

# Executive Summary

ANONYMOUS ADULT #4

SAMPLES COLLECTED: 5/25/06

From the moment of conception to the end of life, we are exposed to industrial chemicals that cross into our bloodstream through our skin, gut, or lungs. After reviewing this packet, you will be one of only a small number of people in the world to know a portion of your personal body burden of industrial chemicals, what we call the human toxome.

## STUDY BACKGROUND

You gave samples on 5/25/06. Five state-of-the-art laboratories performed the analyses, AXYS Analytical in Sydney, BC; BrooksRand in Seattle, Washington; Dasgupta Laboratory at Texas Tech in Lubbock, TX; Pacific Toxicology in Woodland Hills, CA and TNO in the Netherlands. The Environmental Working Group (Washington DC) designed the study in collaboration with Commonweal (Bolin, CA), analyzed the test results, and reviewed and synthesized data from the open scientific literature on the toxicity and possible exposure sources for the contaminants studied.

## RESULTS

The lab analyses show that blood and urine from you and your study group contain a diverse range of industrial chemicals, including plasticizers, flame retardants, Teflon chemicals, and heavy metals. Your samples contained 40 of the 84 chemicals for which we tested, including some chemicals that our literature survey suggests have never before been biomonitored for in the U.S. population. Before reviewing your test results, please note the four facts below that all body burden tests reveal.

## YOUR TESTS REVEAL FAILURES IN POLICIES TO PROTECT HEALTH

1. Every person in the world has industrial chemicals in or passing through their bodies, the result of five decades of intensive (and continuing) chemical use in industrialized nations.
2. Because of gaps in our system of public health protections, health effects of the human toxome are mostly unknown. Chemical manufacturers are not required to conduct safety studies. When they do test, they often test in a lab at high doses and for one chemical at a time. Most studies of people focus on high, occupational exposures.
3. We cannot predict future health problems from your toxome test results.

Scientists are only beginning to study the health effects of chronic exposures to low doses of chemical mixtures. While studies strongly demonstrate the role chemicals play in a host of health problems, risks to an individual are largely unknown. Genetics, timing, and dose all play a role.

4. While you cannot shop your way out of body burden pollution, you can take simple steps to reduce your exposures. We describe some of them below.

## **YOUR TOXOME – SUMMARY**

We tested your blood and urine for 84 chemicals in 10 chemical groups. As was the case for all study participants, in your samples we found chemicals from nearly all of these groups. Each chemical is in your body through your own unique exposures, from consumer products and contaminants in air, water, food, and house dust.

Below we describe your test results, where your levels fall relative to others tested, possible health implications, and what you can do to reduce your exposures.

Where possible, we compare your levels to national exposure data. When national exposure data are not available, we compare your results against others in EWG and Commonweal test groups, or against other toxome studies in the scientific literature. Most toxome study groups, including yours, are relatively small, so a very high or low ranking among these groups isn't necessarily an indication of where your exposures fall nationally.

We've categorized your exposures as high, moderate or low based on whether they fall in the upper quarter, mid half, or lower quarter relative to exposures measured in other studies.

## TOTAL MERCURY AND METHYLMERCURY

### Your exposure: high.

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We tested your samples for total mercury and methylmercury. Methylmercury is the form of mercury that contaminates seafood. Total mercury is the sum of all forms of mercury, including methylmercury, and the forms of mercury used in dental fillings and as preservatives in vaccinations and flu shots.

The level of total mercury in your blood, 3.2 parts per billion (ppb, or micrograms per liter), is high relative to national studies. You fall in the 93rd percentile nationally, which means that 7 percent of the population has higher exposures than yours.

Methylmercury accounts for nearly all of your total mercury load and reflects contamination in the seafood you ate over the several months prior to your blood draw. You will notice that your methylmercury level (expressed as mercury) is slightly higher than the concentration of total mercury found in your blood. Brooks-Rand considers these results to comply with their QA/QC criteria, and advises that the results imply that nearly all of your total mercury load is in the form of methylmercury.

Your methylmercury level, at 4.2 ppb, is lower than the federal safety standard of 5.8 ppb set for pregnant or nursing women and young children to protect against damage to a developing brain. Although the government has not yet set a safe level to protect non-pregnant adults, the National Academy of Sciences found that mercury-driven risks for immune disorders and cardiovascular disease may occur at even lower levels than those associated with brain impairment.

People who consume seafood can reduce their mercury exposures by changing the types of seafood they eat. Body burden levels of mercury will decline over time: on average, the human body can excrete half of its mercury load over a period of two months.

Of the seafood you listed in your exposure survey as being part of your typical diet, lobster and shrimp are typically low in mercury, although shrimp farms, the source of most shrimp on the market, can endanger sensitive coastal ecosystems. Wild Pacific salmon is usually low in mercury. We recommend wild salmon over farmed salmon (both are low in mercury, but farmed salmon can be contaminated with PCBs). We have included in the "Tips to Reduce Exposure" section of this binder a list of fish that are low in mercury.

You can also reduce your mercury exposures by avoiding mercury (silver-colored) dental fillings and by requesting vaccinations and flu shots free of the mercury preservative called thimerosal.

## **PLASTICIZERS – PHTHALATES**

**Your exposure: high.**

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Phthalates are common plastic softeners and solvents in a wide variety of consumer products, including cosmetics, paint, food packaging, and plastics including children's toys. In many laboratory studies, phthalates are linked to birth defects of the male reproductive system, including a penis deformity called hypospadias, and undescended testicles, a condition linked to infertility and testicular cancer.

Studies of typical phthalate levels in people link the chemicals to sperm damage, low sperm count, demasculinization of baby boys, asthma, and alteration of reproductive hormone levels in baby boys drinking breast milk with high levels of phthalates. These studies are considered preliminary, but are consistent with a wealth of observations in animal studies.

The lab tested your urine for seven chemicals that are breakdown products of five types of phthalates. The level of total phthalates (the sum of 7 individual phthalate breakdown products) in your urine was 1281 parts per million (ppm), a high level compared to national studies. (The unit "ppm" refers to micrograms of phthalates per gram of a urinary protein called creatinine. This protein is used in place of urine volume in the standard calculation of phthalate concentration to correct for test effects that stem from normal changes in urine concentration throughout the day.)

People excrete phthalates from the body fairly rapidly. Your level reflects your exposures in the day or two prior to your sampling. Most people are exposed daily to multiple types of phthalates.

Because of their ubiquity in consumer products and the human body, phthalates are the subject of recent scientific and regulatory action and debate. Of the five phthalates found in this study (with four found in you), the EU has banned DEHP from children's toys, and DBP and DEHP from cosmetics. None are banned in the U.S., but some manufacturers have removed them from toys and personal care products because of public pressure.

To reduce your exposure to phthalates, avoid nail care products containing "dibutyl phthalate" (read the ingredient label); avoid products with "fragrance" noted on the label, which commonly contains the phthalate diethyl phthalate (DEP); avoid cooking

in plastic; buy a non-plastic shower curtain; use paints and other hobby products in well-ventilated areas; and avoid foods packaged in hard, clear containers. Also, don't let children chew on soft plastic toys.

## **BROMINATED FIRE RETARDANTS: PBDEs (22 of 46 found)**

**Your exposure: high.**

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PBDEs, or polybrominated diphenyl ethers, are brominated fire retardants used in foam furniture and plastics for electronics like televisions and computers for the past 25 years. These chemicals interfere with the thyroid gland, which controls metabolism and growth. They may jeopardize brain development in children, and they raise concerns with respect to thyroid disease in adults. Safe exposure levels have not yet been established.

Twenty-two out of 46 individual PBDE chemicals were detected in your blood. The level of total PBDEs (the sum), at 80.6 parts per billion (ppb, or nanograms per gram of blood lipids), is high relative to others tested in EWG and Commonweal studies; 4 people had equal or higher levels of 41 tested. National exposure levels are not available: the Centers for Disease Control and Prevention is expected to publish the first national study of PBDE body burden levels in 2007.

Many PBDEs are difficult to excrete, and remain in the body for a long time. Your body burden levels reflect your exposures over a period ranging from years to weeks prior to your blood draw, depending on the particular PBDE chemical.

In 2005, manufacturers stopped selling two of the most toxic PBDE commercial mixtures because of concerns over their ubiquity in human blood and breast milk: "Penta" (predominantly containing chemicals called PBDE-99 and PBDE-47) and "Octa" (predominantly comprising PBDE-183). These same mixtures were banned in Europe two years earlier, although European manufacturers had never used them widely. Penta and Octa chemicals remain in many U.S. homes, primarily in foam furniture, and they commonly contaminate house dust.

Penta and Octa chemicals continue to build up in people's bodies even after their phase-out: laboratory data shows that the common "Deca" form of PBDEs (PBDE-209) used in electronics, including computer and television casings, may break down into Penta and Octa in the environment and the body. Many states are considering banning Deca as well as Penta and Octa formulations. The federal government currently has no such plans.

Despite the potential health risks and the ability of brominated fire retardants to

accumulate in the human body, the Consumer Product Safety Commission has issued national fire-proof mattress standards effective July 2007 that may increase these chemicals' use. Developed primarily to protect against cigarette fires, these standards might result in the widespread use in mattresses of largely untested brominated fire retardants proposed as substitutes for PBDEs. Because such standards have long been in place in California, several companies offer mattresses free of brominated fire retardants as an alternative for concerned consumers.

## **LEAD**

### **Your exposure: high.**

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The level of lead in your blood, 3.1 ug/dL (micrograms of lead per tenth of a liter of blood, or deciliter), is high relative to national levels. Your level falls in the 87th percentile, which means that 13 percent of the population has levels higher than yours.

The government's action level for lead is 10 ug/dL, set to protect children against the well-established brain damage associated with this neurotoxic metal. While an action level has not been set for adults, lead is thought to pose risks at any level, and scientists are beginning to question the role that a lifetime of lead exposure may play in neurodegenerative diseases of aging like Parkinson's and Alzheimer's.

Americans' lead exposures are much lower now than they were before about 1980, when the use of leaded gasoline and lead-based house paint was restricted. Now, most people are exposed to lead through their drinking water (it leaches from lead pipes, pipe solder, and brass fixtures in the home) or through dust from chipping paint in older homes.

Lead stays in the body a long time: on average, people excrete half of any lead exposure over a period of 25 years. The levels measured in your blood reflect both your childhood exposures and your more recent exposures. While it is not possible to significantly reduce your current body burden of lead, it is a good idea to minimize future exposures.

We recommend that you test your tap water for lead with a home test kit and, if needed, install a water filter (recommendations are in the "Tips to Reduce Exposures" section of this binder). Since lead can accumulate in water pipes overnight, run your tap water for at least 60 seconds, until it runs cold, before drinking it. Keep paint in older homes in good repair, repaint chipped surfaces, and use wet sanding methods on chipped areas to minimize airborne dust.

## **NITRO- & POLYCYCLIC MUSKS**

**Your exposure: high.**

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Nitro- and polycyclic musks are synthetic fragrances used in cosmetics, perfume, air fresheners, cleansing agents, detergents, and soap. Musks are also used as food additives, and in cigarettes and fish bait. Musks contaminate lakes and fish in the United States and Europe. In laboratory studies, some nitromusks have been linked to cancer. Studies of nitromusks in people suggest that high levels of some of these chemicals are associated with reproductive and fertility problems in women. Some also produce skin irritation and allergic reactions.

Growing concerns about the health effects of musks have led the European Union (EU) to prohibit the use of some of these chemicals, particularly nitromusks, in cosmetics and personal care products. Two musk chemicals, musk ambrette and versalide, are rarely if ever used in consumer products because of their neurotoxic effects in laboratory animals. As the use of nitromusks has declined over the past decade, the use of some polycyclic musks has increased. Though generally thought to be safer than nitromusks, studies suggest that some widely used polycyclic musks may affect hormone systems. In the United States, all musk chemicals are unregulated, and safe levels of exposure have not yet been set.

The level of musks in your blood, 0.82 ppb (micrograms of musks per liter of blood), is high relative to others tested in EWG and Commonweal studies. Your level falls in the 79th percentile, which means that 4 of 19 people tested have levels higher than yours.

Nitro- and polycyclic musks tend to accumulate in the fatty tissues of our bodies, and are often detected in breast milk. Your body burden levels reflect your exposures over a long time period.

To reduce exposures to musks, avoid perfumes, colognes, and air fresheners. Avoid cosmetics, detergents, soaps, and fabric softeners that contain fragrance. Check ingredient labels to ensure that fragrance is not listed, even for products marketed as “fragrance-free.” These products may still contain fragrances that mask or cancel the scent. Current laws do not require that manufacturers list fragrance ingredients, so avoiding fragrance altogether is the only sure way to avoid musk.

## **ROCKET FUEL: PERCHLORATE**

**Your exposure: low.**

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Perchlorate is used by the Department of Defense as the explosive ingredient in

solid rocket and missile fuel. It is also used to make fireworks and road flares, and is a contaminant in fertilizers that were widely used 50 years ago but are in limited use today.

Perchlorate is a common contaminant in tap water and food, with sources ranging from defense industry and manufacturing sites to polluted crop irrigation water and fertilizer. In a recent national study, scientists found perchlorate in urine from 100 percent of nearly 3,000 people tested.

Studies show that small amounts of perchlorate can disrupt proper thyroid function and reduce thyroid hormone levels, particularly in women. Small changes in a woman's thyroid hormone levels during pregnancy have been associated with reduced IQs in children.

Pregnant women and children need more thyroid hormone (to support growth) than other people, so they are at particular risk from the thyroid-blocking effects of perchlorate. Perhaps most at risk are pregnant women who are among the 36 percent of women in the U.S. with low intake of iodine, a nutrient blocked by perchlorate that is essential for proper thyroid function.

Your perchlorate level, 1.7 parts per billion (ppb, or micrograms per liter of urine), falls in the 19th percentile nationally, which means that 19 percent of people have exposures equal to or lower than yours. You ranked in the 64th percentile among people tested in EWG/Commonweal studies. Your level was lower than the concentration that produced abnormal thyroid hormone levels in women at risk from perchlorate effects because of their low iodine levels.

Because perchlorate widely contaminates the food supply, exposures are hard to avoid. Your water supplier can tell you if your tap water has been tested for perchlorate. A reverse osmosis home water filter will remove perchlorate. Using iodized salt in foods prepared at home can reduce potential thyroid risks from perchlorate exposures.

## **TEFLON CHEMICALS – PERFLUOROCHEMICALS (PFCs)**

**Your exposure: low.**

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PFCs are ubiquitous stain- and grease-proof coatings on furniture, carpet, clothing and food packaging. They include Teflon, Scotchgard, Gore-Tex, Stainmaster, and coatings on microwave popcorn bags, butter boxes, and fast food containers. They never break down in the environment, and some can build up in the body over time. They move through the atmosphere easily, and contaminate wildlife globally, from



polar bears to cormorants. In laboratory studies, they have been linked to multiple types of cancers (breast, liver, testicular, and pancreatic) and birth defects. In studies of workers, they are associated with prostate cancer and elevated risk of stroke. Safe levels of exposure have not yet been set.

The level of total PFCs (the sum of 13 individual chemicals) in your blood, at 29.0 parts per billion (ppb, or nanograms per milliliter), is low, falling in the 31st percentile nationally. In EWG and Commonweal studies, 20 of 41 people had higher PFC levels than yours.

Five out of 13 PFCs were detected in your blood. One of the PFC chemicals accounts for the majority of your total exposures: 3M's Scotchgard chemical (PFOS), which the company used from the 1950's until its phase-out over health concerns in 2000 (Scotchgard has since been reformulated). It is still in your blood because it lingers for years in the body and remains a common environmental pollutant.

Your levels for two PFC chemicals ranked high relative to national studies or in comparison with others tested by EWG and Commonweal. These chemicals are breakdown products of stain- and grease-proof coatings on food packaging, furniture, carpet, and clothing.

PFOA, found in your blood at moderate levels, is used to make impervious coatings like Teflon and Gore-Tex. It is classified as a likely human carcinogen, and is subject to an EPA-proposed (voluntary) global phase-out over the next decade.

Some PFCs are difficult to excrete, and remain in the body for a long time. Your body burden levels reflect your exposures over a period ranging from decades to months prior to your blood draw, depending on the particular PFC chemical.

PFC manufacturers are facing legal and regulatory pressure. The Environmental Protection Agency (EPA) forced 3M to take Scotchgard (PFOS) off the market in 2000 when company tests revealed widespread human blood pollution and birth defects in laboratory studies. 3M has since reformulated the product. In February 2006 DuPont, 3M and other major manufacturers agreed to reduce their environmental pollution for PFCs in plans negotiated with EPA. For at least \$120 million DuPont recently settled two cases over drinking water pollution and the company's failure to divulge data on birth defects and human blood pollution as required by federal law. Some chemicals in the PFC family and in your blood, including PFOS (pre-2000 Scotchgard), are proposed for global phase-out under the terms of the Persistent Organic Pollutants (POPs) Treaty known as the Stockholm Convention.

EPA is currently conducting an assessment to estimate health risks from consumers'

exposures to PFCs, but in the meantime, the chemicals are still the standard in stain- and grease-proof coatings in products ranging from blue jeans to French fry boxes.

To minimize your exposures to PFCs and their impacts on the environment, we recommend that you phase out your use of Teflon and other non-stick pans; decline optional stain-proof coatings on furniture and carpet; avoid buying clothing advertised as stain-proof; and eat fewer greasy, pre-packaged foods, which tend to be held in containers coated with PFCs.

## **ANTIMICROBIAL – TRICLOSAN**

### **Your exposure: detected.**

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Triclosan is a pesticide designed to kill microorganisms. It is added to a range of consumer products from liquid hand soap to cutting boards, toothpaste, children's toys, and shoe liners. Because of its ubiquity in products, triclosan is widely detected in human urine, wastewater treatment plant effluent, and rivers and streams across the country.

Triclosan is not considered toxic to humans, but it is toxic to wildlife. In the environment, it breaks down into toxic chemicals, including a form of dioxin linked to cancer and other health concerns, and methyl triclosan, a persistent pollutant that can build up in the food chain over time. It forms carcinogens when combined with chlorinated tap water, and it alters thyroid gland function in frogs through mechanisms thought to be relevant to humans, raising questions about its presumed safety in products. Scientists voice additional concerns over the potential for resistant strains of bacteria to develop as the use of the chemical in consumer products continues to increase.

Triclosan was detected in your blood, but at levels too low to be quantified by laboratory instruments. It has been found in 17 of 19 people tested in EWG and Commonweal studies. The presence of triclosan probably reflects exposures over the several days prior to testing, though this is a subject of ongoing scientific debate. One study found that people excrete significant amounts of any given triclosan exposure within about four days, while other studies indicate that the chemical could cling to body fat and build up in human tissues over time.

Because it is a common pollutant in rivers, triclosan is also a likely tap water contaminant. The government has not set safety standards for the chemical in tap water and does not require testing. Canada restricts dioxin impurities in soap and other personal care products containing triclosan. The U.S. has no such limits.

## **SURFACTANTS – ALKYLPHENOLS**

**Your exposure: not detected.**

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Alkylphenols are ingredients, manufacturing aids, and breakdown products of surfactants and detergents used in consumer products that range from carpet cleaners to cosmetics, paint and plastic. People are exposed through these products, but also through the normal ingestion and inhalation of house dust, which accumulates alkylphenols from household products.

Alkylphenols are also active ingredients in detergents and workhorse chemicals for industries and industrial processes ranging from mining and textiles to paper manufacturing, dust control, and rubber and plastic manufacturing.

Because of their ubiquity in products, human excretions, and industrial wastes, alkylphenols widely pollute rivers and streams, and some may widely pollute the food chain as well. Some of them mimic estrogen in the body. They have been implicated in the widespread feminization of male fish observed in waters in Europe and the U.S., including the increasingly common condition in which both eggs and sperm are found in the fish testicle.

Effects of alkylphenols in humans are not well understood, but the chemicals are toxic to wildlife, and lab studies show a broad range of reproductive effects from alkylphenol exposures, ranging from infertility to early puberty, sperm damage, and endometriosis.

Alkylphenols have been found in only 2 of 19 people tested in EWG/Commonweal studies. We did not detect alkylphenols in your samples. More sensitive lab methods, not commercially available at the time of your sampling, show alkylphenols in about half of all people tested.

Though their use in the U.S. is not restricted, many companies have voluntarily removed alkylphenols from products over concerns about their persistence in the environment and their toxicity to wildlife. The government has not set safety standards for these chemicals in tap water and does not require testing.

Exposures to alkylphenols are difficult to avoid, since they are ubiquitous environmental and household pollutants. You can avoid alkylphenols in personal care products – they are typically listed on the ingredient label under names that include the clause “nonoxynol” and “octoxynol.”

## **BISPHENOL A & BISPHENOL A DIGLYCIDYL ETHER METABOLITE: BPA & BADGE-40H**

**Your exposure: not detected.**

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BPA and BADGE are building blocks and additives in plastics and resins used for baby bottles, water coolers, dental sealants, and metal food can linings. They are widely detected in food and drinks held in these plastic or epoxy-lined containers, and they leach out of new dental sealants into saliva.

We tested your blood for BPA and for BADGE in the form in which it is found in the body (BADGE-40H). Recent studies have linked BPA to many adverse health effects in mice and rats at doses that may overlap with typical human exposures. These effects include early puberty, breast cancer, diabetes, and low sperm count. Though far less studied than BPA, research associates BADGE exposures with cancer and hormone disruption. BADGE can form toxic metabolites and breakdown products in food and in the body. Although evidence is conflicting, BPA may be one of these breakdown products.

The current "safe" levels of exposure for humans established by FDA are set far above levels now shown to be harmful in lab studies. Because a fraction of the population may incur exposures that overlap with levels harmful to lab animals, some prominent scientists consider BPA to be one of the top chemicals of concern for public health.

BPA has been detected in the blood of 7 out of 41 participants in EWG and Commonweal studies, but not in yours. More sensitive lab methods, not commercially available at the time of your sampling, show that BPA is present in nearly everyone tested; your samples may well have contained BPA at levels below our study detection limits. BADGE-40H was detected in the blood of 30 of 41 study participants in EWG/Commonweal studies, but also was not detected in yours. The Centers for Disease Control and Prevention is expected to publish the first national study of BPA body burden levels in 2007.

BPA is currently under intense scientific and regulatory debate because of concerns that it might pose risks to human reproduction. A major government safety panel is due to convene on the subject next year. Seven prior government reviews outside the U.S. have deemed current BPA exposures within safe limits, but none has assessed the reproductive risks demonstrated in more than 100 recent, low-dose studies.

You can reduce exposures to BPA and its epoxy resin (BADGE) by avoiding drinking water from hard, transparent (clear or tinted) plastic bottles (including water cooler

bottles and Nalgene), and by cutting down on canned foods. We also recommend caring for your teeth to minimize the need for BPA- and BADGE-based dental sealants.

## **SUMMARY**

The human toxome of industrial chemicals is a global condition, but your toxome is as unique as your genome, reflecting your diverse exposures to chemicals over the course of a day and over your lifetime. While the health risks of the human toxome are not well understood, a substantial body of science documents the role of chemical exposures in a growing number of human health problems.

We urge you to review the remainder of this packet. You will learn more about your exposures and actions you can take, from the personal to the political, to mend the gaps in our system of public health protections that fail to require companies to prove chemicals are safe before they are sold in products and accumulate in the human body.