

### SUMMARY

**Suboptimal climatic conditions - as it is the case for covered sky - might require to expose the SODIS bottles during two consecutive days. Sunlight exposure induces lethal effects to the microorganisms and hence, revival or regrowth has not been recorded.**

### BACKGROUND INFORMATION

#### Suboptimal conditions in the field

In the field, optimal conditions can often not be found, i.e. covered sky instead of full sunshine (see also Technical Notes 6). To encounter these problems, it is important to know that the die-off of microorganisms and pathogens is caused by several factors:

- Light
- Temperature
- Nutrition
- Humidity
- Time

Pathogens cannot grow outside the human body, apart from some exceptions like salmonella.

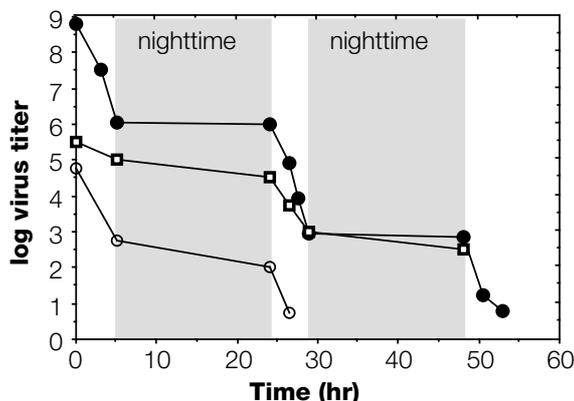
#### Prolonged SODIS operation

With covered sky, exposure for two consecutive days is needed to reach the required radiation dose and to ensure complete inactivation of the pathogens (see Figure 1 as an example).

#### Regrowth of microorganisms

Bacterial suspensions exposed to artificial UV-C radiation are inactivated within a few seconds only.

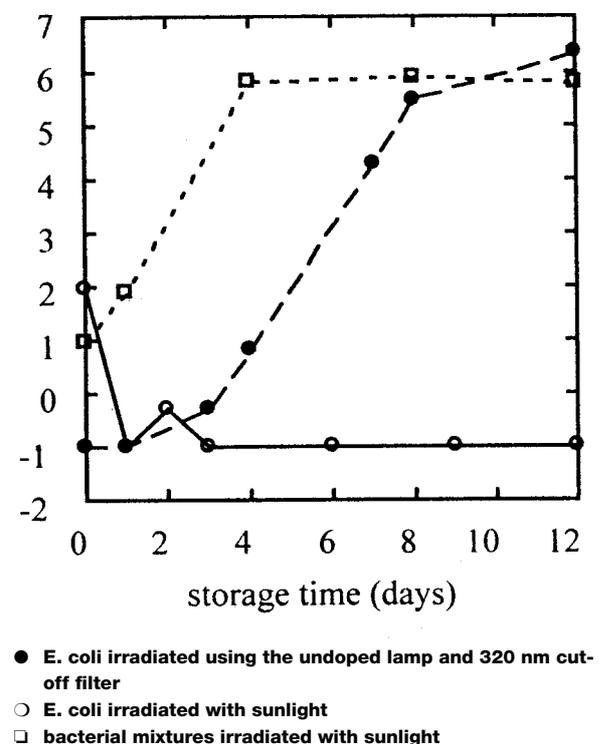
**Figure 1: Prolonged SODIS operation (3 days) of ● coliphage f2 and the animal viruses □ EMCV and ○ rotavirus.**



However, it is observed that bacterial regrowth occurs which reaches the original cell density within a 1-week period (Figure 2). In comparison, suspensions exposed to normal sunlight and for a longer period of time (several hours) did not result in a revival or regrowth of *E. coli* even after prolonged storage periods of over two weeks.

However, the SODIS bottle exposed to sunlight is also a bioreactor in which harmless bacteria mixtures can multiply (Figure 2) as they would also do in the environment. Killing the pathogenic microorganisms is the target of SODIS and not the production of a sterile water.

**Figure 2: Regrowth of *E. coli* and bacterial mixtures during increasing storage time of the irradiated suspensions.**



### REFERENCES

Wegelin, M. et al. (1994). Solar water disinfection: scope of the process and analysis of radiation experiments. *J Water SRT-Aqua*, 1994, **43**, No. 3, 154-169. [P1]