



Monitoring marine waters for WFD compliance

Recent work in the coastal Mediterranean waters of the 'Comunidad Valencia' in Eastern Spain confirms that wastewater treatment plants (WWTPs) are a significant source of pollutants that need monitoring under the Water Framework Directive (WFD) and Priority Substances Directive. However, these substances also directly enter coastal waters from mixed urban, industrial and agricultural sources, creating a challenge for the development of control measures.

The WFD¹ and Priority Substances Directive² set Environmental Quality Standards (EQS) for many polluting substances which should therefore be monitored. This study took water samples from 41 coastal locations in 4 seasonal sampling campaigns (July & November 2008, February & May 2009). It also sampled effluents from 28 WWTPs in 3 campaigns (March, June & November 2008). Each sample was examined for 71 regulated or associated organic pollutants to determine if WFD standards are achieved and if WWTPs are a significant influence on water quality, since their effluents are regulated only for nutrient and organic matter content and many priority pollutants are therefore discharged.

The most frequent marine pollutants were all present in WWTP effluents, generally at higher concentrations. The geographical distribution of pollutants varied considerably, although ports were affected by similar pollutants and contaminants clearly differed between northern and southern regions.

Of the 71 regulated pollutants measured, 35 were not detected in coastal waters and 27 were not found in WWTP effluents. Many were not expected, because they are restricted or banned substances (e.g. pesticides and herbicides). Others are highly hydrophobic (water repelling), so become attached to sediments rather than water and may accumulate in shellfish or bottom-dwelling organisms. Only 13 compounds, which belong to four different classes (VOCs, organochlorinated pesticides, phthalates and TBT) were found in more than 20 per cent of samples.

For each substance, two types of EQS are defined - annual average concentration (EQS-AAC) and maximum allowable concentration (EQS-MAC). The study lists four examples of compounds exceeding EQS:

- Octylphenol (a commercial surfactant) - found in only one marine sample, but more common in WWTP effluents. It degrades in WWTPs and is adsorbed by sludge, but is not completely removed.
- PeCB (from solid waste and biomass combustion, and fungicides) - exceeded its EQS-AAC value in four water bodies, near cities and agriculture. A total ban on its use is not yet in place but has been proposed.
- Organochlorinated pesticides - present in coastal waters despite almost all being banned. Found most abundantly in spring samples from coastal waters near agricultural areas, the results show that they are still being used (perhaps as farmers use up the last of their stocks).
- Phthalates (principally DEHP, a widespread plasticiser that makes PVC soft and pliable) - DEHP exceeds EQS-AAC in many areas, but with no clear pattern, which makes the identification of sources and hence control measures difficult. DEHP is the only pollutant found at lower concentrations in WWTP effluents than marine samples, since it is efficiently removed by accumulation in sludge and microbial action.

Two other compounds (organochlorinated pesticides), HCH and endosulphan, were consistently high and almost exceeded their EQS-AAC, so may also merit further study, despite being of apparently lower significance. Finally, it should be highlighted that in the sample campaign carried out in 2010, only DEHP exceeds its EQS-AAC value.

1. http://ec.europa.eu/environment/water/water-framework/index_en.html
2. http://ec.europa.eu/environment/water/water-dangersub/lib_pri_substances.htm

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