

# NO CLEAN BILL OF HEALTH

Toxic chemicals in cash register receipts



CEH





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# SUMMARY

Many people know the phrase from Aesop's fables, "jumping out of the frying pan and into the fire." But Aesop probably had no idea that people in the twenty-first century would be using this message to describe our government's system of regulating toxic chemicals.

But unfortunately, the way that toxic chemicals are regulated in the US means that we are constantly hopping between frying pan and fire. There are tens of thousands of chemicals used in the US, and most of them have never been safety tested. So scientists often find problems with a chemical only after our children and families have suffered toxic exposures. Then, when regulators finally step in to restrict the harmful chemical, companies simply switch to another untested chemical, and the cycle begins again. Frying pan, fire, and back again.

In this report, we discuss one recent example of jumping into the toxic chemical fire, a change that has been made in chemicals used in the thermal paper found in most cash register receipts. Until recently, most receipt paper has been coated with a chemical called BPA (bisphenol A). As researchers documented many health problems linked with BPA, and as regulators began to enact restrictions on BPA, companies have begun to eliminate BPA, switching to receipt paper coated with BPS.

But BPS is a chemical cousin of BPA, and recent research has shown that BPS may be no safer than BPA. In CEH's recent testing of cash register receipts from more than 100 national chain restaurants, stores and other businesses, over 90 percent of the receipts tested were coated with BPS. We're truly in the fire.

California identified BPA as a chemical known to cause reproductive harm in 2015. The Center for Environmental Health is initiating legal action against the companies that are still using BPA-containing receipts.

**"BUT BPS IS A CHEMICAL COUSIN OF BPA, AND RECENT RESEARCH HAS SHOWN THAT BPS MAY BE NO SAFER THAN BPA."**



# HOT TOPIC: WHAT IS THERMAL PAPER?

Thermal paper is used to print cash register receipts, boarding passes, luggage tags, some faxes, and other similar items. Bisphenols (formerly BPA, now more commonly BPS) are chemicals used in thermal paper to allow the paper to change color when selectively heated. Under heat or pressure, the BPA or BPS molecules react with dye in the paper to produce a color.

BPA (and likely BPS) is easily absorbed through our skin. People who handle receipts regularly, such as cashiers, may be exposed to almost twice as much BPA as other people.

Recently, researchers showed that holding thermal receipt paper after using hand sanitizer transferred 185 times more BPA than when the hands were dry. This study also showed that women absorbed BPA more rapidly than men, possibly because women have thinner skin, and are more likely to use hand lotion, which acts like hand sanitizer in transporting chemicals through the skin.

In addition, thermal paper is typically used for cash register receipts in restaurants, making bisphenol contamination of food from fingers and hands likely.

**"THERMAL PAPER IS USED TO PRINT CASH REGISTER RECEIPTS, BOARDING PASSES, LUGGAGE TAGS, SOME FAXES, AND OTHER SIMILAR ITEMS."**



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# WHY ARE COMPANIES GOING “BPA-FREE”?

Bisphenol A does not occur naturally but it is a high production chemical and thus has become ubiquitous in the environment. BPA is now one of the highest volume chemicals manufactured: produced at a rate of about 15 billion pounds per year.

The first Bisphenols were synthesized in the late nineteenth century. In 1936, while attempting to discover new synthetic estrogens for medical applications, researchers Edward Charles Dodds and Wilfrid Lawson first discovered the estrogenic properties of bisphenols. Estrogens are the hormones usually referred to as “female” hormones.

In the last decade, BPA has become one of the most well-studied chemicals in use. There are an enormous number of studies documenting health problems linked to BPA exposure. For example, when a group of scientists from across the country recently reviewed studies of how BPA impacts reproduction – our ability to have healthy children -- they identified well over 100 studies conducted since 2007. The researchers concluded that BPA harms ovaries and the uterus in women, and the prostate in men. Another large review, this one looking at about 200 studies, found that BPA exposure is linked to fertility problems in both men and women, asthma and behavior problems in children, and diabetes, obesity, and heart disease in adults.



This extensive research demonstrating BPA’s health impacts has resulted in growing public concern and recent government regulation. Examples of government regulation include:

- In July 2016, the European Union prohibited the use of BPA in thermal receipts. The EU Regulation preamble states “bisphenol S (BPS) – the most likely substitute for BPA in thermal paper – may cause similar health problems [as seen with BPA]”
- California’s Proposition 65: Bisphenol A (BPA) was added to the state’s Proposition 65 list of harmful chemicals based on its reproductive toxicity in 2015.
- In 2010, BPA was classified as a Schedule 1 toxic substance under the Canadian Environmental Protection Act, initiating development of regulatory risk management measures.



# IS “BPA-FREE” ENOUGH?

No, it's not. While the evidence of the toxic effects of BPA has led a few regulatory agencies to enact restrictions on its use, BPS is presently not regulated and can be used without restriction. BPA's hazards have resulted in the replacement of BPA in some receipts, but this leaves significant unaddressed safety questions about replacement chemicals like BPS.

Since BPA and BPS have similar chemical structures, replacement of BPS for BPA is straightforward for businesses. Scientists believe that the similar structure also means that the toxicity of BPS is likely to be similar to BPA. BPS, however, is less studied because, compared to BPA, it has only recently been introduced into consumer products on a large scale. BPS is often used in receipts and other products marketed as “BPA-free.”

A study in 2012 found BPS in 81% of Americans tested. Another study, this one in 2013, found that tiny amounts of BPS -- as little as one part per trillion - - could interfere with the normal functioning of a cell. These are levels likely to be present in our bodies.

## HERE IS WHAT SOME SCIENTISTS AND REGULATORS HAVE SAID ABOUT BPS – ALONG WITH A TRANSLATION:

“THE AVERAGE ESTROGENIC POTENCY FOR BPS IS WITHIN THE SAME ORDER OF MAGNITUDE AS THE POTENCY OF BPA.”

Translation – BPA acts like the “female” hormone estrogen in our bodies. So does BPS, and it is about as potent as BPA.

“BPS HAD EVEN A MORE POTENT INHIBITORY EFFECT FOR TESTOSTERONE THAN BPA.”

Translation – For one “male” hormone, testosterone, BPS was more potent than BPA.

“BPS CAN EXHIBIT ANTI-ANDROGENIC PROPERTIES THAT CAN LEAD INTO THE ALTERATION OF REPRODUCTIVE FUNCTIONS IN ADULTS.”

Translation – BPS blocks the action of “male” hormones.

“BPS APPEARS TO BE MORE RESISTANT TO ENVIRONMENTAL DEGRADATION THAN BPA, LEADING TO THE POSSIBILITY FOR IT TO BECOME A WIDESPREAD ENVIRONMENTAL POLLUTANT IN THE NEAR FUTURE.”

Translation – BPS does not break down as easily as BPA, so it may end up being more widespread and harmful in the environment.




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# WHAT CEH DID

CEH tested receipts to find out which ones are coated with BPA and which with BPS, and to identify which businesses use which chemical.



We obtained receipts by purchasing items from national and regional businesses in California. Between June and August of 2016, CEH staff visited dozens of outlets of national and local chain restaurants, grocery stores, and other retailers around the Bay Area and Los Angeles. In all, we tested receipts from more than 100 businesses: 34 restaurants, 12 grocery stores, and 57 retailers.

We tested for the presence of BPA and BPS on the receipts' surface by using Fourier transform infrared spectroscopy (FT-IR).<sup>\*</sup> We also sent six receipts to an independent lab to confirm the presence of the chemicals we found.

**“CEH TESTED RECEIPTS TO FIND OUT WHICH ONES ARE COATED WITH BPA AND WHICH WITH BPS, AND TO IDENTIFY WHICH BUSINESSES USE WHICH CHEMICAL.”**

<sup>\*</sup>The FT-IR spectra of each receipt was recorded at room temperature on a Fisher Scientific Nicolet Is5 Spectrometer equipped with an iD7 ATR accessory (Thermo Fischer Scientific Inc.) by scanning from 4000-400 cm<sup>-1</sup> at a resolution of 4 cm<sup>-1</sup> and analyzed using OMNIC software version 9.5.9. Our results were confirmed by sending some of the receipts to an independent lab which performed tests in accordance with protocols EPA SW8270C and EPA SW3580A.



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# OUR RESULTS

Our results show that BPS has replaced BPA in most receipts. All of the receipts tested contained one of the two chemicals. Our testing found that 95% of the receipts had BPS, and 5% had BPA. All the receipts had either BPA or BPS: the latter was identified in receipts from 98 of the 103 businesses tested, while the former was identified in 5.

Predictably, in response to regulations on BPA, thermal paper makers have switched to a different chemical, BPS. Unfortunately, the reality is that BPS is not likely to be any safer than BPA and could even be more harmful to our health. It looks like we are back in the fire.

TYPE OF BUSINESS	RECEIPTS WITH BPS	RECEIPTS WITH BPA
RESTAURANT (N=34)	33	1
GROCERY (N=12)	12	0
RETAIL (N=57)	53	4
TOTAL (N=103)	98	5



# LIST OF BUSINESSES WITH BPA-CONTAINING RECEIPTS



NORDSTROM

PAPAYA



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# LIST OF BUSINESSES WITH BPS-CONTAINING RECEIPTS

7-ELEVEN  
99 CENTS ONLY  
ARBY'S  
ARMANI EXCHANGE  
BANANA REPUBLIC  
BANK OF AMERICA ATM  
BARNES AND NOBLE  
BEBE  
BLOOMINGDALES  
BURGER KING  
BYER CALIFORNIA  
CARLS JR  
CHARLOTTE RUSSE  
CHEVRON  
CHICK-FIL-A  
CHILDREN'S PLACE  
CHIPOTLE  
CHURCH'S CHICKEN  
COST PLUS  
COSTCO  
CVS  
DAISOJAPAN  
DB SHOES  
DEAN & DELUCA  
DENNY'S  
DOLLAR GENERAL  
DOLLAR TREE  
DOMINO'S PIZZA  
EL POLLO LOCO  
EXTREME PITA  
FAMILY DOLLAR  
FEDEX  
FIVE GUYS

FOOD MAXX  
FOODS CO.  
FOREVER 21  
GAP  
GH BASS & CO  
GROCERY OUTLET  
GUESS FACTORY STORE  
HOMEDEPOT  
IKEA  
IN N OUT  
J.CREW  
JACK IN THE BOX  
KATE SPADE  
KFC  
KFC/A&W  
KMART  
LITTLE CAESARS  
LONG JOHN SILVER'S  
LUCKY  
MACY'S  
MADEWELL  
MARSHALLS  
MCDONALD'S  
NOB HILL FOODS  
OFFICEDEPOT  
OFFICEMAX  
PACSUN  
PANERA BREAD CAFÉ  
PAPA JOHNS  
PARAGON OUTLETS  
PAYLESS SHOE SOURCE  
PEETS COFFEE & TEA  
PHARMACA

PIZZA HUT  
POPEYES  
QUICKSILVER  
QUIZNOS  
REI  
RITE AID  
ROSS DRESS FOR LESS  
ROUND TABLE  
SAFEWAY  
SAM'S CLUB  
SEE'S CANDIES  
SEPHORA  
SIZZLER  
SMASHBURGER  
SONIC DRIVE-IN  
SPROUTS  
STAPLES  
STARBUCKS  
SUBWAY  
SWEET TOMATOES  
TACO BELL  
TARGET  
TJ MAXX  
TOYSRUS  
TRADER JOES  
UNIQLO  
VICTORIA'S SECRET  
VONS  
WALGREENS  
WALMART  
WENDY'S  
WILSONS LEATHER OUTLET



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# WHAT YOU CAN DO

CEH WARNS CONSUMERS TO AVOID CONTACT WITH BPA OR BPS WHENEVER POSSIBLE.

## STEPS TO MINIMIZE YOUR EXPOSURE INCLUDE:

- Say “no thanks” to printed receipts if you don’t need them.
- Ask for email receipts when available.
- Don’t use alcohol-based hand cleaners while handling receipts.
- Children, babies, and pregnant women should avoid handling receipts.
- After handling a receipt, wash hands before eating or preparing food.
- If you are unsure, check whether paper is thermally printed by rubbing it with a coin. Thermal paper discolors with the friction; conventional paper does not.



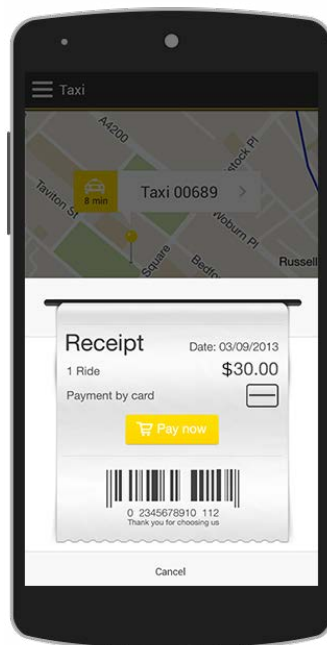


# WHAT BUSINESSES CAN DO

BUSINESSES SHOULD HELP REDUCE CUSTOMER AND EMPLOYEE EXPOSURE TO BPA AND BPS.

STEPS TO MINIMIZE EXPOSURE INCLUDE:

- Print receipts just for customers who want them. Cashiers should ask before printing receipts.
- Switch to e-mail receipts wherever possible.
- Switch to receipt printers that use ink rather than thermal printing.



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