ColiMinder
rapid microbiology
by VWM SOLUTIONS

References
Awards &
Scientific Publications

This document covers information about VWMS customers in different application fields and awards won for the technology as well as a list of peer-reviewed scientific publications.

BOTTLED WATER

Customer:	**Romaqua** – Mineral Water Bottling, Borsec, Romania
Application:	Online monitoring of microbiological water quality of two mineral water wells and quality control though out mineral water bottling process. Already using 2 ColiMinder devices in 2 different bottling plants.
Task:	Safeguarding product quality, testing final product quality, increase safety and efficiency of the mineral water bottling process.
Target organism:	Total Microbiological Activity (ALP)
Contact:	via VWMS

Customer:	**Major international soft drink bottling company,** South Africa
Application:	Online monitoring of microbiological water quality of water production from municipal tap water and quality control though out the soft drink production process.
Task:	Safeguarding product quality and increase safety and efficiency of the soft drink production process.
Target organism:	Total Microbiological Activity (ALP)
Contact:	Via VWMS

Customer:	**Major international water bottling company,** Europe
Application:	Project to be started by March 2021. Using the ColiMinder to continuously monitor microbiological quality in the bottling line.
Task:	Adopt the CIP (Clean in Place) schedule to evidence-based actual microbial load as provided by the ColiMinder, instead of taking the decision to CIP based on experience and balance between risk and cost. Huge savings expected.
Target organism:	Total Microbiological Activity (ALP)
Contact:	not further information possible due to NDA.

DRINKING WATER

Customer:	WSD – public Water Supply Department, Hong Kong
Application:	Project designed for ColiMinder technology evaluation: "Pilot Trial on the use of novel on line monitoring technology for fast process monitoring of microbial quality at water treatment works"
Task:	Ensuring microbial safety in drinking water supply.
Target organism:	Total Microbiological Activity (ALP)
Contact:	**via VWMS GmbH**

Water Supplies Department
The Government of the Hong Kong Special Administrative Region

Customer:	Unitywater - drinking water utility, Australia
Application:	Online monitoring of microbiological water quality of final drinking water in Unitywater's network, installed at BliBli reservoir.
Task:	Ensuring safety of drinking water supply.
Target organism:	Total Microbiological Activity (ALP)
Contact:	**via Optimosgroup, ColiMinder distributor for Australia** Mr. Phil Krasnostein phil@optimosgroup.com.au

Unitywater

Customer:	**De Watergroep**, national drinking water supply, Belgium
Application:	Technology evaluation project: Online monitoring of microbiological water quality in a national drinking water network, installed at junction station. During evaluation period, different spiking trials with various water qualities have been realized.
Task:	Ensuring safety of drinking water supply. Results of evaluation prove the sensitivity and reliability of the ColiMinder.
Target organism:	Total Microbiological Activity (ALP)
Contact:	**Han Vervaeren** De Watergroep Vooruitgangstraat 189 B - 1030 Brussels Email: Han.Vervaeren@dewatergroep.be Web:www. dewatergroep.be

De Watergroep

Customer: **Bathurst Regional Council,** municipal drinking water supply, Australia

Application: Online monitoring of raw water quality for drinking water production –
                     installed at pumping station located in a 21 km long pipeline between reservoir
                     and drinking water production facility

Task: Ensuring safety of drinking water supply

Target organism: E. coli

Contact: **Phil Krasnostein**
                     Director
                     Optimos Solutions (VWMS' distribution partner)
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Customer: **MEKOROT**, Israel's public water supplier

Application: online monitoring of drinking water supply and delivery network with
                     ColiMinder ERU

Task: Ensuring safety of drinking water supply and network

Target organism: E. coli and Total Activity (ALP)

Contact: Dalit Vaizel-Ohayon, PhD
                     Chief Bacteriologist
                     Mekorot National Water Company
                     Jordan District, Central Laboratory
                     P.O.Box 610 Nazareth Illit 17105, Israel
                     Tel: +972 4 6500685
                     Mobile phone: +972 50 7126839
                     Email: dvaizel@mekorot.co.il

Customer: **Ville de Laval, municipal drinking water supply, Canada**

Application: The ColiMinder is installed at raw water intake from river "Rivière des Mille Îles
                     to a drinking water plant

Task: Monitoring of microbiological quality of raw water

Target organism: E. coli

Contact: **via VWMS GmbH**

Customer: **Seoul Water Institute,** Public drinking water supplier of
Seoul Metropolitan Government, Republic of Korea

Application: Drinking water production, monitor biological performance of activated carbon filtration/adsorption system

Task: Monitoring quality and functionality of activated carbon filter activity and its backwashing

Target organism: Total Activity (ALP)

Contact: **via VWMS GmbH**

THE OFFICE OF WATERWORKS
SEOUL METROPOLITAN GOVERNMENT

Customer: **EVN**, public drinking water supplier, Lower Austria

Application: Monitoring of drinking water wells, riverbank filtration wells, storage tanks and supply network.

Task: monitoring for early detection of contamination; rapid response on contaminations, ensuring safety in public drinking water supply

Target organism: E. coli for wells & raw water and Total Activity (ALP) for network and storage

Contact: **Christian Eidher**
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EVN

Customer: **Gemeinde Weiden an der March** (Municipality), Lower Austria

Application: Monitoring of drinking water production quality and performance

Task: The ColiMinder is monitoring at raw water intake and after activated carbon filtration to control process performance. After activated carbon filtration a UV disinfection is installed. The municipality intends to switch off UV disinfection in case contamination is low according to ColiMinder results.

Target organism: Total Microbiological Activity (ALP)

Contact: **Franz Neduchal**
Vice Mayor of Gemeinde Weiden an der March
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WEIDEN
an der March.

SURFACE WATER & BATHING WATER

Customer: **Eau de Paris - public water utility for Paris**

Application: 1. surface water monitoring in different public recreation areas, **dedicated for swimming competition at Olympic Games 2024**
2. deployment in raw water monitoring for **drinking water production.**

Task: ensuring safety in bathing waters / enabling quick reaction on contamination events / drinking water safety

Target organism: E. coli, Enterococcus in some cases

Contact :   **Dr Sophie Haenn**
Microbiologist
19, rue Neuve-Tolbiac CS 61373
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sophie.haenn@eaudeparis.fr

Customer: **University of Tokyo**

Application: surface water monitoring in different public recreation areas, also the ones **dedicated for swimming competition at upcoming Olympic Games**

Task: ensuring safety in bathing waters, enabling quick reaction on contamination events

Target organism: E. coli

Contact: **Prof. Hiroyuki Katayama**
University of Tokyo
Department of Urban Engineering,
Graduate School of Engineering
Bunkyo-ku, Tokyo, 113-8656 I Japan

Customer: **major water company in France, via our partner SubseaTech**

Application: monitoring bathing water quality at Marseille's Mediterranean beaches

Task: Measurements of different samples from beaches at Mediterranean Sea in Southern France, using the ColiMinder ERU in a car, in order to open / close beaches for swimming and helping to identify sources of contamination

Target organism: E. coli / Enterococcus in saline water

Contact :

Yves Chardard, Président / CEO
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Marine and Underwater Technologies
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Customer: **NIWA - National Institute of Water and Atmospheric Research**

Application: Surface water monitoring using ColiMinder ERU in different applications and both fresh and saline waters.

Task: scientific studies, validations, research projects

Target organism: E. coli, Enterococcus in Fresh-/Saline-Waters

Contact:
Dr Rebecca Stott
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Hamilton | New Zealand
www.niwa.co.nz
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Customer: **KIT – Karlsruhe Institute of Technology**

Application: Surface water monitoring in different applications using ColiMinder Mobile. Current project: karstic spring monitoring throughout Europe

Task: scientific studies, validations, research projects in real world setting

Target organism: E. coli

Contact:
Prof. Nico Goldscheider
Karlsruhe Institute of Technology
Institute of Applied Geosciences
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76131 Karlsruhe I Germany

Customer: **Université Polytechnique de Montréal**

Application: monitoring of surface water and raw water in drinking water production, bathing water and sewage plant discharge using 6 ColiMinder devices

Task: scientific validation of the technology; helping municipalities and other institutions to ensure water safety

Target organism: E. coli

Contact:
Jean-Baptiste Burnet, PhD
Canada Research Chair in Source Water Protection

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Customer:	**AgResearch, New Zealand**
Application:	monitoring of surface water in agricultural production and land use
Task:	Monitoring at different sites / of different streams and effluents in agricultural land use and production
Target organism:	E. coli
Contact:	**via VWMS GmbH**

WASTE WATER

Customer:	**DSD - Drainage Service Department**, public wastewater institution Hong Kong, with **ARUP** International Consultancy
Application:	Sewage treatment monitoring and controlled disinfection at Stonecutters Island Sewage Treatment Works (SCISTW), one of the world's largest wastewater treatment plants.
Target organism:	E. coli (saline water)

Task:

official statement from DSD dated 2018:

DSD and ARUP present an innovative project at Hong Kong´s Stonecutters Island Treatment Works (SCISTW).

As an attempt to adopt new technology in order to improve efficiency and efficacy of sewage treatment, DSD and ARUP are trialing VWMs' ColiMinder technology at HK Stonecutters Island.

The treatment works at Stonecutters Island consists of Chemically Enhanced Primary Treatment (CEPT) and disinfection with Sodium Hypochlorite. The SCISTW services a population of more than 5 Million and with a design ADWF of 2,450,000 m^3/d is it one of the world's largest CEPT wastewater treatment plants.

Sodium Hypochlorite for disinfection consists as one of the significant operating costs. A number of inherent technical issues, including variable wastewater chlorine demand and fluctuating environmental conditions provide a challenge for the operators to optimize the chemical consumption while meeting disinfection objectives.

The goal of DSD and ARUP is to:

- *Improve process efficiency*
- *Safeguard water quality*

The trial has been under way since December 2017 and so far over 5,000 measurements have been recorded without failure or need for re-calibration of the unit. While the trial period is planned for 12 months in order to cover all expected process conditions, initial performance indicates that the equipment is reliable and the relationship between ColiMinder and Laboratory results is positive.

Contact:

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Customer:	**MSD Cincinnati, Ohio, US**
Application:	Controlled disinfection in sewage treatment discharge, monitoring before and after disinfection
Task:	Monitoring sewage treatment process performance
Target organism:	E. coli
Contact:	**via VWMS GmbH**

Customer:	**Trojan UV** in cooperation with **Western University, Ontario, Canada**
Application:	Controlled disinfection in sewage treatment discharge
Task:	Monitoring sewage contamination after UV disinfection
Target organism:	E. coli
Contact:	**via VWMS GmbH**

MEMBRANE INTEGRITY

Customer: **DHI Group, Denmark**

Application: DHI is in charge of a hospital sewage plant discharge quality monitoring, using the ColiMinder to monitor membrane integrity in a public hospital's MBR plant. **Project has been awarded by Danish EPA as "BAT" (Best Available Technology)**

Task: Fully automated contamination monitoring of sewage plant discharge. Automatic warnings in case of increased contamination due to broken UF membranes.

Target organism: E. coli

Contact:
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INDUSTRIAL WATER

Customer: **Producer of metal working fluids, Europe**
Cannot be named due to an existing NDA.

Application: Monitoring of microbiological contamination in metal working fluids in industrial production process.

Task: Automated quality monitoring and disinfection

Target organism: Total Activity (ALP)

Contact: for further information please contact VWMS

… more customers are using the ColiMinder, and many more will do so. List to be continued.

AWARDS won by ColiMinder

GLOBAL CHALLENGE: ISRAEL: BACTERIA DETECTION

CONNECTING INNOVATIVE SOLUTIONS WITH THE MEKOROT NATIONAL WATER UTILITY - ISRAEL

2019:

September 2019:

Winner of the MEKOROT -Bacterial Detection Challenge

2016:

October 2016 **WaterSmart Innovations Conference**

LAS VEGAS Channels for Innovation Summit:

➢ **MOST INNOVATIVE NEW TECHNOLOGY**

July 2016 **Singapore Water Week**

TechXchange: WINNER OF INNOVATION AWARD

➢ **1st Place voted by the Jury**

➢ **1st Place voted by TechXchange Participants**

Jan 2016 **International Water Summit ABU DHABI**

Innovate@IWS: FIRST PLACE INNOVATOR

➢ **WINNER OF INDUSTRIAL WATER SECTOR**

2015:

- 3/2015 - Neptun Water- Award
- 3/2015 - Science2business Award 2015

2014 :

- 12/2014 - STEP AWARD – Germany – TOP 20
- 11/2014 - Austrian Young Entrepreneurs Competition – Winner Category Environment
- 11/2014 - Austrian Young Entrepreneurs Competition - 9. Rank
- 10/2014 - NÖ Future Award – 2. Rank
- 10/2014 - Green Business Award 2014 – 1. Rank
- 10/2014 - Cisco + Pioneers – Innovation Challenge – Top 50
- 10/2014 - Innovationspreis 2014 – outstanding Innovation
- 09/2014 - DAPHNE Environment Award – awarded Excellent Project

2013 :

- 12/2013 RIZ Niederösterreich – Genius Ideas Award – 3. Rank
- 10/2013 GC- Genius Ideas Competition 2013 – 2. Rank Product Development
- 11/2013 Austrian Young Entrepreneurs Competition – 62. Rank

List of peer-reviewed publications

Katalin Demeter, Jean-Baptiste Burnet, Philipp Stadler, Alexander Kirschner, Matthias Zessner, Andreas H. Farnleitner (March 2020); Automated online monitoring of fecal pollution in water by enzymatic methods; March 2020 – Current Opinion in Environmental Science & Health, Published by Elsevier B.V., www.sciencedirect.com

Margot Cazals, Rebecca Stott, Carole Fleury, François Proulx, Michele Prevost, Pierre Servais, Sarah Dorner, Jean-Baptiste Burnet; (February 2020) Near-real time notification of water quality impairments in recreational freshwaters using rapid online detection of β-D-glucuronidase activity as a surrogate for *Escherichia coli* monitoring; February 2020 - Science of The Total Environment

Emile Sylvestre, Jean-Baptiste Burnet, Patrick Smeets, Gertjan Medema, Michele Prevost, Sarah Dorner (December 2019) Can routine monitoring of *E. coli* fully account for peak event concentrations at drinking water intakes in agricultural and urban rivers? December 2019 Water Research 170:115369

Jean-Baptiste Burnet, Emile Sylvestre, Jonathan Jalbert, Sandra Imbeault, Pierre Servais, Michele Prevost, Sarah Dorner, (2019), Tracking the contribution of multiple raw and treated wastewater discharges at an urban drinking water supply using near real-time monitoring of b-D-glucuronidase activity, Water Research 164 (2019)

Jean-Baptiste Burnet, Quoc Tuc Dinh, Sandra Imbeault, Pierre Servais, Sarah Dorner, Michèle Prevost - Autonomous online measurement of ß-D-glucuronidase activity in surface water: is it suitable for rapid *E. coli* monitoring? Water Research 152 (2019) 241-250

Philipp Stadler, Luke C. Loken, John T. Crawford, Paul J. Schramm, Kirsti Sorsa, Catherine Kuhn, Domenico Savio a,h,i, Robert G. Striegl, David Butman, Emily H. Stanley, Andreas H. Farnleitner, Matthias Zessner - Spatial patterns of enzymatic activity in large water bodies: Ship-borne measurements of beta-D-glucuronidase activity as a rapid indicator of microbial water quality; Science of the Total Environment 651 (2019) 1742–1752

Philipp Stadler, Günter Blöschl, Wolfgang Vogl, Juri Koschelnik, Markus Epp, Maximilian Lackner, Markus Oismüller, Monika Kumpan, Lukas Nemeth, Peter Strauss, Regina Sommer, Gabriela Ryzinska-Paier, Andreas H. Farnleitner and Matthias Zessner - Real-time monitoring of beta-D-glucuronidase activity in sediment laden streams: A comparison of prototypes. Water Research, Volume 101, 15 September 2016, Pages 252-261 (2016, May). Paper

Demeter K, Burnet J-B, Stadler P, Kirschner A, Zessner M, Farnleitner AH, Automated online monitoring of fecal pollution in water by enzymatic methods, Current Opinion in Environmental Science & Health, https://doi.org/10.1016/j.coesh.2020.03.002.

Further references

Wolfgang Vogl, Darren Yuk Hei Li, Sarah Lam, Juri Koschelnik, Ines Daubek, (October 2019), Rapid enzymatic activity measurement as an indicator of microbiological contamination - Results after 6 years of validations and experiments in different applications, Poster Presentation, IWA-ASPIRE 2019 Hong Kong

Daubek I., Beyer Reiter J*, Koschelnik J, Thornock A, Vogl W.* (Sept 2019), Rapid detection of microbiological contamination by measurements of specific enzymatic activity, Poster Presentation, IWA-HRWM 2019 Vienna

Jean-Baptiste Burnet, Emile Sylverstre, Mounia Hachad, Pierre Serviais, Sarah Dorner, Michèle Prevost (November 2018) Tracking the contribution of multiple treated wastewater and CSO discharges at drinking water intakes by online *E. coli* monitoring. Presentation at Water Quality Technology Conference 2018 – Toronto

Wolfgang Vogl, Juri Koschelnik, Ines Daubek - Rapid detection of microbiological contamination by measurements of specific enzymatic activity – Results after 4 years of validations and experiments in different applications, oral presentation; Water Institute of Southern Africa; WISA 2018 Conference; conference Cape Town.

Maximilian Lackner, Wihelm Grabow, Philipp Stadler (2017 by CRC Press) - Handbook of Online and Near-real-time Methods in Microbiology

Rebecca Stott, David Bremner, Ryan Evision, Claire Conwell, Juliet Milne, and Wendy Purdon (November 2017) - Moving to real-time measurement of microbial health risks in rivers - Rebecca Stott. NIWA, New Zealand. Presentation on 5th Biennial Symposium of the International Society for River Science (19-24 November 2017)

Jean-Baptiste Burnet, Dinh Quoc T., Ceccantini J., Servais P., M. Prévost and S. Dorner. (November 2017) - Analytical validation of automated high frequency monitoring of beta-D-glucuronidase activity in drinking water supplies 2017 AWWA Water Quality Technology Conference. Portland, Oregon – November 12-16, 2017. Presentation

Juliet Milne, Anna Madarasz-Smith. Tim Davie (October 2017) - Recreational water quality monitoring and reporting in New Zealand, A position paper prepared for the New Zealand regional sector. Report (October 2017)

Burnet Jean-Baptiste, Ceccantini Joïa, Quoc Dinh Tuc, Sylvestre Émile, Servais Pierre , Prévost Michèle and Dorner Sarah Automated high frequency monitoring of β-D-glucuronidase activity in drinking water supplies in Québec, Canada, UNC Water Microbiology Conference 2017 & 19th International Symposium on Health-Related Water Microbiology, May 15-19, 2017 University of North Carolina at Chapel Hill, NC, USA

Anna Ender, Nadine Goeppert, Felix Grimmeisen, Nico Goldscheider Science of the Total Environment – Evaluation of β-d-Glucuronidase and particle-size distribution for microbiological water quality monitoring in Northern Vietnam, Karlsruhe Institute of Technology, Institute of Applied Geosciences, Water Microbiology 2017 (May 2017) – Current Regulatory Monitoring Frameworks Account for Microbial Risk Associated with Peak Contamination Events? (WaterMicro 2017). Oral Presentation

Wolfgang Vogl - Fully Automated Online Measurement of Bacterial Contamination in Water, European Wastewater TAG 8, London (November 2016). Oral Presentation

Water's Digital Future: The outlook for monitoring, control and data management systems. 2016 Global Water Intelligence

Stadler, P., Vogl, W., Koschelnik, J., Epp, M., Lackner, M., Oismüller, M., Kumpan, M., Strauss, P., Sommer, R., Ryzinska-Paier, G., Farnleitner, A.H., Zessner, M. (2015, September) Rapid and on-site monitoring of beta-d-glucuronidase activity identifies the dynamics of *E. coli* in surface waters draining an agricultural catchment, was held on the 17th IWA International Conference on Diffuse Pollution and Eutrophication, Berlin, Germany.

Koschelnik, J., Vogl, W., Epp, M. & Lackner, M. (2015, July). Rapid analysis of ß-D-glucuronidase activity in water using fully automated technology, Water Resources Management VIII, published by WIT Press (WIT Transactions on Ecology and The Environment, Vol. 196 ISSN 1743-3541).

Lendenfeld, T. & Vogl, W. (2015, March), Bestimmung der mikrobiologischen Wasserqualität - Neue Methoden - Online Analytik, presented at the **ÖWAV (Österreichischer Wasser- und Abfallwirtschaftsverband), Vienna, Austria.**

Vogl, W. (2015, January) Tests and case studies in using rapid and automated measurement technology for detection of faecal contamination, presented at the SWIG Conference (The role of sensors in disinfection and microbiological monitoring), **Manchester, Great Britain.**

Lackner, M. & Vogl, W. (2014, December) Automatisierte Messung der mikrobiologischen Wassergüte für die Prozesssteuerung presented at the **VDI Workshop, Vienna, Austria**

Koschelnik, J., Epp, M., Vogl, W., Stadler, P. & Lacker, M. (2014 October) MFU/100ml: New Measurement Parameter for Rapid Enzymatic Monitoring of Fecal-Associated Indicator Bacteria in Water presented at the Water and Health Conference, **North Carolina, USA.**

Vogl, W. (2014, June) *Measurement of fecal contamination (E. coli, coliforms)* presented at the **Water Innovation, Brussels, Belgium.**

Koschelnik, J., Vogl, W., Epp, M. & Lackner, M. (2014, May). *Rapid analysis of ß-D-glucuronidase activity in water using fully automated technology*, presented at the **Water Pollution 2014, The Algarve, Portugal.**

Vogl, W., Hirsch, A., Lackner, M., Koschelnik, J. (2013, September). *Rapid Detection of E. coli in Surface Waters for Quality and Health Monitoring Using Fluorescence-Based ColiMinder V*, presented at the **WaterMicro2013** (17th International Symposium on Health-Related Water Microbiology), **Florianopolis, Brazil**

Vogl, W. & Koschelnik, J. (2013, April). *Quantitative Real-Time Fluorescence Spectrometer for Automated Analysis of Microbial Contamination in Surface/Sanitary Water*, presented at the tradeshow, **Wasser Berlin, Berlin, Germany.**

Vogl, W. & Koschelnik, J. (2013 February). *Rapid Analysis of Microbial Contamination in Water*, presented at the **Acquea 2013, Brussels, Belgium.**