memo

Environment Agency

To	Roger Green	Our ref	
From	Andrew Wither	Your ref	
Ext. Number	7 21 2662	Date	22 March 2007

Roger,

Phosphate levels in the Irish Sea -Whitehaven.

It is generally assumed that nitrogen – not phosphorus – is the limiting nutrient in coastal waters. This is probably somewhat simplistic, but does explain why relatively little has been published on 'safe' phosphorus levels.

Attached is a summary I put together a couple of years back of the various standards proposed. You will see there is a figure for every occasion. The one we have tended to work to is the CSTT standard which was used throughout the UK for implementing the Urban Waste Water Treatment Directive (i.e. the control of sewage to coastal waters).

The CSTT limit is 0.2 µ-mol ≡ 6.2 µg/l –P

I've attached some DAIP lots showing data from 2002. DAIP = Dissolved Available Inorganic Phosphorus; for practical purposes this will be the same as orthophosphate-P
This is the most recent we have but I've no reason to believe it has changed significantly since.

February: This represents the winter maximum before any new season plankton growth starts depleting the nutrients. Levels are well above the threshold at 1.6-2 µ-mol. (fig. 33)
March: Levels are lower, now around 1 µ-mol (fig 35)
May: This will be following the spring bloom and levels have dropped to around 0.6 µ-mol. The plume from the Solway is evident of where much of the phosphorus comes from! (fig 37)
June: Now below the 0.2 µ-mol threshold. (fig 39a)
July: Some evidence of increase but generally still low at ca. 0.2 µ-mol (fig.40)
September: Little change from July (fig 41)
October: Levels starting to rise again with reduced growth and wetter weather bringing more down the rivers (fig 43)

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Although the winter levels are high Cumbrian Coastal waters show a classic pattern with maximum levels in late winter a rapid decline following the spring and early summer plankton blooms, 'steady – low' levels in late summer and a gradual rise from autumn onwards. As the plots show there is no obvious hot-spot off Whitehaven

Some elevation in nutrient levels is to be expected particularly in Winter when there will be a lot of fresh water from the rivers present.
Typical salinities (psu) off Whitehaven during 2002 were:

February:	30-31
March	31
May	33
June	32
July	32
October	32-33

As a reference, the east coast of the Isle of Man is typically 33.5 - 34

Nitrogen is even more elevated when compared with CSTT limits such that the NE Irish Sea exhibits a higher than normal N:P ratio

This data confirms the general consensus that the NE Irish Sea is hypernutrified (i.e. rich in nutrients). However none of the classic symptoms of eutrophication are manifest:

- bottom water anoxia
- shell fish mortalities
- excessive or prolonged blooms of nuisance or toxin producing algae.

The general consensus is that the area whilst enriched in nutrients is not suffering from 'Undesirable Disturbance of the Marine ecosystem' to use currently fashionable jargon.

Andrew Wither
Principal Marine Scientist