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IMPACT OF DECENTRALISED WASTEWATER TREAMENT PLANTS ON ENVIRONMENTAL EXPOSURE OF DETERGENT SURFACTANTS

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This position paper is based on the information collected by LEAF (http://www.leaf-water.org). In 2005, approximately 43.5 million people of the EU population (~11%) were not connected to wastewater collection systems. The Urban Waste Water Treatment Directive (91/271/EC) requires for agglomerations with >2000 population equivalents (p.e.) biological treatment of wastewater (secondary treatment), and/or tertiary treatment (P- and N-elimination) in areas defined as "sensitive" to eutrophication. For agglomerations of <2000 p.e. with a collecting system the Directive envisages an 'appropriate treatment'. For the remaining population individual provisions of member states may be in force to prevent surface water pollution. Decentralised wastewater treatment plants (DWTPs) defined as small biological systems serving 1 to 100 persons may be used by the population without collecting system or very small agglomerations to comply with the Directive.

The DWTPs commercially available in the EU use technologies comparable to those of large scale sewage treatment systems and may thus be classified accordingly: suspended growth systems (e.g. activated sludge systems), biofilm reactors (e.g. trickling filter) and constructed wetlands. In comparison to large scale treatment systems, well functioning DWTPs show similar carbon removal efficiencies. Secondary treatment results in the removal of setteable solids and biological oxygen demand, and partial nitrification. In general, most aerobic decentralized treatment systems available are capable of oxidising ammonium (nitrification) partially or completely. More specific treatment requirements for DWTPs are or will be set at the level of the individual member states through certification programmes.

Because all detergent surfactants marketed in the EU must be readily biodegradable according to EEC 648/2004, they will be removed from wastewater in modern DWTPs. Indeed, removal percentages of anionic and non-ionic surfactants measured with sum parameter analyses (MBAS and BiAS), in two small DWTPs (6 p.e.), a constructed wetland (reed bed) and a trickling filter, respectively, were >90%. A removal of 98% was observed with a specific analytical method for linear alkylbenzenesulphonate (LAS), volume-wise the most important detergent surfactant in Europe and the world. The performance of these two DWTPs with respect to the removal of surfactants is therefore comparable to large scale biological treatment systems. This suggests that risk assessments taking into account treatment in large systems can be extrapolated to DWTPs.

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The number of DWTPs installed in the EU anno 2007 is still rather limited. This probably reflects that in many countries small agglomerations and the population without collection systems are not yet obliged to treat their waste water (see above). Due to national provisions Germany has already made an effort during the last years and have a significant number of DWTPs in place. It is expected that new regulations will enlarge the number of DWTPs e.g. in countries such as Belgium, Denmark, Finland and Sweden. Yet, the total number of DWTPs installed in the Belgium, Denmark, Finland, Sweden, Germany and the Netherlands already amounts over 2.2 million.

Based on the LEAF study ERASM concludes that importance of DWTPs will gradually increase due to legislative requirements of treating wastewater in Europe. While the experimental data with regards to surfactant removal are relatively limited, the available information suggests that current risk assessments for surfactants may also be applicable to DWTPs.