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WW comments on UKTAG: Updated Recommendations on Environmental Standards (SR3 – 2012)

General Comments

The 2012 recommendations do set out clearly the proposed changes to Environmental standards. It is clear within the text that standards may be developed or applied in different ways such as for design only (CSOs), where biological data is not available, to trigger investigation, in support of high status only etc and thus the application of 'standards' is not particularly clear. We would recommend that its specific purpose is attached to the table of standards in every case.

The priority for a good understanding of biological data to determine waterbody condition and then the use of physical and chemical standards to determine likely cause of less than high condition of predict the likely deterioration in status is not made clear. Role of risk based monitoring (p33) emphasises the need for sufficient monitoring of the ecology to detect failure and thus require chemical monitoring.

It's disappointing that the consultation does not include a standard for phosphorus or an update on the current position and thinking. However, it is understood that relating a phosphorus chemical standard to biological standards in inherently difficult . Likewise the relevance of the new flow standards would be greater with the further information on biological indicators (due in August).

It is reassuring to note that UKTAG recognise the difficulties presented from having different standards for the WFD and N2k sites, and that work is being undertaken to align these where possible.

It is concerning that there is still a lack of data for estuaries and coastal waters, and as a result, there has been little progress in deriving further standards, or for the EA to undertake comprehensive monitoring programmes. The danger is that we will enter a second planning round with insufficient knowledge to assess the improvement works which may be needed in these environments. This is disappointing as this lack of data was recognised in the preparation of the first RBMP.

Overall, this consultation document highlights the lack of data available for the derivation of standards and compliance assessment. This is particularly noticeable for coastal and estuarine waters, freshwater biological data and specific pollutants.

Specific Pollutants

There are three specific pollutants which cause concern:

- Copper – widespread throughout the environment and difficult to control since it is used for domestic plumbing
- Glyphosate – a herbicide which has typically been used in close proximity to aquatic environments due to it's propensity to biodegrade. A tight standard for this substance may have a knock on effect causing a lack of control of invasive plant species near watercourses. This could promote a catch 22 situation whereby either the glyphosate or the invasive species standards are not complied with (discussed on page 25 of the consultation).
- Iron – again this is the prime chemical used by the water industry to reduce phosphorus concentrations in sewage works effluents. A tight iron standard may make the ability to

achieve the phosphorus standards from point source disproportionately expensive given the additional iron removal plant which would be required.

The consultation document notes (page 16, footnote 1) that in most cases extensive biological and chemical datasets were unavailable, therefore standard derivation was undertaken in the laboratory. Work undertaken by UKWIR (EQ01 Chemical Investigations Programme, project Manager Brian Ellor) and regulators on the Chemicals Investigation has found a similar situation. Typically, data on specific pollutants has been collected by the EA at a few strategic locations which are usually downstream of larger discharges. This gives a distorted view of the presence and effect of these substances in the environment.

The UKWIR Chemicals Investigation has been using the Biotic Ligand Model (BLM) to derive appropriate standards for certain metal substances- copper, zinc, nickel and lead, in the environment based on the bioavailability of that metal to organisms. This work has encountered many similar difficulties in that there is a lack of data, data available is not uniformly dispersed and tends to be centred on discharge locations where there may already be a biological tolerance to the substances, and in many cases the analysis has been in the wrong form, e.g. total rather than dissolved and vice versa.

The main recommendation from the on-going UKWIR Chemicals Investigations is that the BLM is applied where an EQS is exceeded for that substance to determine the bioavailability at that location taking account of the alkalinity, pH and hardness.

Further discussion on the changes to iron standards are detailed in Appendix 1 and taken from the 2011 UKWIR report reviewing the setting of iron limits for wastewater treatment works effluents.

The report recognises the low level of data collected in this area, and small number of sites assessed. Is it possible to spend time undertaking monitoring to better understand the occurrences and consequences of these pollutants before setting standards, which may or may not be achievable, and could drive significant investment?

<u>Nitrate Risks to Associated Surface Waters</u>

It is reassuring to see that at this stage there is no standard for nitrate concentrations in surface waters, although a threshold methodology has been proposed. However since a standard has been included for groundwater fed wetlands, the document clearly acknowledges the impact of nitrate on flora. The protection of GW fed wetlands but not surface waterbodies fed from nitrate rich baseflow from groundwaters seems to be an anomaly.

We would welcome the collection of data to inform the understanding of the ecological effect of nitrogen in freshwaters and TRACs since this will have implications for the water industry and for agriculture, potentially requiring significant change.

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We welcome the threshold recommended for Nitrate in GW to protect drinking waters, especially since there is no surface water standard to relate nitrate too in our groundwater fed catchments. However within this section, under 'implications' there is the suggestion that further investigations on the levels of phosphate within groundwater will be required. Recent Wessex Water investigations are indicate that certain geologies produce elevated levels of phosphorus within groundwater which can contribute to failing freshwater systems. We would welcome further work in this area and consideration in the forthcoming phosphate standards.

With reference to alien species, whilst we welcome the acknowledgement that these can displace or alter native communities, but they can also contribute to the functioning of the aquatic ecosystem and may have role where climate change has altered the existing flora/fauna. We support the intention to identify high risk invasive so as to manage their impact quickly and to base the listings on an existing system; the GBNNSS.
The role of fish which are nationally native but outside of their normal range or environment seems to be increasingly important in terms of ecological impacts so we support the inclusion of this factor as a reason for investigation of freshwater sites with apparent eutrophication. Roach and carp have been shown to show impacts .

We are pleased that the document acknowledges the problems in detecting the effects of reduced flows in freshwater with the existing biological classification. The data gathered from the recent HMWB studies for the classification of reservoirs by the EA and Water industry may assist in better understanding the flow parameters that most affect the ecosystem eg the frequency or strength and timing of high flows rather than the percentage reduction in Qn. The strong relationship between the effects of flow with channel morphology and condition should be made clearer (as shown in the water levels and bathymetry) .
The reduction in threshold for risk assessment of new abstractions fits with our own findings and we cannot detect the effect at low flows below 20% either (with WFD or broader ecological assessments).
The provision of ref to stream types would have made the guidance easier to read.

With reference to water levels in lakes, whilst it is acknowledged that few water company assets lakes are likely to fall within this scope, being largely HMWBs, we welcome the sense in measuring change in habitat. However the light penetration assumed for sites with no field data seem very large for southern lowland lakes which are typically more eutrophic. The estimation of the risk of impact seems complex and the EA rarely has bathymetric data.

Intermittent discharges
It would be useful to reference the designations for salmonid and cyprinid fishery (or clarify that they are as per existing directive) to better understand the effects of proposals to FIS and 99 percentile standards. In practice most hydraulic improvements that we make to CSOs tend to use the more robust assumption of spill frequency (eg 3 spills / Bbathing season , 10 / year for Shellfish, or what we agree locally with the EA for inland CSOs rather than FIS or 99%iles.

Appendix 1: A REVIEW OF THE SETTING OF IRON LIMITS FOR WASTEWATER TREATMENT WORKS EFFLUENTS

UKWIR Report Ref. No. 11/WW/20/4

Extract of the report summarising the conclusions and recommendations relating to the change of tightening of existing iron standards.

The key conclusions arising from this project are:

Iron detected in the aqueous phase (of effluents or river waters) is either stabilised via binding with natural or synthetic chelating agents, or is in a filterable, but not dissolved, colloidal form, which may be subject to further aggregation and precipitation within the river. The bioavailability, and hence toxicity of chelated or colloidal iron is significantly lower than the free metal ion (Fe^{2+} or Fe^{3+}) thus minimising potential ecological impacts.

Concentrations of iron in UK rivers is generally low because of the physico-chemical characteristics of iron, with EQS exceedances only likely to occur in the vicinity of mine water drainage or iron-rich substrates such as greensands. Monitoring data show that any iron discharged from WwTW is rapidly lost from the water column via dilution as well as assimilated into sediments where iron naturally occurs at percent concentrations. Consequently, monitoring data do not suggest measurable impacts on downstream water or sediment concentrations because of iron dosing at WwTW.

By 2015 over 600 WwTW will be dosing iron for phosphorus removal, most with permit values between 3 and 5 mg/l total iron as a maximum admissible concentration. Effluent quality data suggest that even without tertiary treatment the majority of WwTW discharge iron at less than 1 mg/l total iron. Tertiary treatment in the form of sand filters, provide a small but statistically valid reduction in total iron concentrations discharged (to around 0.5 mg/l), although not necessarily dissolved iron, which can be influenced by complexation, particularly with EDTA. The presence of colloidal and complexed iron means there is a limit to the minimum concentration of iron achievable via the use of sand filters. Technical feasibility issues would therefore likely to be raised if any future permits were set at significantly below 1 mg/l total or dissolved iron in response to a reduction in the EQS, or implementation of a stringent no deterioration policy.

Assessment of biological data downstream of WwTW dosing iron, fails to show widespread negative impacts. Counts of iron sensitive species actually indicate an improvement following iron dosing as does the general indicators of ecological status, possibly resulting from reductions in other factors affecting ecology (e.g. phosphorus reductions).

Current permits appear to have been negotiated based on a combination of modelling and technical feasibility. The Agency have expressed a desire to move to the use of percentile limits with an upper tier limit and look up table for number of acceptable failures. Using the Agency's RQP tool to run scenarios on a 'river needs' basis, suggests that a move to the percentile regime would not result in any tightening of permits for most works and in some cases may allow Water Companies to cease using sand filters in an attempt to avoid exceeding their current MAC permit. However, application of a percentile permit to current effluent quality, as has happened for copper for some companies, would represent a significant tightening of limits. This in turn would lead to shrinking headroom and the restricting of options for future planning, which may include increased dosing to respond to

tightening phosphorus standards, the receiving of trade iron discharges or population growth within the sewer catchment.

Estimates of the cost of the installation of additional sand filters to meeting any tightening permits in the future have been provided based on current works performance for secondary treatment. Based on available dilution data, estimates of sand filter whole life costs are likely to begin to rise sharply into the hundreds of millions of pounds if downstream targets were set at less than 0.5 mg/l for iron, with commensurate increases in carbon emissions. One company estimates that this could translate into an increase in customer bills of £6 per household over a five-year period.

Recommendations

Based on the data presented in this report, the following recommendations may be provided:

1. Iron discharged from WwTW has been shown to:

    a. not impact on downstream dissolved or total iron concentrations

    b. not impact on downstream sediment quality

    c. not impact on downstream ecology

Combining these facts with there being no evidence of WwTW contributing to any current EQS exceedance, the following permitting options may be considered:

- Cease wide-spread permitting for a naturally occurring element not shown to have any downstream impacts, unless a sufficiently strong case can be provided by the Agency for implementing a permit. The only elevated concentrations of iron observed have been associated with high suspended solids loading, which themselves would exceed their permit conditions.

- Convert existing MAC iron permits to 95th percentile values with an UTL generically derived from modeling scenarios, effectively agreeing 4 mg/l total iron as a standard effluent discharge limit.

- Apply the RQP model for WwTW on an individual basis, taking the target 95th percentile effluent target and applying as a 95th percentile, not a MAC (as would currently be the case). This would see very relaxed permits for WwTW with high dilution and potentially tighter permits for WwTW with low dilution, which would be manageable in most cases, based on current secondary treatment effluent quality data, but for works with very low dilution, tertiary treatment may have to be applied with additional costs.

- Consider setting permits as 'filterable' iron which would therefore match the EQS for iron in the receiving water. Historically, effluent permits have been set as total metal, to allow the possibility that the metal could become bioavailable in the receiving water downstream of the WwTW. Iron, however, will only become less bioavailable in receiving waters as colloidal forms aggregate, precipitate and get incorporated into the sediment, or tightly bound iron gets flushed out of the riverine system.

- Any shift to a policy which sets percentile permits based on current works performance should be resisted, as it represents a significant tightening compared with current permit values and as it does not take dilution into account, does not reflect any of the impacts (or lack of them) that the WwTW has on the receiving water. Furthermore, its imposition would restrict the ability of the works to accept increasing loads of iron from either domestic or trade sources, or to increase iron dosing within the works in response to any tightening of future phosphorus limits.

2. The conclusions and recommendations from this report need to be considered in light of the new policy to be published by the Environment Agency future permitting of substances under the WFD, and in particular, any 'no deterioration' policy. The data presented in this report suggests that any strict adherence to a 'no deterioration' policy would have significant implications for the Water Industry in terms of costs to install tertiary treatment, the technical feasibility of achieving total iron concentrations significantly less than 1 mg/l and increasing carbon emissions.