

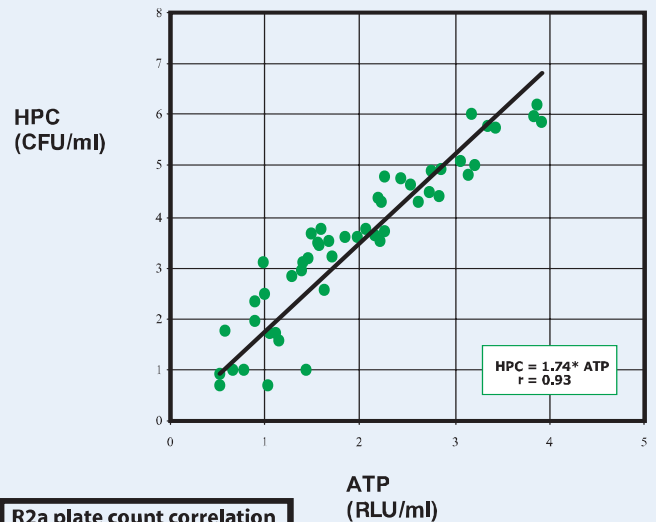


REAL-TIME MICROBIOLOGICAL SURVEILLANCE OF DRINKING WATER



PROFILE-1™

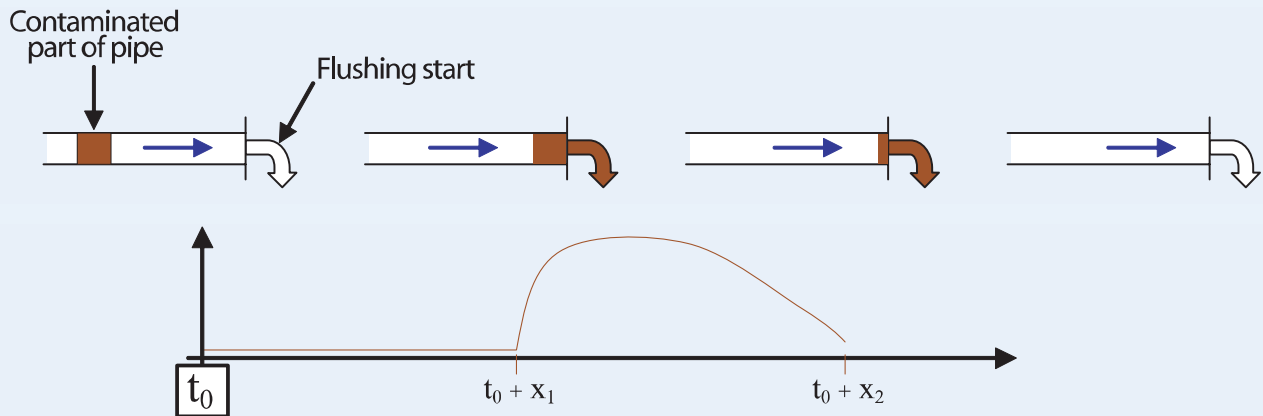
THE ONLY WORLD-KNOWN **RAPID BACTERIAL ATP ASSAY** ,
CORRELATED TO SENSITIVE PLATE COUNT METHODS
NO BIOCIDES OR BUFFER INHIBITION
DISCRIMINATING BACTERIAL ATP FROM TOTAL ATP



R2a plate count correlation with bacterial ATP
Deininger et al (1999)

NO MORE WAITING LAB RESULTS BEFORE DETECTING ABNORMAL BACTERIA GROWTH ...

Disinfection and flushing operations efficiency of pipes **evaluated** \leftarrow **5 mn !**



Bacterial ATP before, during and after flushing

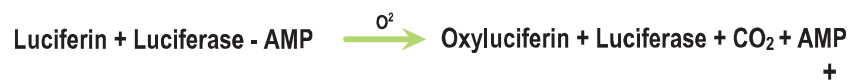
ATPBIOLUMINESCENCE CRUCIAL ISSUES RESOLVED WITH THE RAPID BACTERIAL ATP ASSAY PROFILE-1™

TOTAL ATPBIOLUMINESCENCE : A CONTROVERSIAL THEORY...

Any **living cell, including bacteria has ATP** (Adenosine Triphosphate). Higher the concentration of ATP in a sample, higher the number of living cells in it.

Mixed to a substrate-enzyme complex named Luciferin/Luciferase, extracted from firefly, ATP produces a bioluminescence reaction **proportionate in theory to the quantity of ATP in contact with the enzyme.**

SUBSTRATE-ENZYME LUCIFERIN/LUCIFERASE REACTION WITH ATP MOLECULES



A controversial total ATP analysis assertion :

→ ATP amount → light measured by a bioluminometer → viable bacteria counts...

« Rapid total Atp assays : a different reality faced by crucial issues... »
end-user comment

FIRST ISSUE : bacterial ATP not discriminated from total ATP

- ⊞ All cells including non-microbial cells are lysed (ruptured) in a vial.
- ⊞ Bacterial ATP + non-microbial ATP released and detected by Atpbioluminescence: non-microbial ATP hiding bacterial ATP values.
- ⊞ Total ATP resulting in no correlation with sensitive plate count methods.

ONLY RESPONSE TO THIS ISSUE : flushing non-microbial ATP before bacterial ATP extraction and detection.

SECOND ISSUE : Atpbioluminescence signal quenched by inhibiting substances

- ⊞ Buffers, biocides, metal ions reduce atpbioluminescence signal (Luciferase enzyme destruction): →90% signal reduction in some cases (Vélasquez et al, 1997).
- ⊞ Quenching level not predictable and varying from sample to sample.

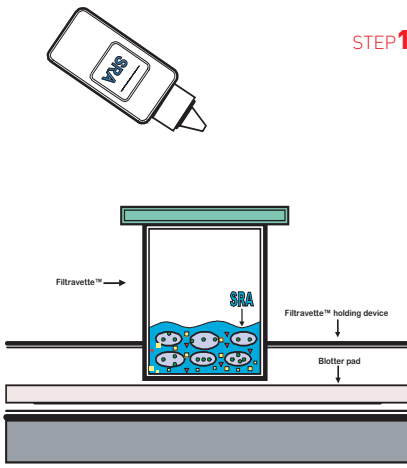
ONLY RESPONSE : flushing the inhibiting substances with free, non-microbial ATP before bacterial Atp extraction and detection.

THIRD ISSUE : swab collection → reduced sampling volume

- ⊞ 0.1 ml not representative of bacterial population in sample → too low signal.



STEP 1



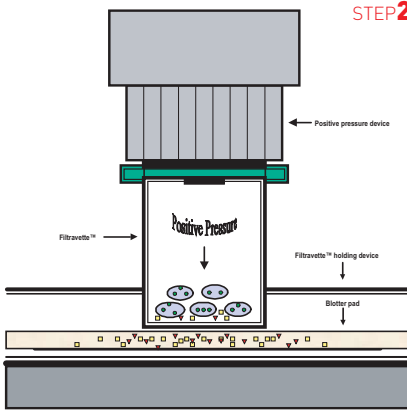
PROFILE-1™

THE UNIQUE RESPONSE TO THESE ATP CRUCIAL ISSUES :

WORLDWIDE PATENT SYSTEM FLUSHING INHIBITING SUBSTANCES + FREE + NON-MICROBIAL ATP BEFORE BACTERIAL ATP EXTRACTION AND BIOLUMINESCENCE.

PROFILE-1™ the only rapid portable (< 5 mn) world-reputed bacterial ATP assay : with 50µl - 100 ml flexible sample concentration increasing sensitivity (ultrapure water analysis)

STEP 2



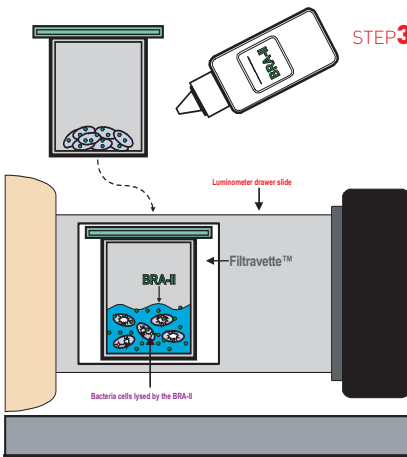
- 1 → Correlated with sensitive reliable drinking water plate count methods
- 2 → Discriminating total, plant cell ATP from bacterial ATP
- 3 → Not affected by bioluminescence quenching substances in water (biocides, salts, metal ions,...)

RAPID ASSAY PRINCIPLE :

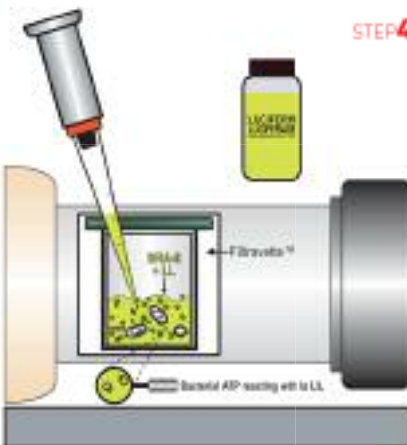
- ⊗ Bacteria filtration + concentration on Filtravette™ bottom filter.
- ⊗ SRA (Somatic Releasing Agent) lysing non-microbial cells.
- ⊗ Release of non-microbial ATP (see STEP1).
- ⊗ Inhibiting substances + free, non-microbial ATP: flushed by positive pressure , absorbed on blotter pad (see STEP2).
- ⊗ Filtravette™ positioned inside Bioluminometer drawer.
- ⊗ Addition of BRA-II Reagent lysing bacteria cells and release of bacterial ATP inside Filtravette™ (see STEP3).
- ⊗ Addition of Luciferin/Luciferase mixed inside Filtravette™ (see STEP).
- ⊗ PROFILE-1™ drawer is closed: light emission quantified and proportionate to viable bacteria concentration in sample.

HIGHER THE BACTERIA CONCENTRATION,
HIGHER THE BIOLUMINESCENCE SIGNAL DETECTED !

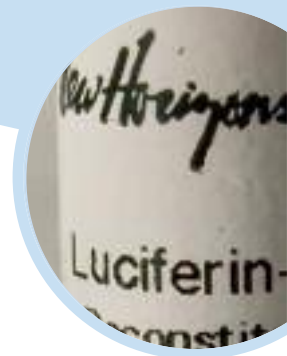
STEP 3



STEP 4



- Bacterial ATP
- Free ATP
- Bacteria cell
- ▼ Inhibiting materials
- ☀ Luciferin / Luciferase



PROFILE-1™ APPLICATIONS

↓ 5 mn assessment of :

- ④ Bioterrorism water surveillance scheme in reservoirs and network sampling points.
- ④ Flushing, and/or disinfection efficiency (after pipe work or renewal) :
Saving days of immobilization of technicians + equipments when reprocessing (abnormal bacterial release following flushing).
- ④ Real-time microbiological check of subcontractor work site.
- ④ Abnormal bacteria growth in public and private network, production outlet, or end-user point.
- ④ Rapid assesment of samples before sending to lab.
- ④ Detection of viable but not culturable bacteria.
- ④ Detection of spores of bacteria in water samples.



SCIENTIFIC BIBLIOGRAPHY

ATPbioluminescence inhibition studies

- 1 → Quenching and Enhancement Effects of ATP Extractants, Cleanser, and Sanitizers on the Detection of the ATP Bioluminescence Signal Journal of Food Protection, Vol. 60, No. 7, 1997, Pages 799-803, International Association of Milk, Food and Environmental Sanitarians
- 2 → Washing efficiency tests with samples containing quenching substances with PROFILE-1™ diagnostic test kit New Horizons Diagnostics

Paris Drinking water network study

- 3 → An ATP based method for monitoring the microbiological drinking water quality in a distribution network Water Research volume 37, Issue 15, September 2003 Pages 3689-3696

Correlation studies - Water microbiology

- 4 → Rapid Determination of Bacteria in Water, American Water Works Association, Water Technology Conference, November 1998, San Diego, California.
- 5 → Water Samples from Worldwide Locations - Rapid Determination of Bacteria in Drinking Water- Rolf A. Deininger and JiYoung Lee - Rapid Method Workshop Kansas City 1999
- 6 → A rapid Method for detecting Bacteria in Water - Rolf A. Deininger and JiYoung Lee Journal of Rapid Methods and Automation in Microbiology 7 (1999) 135-145
- 7 → Rapid Determination of Bacteria in Drinking Water from Public Fountains and Bottled Water, JiYoung Lee and Rolf A. Deininger, Conference on Reducing Foodborne Illness, Washington, DC, Dec. 13-14, 1999

SOME CUSTOMER REFERENCES AND SCIENTIFIC VALIDATION

Evaluated by reputed french microbiologists :

Yves LEVI (Environmental Dpt, Faculty of Pharmacy, Chatenay Malabry),
and **Anjou Recherche Laboratories (Veolia)**

SOME CUSTOMER WHO TRUSTED US :

FRANCE : SAGEP, Communauté Urbaine de Nantes, Communauté Urbaine de Strasbourg, I.R.H. Dpt Recherche de Nancy, E.D.F. Centre Recherche Chatou, Veolia STI, Compagnie Générale des Eaux

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