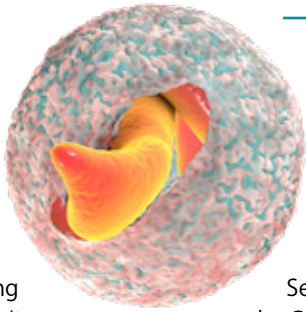
The greater the concentration of organics in the water, the greater the chlorine demand. We were originally using between 12 and 14 mg/ℓ

to achieve a free chlorine residual. The water was chlorinated after the primary settling, dissolved air flotation and sand filtration, and finally after activated carbon filtration. We moved all that after activated carbon filtration and made it double chlorination step with breakpoint chlorination."

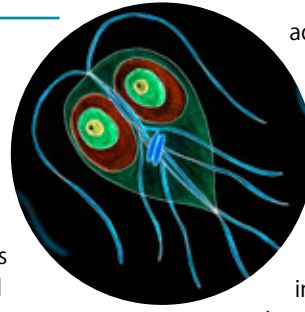
To save money, the team concentrated on the removal of organics before activated carbon filtration, by introducing enhanced coagulation and improving dissolved air flotation under the guidance of Prof Haarhoff. Changing the process of the water plant was radical at the time. Visiting professors were shocked to hear that the Windhoek team took almost all the chlorination out of the process to reduce the chlorine demand and concentrated it at the end of the process. But Menge adds, "They did all come around and support us, once they saw what we were doing and the positive results it produced." The savings in chlorine helped to stabilise the water budget. There was no need to increase the budget for chemicals for the following two to three years with this plan, making the plant more economically efficient. An additional benefit was that the trihalomethane concentration levels decreased considerably.

Bacteria, viruses and parasites

Part of ensuring that the reclamation plant was a success was testing to see if the water coming out of the plant could be blended with other streams of water while maintaining its safe standard. In



Illustrations of Cryptosporidium (left) and Giardia (right)



this case, the plant was fed from two sources, these being the Gammams Sewage Treatment Plant and the Goreangab Dam. The raw waters were then mixed and blended and treated as a single stream. In general, the objective was to utilise a larger portion of the effluent from the sewage treatment plant than water from the Goreangab Dam.

"In 1992, for the first time, a virus was detected in the final water. This was due to contaminated water from the Goreangab Dam. Early rainfall brought dirt and organic matter into the dam, and that resulted in an algae bloom increasing the pH levels of the water above 9.2. We were using aluminium sulphate at the time," explains Menge.

He adds that the high pH of the water coming into the plant impeded flocculation and the aluminium molecules formed a gel that shielded the viruses in the water." This led us to use ferric chloride as coagulant instead which can handle a broader pH range. We could not afford to not treat the Dam water, as we needed every drop."

This research and adjusted chemical process resulted in a single process for the reclamation and dam water, forgoing the dual process and streamlining the treatment producing a more effective and robust treatment method for Windhoek.

"In 1994, we began to isolate Giardia and Cryptosporidium and send these samples to the CSIR. This now proved to be a new problem. A course I attended at the University of Pretoria under guidance of Professor Hans van Leeuwen came in handy. I learned that ozonation was an alternative treatment to oxidise organics and make them biologically available and

additionally act as a disinfectant for Giardia."

Professor Hans van Leeuwen assisted Windhoek with the initial ozone research in 1992. Ozone is

the oxygen-rich O₃ molecule, with high oxidative power, which when added to water helps to purify it. Ozonation can help clear water from parasites by disrupting the cell-membrane structure of these parasites, stopping them from multiplying. It is also a strong oxidant to break down complex organic molecules for easier biodegradation.

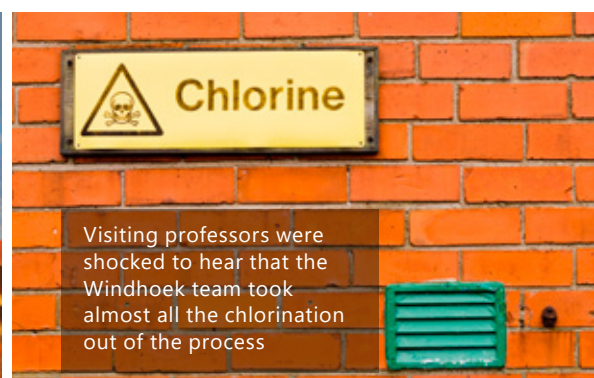
"On a technical level, ozonation was not a proven technology in the Southern Africa region. The only full-scale ozone plant at the time was in the Free-State for a mining company, but it was beset by various technical problems. Ozonation was therefore a risk, but we nevertheless decided to move forward after a research student under guidance of Professor Martin Jekel from Germany made the recommendation from his work on one of our pilot plants."

In 1996 Erich König was appointed as researcher at the laboratory in the chemistry section. He had completed his MSC degree in Water Utilisation. "We needed a researcher as we were piloting membrane plants from the Durban Technical University. By 1998, Windhoek itself was piloting four membrane micro and ultrafiltration plants from various commercial suppliers and a rather large pilot scale Ozone-BAC-GAC demonstration plant," says Menge.

"In order for a company to be considered as a supplier, their pilot plants had to run on Goreangab's water. While their technology may have worked in Europe and America, we had to prove that it would work in Africa, with a water that



Desert landscape, Sossusvlei, Namibia – Namibia is the is the driest country in southern Africa, receiving an average of 280 mm of rain each year, 83% of which is lost to evaporation and a further 14% absorbed by plants



Visiting professors were shocked to hear that the Windhoek team took almost all the chlorination out of the process



1976 – 1980 Goreangab Mark II, high lime treatment and ammonia stripping, 4.8 Ml/d

had a complicated organic composition," he adds.

New Goreangab Water Reclamation Plant

During 1990 to 2000, Windhoek experienced a drought almost every two years. Ben van der Merwe, someone Menge identifies as a visionary, was the head of the Department of Water and Wastewater at the time. Van der Merwe was the driving force behind the planning of the New Goreangab Water Reclamation Plant (NGWRP) and numerous other projects, of which the managed aquifer recharge project became well known at a later stage.

"When all the research and planning started, we did not know that it would take another 10 years before finally building and commissioning the NGWRP. It was planned from the beginning, based on the initial investigations in 1991, that the reclamation process and extension of the plant's capacity would be from 7 600 m³ per day to 21 000 m³ per day, with the limitations of existing infrastructure," explains Menge.

During 1992 a report for the upgrade and extension of the old Goreangab Reclamation Works was compiled under the leadership of van der Merwe for the securing of international funding of the project. When the report was submitted to the KfW in 1993, the project was accepted to be funded with a loan of N\$92 million (R92 million), with provision for contingencies of just over N\$5 million. (N\$1 = R1)

When the new plant had to go out on tender for building, another severe drought was looming. Due to water shortages the city could not afford to decommission the old plant for two years to do upgrades and extensions. Therefore, Mr Ben van der Merwe approached the previous funders of the plant – KfW – and the European Investment Bank (EIB) in 1999, to ask for permission to build a brand-new reclamation plant and to decommission the old Goreangab Water Reclamation Plant. Once the new plant started operating, the old plant would be used to reclaim wastewater for irrigation. Both the EIB and KfW decided to fund

the construction of the new water reclamation plant, which was completed for N\$125 million. At that time, there was a saying around the plant: "You cannot fix an old bicycle with a new bell and pretend you are now driving a new bicycle."

From the beginning of 1993 it was a clear mandate from the KfW, Windhoek could only receive capital if it implemented water saving measures. Water metering and residential water saving campaigns were used, as well as building a dual pipeline for semi-purified wastewater for irrigation. Furthermore, the operations of the plant had to be outsourced to a private company. "The concept of privatisation was initially surprising, but in retrospect, it proved to be the best outcome for the plant. It protected the plant from the whims of politicians over the coming years. Reclamation is a risk-based process, and should anything go wrong, people can be harmed by parasites, viruses and bacteria," states Menge. Under severe conditions, it can cause an epidemic.

The NGWRP was commissioned in 2002, replacing the 1968 facility. The 2002 NGWRP still stands and operates today.

International notoriety

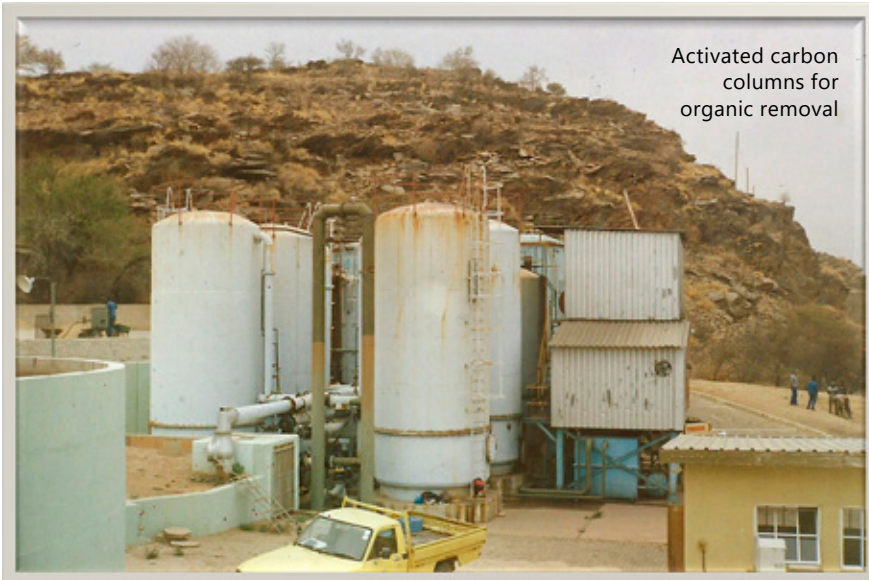
Jürgen has presented papers at conferences around the world, branding Windhoek as the first city in the world to



View of New Goreangab Drinking Water Reclamation Plant, Windhoek, commissioned in 2002



Award to the core team responsible for design and implementation of the first direct potable reclamation plant in Southern Africa



Activated carbon columns for organic removal



Three people having successfully completed three days of full-scale PAC testing regime. (left to right): late Oom Piet van der Merwe, consultant, Jürgen Menge, chief scientist, and Muggie van Staden, a RAU MSc engineering student

have a direct potable reuse plant. He was even part of the delegation, headed by his boss Mr Piet du Pisani, that brought the International Water Association Reuse conference to Windhoek and showcased the NGWRP during 2013. Jürgen has also been part of various teams that have written guidelines for direct potable reclamation as well as papers on the alternatives to reverse osmosis in direct potable reuse. These efforts resulted in the international acceptance of the technology developed in Southern Africa using ozone-BAC-GAC as treatment barriers as an alternative to RO based reuse treatment elsewhere in the world.

While there has always been a focus on the technical risk of direct potable reuse, it needs to be done with a long-term view. "As time moves on, there is a new generation of scientists and engineers in place, overlooking water balances

and plant operations. This is where education on a systems history is vitally important. We need to document the reason for certain processes in the plant, so that any changes made in future are done from an informed position and take these reasons into account." This is also the reason why it is an international recommendation to have an external advisory committee on board during the planning of a new potable reclamation scheme. Local engineering teams and mostly the consultants recruited for the design do not have the background for all the considerations and factors that need to be taken into account during design and often during commissioning.

Reclaimed water has relieved the pressure on Windhoek's groundwater supplies. "Windhoek cannot survive without water reclamation. We have provided 55 years of data and evidence

of safe practice that has helped convince regulators worldwide that direct potable reuse is a safe and economically viable long term augmentation option," adds Menge.

With 47 years as a devoted water scientist and researcher in the water reuse field, Menge concludes: "Water was created to sustain life. We have a responsibility to manage it appropriately. Our current challenge as engineers and scientists is to view the full water cycle as a water supply source, which has the potential to sustain or threaten life. It is our responsibility to design, manage and render it fit for its intended purpose." ●



An expert panel to evaluate the research of the 1991-1998 findings and to make recommendations for the full-scale implementation of the New Reclamation Plant

The senior water engineering team of the City of Windhoek during 1992 – 1998 (from left) Jürgen Menge, chief scientist; Immo Peters, Head of Water and Wastewater Operations; Ernst Gudde, Head of Mechanical Maintenance; Ben van der Merwe, Departmental Head of Water and Wastewater Engineering Services; Bertus Calitz, Head of Technical Design; Hannes Buckle, Head Water Resources and Demand Management; Ferdi Brinkman, Assistant Head Water and Wastewater Engineering Services



Cape Town makes its mark on the world map for water reuse

The Global Connections Map, compiled by the Water Services Association of Australia (WSAA) in partnership with the USA's Water Reuse Association, added three of Cape Town's water reuse schemes to its map. This interactive online tool showcases the location of the hundred potable water reuse schemes worldwide.



Mayoral Committee Member for Water and Sanitation, Councillor Zahid Badroodien

Cape Town now joins the 35 cities where water reuse projects are plotted, which are either planned, built or already in operation. This illustrates how several international communities now rely on water reuse, as part of their strategy to sustain drinking water supply.

Cape Town's features sites

- **Faure New Water Scheme (planned):** This is a direct potable reuse scheme that will produce 70 Mℓ (upgradable to 100 Mℓ) of drinking water per day. The project is currently in the design phase. The scheme will convert highly purified source water from Zandvliet Wastewater Treatment Works into safe drinking water that meets international quality standards. This requires an advanced water purification process involving

multiple technological barriers (ozonation, biologically activated carbon filtration, granular-activated carbon filtration, ultrafiltration, ultraviolet advanced oxidation and disinfection). Once purified, the water will then be blended with dam water and treated again at the existing Faure Water Treatment Plant, before being distributed through the City's drinking water supply network.

- **Atlantis Water Resource Management Scheme (operating):** A groundwater scheme that includes a managed aquifer recharge (MAR) component. The managed aquifer recharge includes the infiltration of conditioned stormwater and treated effluent into strategic zones of the aquifer, to ensure sustainability of the aquifer biome over the long-term. The Atlantis scheme currently produces 13 Mℓ/day and is being

optimised to produce 25 Mℓ/day in the medium term. In the long term, it can be expanded to produce 40 Mℓ/day.

- **Cape Flats Managed Aquifer Recharge (under construction):** A component of the Cape Flats Aquifer Management Scheme. The scheme includes the abstraction of groundwater from the Cape Flats Aquifer and the MAR component, which consists of the injection of treated effluent into the strategic zones of the aquifer, to ensure the sustainability of its biome over the long term. This scheme is anticipated to produce 54 Mℓ of drinking water per day.

"Cape Town is investing more in infrastructure than Johannesburg and Durban combined, with a capital budget 91% larger than Joburg and 117% larger than eThekweni over the next three years. Water and Sanitation represent 42% of our approximate R120 billion 10-year infrastructure pipeline, funding critical projects from our New Water Programme that will produce 300 Mℓ of drinking water daily by 2030. Unlike other metros, Cape Town is proactively securing its water future through innovative solutions that ensure resilience against climate change and population growth," says Mayoral Committee Member Zahid Badroodien.

Water and sanitation represents 42% of Cape Town's R120 billion 10-year infrastructure pipeline. Depicted is the construction of Potsdam wastewater treatment works



Cape Town's new water programme

The new water programme is a strategic response to Cape Town's increasing water needs and climate variability. By introducing multiple



Athlone Wastewater Treatment Works

South Africa is a water-scarce country, making water reuse an invaluable asset to the water security of the nation



water sources, the programme aims to add 300 Mℓ per day to the city's supply.

- The key initiatives include:
- **Water reuse:** The Faure New Water Scheme will be a state-of-the-art water reuse project that will produce up to 70 Mℓ of drinking water daily. Public participation on outsourcing the implementation and operation of the facility begins in March 2025.
 - **Desalination:** The Paarden Eiland Desalination Plant, currently in the

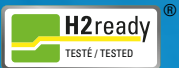
planning phase, will use multi-barrier treatment technology to remove pollutants and salts, ensuring the production of high-quality drinking water. The City launched a public participation process on 31 January 2025, on outsourcing the implementation and operation of the facility, with feedback submissions open until 3 March.

- **Clearing of invasive plant species:** The removal of invasive alien plant

species is a cost-effective way to free up billions of litres of water in Cape Town's key catchment areas. The removal of non-indigenous, water-guzzling plants is an important component of the City's Water Strategy and long-term NWP, which aims to add 55 billion litres per year to the water network.

- **Groundwater abstraction:** Tapping into aquifers to secure over 100 million litres per day. ●

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POLLUTION OF OUR WATER SOURCES: THE REALITY OF DE FACTO REUSE

De facto reuse is defined as the unplanned or incidental presence of treated wastewater in a water supply source, and the use thereof as a drinking water supply source. This can negatively impact end-users, potentially affecting health and causing aesthetic issues like unpleasant taste and odour from algal blooms. **By Chris Swartz, Lead: Water Reuse Division Western Cape Chapter, WISA**



The quality of drinking water sources is rapidly deteriorating on a global scale, largely due to overloaded wastewater treatment systems, industrial discharge and unsewered informal settlements.

This situation is exacerbated during times of drought, when a large portion of river flow consists of wastewater (when the base flow of the river is low). This issue is especially critical locally, as many water supply authorities and service providers rely on these polluted rivers and dams to provide drinking water for the communities and industries they serve.

Our drinking treatment plants were not designed to treat poor quality water, and are mostly only equipped for conventional water treatment processes. To allow for the poor quality of source water where this occurs, their process configurations should therefore also include advanced treatment technologies to ensure removal of all unwanted pollutants from the incoming water.

While provision has been made to add new or modify existing treatment processes, this is mostly done on a project by project basis, and then only at the larger water treatment plants, resulting in a high risk for pollutants (in particular

micro-pollutants) to pass through the treatment plants and have potential health impact on communities.

How prevalent is de facto water reuse in South Africa?

In a research project undertaken for the Water Research Commission by Chris Swartz Water Utilisation Engineers (CSWUE), ten of the largest rivers in the country were surveyed and sampled in an attempt to establish the extent of de facto reuse.

These rivers serve as important sources for drinking water abstraction, industrial use, and irrigation purposes. The findings of the research showed that many of these rivers are severely impacted by wastewater pollution and this poses a potential health risk when the water from these rivers are used as sources for producing drinking water.

Under low base-flow conditions, the impact of wastewater effluent contributions increases dramatically, therefore the wastewater percentage contribution in rivers is highly dependent on streamflow and stream size.

De facto reuse is increasing on a widespread basis in South Africa. The impact thereof is dependent on the concentration, volume, and consistency of wastewater in raw water sources in South Africa.

Micro pollutants

It is the human health and environmental effects of exposure to the micro-pollutants in these waters that are of concern. For this reason, these micro-pollutants are also referred to as chemicals (or contaminants) of emerging concern (CECs).

The monitoring of CECs poses several challenges. Due to the sheer number of

CECs and their transformation products, it would be impossible to monitor each of the chemicals individually and will be extremely time-consuming and expensive. Another challenge is that the relevance of these chemicals changes a lot over time due to changes in production, use and disposal and there is limited availability of new information about their occurrence, fate, and hazards.

The necessary upgrading of the existing conventional water treatment plants to include advanced water treatment processes for removal of the CECs will, in addition, have a huge impact on the cost of drinking water production.

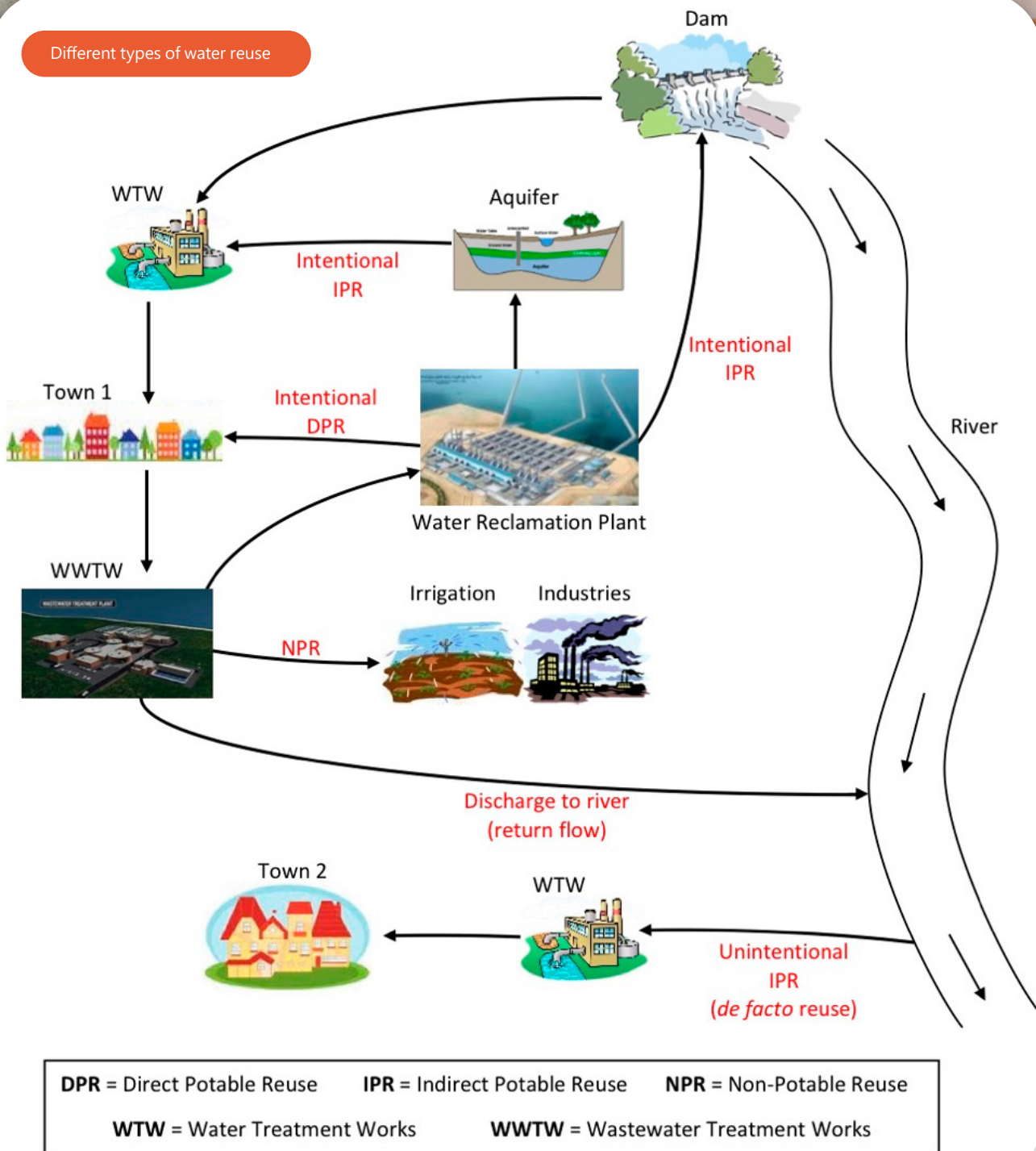
Some of the main reasons for monetary estimates of the impacts of water pollution include raising awareness in order to convince politicians, community leaders and health administrators that a pollution problem of significant magnitude exists, and to encourage them to engage in preventative strategies, and analysing the cost-effectiveness of water pollution interventions or improved technological barriers to prevent disease outbreak when applying water reuse.

In a research project undertaken for the Water Research Commission by Chris Swartz Water Utilisation Engineers (CSWUE), ten of the largest rivers in the country were surveyed and sampled in an attempt to establish the extent of de facto reuse

Breede River was one of the rivers sampled for de facto reuse



Different types of water reuse



Solutions

The Water Research Commission project evaluated the effectiveness of various unit treatment processes at selected South African water treatment plants in removing CECs.

The results showed that conventional treatment processes such as coagulation, flocculation, sedimentation, and filtration can remove moderate amounts of CECs (50 to 70%). However, the removal efficiency may vary depending on the physiochemical properties of the CECs as well as the quality of the water matrix. The

addition of an advanced oxidation process (AOP), such as ozonation, or a membrane process such as Reverse Osmosis (RO) to the treatment configuration of the plant drastically increased the removal capability to a high degree of CEC removal (>85% to >95%). Therefore, a multi-barrier treatment configuration will be the most effective approach for the removal of CECs from surface waters for drinking water production.

One of the conclusions of the study was that there is a need to adopt the methodology that was developed in

this study as part of the national water resource monitoring programs, such as the Integrated Waster Quality Management Strategy (IWQMS), to better understand the level and impact of wastewater on surface water resources. It is also clear that CECs should be incorporated in the Department of Water and Sanitation's water quality databases and data dissemination platforms. Not only will this address various environmental and health challenges, but it will also assist in the evaluation of water and wastewater treatment operations and management. ●



THE WATER PARTNERSHIP OFFICE *and water reuse*

Municipalities face financial constraints and a shortage of specialised expertise in managing water supply and quality. In contrast, the private sector has both the necessary expertise and funding. To bridge this gap, the Water Partnership Office (WPO) was formed to facilitate public-private collaboration within municipal water services. **By Kirsten Kelly**

The WPO is one of the outputs from the National Water Partnerships Programme (NWPP), the brainchild of the Department of the Water and Sanitation (DWS), the Development Bank of Southern Africa (DBSA) and the South African Local Government Association (SALGA). It is a ring-fenced entity housed in DBSA (using DBSA corporate infrastructure), owned by DWS. "Our main focus is to create opportunities for the private sector to support

municipalities – specifically looking at water services. We do this through developing standardised programmes and assisting with project preparation," explains Johann Lübbe, head: Water Partnerships Office, DBSA.

Project preparation

He adds that the WPO supports municipalities in developing and structuring bankable water projects that attract private sector participation. "The biggest challenge municipalities face is preparing and developing projects that are bankable. Ironically, developing a project to a fundable stage requires money, but municipalities often lack both the necessary expertise and financial resources to prepare and structure bankable projects. They tend to focus primarily on the technical aspects of projects while overlooking the financial side, which leads to unaddressed risks that deter private sector investment."

The WPO supports municipalities with project preparation work, creating blended finance and public

private partnership (PPP) solutions. "Government alone cannot fund all necessary projects, so it is essential to explore alternative options. Instead of solely financing projects, the government should focus on filling funding gaps while maximising investment from the private sector and development finance institutions (DFIs)," explains Lübbe.

It is important to note that the WPO is not a bank. While it has access to project preparation funding, its role is to prepare projects and make them bankable. Once a project is ready to go to market, funding can be solicited from various private and institutional investors, as well as DFIs, including the DBSA.

Programmatic approach

The WPO's second focus is standardisation. "Standardisation, as seen in the energy sector, can lead to efficient tendering, expediting project implementation, cost reduction, and knowledge-sharing among municipalities. We want a programmatic approach as opposed to a fragmented project by project method. Standardised models, contract documentation, terms of reference, templates and contracts have been, and are being developed within 6 standardised programmes of the WPO. This approach allows us to avoid reinventing the wheel for every project while continuously refining best practices. We want to develop a portfolio of projects that we can accelerate and scale," states Lübbe.

The WPO Has adopted six standardised national programmes for private sector participation in municipal water and sanitation



Johann Lübbe, head: Water Partnerships Office, DBSA

services. This will make it easier, quicker and cheaper for municipalities and water boards to enter into partnerships. "It will also benefit the private sector, particularly consultants. If they know exactly what the terms of reference will look like for a water reuse project for example, it will simplify the process and allow the private sector to reduce their cost of tendering. It will also allow project developers and lenders to become more familiar with contract documents, risks, etc. and over time result in more competitive pricing on projects," adds Lübbe.

The six standardised programmes are:

- 1) Water reuse
- 2) Non-revenue water
- 3) Wastewater treatment
- 4) Non-sewered sanitation
- 5) Seawater desalination
- 6) Management contracts

Water reuse

"Our water reuse programme is one of our priority programmes and seeks to recover and repurpose valuable water resources that are currently lost in rivers and oceans. In addition to recovering water from wastewater, the opportunity exists to extract maximum value from a "waste" resource by generating energy and processing sludge for beneficial use, thereby creating new revenue streams to help finance these projects. We focus on resource recovery and assist municipalities in maximising and scaling reuse opportunities in the country. Wastewater can be treated to potable standards or used at a certain quality for industrial and agricultural purposes," says Lübbe.



The current National Water and Sanitation Master Plan (NW&SMP) aims to fast track the implementation of priority actions such as water reuse, in order to address the current

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water crisis, as well as future water challenges that may impact sustainable development in the country.

“Water reuse offers a way to diversify our water supply mix. Additionally, from a climate change perspective, establishing a circular water management system that optimises reuse enhances resilience,” maintains Lübbe.

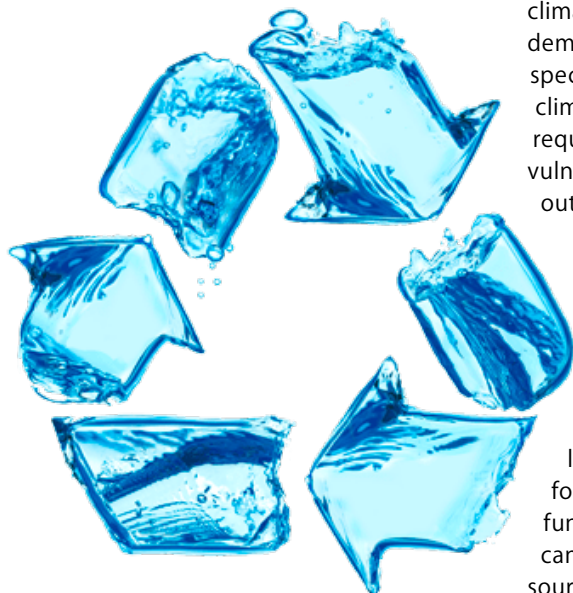
Water reuse funding

Funding for the water reuse program has been secured from the Green

Climate Fund (GCF), amounting to \$235 million. This includes a grant component to co-fund project preparation and a \$200 million concessional loan to enhance bankability within a blended finance structure.

The Council for Scientific and Industrial Research (CSIR) was appointed to conduct primary screenings and detailed climate risk and vulnerability assessments on potential water reuse projects. Since the GCF places strong emphasis on climate impact, it is necessary to demonstrate that water insecurity in specific municipalities is driven by climate vulnerability. To address this requirement, detailed climate risk and vulnerability assessments were carried out in 47 municipalities.

The CSIR was requested to conduct assessments for all metros and intermediate cities, covering eight metros and approximately 39 intermediate cities – 47 municipalities in total. The result of this work is a list of municipalities that qualify for further assistance from the GCF funding. Non-qualifying municipalities can still be supported but from sources other than the GCF funding.



Larger cities and towns, where demand and offtake opportunities are higher, are most suitable for water reuse projects. After identifying the qualifying municipalities, the next step will be to build a pipeline of projects for preparation, structuring, and implementation. Over time, this could lead to a strong pipeline of water reuse projects, which will likely be structured as Public-Private Partnerships (PPPs) and may also lead to the creation of a new financial asset class. A workshop has already been held with some municipalities to introduce them to the programme.

According to Lübbe, the aim is to create a new asset class of water reuse infrastructure. “Water reuse projects are often doomed from the start as municipalities do not have the balance sheets to secure funding for implementations. Then there is the technology side, where municipalities are either unaware or unsure of how to use new technologies to upgrade their existing wastewater treatment works and reuse the wastewater they are treating. Another barrier is political will; PPPs often take a long time to prepare, structure and implement, and it requires a strong political will for municipal council that may not see the implementation of a project within its term in office.”

Ultimately, the water reuse programme aims to encourage municipalities to shift away from traditional wastewater treatment works and instead recognise them as water resource centres.

Lübbe notes some significant and exciting developments in terms of policy and regulation. “There is a proposed requirement for all water service providers (WSPs) to have an operating licence, with licensing requirements that focus on the competency and performance levels of service providers, linked to the DWS’s gazetted minimum norms and standards for water and sanitation services. Then Treasury and the DWS are busy with reforms aimed at ring fencing the water and sanitation business within municipalities and this will go a long way to attract private sector funding and expertise as water and sanitation will have a defined and secured revenue stream.” ●

DEPUTY MINISTER SELLO SEITLHOLO CALLS FOR A JOINT COMMITMENT TO ADDRESS POLLUTION AT HARTBESPOORT DAM

The Department of Water and Sanitation's Deputy Minister, Sello Seithloho has called on various stakeholders to cooperate and address the persistent problem of hyacinth and algae that infest the Hartbeespoort Dam.



Deputy Minister, Sello Seithloho, Department of Water and Sanitation

Seithloho identified the Madibeng local municipality, which must address the effects of inadequately treated effluent that is being released into the Hartbeespoort catchment. He calls on the municipality to implement its by-laws and curb the problems caused by littering and chemical spillage.

"It is unfortunate that the crisis here is predominantly caused by municipalities. Although other sources of pollution exist, such as agricultural runoff and industrial chemicals, our department is focusing on municipalities. We are also advocating for the polluter-pay principle so that everyone knows the repercussions of polluting our water bodies," says Seithloho.

He also reiterates the need for intergovernmental commitment to resolve pollution of the country's water sources. Seithloho adds, "Different stakeholders should coordinate to tackle the issue of pollution. There should also be cross-department efforts between the Departments of Environment, Fisheries and Forestry and Human Settlements. We should work together to implement the reforms in Operation Vulindlela or the Medium-Term

Development Plan. If there is no coordination amongst us as government to address the reforms at a local level including the issues of pollution, we will not achieve anything."

Hartbeespoort Dam has become increasingly eutrophic, meaning it has nutrients that support the rapid growth of hyacinth. This also deprives the water of oxygen — killing fish in the water source. This eutrophic state is an effect of increased urbanisation which leads to increased solid waste and wastewater discharges entering the upstream of the dam via the municipal wastewater treatment works (WWTWs).

Two years ago, the Department of Water and Sanitation appointed Magalies Water to develop a three-year remedial programme to profile problematic contaminants as well as to remove the floating plants in Hartbeespoort Dam. Magalies Water has since appointed subcontractors to complement the biological control through the mechanical and manual removal of water hyacinths.

Biological remediation or nano-bubble technology has also been piloted at the dam and focuses on specific parts of the inlets from the municipality. This technology efficiently dissolves much-needed oxygen into the aquatic ecosystem, which will help reduce a certain amount of nitrates and phosphates in the water.

The dam's hyacinth infestation currently covers 33.84% of the dam's surface. The Department of Water and Sanitation will monitor the progress of the remedial programme that is currently underway and will continue to conduct compliance checks and enforcement activities in the catchment area, with a focus on WWTWs. ●

Rapid urbanisation has led to more effluent being deposited into the dam

Autonomous Gravity Sand Filter



Founded in Johannesburg in 1984 under the name Valve & Allied, Superior Filtration is an original equipment manufacturer with filters installed in over 40 countries worldwide.

Filtration without borders: established locally, soaring internationally

“From Peru to Bulgaria, our business increasingly comes from outside South Africa. This is because of our concerted effort to expand our footprint – underpinned by our uniquely designed water filters, our 40+ year track record and our commitment to excellent service. Engineers with experience with our products often introduce them to new workplaces when they move to different companies and countries,” states Peter Walker, the founder of Superior Filtration.

Walker is passionate about the water sector and finds it a privilege to have travelled the world due to filters. “Water is the most important industry in the world. Everything needs water. In South Africa, water requires our attention as it is central to the well-being of its citizens and the economy. I have met design and project engineers and end users across a range of industries and applications. These experiences broadened my perspective and allowed me to incorporate new insights into our product development. It is interesting and fulfilling work. Typically, filtration is a small yet critical component of a plant. A malfunction can have devastating financial and reputational consequences.”

As an original equipment manufacturer, Superior Filtration develops, designs, manufactures and markets equipment for removing suspended solids from water. The bulk of their manufacturing occurs in Gauteng, and occasionally, they use fabricators in the United Kingdom, particularly for the oil and gas industry.

Albert Bam, a director at Superior Filtration, emphasises the company's commitment to finding the simplest, effective, efficient solutions for removing suspended solids from water. “When designing products, Superior Filtration prioritises simplicity and durability. We build robust filters suitable for tough industrial and municipal applications, have low operating costs and require minimal maintenance.”

Superior Filtration supplies products to the industrial process water, mining, mineral processing, petrochemicals, potable water and wastewater, oil and gas, and food and beverage sectors. Durability is a top priority in these industries. Superior Filtration's products prove their mettle through minimising downtime for breakdowns and maintenance.

Stand out products

The company designs and manufactures

products with purpose-built automation innovations designed to require low-to-no management or maintenance. The team has seen a massive uptake in two of the products.

“We are particularly proud of our AGF – Autonomous Gravity Sand Filter. This is an autonomous, mechanical, rapid gravity sand filter. It is a polishing filter used to remove fine suspended solids from water. It requires no human intervention, external control system or electrical supply. The backwash cycle initiation occurs autonomously and is driven entirely by built-in hydraulic design features. This product can run for 30 years without anyone touching it,” says Walker.



Gravity Screen Filter (GraviFilter)



Peter Walker, the founder of Superior Filtration



Albert Bam, director, Superior Filtration



Ndanganeni Mahangani, sales director and chemical engineer

gap between available technology and the client's needs and will spend significant time providing proof of concept. This includes taking clients to some of our active installations to see our filters in operation," says Ndanganeni Mahangani, sales director and chemical engineer. Mahangani adds that Superior Filtration stands firm on its need to supply simple and robust products. "We do not chase the latest trends.

We decided to stick with our core products. We are more interested in optimising our products and bringing the best value to our customers. We have perfected the skill of designing and manufacturing filters."

As filtration experts, Superior Filtration serves as a valuable technical resource for process engineers who must consider the entire process. "Our filters are a small but important part of that process. We understand the process and the function that our filters will be required to fulfil. Then we focus on ensuring our filters are fit-for-purpose and integrate seamlessly in that process", concludes Bam. ●

Another product that excites the team and its potential customers is the Gravity Screen Filter (GraviFilter). The GraviFilter is a highly efficient, non-pressurised screen filter with an integral, continuous cleaning mechanism (self-cleaning). It removes suspended solids from water and effectively removes soft, fibrous and organic solids while operating efficiently in process systems with higher solids loads. GraviFilter offers extended flow intervals with limited operator intervention.

Bespoke Engineering

Some of our successes are in offering bespoke engineering across a range of products.

A recent project was to supply five large AGF filters to Angola. Transport costs would be high by road or sea, and logistics would be tricky. We redesigned each filter from a single cylinder into two halves, which we joined on-site. This innovative engineering, offered at no cost to the customer, reduced transport costs by 50%.

A project in Bulgaria required 4 x AGF double-decker filters – each 7.5m in diameter and 9m high. This requires on-site fabrication. Our engineers supplied a bespoke design with the bulk of the materials provided as "cut, rolled and prepared" plates – for easy loading in containers and supply to Bulgaria. We included detailed erection drawings and provided on-site engineering support during project initiation.

Fit for purpose

"Our products are not only uniquely designed and highly effective, but our true strength lies in our attention to detail. We take the time to fully understand each client's process before making a recommendation. By investing significant time and effort, we specify the right filter for every project—maximising our clients'

efficiency, performance, and longevity. Our products must do the job at the lowest possible operating and maintenance cost. Furthermore, we stand by our products after the sale, giving additional technical support. In our mindset, the filter remains our property after the sale – we are that invested in long-term positive outcomes," comments Walker.

The company also assists clients in their design layout and provides 3D drawings.

Superior Filtration may propose a trial installation to confirm a filter's suitability in a difficult application. "We bridge the

Superior Filtration serves as a valuable technical resource for process engineers who must consider the entire process



For businesses who are serious about fire protection, high-quality, dependable fire tanks are essential

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Don't let your business come under fire

These dedicated fire water tanks include vortex inhibitors customised to optimise delivery rates, flow control valves, water level indicators, safety ladders, inspection hatches, overflows and drainage systems



Meeting the ASIB standards, Rainbow Reservoirs provide a robust solution to the hazards of on-site fires



The Occupational Health and Safety Act requires property owners to comply with fire safety regulations by implementing appropriate fire safety measures and providing necessary equipment to protect both lives and property. For businesses who are serious about fire protection, high quality, dependable fire tanks are essential.

Compliance with SANS 10400-T fire safety standards is mandatory. Inadequate fire protection in this regard may result in a fire-related insurance claim being rejected. It is thus essential to ensure that the fire-fighting equipment meet all required standards, rules and regulations for fire safety.

There are bodies such as Automated Sprinkler Inspection Bureau (ASIB) who provide lists of respected suppliers, and the Fire Protection Association of South Africa (FPASA), which provides specialised fire safety management technical and training service to industry, commerce and society at large.

Fire tank options

Rainbow Reservoirs, a steel tank manufacturer in South Africa, is a member of the FPASA, and is a

listed supplier on ASIB's records. They offer anti-corrosive Aluzinc steel fire protection tanks that meet the stringent requirements of South Africa's fire safety laws.

Rainbow Reservoir's tanks are modular, bolted steel and prefabricated to facilitate quick, onsite installation and rapid commissioning. Rainbow Reservoir tanks offer fixed fire protection tanks of any required volume that are configured to suit the terrain and space available and can be colour matched with adjacent structures. Their products are in daily use throughout Africa and beyond.

Along with the tanks, there are associated features including vortex inhibitors customised to optimise delivery rates, flow control valves, water level indicators, safety ladders, inspection hatches, overflows and drainage systems integrate seamlessly to ensure that these fire protection tanks can be relied upon to respond to fire-related incidents immediately and with maximum efficiency.

These steel tanks are engineer-designed to be safe and reliable and provide long-term peace of mind in fire-security and protection systems. ●



FIGHTING FIRE WITH WATER DURING A WATER CRISIS

If there is no water that comes out of your taps, the chances are there is no water in the mains to fight a fire. **Kirsten Kelly** talks to Wynand Engelbrecht, the Chief Fire Officer at Fire Ops SA about the water crisis and fire safety.

“**A** ssets are under threat due to lack of water, and this is often compounded by the fact that municipal fire services lack basic equipment like ladders, platforms and rescue vehicles,” adds Engelbrecht.

Maintenance of fire hydrants

Like most water infrastructure, fire hydrants are also badly maintained.

A fire hydrant is a connection point that is used by fire fighters to tap directly into piped main supplies or water supply to add on to their emergency water tanks. Fire hydrants are strategically placed along roads, streets, and workplaces and they are often highlighted for visibility to the public and firemen.

The firefighters attach a hose to the fire hydrant, opens a valve on the fire hydrant to provide a powerful flow of water and is one of the most essential



Wynand Engelbrecht, the Chief Fire Officer at Fire Ops SA

firefighting equipment available to extinguish fires.

Fire hydrants should be in a clear and easily accessible area to prevent firefighters from wasting valuable time trying to locate the fire hydrants during an emergency. Placing fire hydrants in an accessible area allows fireman to easily access water to control the fire and limit extensive damage to the property.

“Maintenance and servicing of fire hydrants used to fall under the fire department’s responsibility. But in the early 2000s, the responsibility was removed from the fire department, and it now sits directly with municipal services. I estimate that there should be close to 2.5 million fire hydrants in a metro like Johannesburg. However, many fire hydrants are simply not operational; they are either flooded or have bees or hornets in them. Furthermore, they are not clearly marked. Pillar fire hydrants should be marked, and clearly visible and underground fire hydrants should have blue cat eye reflector markers on the road to help identify where they are. This is seldom the case. I have even come across incorrectly installed fire hydrants that are impossible to access,” states Engelbrecht.

Regulation

However, even if a fire station has all the



essential equipment, without a reliable water supply, its firefighting efforts are severely hindered.

Engelbrecht goes on to explain that municipalities are legally obliged to provide water for firefighting, and thus water for firefighting is given equal importance as drinking water when designing water networks. “However, most of our water networks are old, and water mains are already overloaded by increased water demand from growing businesses and population. They have also not been maintained, leading to water outages.”

Municipal responsibility is outlined in various laws and standards:

1. **Water Services Act (Act No. 108 of 1997):** This act designates municipalities as water services authorities, making them responsible for providing water services, including water for firefighting, within their jurisdictions.
2. **SANS 10090:2003 (Community Protection Against Fire):** This standard emphasises that “Two essentials for protection against fire are an efficient fire service and an adequate water supply. Local authorities should achieve and maintain a category 1 service.”
3. **The Constitution of South Africa** assigns municipalities the duty of managing water and firefighting services.
4. **The Water Services Act (1997) and the Fire Brigade Services Act (1987)** mandate local governments to ensure that fire departments have adequate access to water.

Furthermore, legal precedents have reinforced this responsibility. In a recent High Court ruling, a municipality was found liable for damages suffered by a

business because an interruption in the water supply hampered efforts to fight a fire at its premises.

Therefore, under South African law, municipalities are obligated to provide and maintain an adequate water supply for firefighting to protect lives and property within their areas of jurisdiction.

“However, in SANS 10400-W, there is an interpretation that the land owner should ensure that there is adequate and reliable water supply for firefighting. This implies that, for instance, 72 000 litres of water must be stored for every hydrant that can be used to extinguish a fire on the property with a pump to maintain 3 bar pressure. An engineer can be appointed to do a rational design and reduce the required water storage. Furthermore, sprinkler systems require separate water storage facilities to the fire hydrants. Besides the expense, these water storage facilities take up a large footprint that a property cannot always accommodate,” states Englebrecht.

Compliance with building regulations is fundamental to fire safety. Under the National Building Regulations and Building Standards Act, all buildings in South Africa, including residential properties, are required to ensure the safety of occupants from fire hazards. These regulations dictate that buildings must be designed and constructed in ways that minimise fire risks, such as the use of fire doors, fire-resistant materials and the proper installation of electrical systems.

“Every business and home are built differently, and I always advise businesses to use a fire consultant when trying to minimise risks. For instance, equipment within a building may be worth more than the building itself and

could be destroyed with water. It would therefore not be a good idea to have a sprinkler system above that equipment. Certain fires that are caused by chemicals cannot be extinguished with water. It is always best to consult a specialist,” states Engelbrecht.

How much water is needed to put out a fire?

This depends on a range of factors, but according to Engelbrecht, four factors make the biggest difference:

- How soon after the fire happens is the service called?
- How soon can the firefighters get to the fire?
- How soon can firefighters enter the building?
- How skilled are the firefighters once they are in the building?

Van Zyl and Haarhoff (1997; 2007) investigated fire incidents spanning 1980 to 1991 within a section of the central business district in the City of Johannesburg, and a residential area in the Province of Mpumalanga. Highlights of their study were:

- I. Extinguishing large fires in the CoJ over the 11-year period typically took between 30 and 90 minutes, with fire flows ranging between 300 and 2 100 litres per minute (large fires are fires that require more than 5 000 litres to extinguish)
- II. 90% of the large fires investigated were extinguished using fire flows of 3 120 litres per minute.

Innovate

Many laws and standards pertaining to firefighting and safety are drawn from Europe and America. But Engelbrecht argues that conditions in South Africa are vastly different from “First World

Countries'. "We need municipal authorities to sit down and think about good practise that is better aligned to reality in South Africa. For instance, there could be a bylaw that allows fire hydrants to be fed by certified boreholes."

International best practice states that a fire hydrant should be capable of delivering a water flow of at least 1 500 litres/minute at 3 bar. "Firefighters are more concerned with the flow of water than the pressure. We can pressurise water ourselves with pumps. In response to the water situation, Fire Ops have developed their own Ultra High-Pressure system (UHP) where pressure is increased from 3 bar to 140 bar and flow is decreased from 1 500 litres/minute to 100 litres/minute. This also significantly reduces water damage," says Engelbrecht.

Fire Ops' rapid intervention vehicles (RIV) carry between 380 litres and 500 litres of water and a 90 m high pressure hose. Fitted with UHP technology, they can work at a structural fire for up to 25 minutes with this water supply – completely independent on fire hydrants, instead plugging into domestic water supply (like pool water and taps) to refill our tanks. They have also developed a standalone, fully mobile UHP system, built by their technical division that can either be purchased or rented from and kept on site at commercial properties and manufacturing plants that pose a strong threat of fire or potentially

FIRE OPS SA FACT BOX

- Private Fire Brigade
- Operates in Gauteng (Crown Mines, Rosebank, Fairland, Chamdor, Randpark Ridge, Waterfall City, Alberton, Kyalami); KwaZulu Natal (Kloof) and Free State (Bloemfontein)
- Fleet of 27 vehicles (large pumpers, water tankers, RIV's (rapid intervention vehicles) and response motorcycles)
- Staff – more than 100 full time fire fighters, officers and commanders
- Servicing over 533 000 addresses of residences and companies.

As South Africa faces ongoing water shortages, the challenge of firefighting becomes even more complex. Firefighting and water scarcity may seem at odds, but through innovative technology and responsible resource management, we can effectively combat fire while minimising water waste. Fire Ops SA has adopted ultra-high-pressure (UHP) systems that use significantly less water while maintaining firefighting effectiveness. By utilising alternative water sources such as swimming pools, boreholes, and rainwater harvesting systems, the organisation ensures rapid response without over-reliance on municipal supply. In times of crisis, adaptability is key – our approach balances fire suppression with water conservation, proving that saving lives and protecting resources can go hand in hand." De Wet Engelbrecht, CEO of Fire Ops SA



hazardous environment. With a 500-litre horizontal tank, the system delivers 100 litres of water per minute at a working pressure of 90-170 bar.

Engelbrecht estimates that over 1 million litres of water was used to extinguish the 2003 fire at Albert Street where 77 people died. "If the UHP was used from the beginning we could have drastically reduced water usage to 5 000 litres of water. High pressure breaks up water particles, eventually creating cold steam; thereby increasing the absorption ratio. This creates a 'cold fire' that is easier to extinguish. By atomising water, there is less runoff water and firefighting becomes far more water efficient. We are probably the only fire brigade in the world that uses UHP for all structural fires."

"There are cases, such as industrial fires, where conventional firefighting methods are still the best approach, but adjusting nozzles and hose sizes can make all the difference, make the best use of water," he adds.

Innovation is key to addressing the challenges of firefighting during a water crisis. With aging infrastructure, limited municipal resources, and growing urban populations, traditional firefighting methods are no longer sufficient. By adopting advanced technologies such as UHP and exploring alternative water sources like certified boreholes, South Africa can develop more efficient, water-conscious firefighting strategies. This can reduce water usage, ensuring that critical resources are preserved while still protecting lives and property. ●

The decline in both the availability and quality of water is well-documented, prompting many businesses to assess the potential financial impact of this issue on their operations. **Kirsten Kelly** talks to **Mike Smith**, a director at Talbot, about water risk profiling.



Understanding water risks: a business imperative

“**A**s an economist, I work with our clients to assess the costing and financing of various water projects, as well as the financial impact of not implementing such mitigation strategies. This largely involves assessing water supply and quality risk, and converting that into a financial impact. It’s about monetising water

and factoring in the cost if it becomes unavailable or fails to meet a certain quality standard,” explains Smith.

When conducting a water risk assessment, Talbot evaluates the specific catchment area where the business operates. Both the present and future water supply versus demand is calculated. Talbot will also examine activities upstream from the client – this can include elements such as pollution caused by a wastewater treatment plant or factory, use of water in excess of licence as well as climate change.

Augmentation strategies

“We pinpoint possible climate change impacts. There are models that predict the change in weather patterns and the impact of these changes (flooding or drought) on a catchment area. Furthermore, we evaluate the performance of water service providers (WSPs) as well as any existing augmentation strategies in the catchment area,” says Smith.

For instance, Phase 2 of the Lesotho Highlands Water Project will have a bearing on water supply in Gauteng. There are plans for the building of various dams as part of the uMkhomazi Water Project that will supply the Pietermaritzburg and Durban areas. Depending on the client and position of these dams; it could be good news



Mike Smith, director, Talbot



for one client (creating a more consistent water supply) and bad news for another (removing water from one catchment to supply another).

Regulations and tariffs

“Another component of water risk is compliance and reputational issues. When compiling a water risk profile, we will flag restrictions from a regulation perspective as well as assessing any existing water use licenses against the current industry practices,” adds Smith. “Then there are tariffs. In South Africa, there is a general lack of consistency around water and discharge tariffs, and particularly the escalation thereof. But by looking at historical data, we believe that there will be double digit increases going forward.”

Financial markets and consumers also need to be considered. Environmental, social, and governance (ESG) performance is receiving greater attention from investors, customers, suppliers, and other stakeholders and is becoming a bigger part of future enterprise value. For many companies, water plays a critical role in ESG and corporate social responsibility performance. Investing in responsible water management can measurably improve a company’s ESG profile while reducing operational risks.

Challenges

Regulations, climate change, demand and supply, market pressures as well as augmentation plans impact each other, making water risk profiling an extremely complex task.

Furthermore, water risks are dynamic and can change on a weekly, daily or even hourly basis. Fortunately, Talbot uses data-driven solutions that provide a more dynamic analysis of future water risks.

“All of the data and information that we use is extremely granular and localised, so businesses in the same catchment area may have entirely different risk profiles. Similarly, a multi-site business with will have a different set of risks per location,” states Smith.

Like all models, the quality of the data used determines the outcome and accuracy. Smith notes that the renewal of the Blue Drop, No Drop and Green Drop Reports have been a great step forward in making people aware of the state of local infrastructure.

Next steps

Once Talbot has identified the water risks of a business, they are then well positioned to create a strategy for their mitigation and adaptation. “Our process engineers will firstly optimise a company’s water usage, thereby reducing consumption. From there, we look at options like water recovery plants and/or buffering water supply through storage. Ultimately, we are targeting water resilience, and that requires a multi-pronged approach,” says Smith.

“It is important to monetise water risks to give credibility to investment decisions on water projects. For example, a water recovery plant may cost a company R150 million, but their loss in production, if they have a water supply issues, as well as their discharge tariffs, may cost them R200 million over the next five years. With limited water availability and its deteriorating quality, businesses are increasingly aware of the financial impact of water on their bottom line,” concludes Smith. ●

DEEP CONCERN OVER MUNICIPALITIES FAILING TO MANAGE WATER RESOURCES EFFECTIVELY

The African Water and Sanitation Industry Association (AWSISA) is deeply concerned about the critical state of South Africa's water sector, which is being exacerbated by the failure of municipalities to manage water resources effectively.



Despite receiving various grants from the national government, municipalities are failing to invest in and maintain their water infrastructure, leading to a significant loss of water. In Gauteng, for example, municipalities lose approximately 2.6 billion litres of water per day. This staggering loss is a stark reminder of the inefficiencies and mismanagement of water resources by municipalities.

The situation is dire, and it is imperative that municipalities take their responsibilities as water service authorities seriously. Municipalities owe water boards over R25 billion, and this threatens the water sector's financial sustainability. AWSISA is also concerned that the failure to maintain and repair municipal water infrastructure means that no matter how much water is put into the system, it ends up being lost, often literally, into the ground. Accordingly, consistent power supply is important for continuous water supply. However, intermittent power supply from municipalities continues to hinder effective treatment and supply of water.

To address the financial sustainability challenges facing municipalities, AWSISA emphasizes that the culture of non-payment by citizens must be changed. Government departments and businesses must also act responsibly by paying their municipal bills timeously. AWISISA urges provincial and national governments, the business sector, and citizens to hold municipalities accountable for their role in the water crisis. It is imperative that we work together to address the root causes of the problem and ensure that municipalities are equipped to manage water resources effectively. ●

WATER INFRASTRUCTURE AND EQUIPMENT MAINTENANCE: A STRATEGIC NECESSITY

Proper maintenance of infrastructure and equipment is essential to prolong the usable life of these assets. With the right strategic approach, the capital investment required for maintenance becomes the most cost-effective solution.

Using a preventative maintenance agreement (PMA) helps avoid costly replacements, extends a component's life, and brings down the cost of unnecessary scheduled maintenance

As companies and municipalities face economic challenges, they are required to get more out of their water infrastructure and equipment. Extending the replacement cycles for pumps, filters, mixers, and other components defers the cost of replacing them. Conversely, without regular and proper maintenance, this approach backfires – leading to underperformance, breakdowns, and eventually an expensive catastrophic failure that will necessitate replacement.

"Anyone who has driven an under-maintained car knows it's a case of diminishing returns," says Chetan Mistry, strategy and marketing manager at

Xylem Africa. "Fuel consumption goes up, performance declines, and once one thing breaks, it often triggers a domino effect of other issues. Similarly, under-maintenance of water systems invites trouble and unnecessary scheduled maintenance has its drawbacks. The key is to strike a balance that ensures longevity and cost-efficiency."

This balance is why more private and public water system managers are turning to preventative maintenance agreements (PMAs).

The maintenance conundrum

Water infrastructure and equipment require regular upkeep. For instance, filters and tanks may need annual inspections, while other components – though durable for several years, benefit from frequent checks. General inspections are also critical to discovering emerging issues such as leaks or component wear.

Despite its importance, maintenance is often seen as a grudge purchase. It involves costs, disruptions, and logistical

headaches. Many site managers adopt an "if it's not broken don't fix it" attitude towards maintenance to avoid these difficulties, but this approach ultimately proves costly.

According to the Water Research Council, annual maintenance of infrastructure like pipelines or pump stations can cost less than 1% of their replacement value. By contrast, poor maintenance can reduce a pump's lifespan by 30% to 50%. The cost of failure extends far beyond the direct cost of repair and replacement of equipment and includes secondary impacts, such as contamination and service interruptions.

Underperforming water systems pose significant risks, especially in industrial settings. For example, low water pressure can compromise fire prevention, and failed dewatering systems can endanger fragile areas.

To address these challenges, a suitable maintenance strategy needs to be adopted to ensure cost-effective reliable operations. The shift away from reactive maintenance (operate to fail) to condition-based maintenance, provides owners of water infrastructure and pumping equipment an opportunity to reduce maintenance costs while extending the usable lifespan of their assets efficiently.



Chetan Mistry, strategy and marketing manager at Xylem Africa

Implementing such systems with limited resources and expertise can become overwhelming. This is where preventative maintenance agreements (PMA) stand out.

How PMAs reduce costs and improve reliability

A preventative maintenance agreement is a supplier-managed solution that provides structured, cost-effective maintenance. A well-designed PMA offers numerous benefits, including:

- Predictable maintenance budgets
- Detailed equipment status reports after each inspection
- Priority service from authorised technicians
- 24-hour emergency response guarantees
- Unlimited telephone support
- Extended warranty protection for equipment

Original equipment manufacturers (OEMs) are uniquely positioned to deliver high-value PMAs. By auditing a site's equipment and tailoring maintenance plans to its budget and scope, OEMs can offer solutions that meet both operational and financial needs.

Cost-effectiveness of PMAs

PMAs save costs in three key ways:

1. Proactive issue resolution

By addressing potential problems early and using OEM replacement parts, PMAs reduce the likelihood of failures.



As businesses and municipalities face economic constraints, water equipment and infrastructure are being used far beyond their life spans- which can result in expensive replacements in times of failure

2. Fewer site visits

With lower failure rates, inspection intervals are tailored to the equipment in use and the specific site conditions. Inspections may vary from four to one inspection per year.

3. Access to skilled technicians

PMA clients benefit from expert technicians who complete tasks efficiently, without incurring additional costs for critical repairs or advanced workshop services.

"Maintenance is resource-intensive, requiring staff, money, and time," explains Mistry. "While some tasks can be handled by on-site teams, they often have competing priorities. Unexpected or critical repairs can become prohibitively expensive. A PMA alleviates this burden, providing predictable costs and ensuring equipment up-time."

Versatility beyond OEM products

PMA benefits are not limited to a specific vendor's products. Leading OEMs, such as Xylem, have the expertise and resources to service third-party equipment. This flexibility ensures that all systems on-site remain productive, allowing staff to focus on other priorities while managers maintain cost predictability and uptime.

A well-designed preventative maintenance agreement delivers value by ensuring water infrastructure and equipment remain reliable and cost-effective. By planning for maintenance rather than reacting to failures, companies and municipalities can navigate economic challenges with confidence, extending the life of their assets and avoiding costly disruptions and service delivery challenges.

When it comes to maintaining water systems, the right PMA ensures equipment keeps doing its job – efficiently, reliably, and within budget. ●

Complex water infrastructure requires proper maintenance, however without a maintenance plan such as a preventative maintenance agreement, maintenance can become costly, and often miss the purpose it is meant to fulfil



VEGA instruments offer reliable measurements in the most challenging environments

HOLDING UP UNDER PRESSURE

Africa's urban populations are increasing, and infrastructure is expanding to meet it. This unprecedented growth makes sustainable water management and treatment even more crucial, as the pressure on existing water networks increases.

Reliable water supply is linked to social stability, and when access to water falters unrest usually follows. Effectively monitoring and managing pressure within water systems is essential to ensuring a consistent supply, as well as achieving

sustainability goals such as resource waste reduction.

Monitoring the flow

Municipalities and water utilities can invest in pressure sensors that facilitate a sustainable water management process focused on efficiency, reliability, and resilience.

Water management is a holistic practice that is more than just ensuring water flows to households. As the sector moves towards more sustainable and environmentally conscious practices, precise pressure monitoring becomes a necessity. Accurate pressure readings can prevent costly leakages and optimise water flow while minimising energy use and resource waste.

VEGA, a manufacturer of sensor technology for level, switching and pressure, offers a robust sensor solution that offers accurate pressure data with operational longevity

and minimal resource demand, allowing facilities to streamline their processes while significantly reducing environmental strain.

The selection of sensors is often based on their initial cost. Using sensors that are reliable, accurate, and robust can save utilities and municipalities in the long run by avoiding water outages, and damage to infrastructure that comes from inaccurate sensor data.

The right sensor

VEGA provides custom pressure measurement to utilities, contributing to sustainable water supply and supporting companies in achieving their sustainability goals, such as reducing waste and minimising their environmental footprint. With pressure sensors like the VEGABAR 38, the remote monitoring of tanks and chemical systems is possible- saving time and resources. Equipped with IO-Link communication, pressure sensors can be seamlessly integrated into existing operations and automated setups. Our pressure sensors feature an energy-efficient LED light ring and a user-friendly VDMA menu structure aimed at enhancing the user experience while cutting down on operational costs and energy usage.



VEGAWELL 52 is suitable for continuous level measurement in deep wells/ reservoirs and rivers

The VEGABAR 82 pressure transmitter is engineered for use in extreme conditions, featuring a robust ceramic measuring cell that resists abrasion. Its design is intended to minimise maintenance costs and enable effective operation in harsh environments like sewerage feed and pipeline systems, facilitating continuous service, while prioritising resource conservation. The simple connection of the VEGABAR series 80 sensors as electronic differential pressure opens new possibilities for differential pressure measurement in water and wastewater applications.

To achieve precise measurements of influent and effluent flow, the VEGADIF 85 differential pressure transmitter plays a key role and is designed to provide reliable pressure readings and can measure filter contamination with accuracy. Its robust construction and state-of-the-art technology ensure accurate and consistent performance, making it an indispensable tool for effective flow management in any industrial setting. With features that accommodate a wide range of operating conditions, the VEGADIF 85 is ideal for ensuring optimal performance in fluid measurement applications. Its overload diaphragm ensures it withstands varying pressure conditions, while its multivariable sensing capabilities deliver precise measurements essential for informed decision-making in operations.

The VEGAWELL 52 is designed for hydrostatic level and pressure monitoring in deep wells, basins, and reservoirs, offering a durable solution for continuous measurement. Its hardy construction allows it to withstand harsh environmental conditions, making it suitable for both surface and sub-surface applications. The VEGAWELL 42 offers an energy-efficient design that supports sustainable operations in water treatment plants and assists in reducing operational costs, operating effectively in challenging environments while maintaining measurement accuracy and reliability. The advanced technology incorporated in the design ensures precise data reporting, facilitating informed decision-making regarding water management and resource allocation. Its performance and reliability make it a significant tool for facilities involved in water resource monitoring.

These sensors can all be monitored via the VEGA tools app which uses Bluetooth to manage and troubleshoot sensors wirelessly. This saves on time and labour, avoiding on-site intervention.

Adopting accurate and tough sensors the water and wastewater industries can greatly improve their sustainability efforts, and smooth out their day-to-day activities. Quality sensors, like those found in the VEGA product line-up, allow utilities and municipalities to focus on their primary goal: providing safe and sustainable water management, which is vital to the health of local communities. ●

Precise pressure monitoring in municipal water systems ensures efficient, reliable and sustainable operations

PUMPS TRUCKS HARD AT WORK IN SWAKOPMUND MUNICIPALITY

Werner Pumps recently handed over two high-pressure jetting truck units to Swakopmund Municipality, in Namibia, where they have been put to work for sewer drain cleaning and sewer pump station maintenance in the coastal region.

The Impi comes with a hydraulic slewing suction boom, two hydraulic-driven hose reels and multiple toolboxes



The Werner Impi 10 000 € Combination Vacuum and jetting truck and Werner Hippo 8 000 € jetting truck were both manufactured by Werner Pumps in South Africa at the company's headquarters in Springs.

The Impi unit offers hydraulically operated jetting and vacuum functionality and is an effective solution for clearing sewer and stormwater lines, while the smaller Hippo unit offers jetting-only functionality with a high-pressure piston plunger. Both have a capacity of 295 ℓ per minute and a maximum pressure of 135 bar.

Feature of the Impi

These trucks feature a hydraulic slewing suction boom, two hydraulic-driven hose reels and multiple toolboxes. Both trucks offer safety features such as sight glasses and sludge level indicators, failsafe control panels and pressure-tested stainless steel tanks.

"It's great to see the trucks being used extensively to improve sewer maintenance and repair," says Sebastian Werner, MD at Werner Pumps. "We extended our footprint into Namibia only recently, but the vehicles are doing us proud and helping us to establish our reputation for quality equipment manufactured in southern Africa within the region." ●

SOIL AND GROUNDWATER REHABILITATION IN SOUTH AFRICA'S PETROCHEMICAL AND MINING SECTORS

The manufacturing, petrochemical, and mining industries have long been pillars of South Africa's economy. However, their operations have also left a significant environmental footprint, particularly on soil and groundwater contamination. **By Robert Erasmus, MD of Sanitech, and Harry Ylikangas, CEO of Sensatec Africa**

The environmental legacy of industrial activity in manufacturing, petrochemical, and mining sectors includes the contamination of soil and groundwater with a diverse range of pollutants, including sulphate, ammonium, nitrate, heavy metals and metalloids, such as lead, mercury, arsenic and cadmium, which are toxic and persistent in the environment. Hydrocarbon pollutants, including petroleum products and their byproducts, and organic compounds, such as pesticides and industrial solvents, pose serious risks to human health, ecosystems, and water resources.

Despite a strong regulatory framework and a skilled workforce, many contaminated sites remain in a "care and maintenance" phase, focusing on containment rather than achieving permanent remediation.

Traditional remediation methods like excavation and disposal, onsite bioremediation or pump-and-treat systems for groundwater can be ineffective, time-consuming, and costly. They can also have unintended consequences like disturbing soil characteristics and natural groundwater flows.

The solution - a collaborative approach
Overcoming the complex environmental



Robert Erasmus, MD of Sanitech

challenges posed by the manufacturing, petrochemical, and mining industries requires a collaborative approach involving industry leaders, environmental experts, and technology providers. By pooling resources, knowledge, and innovative technologies, these partnerships can accelerate the development and implementation of effective and sustainable remediation solutions.

Private sector companies are at the forefront of driving innovation, developing solutions such as advanced bioremediation and insitu treatment methods. These technologies offer efficient and environmentally friendly approaches to complex contamination problems. By combining technical expertise, experience, and a strong local

presence, private sector companies are well-positioned to deliver comprehensive remediation solutions that can significantly reduce project timelines.

Furthermore, the private sector can provide the necessary financial resources and expertise to support especially large-scale remediation projects, demonstrating a commitment to environmental responsibility and long-term sustainability. Effective communication and engagement with local communities are critical for successful remediation projects. Private sector involvement can help build trust and address community concerns through transparent and inclusive processes. By working closely with regulatory authorities, private sector companies can ensure compliance with environmental standards and contribute to the development of more stringent regulations.

The benefits of a collaborative approach

A multi-stakeholder approach enhances the efficiency of soil and groundwater remediation. Combining the expertise of industry, academia, environmental consultants, and government entities optimizes resource allocation, shortens remediation timelines, and reduces costs. Improved communication and community engagement foster public trust and smoother project implementation.

By fostering partnerships between industry, government, and academia, South Africa can accelerate site rehabilitation and establish itself as a leader in sustainable resource management. Leveraging innovative technologies and shared expertise will expedite remediation efforts, protect human health and the environment, and contribute to a more sustainable future. ●



Mining has a significant impact on the environment, and the efforts to remedy this impact must be strengthened



Contaminated groundwater is very serious and threatens the health of people and planet



Petrochemical manufacturing requires special care when assessing and managing its environmental impact

Landfills create leachate, a liquid that seeps from waste, which is highly hazardous and can contaminate groundwater. SRK Consulting, an international consulting firm that offers technical services to the natural resource industries, maintains that through monitoring groundwater, municipalities can manage this contaminant.

WHY MONITORING AT LANDFILLS IS VITAL TO KEEPING GROUNDWATER CLEAN



“**G**roundwater monitoring is a legislative requirement, but it is often done simply to ‘tick the box’ in the compliance process,” argues Richard O’Brien, principal environmental geochemist and partner at SRK Consulting. “To effectively mitigate risk, it is essential that this monitoring is conducted scientifically and diligently – and that the data is analysed correctly so that the right actions can be taken.”

SRK is monitoring groundwater around landfill sites for several South African municipalities and waste management organisations, giving municipal managers and operators insights into contamination risks arising from leachate plumes under these facilities.

O’Brien explains when groundwater monitoring is done correctly the data can yield early warning signs which inform the intervention strategies of municipalities. “Key aspects of effective groundwater monitoring are, firstly, ensuring that the

sampling is performed consistently and diligently, that analyses are accurate, and secondly, understanding how to interpret the results of these samples,” O’Brien noted. “These test results will help detect changes in the groundwater chemistry, for instance, warning municipalities of any signs of groundwater contamination.”

Accuracy of groundwater sampling

When collecting samples for groundwater monitoring, the samples need to accurately represent the groundwater as it occurs in the aquifer. This requires all aspects of the monitoring system, including infrastructure, to be well maintained.

Landfills can present quite an aggressive environment, where monitoring well headboxes may be vandalised and damaged. The site conditions are often dusty and full of debris, which can impact

the sample if there is ingress into the monitoring well.

“Obtaining a sample is not quite as simple as lowering a plastic tube into a water resource,” he said. “If the groundwater sample is taken from ‘standing water’ which has contact with the atmosphere, it will undergo chemical changes such as oxidation – and will not deliver an analytical result accurately reflecting the aquifer chemistry.”

As part of one of the current monitoring contracts, SRK is also conducting maintenance of the monitoring infrastructure to ensure the integrity of results. For instance, fine



Richard O'Brien, principal environmental geochemist and partner at SRK Consulting



colloidal material in groundwater can accumulate in the monitoring boreholes and negatively impact the chemistry of the sample, he points out. ‘

“We therefore conduct an ad hoc process of jetting out the accumulated silt to recover the monitoring well and restore its functionality,” he says. “This should only be done when it is shown that silt has accumulated and always well in advance of sampling.”

Monitoring

Beyond the quality and chemistry of the groundwater, a range of other important measures are taken as part of the groundwater monitoring regime. This includes the depth in relation to the water table, which informs calculations about the groundwater’s direction of flow.

“The monitoring pump is installed, being careful to ensure it is in the targeted zone – so that results are consistent and comparable over time,” he adds. “During pumping, we monitor the electrical conductivity, indicating the level of dissolved salts in the water; we

also measure indicators like the pH, redox potential, the dissolved oxygen, as well as the temperature.”

SRK Consulting is able to execute detection monitoring protocols by diligently collecting samples, testing them at accredited laboratories, and interpreting the results.

“This allows municipalities to assess if the results meet the parameters that are laid out in the regulatory licenses for each landfill, whether they are operational or not,” states O’Brien. “This groundwater quality monitoring is becoming increasingly important as the country relies increasingly on precious groundwater resources as the population and economy grows.”

He notes that landfills evolve with time in terms of the leachate they generate, and the monitoring data informs how their impact on groundwater changes.

“Where we have a long-term monitoring record of both leachate and groundwater, we can start drawing conclusions about the interaction between leachate chemistry and groundwater chemistry.”

Integrated approach

Various levels of expertise are required to ensure an effective monitoring programme. The site work will be conducted by experienced sampling technicians and scientists, and the team will be led by a professional geohydrologist, environmental geologist, or geochemist.

Outside of the landfill context, he noted that the private sector can also do more to protect groundwater resources through better monitoring, rather than approaching the exercise purely to achieve compliance.

“By encouraging a broader water stewardship approach, we encourage clients to glean as much insight as possible from the monitoring process – and then to interrogate it more closely for valuable strategic and operational guidance,” he says. “There is tremendous value in this data, in terms of understanding and minimising the impact of every industrial operation; and this impact, of course, is the key indicator that all companies should be working to reduce.” ●

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