2006 Philadelphia Annual Meeting (22–25 October 2006)

Paper No. 12-12

Presentation Time: 11:15 AM-11:30 AM

NONPOINT SOURCES OF PERCHLORATE IN GROUNDWATER OF SUFFOLK COUNTY, LONG ISLAND, NY

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Perchlorate in groundwater is a concern due to the threat of a mandated national drinking water standard provoked by the likelihood that low levels of perchlorate may disrupt normal thyroid function. Nonpoint sources may be an important contribution to the perchlorate concentrations of groundwater, however since they are widespread they are difficult to discern and remediate. We measured perchlorate concentrations of nonpoint sources in Suffolk County, NY. Perchlorate was determined using ion chromatography coupled with mass spectrometry. Perchlorate was detected in nearly all samples.

Rain water concentrations of 90 ± 10 parts per trillion (ppt) were on average higher that those measured globally. Global average values are 10-70 ppt. Chemical fertilizers ranged from 0 to 25 ppt, while one organic fertilizer measured at 8.6 ppb; natural nitrate deposits in Chile with high perchlorate are commonly used in organic fertilizers. The organic fertilizer we measured contains kelp, which is also known to contain perchlorate. We were surprised to find up to 163 ppb of perchlorate in soil water under turfgrass maintained with organic fertilizer. Suffolk County receives 44 inches of rain annually plus the sites were regularly irrigated. Thus, we would expect perchlorate to be diluted in soil water influenced by fertilizer unless there is another source of perchlorate.

Wastewater samples ranged from 0.6 to 20.4 ppb with an average value of 4 ppb. To our knowledge these are the first measured concentrations in residential wastewater. One likely source of perchlorate in wastewater is bleach for which concentrations as high as 8000 ppb have been reported. However, most bleach has lower levels; thus, there must be other sources of perchlorate in wastewater.

Samples collected from road runoff had an average value of 2.4 ± 3.5 ppb and a maximum value of 18.5 ppb. It is known that road flares have perchlorate as a major component. We found 9.2 ppb perchlorate in a road salt sample, but it is highly likely that there are other sources of perchlorate in road runoff as well.

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