

Together, We're Taking Energy Further™

Nalco Champion, an Ecolab company, offers a singular focus on providing specialty chemistry programs and related services for upstream, midstream and downstream oil and gas operations. Through onsite problem solving and the application of innovative technologies, we deliver sustainable solutions to overcome complex challenges in the world's toughest energy frontiers. Together, we're taking energy further. nalcochampion.com

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AccuCount™

Microbial Enumeration Technology



BETTER OUTCOMES START WITH
BETTER
MEASUREMENTS



Microorganisms can cause multiple threats in production, injection and fracturing operations. Those threats range from production downtime due to microbial influenced corrosion (MIC) downhole and on surface equipment, to formation souring.

Equipped with AccuCount™ Microbial Enumeration Technology, your Nalco Champion engineer can accurately detect and measure active and dormant microorganisms affecting oil and gas operations on-site. The results are completed within 10 minutes, giving you the reliable information you need to quickly make critical decisions.

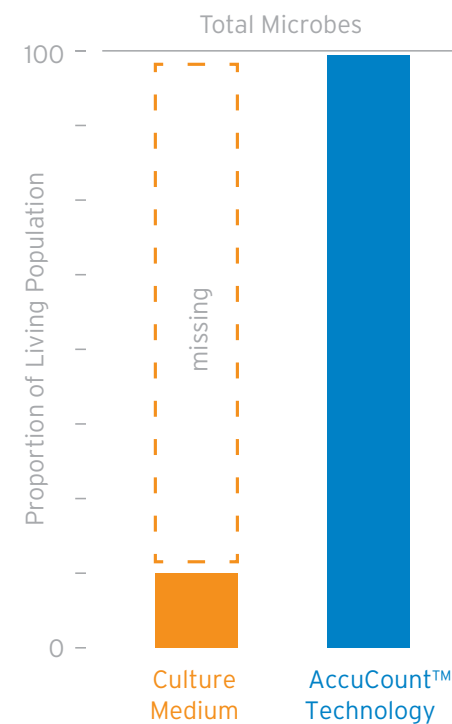


EARLY DETECTION, FASTER TREATMENT

Available exclusively to Nalco Champion customers, our advanced AccuCount technology is the fastest, surest way to measure adenosine triphosphate (ATP) levels and adenosine monophosphate (AMP) in your system, which directly correlates to the microbes present. With accurate, real-time ATP and AMP measurements, your Nalco Champion engineer can identify microbial risks and help you design and optimize mitigation strategies.

BENEFITS AT A GLANCE

- Real-time feedback for quick action against microbial risks or threats
- Same-shift problem solving
- Analysis of multiple sample types
- Consistent with NACE standards TM0194 and TM0212
- Consistent with ASTM standards D4012, D7687 and E2694
- Accurate interpretation of data, graphic analysis and site-specific control parameters of risk matrix.



AccuCount technology is the first and only solution that is designed to measure active and dormant microorganisms for oilfield applications. Now it's possible to test multiple types of samples such as solids, coupons, production fluid and hydrocarbon-based samples.

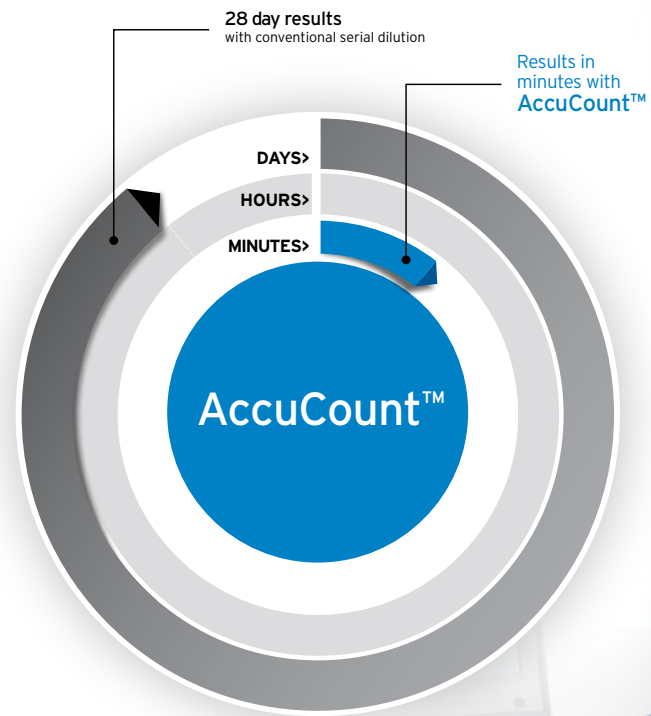
RESULTS IN MINUTES

The life cycle of bacteria can happen over a few hours, which can cause rapid changes in the system within that time frame. AccuCount technology is faster and more accurate than conventional microbial tests and traditional ATP detection methods. By providing real-time data of the system at the time of testing, minimizing the chance of a system change and allowing for better management of treatment.

THE ACCUCOUNT ADVANTAGE

Conventional serial dilution tests require cultivation for up to 28 days. During that time, on-site conditions may have changed, potentially making the analysis and mitigation strategies less effective. First-generation ATP test methods also have limitations, including interferences and inaccuracies associated with suspended solids, dissolved solids and organic materials.

AccuCount technology overcomes the limitations of both types of testing. In just a few minutes, your engineer can use the AccuCount technology test kit to measure the amount of microbes in your system. Real-time ATP and AMP[†] detection can lead to proactive treatment strategies, thereby potentially maximizing production, improving asset integrity, minimizing risk of reservoir souring and reducing overall costs.



Quicker Results

†

ATP = Adenosine Triphosphate
(Primary energy carrier for all life - active microorganisms)




AMP = Adenosine Monophosphate
(dormant microorganisms)



ACCURATE RESULTS, BETTER RECOMMENDATIONS

Nalco Champion's AccuCount technology measures all living organisms, including dormant microorganisms. By comparison, conventional testing measures only a fraction of the total population. More accurate measurements enable your Nalco Champion engineer to recommend the most effective chemical management program.

SERIAL DILUTION (industry standard) VS. ACCUCOUNT MICROBIAL ENUMERATION TECHNOLOGY

MEASUREMENT	SERIAL DILUTION (industry standard)	ACCUCOUNT
SPEED 	Days/weeks	Minutes
ACCURACY 	Only detects bacteria that grow in specialized media - has been shown to miss up to 6 logs of microorganisms present	Detects total microbes present
SPECIFICITY 	Only detects organisms that can grow in the culture media	Detects all organisms

ACCUCOUNT PERFORMANCE

DESIRED PERFORMANCE	OTHER ATP KITS	ACCUCOUNT	ACCUCOUNT
RESULTS NOT OVER-INFLATED DUE TO FREE ATP	X	✓	Filtration step captured only intact cells
REACTION NOT AFFECTED BY ORGANICS, SALINITY, ETC.	X	✓	Wash step cleans up potential inhibitors
EFFECTIVELY QUANTIFIES PLANKTONIC AND SESSILE MICROBES	X	✓	Two different methods based on sample types
DETECTS DORMANT BACTERIA	X	✓	AMP enzyme detects AMP content in dormant cells

Better Recommendations



ASSET PROTECTION WITH ACCUCOUNT TECHNOLOGY

ATP measurement provides you with better information throughout the life of your assets.

Comprehensive Initial Survey - Testing several locations during one time period helps determine microbial "hot spots." Your Nalco Champion engineer also can determine if an adequate biocide dose is reaching all areas.

Treatment Optimization - Testing over different time periods helps determine biocide effectiveness, risk of MIC and the introduction of microorganisms to new parts of a field.

Performance Monitoring - Testing can determine the optimal biocide and dose rate. It may also be used to rapidly test biocide effectiveness.

WHAT WE CAN ANALYZE

Nalco Champion's AccuCount technology enables our engineers to enumerate microbes in the following:

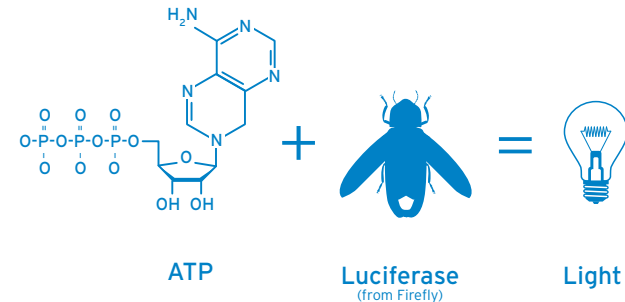
- Fresh and brackish waters
- Produced and injection water
- Drilling and completion fluids
- Hydrocarbon-based samples
- Solids
- Coupons
- Pig debris

THE SCIENCE & TECHNOLOGY BEHIND THE RESULTS

Software included in the AccuCount kit allows accurate interpretation of the data and graphic analysis of the microbial risk. This tool is exclusive to Nalco Champion customer and allows the users to establish site-specific control parameters for the risk matrix.

HOW ACCUCOUNT TECHNOLOGY WORKS FOR YOU

Your Nalco Champion engineer can use AccuCount technology to extract and quantify microbes in your system by measuring the intracellular ATP and AMP. The test involves extraction of ATP and AMP using a patented process followed by mixing the extracted material with an enzyme that produces light in the presence of ATP and AMP. The amount of light produced is directly proportional to the amount of ATP and AMP present and can be used to determine the active and dormant microbial population present. The comprehensive software provided with the AccuCount technology enables your Nalco Champion engineer to proactively view and manage your microbial mitigation program.



The enzyme that produces light comes from the firefly (*Photinus pyralis*).

ACCUCOUNT HEALTH CHECK

AccuCount Software combines cloud-based data analysis with ATP & AMP technology to provide a real-time graphical representation of a system. The software provides the user with tremendous time-savings, enables robust and immediate interpretation of data, and easy collaboration with Nalco Champion coworkers. It compares the real-time ATP & AMP data from a sample to the user's pre-established control targets, which generates an alert of the system's health.

