



SHOPPING SAFE: THE 2018 CONSUMER SHOPPING GUIDE

Protecting Your Household From 1,4-Dioxane Exposure



THE HIDDEN CARCINOGEN

1,4-dioxane is a hidden carcinogen lurking in everyday products. It can be found in up to 46% of personal care products, including baby products, shampoo, body wash, and lotions. It is also found in many laundry detergents. 1,4-dioxane is not intentionally added to products and it does not enhance the effectiveness of a product, but rather it occurs as an unwanted byproduct. It results from a process called ethoxylation, which is used to reduce the risk of skin irritation caused by harsh petroleum-based ingredients. Manufacturers can remove dioxane from products simply and cheaply. The FDA recommends that manufacturers remove the chemical; unfortunately many companies opt not to take that extra step.

Exposure to 1,4-dioxane occurs through inhalation, or breathing vapors, swallowing liquid or water contaminated with 1,4-dioxane, and through skin absorption. The International Agency for Research on Cancer (IARC) has determined that 1,4-dioxane is "possibly carcinogenic to humans." The U.S. Department of Health and Human Services (HHS) considers 1,4-dioxane as "reasonably anticipated to be a human carcinogen." The EPA has established that 1,4-dioxane is "likely to be carcinogenic to humans." Exposure to this chemical is linked to tumors of the liver, gallbladder, nasal cavity, lung, skin, and breast.



WHY IS INDEPENDENT TESTING NEEDED?

"1, 4-Dioxane: The Hidden Carcinogen" which helped prompt New York State to address 1,4-dioxane in drinking water. The state established a new Drinking Water Quality Council. The Council is comprised of 12 individuals, including scientists from the NYS Department of Health (DOH), NYS Department of Environmental Conservation (DEC), and local universities. One of their first mandates is to review and set a drinking water standard for 1,4-dioxane. The Council met three times to review relevant science on 1,4-dioxane and discuss setting a drinking water standard; however, a standard has yet to be determined.

CCE's report documented high levels of 1,4-dioxane detected in drinking water on Long Island. Thirty-nine water districts, which represents 75% of Long Island population served, had maximum detections above .35 parts per billion (ppb), the EPA health reference standard. The highest levels were found in Hicksville (33 ppb), Water Authority of Western Nassau (12 ppb), and Town of Hempstead (10 ppb). The report generated a heightened awareness of 1,4-dioxane contamination.

The Suffolk County Water Authority spearheaded successful water treatment pilots to remove 1,4-dioxane from contaminated drinking water using a process called "advanced oxidation." However, large scale deployment of this treatment technology has not occurred. Senator Schumer and Senator Gillibrand petitioned the FDA to mandate removal of the chemical from consumer products, but the FDA declined to take action.

CCE's 2017 report generated numerous consumer responses requesting information and guidance to avoid buying products containing 1,4-dioxane; however, 1,4-dioxane is not technically an ingredient, therefore manufacturers are not mandated to list "1,4-dioxane" on the label. Consumers are left in the dark. CCE wants to provide consumers with answers.

To develop an accurate consumer's guide, independent science is needed. CCE contracted with a certified independent laboratory in New York State to test 30 common consumer products, including laundry detergent, baby products, body washes, and shampoos. We tested products only for 1,4-dioxane. After an extensive search we contracted with a lab that can test down to the very low level of .025 mg/kg (ppm). In the test result chart, a "no detect" means the product had no 1,4-dioxane or levels lower than .025 ppm of 1,4-dioxane.

We hope members of the public use this new information to guide their shopping habits and to demand change from the industry. Carcinogenic chemicals should not be in our bath products, shampoos, baby products and laundry soap. WE DESERVE BETTER.

1,4-DIOXANE HEALTH STUDIES

The general population may be exposed to 1,4-dioxane by contaminated air, water, and consumer products (including food). Dermal absorption, or absorption through the skin, can occur through bathing or showering in contaminated tap water or through the use of cosmetics, detergents, shampoos, and bubble baths containing 1,4-dioxane. Exposure to 1,4-dioxane occurs through inhalation, or breathing vapors, as well as swallowing liquid or water contaminated with 1,4-dioxane. Numerous scientific studies have determined that exposure to 1,4-dioxane can have significant adverse effects on human and animal health.

The Agency for Toxic Substance and Disease Registry (ATSDR) found that even at low concentration levels, 1,4-dioxane exposure through inhalation or dermal contact can irritate the skin, eyes, and respiratory tract. Acute exposure to high levels of 1,4-dioxane may cause severe kidney and liver impacts and possibly death. Chronic inhalation exposure of 1,4-dioxane primarily targets and damages the liver, kidneys, and nasal cavity. Liver tumors have been observed in rats and mice following chronic drinking water exposure. Nasal tumors were also observed in rats following chronic inhalation or drinking water exposure. Given the results of the studies conducted on rats and mice, the ATSDR concluded that 1,4-dioxane is likely to be carcinogenic to humans.¹

The National Cancer Institute conducted in-depth studies on rats and mice exposed to 1,4-dioxane in their drinking water and also reported increased incidences of liver and nasal cavity cancer. Under the conditions of this bioassay, 1,4-dioxane was carcinogenic in both sexes of rats and mice.²

A skin absorption study cited by ATSDR found that guinea pigs and rabbits that had 1,4-dioxane applied to their skin formed lesions on their kidneys.³ Studies conducted by the U.S. Food and Drug Administration (FDA) showed that 1,4-dioxane could penetrate animal and human skin when applied in certain preparations, such as lotions.⁴

The FDA has not independently conducted a hazard identification and risk assessment concerning exposure to 1,4-dioxane as a contaminant in cosmetic products. In an independent risk assessment, the Scientific Committee on Consumer Safety (SCCS) of the European Commission concluded that 1,4-dioxane amounts in cosmetic products are considered safe for consumers at trace levels of 10 ppm or lower.⁵ This is not an enforceable standard, rather a consumer guideline.

Based on evidence from numerous scientific studies, the EPA has classified 1,4-dioxane as likely to be carcinogenic to humans by all routes of exposure⁶, and in 2010 the EPA set a health-based guidance of 0.35ppb for drinking water. The International Agency for Research on Cancer determined that 1,4-dioxane is possibly carcinogenic to humans, and the U.S. Department of Health and Human Services considered 1,4-dioxane as reasonably anticipated to be a human carcinogen.

PAST PRODUCT TESTING AND METHOD OF TESTING

Product testing in 2007 by the Green Patriot Working Group revealed levels of 1,4-dioxane at 63 ppm in original Tide and at 89 ppm in Tide Free and Clear, as well as detections above 1ppm in "green" detergents. That study prompted manufacturers, including Tide, to publicly promise to reduce 1,4-dioxane in their products. In 2008, Environmental Working Group surveyed 15,000 products and Organic Consumer Association tested 100 products. The studies found 46% of personal care products contained 1,4-dioxane. No independent testing has been done in the last decade.

CCE researched the most commonly used brands of shampoo, baby products, detergents, and body washes, and chose 30 products to test for 1,4-dioxane. We included some products in our sampling that are marketed as "natural" or "green" for comparison. CCE contracted with a New York State certified laboratory. Samples of each product were labeled with an ID number to ensure quality control and blind testing. The samples were shipped in a temperature controlled container provided by the laboratory. We only tested for 1,4-dioxane. We took a video recording of the process of pouring, labeling, and packing each sample shipment to ensure the sampling process was done correctly and according to the laboratory regulations.



1. ATSDR. 2006. Toxicological Profile for 1,4-dioxane (update). U.S. Department of Health and Human Services. Agency for Toxic Substances and Disease Registry. <https://www.atsdr.cdc.gov/toxprofiles/tp187.pdf>

2. NCI. 2014. Bioassay of 1,4-Dioxane for Possible Carcinogenicity (1978) Technical Rpt Series No. 80 DHEW Pub No. (NIH) 78-1330, U.S. Department of Health Education and Welfare, National Cancer Institute. https://ntp.niehs.nih.gov/ntp/htdocs/LT_rpts/tr080.pdf

3. ATSDR. 2006. Toxicological Profile for 1,4-dioxane (update).

4. FDA. 2017. 1,4-Dioxane in Cosmetics: A Manufacturing Byproduct. U.S. Food and Drug Administration. <https://www.fda.gov/Cosmetics/ProductsIngredients/PotentialContaminants/ucm101566.htm>

5. <https://www.fda.gov/Cosmetics/ProductsIngredients/PotentialContaminants/ucm101566.htm>

6. EPA. 2017. Technical Fact Sheet - 1,4-Dioxane. U.S. Environmental Protection Agency. https://www.epa.gov/sites/production/files/2014-03/documents/ffro_factsheet_contaminant_14-dioxane_january2014_final.pdf

TEST RESULTS

<i>PRODUCTS TESTED</i>	1,4-Dioxane in Parts per Million (ppm)	1,4-Dioxane in Parts per Billion (ppb)
Body Washes and Gels:		
Victoria's Secret (Bombshell Fragrance Wash)	17	17,000
Victoria's Secret (Love Fragrance Wash)	16	16,000
Olay Moisture Ribbons Plus Body Wash (Shea + Lavender Oil)	3.5	3,500
Neutrogena Rainbath Shower and Bath Gel (Ocean Mist)	2.2	2,200
Suave Essentials Body Wash (Wild Cherry Blossom)	2	2,000
Bath and Body Works Shower Gel (Sonoma Weekend Escape)	.63	630
Method Body Wash (with Avocado Extract)	No detect*	No detect*

<i>PRODUCTS TESTED</i>	1 4-Dioxane in Parts per Million (ppm)	1,4-Dioxane in Parts per Billion (ppb)
Detergents:		
Tide Original	14	14,000
2x Ultra Ivory Snow (Gentle Care)	11	11,000
Tide Simply plus Oxi (Refreshing Breeze)	8.3	8,300
All with Stain Lifters (Fresh Rain)	5.2	5,200
Arm and Hammer (Clean Burst, 2x Concentrated)	2.8	2,800
Purex plus Oxy Stain Removers (Fresh Morning Burst)	2	2,000
Mrs. Meyer (Lavendar Scent)	No detect*	No detect*
Seventh Generation (Free and Clear)	No detect*	No detect*
Ultra Downy April Fresh (Fabric Softener)	No detect*	No detect**

*A "no detect" means the product had no 1,4-dioxane or levels lower than .025 ppm of 1,4-dioxane.

There is no drinking water standard for 1,4 dioxane however, the EPA cancer risk reference standard for drinking water is .35 ppb which is .00035 ppm

<i>PRODUCTS TESTED</i>	1,4-Dioxane in Parts per Million (ppm)	1,4-Dioxane in Parts per Billion (ppb)
Shampoos:		
Pantene Pro-V Nature Fusion	5.5	5,500
Herbal Essences Platinum	4.2	4,200
OGX Lavendar Platinum	2.4	2,400
John Frieda Brilliant Brunette	2.4	2,400
Dove Nutritive Solutions (Coconut and Hydration)	2.2	2,200
Tresemme Moisture Rich with Vitamin E	1.5	1,500
Suave Professionals Moroccan Infusion (Color Care)	1.5	1,500
Garnier Fructis with Active Fruit Protein	.4	400
Aveeno Active Minerals Pure Renewal	No detect*	No detect*
PRODUCTS TESTED		
Baby Products:		
Johnson's Baby Shampoo	.87	870
Disney Frozen Bubble Bath	.81	810
Original Bubble Mr. Bubble	.59	590
Aveeno Baby Gentle Wash and Shampoo	No detect*	No detect*
The Honest Company Shampoo & Body Wash	No detect*	No detect*



Even Baby products have trace amounts of 1,4 dioxane



Some products have no detectable levels of 1,4 dioxane

*A "no detect" means the product had no 1,4-dioxane or levels lower than .025 ppm of 1,4-dioxane.

There is no drinking water standard for 1,4 dioxane however, the EPA cancer risk reference standard for drinking water is .35 ppb which is .00035 ppm

TEST CONCLUSIONS

- Unfortunately, 1, 4-dioxane is found in common household products. Out of the 30 products tested, 23 had detectable levels of 1,4-dioxane.
- The levels of 1,4-dioxane in bath and shampoo products we tested are mostly below the FDA recommendation of 10 ppm for dermal exposure with the clear exception of Victoria Secret's shower gels (Victoria Secret's Bombshell is 17 ppm and Victoria Secrets Love is 16 ppm).
- Baby products had the lowest levels of 1,4-dioxane.
- All 23 products that contained 1,4-dioxane are above EPA health consultation standard of .35 ppb for drinking water. These products may be contributing to water contamination. Sewage treatment plants and septic systems are not designed to filter out 1,4-dioxane, therefore, products wash down the drain and end up on our marine environment, surface waters and aquifers.

THE TOP 10 PRODUCTS WITH THE HIGHEST LEVELS OF 1,4-DIOXANE ARE:

1. Victoria's Secret Bombshell – 17,000 ppb
2. Victoria's Secret Love – 16,000 ppb
3. Tide Original – 14,000 ppb
4. 2x Ultra Ivory Snow Gentle Care – 11,000 ppb
5. Tide Simply plus Oxi (Refreshing Breeze) – 8,500 ppb
6. Pantene Pro-V Nature Fusion Shampoo – 5,500 ppb
7. All with Stain Lifters – 5,200 ppb
8. Herbal Essences Deep Moisture Shampoo – 4,200 ppb
9. Olay moisture ribbons 3500 ppb
10. Arm and Hammer (Clean Burst, 2x Concentrated) – 2,800 ppb

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1,4-DIOXANE POLICY AND CONSUMER RECOMMENDATIONS

1. FDA SHOULD REQUIRE COMPANIES TO REMOVE 1,4-DIOXANE FROM CONSUMER PRODUCTS

Since the 1980s the FDA has recommended that manufacturers use the “vacuum stripping” technique as a way of reducing 1,4-dioxane in consumer products. According to the FDA website, “The FDA will continue to monitor information about 1,4-dioxane and its levels in cosmetics and plans to conduct a new survey in 2018. If the FDA were to determine that a health hazard exists, it would advise the industry and the public, and would consider appropriate actions for protecting the health and welfare of consumers.”

Industry has long known that 1,4-dioxane is a problem. In fact, the personal care product industry has been aware of health concerns associated with 1,4-dioxane for over four decades. In 2000, the FDA was expressing concerns about 1,4-dioxane due to its potential to contaminate a wide range of products, its ready absorption through the skin, and emerging evidence linking it to cancer.

■ **The FDA needs to stop stalling and change their policy to require 1,4-dioxane be removed from products. ***

■ **Shoppers should demand that the FDA require companies manufacturing personal care products remove 1,4-dioxane.**

**Although the FDA claims that manufacturers have been reducing 1,4-dioxane in products, these recent CCE test results do not substantiate that claim.*

2. STATES SHOULD PASS LAWS THAT BAN 1,4-DIOXANE IN CONSUMER PRODUCTS

Banning 1,4-dioxane in consumer products at the state level will protect the public and our water resources, and will drive the federal government to act. State bans will also incentivize manufacturers to change their processes throughout the nation.

3. NEW YORK STATE NEEDS A DRINKING WATER STANDARD FOR 1,4-DIOXANE

Currently there is no national drinking water standard for 1,4-dioxane, leaving the standard at the default of 50 ppb (approximately 50ug/l), which is a generic standard for all unregulated volatile organic chemicals. However, the EPA has established a Cancer Risk Guideline of 0.35 ug/l for 1,4-dioxane, and has taken no action to establish a national drinking water standard. CCE believes that a uniform statewide drinking water standard of .35 ug/l. would best protect public health.

CCE was encouraged with actions by NYS Governor Cuomo and NYS Health Commissioner Zucker to establish a health based standard for 1,4-dioxane in drinking water; however, progress is slow. We need the Governor and the Health Commissioner to be mindful that a defined timeline to complete this determination is critical to protecting public health.

4. FEDERAL AND STATE FUNDING IS NEEDED TO ASSIST WATER SUPPLIERS IN OBTAINING TECHNOLOGY TO REMOVE 1,4-DIOXANE FROM DRINKING WATER

Since air stripping and carbon adsorption systems cannot remove 1,4-dioxane (nor can biological reduction), the industry has been searching for the most economical solutions to remove it from the water. An advanced oxidation process (AOP) that uses ozone and hydrogen peroxide consistently demonstrates effectiveness in removing 1,4-dioxane.

New York State has approved a pilot treatment system using AOP that is being used by the Suffolk County Water Authority. The initial results are very positive but the technology is expensive. However, expensive or not, it is critical that water suppliers are able to utilize this critical emerging technology. Federal and State funds should be allocated in the budget to assist public water suppliers with the financial cost of purchasing treatment systems.

5. LAUNDROMATS NEED GREATER TESTING

A laundry’s wash process results in clean, fresh linens; however, it also leaves behind dirty water. What becomes of that water and the potential pollutants in it should be of importance to all communities and government regulators.

In early 2017, CCE called on the NYS Department of Environmental Conservation (DEC) to sample the effluent of Laundromats discharging into a drinking water source. DEC agreed and selected three Laundromats in Suffolk County that are discharging treated effluent into groundwater. This was a good first step; however, it’s not enough. DEC should craft a testing and sampling plan for Laundromats in New York so we can generate a rigorous database and determine if further action is needed.

6. READ LABELS

Some companies remove 1,4-dioxane from their finished products; however, not all companies do, and this is not disclosed on labels. Shoppers need to be educated on avoiding products that contain 1,4-dioxane. Read the label! Products that are most likely to contain 1,4-dioxane have ingredients listed on cosmetics, detergents, and shampoos that include:

- polyethylene glycol (PEG),
- polyethylene,
- polyoxyethylene,
- Avoid products that contain ingredients and chemicals ending in -eth and -oxynol. These ingredients are manufactured in a way that can result in simultaneous formation of 1,4-dioxane as an impurity.



At a press conference in Farmingdale on Tuesday, Feb. 28, 2017, Adrienne Esposito, executive director of the Citizens Campaign for the Environment, holds up copy of a report the group produced about the widespread prevalence of the contaminant 1,4-dioxane in many commercial products. The chemical has also been found in the water supply on many parts of Long Island. Photo Credit: Newsday / John Paraskevas

CITIZENS CAMPAIGN



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PROTECT DRINKING WATER FROM 1,4-DIOXANE

Read CCE's report on 1,4-dioxane in Long Island drinking water (#51NB) [Take action to establish a drinking water standard for 1,4-dioxane](#)

1,4-Dioxane Widespread in Long Island Drinking Water

1,4-Dioxane is an emerging contaminant of concern found in Long Island's groundwater and drinking water. It is a Synthetic Organic Compound (SOC), which is never found in nature. According to CCE's recent evaluation of public water supplies across Long Island, Nassau and Suffolk water suppliers have reported the highest levels of 1,4-dioxane contamination in the nation. 1,4-Dioxane is listed as "likely to be carcinogenic to humans," with a Lifetime Cancer Risk Guidance for drinking water of 0.25 µg/L (micrograms per liter) by the U.S. EPA. The chemical has been linked to tumors of the liver, kidneys, and nasopharynx. Our interactive map (below) shows the highest detections of 1,4-dioxane in each water distribution area across Long Island.

CCE's Map of 1,4-Dioxane Across Long Island, by Highest Level Detected Within Each Water Body

For more information regarding CCE's campaign regarding 1,4-dioxane contamination on Long Island, please visit: <https://www.citizenscampaign.org/>

LONG ISLAND COMMUNITY FOUNDATION **LICF** a division of THE NEW YORK COMMUNITY TRUST

CCE wishes to thank the Long Island Community Foundation for their support for this project. Their continued commitment to protecting our natural resources and public health has made Long Island a safer and more sustainable place to live.