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Comments on "Hypoxia in the Northern Gulf of Mexico: An Update by the EPA Science Advisory Board," 8-30-07

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In general, the report was well written, concise and described a number of anthropogenic activities that contribute to the continuing expansion of the hypoxia region in the Gulf of Mexico. To its credit, the report provides a number of technically sound recommendations that describe practical approaches for reducing the nutrient loading (nitrogen and phosphorus) to the Gulf of Mexico.

One such recommendation focuses on the reduction of the phosphorus concentration in the effluent discharge from municipal wastewater treatment plants. The report claims that reducing the municipal wastewater treatment plant effluent phosphorus concentration to a level of 0.3 milligram per liter will result in a 21% decrease in the total annual phosphorus flux into the Gulf of Mexico. Although reducing the total annual flux of phosphorus is certainly a scientifically defensible approach for limiting the rate of hypoxia expansion, there are two major concerns regarding this recommendation.

First, it is unclear why the Panel selected a wastewater treatment level resulting in a 0.3 mg/liter phosphorus effluent concentration. Owing to the implementation of the TMDL rule, there are number of municipal wastewater treatment plants that are now required by their state regulatory authority to comply with an effluent phosphorus discharge concentration of <u>0.1 mg/liter</u> or less. In other words, there is standard wastewater treatment technologies or best management practices (e.g., membrane bioreactors/chemical precipitation) that are routinely employed by municipal wastewater plants to achieve phosphorus effluent discharge concentrations that are much less than what the Panel has recommended. Following the logical arguments adduced by the Panel, a lower effluent phosphorus discharge limit for municipal wastewater treatment plants should result in an even greater reduction in the total annual phosphorus flux into the Gulf of Mexico.

Secondly, although at first glance, reduction in the phosphorus concentration associated with the wastewater treatment plant effluent discharge would appear to be beneficial in terms of reducing the total annual phosphorus flux into the Gulf of Mexico, a more comprehensive and detailed evaluation of this recommendation may actually lead a decision-maker to a different conclusion. The fundamental flaw in simply decreasing the phosphorus concentration in the effluent discharge from a municipal wastewater treatment plant *without* also reducing the treatment plant's *influent* phosphorus loading is that the ultimate result is simply transferring the phosphorus from the water to the solid phase. In other words, a reduction in the phosphorus concentration associated with the effluent wastewater discharge results in a commensurate *increase* in the phosphorus concentration associated with the sludge (or biosolids).

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Unfortunately, in many cases, the phosphorus rich biosolids are normally land applied within the same watershed in which they are generated (i.e., the watershed that contains the wastewater treatment plant). Moreover, because phosphorus reacts rapidly with a variety of common soil metal species (e.g., calcium, iron, aluminum, etc.), it tends to accumulate on the soil surface rather than percolate through (i.e., infiltrate) the soil profile. Therefore, if ineffective engineering and/or agricultural controls are in place to limit soil erosion, the biosolids land application sites have the potential to become significant non-point sources of phosphorus loadings to the same water bodies that ultimately discharge into the Gulf of Mexico.

The Panel is strongly encouraged to utilize a nutrient mass balance framework when evaluating the long term environmental impact of its recommendations. In other words, like the cross media transfer of phosphorus at the wastewater treatment plant, removal of nitrogen through denitrification may result in the formation of nitrogen oxides – a result that may exacerbate the negative environmental impacts associated with the accumulation of greenhouse gases.

Furthermore, the Panel may consider including some discussion of the importance of reducing the overall discharge of phosphorus (and nitrogen) to municipal wastewater treatment systems. This desired outcome could be achieved simply by encouraging municipal wastewater treatment plants to establish more stringent pretreatment effluent guidelines for industries and commercial businesses that typically discharge large amounts of nutrients (e.g., meat packing, dairies, food processors, chemical manufacturers, etc.) to the wastewater collection systems (i.e., sewer).