

MEMORANDUM

To: Groundwater Advisory Council
From: H. Bokuniewicz
Re: Minutes of the meeting of 27 March 2006
Date: March 28, 2006

PRESENT

H. Bokuniewicz
B. Brownawell
S. Colabufo
S. Jones
D. Paquette
G. Proios
S. Robbins
K. Roberts
W. Spitz
S. Terracciano

REGRETS

M. Alarcon
N. Bartilucci
L. Koppleman
R. Liebe
M. Nofi
K. Willis

1. The minutes of the last meeting were distributed. Any corrections can be sent to me.
2. There will be a meeting of the advisory group for the Suffolk Comprehensive Water Management Plan on 4 April.
3. George Proios has asked about alkyphenol ethoxylates. Bruce Brownawell has conducted research on these compounds and discussed the topic with the committee.

Research at the University began about seven years ago, when alkyphenol ethoxylates (APEO) and their metabolites were recognized as endocrine disruptors in fish populations receiving sewage inputs. The compounds cause the feminization of fish, altering the serum steroid levels. The nonphenol concentrations increases a specific protein in the fish population (vitellogenin protein or VTG). This indicator protein has been found in winter flounder in Jamaica Bay. The sex-ratio of young-of-the-year flounder in Jamaica Bay is 1:9 (male to female) whereas the sex-ratio is 1:1 in Shinnecock Bay. The impact has also been found in silversides (by Tara Duffy at MSRC) as well as in sea bass in Oyster and Little Neck Bays. We do not know the source or the age of the compounds. They may have potential impacts on human and environmental health. They are similar to natural or "birth-control" estrogens.

Concentrations of 100 to 200 ppb are acutely toxic to marine organisms. They are weakly estrogenic; estrogenic effects require 1000 to 10,000 times the concentration of pure estrogen; they are strong compared to DDT, however. They act to inhibit enzymes pollutant and steroid hormone metabolism. APEO has been banned in Europe. The state of Connecticut recently banned APEO in laundry detergents (but

not shampoos) after a union for people who launder uniforms (SINTAS) sued their employers for exposure to nonylphenol. The State is concerned about effects on wild life and the environment but the lawsuit raised human health issues.

The compounds are used in the United States but sales data has not been required since 1994. In 1995 we were producing 300 million kilogram per year. They are used primarily in surfactants but may be in pesticides and in juices; at Boston University estrogenic compounds were found in samples from the plastic bottles.

In aerobic groundwater, APEO oxidized to less-toxic, acidic compounds but in anaerobic environments, the metabolites can be more toxic. Bruce has done a study around a septic system on Cape Cod. Using HPLC-MS, concentrations were detected in the low ppt levels but there may have been contamination from detergents or atmospheric deposition. The septic system at Cape Cod was a multifamily one. The results have been submitted to "Environmental Science and Technology". The study consisted of a leach pit only a few feet above the water table. Monitoring wells were set 2.5 feet, 10 feet and 19.3 feet down gradient. An anaerobic core of the plume was found at a depth of 12 to 14 feet below the water table. The plume was defined by tracers – boron from detergents, EDTA from shampoos and total nitrogen. The plume was found to extend to the surface but some other tracers (caffeine, nicotine and natural estrogen) were confined to the anaerobic core. Other tracers included florescence whitening agents and nonphenols (NPEO) and their metabolites.

In the Hudson and surroundings, the principle source is sewage but they may also be contributed from leather tanneries, paper mills and textile manufacturers. (Aircraft de-icers may be another source although the ethylene glycol is the usual concern. Airports, however, use different products; Steve Corsey (USGS) did a survey of these issues). NPEO metabolites are found at 3-50 ppb in sediments in NY Harbor. They exhibit long term stability in anoxic environments but degrade to more soluble compounds in toxic settings. When STP's were upgraded to avoid by-passing sewage and secondary treatment was added, a 93% total removal efficiency was achieved resulting in more hydrophobic metabolized compounds. There may be some concern when applying biosolids (sewage compost) to the land.

The USGS has examined some sites in Brooklyn, Queens and the south fork but no significant contributions were found in groundwater. Some work has been done internationally on groundwater but much higher levels were found in juices.

Some preliminary data suggests that NPED might be tracked with MBAS (Methylene Blue Active Substances) but the correspondence has not been systematically studied. DEC has data on MBAS around laundromats. Filters used at laundromats take out lint but carbon filters needed use to remove MBAS. The problem is that the carbon saturates very quickly (in a few days) and if the filters are not changed, the treatment is not viable. MBAS has been found in monitoring wells downstream of mega-Laundromat in Shirley as well as DDT (probably from clothes). As a result, public water was provided to the community. Standards are secondary standards, that is aesthetic ones, not based on endocrine disruption.

When LI only had small laundromats, MBAS was never detected above the (secondary) standard, although DEC permitted them for treatment. When mega laundromats were established, with hundreds of machines operating round the clock,

the point source is large and discernable plumes were to be expected. Plumes from laundromats may be anaerobic due to high organic sources and NPEOP surfactants may enter at high levels. If oxidized by, perhaps, the presence of bleach, they could, however, be transformed into less toxic compounds. More applications for these types of facilities are being submitted to the DEC and the SCWA has objected to at least one because it was in the two-to-five year capture zone for public supply wells.

The MBAS standard as only an esthetic one but, if phenols are preserved there may be environmental, or human health issues, perhaps for optical brighteners, too which undergo photochemical degradation but may persist in groundwater as a plume tracer. It may be that florocene in storm water can be used to detect illegal waste hookups. Laundromats can only be required to monitor MBAS not total NPEO (or "NP"). Bill Spitz will send Bruce a description of the methods used to see if they might be detected by current methods.

Should NPED be banned in NY? We need to review the CT ban which only banned it in detergents from commercial laundromats. Perhaps, however, the Jamaica Bay situation is enough to raise the concern; the highest levels in Jamaica Bay are within two times the levels needed to cause endocrine disruption effects in young-of-the-years flounder. It's not clear that the county can take unilateral action, however; action must be taken by the State.

The EPA has a method for NPEO and has issued non-binding guidelines but not a criterion. There are apparently a wide range of sources and the CT ban only covers a fraction of the possible sources.

4. Mark Benotti's results are being reviewed by colleagues and specialists at the USGS. It should be published in a few weeks but it will not come out as a "Fact sheet" (this series has been discontinued as a move towards privatizing the USGS publishing function. It will be an Open-File report instead.
5. Later, we intend to plan the USGS Groundwater Symposium for June 2007. The USGS Water Sciences Center in Coram now has Steve Terracciano as acting director. Chris Schubert is the Study Section chief and Ron Busciolano as the Data Section chief. The USGS is now in the midst of its synoptic water-level survey including Staten Island and Manhattan where deep, steep fractures and shallow, horizontal fractures are a concern for the water tunnel. Two hundred feet of unconsolidated sand in Chinatown may be looked at for an emergency water supply.
6. The NYC Bureau of Water and Sewers has no money, apparently to continue the Aquifer Recharge Study (ARS). This had been conducted by Malcolm Pirnie but it is now being continued from a different bureau with CDM.
7. The next meeting will be on 24 April.