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Readings from Real Time ATP Measurements using Uni-Lite NG Luminometer

Object:
Torekällberget's Restaurant, Södertälje

Test date:
25/11/2008

Test data:

Test location	Marking concerns	RLU= Relative Light Unit	Assessment of biomass: N=Normal or below normal E=Elevated SE=Significantly elevated			Celsius◦/ RH %	Remarks e.g. test surface
Waste room wall	VS1	120	N			6.5+ 51%	10x10 cm 12:00 1st reading
Waste room wall	VS2	246	N			6.5+ 51%	10x10 cm 12:00 1st reading
Waste room wall	VSS1	16	N			7.6+ 44%	10x10 cm 16:30 comparative 2nd reading
Waste room wall	VSS2	65	N			7.6+ 44%	10x10 cm 16:30 comparative 2nd reading

Tester: Hasse Salomonsson

Analysis performed by: Hasse Salomonsson

Date of analysis: 081125

Signature:

Method: measurement of biomass using ATP bioluminescence

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ATP measurement is a well-proven, reliable method for testing microbial activity and contamination. The difference between it and traditional bacteria measurement derives largely from the fact that the ATP method measures cell activity in the forms of both microbial and somatic activity and can be used in real time in contrast to bacteria cultures. Microorganisms are detected by the method, as they are in a bacteria culture, but – equally importantly – so are waste products from foodstuffs. These in turn act as a hot-bed for the growth of bacteria. The amount of ATP (adenosine-5-triphosphate, formed in living cells) is displayed as RLUs (relative light units).

The test is completed quickly as part of a decontamination process. By measuring prior to the disinfection process in order to gain knowledge of the organic materials, and by measuring again after a given period, we can determine whether the disinfection process is effective.

Hygiene control with the aid of ATP bioluminescence measurement is applied in various areas such as the food industry, milk production, breweries, paper mills, water treatment, hospitals etc (e.g. control of living organisms in spaces) to gain a quick overview of microbial contamination. Areas of application are constantly expanding as a result of increased requirements for self-inspection and hygiene. Below is an example of hygiene measurement within the food industry.

Food industry limits (3M Clean-Trace)

Reading (3 categories)	***Interpretation***
Category 1. <150 RLU	*Clean*
Category 2. 150–500 RLU	*Borderline approval*
Category 3. >500 RLU	*Not approved*

The above values are interesting as a measurement of hygiene both in determining the total biomass connected with activities and as a comparative measurement before and after an action has been taken to establish whether an improvement has taken place. Furthermore, repeat checks make it is possible to monitor and improve procedures according to the requirements of a self inspection programme.

CFU (colony-forming unit) and RLU comparison:

	Number of tests	**%**
> 500 RLU >300 CFU	**59**	**36.4**
< 500 RLU < 300 CFU	**49**	**30.3**
	108	**66.6**
> 500 RLU < 300 CFU	**37**	**22.8**
< 500 RLU >300 CFU	**17**	**10.5**
	54	**33.3**

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05/12/2008

Report from tests in waste room at the Torekällberget Restaurant, Södertälje

Inni Powerflex on assignment from Matseco AB, Bergfotsgatan 5 B, SE 431 35 Gothenburg carried out sampling tests at the Torekällberget Restaurant, Södertälje (see Measurement Protocol 25/11/2008).

Summary:

Two surface specimens were taken on the wall approx 20 cm above the waste bins on the right in the waste room and about 1 metre into the room before the ionization equipment was installed and operated, using special 3M Clean-Trace swabs containing reagent for bioluminescence tests. The tests were analyzed immediately, i.e. in real time using a portable Uni-Lite Ng luminometer. After sampling at around 12:00 disinfection equipment (the ionizer) was installed and started at around 12:30. The marking of test tubes VS1 and VS2 represent this sampling. The second specimens on the wall immediately next to the first specimens were taken around 16:30 after 4 hours' ionizer operation and are represented by test tube VSS1, for comparison with VS1. Test tube VSS2 is for comparison with VS2. The differences between the tests are great and indicate a significant disinfection and reduction of active biomass.
It should be noted that biomass was very low from the beginning due to low temperatures in the waste room, equivalent to those of a refrigerator. In normal cases with higher temperatures the occurrence of biomass and active microorganisms would have been significantly higher. Despite these low initial values it was possible to note a significant reduction after ionization.

Background / Purpose

By measuring ATP bioluminescence in cells before and after the operation of disinfection equipment – in this example a bipolar ionization unit from Matseco AB – it is possible to determine how the installed equipment affects the quantity of active microorganisms*. (A reduced quantity of active biomass through ionization not only reduces the number of active microorganisms but also the odour problem. Odour can be measured subjectively by an odour panel, but an obvious odour reduction is experienced immediately. Measurement of the amount of active biomass provides a more objective result of the equipment's disinfection capability. Ionization affects the amount of biomass by breaking down the cell walls of microorganisms. ATP in cells is measured in relative light units (RLU) and provides and assessment of all microbiological activity (bacteria, mould, spores, etc.)).*

Results / Analysis

Factors that influence the amount of microorganisms in the waste room are e.g. the amount and type of refuse, food waste, temperature, humidity and air circulation. At the time of the first specimens the amount of waste was moderate, while the amount during the later specimens had at least doubled. Relative humidity and air temperatures were almost identical. In normal circumstances a considerable increase in the amount of active biomass would be expected, i.e. a substantial increase in contamination during the second sample. **This was not however the case, indeed significant reductions of around 85% and 75% were noted from the different sample sites. This is a clear indication of the disinfection capability of installed bipolar ionization, entirely in line with scientific understanding and proven experience in this area.**

Because the temperature in the waste room was low at the time of sampling, this caused the amount of bacteria and other active biomass to be very low initially. The result – despite these conditions – clearly demonstrates the disinfection capability of the installed equipment and points to the effective elimination of contaminants even where there is an abundant presence of bacteria (such as in a warmer climate). The odour from active decomposition that was apparent during the taking of the first sample was no longer noticeable during the second sample.

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