

Now Promoting Endocrine Disruption: NPEs Targeted for Permanent Clean-Up

In early June a coalition of environmental advocates, public health policy organizations, and laundry workers took the idea of spring cleaning to a whole new level. They petitioned the EPA to ban a common class of detergent and cleaning product ingredients. The group said the ingredients, known together as nonylphenol ethoxylates, have now been clearly linked to the problem of endocrine disruption, and it's time for them to go.

Nonylphenol ethoxylates (NPEs) are a common type of surfactant, or synthetic cleaning agent. They're frequently found in detergents and other cleaners where they cause dirt and oils to mix with water so they can be easily rinsed from clothes, surfaces, and other things. NPEs are a nonionic surfactant, which means they have no electrical charge. Like most synthetic surfactants, they're cheap to produce, leave little or no film behind, and aren't easily deactivated by hard water.

Roughly 270 million pounds of NPEs are used in the U.S. each year. And because most of this use takes place when we do the laundry and clean our homes and offices, the majority of the NPEs that get manufactured each year end up being rinsed down the drain. Unfortunately, NPEs have a peculiar side effect: They mimic the hormone estrogen, which makes them part of the class of harmful compounds known as endocrine disruptors.

When absorbed by humans and animals, the body can't distinguish between NPEs and this potent hormone. The result is cellular confusion, and since the hormone NPEs mimic is sexually related, that confusion takes a reproductive and/or developmental form. In the lab, for example, male rainbow trout exposed to NPEs become part male and part female.

Findings like these have led researchers to believe that NPE pollution is likely at least partially if not entirely responsible for a variety of odd gender bending phenomenon now being seen in aquatic species. And while human effects remain unknown, scientists believe they may be affecting people, too.

So clear are the warning signs that NPEs cause significant harm that these chemicals have already been banned in Canada and Europe. Even consumer giant WalMart has named them as one of three chemicals they're asking suppliers to phase out. To spur similar action on a federal level, the Sierra Club led the recent effort to petition the EPA to ban NPEs from detergents and cleaners.

The recent petition is the first to ask the agency to regulate a hormone disrupting chemical. In addition to requesting that NPEs be removed from detergents and cleaners, it also asks the EPA to restrict and eventually ban their use in other products that contain them, including paper, textiles, paints, lube oils, and tires, and to require product labeling in the meantime.

To read the petition, visit

<http://www.sierraclub.org/healthycommunities/downloads/np-npepetition.pdf>.

For more information about NPEs, check out

<http://www.sierraclub.org/healthycommunities/toxics/> a nd

http://www.sierraclub.org/toxics/toxic_laundry.asp.

<http://www.sierraclub.org/healthycommunities/downloads/np-npepetition.pdf>

Groups Demand Action on Gender-Bending Chemicals

The Sierra Club, Environmental Law and Policy Center, UNITE HERE, Washington Toxics Coalition, Physicians for Social Responsibility and the Pacific Coast Federation of Fishermen's Associations are petitioning EPA under the Toxic Substances Control Act to request additional study, product labeling and restrictions on the use of nonylphenol and nonylphenol ethoxylates.

What are nonylphenol and nonylphenol ethoxylates?

Nonylphenol (NP) is an organic chemical used primarily to produce nonylphenol ethoxylates (NPEs). The main use for NPEs is as a cleaner and detergent, but they are also used in some manufacturing processes and personal care products. When NPEs degrade, they break down into more toxic substances, including NP (the parent compound), which persist longer in the environment.

How widely are these chemicals used?

In 1998, 230 million pounds of NP were produced in the United States with demand increasing at about two percent annually. The chemical is used to produce almost 400 million pounds of products containing NPEs in the U.S. each year.

Are these chemicals found in the environment?

NP and its other breakdown products have been found in streams and rivers, drinking water, treated wastewater, sediment and sewage treatment plant sludge. A U.S. Geological Survey study found metabolites of NPEs present in over 61 per cent of tested U. S. streams. EPA has found an overall average concentration of alkylphenolic compounds (a family of chemicals which includes NP and NPEs) of 1 part per billion in treated drinking water.

What are the potential effects of these chemicals on our environment?

Even at levels often found in America's waterways, NPEs may hinder the reproduction, growth, and survival of aquatic life such as rainbow trout, winter flounder, salmon and oysters. Extensive research indicates that NPE metabolites disrupt the endocrine system and interfere with the hormones of fish and shellfish. Exposure to NPE breakdown products causes organisms to develop both male and female sex organs; increases mortality and damage to the liver and kidney; decreases testicular growth and sperm counts in male fish; and disrupts normal male to female sex-ratios, metabolism, development, growth, and reproduction.

What are the potential human health effects of these chemicals?

There is little published research concerning the human health effects of NP and NPEs. In September, 2006, however, research published in Toxicological Sciences shows that human placenta exhibits changes in response to NP in the first trimester. The result may be early termination of pregnancy and fetal growth defects. It also found that the effects of NP are greater and longer lasting than estrogen and can occur at concentrations 100-1000 times lower than those previously studied.

Do sewage treatment plants remove these chemicals from wastewater?

Sewage treatment plants remove some, but not all, NPEs. The problem is that treatment at wastewater treatment plants produces NPE metabolites that are more toxic, more estrogenic, and more persistent

than NPE itself. They then enter the environment in the effluent that is released to surface water or groundwater and in sewage sludge. And because of sanitary and combined sewer overflows, there are billions of gallons of polluted wastewater that spill into our water without ever reaching any treatment at all.

What action has the EPA taken?

In December, 2005, U.S. EPA published final water quality criteria for nonylphenol. These criteria are required to protect aquatic life found in waters. In developing criteria, the EPA acknowledged that the outdated 1985-era procedures it relies on do not take into account recent research that would enable the agency to better protect aquatic life from the harmful effects of endocrine disruption. The current EPA criteria for chronic exposure is 6.6 parts per billion in freshwater and 1.7 parts per billion in saltwater, which are not low enough to address fully the endocrine-disrupting effects that have been observed. In addition, these criteria fail to account for all NPE metabolites.

Are other countries addressing the risks these chemicals present?

Canada set a limit of 1 part per billion of NP and NPE mixtures in freshwater and 0.7 parts per billion in saltwater. The European Union has limited the use of NP and NPEs to 0.1% by mass in industrial and institutional cleaners, domestic cleaners, textile and leather processing, cosmetics and personal care products, and a number of other applications. There are some exemptions to this restriction.

How is the private sector addressing these chemicals?

Some large detergent manufacturers, including Procter & Gamble and Unilever, for example, have publicly stated that they do not use NP due to environmental concerns. Wal-Mart has also asked its suppliers who use NP to find safer replacement chemicals.

Are there safer alternatives to nonylphenol?

Yes. According to the EPA's voluntary program encouraging the phase-out of these chemicals ("Safer Detergents Stewardship Initiative") "safer alternative surfactants are comparable in cost and are readily available." See: <http://www.epa.gov/dfe/pubs/projects/formulat/sdsi.htm>

What does this petition ask the EPA to do?

The petitioners are requesting that EPA use its authority under the Toxic Substances Control Act to require manufacturers and processors to provide information to fill gaps in toxicity data which the EPA has acknowledged, including data on effects on laundry workers and the general population. In addition, the petition requests labeling of products containing NP and NPEs, restrictions on discharging these chemicals into poorly operating wastewater treatment plants, pollution prevention planning for facilities using large quantities of these chemicals, and a ban on their use in industrial and commercial detergents.

A Safer Alternative Exists to Replace Nonylphenol Ethoxylates, A Toxic Laundry Detergent

Aquatic life in waters throughout the U.S. is threatened by some recently discovered pollutants that are released by sewage treatment plants. Nonylphenol ethoxylates (NPEs) is one major class of these pollutants. The metabolites of NPEs are present in over 61 per cent of tested U. S. streams.

NPEs are manufactured from the parent chemical nonylphenol (NP). More than 80 percent of NP is used in products such as commercial and household detergents. In 2004 alone, more than 260 million pounds of NP was used in the U.S.

NPEs are particularly dangerous because they become more toxic as they are metabolized by bacteria during sewage treatment. NPE and its metabolites often pass through wastewater treatment plants at a concentration that has been shown to cause harmful effects to aquatic life in laboratory studies. They pose additional risks because they take longer to degrade than any other cleaning agent, and their persistence in aquatic ecosystems increases the amount of time organisms are exposed to them.

Extensive research indicates that NPE metabolites mimic natural hormones, disrupting the endocrine and developmental systems of fish, shellfish and other aquatic species. Exposure to NPE metabolites generally has a feminizing effect, increasing the incidence of fish with both male and female sex characteristics. In laboratory tests they have been found to decrease testicular growth and sperm counts in male fish; and disrupt normal sex-ratios, metabolism, development, growth and reproduction. They also increase mortality and damage the liver and kidneys.

Because of their concern about the environmental toxicity of NPEs and their effects on aquatic wildlife, Canada and the European Union have effectively banned the use of NPEs in detergents. Meanwhile, NPE sales have increased in the U.S., and the U.S. government has taken no action.

In the interest of protecting water quality and commercial and sportsfishing industries, industrial users and producers of detergents should switch to an alternative cleaning agent in detergents. Safer alternatives to NPEs, such as alcohol ethoxylates, are readily available and technically feasible for industrial and domestic laundry detergents. The Sierra Club is urging the Environmental Protection Agency, state agencies, municipal wastewater treatment agencies and corporations to eliminate the use of NPEs in the industrial and domestic laundry detergents used in the U.S.

Fortunately, some U.S. corporations, recognizing the dangers of NPEs, have voluntarily eliminated NPEs in their products. Procter & Gamble (P&G) voluntarily stopped using NP compounds in their high-volume applications. P&G recognizes that NPE use "might create long-term concerns for the environment." Other U.S. companies continue to use NPEs in detergents. Cintas Corporation, one of the nation's largest industrial laundries, acknowledged the feasibility of using safer laundry detergents by agreeing to substitute alcohol ethoxylates for NPEs at its Branford, Connecticut, facility in 2005. It should switch to this safer detergent at all of its laundries. Other companies should follow its lead.

For more information, see Sierra Club's website: http://www.sierraclub.org/toxics/toxic_laundry.asp.

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