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Water pollution caused by cosmetic chemicals, cleaning supplies and plastics

Sources of Hormone-Disrupting Chemicals in San Francisco Bay

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Water pollution caused by cosmetic chemicals, cleaning supplies and plastics

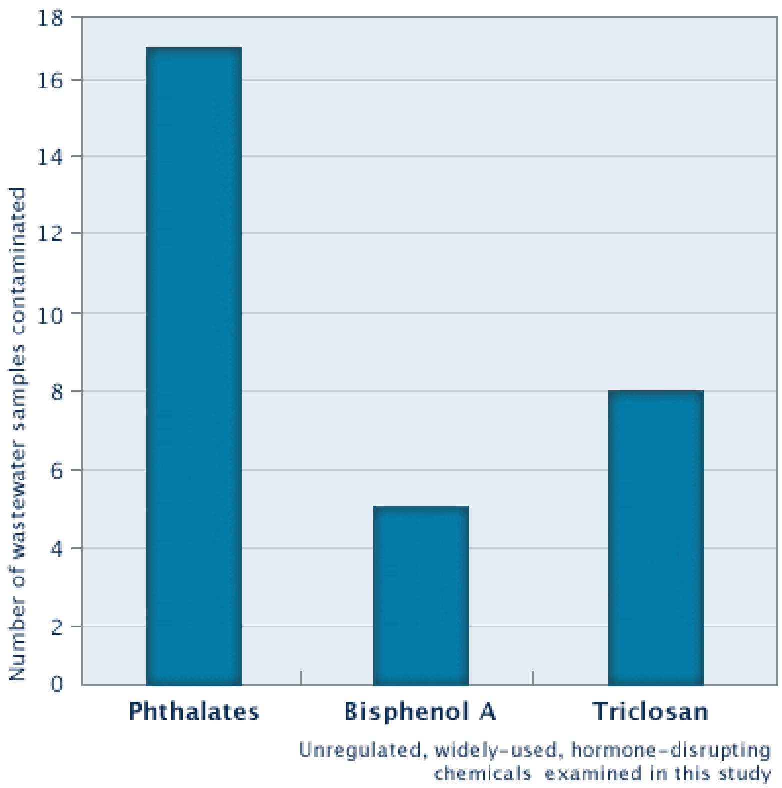
95 Percent of Wastewater Samples Show Widespread Use of Chemicals

Advances in technology allow an unprecedented look at chemical contaminants in water bodies throughout the United States. In 2002, the first nationwide study of man-made chemicals and hormones in 139 streams revealed that 80 percent of streams tested were contaminated (Kolpin 2002). Several of the chemicals examined are known or suspected of disrupting the hormone systems of animals and people. Of these, only a small fraction have been regulated at all, much less tested for toxicity, persistence in the environment, or other harmful characteristics, such as hormone disruption. Some of the same unregulated, widely-used, hormone-disrupting chemicals have been detected at trace levels in the San Francisco Bay (Oros 2002).

Fish and other aquatic life inhabiting waters containing man-made hormone-disrupting chemicals may develop reproductive and other health disorders. For example, male fish with immature eggs in their testes have been documented with increasing frequency throughout the U.S. (Pait 2002; Goodbred 2007). Damage to the reproductive health of vulnerable fish populations may result in detrimental consequences to local fisheries and aquatic ecosystems; in addition, there is concern that people could become further exposed to hormone-disrupting chemicals by eating contaminated fish (Houghton 2007).

To identify some of the sources of these hormone-disrupting chemicals, Environmental Working Group (EWG) and East Bay Municipal Utility District (EBMUD) researchers analyzed samples of wastewater from residential, commercial, and industrial sites in the San Francisco Bay Area. 18 of 19 wastewater samples examined contained at least 1 of 3 unregulated, widely-used hormone disruptors - phthalates, bisphenol A, and triclosan; 2 samples contained all 3 substances. Despite sophisticated wastewater treatment, these chemicals were detected in treated waters discharged into the Bay.

Analysis of 19 wastewater samples for 3 hormone-disrupting substances reveals widespread contamination.



While wastewater treatment is extremely effective in removing biodegradable food and human waste, it was never designed to address this broad spectrum of unregulated chemical pollution. Advances in wastewater treatment may reduce some types of pollution, but new chemicals are introduced continuously into the marketplace. Expensive potential improvements to wastewater treatment facilities would result in higher consumer water rates, while only removing a fraction of these contaminants of concern. Instead, it is critical to look at more cost-effective ways to protect our waterways through reducing chemical pollution at the source – before it ever reaches the treatment plant or the Bay.

This study represents a first look at specific sources of hormone-disrupting chemical contamination from residential, commercial, and industrial sources that can enter San Francisco Bay. By tracing these chemicals to particular sites – including residential areas, a nail salon, laundries, a pet wash, medical centers, and industrial facilities – we can identify simple pollution prevention strategies.

Choices you make at home and on the job to reduce your exposure to hormone disruptors can reduce the impact of these chemicals on wildlife in San Francisco Bay. For example, by making informed choices when you buy everyday products, from shampoo and toothpaste to laundry detergent and even canned food, you can help protect the environment, without breaking the bank. This report provides detailed findings from our study, and presents tips to help you reduce your use of hormone-disrupting chemicals and better protect the Bay.

Of course, ultimately, we need to fix our system of chemical regulations. The law establishing U.S.

regulation of chemicals was created over three decades ago, and has not been revised since, despite significant advances in our understanding of the impacts of a variety of chemicals to ecological and human health. Of particular relevance, U.S. chemical regulations were created before the body of scientific evidence on hormone-disrupting chemicals was established and, therefore, are not designed to identify and act against substances with these properties. In the absence of federal action, local and state leaders have brought special attention to the critical ecological and public health problem of hormone disruption caused by man-made chemicals. EWG and EBMUD are participating in national stakeholder initiatives to advance chemical policy in the U.S.

Hormone Disruptors and Human Health

Hormone-disrupting chemicals are not just an ecological concern. Studies of ordinary people show that our own bodies typically are contaminated with low levels of phthalates, bisphenol A, and triclosan (Calafat 2005; CDC 2005; Wolff 2007). The sources of this pollution in people include many ordinary consumer products, such as cosmetics, canned foods, and "antibacterial" soaps and cleaning agents. Recent research indicates that chemicals that interfere with the hormone system can cause adverse health effects in cells at levels as low as 1 part per trillion (Wozniak 2005).

Already, epidemiological evidence suggests that people may be experiencing health effects caused by exposures to hormone-disrupting chemicals. Adult men with higher levels of phthalates in their bodies are more likely to show signs of hormonal disturbance, including reduced sperm concentration and motility, increased damage to sperm DNA, and altered hormone levels (Duty 2003, 2004, 2005; Hauser 2007). Baby boys exposed to higher levels of phthalates in the womb or in breast milk are more likely to display reproductive system abnormalities (Swan 2005). And women with polycystic ovarian disorder, a leading cause of female infertility, or those who suffer recurrent miscarriages, are more likely to have higher levels of bisphenol A in their blood (Sugiura-Ogasawara 2005; Takeuchi 2006). Though no epidemiological studies of triclosan are available, a recent animal study suggests that this substance may be a potent disruptor of the thyroid system (Veldhoen 2006).

These studies indicate that taking action now to reduce your exposures to hormone-disrupting chemicals may benefit the health of you and your family, as well as the health of the surrounding environment.

Hormone-disrupting chemicals are found in many consumer products and contaminate wastewater from a variety of residential, commercial, and industrial sites.

Hormone-disrupting Chemical	Wastewater Samples Contaminated	Consumer Products	Health Effects
		·Perfumes & personal care	

Phthalates	·Homes ·Nail salon ·Laundries ·Pet wash ·Medical centers ·Manufacturing ·Treated wastewater	products containing "fragrance" ·Nail polish ·Flexible & PVC/vinyl plastic, including food wrap, building materials, toys, IV tubing, blood & fluid storage bags ·Adhesives, inks, pill coatings, detergents ·Many others	Phthalate exposure is linked to male reproductive system problems including feminization of baby boys (Swan 2005), altered hormone levels in baby boys and men (Duty 2005; Main 2006), reduced sperm concentration and motility and increased sperm DNA damage in men (Duty 2003, 2004; Hauser 2007).
Bisphenol A (BPA)	·Industrial laundry ·Pharmaceutical & Paper products manufacturing ·Treated wastewater	·Polycarbonate plastic including hard plastic water & water cooler bottles, hard plastic baby bottles, plastic silverware, Lexan products, and many items labeled plastic #7 or "PC" ·Linings of food and beverage cans ·Dental sealants	BPA exposure is linked to polycystic ovarian syndrome, the most common form of infertility in the U.S. (Takeuchi 2006), as well as to recurrent miscarriage and reduced levels of an essential sex hormone in men (Hanaoka 2002; Sugiura-Ogasawara 2005). Over 100 animal studies reveal a wide array of adverse health effects caused by low dose exposures in utero (Myers 2006).
			Triclosan causes thyroid disruption in frogs at low levels

Triclosan	·Laundries ·Veterinary & Medical centers ·Plastic bag manufacturing ·Treated wastewater	·"Antibacterial" hand soap, toothpaste, personal care products ·"Antibacterial" detergents & cleaning products ·"Antibacterial" plastic & foam items including shoe insoles, plastic cutting boards	found in many streams (Veldhoen 2006); human and frog thyroid signaling systems are nearly identical. In tap water and in lakes and streams, triclosan forms chemicals linked to cancer and other health problems, and known to accumulate in animals (Adolfsson-Erici 2002, Lindstrom 2002; Balmer 2004; Lores 2005; Fiss 2007).

Chemicals that Disrupt our Hormone Systems

From the moment of conception, human growth and development is regulated by tiny amounts of biochemicals called hormones. Our bodies manufacture trace quantities of these chemical messengers, which enter our bloodstream and travel throughout our systems, managing our metabolism and controlling the function of our organs. Hormones are able to produce an array of sophisticated regulatory signals crucial to human health at part per billion or part per trillion levels in the blood. Disruption of the human hormone (or endocrine) system can cause a broad range of illnesses, including reproductive and metabolic disorders and cancer.

Many man-made chemicals widely used today may be capable of causing hormone-disrupting effects in people, fish, and wildlife. 3 hormone-disrupting chemicals were the focus of this study: phthalates, a class of chemicals used in products ranging from cosmetics to plastics; bisphenol A, a chemical used to make a type of hard plastic (polycarbonate), and to make an epoxy resin that lines food cans; and triclosan, an antibacterial ingredient found in numerous consumer products, including liquid hand soap, toothpaste, plastic cutting boards, and shoe insoles.

These chemicals have been detected in streams and rivers as a result of exposure to wastewater from our communities (Kolpin 2002). Wastewater treatment is extremely effective at removing biodegradable pollutants such as human and food waste, but it cannot remove all of the unregulated tide of persistent chemicals washed down the drain.

Phthalates, bisphenol A, and triclosan have also been detected in people (Calafat 2005; CDC 2005; Wolff 2007). Laboratory studies have revealed evidence that these chemicals can disrupt animal hormone systems at levels comparable to those found in ordinary Americans (e.g. Nagel 1997; Mylchreest 2000; Veldhoen 2006). Research on people has also linked specific adverse health effects to exposures to some of these chemicals (Hanaoka 2002; Duty 2003, 2004, 2005; Sugiura-Ogasawara 2005; Swan 2005; Main 2006; Takeuchi 2006; Hauser 2007; Meeker 2007; Stahlhut 2007).

A critical insight of recent research is that chemicals that interfere with the hormone system can alter biological systems even when present at extremely low levels, as low as 1 part in 1 trillion (Wozniak 2005). While it may seem surprising that such small amounts of a chemical could affect health, only small amounts of hormones are necessary to regulate our metabolism naturally. A man-made chemical that, for example, is similar in shape to a hormone, and can mimic that hormone when it is present in the body, might disturb the hormone system even when present at a low concentration.

Current chemical regulations in the United States do not require that new or existing chemicals be tested for their ability to disrupt the hormone system. As a result, numerous consumer products are made using chemicals suspected of causing hormone disruption, including phthalates, bisphenol A, and triclosan. We may be exposed to these chemicals every time we use these products, and through our use of them, release them into the environment where they may impact fish and wildlife.

As a result, use of hormone disrupting chemicals creates a burden not only for our bodies, but also for surrounding fish and wildlife. Our analyses suggest that wastewater from a typical urban area may contain phthalates, bisphenol A, and triclosan. Though this wastewater is treated before it is released into the environment, typical wastewater (sewage) treatment methods were not designed to degrade the thousands of synthetic chemicals now present in the waste stream. While some chemicals are removed by treatment to some extent, others persist and may contaminate surrounding streams and oceans (e.g. Kolpin 2002; Oros 2002). Fish living in contaminated waters may develop a variety of reproductive problems due to this assault on their hormone systems. For example, male fish, exposed to treated wastewater, that produce immature eggs in their testes have been discovered in many parts of the United States (Pait 2002; Goodbred 2007).

The best way to reduce exposures to hormone disrupting chemicals is to avoid using them in the first place. By eliminating these chemicals at the source, we prevent human exposures from consumer products, and we prevent fish and wildlife exposures from our wastewater. By choosing products that do not contain hormone-disrupting chemicals, you protect your own health and the health of your family, and you reduce the amount of pollution entering the environment.

For truly broad change, however, we need to update chemical regulations at the federal level. Our government must acknowledge the new science that clearly shows that some chemicals that act on the hormone system can produce health effects at very low levels, and should not be used in consumer products. Updated chemical regulations should ensure that chemicals used in the United States be safe for people and for the environment.

» Phthalates

Invented in the 1930s, the common industrial chemicals called phthalates (pronounced tha-lates) are used as ingredients in a diverse range of consumer products, from cosmetics to food wraps, toys and building materials. Currently, the chemical industry produces billions of pounds of phthalates each year. They are used as plasticizers to soften plastic, especially PVC plastic, and to make nail polish flexible and chip-resistant; as skin moisturizers and skin penetration enhancers in cosmetics; as an ingredient of fragrance in cosmetics and cleansing products; as components of a broad array of consumer products, from adhesives to inks; and as solvents in a wide range of applications. People are exposed to phthalates daily through their contact with consumer products, via food packaged in plastic, and from indoor air (CDC 2005).

In September 2000, scientists from the Centers for Disease Control and Prevention (CDC) conducted the first accurate measurements of human phthalate exposures, and reported finding phthalates in every one of 289 people tested, at surprisingly high levels (Blount 2000). Levels of some phthalates in U.S. women of childbearing age have been found to exceed the government's safe levels set to protect against birth defects, according to another CDC study (Kohn 2000). Results of phthalate testing in more than 2,500 people ages 6 and above confirmed the CDC's original findings: phthalate exposures are widespread across the population, and women are exposed at higher levels than men (CDC 2003). In a recent study of girls age 6 to 8 spearheaded by Mount Sinai School of Medicine, phthalates were found in every one of 90 girls tested (Wolff 2007). Phthalates are widespread contaminants in the environment as well (Kolpin 2002; Rudel 2003).

Epidemiological studies of ordinary people have linked high phthalate levels to reduced sperm motility and concentration, increased damage to sperm DNA, and alterations in hormone levels in adult men (Duty 2003, 2004, 2005; Hauser 2007). A recent study of 134 births found marked differences in the reproductive systems of baby boys whose mothers had the highest phthalate measurements during pregnancy (Swan 2005). A second study indicated that these mothers' exposures were not extreme, but rather were typical for about one-quarter of all U.S. women (Marsee 2006). Further research documented decreased testosterone levels among baby boys exposed to phthalates in their mother's breast milk (Main 2006).

New epidemiological studies indicate phthalates may produce non-reproductive health effects in men as well. Results from one study suggest that breakdown products of one particular phthalate, DEHP, may be associated with alterations in thyroid hormone levels (Meeker 2007). In another study, increased levels of certain phthalates were associated with increased waist circumference and insulin resistance in adult men in the United States (Stahlhut 2007). According to the American Heart Association (2007), over 60 million Americans have insulin resistance; 1 in 4 of these people develop Type 2 diabetes.

In addition to this epidemiological research on humans, laboratory studies indicate phthalates cause a broad range of birth defects and reproductive impairments in animals exposed in utero and shortly after birth (e.g. Marsman 1995; Wine 1997; Ema 1998; Mylchreest 1998, 1999, 2000; Gray 1999; CERHR 2000). Phthalate exposures damage the testes, prostate gland, epididymis, penis, and seminal vesicles in laboratory animals (e.g. Mylchreest 1998); most of these effects persist throughout the animal's life. Phthalates have also been shown to bioaccumulate in fish tissue and to affect estrogen levels in fish (Jobling 1995).

Phthalates are considered a hazardous waste and are regulated as pollutants when industry releases them into the environment. In contrast, phthalates are essentially unregulated in food, cosmetics, and consumer products. One phthalate, DEHP, is regulated in drinking water. In addition, this phthalate was removed voluntarily from children's toys more than a decade ago. The European Union has banned use of some phthalates in cosmetics and other consumer products, in response to concerns about exposure and toxicity.

» Bisphenol A

In use since the 1950s, bisphenol A (BPA) is an industrial chemical and a building block for polycarbonate plastic and epoxy resins. BPA is found in many everyday products such as the lining of metal food and drink cans, plastic baby bottles, pacifiers and baby toys, dental sealants, computers, cell phones, hard plastic water bottles, paints, adhesives, enamels, varnishes, CDs and DVDs, and certain microwavable or reusable food and drink containers. By 1990, the annual U.S. production of this compound had exceeded 1 billion pounds (EPA 2006).

Bisphenol A been shown to leach into food and water from containers – particularly after heating or as the plastic ages. In studies conducted over the past 20 years, scientists have detected BPA in breast milk, serum, saliva, urine, amniotic fluid, and umbilical cord blood from people in Europe, North America, and Asia (CERHR 2006). Researchers at the Centers for Disease Control and Prevention (CDC) recently detected BPA in 95 percent of nearly 400 U.S. adults (Calafat 2005). A study of girls age 6 to 8 reported measurable amounts of BPA in 85 of 90 participants (Wolff 2007). EWG-led biomonitoring studies have detected BPA in 7 of 41 people tested for this chemical, located in 4 states and the District of Columbia (EWG 2007a). Bisphenol A is so common in products and industrial waste that it pollutes not only people but also rivers, streams, estuaries, house dust, and even air nearly everywhere it is tested (e.g. Kolpin 2002; Rudel 2003).

A large body of evidence indicates that BPA can disrupt the hormone system at very low concentrations. At some very low doses the chemical causes permanent alterations of breast and prostate cells that precede cancer, insulin resistance (a hallmark trait of Type 2 diabetes), and chromosomal damage linked to recurrent miscarriage and a wide range of birth defects including Down syndrome (vom Saal 2005). As of December 2004, 94 of 115 peer-reviewed studies had confirmed BPA's toxicity at low levels of exposure. Few chemicals have been found to consistently display such a diverse range of harm at such low doses. ("Low doses" are typically defined as those that produce tissue concentrations at or below those in the typical range of human exposures.)

One striking study found that very low doses of BPA (20 parts per billion) given to mice for just 1 week caused an error in cell division called aneuploidy (Hunt 2003). This type of cell division error results in the new cells having the wrong number of chromosomes, and is linked to miscarriages and certain birth defects in people, including Down syndrome.

Based on the results of this study, Japanese researchers recently looked at a small number of women to see if higher levels of bisphenol A in their bodies were associated with recurrent miscarriage. They not only found such an association, but also found evidence of aneuploidy in the miscarried fetuses, further suggesting that the higher rates of miscarriage could be BPA-related (Sugiura-Ogasawara 2005).

Japanese scientists found that women with polycystic ovarian syndrome had higher serum levels of BPA relative to women with normal ovarian function, and that there were positive correlations between BPA concentrations and androgen levels (Takeuchi 2006). Polycystic ovarian syndrome is the most common form of female infertility in the U.S., affecting as many as 5 percent of American women (Knochenhauer 1998).

Men with occupational exposure to epoxy resins were found to have decreased secretion of follicle stimulating hormone when compared with men without occupational exposure to epoxy resins (Hanaoka 2002). Follicle stimulating hormone is critical to sperm formation; diminished secretion of this hormone in men can result in reduced sperm concentration and infertility.

A recent animal study also found a link between exposure to low doses of bisphenol A and insulin resistance. In this study, adult mice were exposed to low doses of BPA – 10 parts per billion per day for 4 days (Alonso-Magdalena 2006). The exposed animals were found to have sustained increases in serum insulin levels after just 2 days of exposure, and impaired glucose tolerance after 4 days. Increased insulin levels are associated with Type 2 diabetes; interestingly, women with polycystic ovarian syndrome, epidemiologically associated with BPA exposures, often develop insulin resistance as well (AHA 2007). Over 60 million Americans exhibit insulin resistance, and one in four of these people develop Type 2 diabetes (AHA 2007).

The study of bisphenol A has opened a new chapter in our understanding of the effects of chemicals on our bodies. Where traditional toxicology asserts that higher doses confer greater harm, bisphenol A tests show that low doses can be the most toxic of all, below the radar screen of the body's compensatory detoxifying mechanisms, or below overtly toxic doses that destroy the tissues under study. In one investigation, a low dose of BPA produced a 70 percent higher growth rate of prostate cancer cells in lab animals than did higher doses (Wetherill 2002). In another study, lower doses of BPA resulted in higher rates of breast cell growth that can precede cancer (Markey 2001).

The unusually broad toxicity of BPA is explained by a prominent scientist as stemming from the fact that BPA can alter the behavior of over 200 genes – more than 1 percent of all human genes (Myers 2006). These genes control the growth and repair of nearly every organ and tissue in the body. Taken in its totality, the range of toxic effects linked to BPA is startlingly similar to the litany of human health problems on the rise or common across the population, including breast and prostate cancer, diabetes, obesity, infertility, and polycystic ovarian syndrome (Myers 2006).

Significantly, many of the studies showing adverse effects examine levels many times lower than what the Environmental Protection Agency (EPA) considers safe, 50 ug/kg/day, or 50 parts per billion per day. The EPA established this standard for BPA (the reference dose, or RfD) in 1987, a decade before the low-dose BPA literature developed (EPA 1987). The vast majority of studies finding BPA toxic at low doses have been published since 1997, the year that a pivotal study showed BPA's ability to harm the prostate at levels far below what was thought safe (Nagel 1997). EPA's safety standard is 25 times the dose now known to cause birth defects in lab studies, and has not been updated for 20 years. BPA is allowed in unlimited amounts in consumer products, drinking water, and food, the top exposure source for most people, despite studies that show that BPA is toxic to lab animals at doses overlapping with or very near to human exposures.

Researchers from around the world have detected BPA in surface waters, sometimes at levels approaching the EPA's safe reference dose. Bisphenol A was found in Dutch surface water at levels up to 330 parts per trillion; scientists documented one water sample that contained 21 parts per billion of BPA (Belfroid 2002). Fromme and others (2002) reported BPA levels in surface waters ranging from 0.5 to 410 parts per trillion, and levels in treated wastewater ranging from 18 to 702 parts per trillion. Scientists with the United States Geological Survey detected BPA in 41 percent of the 109 streams sampled in a recent investigation, with the highest concentration at 12 parts per billion (Kolpin 2002).

A number of studies have shown impacts to fish and other wildlife when exposed to bisphenol A. A study of brown trout exposed to BPA at concentrations found in the environment reported impacts to sperm quality in males and either inhibited or reduced ovulation in females (Lahnsteiner 2005). Iwamuro and others (2006) reported that in the parts per billion range, BPA affected tadpole tail development in *Xenopus*, a frog species often used in bioassays. Another study showed bisphenol A bioaccumulated in spotted halibut (Lee 2004).

Finally, BPA is known to react with the chlorine chemicals used to disinfect tapwater and treated wastewater, creating an array of chlorinated substances that themselves exhibit hormone-disrupting properties (Hu 2002).

» Triclosan

Triclosan is an antimicrobial agent found in a broad variety of products, ranging from hospital and household liquid hand soap, detergents, and other sanitizing products, to toothpaste and hair products, pesticides, and plastic and foam products like cutting boards and shoe insoles. The popularity of antibacterial consumer products has led to increased consumer use of triclosan (Perencevich 2001; Tan 2002). This antimicrobial agent is marketed under a variety of trademarked names as well, including Microban, Irgasan DP-300, Lexol 300, Ster-Zac, Cloxifenolum, Biofresh, and others.

Triclosan has been detected in human breast milk and blood samples from the general population (Adolfsson-Erici 2002; TNO 2005), and in the urine of 61 percent of 90 girls ages 6 to 8 tested in a recent study spearheaded by Mount Sinai School of Medicine (Wolff 2007). EWG-led biomonitoring studies have detected triclosan in 17 of 21 people tested (EWG 2007a). Scientists recently found triclosan in 58 percent of 85 streams across the U.S. (Kolpin 2002), the likely result of its presence in discharges of treated wastewater.

The amount of triclosan in the wastwater stream is estimated to be as much as 3 to 5 milligrams per person per day from residences alone (McAvoy 2002); in addition, substantial discharges of this antimicrobial agent are expected from laundries, hair salons, medical facilities, and many other commercial and industrial sites. Optimal water treatment can result in degradation and removal of 95 percent of triclosan (Samsoe-Petersen 2003); however, small amounts may pass through the treatment plants to receiving waters.

Triclosan kills microbes by disrupting protein production, and also by binding to the active site of a critical carrier protein reductase that is essential for fatty acid synthesis. This target enzyme is present in microbes but not in humans. Though triclosan is known to be acutely toxic to certain types of aquatic organisms (Orvos 2002), available studies do not indicate it causes cancer or birth defects in humans (Bhargava 1996). Products containing triclosan may occasionally cause skin irritation in people with a specific sensitivity (Bhargava 1996).

Triclosan has the tendency to bioaccumulate (Samsoe-Petersen 2003), or become more concentrated in the fatty tissues of humans and other animals that are exposed to this chemical. The chemical structure of triclosan is similar to that of DES, a non-steroidal estrogen linked to cancer development in those exposed in utero, raising concerns about its potential to act as an endocrine disruptor. A recent study on fish showed that triclosan had weakly androgenic effects, but no estrogenic effects (Foran 2000).

In contrast, another study found that low levels of triclosan in combination with thyroid hormones triggered rapid transformation of tadpoles into frogs (Veldhoen 2006). Rather than mimicking the thyroid hormone, triclosan, in concentrations of less than 1 part per billion commonly measured in U.S. streams, appeared to make thyroid hormones more potent. This hormone signaling mechanism is similar in frogs and humans, suggesting that triclosan could potentially disrupt the human thyroid system.

The evolving interaction between microbes and antiseptic agents has led to concern that use of specific antimicrobial ingredients may provoke the development of strains of bacteria that are resistant to disinfection. Studies have described strains of bacteria that have acquired reduced susceptibility to triclosan (McMurry 1998; Chuanchuen 2001). The identification of a triclosan-resistant bacterial enzyme suggests that resistance to this antiseptic ingredient may develop more readily than to other agents (Heath 2000). In addition, exposing specific bacterial strains to triclosan appears to result in selection favoring bacteria that are resistant to multiple antibiotics (Chuanchuen 2001).

The American Medical Association has advanced an official recommendation against using antibacterial products in the home due to concern about antimicrobial resistance (Tan 2002). A Food and Drug Administration panel reviewed the existing research and found no evidence that households that use antibacterial products are healthier than households that use soap and water and other typical cleansing products (FDA 2005).

Studies indicate that in surface waters, triclosan can interact with sunlight and microbes to form methyl triclosan, a chemical that may bioacummulate in wildlife and humans (Adolfsson-Erici 2002; Lindstrom 2002). A recent European study found methyl triclosan in fish, especially concentrated in fatty tissue (Balmer 2004). Triclosan also can degrade into a form of dioxin, a class of chemicals linked to a broad range of toxicities including cancer (Lores 2005). New research shows that triclosan in tap water can react with residual chlorine from standard water disinfecting procedures to form a variety of chlorinated byproducts at low levels, including chloroform, a suspected human carcinogen (Fiss 2007).

HORMONE DISRUPTORS FOUND

The East Bay Municipal Utility District treats wastewater from the region marked in green. We tested wastewater samples from homes, businesses, and industrial sites in this region for the presence of key hormone-disrupting chemicals.

Learn more about Hormone Disruptors:

· in the Home
· in Nail Salons
· in Pet Care
· in Laundries
· in Medical Facilities
· in Manufacturing
· in Treated Wastewater

» in the Home

Choosing household products that do not contain hormone-disrupting chemicals may benefit your health and the health of your family, and can reduce the amount of these chemicals entering San Francisco Bay. You can make safer choices at home each time you prepare a meal, wash dishes, wash clothes, or take a shower.

•We tested 2 residential samples.
•We detected 4 of 5 phthalates.
•We did not detect bisphenol A or triclosan.

Hormone-disrupting contaminants were detected in Residential Wastewater (parts per billion)

	Sample	Sample

	1	2
Phthalates		
DEP	4.0	9.1
DBP	ND	ND
BBzP	0.76	1.0
DEHP	9.1	3.3
DOP	0.6	ND
Bisphenol A	ND	ND
Triclosan	ND	ND

More Information:

Phthalates in the home

Phthalates are found in many typical household products. We detected 4 of 5 phthalates in wastewater from 2 residential samples. Studies show phthalates are common contaminants of people as well as streams and rivers (Kolpin 2002; CDC 2005; Wolff 2007).

- Phthalates are widely used in cosmetics and personal care products. Dibutyl phthalate (DBP) is used in some types of nail polish – check the list of ingredients. Diethyl phthalate (DEP) is a component of fragrance in many personal care products – in this case, you won't see the phthalate listed as an ingredient, only the word "fragrance" will appear on the ingredient list. Phthalates may also be used as skin moisturizers and skin penetration enhancers in cosmetics, and as ingredients in liquid soaps, detergents, and other cleansing products.
- Phthalates are widely used to make plastics, especially PVC or vinyl plastic. Many plastic products commonly found in the home or garden can contain phthalates, including food wraps and containers, toys, garden hoses, dentures and orthodontic appliances, building materials, shower curtains, home and garden furnishings, and clothing.
- Phthalates may also be components of a variety of other household products, including pill coatings for pharmaceuticals and nutritional supplements; lubricants, waxes, inks, and adhesives; and insecticides and insect repellants.

To reduce exposures to phthalates in your home:

- Use nail polish and other beauty products that do not contain "dibutyl phthalate" – check the ingredient list.
- Use personal care products, detergents, cleansers, and other products that do not contain "fragrance" in the ingredient list – "fragrance" commonly includes the phthalate DEP.
- Avoid cooking or microwaving in plastic.

- Use a non-vinyl shower curtain.
- Use paints and other hobby products in well-ventilated areas.
- Give children wooden and other phthalate-free toys, and don't let children chew on soft plastic toys.

Bisphenol A in the home

Bisphenol A (BPA) is found in many typical household products. We did not detect BPA in wastewater from 2 residential samples, but studies indicate people are exposed to this chemical in their daily lives (CERHR 2006). Bisphenol A is commonly detected in people, and in streams and rivers (Kolpin 2002; Calafat 2005; Wolff 2007).

- Bisphenol A is used to make a plastic coating, called BADGE, that is applied to the inside of food and beverage cans to keep food from reacting with the metal of the can. This coating appears as a solid color on the inside of the can, and can leach into the food stored inside.
- Bisphenol A is used to make polycarbonate plastics – used in such products as hard plastic baby bottles, 5 gallon water cooler bottles, hard water bottles, plastic silverware, and Lexan products. You can check for the type of plastic on the bottom of the bottle – polycarbonate bottles may be labeled with plastic number 7 ("Other" type of plastic) or may contain the letters "PC" below the recycling symbol. Bisphenol A can leach out of these types of bottles into your beverage or food.

To reduce exposures to bisphenol A in your home:

- Cut down on canned foods, especially liquid infant formula in metal cans.
- Avoid eating or drinking from polycarbonate plastics. Alternatives include bottles and other materials made from glass, ceramic, stainless steel, or polypropylene plastic – labeled plastic number 5 on the bottom (translucent, not transparent).

Triclosan in the home

Triclosan is found in many typical household products. We did not detect triclosan in wastewater from 2 residential samples, but studies indicate people are exposed to this chemical in their daily lives (Adolfsson-Erici 2002; Tan 2002; TNO 2005; Wolff 2007). Triclosan is commonly detected in people, and in streams and rivers (Adolfsson-Erici 2002; Kolpin 2002; TNO 2005; Wolff 2007).

- Triclosan is used in a broad array of cosmetics and personal care products with antibacterial properties, including liquid hand soap, deodorant, toothpaste, and hair care products.
- Triclosan is also used in plastic and foam products labeled "antibacterial," including plastic cutting boards, bath mats, and shoe insoles.
- Triclosan is also used in pesticides and "antibacterial" household detergents and other cleansing products.

To reduce exposures to triclosan in your home:

- Avoid unnecessary use of "antibacterial" products – read the list of ingredients. The American Medical Association recommends against using products with antibacterial ingredients in the home (Tan 2002). Studies indicate that households that use antibacterial products are no healthier than those that use soap and water and other typical cleansing products (Larson 2003; FDA 2005).

- If you use an antimicrobial skin disinfectant, use an alcohol hand rub instead of a product containing triclosan.

» in Nail Salons

By choosing nail care products and other cosmetics that do not contain hormone-disrupting chemicals, you protect your own health and the health of your family, and you reduce the amount of pollution entering San Francisco Bay. If you own or work in a nail salon, offer customers phthalate-free nail care. If you are a nail salon customer, seek out phthalate-free nail polishes, or bring your own.

•We tested 1 nail salon.
•We detected 4 of 5 phthalates.
•We did not detect bisphenol A or triclosan.

Hormone-disrupting contaminants were detected in Nail Salon Wastewater (parts per billion)

Phthalates	
DEP	ND
DBP	0.46
BBzP	0.74
DEHP	1.2
DOP	0.2
Bisphenol A	ND
Triclosan	ND

More Information:

Phthalates in nail salons

Phthalates are found in many nail care products and other cosmetics. We detected 4 of 5 phthalates in wastewater from 1 nail salon. Studies show phthalates are common contaminants of people as well as streams and rivers (Kolpin 2002; CDC 2005; Wolff 2007).

- Phthalates are widely used in cosmetics and personal care products. Dibutyl phthalate (DBP) is used in some types of nail polish – check the list of ingredients. Diethyl phthalate (DEP) is a component of fragrance in many personal care products – in this case, you won't see the phthalate listed as an ingredient, only the word "fragrance" will appear on the ingredient list. Phthalates may also be used as skin moisturizers and skin penetration enhancers in cosmetics, and as ingredients in liquid soaps, detergents, and other cleansing products.

To reduce exposures to phthalates at the nail salon:

- Use nail polish and other beauty products that do not contain "dibutyl phthalate" – check the ingredient list. If you own or work in a nail salon, offer customers phthalate-free nail care. If you are a nail salon customer, seek out phthalate-free nail polishes, or bring your own.
- Use personal care products, detergents, cleansers, and other products that do not contain "fragrance" in the ingredient list – "fragrance" commonly includes the phthalate DEP.
- Apply nail polish in well-ventilated areas.

Triclosan in nail salons

Triclosan is found in many "antibacterial" soaps, cleansers and other personal care products that may be used in some salons. We did not detect triclosan in wastewater from 1 nail salon, but studies indicate people are exposed to this chemical in their daily lives (Adolfsson-Erici 2002; Tan 2002; TNO 2005; Wolff 2007). Triclosan is commonly detected in people, and in streams and rivers (Adolfsson-Erici 2002; Kolpin 2002; TNO 2005; Wolff 2007).

To reduce exposures to triclosan at the nail salon:

- Avoid unnecessary use of "antibacterial" cosmetics – read the list of ingredients. The American Medical Association recommends against using products with antibacterial ingredients without specific need (Tan 2002). Studies indicate that households that use these products are no healthier than those that use soap and water and other typical cleansing products (Larson 2003; FDA 2005).
- If you need to use an antimicrobial skin disinfectant, use an alcohol hand rub instead of a product containing triclosan.

» in Pet Care

By choosing pet care products that do not contain hormone-disrupting chemicals, you protect your pet's health, and you reduce the amount of pollution entering San Francisco Bay.

•We tested 1 pet wash and 1 veterinary clinic.
•We detected 5 of 5 phthalates.
•We detected triclosan.
•We did not detect bisphenol A.

Hormone-disrupting contaminants were detected in Pet Care Wastewater (parts per billion)

	Pet Wash	Veterinary Clinic
Phthalates		
DEP	1.3	ND
DBP	0.76	ND
BBzP	2.3	ND
DEHP	6.5	ND
DOP	1.6	ND
Bisphenol A	ND	ND
Triclosan	ND	14

More Information:

Phthalates in pet care

Phthalates are found in many pet care products. We detected 5 of 5 phthalates in wastewater from 1 pet wash. Studies show phthalates are common contaminants of people as well as streams and rivers (Kolpin 2002; CDC 2005; Wolff 2007).

- Phthalates are widely used in cleansing products. In addition, diethyl phthalate (DEP) is a component of fragrance in many cleansing products – in this case, you won't see the phthalate listed as an ingredient, only the word "fragrance" will appear on the ingredient list.
- Phthalates are widely used in plastic pet products, including toys, some food and water dishes, and food wraps.
- Phthalates are widely used in plastic medical products, such as IV tubing and blood and fluid storage bags.
- Phthalates may also be components of a variety of other pet care products, including pill coatings for pharmaceuticals and nutritional supplements, and insecticides and insect repellants.

To reduce exposures to phthalates for your pet:

- Use pet wash products that do not contain phthalates or "fragrance" – read the ingredient label. If you own or work in a pet wash, offer customers phthalate-free products.
- Use non-plastic pet dishes and pet toys.
- Veterinary workers and pet owners can urge their veterinary facilities to reduce or eliminate use of products containing phthalates.
- Avoid treating your pet with pills, insecticides, and insect repellants that contain phthalates.

Bisphenol A in pet care

Bisphenol A (BPA) may be found in pet care products. We did not detect bisphenol A in wastewater from a pet wash or a veterinary clinic, but studies indicate bisphenol A is commonly detected in people, and in streams and rivers (Kolpin 2002; Calafat 2005; Wolff 2007).

- Bisphenol A is used to make a plastic coating, called BADGE, that is applied to the inside of the food and beverage cans to keep food from reacting with the metal of the can. This coating appears as a solid color on the inside of the can, and can leach into the food stored inside.
- Bisphenol A is used to make polycarbonate plastics, sometimes used in pet food and water dishes. You can check for the type of plastic on the bottom of the dish – polycarbonate products may be labeled with plastic number 7 ("Other" type of plastic) or may contain the letters "PC" below the recycling symbol. Bisphenol A leaches out of these types of dishes and into your pet's water or food.

To reduce exposures to bisphenol A for your pet:

- Cut down on canned foods for your pet.
- Avoid using polycarbonate plastic dishes for your pets. Alternatives include dishes made from glass, stainless steel, ceramics, or polypropylene dishes labeled plastic number 5 on the bottom (translucent, not transparent).

Triclosan in pet care

Triclosan may be found in "antibacterial" soaps, detergents, and other cleansing products that may be used in veterinary clinics or for home pet care. We detected triclosan in wastewater from 1 veterinary clinic. Triclosan is commonly detected in people, and in streams and rivers (Adolfsson-Erici 2002; Kolpin 2002; TNO 2005; Wolff 2007).

To reduce exposures to triclosan for your pet:

- Avoid unnecessary use of "antibacterial" pet care products. The American Medical Association recommends against using products with antibacterial ingredients without specific need (Tan 2002). Studies indicate that households that use antibacterial products are no healthier than those that use soap and water and other typical cleansing products (Larson 2003; FDA 2005).
- If you need to use an antimicrobial skin disinfectant, use an alcohol hand rub instead of a product containing triclosan.
- Veterinary clinics can switch to effective alternatives to triclosan-based disinfection products.

» in Laundries

By washing clothes with products that do not contain hormone-disrupting chemicals, you protect your own health and the health of your family, and you reduce the amount of pollution entering San Francisco Bay.

•We tested 2 industrial laundries, 1 diaper service, and 1 coin-operated laundromat.
•We detected 5 of 5 phthalates.

•We detected bisphenol A.
•We detected triclosan.

Hormone-disrupting contaminants were detected in Laundry Wastewater (parts per billion)

	Industrial Laundry 1	Industrial Laundry 2	Coin-Op Laundry	Diaper Service
Phthalates				
DEP	ND	ND	16	ND
DBP	ND	86	ND	12*
BBzP	ND	95	ND	0.2
DEHP	30	2700*	66	0.63*
DOP	1.5	ND	13	ND
Bisphenol A	21.5	ND	ND	ND
Triclosan	9.24	ND	24.7	ND

*Estimated Value

More Information:

Phthalates in laundries

Phthalates are found in many detergents, laundry products, and washable items. We detected phthalates in wastewater from 4 of 4 laundries. Studies show phthalates are common contaminants of people as well as streams and rivers (Kolpin 2002; CDC 2005; Wolff 2007).

- Phthalates are used as ingredients in liquid soaps, detergents, and other cleansing products. Diethyl phthalate (DEP) is a component of fragrance in detergents – in this case, you won't see the phthalate listed as an ingredient, only the word "fragrance" will appear on the ingredient list.
- Phthalates are widely used to make plastics, especially PVC or vinyl plastic. Many washable plastic products can contain phthalates, including plastic or plastic-coated linens and clothing.

To reduce exposures to phthalates in laundries:

- Use detergents, cleansers, and other products that do not contain phthalates or "fragrance" in the ingredient list – "fragrance" commonly includes the phthalate DEP.

- Do not use plastic or plastic-coated linens or clothing.

Bisphenol A in laundries

Bisphenol A (BPA) is not a typical component of laundry products. However, we did detect BPA in wastewater from 1 industrial laundry. Bisphenol A is commonly detected in people, and in streams and rivers (Kolpin 2002; Calafat 2005; Wolff 2007).

Sources of bisphenol A in the wastewater from this industrial laundry might include polycarbonate components of washing machines, polycarbonate water pipes, epoxy-phenolic resins in surface coatings of drinking water storage tanks, or BPA-based polymers used in coatings, adhesives, and putties used in construction (CERHR 2006). Both heat and detergents accelerate the leaching of BPA into water.

Triclosan in laundries

Triclosan may be found in many "antibacterial" detergents, and in plastic or foam items labeled "antibacterial," such as plastic bath mats and foam shoe insoles. We detected triclosan in wastewater from 1 industrial laundry and 1 coin-operated laundromat. Triclosan is commonly detected in people, and streams and rivers (Adolfsson-Erici 2002; Kolpin 2002; TNO 2005; Wolff 2007).

To reduce exposures to triclosan in laundries:

- Avoid unnecessary use of "antibacterial" products (read the list of ingredients). The American Medical Association recommends against using products with antibacterial ingredients in the home (Tan 2002). Studies indicate that households that use these products are no healthier than those that use soap and water and other typical cleansing products (Larson 2003; FDA 2005).

» in Medical Facilities

Medical treatment free of hormone-disrupting chemicals is healthier for you and your family, and reduces the amount of pollution entering San Francisco Bay.

•We tested 1 hospital and 1 medical clinic.
•We detected 3 of 5 phthalates.
•We detected triclosan.
•We did not detect bisphenol A.

Hormone-disrupting contaminants were detected in Medical Wastewater (parts per billion)

	Hospital	Medical Clinic
Phthalates		

DEP	ND	ND
DBP	ND	0.66
BBzP	0.82	0.74
DEHP	2.7	1.0
DOP	ND	ND
Bisphenol A	ND	ND
Triclosan	237*	18.2

*Estimated Value

More Information:

Phthalates in medical facilities

Phthalates are found in many medical products. We detected 3 of 5 phthalates in wastewater from a hospital and a medical clinic. Studies show phthalates are common contaminants of people as well as streams and rivers (Kolpin 2002; CDC 2005; Wolff 2007).

- Phthalates are widely used in PVC plastic medical products, such as IV tubing and blood and fluid storage bags.
- Phthalates may also be components of pill coatings for pharmaceuticals and nutritional supplements.
- Phthalates are widely used in cleansing products. In addition, diethyl phthalate (DEP) is a component of "fragrance" in many cleansing and personal care products.

To reduce exposures to phthalates from medical treatment:

- Health care workers and patients can urge their medical facilities to reduce or eliminate use of products containing phthalates.
- Use detergents, cleansers, and personal care products that do not contain phthalates or "fragrance" in the ingredient list – "fragrance" commonly includes the phthalate DEP.

Triclosan in medical facilities

Triclosan may be found in "antibacterial" soaps, detergents, and other sanitizing products that may be used in medical facilities. We detected triclosan in wastewater from a hospital and a medical clinic. Triclosan is commonly detected in people, and in streams and rivers (Adolfsson-Erici 2002; Kolpin 2002; TNO 2005; Wolff 2007).

To reduce exposures to triclosan from medical treatment:

- Avoid unnecessary use of "antibacterial" products. The American Medical Association recommends against using such products without specific need (Tan 2002).
- Use an alcohol hand rub instead of a product containing triclosan for hand and skin disinfection.
- Medical facilities can switch to effective alternatives to triclosan-based disinfection products.

» in Manufacturing

Hormone-disrupting chemicals are used in the manufacture of a multitude of consumer and industrial products. Reformulating products and adapting manufacturing processes can help to reduce exposures to these chemicals.

•We tested wastewater from manufacturers of adhesives, beverages, paper products, pharmaceuticals, and plastic bags.
•We detected 4 of 5 phthalates.
•We detected bisphenol A.
•We detected triclosan.

Hormone-disrupting contaminants were detected in Manufacturing Wastewater (parts per billion)

	Pharma-ceuticals	Plastic Bags	Paper Products	Beverages	Adhesives
Phthalates					
DEP	ND	ND	ND	ND	ND
DBP	0.58	0.36	ND	ND	120*
BBzP	0.27	2.3	0.14	ND	39
DEHP	0.99	49	6.8	ND	47*
DOP	ND	10	ND	ND	ND
Bisphenol A	0.295	ND	0.753	ND	ND
Triclosan	ND	6.69	ND	ND	ND

*Estimated Value

More Information:

Phthalates in manufacturing

We detected 4 of 5 phthalates in wastewater from facilities that manufacture pharmaceuticals, plastic bags, paper products, and adhesives. Studies show phthalates are common contaminants of people as well as streams and rivers (Kolpin 2002; CDC 2005; Wolff 2007).

Phthalates are used to make a broad range of products:

- Adhesives
- Blood-product storage
- Car-care products
- Carpet
- Cosmetics & personal care products
- Detergent
- Electronics
- Enamels/glass
- Food containers
- Fragrance
- Home & garden products
- Industrial/lubricating oils
- Inks & Dyes
- Insecticides & insect repellants
- IVs
- Nail polish
- Packaging film
- Paint
- Paper
- Pill coatings
- PVC & flexible plastics
- Rubber
- Rubbing alcohol
- Stains & texture coatings
- Toys

- Varnish, sealants, lacquer
- Vinyl-flooring products
- Windshield cleaners

To reduce exposures to phthalates from manufacturing:

- If you own or work in a manufacturing facility that produces a product containing phthalates, investigate the possibility of reformulating the product to eliminate these chemicals.
- Check your facility for other products that may contain phthalates – for example, vinyl tubing, or housekeeping chemicals listing "fragrance" as an ingredient – and replace them with phthalate-free alternatives.
- As a consumer, you can reduce the market for products containing phthalates by purchasing phthalate-free alternatives.

Bisphenol A in manufacturing

Bisphenol A (BPA) may be found in many everyday products. We detected bisphenol A in wastewater from 2 facilities, one that manufactures pharmaceuticals, and one that manufactures paper products. Bisphenol A is commonly detected in people, and in streams and rivers (Kolpin 2002; Calafat 2005; Wolff 2007).

- Bisphenol A is used to make polycarbonate plastics – those labeled with plastic number 7 ("Other" type of plastic) or with the letters "PC" below the recycling symbol. Bisphenol A leaches out of these types of materials.
- Bisphenol A is used to make a plastic epoxy coating, called BADGE, that is applied to the inside of food and beverage cans to keep food from reacting with the metal of the can. This coating appears as a solid color on the inside of the can, and can leach into the food stored inside.
- BPA is used in a variety of industrial products, most of which result in little exposure for the general population. However, worker exposures in these settings could be a concern for the smaller number of people with on-going, high level exposures. These might include plastics manufacturing for mobile phone housings, displays, computer parts, household electrical equipment, lamp fittings, automotive plastics, thermal paper, and printing inks (CERHR 2006).

To reduce exposures to bisphenol A in manufacturing:

- If you own or work in a manufacturing facility that produces a product containing bisphenol A, investigate the possibility of reformulating the product to eliminate this chemical.
- Check your facility for other products that may contain bisphenol A – for example, anything made of polycarbonate plastic – and replace them with BPA-free alternatives. This is especially important for polycarbonate equipment exposed to heat, acidic or basic solutions, or soaps and detergents – such conditions increase the leaching of bisphenol A into water and other fluids in contact with the plastic.
- As a consumer, you can reduce the market for products containing bisphenol A by purchasing BPA-free alternatives.

Triclosan in manufacturing

Triclosan may be found in "antibacterial" soaps, detergents, and other sanitizing products that may be used in manufacturing facilities. We detected triclosan in wastewater from a facility that manufactures paper bags. Triclosan is commonly detected in people, and in streams and rivers (Adolfsson-Erici 2002; Kolpin 2002; TNO 2005; Wolff 2007).

To reduce exposures to triclosan from manufacturing:

- Avoid unnecessary use of "antibacterial" products.
- Switch to disinfection products that do not contain triclosan.
- Use an alcohol hand rub instead of a product containing triclosan for hand and skin disinfection.

» in Treated Wastewater

Even after sophisticated treatment, trace levels of hormone-disrupting chemicals remain in treated wastewater entering San Francisco Bay. Fish and other aquatic species exposed to these chemicals may develop reproductive and other health problems due to disruption of their hormone systems. Reducing the pollutants at the source is the most effective way to reduce the amount of pollution entering San Francisco Bay.

•We tested 3 samples of treated wastewater.
•We detected 4 of 5 phthalates.
•We detected bisphenol A.
•We detected triclosan.

Hormone-disrupting contaminants were detected in Treated Wastewater

(Water released into San Francisco Bay, parts per billion)

	Sample 1	Sample 2	Sample 3
Phthalates			
DEP	ND	ND	ND
DBP	ND	0.57	5.5*
BBzP	0.84	0.74	ND
DEHP	2.9	1.0	0.21*
DOP	0.39	ND	ND
Bisphenol A	0.38	ND	0.31
Triclosan	ND	0.9	0.42

*Estimated Value

More Information:

Phthalates in treated wastewater

Studies of wastewater treatment show that phthalates may pass through treatment facilities without degrading (Alatriste-Mondragon 2003; Fauser 2003; Marttinen 2003), contaminating treated wastewater released into surrounding streams, rivers, and oceans. We detected 4 of 5 phthalates in treated wastewater samples. Studies show phthalates are common contaminants of people as well as streams and rivers (Kolpin 2002; CDC 2005; Wolff 2007). Phthalates have even been detected in San Francisco Bay (Oros 2002).

Reducing use of products containing phthalates will help to reduce phthalates in wastewater:

- Use nail polish and other beauty products that do not contain "dibutyl phthalate" – read the ingredient label.
- Use personal care products, detergents, pet care products, cleansers, and other products that do not contain phthalates or "fragrance" in the ingredient list – "fragrance" commonly includes the phthalate DEP.
- Avoid cooking or microwaving in plastic.
- Avoid products made of flexible PVC or vinyl plastic. A few examples of these products include vinyl shower curtains and toys for kids or pets made of PVC.
- Reformulate manufactured products to eliminate use of phthalates.
- Health care workers and patients can urge their medical facilities to reduce or eliminate use of products containing phthalates.

Bisphenol A in treated wastewater

Studies of wastewater treatment methods show that bisphenol A (BPA) may pass through treatment facilities without degrading (e.g. Fromme 2002), thus contaminating treated wastewater released into surrounding streams, lakes, and oceans. We detected bisphenol A in 2 of 3 treated wastewater samples. Studies show BPA is commonly detected in people, and in streams and rivers (Kolpin 2002; Calafat 2005; Wolff 2007).

Reducing use of products containing bisphenol A will help to reduce bisphenol A in wastewater:

- Avoid eating or drinking from polycarbonate plastics. Alternatives include bottles and other materials made from glass, stainless steel, or polypropylene bottles labeled plastic number 5 on the bottom (translucent, not transparent).
- Cut down on canned foods.
- Reformulate manufactured products to eliminate use of bisphenol A.

Triclosan in treated wastewater

Studies of wastewater treatment methods show that triclosan may pass through treatment facilities without degrading (e.g. Samsoe-Petersen 2003), thus contaminating treated wastewater released into surrounding streams, lakes, and oceans. We detected triclosan in 2 of 3 treated wastewater samples. Research has revealed that triclosan is a common contaminant of people as well as streams and rivers (Adolfsson-Erici 2002; Kolpin 2002; TNO 2005; Wolff 2007).

Triclosan can also form a variety of harmful byproducts, including a form of dioxin (Lores 2005), chloroform (Fiss 2007), and methyl triclosan (Adolfsson-Erici 2002, Lindstrom 2002; Balmer 2004), under conditions typically found in wastewater treatment facilities. Dioxins and chloroform are linked to cancer in people (Lores 2005; Fiss 2007), while methyl triclosan is thought to bioaccumulate, or concentrate, in the fatty tissues of wildlife and people (Adolfsson-Erici 2002, Lindstrom 2002; Balmer 2004).

Reducing use of products containing triclosan will help to reduce triclosan in wastewater:

- Avoid unnecessary use of "antibacterial" products (read the list of ingredients). The American Medical Association recommends against using products with antibacterial ingredients in the home (Tan 2002). Studies indicate that households that use antibacterial products are no healthier than those that use soap and water and other typical cleansing products (Larson 2003; FDA 2005).
- If you use an antimicrobial skin disinfectant, use an alcohol hand rub instead of a product containing triclosan.
- Medical and veterinary facilities can switch to alternatives to triclosan-based disinfection products.

Regulatory Status

Despite mounting evidence concerning the potential health effects of exposures to chemicals that disrupt the hormone system, much remains to be done to protect people and the environment from this broad spectrum of chemicals. The Toxic Substances Control Act, the law that regulates chemicals in the United States, was created before the science behind hormone-disrupting agents began to develop. As a result, the current system of chemical regulation in the U.S. is not designed to identify and act against chemicals of concern that can harm the hormone systems of people, fish, and wildlife. New legislation is an essential tool to safeguard Americans and our environment from hormone-disrupting chemicals.

A patchwork of current federal initiatives attempts to reduce exposures to phthalates, bisphenol A, and triclosan. For example, phthalates are considered a hazardous waste and are regulated as pollutants when released into the environment (e.g. EPA 2006). One phthalate, DEHP, is regulated in drinking water. In addition, this phthalate was removed voluntarily from children's toys more than a decade ago. (Despite this, 2 recent studies (Purvis 2005; Kay 2006) have detected DEHP and other phthalates subject to this voluntary action in toys on the market today.) Yet most phthalates are unregulated in food, cosmetics, and consumer and medical products, and through their use, may enter the environment where they can harm people, fish, and wildlife. Phthalates have been shown to bioaccumulate in fish tissue and to affect estrogen levels in fish (Jobling 1995).

Examination of infants receiving intensive care revealed exposures to DEHP via medical devices at levels comparable to those causing health effects in laboratory animals (Calafat 2004). Studies of pollution in people performed by the Centers for Disease Control and Prevention (CDC) indicate many women are exposed to DEHP and other phthalates at levels above the government's safe dose designed to protect against birth defects (Kohn 2000). Despite these findings, efforts to reduce exposures of Americans to phthalates have faltered at the federal level.

Government reviews of the toxicity of bisphenol A rarely consider recent studies suggesting this chemical can produce adverse health effects at low doses. The U.S. Environmental Protection Agency (EPA) established its safety standard for bisphenol A (the reference dose, or RfD) in 1987, a decade before the BPA low-dose literature was established (EPA 1987). The vast majority of studies finding bisphenol A toxic at low doses have been published since 1997, the year that a pivotal animal study showed BPA's ability to harm the prostate at levels far below what was thought safe (Nagel 1997). EPA's safety standard is 25 times greater than a dose now known to cause birth defects in animal studies (50 ug/kg/d vs. 2 ug/kg/d), and has not been updated for 20 years.

Ten years ago, the U.S. Food and Drug Administration (FDA) published estimates of infant and adult bisphenol A exposures (FDA 1996). Despite the fact that FDA has not yet established an Acceptable Daily Intake (ADI) for BPA, and has not conducted its standard toxicology study to determine a safe dose for humans (FDA 2007), in 2005 an FDA official asserted that "...FDA sees no reason to change [its] long-held position that current [BPA] uses with food are safe" (FDA 2005). A 2001 assessment of BPA by the U.S. National Toxicology Program, which found BPA safe at low doses, occurred before the publication of dozens of BPA studies that substantially bolster the evidence for low-dose effects (NTP 2001; vom Saal 2005).

The Center for the Evaluation of Risks to Human Reproduction (CERHR), an agency within the National Institutes of Health, began a review of the health risks associated with bisphenol A earlier this year. However, an Environmental Working Group investigation revealed that CERHR was run by a consulting group, Sciences International, with ties to companies that manufacture BPA (EWG 2007b). In preparation for the CERHR evaluation, Sciences International staff prepared a report that reviewed the scientific literature surrounding bisphenol A. This report omitted at least 12 studies showing low-dose toxicity. Following EWG allegations of conflict of interest, CERHR delayed its evaluation of bisphenol A, and terminated its 5 year, 5 million dollar contract with Sciences International in its fourth year.

Triclosan has received little attention to date from U.S. agencies charged with public health protection. An FDA panel evaluated research on household use of antibacterial products, such as those containing triclosan, at the urging of the American Medical Association. The FDA found no evidence that those using antibacterial products in their homes were healthier than those using soap and water and other typical cleansing products lacking specific antibacterial agents (FDA 2005). The American Medical Association is concerned that increased use of antibacterial products in the home will lead to the development of microbial resistance to antibiotic agents (Tan 2002).

Although a triclosan byproduct has been detected in San Francisco Bay (Oros 2002) and numerous studies have shown effects to aquatic life at the concentrations found in the environment (e.g. Samsoe-Petersen 2003; Orvos 2002; Ishibashi 2004), no regulatory controls on the sale and use of triclosan have been developed.

Local efforts to reduce use of these hormone-disrupting chemicals have met with mixed success.

The City of San Francisco's Stop Toxic Toys bill requires testing of up to 100 children's products each year, and prohibits the sale of those products that contain high levels of phthalates. The original bill, passed in 2006, also targeted products containing bisphenol A; however, lawsuits on behalf of chemical manufacturers pushed city supervisors to adopt a less protective law. San Francisco supervisors will reconsider a bisphenol A ban if the California State Legislature has not done so in the next year.

Meanwhile, nearby cities of Palo Alto and San Jose have phased out municipal purchases of products containing triclosan. The East Bay Municipal Utility District (EBMUD), EWG's technical partner in the present study of sources of hormone-disrupting chemicals in San Francisco Bay, is phasing out purchases of triclosan, as well as its chemical cousin, triclocarban. Similar local efforts to reduce exposures to phthalates, bisphenol A, and triclosan are underway in a few other parts of the country as well.

Federal regulation is essential to protect all Americans from the harmful effects of exposures to hormone-disrupting chemicals. Phthalates, bisphenol A, and triclosan are just a few of hundreds of chemicals that may harm people, fish, and wildlife - highlighting the need to begin reform of our system of chemical regulations. The nation's system of regulations for industrial chemicals like these are embodied in the Toxic Substances Control Act, a law passed in 1976, and the only major environmental or public health statute that has never been updated. Under this law, companies are not required to test chemicals for safety before they are sold, and are not required to track whether their products end up in people or the environment at unsafe levels. As a result, phthalates, bisphenol A, and triclosan are widely used, are allowed in unlimited quantities in a broad range of consumer products, are found in people, fish, and wildlife, and often lack safety standards.

What You Can Do

Protect yourself and San Francisco Bay from harmful hormone-disrupting chemicals

Choosing products that do not contain hormone-disrupting chemicals may benefit your health and the health of your family, and can reduce the amounts of these chemicals entering San Francisco Bay. You can make safer choices each time you prepare a meal, wash dishes, wash clothes, or take a shower. Extend these choices to your workplace to create a larger health impact for people and the Bay.

To reduce exposures to phthalates:

- Use nail polish and other beauty products that do not contain "dibutyl phthalate" (DBP) – check the ingredient list.
- Use personal care products, detergents, cleansers, and other products that do not contain "fragrance" in the ingredient list – "fragrance" commonly includes the phthalate DEP.
- Avoid cooking or microwaving in plastic.
- Use a non-vinyl shower curtain.
- Use paints and other hobby products in well-ventilated areas.

- Give children wooden and other phthalate-free toys, and don't let children chew on soft plastic toys.
- Health care workers and patients can urge their medical facilities to reduce or eliminate use of products containing phthalates.
- Avoid products made of flexible PVC or vinyl plastic. A few examples of these products include PVC lawn furniture, vinyl raincoats, flexible PVC building materials, vinyl shower curtains, and toys for kids or pets made of PVC.

For more information on safe cosmetics, visit Skin Deep, EWG's database of thousands of personal care products, each with its own safety rating based on dozens of toxicity and regulatory databases.

For more information about dibutyl phthalate in nail polish, see EWG's reports:
·Beauty Secrets
·Not Too Pretty

For more information on eliminating phthalates in medicine, visit Health Care without Harm

To reduce exposures to bisphenol A, and to the epoxy resin made from bisphenol A:

- Cut down on canned foods. To keep food from reacting with the metal of the can, a plastic coating made from bisphenol A is commonly applied to the inside of the can. This coating appears as a solid color on the inside of the can, and can leach into the food stored inside.
- Avoid eating or drinking from polycarbonate plastics – used in such products as hard plastic baby bottles, 5 gallon water cooler bottles, hard plastic water bottles, plastic silverware, and Lexan products. You can check for the type of plastic on the bottom of the bottle – polycarbonate bottles may be labeled with recycling number 7 ("Other" type of plastic) or may contain the letters "PC" below the recycling symbol. Bisphenol A may leach out of these types of bottles into your beverage or food. Alternatives include bottles and other materials made from glass, stainless steel, or polypropylene bottles labeled number 5 on the bottom (translucent, not transparent).

For more ways to avoid BPA exposure, see EWG's list of Consumer Tips

For more information on BPA in cans, see EWG's report:
Bisphenol A: Toxic plastics chemical in canned food

To reduce exposures to triclosan:

- Avoid unnecessary use of "antibacterial" products (read the list of ingredients). The American Medical Association recommends against using "antibacterial" products in the home (Tan 2002). Studies indicate that households that use these products are no healthier than those that use soap and water and other typical cleansing products (Larson 2003; FDA 2005).
- If you need to use an antimicrobial skin disinfectant, use an alcohol hand rub or rinse product that does not list triclosan or "fragrance" in the ingredients.

EWG's Skin Deep database lists personal care products with and without triclosan.

Summary of Results and Methods

Hormone Disruptors Detected in Wastewater

The table below summarizes the results of analyses conducted by Environmental Working Group (EWG) and East Bay Municipal Utility District (EBMUD) scientists on wastewater from residential, commercial, and manufacturing sites in the San Francisco Bay Area. We measured levels of 3 widely-used hormone disruptors, phthalates, bisphenol A, and triclosan, in 19 samples. Locations included homes, a nail salon, laundries, a pet wash, medical and veterinary centers, manufacturing facilities, and an EBMUD facility discharging treated wastewater to the Bay. 18 of 19 water samples examined contained at least 1 of these 3 substances; 2 samples contained all 3 substances.

Hormone-disrupting substances were detected in wastewater samples from homes, businesses, and industrial sites.
(measurements in parts per billion)

	Phthalates						
	DEP	DBP	BBzP	DEHP	DOP	**Bisphenol A**	**Triclosan**
Residential 1	4.0	ND	0.76	9.1	0.6	ND	ND
Residential 2	9.1	ND	1.0	3.3	ND	ND	ND
Nail Salon	ND	0.46	0.74	1.2	0.2	ND	ND
Industrial Laundry 1	ND	ND	ND	30	1.5	21.5	9.24
Industrial Laundry 2	ND	86	95	2700*	ND	ND	ND
Coin-Op Laundry	16	ND	ND	66	13	ND	24.7
Diaper Service	ND	12*	0.2	0.63*	ND	ND	ND
Pet Wash	1.3	0.76	2.3	6.5	1.6	ND	ND
Veterinary Clinic	ND	ND	ND	ND	ND	ND	14
Hospital	ND	ND	0.82	2.7	ND	ND	237*
Medical Clinic	ND	0.66	0.74	1.0	ND	ND	18.2

Pharmaceutical Manufacturer	ND	0.58	0.27	0.99	ND	0.295	ND
Plastic Bag Manufacturer	ND	0.36	2.3	49	10	ND	6.69
Paper Products Manufacturer	ND	ND	0.14	6.8	ND	0.753	ND
Beverage Manufacturer	ND	ND	ND	ND	ND	ND	ND
Adhesives Manufacturer	ND	120*	39	47*	ND	ND	ND
Treated Wastewater 1	ND	ND	0.84	2.9	0.39	0.38	ND
Treated Wastewater 2	ND	0.57	0.74	1.0	ND	ND	0.9
Treated Wastewater 3	ND	5.5*	ND	0.21*	ND	0.31	0.42

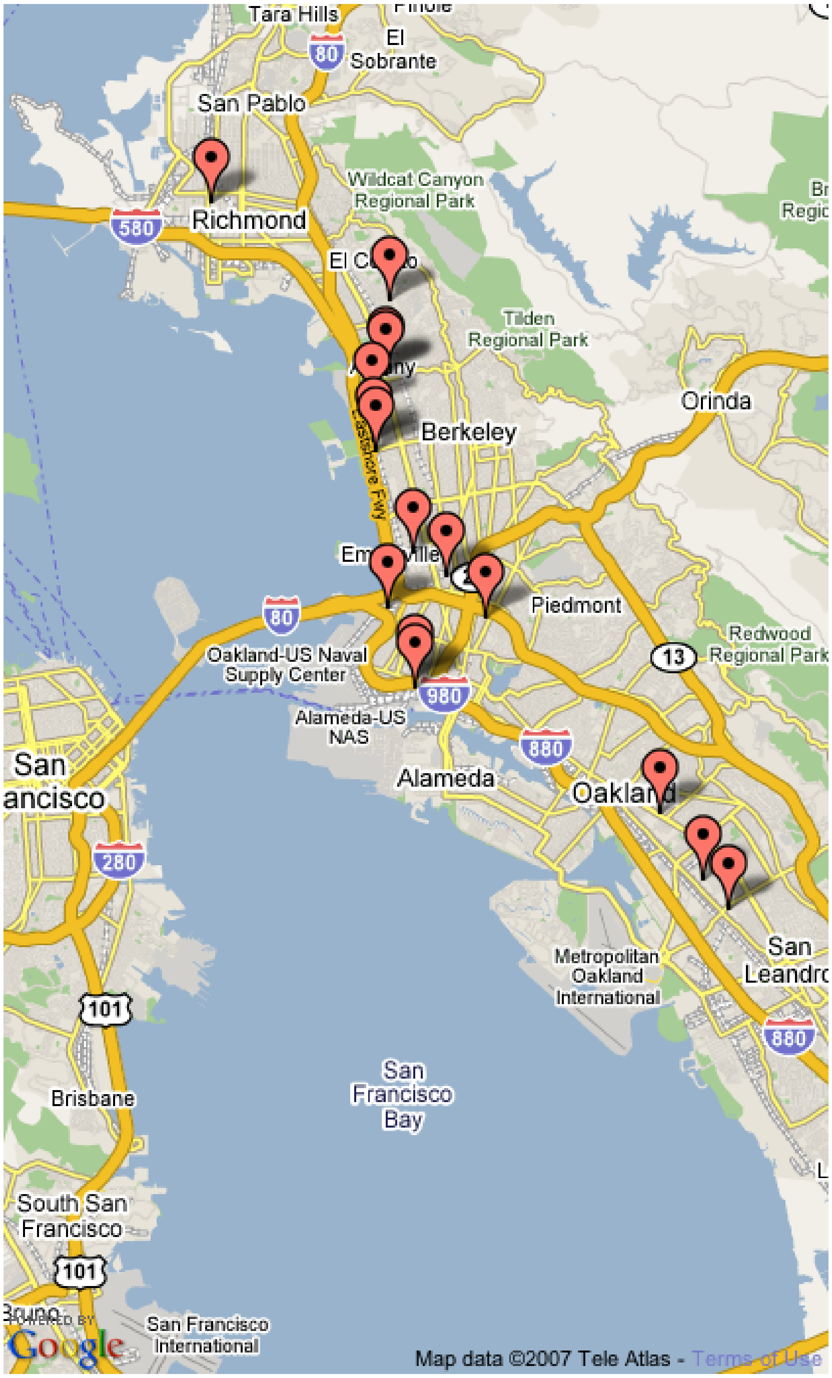
*Estimated Concentrations

Methods

The analysis of chemical contaminants entering San Francisco Bay from residential, commercial, and industrial wastewater streams was a collaboration between EWG and EBMUD.

We collected a total of 21 samples of wastewater during 3 rounds of sampling, taking place in August, September, and November, 2006, before major winter rainfall to avoid dilution by stormwater. Samples were drawn from a residential area (2 samples); a variety of commercial locations, including a nail salon, 2 industrial laundry facilities, a residential coin laundry, a diaper service, a pet wash, a veterinary clinic, a hospital, an outpatient medical clinic, and sites manufacturing pharmaceuticals, plastic bags, paper products, beverages, and adhesives; and water entering (2 samples) and exiting (3 samples) the EBMUD wastewater treatment plant before discharge into the Bay. Information on samples of water entering the wastewater treatment plant is not reported here.

Hormone-disrupting chemicals were detected in wastewater throughout the region.



Samples were analyzed by the EBMUD analytical laboratory, as well as by MWH Laboratories (www.mwhlabs.com; Monrovia, CA), for a number of chemicals that are linked to disruption of the endocrine (or hormone) system. Well-established analytical methods were used to measure contaminants; the tests are known as EPA 625 and USGS 0-1433-01. These tests provide measurements for several pollutants; we report on a small fraction of the chemicals detected, specifically, those linked to disruption of hormone systems and found in common consumer products.

These include include several phthalates, used in fragrances, nail polish, adhesives, inks, pill coatings, and flexible plastics like PVC; bisphenol A, used in polycarbonate plastic, dental fillings, and to make a substance that lines the insides of food and beverage cans; and triclosan, an antimicrobial agent used in personal care products and numerous other products labeled "antimicrobial," from plastic cutting boards to shoe insoles. The phthalate chemicals mentioned in this report include diethyl phthalate (DEP), di-n-butyl phthalate (DBP), butylbenzyl phthlalate (BBzP), di(2-ethylhexyl) phthalate (DEHP, also known as bis(2-ethylhexyl) phthalate), and di-n-octyl phthalate (DOP).

The analytical methods used were designed to detect trace amounts of contamination in natural waters, as opposed to the broader range of contamination expected in wastewater. As a result, some of the measurements obtained are considered estimates, because the concentrations of particular contaminants present in some of the wastewater samples were much higher than the standards used to calibrate the analytical techniques. Estimated measurements are marked with an asterisk.

In addition, contamination with certain phthalates is suspected for the batch of samples collected in November and analyzed by the EBMUD analytical laboratory; as a result, all measurements of one particular phthalate, dimethyl phthalate (DMP), were discarded. The estimated measurements of other phthalates that account for contamination are marked with an asterisk as well.

A complete summary of the data obtained, including measurements of dozens of other chemicals obtained using the EPA and USGS methods, and analyses of wastewater samples flowing into the EBMUD wastewater treatment plant, is available.

Other chemicals detected in one or more wastewater sample include:

- 1,4-Dichlorobenzene
- 2,4,5-Trichlorophenol
- 2,4,6-Trichlorophenol
- 2,4-Dichlorophenol
- 2,4-Dimethylphenol
- 2-Chlorophenol
- 2-Cresol
- 2-Methylnaphthalene
- 3,4-Methylphenol
- 4-Chloroaniline
- 4-Cresol
- 4-Nitrophenol
- Acenaphthene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene

- Benzo(ghi)perylene
- Benzo(k)fluoranthene
- Benzoic Acid
- Benzyl Alcohol
- Caffeine
- Chrysene
- Dibenzo(a,h)anthracene
- Dibenzofuran
- Fluoranthene
- Fluorene
- Isophorone
- N,N-Diethyl-m-toluamide
- Naphthalene
- N-Nitrosodimethylamine
- p-Chloro-m-cresol
- Pentachlorophenol
- Phenanthrene
- Phenol
- Pyridine
- Tri(2-butoxyethyl) phosphate
- Tri(2-chloroethyl) phosphate
- Tri(dichloroisopropyl) phosphate

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About This Report

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Down the Drain: Chemicals From Personal Care Products Polluting SF Bay

OAKLAND – Hormone-disrupting chemicals from a wide variety of consumer products are polluting San Francisco Bay, posing risks to marine life and challenges for consumers and utility districts. Tighter regulatory controls on consumer products containing these chemicals are necessary to protect human and environmental health.

Environmental Working Group (EWG), in a year-long effort with East Bay Municipal Utility District's (EBMUD) technical support, sampled and analyzed wastewater from residential, commercial, and industrial sites that discharge to the EBMUD wastewater treatment plant. Eighteen of 19 samples contained at least one of three unregulated, widely-used hormone disrupting chemicals – phthalates, bisphenol A and triclosan.

EWG's report, Down the Drain: Sources of Hormone-Disrupting Chemicals in San Francisco Bay details the results of this study. The report is now available on EWG's website, www.ewg.org.

Chemicals such as phthalates, bisphenol A, and triclosan are introduced into everyday products like cosmetics, antibacterial soap, perfumes, food and beverage containers and plastic bottles, with little regulatory oversight. Fish exposed to hormone-disrupting chemicals can develop "intersex" characteristics, such as males with immature eggs in their testes.

"This is the first look at specific sources of hormone-disrupting chemicals that can make their way to the Bay," said Rebecca Sutton, PhD, an EWG staff scientist. "By tracing these chemicals to particular sources -- we can identify simple pollution prevention strategies for people to take to protect the Bay."

The report says that today's sophisticated sewage treatment process can address many pollutants, but trying to keep up with this unregulated tide of chemicals flushed down the drain would translate to ever-higher treatment costs, and still not all of these pollutants would be removed. Researchers believe it's both wiser and more effective to keep hormone disruptors out of consumer products in the first place. By making informed choices when you buy everyday products, you can reduce the impact of these hormone-disrupting chemicals on fish and wildlife in the Bay.

"Ultimately, we need to fix our system of chemical regulations," said Sutton. "The law establishing

U.S. regulation of chemicals was created over three decades ago, before the scientific evidence on hormone-disrupting chemicals developed." Chemicals should be tested for their potential to impact the water environment, before they are allowed in the marketplace. In our current regulatory framework, harm must be proven after these chemicals are already in use – often after it's too late.

WHAT YOU CAN DO

To reduce exposures to phthalates:

- Use nail polish and other beauty products that do not contain dibutyl phthalate (DBP).
- Use personal care products, detergents, cleansers, and other products that do not contain "fragrance" in the ingredient list, which commonly includes the phthalate DEP.
- Avoid products made of PVC or vinyl plastic. A few examples of these products include PVC lawn furniture, vinyl raincoats, PVC pipe and other building materials, vinyl shower curtains, and toys for kids or pets made of PVC.

To reduce exposures to bisphenol A, and to the epoxy resin made from bisphenol A:

- Cut down on canned foods. To keep food from reacting with the metal of the can, a plastic coating made from bisphenol A is commonly applied to the inside of the can.
- Avoid eating or drinking from polycarbonate plastics – used in such products as hard plastic baby bottles, 5 gallon water cooler bottles, hard plastic water bottles, plastic silverware, and Lexan products. Alternatives include bottles and other materials made from glass, stainless steel, or polypropylene.

To reduce exposures to triclosan:

- Avoid unnecessary use of "antibacterial" products. Studies indicate that households that use these products are no healthier than those that use soap and water and other typical cleansing products.
- If you need to use an antimicrobial skin disinfectant, use an alcohol hand rub or rinse product that does not list triclosan or "fragrance" in the ingredients.

Source URL:
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