



Position Statement on Nonylphenol Ethoxylates

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October 2000



Knowing that nonylphenol ethoxylates have the potential to be acutely and chronically toxic, and estrogenic to aquatic animals, and knowing they are finding their way to the environment, is the use of nonylphenol ethoxylates really necessary?

Alkylphenol ethoxylates (APEs), especially nonylphenol ethoxylates (NPEs), are widely used nonionic surfactants. In fact, in a report written by the Canadian World Wildlife Foundation, it was estimated that over 300,000 tonnes are produced throughout the world annually making it the second largest class of non-ionic surfactants in use today (Metcalf et al, 1996). In Canada, the major users of APEs are industries such as pulp and paper, textile manufacturing, plastics, petroleum production, and the manufacturer's of household and industrial detergents. After use, these surfactants generally end up in sewage treatment plants, where, contrary to initial belief, they are often only partially degraded. James Maguire (1999) performed a review of the literature and studies completed on the biodegradation and persistence of NPEs in the environment and determined that in general, the initial degradation of parent NPEs in sewage treatment plants is readily achievable, but ultimate degradation of the break-down products is not. These breakdown products are more persistent in the environment, toxic to aquatic organisms, and have been found to affect endocrine systems in fishes and mammals.

It has been estimated that sewage treatment plants discharge to the environment 60 – 65 % of all nonylphenolics that enter the plant (Bennie, 1999). The environmental release of NPEs and their metabolites because of discharge from sewage treatment plants can be accomplished in one of two ways. The final treated effluent may be discharged into nearby receiving waters or the NPE's may adsorb onto the sludge, which is then disposed of by incineration, by landfilling, or by spreading onto agricultural soils for amendment. NPEs may also enter the environment directly in areas where there is no waste treatment. Donald T. Bennie (1999) has summarized the many studies that have been performed on the environmental occurrence of nonylphenol ethoxylates and their breakdown products. It has been determined that concentrations of various NPEs, ranging from 0.0015 – 8600 ppm, are present in the environment. Not only has their presence been identified in environments such as the fresh waters of lakes and rivers, groundwater, sediment, municipal landfill leachates, and even drinking water, but their presence has also been identified in the tissues of aquatic animals.

The aquatic toxicity of NPEs to most organisms generally increases as the length of the ethoxide chain decreases, therefore, the breakdown products are often more toxic than the parent surfactants. One possible break down product, known as nonylphenol, is relatively toxic and has an acute toxicity (LC50 value) of 17 – 3000 ppm in fish, 20 –3000 ppm in invertebrates, and 27 – 2500 ppm in algae (Servos, 1999). Its chronic toxicity values (NOEC value, the concentration below which there is no observed effect) are as low as 6 ppm in fish and 3.7 ppm in invertebrates (Servos, 1999). NPEs have also been reported to cause adverse biological affects on the endocrine system. The Endocrine System is the system of glands in animals that controls bodily functions by way of hormones. These hormones, in concert with the brain, regulate growth, development, and reproduction, and also have many other functions essential for maintaining the body's homeostasis. Recently, many chemicals and derivatives of chemicals used in pesticides, plastics, detergents, and other everyday materials have been proven to affect the balance of normal hormonal functions in animals. These artificial substances, known as endocrine disrupters or endocrine modulators, most commonly disrupt the functions of the steroid hormones, many of



which determine sexual characteristics and behavior. NPEs exert their adverse biological affects by mimicking the family of female hormones called estrogens; therefore, they are also known as environmental estrogens.

Currently, there is insufficient evidence to resolve the ecological risk associated with the amount of NPEs present in the environment. Because of this, these chemicals have been placed on the second Priority Substances List by the Canadian Environmental Protection Act and are under review. Recently, the use of NPEs in consumer products has been eliminated, but many manufacturers of industrial and commercial detergents and disinfectants are still using these surfactants almost exclusively. Knowing that NPEs have the potential to be acutely and chronically toxic, and estrogenic to aquatic animals and knowing they are finding their way to the environment, is the use of nonylphenol ethoxylates really necessary, since there are safer alternative surfactants readily available?

Since inception in 1998, Virox Technologies has believed that the use of NPEs is unnecessary. We believe that there is no longer a need to compromise on efficacy of application, or to trade it off for either personal safety or environmental integrity. Accelerated Hydrogen Peroxide (AHP) has found the balance between efficacy and safety without the need for ever using harmful surfactants such as Alkylphenol ethoxylates including Nonylphenol ethoxylates. AHP is a synergistic blend of commonly used, safe ingredients that when combined with low levels of hydrogen peroxide produce exceptional potency as germicide and performance as a cleaner. The benefits and efficacy of AHP have been validated by third party clinical studies conducted by scientific organizations and third party researchers that are recognized by government regulatory agencies in Canada, the U.S and Europe.

References:

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