BPA

Buyer Beware

Toxic BPA and regrettable substitutes found in the linings of canned food

A REPORT BY:
Breast Cancer Fund, Campaign for Healthier Solutions,
Clean Production Action, Ecology Center, Mind the Store Campaign

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This report was conceived, authored and produced as a collaborative effort by the following organizations:

Breast Cancer Fund

The Breast Cancer Fund is the leading national organization working to prevent breast cancer by eliminating our exposure to toxic chemicals linked to the disease.

We translate the growing body of scientific evidence linking breast cancer and environmental exposures into public education and advocacy campaigns that protect our health and reduce breast cancer risk. We help transform the way our society thinks about and uses chemicals and radiation, with the goal of preventing breast cancer and sustaining health and life. We find practical solutions so that our children, our grandchildren and the planet can thrive.

Campaign for Healthier Solutions

The Campaign for Healthier Solutions is led by the Environmental Justice Health Alliance for Chemical Policy Reform (EJHA) and Coming Clean. The campaign seeks to work with discount retailers and dollar stores to help them protect their customers, and the communities in which they operate, by implementing corporate policies to identify and phase out harmful chemicals in the products they sell.

Clean Production Action

Clean Production Action works with companies, governments and advocates to promote safer alternatives to toxic chemicals in products and supply chains. CPA's GreenScreen® for Safer Chemicals is now the leading chemical hazard assessment tool to identify safer chemicals.

Ecology Center

The Ecology Center educates consumers to help keep their families healthy and safe; pushes corporations to use clean energy, make safe products and provide healthy food; provides people with innovative services that promote healthy people and a healthy planet; and works with policymakers to establish laws that protect communities and the environment.

Safer Chemicals Healthy Families' Mind the Store Campaign

The Mind the Store campaign is challenging the nation's biggest retailers to adopt comprehensive chemical management policies to disclose, reduce, eliminate and safely replace the Hazardous 100+ Chemicals of High Concern and other toxic chemicals in products. The Safer Chemicals, Healthy Families coalition represents more than 11 million individuals and includes parents, health professionals, advocates for people with learning and developmental disabilities, reproductive health advocates, environmentalists and businesses from across the nation.

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Executive Summary

This report, Buyer Beware: Toxic BPA & Regrettable Substitutes in the Linings of Canned Food, was conceived, authored and produced as a collaborative effort by the Breast Cancer Fund; Campaign for Healthier Solutions; Clean Production Action; Ecology Center; Environmental Defence (Canada); and Safer Chemicals, Healthy Families' Mind the Store campaign.

Bisphenol A (BPA) is a toxic, endocrine-disrupting chemical that negatively impacts our hormonal systems, contributing to a host of harmful health effects. Hundreds of scientific studies have linked extremely small amounts of BPA, measured in parts per billion and even parts per trillion, to an increased risk of breast and prostate cancer, infertility, type-2 diabetes, obesity, asthma, and behavioral changes including attention deficit disorder. It is likely that people are exposed to BPA from canned foods at levels that are compromising our health.

OUR RESEARCH

This investigation consolidates and builds on the evidence presented in previously released reports on BPA in food packaging by performing three important tasks:

1. Identify and analyze the interior linings and lids of nearly 200 canned foods, including — for the first time ever — the replacement materials for BPA-based epoxy being used by national brands and retailers, and the extent to which those companies have studied the safety of these materials
2. Present a summary of dozens of can coating types approved for use by the FDA since the agency publicly announced its support for industry action to remove BPA from food packaging in 2010, and show the replacements' potential health hazards
3. Follow up on the promises made by major national brands and retailers — and survey the policies they have adopted — to gauge their responsiveness to the intensifying public demand for full disclosure of ingredients and safety data on the chemicals in linings of food cans.

OUR GOALS

A collaboration of non-governmental organizations (NGOs) throughout the United States and Canada participated in this product-testing investigation conducted by the Ecology Center. These were our goals:

1. Determine to what extent BPA-based epoxy linings are still being used by major national brands and retailers in canned food linings, and whether these companies have policies in place to disclose and/or phase out its continued use
2. Determine the types of substitutes used in "BPA-free" can linings, and to what extent the safety of these substitutes has been studied
3. Identify company leaders and laggards in reducing the use of BPA in can linings
4. Generate solutions for moving the market toward informed substitution and safer, non-BPA alternatives for canned food linings.

NGOs collected canned food for testing and also surveyed well-known national food brands, grocery stores and big box retailers. This report analyzed the interior coatings and lids of 192 cans containing vegetables, fruits, soups, broth, gravy, milks and beans. Canned food was collected in 19 U.S. states (see appendix in the full Report) and one Canadian province. The Cans Not Cancer and Mind the Store campaigns, along with Environmental Defence (Canada), also surveyed leading national brands and the largest retailers of canned food to find out what policies they have in place to phase out the use of BPA-based epoxy and to avoid regrettable substitutions.

KEY FINDINGS

Our findings were alarming. We expected that the explosion in consumer demand for BPA-free packaging would have resulted in swifter action by canned food brands and retailers. However, 67 percent of the cans tested (129 out of 192) contained BPA-based epoxy in the body and/or the lid.

Toxic BPA Is Still Hiding in Many Popular National Brands of Canned Food

- Our analysis showed that, across the board, canned food manufacturers both large and small are not making good on their promises to discontinue use of BPA.
- In the samples we tested, 100% of Campbell's cans (15 out of 15) contained BPA-based epoxy, even though the company claims to be making significant progress in its transition away from BPA.
- 71% of sampled Del Monte cans (10 out of 14) tested positive for BPA-based epoxy resins.
- 50% of sampled General Mills cans (6 out of 12, including Progresso and Green Giant) tested positive for BPA.
- Although fewer cans were tested for these large companies, all 3 cans from McCormick & Company (Thai Kitchen) and all 3 cans from Nestlé (Nestlé Carnation) contained BPA-based epoxy.
- All of the cans sampled from 5 smaller brands also tested positive for BPA-based epoxy: Empire Company Limited (3 out of 3); Goya Foods (2 out of 2); Ocean Spray Cranberries (2 out of 2); Thai Agri Foods (2 out of 2); and Vilore Foods (2 out of 2).
- Although Campbell's, McCormick and Nestlé have indicated their intentions to transition out of BPA use by 2016 or 2017, survey responses from Del Monte Foods, General Mills, Hormel and J.M. Smucker Company did not indicate a goal or timeline to move away from BPA can linings.
- But not all the news is bad:
    - Amy's Kitchen, Annie's Homegrown (recently acquired by General Mills), Hain Celestial Group and ConAgra have fully transitioned away from the use of BPA and have disclosed the BPA alternatives they're using. No BPA-based epoxy resins were detected in any of the cans tested from these brands.
    - Eden Foods reported eliminating the use of BPA-based epoxy liners in 95% of its canned foods and stated that it is actively looking for alternatives. No BPA epoxy was detected in the Eden canned foods that were tested.

See the full Report for more testing results.

Test Results and BPA Policies Vary Widely in Retailers' "Private-Label" Canned Food

- Grocery stores, big box retailers and dollar stores are not doing enough to eliminate and safely replace BPA in their canned food. In the aggregate, 62% of retailers' private-label canned food tested positive for BPA-based epoxy resins, including samples from the brands of popular retailers such as Albertsons (Albertsons, Randalls, and Safeway), Dollar General, Dollar Tree (Dollar Tree and Family Dollar), Gordon Food Service, Kroger, Loblaws, Meijer, Target, Trader Joe's, Walmart and Whole Foods.
- Five retailers — Dollar General, Dollar Tree (Dollar Tree and Family Dollar), Gordon Food Service, Meijer and Target — had BPA-based epoxy coatings in all tested cans of beans and tomatoes.
- **Grocery retailers:** BPA was found in the majority of private-label canned goods tested at the two biggest dedicated grocery retailers in the United States: Kroger and Albertsons (Safeway). In private-label cans, 62% of Kroger products (13 out of 21), and 50% of Albertsons products (8 out of 16 from Albertsons, Randalls, Safeway) tested positive for BPA-based epoxy resins. While both retailers have adopted policies to reduce BPA in canned food, our testing revealed BPA is still commonly found in their products.
- **Big box retailers:** BPA was found in private-label cans sold at both Target and Walmart, the largest grocery retailer in the United States. In their private-label products, 100% of Target cans (5 out of 5), and 88% of Walmart cans (7 out of 8) tested positive for BPA-based epoxy resins. Our survey revealed that neither of these two major retailers has policies in place to eliminate BPA in canned food, unlike competing grocery retailers.
- Discount retailers (commonly known as 'dollar stores') were among the laggards in transitioning away from BPA in can linings. Our testing revealed that 83 percent of Dollar Tree and Family Dollar private-label cans (5 out of 6) and 64 percent of Dollar General private-label cans (9 out of 14) were coated with BPA-based epoxy resins. This is especially a problem because discount retailers are often the major retail outlet in low-income communities—which already face the highest levels of BPA exposure.

- **Canadian retailers:** BPA in canned foods is a problem that is not restricted to the United States. In Canada, 80% of Loblaws' private-label cans (4 out of 5) tested positive for BPA-based epoxy resins. Loblaws is the largest grocery chain in Canada.
- **No comprehensive safe substitution policies:** While some retailers have made progress in reducing the use of BPA in canned food, no retailer has a policy in place to completely eliminate BPA in all of its canned food. No retailers have specific timelines for phasing out BPA, nor have they conducted transparent assessments of the alternative linings.
- **Some retailers are making progress:** Albertsons, Safeway, Kroger, Publix, Wegmans and Whole Foods have adopted policies to reduce the use of BPA in their private-label canned food. Whole Foods has clearly adopted the strongest policy of the retailers. Whole Foods reports that store brand "*buyers are not currently accepting any new canned items with BPA in the lining material.*"

See the full Report for more test results.

The continued presence of BPA — and potentially unsafe alternatives — in the lining of canned foods has resulted in ongoing hazardous exposures to workers, low-income populations, pregnant women, children and other vulnerable populations.

"BPA free" May Not Mean Safe

Our investigation raises the concern that retailers and brands could be replacing BPA-based epoxy with regrettable substitutes. Identifying the safety of BPA alternatives is challenging, given the limited FDA review and approval of packaging additives and the highly protected trade secrets in this product sector. Further, there is very little data in the published scientific literature regarding the health effects of BPA epoxy replacements, nor is this data publicly available from the FDA.

Five major coating types were identified among the 192 cans tested: acrylic resins, BPA-based epoxy, oleoresin, polyester resins, and polyvinyl chloride (PVC) copolymers. We know very little about the additives used in these compounds to give them the properties that make them stable and effective can linings. Our research does demonstrate that there are multiple formulations of most of these compounds, but there is no way to determine the specific chemicals used or how they are produced.

We found that 18% of retailers' private-label foods and 36% of national brands were lined with a PVC-based copolymer. This is clearly a regrettable substitute, because PVC is a polymer made from vinyl chloride, a known carcinogen.

Similarly, many of the acrylic linings included polystyrene, a plastic made from the styrene monomer which is considered a possible human carcinogen. All plastics contain some level of residual or unreacted monomer. We found that 39% of cans had a polystyrene-acrylic combination. Data is not publicly available to indicate at what level monomers like vinyl chloride or styrene migrate from the can linings into food. For the other coating types, the lack of safety data and unknown additives mean we have no reliable data attesting to the safety of these compounds.

When It Comes to Labeling, It's Anyone's Guess

- Even though most national brands — and a number of private-label retail brands — now claim to be manufacturing BPA-free canned foods, few are *labeling* their products BPA-free, with the notable exception of Amy's Kitchen and Eden Foods.
- Only a handful of national brands and retailers are disclosing which BPA-replacement chemicals they're using. These include Amy's Kitchen, Annie's Homegrown, ConAgra, Eden Foods and Hain Celestial Group. However, the safety data for these alternatives is not publicly available.
- No national brand or retailer discloses its BPA alternatives on the label.
- No manufacturer or retailer is labeling which of its canned foods have BPA-based epoxy in the linings.

All Foods Are Not Created Equal When It Comes to Cans

Food companies choose coatings for their cans in part based on properties of the food. For example, tomatoes, which are highly acidic, react with oleoresin, causing an unpleasant taste. Our findings illustrate the complex can lining requirements posed by different types of foods:

- All food categories had at least some cans coated with BPA-based epoxy, reflecting the fact that this coating type, unlike the alternatives, is used in all types of food.
- The corn and peas category was the least likely overall to contain BPA-based epoxy, either as a single coating or in combination with another coating, and the most likely to contain oleoresin, a plant-based substitute
- Broth and gravy cans were the most likely overall to contain BPA-based epoxy. 100% of broth and gravy can lids were coated with BPA-based epoxy. All broth and gravy can bodies were coated with either BPA-based epoxy (40% of broth/gravy bodies) or a combination of BPA-based epoxy and an acrylic resin (60% of broth/gravy bodies).
- Canned milks (including evaporated, sweetened condensed, and coconut) also had a high frequency of BPA-based epoxy (85% of bodies, 45% of lids).

See the full Report for more testing details by product type.

RECOMMENDATIONS

The continued presence of BPA — and potentially unsafe alternatives — in the lining of canned foods has resulted in ongoing hazardous exposures to workers, low-income populations, pregnant women, children and other vulnerable populations.

1. **National brands, grocery stores, big box retailers and dollar stores should take these steps:**

    - Commit to eliminating and safely substituting BPA from all food packaging, replacing it with safer alternatives, and establishing public timelines and benchmarks for the transition.
    - Conduct and publicly report on the results of "alternatives assessments," using the GreenScreen® for Safer Chemicals or a similar third-party certification tool for assessing the safety of can linings.
    - Label all chemicals used in can liners, including BPA or BPA alternatives; and demand that their suppliers of canned food linings fully disclose safety data, so as to provide a higher level of transparency to consumers.
    - Adopt comprehensive chemical policies to safely replace other chemicals of concern in products and packaging.

2. **Can-lining suppliers** need to see themselves as part of the solution by publicly disclosing the chemical composition of their can linings and ensuring that the final materials have been rigorously assessed for their impacts on environmental and human health.

3. **Congress** should adopt the "Ban Poisonous Additives Act" to reform the FDA's fatally flawed system for reviewing and approving the safety of packaging materials.

This report is meant to serve as a wake-up call for national brands and retailers of canned food who are jumping from the frying pan into the fire by eliminating BPA and potentially replacing it with regrettable substitutes. Consumers want BPA-free canned food that is truly safer, not canned food lined with chemicals that are equally or more toxic.

Until we see federal policy reform and voluntary market-based solutions that provide people with the information they need to make safe and informed purchases of canned food, we recommend that consumers take action to demand change:

Steps Consumers Can Take

1. **Consumers should reinforce and strengthen their call for safer canned foods in the following ways:**

    - Support the "Ban Poisonous Additives Act" and other federal policy initiatives that would require the FDA to more strictly regulate the safety of food packaging
    - Demand that their favorite national brands and retailers take these steps:
        - Set a time frame to eliminate BPA and use safe substitutes in the lining of canned foods and other food packaging;
        - Label the presence of BPA and BPA-alternative chemicals in their can linings; and
        - Publicly disclose safety data for their BPA alternatives.
    - Vote with their pocketbooks and only purchase canned food from manufacturers and retailers that fully disclose the identity and safety of their can linings.
    - Avoid canned foods whenever possible, choosing fresh and frozen instead.
    - Join the campaigns listed in this report and visit their websites for additional information and updates:

      www.breastcancerfund.org
      www.MindTheStore.org
      www.cleanproduction.org
      www.ecocenter.org
      www.nontoxicdollarstores.org
      www.environmentaldefence.ca

Introduction

This study set out to analyze the interior coatings and lids of nearly 200 canned foods collected in 19 states and one Canadian province to determine whether the use of bisphenol A (BPA) continues to be widespread among major national brands and retailers of canned foods. We also wanted to determine what replacement materials for BPA-based epoxy are being used by retailers and manufacturers and the extent to which those companies have studied the safety of those materials.

Our findings were alarming: This report validates our concerns that, despite consumer demand for BPA-free cans, 67 percent (129 of 192) of the cans we tested contained BPA-based epoxy in the body and/or the lid. Our investigation also found, for the first time, that some retailers and brands have replaced BPA with PVC, made from vinyl chloride, a carcinogen.

BPA is a hormonally active chemical. The scientific evidence linking BPA exposure to harm in humans is compelling and growing: More than 300 animal and human studies have linked exquisitely small amounts of BPA exposure, measured in parts per billion and even parts per trillion, to a staggering number of health problems, including breast and prostate cancer, asthma, obesity, behavioral changes (including attention deficit disorder), altered development of the brain and immune system, low birth weight and lowered sperm counts.

Efforts to ban or restrict BPA in the United States and Canada have been ongoing since 2005. In a stunning example of the power of consumer demand to move a $77 billion market, five U.S. cities and counties, and 13 states banned BPA from baby bottles, infant formula cans and sports water bottles. This flurry of legislative activity, coupled with consumers voting with their pocketbooks for BPA-free packaging, drove BPA out of infant food packaging and water bottles nationwide. International regulation of BPA in food packaging has been equally aggressive.[1]

But a number of challenges remain: 1) No city or state and only one world government (France) has banned BPA from the lining of all food cans; 2) national brands and retailers, for the most part, have been moving too slowly to get BPA out of canned food; 3) no national brands or retailers are labeling which of their foods are still packaged in cans containing BPA; 4) only a handful of national brands publicly disclose the BPA alternatives they are using; 5) the safety of BPA alternatives used in can linings remains unclear, as can-lining suppliers are not being transparent about the full chemical identity or safety of the linings they offer; and 6) the federal system for regulating the safety of the chemicals in canned food and other food packaging chemicals is badly broken.

The continued presence of BPA — and potentially unsafe alternatives — in the lining of canned foods has resulted in ongoing hazardous exposures to workers, low-income populations, pregnant women, children and other vulnerable populations. Yet what are the big national brands and retailers doing to make good on their promises to discontinue use of BPA and to ensure the safety of the BPA alternatives they are using or considering?

In this report, we surveyed leading national brands and retailers of canned food to find out what policies they have in place to phase out the use of BPA and avoid regrettable substitutions for this hormonally active chemical. In the case of iconic national brands such as Campbell's and Del Monte, the answer seems to be, very little. Campbell Soup Company, a leader in the canned food industry grossing over $2.4 billion in sales annually, promised its shareholders in 2012 that it would phase out the use of BPA in can linings. According to its own estimates, however, the company is still one to two years away from full-scale conversion. In our product testing, 15 out of 15 Campbell's products analyzed tested positive for BPA-based epoxy resins, even though the company claims to be making significant progress in its transition away from BPA.[2]

In our correspondence with Del Monte Foods, there was no mention of a timeline to move away from BPA use. Del Monte Foods is one of the country's largest producers, distributors and marketers of canned foods in the United States, generating approximately $1.8 billion in annual sales. Its testing results were also troubling, with 10 out of the 14 Del Monte cans analyzed testing positive for BPA-based epoxy resins.

In private-label brands of major retailers, the results were equally troubling: The vast majority of the cans we analyzed carrying the banners of such popular retailers as Kroger, Albertsons, Walmart and Target tested positive for BPA-based epoxy. For example, 13 out of 21 private-label cans we analyzed from Kroger tested positive for BPA-based epoxy resins. Also testing positive for BPA-based epoxy resins in our analyses were two out of seven private-label cans from Albertsons (Albertsons and Safeway); seven out of eight private-label cans from Walmart; five out of five private-label cans from Target; and three out of nine private-label cans from Aldi Nord (Trader Joe's). In aggregate, 62 percent of retailers' private-label canned food tested positive for BPA-based epoxy resins. Equally worrying is the fact that most dollar stores — a mainstay for low-income families — also continue to sell canned food lined with BPA.

The good news is that some major retailers and national brands have reduced or eliminated their use of BPA in canned food: Amy's Kitchen, Annie's Homegrown and ConAgra have fully transitioned away from the use of BPA and are being transparent about the replacement materials they now use to line their canned foods. This good news is muddied, however, by the fact that none of these companies has made public the safety data for the BPA-alternative chemicals they're using instead.

Major retailers including Albertsons, Safeway, Kroger, Publix, Wegmans and Whole Foods have adopted policies to reduce or phase out BPA in their private-label canned food. Most notably, Whole Foods' brand "buyers are not currently accepting any new canned items with BPA in the lining material." On the flip side, however, none of these retailers have specific timelines in place to guide their phase-out of BPA, nor have they conducted assessments on the replacement can linings to ensure they are safe. Other retailers, such as Walmart and Target, are even further behind, with no policies in place to eliminate and safely replace BPA. Big retailers need to "mind the store" and adopt comprehensive, transparent policies to eliminate BPA and replace it with safe substitutes, in both their private-label products and the brand-name canned foods they sell. Purchasing canned food is a "buyer beware" situation for consumers.

The canned food industry landscape is riddled with hazards: Even though most national brands — and a number of private-label retail brands — are now boasting some BPA-free canned foods, few are labeling their products BPA-free, with the notable exception of

In aggregate, 62 percent of retailers' private-label canned food tested positive for BPA-based epoxy resins. Equally worrying is the fact that most dollar stores—a mainstay for low-income families—also continue to sell canned food lined with BPA.

Amy's Kitchen and Eden Foods. No manufacturer is labeling which of its canned foods *are* lined with BPA epoxy. Furthermore, only a handful of manufacturers are publicly disclosing the BPA alternatives they are using, and to date no manufacturers have publicly disclosed safety data on the chemical composition of the BPA-free can-lining alternatives they're using. This lack of data on the safety of BPA alternatives is a major concern. Consumers want to know that replacement can linings do not have the same hormonally active properties inherent in BPA can linings.

Research demonstrates that removing BPA from food packaging will significantly reduce the levels of BPA in people. A peer-reviewed study conducted by the Breast Cancer Fund and Silent Spring Institute and published in *Environmental Health Perspectives* (2011) documented an average decrease of 66 percent in BPA levels when study participants were provided with food that had not come in contact with BPA-containing food packaging, such as canned food and edibles packaged in polycarbonate plastic.

The canned food industry is hearing — loud and clear — that consumers and health experts are concerned about the use of BPA in food packaging. According to a 2013 article in Chemical and Engineering News,[3]

> In the past decade, consumers and health experts have raised concerns about the use of BPA in food packaging. The molecule has a shape similar to [that of] estrogen and thus may act as an endocrine

disrupter. The chemical industry and makers of metal food packaging contend that BPA is safe. But for food companies, pleasing consumers is a high priority, and most are eager to move away from packaging based on BPA. Coating manufacturers and their suppliers are working overtime to find a replacement for the ubiquitous epoxies, which are made by reacting BPA with epichlorohydrin. A review of patent filings and regulatory approvals shows that dozens of substances are in the pipeline. They are being developed by paint firms including Valspar, PPG Industries and AkzoNobel, and by chemical firms such as Eastman Chemical, Cytec Industries, and Dow Chemical.

The $80 billion global canned food market is huge and growing, so why aren't manufacturers and retailers doing more to get BPA out of people by removing it from the lining of canned foods, and why aren't they safeguarding our health by ensuring BPA substitutes are safe?

The $80 billion global canned food market is huge and growing, so why aren't manufacturers and retailers doing more to get BPA out of people by removing it from the lining of canned foods, and why aren't they safeguarding our health by ensuring BPA substitutes are safe?

This same trade journal suggests that even the industry knows consumers are going to be skeptical of the safety of any BPA-alternative can lining: "Chemical and coating companies know that any substitute they propose will be carefully scrutinized by watchdog groups … [P]henolic compounds like those used to cross-link resins may also be implicated as endocrine disrupters; and, in addition, consumers wary of BPA are not likely to embrace vinyl-based replacements."[4]

Our research revealed that can-lining suppliers are not providing their customers full ingredient disclosure or safety data on the chemicals in the can linings they're buying, making it impossible for food companies and retailers to be fully transparent with the public about the safety of their canned food. This lack of disclosure puts both business and consumer health at risk. Can-lining suppliers need to see themselves as part of the solution by publicly disclosing the chemical composition of their BPA-alternative can linings, and by ensuring that these materials have been rigorously assessed for their impacts on environmental and human health. This entails gathering and sharing data concerning their material's potential to disrupt our hormonal system — which is what first launched BPA into the scientific spotlight — and its contribution to additional long-term adverse health effects such as cancer and reproductive harm. Without such disclosure we have no way of knowing if BPA alternatives are, in fact, safe. In this age of growing consumer demand for ingredient and safety transparency and disclosure, dialogue with their downstream users and buyers is no longer just an option for suppliers of food can linings — it is essential. In the face of supplier stonewalling, manufacturers and retailers should work together to demand accountability from supply chains that are currently denying them — and consumers — the transparency they want and deserve regarding the identity and safety of the chemicals used to line food cans.

Why have we produced yet another report on BPA in food packaging? This report is meant to serve as a wake-up call for national brands and retailers who are jumping from the frying pan into the fire by eliminating BPA in favor of regrettable substitutions. Consumers want BPA-free food cans that are truly safer, not food cans lined with materials comprised of known or possible carcinogens, such as vinyl chloride (used to make PVC) or styrene (present in some acrylic coatings). Tools such as the GreenScreen® for Safer Chemicals are increasingly being used by industry leaders in the electronics, apparel and building sectors to find safe substitutes for hazardous chemicals. Watchdog groups including the authors of this report are now calling on the canned food industry to adopt the practices of these industry leaders: Make full ingredient disclosure, and conduct publicly transparent hazard assessments of BPA-replacement chemicals using the GreenScreen® for Safer Chemicals, to ensure that they are safe for human health and the planet.

I. Bisphenol A: Science, Health Effects and Food-Based Exposure

BPA is a synthetic estrogen that is recognized as an endocrine-disrupting chemical because of its effects on hormone systems. Studies raised concerns that exposure to even low doses of the chemical may increase the risk of breast and prostate cancer, infertility, type-2 diabetes, obesity and attention deficit hyperactivity disorder. The doses in question, measurable in parts per billion and even parts per trillion, are comparable to the amounts an average person can be exposed to through canned food packaging.

Data from the U.S. Centers for Disease Control and Prevention indicate that 93 percent of Americans[5] tested have detectable levels of BPA in their urine[6,7], suggesting that people are consistently exposed and re-exposed to BPA through the chemical's presence in foods and from other sources. BPA has been detected in breast milk, amniotic fluid and umbilical cord blood, suggesting that babies are exposed to BPA as newborns and even before they are born, during critical windows of development and vulnerability.[8]

A BRIEF HISTORY OF BPA

First synthesized in 1891, BPA re-emerged 40 years later when Edward Charles Dodds, a London chemist and physician, was working to develop estrogenic pharmaceuticals. He discovered BPA's estrogenic properties, and the chemical was briefly considered for use in estrogen-replacement therapy until Dodds synthesized a more potent estrogen, diethylstilbestrol (DES), in 1938.[9] Soon chemists discovered that BPA was also extremely useful as a building block for polycarbonate (PC) plastics and epoxy resins, which rapidly led to this estrogenic chemical becoming one of the most ubiquitous chemicals in modern life. Since the early 1960s, BPA has also become a mainstay of the American diet. That's largely because many food cans are lined with epoxy resin made with BPA.

HEALTH EFFECTS

BPA exposure at levels approaching those that can occur from consuming multiple servings of canned foods, especially those with higher levels of BPA, have been shown to result in adverse health effects. These include abnormalities in breast development that can increase the risk of developing breast cancer, and harmful effects on reproductive development, prostate weight, testis weight, puberty onset, body weight, metabolic and immune system functions, and gender-related behaviors including aggression and some social behaviors.[10, 11, 12, 13, 14, 15, 16, 17,18] The risk of these effects is heightened in the case of prenatal and early-life exposures to BPA, when organs are developing, rapidly growing and differentiating. This raises concerns about pregnant women consuming large amounts of canned foods.

PRENATAL EXPOSURE

The fetus is exposed to BPA during prenatal development through the mother's bloodstream. While the mother's body partially metabolizes BPA before it reaches the fetus, strong evidence indicates that the placental barrier does not protect the fetus from exposure to the active, estrogenic form of BPA. Relevant animal studies[19, 20, 21, 22, 23] have detected the active form of BPA in fetal tissues, documenting the transfer of BPA across the placenta, and human studies document the presence of BPA in various maternal and fetal fluids and tissues.[24, 25, 26, 27, 28, 29, 30, 31] A 2013 study in rats found that fetal serum levels of active BPA were about 50 percent of the levels found in the mothers.[32]

There is mounting evidence from laboratory animals linking BPA exposure in the womb and in early infancy to later-life health effects including

93 percent of Americans tested have detectable levels of BPA in their urine, suggesting that people are consistently exposed and re-exposed to BPA through the chemical's presence in foods and from other sources.

breast cancer, prostate cancer, metabolic changes, decreased fertility, neurological problems and immunological changes. Significantly, many of these studies show negative health effects from low-dose BPA exposure, with most documenting effects at doses much lower than the EPA-designated "safe dose" for BPA (50 µg/kg body weight/day).[33] A 2015 animal study found that low-dose exposure during gestation to BPA and bisphenol S (BPS), a common analog used in BPA-free thermal receipt paper, was associated with hyperactive disorders such as ADD and ADHD, later in life.[34] Another laboratory animal study found that embryonic exposure to low levels of both BPA and BPS negatively affects neural functionality into adulthood and can cause decreased fecundity of the offspring.[35]

BREAST CANCER

With regard to breast cancer, laboratory studies have demonstrated that BPA alters mammary gland development in rats and mice.[36, 37] Because rodent mammary gland development follows a trajectory similar to that of humans, these studies are considered relevant for human breast cancer. Prenatal exposures of rats and mice to BPA have also been shown to result in precancerous growths and mammary tumors.[38, 39, 40] A 2013 study found that exposure to BPA prenatally and perinatally (soon after birth) alters mammary gland development and results in abnormalities that manifest during adulthood.[41] Altered mammary gland development from prenatal BPA exposure may lead to an increased risk of mammary tumors.[42] Recent research found that when pregnant mice drank water laced with BPA at environmentally relevant doses, it altered the long-term hormone response of their offspring in ways that could increase the offspring's risk for developing mammary tumors.[43] Furthermore, when scientists exposed human cell cultures to BPA, they observed increased breast cancer cell proliferation and damage to DNA.[44, 45] In 2015, the Endocrine Society released its second statement on endocrine-disrupting compounds in which it identified BPA as an endocrine-disrupting chemical (EDC) having one of the strongest associations with impaired mammary development.[46] Even more worrisome, recent evidence from studies of cultured breast cancer cells indicates that BPA exposure may reduce the efficacy of chemotherapeutic and hormonal treatments for breast cancer.[47, 48, 49]

PRINCIPAL ROUTE OF BPA EXPOSURE: FOOD PACKAGING

BPA is a chemical used to make, among other things, the epoxy-resin linings of metal food cans. The epoxy lining forms a barrier between the metal and the food, which helps create a seal, keeping the food safe from bacterial contamination. But while BPA-based epoxy resins solve one food safety problem, they unfortunately create another, as BPA can leach from the resin, make its way into food, and ultimately end up in our bodies.[50] Why does BPA leach from the epoxy-resin can liner? The prepolymer for this resin is usually formed using two chemicals, BPA and epichlorohydrin.[51] When these two molecules bind, the resulting copolymer can be incomplete and contain BPA that is not bound to the can lining. As a result, can linings can contain unreacted, free BPA, which migrates from the liner into food.[52] In addition, because BPA is lipophilic, or fat-seeking, it tends to leach more into fatty foods.[53] Although BPA has also been found in non-canned food sources, the most comprehensive review to date found most exposure is from canned foods. [54] After aggregating the results of tests of 300 canned food products, the Breast Cancer Fund demonstrated that canned foods that are salty or fatty, such as soup, meals (e.g., ravioli in sauce) and vegetables, tend to have the highest BPA content.[55]

In March 2011, the Breast Cancer Fund and Silent Spring Institute published a groundbreaking study in *Environmental Health Perspectives* providing clear and compelling evidence that food packaging is a major source of exposure to BPA.[56] For that study, five families were provided with fresh food — not canned or packaged in plastic — for three days. The effect was significant. While the families were eating the food that was not packaged in BPA-containing materials, their BPA levels dropped an average of 66 percent. When the families returned to their regular diets, their BPA levels returned to their pre-intervention condition. This study suggests that removing BPA from food packaging will eliminate a significant source of BPA exposure.

Lower-income communities may be at greater risk of exposure to BPA in canned food. Research has uncovered a relationship between household income and BPA exposure, showing that people with the highest BPA exposure were from the lowest income groups.[57] This data may be attributed to the fact that canned foods are cheaper, last longer and are more readily available than fresh foods in low-income neighborhoods.

OTHER CHEMICALS ALSO LEACH OUT OF BPA-BASED EPOXY CAN LININGS

Much less studied than BPA are the many other materials in epoxy can linings. These chemicals can also migrate into food. A 2004 study, for example, found trimellitic acid — a toxic chemical used as a cross-linking agent in some BPA-based epoxy resins — migrating into food from can coatings in amounts far exceeding the European safety threshold.[58]

In an effort to develop more stable epoxy resins, a 2015 study[59] funded by Valspar and Heinz investigated the migration of melamine — also used as a cross-linking agent — from BPA-based epoxy can coatings into food. Interestingly, the study also found that a portion of the melamine migrating out was actually from the breakdown of the coating rather than from the leaching of unreacted monomer.

This contrasts with BPA, in which the migration into food results from unreacted molecules of BPA; instead, with melamine, the lining breaks down over time and migrates into food.

II. The Safety of BPA Alternatives

Growing concern about BPA's adverse health impacts has increased consumer demand for BPA-free products and packaging. As science and consumer pressure increased, manufacturers and retailers began to replace BPA in water bottles and baby bottles with a host of unknown BPA alternatives. Soon after, when data emerged that BPA was also found in thermal receipt paper, businesses began switching to paper containing BPS, a classic case of "regrettable substitution" in which the replacement chemical was similarly estrogenic and as toxic as the chemical it was replacing. Analyses of alternatives for both plastic bottles and receipt paper revealed concerns about the safety of many of the BPA replacements.[60, 61]

Identifying and assessing the safety of BPA alternatives in food cans has proven more challenging, largely due to inadequate data requirements by the FDA and highly protected trade secrets in this product sector.[62]

When data emerged that BPA was also found in thermal receipt paper, businesses began switching to paper containing BPS, a classic case of "regrettable substitution" in which the replacement chemical was similarly estrogenic and as toxic as the chemical it was replacing.

FDA REGULATION OF INDIRECT FOOD ADDITIVES AND FOOD CONTACT SUBSTANCES IN FOOD PACKAGING

The U.S. Food and Drug Administration (FDA) is the regulating agency for all food contact materials, including BPA. The FDA maintains a list of more than 3,000 chemicals and other substances that are approved for use in food packaging and reusable food containers. These are considered "indirect food additives," because they are not purposely added to food but rather may migrate into food from the final packaging, from storage containers or during the manufacturing process. More than two-thirds of them were approved under a petition-and-review process that began in 1958, including known or suspected carcinogens such as formaldehyde. Food packaging additives that were approved under this process are not subject to regular re-evaluation, despite advances in food and chemical safety.

BPA was approved by the FDA under the petition-and-review process in the early 1960s, based on limited data and the science at the time. Substances in food and beverage packaging approved under this old process, using now-outdated science, are not subject to regular re-evaluation despite significant advances in food and chemical safety. Once an additive is approved, even if that approval was based on science from over 50 years ago, any manufacturer of food or food packaging may use it for the approved purpose. Moreover, the same substance could be used for a different purpose with no requirement to notify the FDA.

The remaining one-third of chemicals in food packaging have been approved since 2000, when the FDA began the Food Contact Notification program, which requires industry to notify the agency of a proposed use of a new chemical (or a new use of a previously approved

chemical) and wait 120 days before marketing it. If the FDA does not object in writing, the new packaging formulation can be used in production. Some safety data is required, based on the estimated level of exposure; however, testing is inadequate and does not take into account endocrine-disrupting properties of the proposed food contact substance or dangers from low-dose exposures.

Both of the regulatory regimes that govern the use and safety of these substances fall short of what is needed to ensure that the chemicals approved for use in food packaging are truly safe for consumption. For example, toxic chemicals of high concern such as polyvinyl chloride (PVC/vinyl plastic) and phthalates (some of which have been banned in toys) are approved for use in food packaging. Direct food additives such as preservatives are required to be labeled, but indirect food additives and food contact substances are not required to be labeled or disclosed to the public, even though these chemicals can leach into food and then into people.

FDA-APPROVED BPA-ALTERNATIVE FOOD CAN LININGS

We reviewed Food Contact Substance Notifications submitted from 2010 to 2015 to identify those intended for use in metal coatings for cans. The start date, 2010, was the year the FDA reversed itself, joined other federal health agencies in expressing "some concern" over BPA safety, and publicly supported industry taking action to remove BPA from baby bottles, feeding cups and the lining of formula cans and other food cans. It was also the year that Heinz removed BPA from cans sold in Australia, the U.K. and Ireland.[63]

Substances registered with the FDA for use in cans or metals included the following:

1. Acrylic resins and precursors: Many of these are copolymers that contain multiple acrylates and styrene.
2. Phenols: These include Bisphenol A, Bisphenol S and Bisphenol AF.
3. Plant-based resins such as oleoresin and isosorbide.
4. Polyester precursors and additives: These are a very diverse group of chemicals, including monomers and cross-linkers.
5. PVC-based coatings (vinyls and vinyl additives).
6. Miscellaneous compounds, including nylon, hydroquinone and others.

See Appendix Table 1 for the full list of registered compounds by category.

Note: It is possible that our research did not capture the full scope of possible BPA alternatives being used to line food cans, because some materials may

Table 1: Summary of can coating types and their potential hazards

Coating type	# of substances associated with coating type in FCN database	Maximum percentage by weight in can coating	Key precursors and additives	Potential health concerns associated with any single substance or monomer in this category
Acrylic resins and precursors	12	10–25%	Styrene, ethyl acrylate and other acrylates	Cancer, endocrine disruption, reproductive toxicity, neurotoxicity, respiratory toxicity
Plant-based resins	2	n/a	Unknown	Unknown
Polyester precursors and additives	19 additives for use with polyesters	1.3–54%	n/a	Cancer, endocrine disruption, reproductive toxicity, neurotoxicity, respiratory toxicity
PVC-based coatings (vinyls and vinyl additives)	3	12%	Vinyl acetate, vinyl chloride	Cancer
Unspecified	8	6–15%	Latex, silicone, hydroquinone	Cancer, respiratory toxicity

have been registered as "indirect food additives" decades ago — which allows for their continued use for the pre-approved purpose — or have been registered as Generally Recognized As Safe (GRAS) chemicals, and are therefore not listed with full chemical identities through the Food Contact Substance Notification Program.

HEALTH EFFECTS OF BPA ALTERNATIVES

Overall, very little data exists in published scientific literature regarding the health effects of the BPA epoxy replacements for food can linings investigated in this report. Since safety data submitted by businesses to the FDA is only available through a Freedom of Information Act (FOIA) request — an arduous legal process in which much data is redacted because of aggressive confidential business information claims —, it is difficult for the public to access safety data for these chemicals. This, combined with the lack of transparency from companies regarding which substances they are actually using in food can linings, creates significant limitations on what we can say about the safety of the compounds being used to replace BPA-based coatings.

Acrylic resins

Many acrylates may be hazardous for workers if they are exposed via inhalation when preparing or applying acrylic-based can linings. Styrene, which is also a constituent of many of these copolymers, is listed as a "reasonably anticipated human carcinogen" by the National Toxicology Program (NTP)[64] and as a "possible carcinogen" by the International Agency for Research on Cancer (IARC).[65] Styrene is also considered an endocrine disruptor by the European Commission on Endocrine Disruption.[66] It is not clear whether styrene from these copolymers is likely to leach into foods.

Phenols other than BPA

Many bisphenols exist, and several of these are used as replacements for BPA in thermal receipt paper. The only non-BPA phenol registered for use in food packaging, b AF, appears to affect a number of hormonal systems — it is estrogenic,[67, 68] can be anti-estrogenic at some concentrations,[69] and may also inhibit testosterone production.[70] Various additives may also be used in phenols, and these are likely to leach from the linings. One study found that trimellitic acid, a chemical linked to adverse effects on the immune system and lungs, leached from the phenol-based lining of b A diglycidyl ether-type coatings.[71] Another study found that when melamine is used in can linings and seals, it is also likely to migrate into food due to breakdown of the coating.[72] Both trimellitic acid and melamine are used as cross-linking compounds.

Plant-based resins

Oleoresin and other plant-based resins are likely derived from fir or juniper trees. Beyond this, very little is known about the process by which these compounds are prepared for use in food cans or whether any other chemicals are added. As a result, we have no reliable data attesting to the safety of these compounds.[73]

Polyester resins

Polyesters are a class of polymers made from polyalcohols and dicarboxylic acids or diesters. Many different monomers can be used to make different versions of polyester. Polyester *resins* are polyesters that have been cured, or hardened, with a cross-linking additive. As a class, polyesters typically show good stability and low toxicity. However, little is known about the additives used to make polyester resins for food can linings. At least 19 diverse chemicals are registered with the FDA as possible monomers or additives for polyester resins. Safety data is limited or nonexistent in most cases.[74] The combination of melamine and formaldehyde is one possible cross-linking agent used in polyester resins. It is worth noting that a recent study reported that melamine migrated into food from BPA-based epoxy coatings cross-linked with melamine-formaldehyde.[75]

Due to more comprehensive chemical regulations in Europe, some polyester additives are being tested in the EU. One example is tricyclodecanedimethanol, which does not appear to have mutagenic effects but does show some evidence of reproductive toxicity.[76] Similarly, isophorone diisocyanate did not demonstrate mutagenic effects, but prenatal exposures may impact respiratory tract development.[77] Some evidence also suggests that the additive tripropylene glycol may be linked to respiratory disorders[78] and cancers of the lung.[79]

Vinyls

Two types of vinyl — vinyl acetate and polyvinyl chloride — are registered for food contact.

- Vinyl acetate is an occupational concern, primarily based on possible acute irritation of the eyes and respiratory tract; some of these effects may become chronic.[80] IARC classifies vinyl acetate as possibly carcinogenic to humans.[81]

- Polyvinyl chloride (PVC) is created from repeated monomers of vinyl chloride, which is considered a known human carcinogen by both IARC[82] and NTP.[83] While PVC as a pure polymer does not itself have health concerns, studies have found that vinyl chloride may leach from PVC containers[84] and pipes[85] into drinking water.

Indeed, PVC's life cycle — from production to finished product to disposal — uses and releases hazardous chemicals including chlorine gas, vinyl chloride, ethylene dichloride, mercury, chlorinated dioxins and furans, phthalates, lead, cadmium, flame retardants, BPA, PCBs, hexachlorobenzene and other chlorinated byproducts.[86]

PVC-based resins in can coatings may contain a variety of additives. Information is needed on the additives, their specific uses and their leaching potential. Additives commonly found in other PVC products include phthalates, organotins, lead, cadmium, chlorinated and brominated flame retardants, and even BPA.[87, 88, 89, 90, 91, 92, 93] These additives can make up as much as 60 percent of a product by weight.[94] Given the life-cycle hazards of PVC, it is clearly a regrettable substitute for BPA-based resins.

III. Manufacturer and Retailer Can Lining Surveys

The Breast Cancer Fund's Cans Not Cancer Campaign surveyed 13 well-known canned food manufacturers to better understand their current use of BPA and BPA alternatives, their timelines for moving away from BPA, and whether they had conducted a GreenScreen® or other alternatives assessment of their can lining.

The surveys asked each manufacturer and retailer the following questions:

1. *Do you use bisphenol A (BPA) to line your canned foods?*
2. *If so, do you have a timeline and plan in place to phase out your use of BPA? Please describe and/or attach any policy you have in place.*
3. *What percentage of the canned food that you manufacture contains BPA?*
4. *If you are not using BPA, what chemicals and chemical additives are used in your canned food linings (e.g., vinyl, oleoresin, etc.)?*
5. *Have you or your suppliers conducted an alternatives assessment (using a tool such as the GreenScreen® for Safer Chemicals) of the BPA-alternative chemicals used to line your canned foods?*
6. *Who supplies your canned food linings?*

MANUFACTURER CAN LINING SURVEY FINDINGS

Companies surveyed represent a wide variety of foods (organic and conventional), lining needs (high and low acidity threshold), and use of BPA and BPA alternatives in their can linings. We sent the survey by email and Federal Express to the following 13 companies, with multiple email follow-ups: Amy's Kitchen, Annie's Homegrown, Campbell Soup, ConAgra Inc., Del Monte Foods, Eden Foods, General Mills, Hain Celestial Group, H.J. Heinz, Hormel Foods, McCormick & Company, Nestlé, and J.M. Smucker Company.

Twelve surveys were returned; no response was received from H.J. Heinz Company. See below for a chart of the survey responses. The complete survey responses can be found at toxicfoodcans.org.

The survey results demonstrated a range in industry willingness to publicly disclose 1) which canned foods are currently lined with BPA epoxy, 2) specific timelines for phasing out BPA, 3) the identification of BPA alternatives being used, and 4) assessments conducted to substantiate claims of health and safety of BPA-alternative chemicals used to line their canned foods. By and large, BPA is still quite prevalent in the market, and shifts to BPA alternatives have been adopted mostly by smaller companies, with the notable exception of ConAgra.

While many companies continue to use BPA-based epoxy to line their canned food, other companies are actively moving away from BPA. ConAgra foods is the only large company which has completely switched to non-BPA liners, while Campbell's, McCormick and Nestlé have set goals to transition out of BPA use by 2016 or 2017. Del Monte's website asserts that as of 2016, it now has the capability to convert 100 percent of its branded fruit and tomato products, and nearly 100 percent of its branded vegetable products to non-BPA linings. However, the company has not stated when this process will officially begin or how long it will take. Amy's Kitchen, Annie's Homegrown and Hain Celestial Group have successfully moved away from BPA use for their products. Eden Foods

uses BPA-based epoxy to line 5 percent of its canned foods. Among the manufacturers that have moved to BPA-free linings, the alternatives most commonly mentioned by the surveyed companies are polyester, acrylic and oleoresin. There was no mention of a timeline to move away from BPA use by Del Monte Foods, General Mills, H.J. Heinz, Hormel or J.M. Smucker Company.

Of the 13 manufacturers surveyed, only four reported the name of their can and can-lining suppliers (Annie's Homegrown, Campbell Soup, ConAgra Foods and Eden Foods); all others declared this information proprietary.

We have learned from our conversations with some manufacturers that their suppliers and their trade associations are holding a tight grip on the information they need to achieve the level of transparency the public wants regarding ingredient disclosure and safety information. In a detailed response to our survey, Eden Foods explained that the company tried to initiate a dialogue in the 1990s with the American Canning Association and Can Manufacturers Institute to better understand the composition and safety of their can coatings, but their efforts were stymied. In its survey response, Eden Foods said these professional organizations showed a "*seemingly orchestrated collusion amongst them in their efforts to spin and dismiss us.*" Eden Foods persisted in pushing its suppliers for greater transparency and were told that it had no right to receive information the suppliers considered proprietary and a "trade secret." Unfortunately, without this information, Eden Foods and other canned food manufacturers cannot provide the level of ingredient disclosure and safety assurances that consumers are demanding.

In the 12 responses, only ConAgra and Nestlé stated that they have conducted safety assessments of the BPA alternatives they are using. ConAgra said all of its alternative linings had been evaluated for safety by a "3rd-party Academic Council" and its own scientific and regulatory affairs department, but included no information on how risk was assessed.

Nestlé reported the use of bioassays to test BPA-free packaging in line with the Guidance Document provided by the International Life Sciences Institute (ILSI). A nonprofit science organization, ILSI is staffed and funded by both the public and the private sector, with a 50 percent representation from industry and the other 50 percent from government and academia. It is based in Washington, D.C., but has various headquarters around the world, with European headquarters in Brussels, Belgium.

Eden Foods persisted in pushing its suppliers for greater transparency and were told that it had no right to receive information the suppliers considered proprietary and a "trade secret." Unfortunately, without this information, Eden Foods and other canned food manufacturers cannot provide the level of ingredient disclosure and safety assurances that consumers are demanding.

According to ILSI, bioassays are used as a risk-assessment tool for non-intentionally added substances (NIAS) and have no singular method. The bioassay process defined by ILSI focuses on in vitro studies testing for genotoxicity, endocrine activity and cytotoxicity, in conjunction with predictions based on current literature, processing conditions, known chemistry of intentionally added substances (IAS), and experience. There is no official process for how to perform a bioassay in either Europe or the United States. There are only guidelines, and laboratories doing the testing may use any combination of the previously listed methods to make recommendations regarding risk, both in hazard identification and in hazard characterization. Hazard identification is an evaluation of the adverse health effects a chemical substance is capable of causing (e.g., liver damage); hazard characterization determines how much of a

chemical is required to cause a toxic effect, and this predicts the levels of exposure at which risk is likely to be negligible or nonexistent.[95]

ILSI acknowledges that there are limitations with this type of testing due to data gaps, and that an exposure-driven risk assessment would be more realistic. With this in mind, it is difficult to know what exact process Nestlé took to assess risk, and what tests were or were not performed to determine the safety of their alternatives.[96]

WHAT ARE LEADING RETAILERS DOING TO ADDRESS BPA IN CANNED FOOD?

As part of this report, Safer Chemicals, Healthy Families' Mind the Store campaign and Environmental Defence (Canada) surveyed 13 of the largest grocery retailers in the United States and Canada to assess whether they have adopted policies to reduce or eliminate BPA in canned food and assess BPA alternatives. We sent letters to the top grocery retailers whose canned food goods were being tested by HealthyStuff.org. The letters (see sample) were sent by both postal mail and email. We then followed up with each of the retailers to ensure receipt of our original letters and requested a response by the deadline. The letters were sent to Albertsons (Albertsons and Safeway), Aldi, Fresh Co. (owned by Sobeys), Kroger, Loblaws, Meijer, Publix, Target, Trader Joe's, Walmart US, Walmart Canada, Wegmans and Whole Foods.

Our first-ever BPA survey of retailers found that:

Albertsons (Albertsons and Safeway), Kroger, Publix, Wegmans and Whole Foods are ahead of their competitors and have made progress in adopting policies to reduce the use of BPA in private-label canned food. Most notably, Whole Foods store brands "buyers are not currently accepting any new canned items with BPA in the lining material." This shows that retailers can work with private-label suppliers to reduce the use of BPA and develop a plan for a complete phase-out of BPA in canned foods. However, none of these retailers have timelines in place to complete a full transition away from BPA in canned food, nor have they required suppliers to conduct alternatives assessments of substitute materials to evaluate the potential hazards of BPA substitutes.

- Albertsons stated, "The Company's principal objective has been to find ways to limit the presence of BPA in several areas … Albertsons Companies has been working with our Own Brand product suppliers to identify acceptable alternatives to packaging containing BPA. It is our desire as a company to use BPA-free packaging for as many products as possible. We expect to make the transition on an ongoing basis as new options become commercially available … Albertsons Companies has been collaborating with our suppliers in exploring alternatives for our Own Brand products."
- Kroger stated, "Kroger recognizes that BPA is perceived as a chemical of concern by some customers. To address these concerns, Kroger is working with its suppliers to transition to non-BPA can liners in numerous categories. While we don't have a set timeline for all products, we continue to engage with suppliers to communicate our intent to transition to non-BPA liners." Kroger also directed us to the company's website, which states, "Kroger has begun a process that we believe will result in the removal of BPA in the linings of canned goods in all of our corporate brand items. We recognize that this transition will take time as our suppliers and manufacturers are still researching and testing feasible alternatives. This is a priority for our Company and we are moving forward with the transition as quickly as possible. In addition to our specific efforts with cans, Kroger is surveying all of our corporate brand food suppliers to determine if BPA is present in product packaging."
- Publix directed us to its website, which states, "Due to concerns shared by Publix and our customers, we initiated conversations with our Publix brand suppliers requesting information on alternatives to BPA in packaged food containers. This included requests for the evaluation of alternative linings that would achieve the same level of shelf life, sterilization and safety that linings with BPA provide. While some manufacturers were able to make this change, many suppliers of canned goods still have a thin lining containing a small amount of BPA to help maintain the integrity of the products. The FDA conducted a safety assessment between 2009 and 2013 and determined that dietary exposure to BPA in packaging with levels in the very low parts per billion ranges was well below the levels that would cause adverse health effects. In 2014,

the agency announced BPA is safe at the current levels occurring in food packaging. Regardless, Publix is committed to being a champion for our customers, and we will continue to work with our Publix brand suppliers to limit the use of BPA in food packaging."

- Wegmans stated, "A couple of years back, we asked that suppliers look for suitable alternatives to BPA. They have had some success and continue to work on this, but have also shared that this has been a difficult task and that different foods and shelf life expectations present unique challenges. Some Wegmans brand canned products are now packed in BPA 'non-intent' [produced without BPA]].cans and have been tested for shelf-life and product quality; progress is happening with other Wegmans brand products."
- Whole Foods stated, "We are working to transition to BPA-free packaging, but since every other manufacturer is also looking at the switch, supplies of BPA-free packaging are limited. In our store brands, our buyers are not currently accepting any new canned items with BPA in the lining material and we have transitioned many of our private label products to BPA-free packages."

Aldi, Target and Walmart responded to our survey indicating that they **do not** have policies to phase out BPA in canned food, unlike other competing retailers. This was surprising, particularly for Target and Walmart, as both retailers have developed more comprehensive chemical policies in other product categories.

- Target stated, "At Target, product and food safety is a top priority. The select Target Owned Brand canned products that utilize BPA in packaging meet current FDA standards, and Target requires its manufacturers to comply with federal and state governmental agency regulations (such as Proposition 65 in California). Target recognizes the need to satisfy the demands and expectations of our guests and the importance of staying informed of technical developments within the food industry that offer the potential to replace or minimize the use of BPA in food-contact packaging materials."
- Walmart stated, "While we are unable to participate in the survey, the information you shared gives us an important perspective and helps us determine what, if any, changes should be made to current practices. We will take this information into consideration as we continue to develop our policies and efforts."

"In our store brands, our buyers are not currently accepting any new canned items with BPA in the lining material and we have transitioned many of our private label products to BPA-free packages."

— Whole Foods

Fresh Co. (Sobeys), Loblaws, Meijer, Trader Joe's and Walmart Canada did not respond to our surveys in time for publication, despite our outreach and follow-up.

Meijer did reply to indicate that it has made progress eliminating BPA in other products besides canned food, but did not respond to our survey questions about canned food.

- Meijer stated, "We are a privately held company and do not complete surveys that require us to share what we would consider proprietary information. What I can tell you is that Meijer has forbidden our suppliers from using BPA in any Meijer brand infant formula or baby food plastic containers, baby food jars or cans, reusable food or beverage containers including lids, baby bottle liners, pacifiers or straws. Additionally, our current environmental sustainability plan includes relevant goals regarding Chemicals & Toxics with targets to reduce chemicals and toxics across the value chain, including BPA."

None of the retailers we surveyed had clear timelines to phase out BPA in their private-label canned foods, unlike some of the national canned food brands we surveyed. Nor did any of the retailers we surveyed report that they have conducted alternatives assessments for BPA-alternative canned food materials. However, some of the retailers indicated their suppliers have tested the alternatives or evaluated the

alternatives in some manner for safety:

- Albertsons stated, “The process of identifying BPA-free packaging alternatives is time-consuming and complex. We must do our due diligence to ensure that our decisions are based on sound scientific data and that all packaging alternatives are safe and viable. Food safety is a critical company priority. BPA-free packaging alternatives are being researched by the most knowledgeable authorities within Albertsons Companies and the retail food industry.”
- Kroger stated, “Our suppliers conduct rigorous testing on BPA can-lining alternatives to ensure product safety, product quality and shelf life are not compromised.”

Supplies of BPA-alternative can linings may be limited for some retailers and brands. Whole Foods, for example, noted that, “Whole Foods Market represents a very tiny slice of the overall canned goods manufacturing market, so our leverage to access the limited supplies of BPA-free cans is small. Our hope is that with the guidance from the FDA and increased demand from manufacturers for alternatives, companies will be encouraged to increase production of alternate materials. We are committed to continuing to search for the safest and most functional packaging materials for our stores.”

Aldi, Target and Walmart responded to our survey indicating that they do not have policies to phase out BPA in canned food, unlike other competing retailers. This was surprising, particularly for Target and Walmart, as both retailers have developed more comprehensive chemical policies in other product categories.

See the table 3 for a summary of the retailers’ responses to our survey. The full retailer responses we received can be found at toxicfoodcans.org.

Table 2: Manufacturer response to survey questions

Manufacturer	Currently using BPA in canned goods?	Currently using a BPA alternative in canned goods?	Goal to phase out of BPA use?	Timeline in place to phase out BPA?	Brands/Products with BPA or non-BPA liners?	Type(s) of BPA alternative(s) being used?	Has this company ever conducted GreenScreen® or other alternatives assessment of their can lining?
Amy's Kitchen	No	Yes	Yes, already achieved.	Phased out in 2012	all non-BPA	polyester, acrylic	No. There was no use of GreenScreen, and no listed safety assessment of ingredients
Annie's Homegrown	No	Yes	Yes, already achieved.	Phased out in 2012	all non-BPA	polyester, acrylic	No. There was no use of GreenScreen, and no listed safety assessment of ingredients
Campbell Soup	Yes	Yes	Yes	Full-scale conversion within 12-24 months	NA*	NA	No. There was no use of GreenScreen, and no listed safety assessment of ingredients
ConAgra Foods, Inc.	Yes	Yes	Yes	Yes — has phased out all U.S. cans from BPA, and is working to move to non-BPA liners in cans from outside the U.S. and Canada by 2016	All U.S./Canada products are non-BPA, imported products like LaChoy (bamboo shoots, water chestnuts) and Libby's (corned beef and beef and gravy) still use BPA liners	polyester, acrylic	ConAgra states their BPA alternatives were reviewed by an 3rd party academic council, but they have not used the GreenScreen or shared their data criteria for safety
Del Monte Foods	Yes	NA	NA	NA	NA	NA	No. There was no use of GreenScreen, and no listed safety assessment of ingredients
Eden Foods, Inc.	Yes, in 5% of products	Yes, in 95% of products-low-acid foods: beans, chili, and rice & beans.	Yes	No official timeline to move from BPA, but actively looking for alternatives	>95% low acid foods (canned beans, chilies, and rice & beans) have BPA-free linings, <5% high-acid items (tomatoes) use an epoxy with BPA	c-oleoresin	No. There was no use of GreenScreen, and no listed safety assessment of ingredients
General Mills	Yes	Yes	NA	NA	Muir Glen moved to a non-BPA liner	NA	No. There was no use of GreenScreen, and no listed safety assessment of ingredients
The Hain Celestial Group, Inc.	No	Yes	Yes	Phased out most products in 2014, actively looking for alternatives for 2 products with no official timeline	Phased out of use in 2014	modified polyester, modified acrylic, polyester enamel, oleoresin, and epoxy resin	No. There was no use of GreenScreen, and no listed safety assessment of ingredients
H.J. Heinz Company	No Response**	No Response	No Response	No Response	No Response	No Response	No Response
Hormel's	Yes	NA	NA	NA	NA	NA	NA
J.M Smucker Company	Yes	NA	NA	NA	NA	NA	NA
McCormick & Company, Inc.	Yes	NA	Yes	Working to eliminate BPA out of cans by 2017, and some products transitioning as early as 2016	NA	NA	No. There was no use of GreenScreen, and no listed safety assessment of ingredients
Nestlé S.A.	Yes	Yes	Yes	Started to remove BPA in 2009, and expect to have fully moved to BPA alternatives by the end of 2016	Carnation expected to be non-BPA by end of 1st quarter 2016, Libby's cans are expected to move to a non-BPA alternative by the end of 2016	polyester, others not described	Nestlé uses bioassays to test packaging extracts, and is in line with the Guidance Document published by the International Life Sciences Institute. It does not use the GreenScreen process.

*NA signifies no answer to our question
**No response signifies that we received no response to our survey

Table 3: Retailer policies on BPA and alternatives in canned food

Retailer	Currently using BPA in canned goods?	Currently using a BPA alternative in canned goods?	Goal to reduce or phase out BPA in canned food?	Timeline in place to phase out BPA?	Brands/Products with BPA or non-BPA liners?	Type(s) of BPA alternative(s) being used?	Has this company ever conducted a GreenScreen® or other alternatives assessment of their can lining?
Albertson's (Albertson's and Safeway)	YES	YES	YES	NO	O Organics soups	Aseptic pour cartons on some products	NA*
Aldi	YES	YES	NO	NO	NA	NA	NA
The Fresh Co. (Sobeys)****	NO RESPONSE**	NO RESPONSE	NO RESPONSE	NO RESPONSE	NO RESPONSE	NO RESPONSE	NO RESPONSE
Kroger	YES	YES	YES	NO	"All Simple Truth Organic canned products are packed in non BPA liners. 75% of our Banner Brand canned fruit has transitioned or is transitioning to non BPA liners by the end of 2015. Some Banner Brand canned vegetables have transitioned or are transitioning to non BPA liners by end of 2015, however, due to the acidity for some canned vegetables there currently isn't a viable alternative to BPA."	Oleoresin and non-epoxy can liners	NO
Loblaw	NO RESPONSE	NO RESPONSE	NO RESPONSE	NO RESPONSE	NO RESPONSE	NO RESPONSE	NO RESPONSE
Meijer	NA	NA	NA	NA	NA	NA	NA
Publix	YES	YES	YES	NO	NA	NA	NA
Target	YES	NA	NO	NO	NA	NA	NA
Trader Joe's	NO RESPONSE	NO RESPONSE	NO RESPONSE	NO RESPONSE	NO RESPONSE	NO RESPONSE	NO RESPONSE
Walmart US	NA	NA	NO	NO	NA	NA	NA
Walmart Canada	NA	NA	NA	NA	NA	NA	NA
Wegmans	YES	YES	YES	NO	"Some Wegmans brand canned products (such as, but not limited to, tomatoes, some vegetables, peaches, fruit cocktail, and apricots) are now packed in BPA non-intent cans (produced without BPA) and have been tested for shelf-life and product quality."	NA	NA
Whole Foods	YES	YES	YES	NO	"We have transitioned many of our private label products to BPA free packages, including our waters, our canned fish line, our coconut milks, our tomatoes, our canned pumpkin for the holidays, and new aseptic bean, soup, and broth packaging, and that number continues to increase as supplies of BPA free packaging increase."	Aseptic packaging	NA

*NA: signifies no specific answer to our question
** No response: signifies that we received no response to our survey

IV. Study Design and Experimental Methods

SAMPLE COLLECTION

Twenty-two nongovernmental organizations (NGOs) in 19 U.S. states and one province in Canada (Ontario) participated in our Canned Food Testing Report (Appendix). Each group was assigned between five and 16 canned foods to purchase, with retailers and national brands specified. A total of 192 cans were purchased from 22 retail stores, representing 17 retail companies. The cans included 68 brands from 44 food manufacturing companies. Purchasers filled out a can submission form indicating purchaser, date and retailer location. Receipts were saved and included with can submissions.

Cans were chosen to include samples representing the following categories:

- Top national and regional retailers, including dollar stores
- Retailer store private-label brands
- Top national brands
- Mainstream grocers, budget grocers, high-end grocers and dollar stores
- Canned food ingredients often used to prepare a holiday meal
- Tomato and bean products for all brands

This study included, for each selected retailer, at least one can each of 1) plain beans (pinto, black, garbanzo, etc.), referred to as "beans" in this report, and 2) tomatoes or tomato sauce. This allowed us to compare two commonly purchased food types, each with different requirements for can coatings due to their different properties, across multiple retailers and brands.

Cans were opened, emptied and cleaned of food residue. Dry cans were shipped to the Ecology Center, where testing took place. Individual cans were labeled with unique ID numbers. Product description information was recorded from the can label and logged in the HealthyStuff Hub at healthystuff.org. Photos of each can were taken.

The 192 cans in our sample set were a mixture of three-piece and two-piece cans. Three-piece cans are constructed of a cylindrical body and two lids (top and bottom). Two-piece cans, also known as drawn-and-redrawn cans, have a top lid, but no bottom lid. For both types of cans, we analyzed the coating inside each can body and top lid.

CAN COATING ANALYSIS

A common tool for determining the identity of unknown materials is Fourier transform infrared (FTIR) spectroscopy.[97] It has been used in thousands of applications, including criminal forensics and the analysis of polymeric coatings such as those used in food cans.[98, 99]

FTIR spectroscopy of a material records a spectrum. Each spectrum has a particular pattern specific to the chemical structure of that material.

In this study, we used a metal tool to scrape the coatings from the interior of each can body and, separately, from the can lid. The body and lid of the same can frequently have different coating types. Pieces of removed coating were placed on the sample stage of an infrared spectrometer (Thermo Scientific Nicolet iS5 in attenuated total reflection mode) and a spectrum was obtained. Thus, two spectra were obtained from each can.

A video showing a researcher preparing a can for analysis is available at www.healthystuff.org.

To avoid cross-contamination, the spectrometer stage and metal instruments were thoroughly cleaned with isopropyl alcohol after each spectrum was obtained.

To identify unknown coatings from the FTIR spectra we obtained, we needed a library of known spectra with which to compare the results. The ideal library, containing well-characterized coatings specifically for food cans, did not exist, so we developed our own. We did this by analyzing the coatings in more than 60 food cans in a pilot study prior to the present investigation. We grouped the resulting FTIR spectra into general categories based on characteristic spectral patterns of various polymer types. We identified five major coating types in the spectra of our pilot cans, listed in Table 4.

Within each of these coating types, with the exception of oleoresin, we observed subtle differences between some of the spectra. This indicated different chemical compositions within the major categories. We gave each subtype a name, listed in Table 4, and used a representative spectrum of each subtype for our custom library of can coatings. We then used this custom library to search for matches to the spectra from the 384 can bodies and lids analyzed for this report.

More detail about the FTIR method used is available at www.healthystuff.org

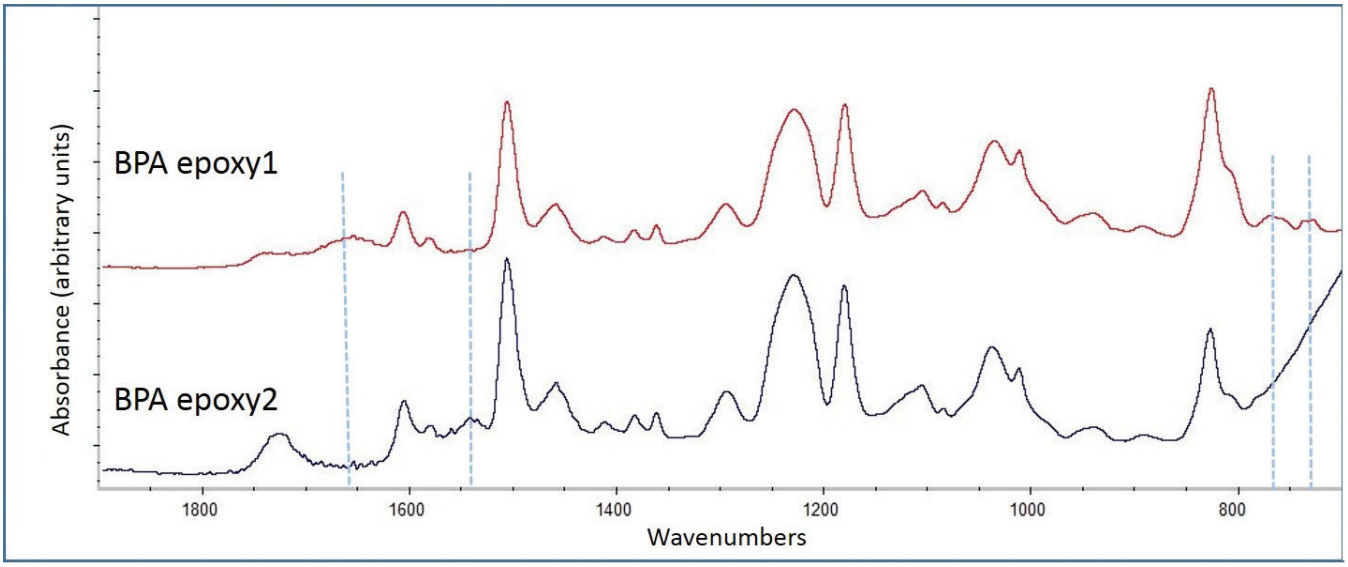
Table 4. Major coating types and subtypes identified by FTIR spectroscopy in this study

Major coating type	Subtypes
Acrylic resins	Styrene-Acrylic1 Styrene-Acrylic2 Acrylic3
BPA-based epoxy *	BPA epoxy1 BPA epoxy2
Oleoresin	Oleoresin
Polyester resins	Polyester1 Polyester2 Polyester3 Polyester4
PVC copolymers	PVC1 PVC2

* BPA is one of a chemical class called bisphenols. Spectral features unique to BPA in our FTIR data indicate that, in the cans we tested, these coatings are indeed based on BPA, not on other common bisphenols such as BPS or BPAF. The coatings we call "BPA-based epoxy" or "BPA epoxy" in this report are often called simply "epoxy resins" in other literature about canned foods.

Figure 1 shows an example of differences between the spectra of coating subtypes.

Figure 1: FTIR spectra of the two BPA-based epoxy subtypes.



The major peak patterns are the same. Regions in which the two spectra differ are indicated by dashed lines. The upward slope at the right-hand side of the BPA epoxy2 spectrum is from an inorganic oxide such as titanium dioxide or zinc oxide.

In most cases, we did not determine the specific chemical differences among these subtypes. The subtype differences are likely due to different monomers, cross-linking agents, or additives such as stabilizers. Definitions of these terms are given in Table 5.

Table 5. Definitions of terms

Term	Definition	Example
Monomer	A building block for a polymer. Monomers are small molecules that chemically link together into long chains to form a polymer.	BPA for BPA-based epoxy
Cross-linking agent or cross-linker	A chemical that causes polymer chains to connect to one another. This creates a strong network of chains.	Melamine-formaldehyde resin Phenol-formaldehyde resin
Additive	Any chemical added to the mix before applying the coating to the can. Additives can have many purposes, such as preventing reaction with food ingredients, aiding in the blending of ingredients in the liquid stage, or adding color.	Zinc oxide to react with sulfur compounds from fish during can processing. The sulfur compounds would otherwise give an unpleasant odor and color to the food.

A recent study[100] funded in part by Valspar Corporation and H.J. Heinz Ltd. gives a glimpse into the complexity of the chemical mixtures used for food can coatings. To make a coating called epoxy anhydride (an example of a BPA-based epoxy), the authors list 13 different chemicals that go into the mix:

Example of a can coating recipe [101]

- Epichlorohydrin-based polymer
- Carboxylic acid anhydride-based polymer
- Propylene glycol monomethyl ether acetate
- 2-n-butoxyethyl acetate
- Ethylene glycol monomethyl ether acetate
- Cyclohexanone
- A dispersing agent (no specifics given, but amines are commonly used)
- Titanium dioxide pigment
- 2-butoxy ethyl acetate
- One of four possible cross-linkers, three of which contain melamine
- A flow additive (no specifics given)
- Naphtha-light aromatic

It is important to note that not all of the above chemicals will remain unchanged in the coating once it is finished. The ingredients are first mixed together, then applied to the metal can and heated. This allows volatile chemicals to boil off and causes the coating to harden through chemical reactions. Nevertheless, residual chemicals left over from the starting mixture are routinely present in finished polymers, including hard coatings such as those in cans. BPA is one of those residual chemicals and is known to migrate into food.

We share this epoxy anhydride "recipe" to illustrate the complexity of coating formulations and, consequently, the difficulty of determining exactly what makes the coating subtypes we observed different from one another. In future work, we expect to further investigate the coating subtype spectra to better understand their chemical compositions.

Although FTIR was the primary instrument used in this study, a high-definition X-ray fluorescence spectrometer (HD XRF) made by XOS® was also used to investigate the coatings in certain cans. In particular, we used HD XRF to verify the presence of chlorine in coatings identified as containing PVC.

WHAT DO WE KNOW ABOUT THE COATING TYPES FOUND IN THE CANS?

Based on our evaluation of the FTIR spectra, combined with information about cans from the available literature, we summarize our knowledge of the coating types in Table 6.

Table 6. Descriptions of the coating types

Major coating type	Subtypes	Description
Acrylic resins	Styrene-Acrylic1 Styrene-Acrylic2 Acrylic3	Two of the coating subtypes contain polystyrene. It is not known if they contain residual styrene or other monomers. Several different monomers, all of which have health concerns, can be used to form acrylic-based resins.
BPA-based epoxy	BPA epoxy1 BPA epoxy2	These coatings use BPA as a starting ingredient, along with many other chemicals. Some versions include formaldehyde. Melamine-formaldehyde resins are sometimes used as cross-linkers.[102, 103] Melamine can migrate from can coatings into foods.[104]
Oleoresin	Oleoresin	Also called oleoresinous c-enamel. Plant oils, particularly tung oil and linseed oil, are blended with a hydrocarbon resin. The source of the hydrocarbon resin may be petroleum.[105]
Polyester resins	Polyester1 Polyester2 Polyester3 Polyester4	These are not the same as polyethylene terephthalate (PET) plastic, which is also called polyester. A large number of monomers can be used to form polyester resins. Melamine-formaldehyde resins or polyisocyanates, both of which have health concerns, are sometimes used as cross-linkers.[106]
PVC copolymers	PVC1 PVC2	PVC is blended with other polymers to make can coatings.[107] We did not determine the copolymers present. We used XRF to verify that these coatings contained the element chlorine, as expected for PVC. The possible plasticizers in the PVC-based can coatings were not identified. We did not see the spectral signature of phthalates in the coatings.

V. Findings

The full set of data from all cans is provided in the Appendix Table 2, including the coating subtypes (see Table 4) identified in each can body and lid. Table 2 in the Appendix is the only table in which the subtypes are specified.

As explained in Section IV, the interior body and the inside of the top lid of each can were analyzed by FTIR spectroscopy. Ninety-four of the 192 cans tested (49 percent) had the same coating on both the body and the lid. The other 51 percent had different coatings on the body and lid.

FOOD CATEGORIES TESTED AND PREVIEW OF RESULTS

The categories of food in the cans are listed in Table 7. Vegetables, fruits, soups, broth, gravy, milks, beans, tomatoes and soup were all included. Canned fish and meats were not, although pieces of meat were present in some of the soups. Corn and peas were grouped together, because they are both sulfur-containing vegetables and showed some similarities in coating types. In the two right-hand columns, Table 7 also lists the percentage of cans in which BPA-based epoxy was detected and the percentage with no BPA detected.

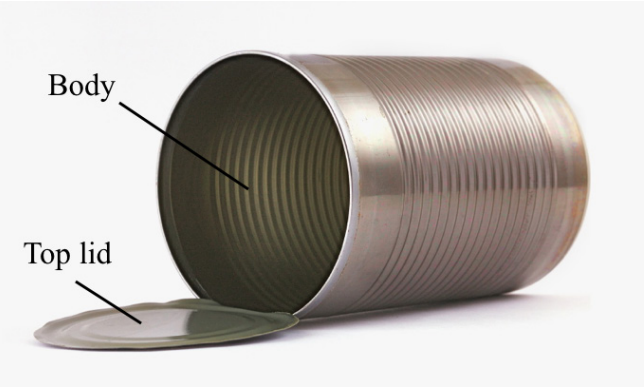


Table 7: Cans grouped by food category

Food type	Number of cans	Containing BPA-based epoxy	Not containing BPA-based epoxy
Broth & Gravy	15	100%	0%
Canned Milk (including coconut)	20	85%	15%
Corn & Peas	17	41%	59%
Beans	38	71%	29%
Fruit (including cranberry)	20	75%	25%
Green Beans & Other Vegetables	21	57%	43%
Pumpkins & Yams	10	50%	50%
Soup & Prepared Meals	24	79%	21%
Tomato Product	27	44%	56%
Total — All Cans	192	67%	33%

The major coating types in cans were combined in various ways

Table 8 summarizes the numbers of bodies and lids coated with each of the coating types identified by our FTIR analysis. The first five rows in the Coatings Identified column are “single” coatings, meaning not combined with another coating type: 1) Acrylic resins, 2) BPA epoxy resins, 3) oleoresin, 4) polyester resins and 5) PVC copolymers.

The next four coatings in Table 8 are two-coating combinations, with the words “resins” and “copolymers” eliminated for brevity: 6) BPA epoxy+acrylic, 7) BPA epoxy+oleoresin, 8) BPA epoxy+PVC and 9) polyester resin+PVC. Finally, two three-coating combinations were found in a number of can lids: 10) BPA epoxy+PVC+acrylic and 11) BPA epoxy+PVC+polyester.

Eight cans of fruit, all light-colored fruits such as peaches and pineapple, had uncoated bodies and coated lids. All eleven samples of canned cranberry sauce, also grouped into the "fruit" food type in Table 7, had coated bodies and lids.

Table 8: Distribution of coating types in can bodies and lids

	Coatings identified	Body	Lid
Single coatings	Styrene Acrylic Resins	6	0
	BPA Epoxy*	57	87
	Oleoresin	16	19
	Polyester Resin	23	33
	PVC Copolymer	13	14
Combination coatings	BPA Epoxy + Acrylic	68	6
	BPA Epoxy + Oleoresin	0	2
	BPA Epoxy + PVC	1	5
	Polyester + PVC	0	2
	BPA Epoxy + PVC + Acrylic	0	4
	BPA Epoxy + PVC + Polyester	0	20
	Uncoated	8	0
	Total	**192**	**192**

* BPA Epoxy is short for BPA-based epoxy.

Table 9 presents another way of showing the distribution of coatings. In it we list the percentage of cans containing each of the five basic coating types, regardless of whether the coating is singular or part of a combination. Overall, 67 percent of cans (129 of 192) contained BPA epoxy in the body, the top lid, or both. This count includes cans with two- or three-coating combinations such as BPA epoxy+acrylic. Table 8 shows that BPA epoxy was found as part of five different combinations.

Table 9: Distribution of coatings

Coating type	% of cans (n=192) *
Containing Acrylic Resin	41%
Containing BPA Epoxy	67%
Containing Oleoresin	11%
Containing Polyester Resin	30%
Containing PVC Copolymer	25%

*Many cans were coated with more than one of the above coating types. Therefore the percentages add up to more than 100%.

BPA epoxy resin has been standard in the industry since the 1960s because of its excellent adhesion, long shelf life and lack of odor or taste. In our sample set, BPA epoxy was frequently used as a single coating (30 percent of bodies and 45 percent of lids). It was also often combined with a styrene-acrylic resin (BPA Epoxy+Acrylic in Table 8, found in 68 can bodies, representing 35 percent of can bodies) and was occasionally found in combination with PVC and oleoresin.

Tables 8 and 9 show that acrylic resins were the second most common overall (in 41 percent of all cans); polyester resins (in 30 percent) and PVC copolymers (in 25 percent) were also relatively common. Styrene acrylic resins were detected as single coatings in only six can bodies but were much more commonly found combined with BPA epoxy. Oleoresin was the least common, detected in 11 percent of cans.

The most common three-coating combination was BPA epoxy+PVC+polyester. The three-coating combinations were detected only in can lids, not bodies.

In most cases, we did not investigate whether the two- or three-coating combinations were blends or layered coatings. In a blend, polymers are mixed together before coating. In a layered coating, the base coat or adhesion layer does not directly contact the food. This may be the case for some of the combination coatings containing BPA epoxy. Since epoxy adheres well to the metal can, it is sometimes used as a base coat with another coating on top. Future work on canned foods should include determining which combination coatings use BPA epoxy as a base coat rather than as a blend with another resin.

FOOD CATEGORY IS STRONGLY LINKED WITH CERTAIN COATING TYPES

Table 10 summarizes the distribution of coatings across food categories. It illustrates that certain coatings are more frequently used for certain food types. It also shows differences between the can bodies versus lids within each food category.

Key findings described in Table 10:

- BPA-based epoxy resin was the only coating type detected in some portion of all food categories tested. See Table 7 for a concise summary of BPA epoxy frequency.

Table 10: Can coating results by food category and can component (body and lid)

Food Category	Component	BPA Epoxy	Styrene Acrylic	Polyester	PVC Copolymer	Oleoresin	BPA Epoxy + Acrylic	BPA Epoxy + PVC	Polyester + PVC	BPA Epoxy + Oleo-resin	BPA Epoxy + PVC + Polyester	BPA Epoxy + PVC + Acrylic	Uncoated	No. Cans
Broth & Gravy	Bodies	40%	*				60%							15
	Lids	80%					13%				7%			
Canned Milk (incl. coconut)	Bodies	85%		15%										20
	Lids	45%		15%	5%		5%	10%			5%	15%		
Corn & Peas	Bodies	6%			12%	47%	35%							17
	Lids	12%		6%	6%	53%				6%	18%			
Dry Beans	Bodies	53%	3%	16%		11%	18%							38
	Lids	58%		18%		13%				3%	5%	3%		
Fruit (including cranberry)	Bodies	5%					55%						40%	20
	Lids	60%		20%				5%	5%		10%			
Green Beans & Other Vegetables	Bodies	19%		38%		5%	38%							21
	Lids	48%		38%		5%					10%			
Pumpkins & Yams	Bodies	20%		20%		30%	30%							10
	Lids	50%		10%		40%								
Soup & Prepared Meals	Bodies	13%	17%	4%			67%							24
	Lids	21%		21%	4%		13%	4%	4%		33%			
Tomato Products	Bodies	11%	4%	11%	41%		30%	4%						27
	Lids	37%		15%	41%			4%			4%			

*Blank cells indicate zero.

- The corn and peas category was the least likely overall to contain BPA-based epoxy resin, either as a single coating or in combination with another coating, and the most likely to contain oleoresin.
- Broth and gravy cans were the most likely overall to contain BPA-based epoxy. All broth/gravy can bodies were coated with either epoxy (40 percent of broth/gravy bodies) or an epoxy+acrylic combination (60 percent of broth/gravy bodies). Broth/gravy lids were 80 percent epoxy coated.
- Canned milks (including evaporated, sweetened condensed and coconut) also had a high frequency of BPA-based epoxy (85 percent of bodies and 45 percent of lids).
- PVC copolymers were used infrequently as single coatings except in tomato products: 41 percent of tomato can bodies and 41 percent of lids were coated with PVC. All other foods had a much lower frequency of PVC copolymer as a single coating. Several combinations with PVC, however, were detected in a variety of food types. In particular, the three-coating combination BPA epoxy+PVC+polyester was found in 33 percent of lids in the soup and prepared meals category and also in the lids (but not bodies) of several other food categories.

COATING TYPES USED BY DIFFERENT RETAILERS AND FOOD COMPANIES

Next, the data are separated by retail companies (Table 11) and food manufacturers (Table 12) to show the number of cans containing each type of coating. Note that many cans contained more than one coating type and that these combinations are not specified in Tables 11 or 12. Tables 11 and 12 illustrate that all retailers and nearly all food companies sold canned goods with a variety of coating types.

Table 11 also shows that 16 different food manufacturers (out of 44 sampled) are now using oleoresin coatings in at least some of their products. Oleoresin has been touted as a safe alternative to BPA-based epoxy, but we were unable to find information about residual monomers or additives, including their leaching potential from oleoresins.

Table 11: Can coating results by retail company

Retailer	Number of Cans Tested	Containing BPA-based Epoxy *	Containing Polyester Resins*	Containing Acrylic Resins*	Containing PVC Copolymer*	Containing Oleoresin*
99 Cents Only Stores	6	5	0	0	2	2
Albertsons (Albertsons, Safeway & Randalls)	25	16	10	9	13	0
Aldi Nord (Trader Joe's)	9	3	5	2	1	1
Anica Savoonga Native Store	4	2	3	1	2	0
Dollar General Corporation	14	9	1	0	3	4
Dollar Tree Inc. (Dollar Tree & Family Dollar)	19	15	7	5	6	0
Gordon Food Service	2	2	0	0	0	0
Kroger Co. (Kroger, Harris Teeter, & Fred Meyer)	38	24	14	14	14	3
Loblaws Inc.	8	5	1	1	3	2
Meijer Inc.	6	5	1	1	5	1
Publix Super Markets Inc.	7	5	1	2	2	1
Sobeys Inc. (FreshCo.)	6	6	0	0	3	1
Target Corporation	12	11	4	5	6	0
Safeway Inc. (Tom Thumb)	1	1	0	0	1	0
Wal-Mart Stores Inc.	22	17	4	5	13	2
Wegmans Food Markets Inc.	3	0	1	1	0	2
Whole Foods Market IP LP	10	3	5	2	4	2
Totals	**192**	**129**	**57**	**48**	**78**	**21**

* Many cans contained more than one coating type. Different coatings can be layered or blended and sometimes differ between the body and the lid of a single can. Therefore, the totals in the latter five columns add up to more than the total number of cans tested (192).

Table 12: Can coating results by food company

	Food Manufacturer Parent Company***	Number of Cans Tested	Containing BPA-based Epoxy*	Containing Polyester Resins*	Containing PVC Copolymer*	Containing Acrylic Resins*	Containing Oleoresin*
Nat'l Brand Companies in Top 100 U.S./Canada Food Companies**	Campbell Soup Company	15	15	3	3	15	
	ConAgra Foods Inc.	2		2	1	2	
	Del Monte Foods Inc.	14	10	9	8	5	
	Dole Food Company Inc.	1		1	1		
	General Mills Inc.	12	6	6	8	7	1
	J.M. Smucker Company	1	1		1	1	
	McCormick & Company Inc.	3	3			1	
	Nestlé S.A.	3	3				
	Seneca Foods Corporation	7	3	3		2	1
	Hain Celestial Group Inc.	1		1			
	Kraft Heinz Company	1	1			1	
Retail Companies with Private- Label Brands	Aldi Nord (Trader Joe's)	9	3	5	2	1	1
	Albertsons (Albertsons, Safeway & Randalls)	7	2	3	2	1	
	Dollar General Corporation	14	9	1	1	3	4
	Dollar Tree Inc	6	5	1		1	
	Gordon Food Service	2	2				
	Loblaws Inc.	5	4			3	1
	Meijer Inc.	6	5	1	1	5	1
	Publix Super Markets Inc.	6	4		1	2	1
	Supervalu Inc.	9	6	5	2	5	
	Target Corporation	5	5		1	1	
	Kroger Co.	21	13	8	6	6	2
	Wal-Mart Stores, Inc.	8	7		1	5	1
	Wegmans Food Markets, Inc.	3		1	1		2
	Whole Foods Market IP LP	5	1	3	1	2	1

Other Food Companies	Amy's Kitchen Inc.	1		1		1	
	Andre Prost Inc.	2	2		1		
	Choice Food of America Inc	1	1			1	
	Clement Pappas & Co. Inc.	1	1			1	
	Conservas La Costeña	1	1				
	E.D. Smith Foods Ltd.	1					1
	Eden Foods Inc.	1					1
	Edward & Sons Trading Company Inc.	2	1	1	1		
	Empire Company Limited	3	3			2	1
	Farmer's Market Foods Inc.	1					1
	Goya Foods Inc.	2	2		2	2	
	Ocean Spray Cranberries Inc.	2	2			2	
	Prairie Industries Inc.	1	1				
	Red Gold LLC	1	1		1		
	Teasdale Quality Foods Inc.	1	1				1
	Thai Agri Foods Public Company Ltd.	2	2				
	Unico Inc.	1	1				
	Vilore Foods Company Inc.	2	2	2	2		
	Totals	**192**	**129**	**57**	**48**	**78**	**21**

* Many cans contained more than one coating type. Different coatings can be layered or blended and sometimes differ in the coatings applied to the body and the lid of a single can. Therefore, the totals in the five content columns add up to more than the total number of cans tested (192).
** www.foodprocessing.com/top100/top-100-2014
*** The categories of food sampled from each company differ in many cases. This makes direct comparison of companies to one another difficult, because some foods have different coating requirements.

DO PRIVATE-LABEL RETAILER BRANDS DIFFER FROM NATIONAL BRANDS IN THEIR CAN COATINGS?

Table 13 compares coatings in cans from national brands to private-label retailer brands. On average, private-label retailer brands appeared to use a smaller variety of coating combinations than national brands. Polyesters, acrylics and PVC were detected in a higher percentage of national brand cans, indicating more frequent use of combination coatings. All coating types, however, were found in both national and private labels.

HAVE COATING TYPES CHOSEN BY MANUFACTURERS CHANGED OVER TIME?

We attempted to determine whether trends in coating usage have changed over time. To do this, we recorded the "best by" or expiration dates from all cans and analyzed the coating types as a function of date. Expiration dates in our sample set ranged from 2015 to 2019 and are listed in the Appendix Table 2. Table 14 shows some possible correlations between date and coating type. In particular, the use of oleoresin appears to have increased between 2015 and 2018 expiration dates: Only 2 percent of cans marked with a 2015 or 2016 date contained oleoresin, increasing to 12 percent for 2017 and 18 percent for 2018 (amounting to 20 cans total with oleoresin). Unfortunately, since there are no regulations or standards regarding food dating, there may not be a consistent relationship between the date marked on the can and the actual production date.

Table 13: Can coating types in private label retailer brands vs. national brands

Brand Type	Containing BPA-based Epoxy *	Containing Polyester Resins*	Containing Acrylic Resins*	Containing PVC Copolymer*	Containing Oleoresin*	Total Cans
National Brand	58 (74%)	28 (36%)	40 (51%)	28 (36%)	5 (6%)	78
Private Label Brand	71 (62%)	29 (25%)	38 (33%)	20 (18%)	16 (14%)	114
All Brands	**129 (67%)**	**57 (30%)**	**78 (41%)**	**48 (25%)**	**21 (11%)**	**192**

* Many cans contained more than one coating type. Different coatings can be layered or blended and sometimes differ between the body and the lid of a single can. Therefore, the totals in the five content columns add up to more than the total number of cans tested (192).

Table 14: Can coating results by expiration or "best by" year						
Best By/ Expiration Date Year	Containing BPA-based Epoxy	Containing Acrylic Resins	Containing Polyester Resins	Containing PVC Copolymer	Containing Oleoresin	Number of Cans
2015-2016*	78%	57%	28%	20%	2%	46
2017	62%	41%	32%	31%	12%	101
2018	62%	21%	31%	15%	18%	39
Number of cans (all)**	**123**	**75**	**57**	**46**	**20**	

* Not all cans had expiration dates. 2019 had too few cans, and these were excluded from analysis.
** 2015 was grouped with 2016 because of the small number of cans with a 2015 date.

IN DEPTH: BEANS AND TOMATOES

As explained in the Study Design and Experimental Method section, we attempted to collect bean and tomato products from each retailer. These are commonly purchased canned foods that have different properties and hence different coating requirements. In particular, tomatoes and beans differ in acidity and sulfur content.

We separated the bean and tomato cans into samples from retail food companies with private-label brands (Tables 15 and 16) and samples from national brand companies (Tables 17 and 18). Tables 15 and 16 show tomato and bean can results, respectively, for private-label retailer brands only. Two retailers (99 Cents Only and Loblaws) have only beans represented, as private-label tomatoes were not available at the time of purchase.

The retail companies in Tables 15 and 16 are grouped into three categories, listed in the left column: 1) companies for which only BPA-based epoxy coatings were detected in private-label canned tomatoes or beans, 2) companies for which some private-label tomatoes or beans had BPA-based epoxy and some had other coatings, and 3) companies for which only non-BPA coatings were detected in private-label canned tomatoes or beans.

Table 15: Coatings used in canned tomato products from retailer private label products			
	Retail Co. (Store Names)	Non-BPA Coatings	BPA Epoxy Coatings
BPA Epoxy	Dollar General		BPA Epoxy, Acrylic (2 cans)
	Dollar Tree (Dollar Tree, Family Dollar)		BPA Epoxy, Acrylic
	Gordon Food Service		BPA Epoxy
	Meijer		BPA Epoxy, Acrylic
	Target		BPA Epoxy, PVC
BPA Epoxy and Non-BPA Coatings	Albertsons (Albertsons, Safeway, & Randalls)	PVC; PVC; Polyester	BPA Epoxy, Acrylic
	Kroger (Kroger, Harris Teeter, & Fred Meyer)	Polyester; PVC, Polyester	BPA Epoxy
Non-BPA Coatings	Publix	PVC	
	Trader Joe's	PVC	
	Walmart	PVC	
	Wegmans	PVC, Polyester	
	Whole Foods Market	PVC	

Table 16: Coatings used in canned beans from retailer private label products			
	Retail Co. (Store Names)	Non-BPA Coatings	BPA Epoxy Coatings
BPA Epoxy	Dollar General		BPA Epoxy (4 cans); BPA Epoxy, Acrylic
	Dollar Tree (Dollar Tree & Family Dollar)		BPA Epoxy (2 cans)
	Gordon Food Service		BPA Epoxy
	Meijer		BPA Epoxy, Acrylic
	Publix		BPA Epoxy
	Target		BPA Epoxy
	Walmart		BPA Epoxy, Acrylic (2 cans); BPA Epoxy, Oleoresin; BPA Epoxy
BPA Epoxy and Non-BPA Coatings	Albertsons (Albertsons, Safeway & Randalls)	Polyester (2 cans)	BPA Epoxy, Acrylic; BPA Epoxy
	Kroger (Kroger, Harris Teeter, & Fred Meyer)	Polyester (2 cans); Oleoresin (2 cans)	BPA Epoxy, Acrylic; BPA Epoxy
Non-BPA Coatings	Loblaws	Oleoresin	
	Aldi Nord (Trader Joe's)	Polyester (2 cans)	
	Wegmans	Oleoresin	
	Whole Foods Market	Acrylic, Polyester	

According to Tables 15 and 16, three retailers — Trader Joe's, Wegmans and Whole Foods Market — are using alternatives to BPA epoxy for both bean and tomato products. Five retailers — Dollar General, Dollar Tree (including Dollar Tree and Family Dollar store brands), Gordon Food Service, Meijer and Target — had BPA-based epoxy coatings in all tested cans of beans and tomatoes. Two of the larger retailer outlets, Albertsons and Kroger, are using a variety of coatings, some with BPA and some without, in their private-label beans and tomatoes.

The data in tables 15 and 16 may reflect differences in retail companies' commitments to phasing out BPA epoxy and using alternatives. Our testing results were generally consistent with the responses to our retailer survey (Table 3).

We performed the same analysis on national brand food manufacturers, as opposed to private-label store brands, in Tables 17 and 18. For each national manufacturer, we tested either a tomato can sample or a bean can sample, not both, because those brands had only one or the other food type available for purchase.

Table 17 summarizes coatings identified in tomato products from national manufacturers. Additional brand names owned by each company are given in parentheses. Campbell's tomato soups and Corina crushed tomatoes, owned by Red Gold LLC, used BPA-based epoxy in all tested tomato cans. General Mills showed a mix of coating types: Two Muir Glen tomato cans that were tested had PVC-based coatings, whereas a Progresso tomato soup had combination coatings including BPA-based epoxy, acrylic, PVC and polyester resins. Two national brand food companies are using non-BPA coatings in tomato products: ConAgra (Hunt's) and Del Monte.

Table 18 summarizes coatings identified in bean cans from national manufacturers. All of the tested brands contained BPA-based epoxy except for Eden Foods, which uses oleoresin in bean cans.

Tables 15, 16, 17 and 18 show that can linings using BPA-based epoxies were detected in close to half of tomato cans and somewhat more than half of bean cans. For tomato products, the most common non-BPA coating was PVC, followed by polyester. For beans, the most common non-BPA coatings were oleoresin and polyester. It is interesting to note that polyester resins were usable in these two different food types.

Table 17: Coatings used in canned tomato products from national brand food manufacturers			
	Food Manufacturer (Brand name)	Non-BPA Coatings	BPA Epoxy Coatings
BPA Epoxy Coatings	Campbell Soup Company		BPA Epoxy, Acrylic (2 cans)
	Red Gold LLC (Corina)		BPA Epoxy, PVC
BPA Epoxy + Non-BPA	General Mills Inc. (Muir Glen, Progresso)	PVC (2 cans)	BPA Epoxy, Acrylic, PVC, Polyester
Non-BPA Coatings	ConAgra Foods Inc. (Hunt's)	Acrylic, Polyester	
	Del Monte Foods Inc.	PVC (2 cans)	

Table 18: Coatings used in canned beans from national brand food manufacturers			
Coating Types	Food Manufacturer	Non-BPA Coatings	BPA Epoxy Coatings
BPA Epoxy Coatings	La Costeña (S&W)		BPA Epoxy
	Goya Foods Inc.		BPA Epoxy, PVC, Acrylic
	Prairie Industries Inc. (NuPak)		BPA Epoxy
	Seneca Foods Corporation (Libby's)		BPA Epoxy
	Teasdale Quality Foods Inc. (Aunt Penny's)		BPA Epoxy, Oleoresin
	Unico Inc.		BPA Epoxy
	Vilore Foods Company Inc. (La Costeña)		BPA Epoxy, PVC, Polyester (2 cans)
Non-BPA Coatings	Eden Foods Inc.	Oleoresin	

Note: Coating types separated by commas are in a single can. Coatings separate by semicolon are in different cans.

VI. Limitations of Our Findings

This report details four sources of data describing the canned food industry's movement away from the use of BPA in food can linings: 1) documentation on compounds registered with the FDA's Food Contact Substance Notification program; 2) survey responses from major canned food manufacturers; 3) survey responses from major retailers; and 4) the results of our independent can testing.

The results of all of these data points suggest an industry-wide shift away from BPA-based epoxy toward other materials in food can linings. The FDA data, manufacturer reports and can-lining tests all suggest these BPA alternatives fall into four primary categories: 1) polyester resins, 2) oleoresin, 3) PVC copolymers and 4) acrylic resins. However, as the FDA data and our can testing results indicate, these base compounds can be blended with a myriad of other chemical additives. This leaves consumers — and some manufacturers — in the dark as to the safety of their food can linings.

One of the reasons BPA-based epoxy has been used in food can linings for so long is its ability to be used across all food types. Our test results in Table 13 illustrate this point. While slightly more BPA leaches into salty and fatty foods, the epoxy still performs its primary purpose of creating a barrier between food and the metal can, regardless of whether the food is heavily acidic, fatty, solid or liquid. Other can coatings have more restricted uses. This likely explains the use of multiple coating types and variations within those coating types. Table 2 in the Appendix provides the detailed results for each can tested, revealing multiple coating types and subtypes.

Ultimately, while we are able to classify the alternatives to BPA-based epoxy into four general categories and several subtypes of those categories, there is a great deal we do not yet know about the composition or the safety of these alternatives. The individual formulations within each category likely have various additives and cross-linking agents that, themselves, remain largely undisclosed. The major gaps in toxicity testing mean that we have almost no data on human health impacts. The limited safety data that companies provide to the FDA is also not publicly available. (See Appendix Table 1.)

In addition, data does not yet exist to demonstrate the stability of the various coatings. This means we do not know if unbound molecules in some coatings migrate into food. This is a major concern, since some of the starting chemicals for these polymers are carcinogens, endocrine disruptors, reproductive toxicants, neurotoxicants and respiratory toxicants.

VII. Making the Case for Informed Substitution

Businesses that do not understand the potential hazards of chemical ingredients in their products face reputational, financial, legal and brand risks. A recent United Nations report[108] comments as follows:

> SIGG Switzerland, a manufacturer of aluminum water bottles, was well positioned to fill the demand for BPA-free water bottles when health concerns arose in the U.S. and Canada with water bottles made from polycarbonate plastic. With sales booming as customers stopped buying polycarbonate water bottles because they contained BPA, SIGG failed to inform consumers that it used BPA in the lining of its aluminum bottles. In 2008, the presence of BPA in SIGG bottle linings became public and the company came under criticism for failing to disclose the chemical in its water bottles. Consumers stopped buying its products and retail stores like REI, Patagonia and Whole Foods Market pulled the bottles from their shelves. Two years later, SIGG Switzerland's U.S. distributor filed for bankruptcy.

Businesses that do not understand the potential hazards of chemical ingredients in their products face reputational, financial, legal and brand risks.

In the SIGG example offered above, the company either did not know of or did not reveal the presence of BPA in its bottle lining. However a company's financial and brand risk can be just as significant with BPA-free alternatives if its substitute materials have not been tested for safety — and specifically for impact to the endocrine system, considering that the hormonal activity of BPA is at the root of scientific concern regarding public health.

This situation of "regrettable substitution" is not just theoretical — it is a reality. An assessment, published March 2011 in *Environmental Health Perspectives* (EHP), of more than 500 commercially available plastic products labeled BPA-free, found many to be leaching endocrine-disrupting chemicals that in some cases were more estrogen active than BPA-containing plastics.[109] The researchers found that most monomers, commercial resins and additives that are used to make many commercially available plastic items exhibited endocrine activity. Researchers emphasize the need to rigorously assess monomers, antioxidants, resins and additives using multiple tests to ensure that plastic products and materials are not mischaracterized as free of estrogenically active (EA) chemicals.

Three years later, in a follow-up study published by EHP in May 2014, the same researchers tested 50 BPA-free products and found similar results, warning "BPA-Free did not mean EA-Free."[110] The good news is that these same researchers identified substitutes on the market that had no hormone-disrupting attributes. They list other monomers and additives including resins, dispersants, pigments and antioxidants that have no detectable estrogenic activity or cellular toxicity. The bad news is that although the researchers did not test can linings, they did examine some of the same materials emerging as BPA alternatives for canned food, and found them to be estrogenically active. It is important to note, however, that assessing estrogenic activity, as was done in these experiments, does not capture other types of hormone disruption or other adverse outcomes such as carcinogenicity, organ toxicity or developmental toxicity.

Companies that take proactive steps to understand the safety of the chemicals in their can linings and ensure their BPA-free materials have been tested for a range of human health and environmental impacts — including estrogen activity, other endocrine disruption, and other critically important health endpoints — will be better positioned to reduce potential risk to the public than companies that simply assume their suppliers are using safe can linings.

The authors of this report are calling on manufacturers and retailers to take our GreenScreen® Challenge and have their can-lining materials assessed for human health and environmental safety using this comprehensive chemical hazard assessment tool. To conduct a meaningful assessment, suppliers must be willing to fully disclose the chemical ingredients — including polymers, additives or resins — of their can-lining materials to an independent third-party GreenScreen® Profiler. Profilers who conduct GreenScreen® assessments can offer Non-Disclosure Agreements as necessary to manufacturers and suppliers to keep chemical identities confidential. However, our GreenScreen® challenge asks companies to publicly report their GreenScreen® hazard results with redacted chemical names. The hazard scores provide the information most needed by consumers, retailers and brands themselves if they wish to reduce business risk. Not knowing the health and environmental impacts of your chemical materials opens up a company to financial and reputational risk. National canned foods brands and retailers can and should raise the bar for their own and other industries by practicing the highest possible level of supply chain accountability and ingredient transparency and safety.

Companies that take proactive steps to understand the safety of the chemicals in their can linings and ensure their BPA-free materials have been tested for a range of human health and environmental impacts—including estrogen activity, other endocrine disruption, and other critically important health endpoints—will be better positioned to reduce potential risk to the public than companies that simply assume their suppliers are using safe can linings.

VIII. Current BPA Regulatory Landscape

A. FEDERAL REGULATION: FDA FOOD CONTACT NOTIFICATION PROGRAM

The FDA approved BPA as a food additive in the early 1960s under its petition-and-review process.[111] Substances used to make food and beverage packaging that were approved under this process are not subject to regular re-evaluation, despite advances in food and chemical safety. Once an additive is approved, any manufacturer of food or food packaging may use it for the approved purpose, with no requirement to notify the FDA of that use.

A newer set of regulations, known as the Food Contact Substance Notification program, emerged in 2000.[112] Under this program, a manufacturer must notify the FDA of a proposed use of a new chemical (or a new use of a previously approved chemical) and wait 120 days before marketing it. Data submitted to the FDA includes the chemical name, the CAS number (a unique identifier), the intended use and any exclusions. For example, many BPA alternatives registered for use since 2010 exclude use in infant formula cans.

If the FDA does not object in writing, the new packaging formulation can be used in production. Another troubling aspect of the FDA's regulation of food packaging additives is the process by which a chemical is identified as GRAS (Generally Regarded As Safe). There are no guidelines specifying how a GRAS chemical is defined. Instead, the manufacturer independently determines — with no FDA oversight — whether it believes a chemical to be GRAS under the intended conditions of use, thus bypassing the Food Contact Notification System.

In 1997, the FDA issued a proposed rule that, if finalized, would eliminate the GRAS affirmation petition process and replace it with a notification procedure (62 FR 18938; April 17, 1997). Although it has been 18 years since the rule was proposed, the FDA has not yet issued a final rule establishing the GRAS notification procedure.[113]

B. STATE BPA REGULATION

State legislation to more strictly regulate BPA in food packaging was first introduced in 2005 in California. Since that time, more than 30 states and localities have introduced policies to ban or restrict BPA. The first state to pass a ban on BPA in any product was Minnesota in 2009, with Connecticut following soon afterward. Thirteen states have adopted a total of 19 policies to regulate the use of BPA in consumer products. Those states have adopted policies regulating BPA in baby bottles and sippy cups (a "sippy cup" is defined by the FDA as a spill-proof cup, including its closures and lids, designed to train babies or toddlers to drink from cups), and a few of those states have gone further, restricting BPA in infant formula cans, baby food jars, sports water bottles and even thermal receipt paper.[114]

In response to a food additive petition filed by the American Chemistry Council, the FDA announced it would ban BPA from baby bottles and sippy cups as of December 2012. A subsequent citizen petition filed by then Rep. Edward Markey (D-MA) prompted the FDA to ban BPA in infant formula packaging in 2013. It is important to note that the agency ruled on these "citizen petitions" based on market abandonment, not safety. The FDA amended its existing regulations to no longer allow the use of BPA in baby bottles, sippy cups or infant formula packaging to reflect their assessment that industry had abandoned the use of BPA in these items.[115]

In 2015, the California EPA listed BPA as a female reproductive toxicant subject to regulation by Prop. 65, which requires consumer products that contain BPA, above a yet-to-be-determined specified safe level, to carry a warning label.

Table 19: State laws enacted to more strictly regulate BPA in food packaging[116]

State	Year policy adopted	Bill Number or Regulatory Body	Description
California	2011	AB 1319	Bans BPA in baby bottles and sippy cups with a de minimis level of 0.1 parts per billion.
Connecticut	2009; 2011	Substitute House Bill 6572; SB 210	Bans BPA in all reusable food and beverage containers, infant formula containers and baby food jars. Bans BPA in thermal receipts.
Delaware	2011	SB 70	Bans BPA in baby bottles and sippy cups.
Illinois	2012	SB 2950	Bans BPA in children's food or beverage containers.
Maine	2011; 2013	Board of EPA; LD 12; LD 902	Bans BPA in baby bottles and sippy cups. Bans BPA in baby food and infant formula containers. Bans BPA from reusable food and beverage containers.
Maryland	2010; 2011	HB 33/SB 213; SB 151	Bans BPA in child care articles. Bans BPA in baby bottles, sippy cups and infant formula containers with a de minimis level of 0.5 parts per billion.
Massachusetts	2010	Massachusetts Public Health Council	Bans BPA in baby bottles & sippy cups.
Minnesota	2009; 2013	SF 0247/ HF 0326; HF 459/ SF 379	Bans BPA in baby bottles & sippy cups. Bans BPA in food marketed to children under 3 excluding formula.
Nevada	2013	AB 354	Bans BPA in baby bottles, sippy cups and containers of infant formula and kids' food.
New York	2010	S 3296H/ A 6919-D	Bans BPA in baby bottles, sippy cups and pacifiers.
Vermont	2010	S 247	Bans BPA in baby bottles, sippy cups, infant formula containers and baby food containers.
Washington	2009	SB 6248	Bans BPA in baby bottles, sippy cups and sports water bottles.
Wisconsin	2010	S 271	Bans BPA in baby bottles & sippy cups.

In addition, four counties (Albany, Schenectady and Suffolk in New York, and Multnomah in Oregon) and the city of Chicago have also adopted policies to regulate BPA in food packaging.

C. INTERNATIONAL BPA REGULATION

The momentum for restricting or prohibiting BPA in food packaging is now global, although few national governments besides France have attempted to regulate BPA in food can linings.

The **European Union** banned the use of BPA in baby bottles and sippy cups in 2011 (Directive 2011/8/EU), but the ban was rescinded in 2015 after the European Food Safety Authority (EFSA) published a highly contentious re-evaluation of BPA exposure and toxicity. However, some EU nation states continue to regulate BPA more strictly, despite the EFSA ruling, including Austria, Belgium, Denmark, France and Sweden.

France banned the use of BPA in all food containers as of 2015 and in infant food packaging as of 2013. Prior to this, a number of French cities had banned baby bottles made with BPA in city nurseries and day care centers.[117]

Denmark placed a temporary national ban on BPA in materials in contact with food for children aged 0–3 years (infant feeding bottles, feeding cups and packaging for baby food). This ban became effective July 1, 2010.

Belgium banned the use of BPA in food contact materials intended for children up to the age of 3, effective 2013.[118]

Canada banned the use of BPA in baby bottles in 2010.

Costa Rica banned BPA in baby bottles and other containers for feeding children in 2010.

Table 20: International regulation of BPA in food packaging[119]

Jurisdiction	Bill / Regulatory Body	Scope	Limit	Effective Date
EU	EU no. 10/2011	Plastic food contact materials	0.6 mg/kg (specific migration)	May 1, 2011
	EU no. 321/2011	Infant feeding bottles	Prohibited	
Argentina	Regulation 1207/2012	Baby bottles	Prohibited	April 3, 2012
Austria	Austrian Food Safety and Consumer Protection Act, LMSVG (327th Regulation of the Ministry of Health, October 2011)	Pacifiers and teethers	Prohibited	January 1, 2012
Belgium	Document Législatif no.5-338/8	Food contact materials and articles for children under 3 years old	Prohibited	January 1, 2013
Brazil	Resolution No. 41 of Sept. 16, 2011	Baby and infant feeding bottles	Prohibited	January 1, 2012
Canada	Hazardous Products Act P.C. 2010-256	Baby bottles	Prohibited	March 11, 2010
China	Food Safety Law 2009[120]	Baby bottles and children's products	Prohibited	June 1, 2011
Costa Rica	Executive Decree[121]	Baby bottles and child feeding containers	Prohibited	April 21, 2010
Czech Republic[122]		Baby bottles	Prohibited	Pre-2012
Denmark	Danish Veterinary and Food Administration	Feeding bottles, feeding cups and materials in contact with food for children up to 3 years	Prohibited	July 1, 2010
Ecuador	Resolution 29 of October 31, 2011	Bottles	Prohibited	October 2011
France	Act 2010-729	Baby bottles	Prohibited	June 30, 2010
		Food contact materials and articles for children under 3 years		January 1, 2013
	Act 2012-1442	Other food contact materials and articles		January 1, 2015
Malaysia[123]		Baby bottles	Prohibited	March 1, 2012
South Africa	Foodstuffs, Cosmetics and Disinfectants Act, 1972 (Act No.54 of 1972)[124]	Baby bottles	Prohibited	Oct 21, 2011
Sweden	SFS 2012:991	Paints and coatings in packaging for food products specifically intended for children under 3 years	Prohibited	July 1, 2013
Turkey[125, 126]		Baby bottles	Prohibited	June 10, 2011; 2008
United Arab Emirates[127]		Baby bottles	Prohibitions announced	2010

Source: www.mts-global.com/en/technical_update/CPIE-018-13.html

Voluntary phase-out of BPA in baby bottles also took place in Australia and New Zealand in 2010, and Japan's canning industry between 1998 and 2003 voluntarily replaced BPA-epoxy resin can liners with a polyethylene terephthalate (PET) liner.[128]

IX. Solutions: Getting BPA Out of Food Packaging, Disclosing and Ensuring Safer Alternatives

A. THE GREENSCREEN® FOR SAFER CHEMICALS: A RESOURCE TO DETERMINE THE SAFETY OF BPA ALTERNATIVES

Companies should investigate the safety of BPA alternatives they are considering or already using to line canned foods. Using a can-lining material that has human health and environmental data gaps may jeopardize public health and a company's brand reputation. GreenScreen® for Safer Chemicals provides information about chemical hazards, and this screening method is now being used by leading companies around the world.

This need for comprehensive but easy to understand chemical information is one reason why companies and regulators are increasingly using GreenScreen® for Safer Chemicals. This chemical hazard assessment tool not only evaluates environmental and human health information about such hazards but also identifies where important information is missing. GreenScreen®'s method builds on national and international precedents for hazard classification and includes structured decision logic in the form of Benchmarks. There are no hidden "black box" criteria that go into classifying a chemical into one of the four GreenScreen® categories ranging from Benchmark 1 — chemical of high concern; to Benchmark 4 — preferred chemical. When too many data gaps exist to classify a chemical into one of the four benchmarks, the chemical is given a Benchmark U (unspecified). The method is available online in its entirety, at no cost, for companies and toxicologists to download. GreenScreen® endpoints used to determine Benchmarks are built on the Globally Harmonized System (GHS) for the classification and labeling of chemicals (CLP in Europe.)

The method involves assessing a chemical's hazards against 18 endpoints for human health and environmental impact, including an assessment of its endocrine-disrupting activity. Hazard levels range from low to very high, and notification is provided about the strength of the information found through comprehensive scientific literature searches. GreenScreen® assessments are conducted by trained Licensed GreenScreen® Profilers who are third-party independent assessors accredited by Clean Production Action. If the organization commissioning the work has authorized full disclosure, complete GreenScreen® assessment reports are available for free. Other GreenScreen® assessments are the property of organizations who sign a Non-Disclosure Agreement with the Profiler and opt out of public dissemination of the report. An example of a GreenScreen® hazard table is given below. The full report can be downloaded from the GreenScreen® Store.

Example of a GreenScreen® Hazard Table

Chemical Name: Tri-o-cresyl Phosphate (CAS# 78-30-8)

How is the Chemical Used? Tri-o-cresyl phosphate is a chemical that functions as a plasticizer, flame retardant, lubricant, water-proofing agent, solvent, chemical intermediate and gasoline additive.

GreenScreen® Hazard Summary Table for Tri-o-cresyl Phosphate

Group I Human					Group II and II* Human									Ecotox		Fate		Physical	
C	M	R	D	E	AT	ST		N		SnS*	SnR*	IrS	IrE	AA	CA	P	B	Rx	F
						single	repeated*	single	repeated*										
L	**M**	**H**	**L**	*M*	**vH**	**vH**	*H*	**vH**	**H**	**M**	DG	*L*	*L*	*vH*	*vH*	**vL**	*M*	*L*	**L**

Abbreviations:

C = Carcinogenicity
M = Mutagenicity
R = Reproductive toxicity
D = Developmental toxicity
E = Endocrine activity

AT = Acute mammalian toxicity
SnR = Respiratory sensitization
IrS = Skin irritation

IrE = Eye irritation
AA = Acute aquatic toxicity
ST = Systemic toxicity
N = Neurotoxicity
SnS = Skin sensitization

CA = Chronic aquatic toxicity
P = Persistence
B = Bioaccumulation
Rx = Reactivity
F = Flammability

Very High (vH), High (H), Moderate (M), Low (L), Very Low (vL), Data Gap (DG)

GreenScreen® Benchmark Score and Hazard Summary Table: Tri-o-cresyl phosphate was assigned a GreenScreen® Benchmark Score of 1 ("Avoid – Chemical of High Concern") as it has high Group I Human Toxicity (Reproductive Toxicity (R)). This corresponds to GreenScreen® benchmark classification 1e in CPA 2011. A data gap (DG) exists for respiratory sensitization (SnR*). As outlined in CPA (2013) Section 12.2 (Step 8 – Conduct a Data Gap Analysis to assign a final Benchmark score), tri-o-cresyl phosphate meets requirements for a GreenScreen® Benchmark Score of 1 despite the hazard data gaps. In a worst-case scenario, if tri-o-cresyl phosphate were assigned a High score for the data gap SnR*, it would still be categorized as a Benchmark 1 Chemical.

In addition to a range of hazard levels for each human health and environmental category in the hazard table, the GreenScreen® method also uses two types of font to help the reader understand the strength of the information or, in other words, how high the confidence level. Hazard levels — Very High (vH), High (H), Moderate (M), Low (L), Very Low (vL) — shown in *italics* reflect estimated values, screening lists, weak analogues and lower confidence. Screening lists are lists that are based on estimated data, use a less comprehensive review or were developed to identify chemicals for further review or more testing.

Hazard levels shown in **bold** are based on good-quality data, authoritative lists or strong analogues. Authoritative lists use information based on a comprehensive expert review by a recognized authoritative body and result in a classification with a higher level of confidence. For more detail on the GreenScreen® methodology, visit the GreenScreen® website.

GreenScreen® is now the leading method for businesses both to comprehensively identify the hazards of chemicals in products and to identify comparatively safer alternatives. The method has been integrated into certification systems such as the US Green Building Council's LEED criteria and is a highly referenced method in alternatives assessment strategies.[129] The GreenScreen® is increasingly being used by company leaders in the electronics, apparel and building sectors to find safer substitutes to hazardous chemicals. We are now calling on the canned food sector to adopt the practices of these industry leaders, transparently screen the chemicals in their can linings, and then communicate the results to consumers.

B. REFORM THE FDA FOOD CONTACT NOTIFICATION PROGRAM

Update and Expand Required Science

The FDA should update its guidelines for safety testing to include more health endpoints, including endocrine disruption and impacts on mammary glands, and should require safety assessments that take into account the impacts of the timing of exposure and low-dose exposures to chemicals such as endocrine-disrupting compounds. The FDA should be provided the authority to require safety testing when the available data is inadequate to assure the safety of food contact substances. Furthermore, the assays that the FDA approves for use in identifying endocrine disruption should be scientifically sound and supported by experts such as the Endocrine Society.

Prohibit Conflicts of Interest

Implement conflict of interest protections to prevent industry-funded scientists or "independent" scientists who have a financial relationship with a company from making a safety determination about that company's proposed food packaging material.

Increase the Transparency of Safety Data

The public should be able to access data assessing the safety of food contact materials without filing a Freedom of Information Act request.

Protect Vulnerable Populations

Safety determinations should take into account and provide sufficient margins of safety for vulnerable populations, including children, pregnant women, workers and other populations with higher exposure or susceptibility to chemicals in food packaging.

Review Currently Approved Substances

Many of the food contact substances currently on the market were approved decades ago using outdated science and outdated methodologies. The FDA should prioritize a review of those chemicals using contemporary scientific tools and weigh their safety in light of new scientific evidence. Further, the agency must have the authority to restrict the use of food contact substances that pose a risk of harm to human health.

Ensure Domestic and International Coordination

The U.S. Food and Drug Administration and the Environmental Protection Agency (EPA) have signed a Memorandum of Understanding to share data on pesticides and toxic substances. This will allow the agencies to share information that will better inform their assessments of risks to the public and the environment. This is an important start, and the FDA should continue to coordinate with the EPA and the European Commission to gather data and assess the safety of chemicals used in food packaging that are also regulated under other authorities, and by other world governments, to insure maximum efficiency and protection.[130]

Provide Adequate Resources to the FDA

Congress should provide the FDA with adequate resources, through appropriations and by instituting an industry fee for approval of food additives and food contact substances, to allow the agency to both implement a more robust system and review substances that are currently approved.

Close the GRAS Loophole

Immediately require companies to notify the FDA of any current GRAS (Generally Recognized As Safe) chemicals used in food contact materials along with all available safety data for these compounds. Required safety data must include data on estrogenic activity and potential endocrine disruption. This information should be publicly available on the FDA's website. Any future GRAS designations should be submitted to and reviewed by the agency prior to the substance being allowed on the market and should be subject to a public rule-making process.

The GRAS program pre-dated the Food Contact Notification program. GRAS chemicals are defined as substances for which there is a "reasonable certainty in the minds of competent scientists that the substance is not harmful under the intended conditions of use." Unfortunately, there is no legal definition of "competent scientists," and these experts are almost always hired and paid for by the company seeking the GRAS designation, creating a built-in conflict of interest.[131] Companies using self-designated GRAS chemicals are not even required to notify the FDA of the chemical's use, making it impossible for the FDA to provide any regulatory oversight or demand accountability from manufacturers for these self-determinations. An estimated 1,000 GRAS chemicals in use remain hidden from the FDA and the public, some of which could be food contact substances. Companies can voluntarily ask the FDA to review a GRAS designation in order to provide legitimacy to their safety claim; however, when the FDA does challenge the validity of a GRAS designation, the company can withdraw the request for review and continue to use the chemical despite those safety questions or concerns.

This self-regulation by industry and lack of transparency to the FDA or the public results in an almost total lack of oversight of the chemicals we ingest through our food. As downstream users demand more

accountability from their suppliers, these regulations will be a hindrance to safer chemical ingredients and new material innovation.

C. ADOPT STRICTER FEDERAL REGULATION OF FOOD PACKAGING

There are a number of important pieces of federal legislation recently introduced in Congress that would force disclosure of BPA in food can linings and more strictly regulate BPA and the safety of BPA alternatives in all food packaging.

On March 19, 2015, Sen. Dianne Feinstein (D-Calif.), introduced S. 821, the BPA in Food Packaging Right to Know Act, which would require the labeling of all canned food containing BPA. The bill requires the Department of Health and Human Services to take the following steps: 1) issue a revised safety assessment for food containers composed in whole or in part of bisphenol A (BPA), taking into consideration different types and uses of such containers; and 2) determine whether there is reasonable certainty that no harm will result from aggregate exposure to BPA through food containers or other items composed in whole or in part of BPA, taking into consideration potential adverse effects from low-dose exposure and the effects of exposure on vulnerable populations, including pregnant women, infants, children, the elderly and populations with high exposure to BPA.

The bill also amends the Federal Food, Drug and Cosmetic Act to prohibit the sale of a food if its container is composed in whole or in part of BPA, unless the label includes the following statement: *This food packaging contains BPA, an endocrine-disrupting chemical, according to the National Institutes of Health.*

On July 9, 2014, the "Ban Poisonous Additives (BPA) Act of 2014" was introduced into both chambers of Congress by Sen. Edward Markey, D-Mass., Rep. Lois Capps, D-Calif., and Rep. Grace Meng, D-N.Y. The bill would empower the U.S. Food and Drug Administration (FDA) to remove BPA from food packaging, label food packaging that still contains BPA while alternatives are developed, encourage manufacturers to replace this hazardous chemical with alternatives that are safer for workers and consumers, and require the agency to review the safety of thousands of food contact substances.

> This self-regulation by industry and lack of transparency to the FDA or the public results in an almost total lack of oversight of the chemicals we ingest through our food.

The Ban Poisonous Additives Act (BPA Act) also establishes the following requirements: 1) Reusable food and beverage containers (such as thermoses) that contain BPA cannot be sold; 2) Other food and beverage containers (such as cans) containing BPA cannot be introduced into commerce; and (3) The Food and Drug Administration will periodically review the list of substances that have been deemed safe for use in food and beverage containers in order to determine whether new scientific evidence exists that the substance may pose adverse health risks, taking into consideration vulnerable populations, including children, pregnant women, workers and disproportionately exposed communities.

D. MARKET-BASED SOLUTIONS

National brands, retailers and suppliers all have a responsibility to ensure that food can linings are safe. This goes beyond regulatory compliance to fostering an active dialogue within the supply chain for full ingredient disclosure in can linings. In addition to disclosure, suppliers should perform comprehensive assessments of alternatives, to promote informed substitution by evaluating the potential health and environmental hazards of proposed BPA alternatives.

While concerned citizens advocate for regulatory reform on behalf of everyone, the public must also continue to demand that canned food manufacturers and retailers voluntarily reach for a high bar of safety and do everything they can to protect the public from exposure to BPA and other potentially unsafe chemicals that can leach from food packaging and get into our bodies.

Market-based advocacy efforts such as the Breast Cancer Fund's Cans Not Cancer Campaign, the Safer Chemicals Healthy Families Campaign, and the Campaign for Healthier Solutions are pressuring manufacturers and retailers to replace BPA in food can linings with safer alternatives and to be transparent about their composition and safety data.

Important Steps National Food Brands Should Take

Launched in 2011, the Breast Cancer Fund's Cans Not Cancer campaign has the goal to ensure safe and healthy food packaging for everyone. The Breast Cancer Fund recognizes that replacing BPA in canned food poses some unique challenges, and finding and testing BPA alternatives for safety takes a commitment of time and resources. However, as the canned food industry seeks safer alternatives to BPA, the authors of this report call on companies to take the following actions:

1. Commit to eliminating BPA from all food packaging and establish timelines and benchmarks for the transition to safer alternatives.
2. Report their plan to find a comparatively safer alternative with a timeline for full hazard disclosure.
3. Label all chemicals used in can liners, including BPA or BPA alternatives.
4. Shift to safer, alternative packaging where possible while seeking a safe BPA alternative.
5. Demand their suppliers of can linings fully disclose safety data so as to provide a higher level of transparency to consumers.
6. Ask manufacturers to take the GreenScreen Challenge and assess potential human health and environmental hazards of bisphenol-A (BPA) alternatives they are considering or already using to line canned foods.

It is not enough to remove BPA from food packaging. Manufacturers must also be transparent about alternatives that are being used, as well as the process by which they are evaluating the safety of those alternatives.

Consumers have the right to know, at the point of purchase, if the food cans they are buying contain BPA or BPA alternatives, and whether these packaging additives have been tested for safety. This information is necessary so that consumers can make safe and informed choices for themselves and their families.

Safer packaging is currently available for many types of foods (e.g., glass containers, paperboard-based packaging, etc.). Manufacturers should commit to shifting packaging to safer forms where possible until safe replacements for BPA in cans can be developed.

Advocates and manufacturers should pool their resources and work together to demand accountability from supply chains that are currently blocking manufacturers — and consumers — from getting the transparency they want and deserve: disclosure of the identity of canned food linings and the relevant safety data.

Recommendations for Big Box and Grocery Retailers

Safer Chemicals Healthy Families, with its Mind the Store campaign, has been challenging the nation's leading retailers to adopt comprehensive policies to manage toxic chemicals in products and packaging. The campaign has been calling on retailers to eliminate and safely substitute BPA and the other Hazardous 100+ Chemicals of High Concern.

The Mind the Store campaign offers the following recommendations to eliminate BPA and avoid regrettable substitutes in canned food and other products.

- In light of our new testing as well as the growing health hazards of BPA, we recommend that retailers work with their private-label and brand-name suppliers to phase out and eliminate BPA in canned food. Retailers should publicly report on their progress on an annual basis.
- Retailers should work with their private-label and brand-name suppliers to develop aggressive yet realistic public time frames and clear metrics for transitioning away from BPA and toward transparently safer alternatives in canned food. Retailers should publicly disclose their time frames and metrics for eliminating BPA in canned food.
- Retailers should require both private-label and brand-name suppliers to conduct and share alternatives assessments (such as the GreenScreen® Methodology) of BPA-free canned food linings to avoid regrettable substitution. Assessments of these alternatives should be conducted in accordance with the Commons Principles for Alternatives Assessment.

- Retailers should adopt policies to phase out, eliminate and safely substitute BPA in other products sold in their stores, such as thermal receipt paper.
- Retailers should adopt comprehensive chemicals policies to identify, disclose, phase out and safely substitute other toxic chemicals in other food packaging and products more broadly, beginning with the Hazardous 100+ Chemicals of High Concern. Retailers should align their policies with the BizNGO Principles for Safer Chemicals, which set a clear framework for managing chemicals in products. The principles include:
    1. Knowledge of chemicals in products and supply chains
    2. Public disclosure of chemicals in products and supply chains
    3. Assessment and avoidance of hazards
    4. Commitment to continuous improvement
    5. External engagement to advance the above principles.
- Retailers should explore ways they can integrate the Chemical Footprint Project into their chemical management programs for food packaging and other products. For example, retailers could require private-label and national brands to assess their Chemical Footprint.
- Retailers should support public policies to phase out BPA and other toxic chemicals in food packaging and consumer goods.

Dollar Stores Must Also Play a Role

Discount dollar stores are a growing and increasingly profitable retail outlet phenomenon across the United States. In 2015, Coming Clean and the Environmental Justice Health Alliance for Chemical Policy Reform launched the Campaign for Healthier Solutions[132] to move "dollar store" retailers toward nontoxic products. Communities served by dollar stores are predominantly communities of color or low-income communities that are already disproportionately exposed to toxic chemicals. Residents of these areas often have reduced access to quality medical care, fresh and healthy food, and public services, which are critical to overall health.

In these communities, dollar stores are often the only store selling essential household goods, including food. Many families regularly purchase canned food from their local dollar retailers. Often, fresh produce is simply not available or affordable.

Our findings that almost all dollar stores stock their shelves with canned food containing BPA-based can linings is another wake-up call that discount retailers need to source products made with safe ingredients. The recommendations listed above hold equally true for the highly profitable and growing chain of discount retailers and dollar stores in the United States. More than 140 diverse environmental justice, medical, public health, community, women's and other organizations have joined the campaign's call on dollar store chains (including Family Dollar, Dollar Tree, Dollar General and 99 Cents Only) to adopt chemical management policies to phase out harmful chemicals from their products, including hazardous linings in canned foods.

E. STEPS CONSUMERS CAN TAKE

Until we see federal policy reform and voluntary market-based solutions that provide people with the information they need to make safe and informed purchases of canned food, we recommend consumers do the following:

- Use glass, ceramic and stainless steel food storage containers and water bottles. Glass jars are easy to clean and can be reused for serving, drinking, storing, freezing and heating foods.
- Use glass and ceramic in the microwave.
- Avoid canned foods whenever possible, choosing fresh and frozen instead.
- Look for soups and sauces in glass or other safe packaging.
- Skip the can, soak your beans overnight and cook them the next day, or use a pressure cooker for dried beans, which will be recipe-ready in an hour or so.
- Join the campaigns listed in this report and visit their websites for additional information and updates:
    - www.breastcancerfund.org
    - http://saferchemicals.org/mind-the-store/
    - www.cleanproduction.org
    - www.ecocenter.org
    - www.nontoxicdollarstores.org
    - www.environmentaldefence.ca

Appendix Supplemental materials

CANNED FOOD SUPPLY CHAIN (FROM CAN MANUFACTURER'S INSTITUTE)

- Steel suppliers
- Can Makers
- Chemical Coatings and Paints Manufacturers

PRIMARY SUPPLIERS OF INTERNAL CAN COATINGS

Akzo Nobel Packaging Coatings www.akzonobel.com/us/

Corporate Headquarters: Strongville OH

Grace Davison Materials and Packaging Technologies www.grace.com

Corporate Headquarters: Cambridge MA

PPG Industries, Inc. www.ppg.com/en/Pages/home.aspx

Corporate Headquarters: Pittsburgh PA

The Valspar Corporation http://valsparglobal.com/ http://valsparglobal.com/

Corporate Headquarters: Minneapolis, MN

Chemical Companies

Eastman Chemical: www.eastman.com/Pages/Home.aspx

Cytec Industries: www.cytec.com

Dow Chemical: www.dow.com/

Primary Steel Suppliers to Canning Industry

ArcelorMittal, Chicago, IL, and Hamilton, Ontario http://arcelormittal.com/

US Steel, Pittsburgh, PA, www.ussteel.com/corp/index.asp

USS-POSCO Industries, Pittsburg, CA www.uss-posco.com/

BPA STATES AND ORGANIZATIONS THAT COLLECTED CANS

State	Group
Alaska	Alaska Community Action on Toxics
California	Breast Cancer Fund Lideres Campesinas en California
Connecticut	Clean Water Action
Florida	Clean Water Action
Maryland	Maryland PIRG
Massachusetts	Clean Water Action
Maine	Environmental Health Strategy Center
Michigan	Ecology Center
Minnesota	Healthy Legacy Coalition
New Jersey	Moms Clean Air Force
New Mexico	Los Jardines Institute
New York	Clean and Healthy NY
Oklahoma	Learning Disabilities Association (LDA) of Oklahoma
Oregon	Oregon Environmental Council
Rhode Island	Clean Water Action
Texas	Texas Campaign for the Environment Texas Environmental Justice Advocacy Services (TEJAS)
Vermont	Vermont Conservation Voters
Washington	Washington Toxics Coalition
West Virginia	People Concerned for Chemical Safety
Ontario, Canada	Environmental Defense

TABLE 1: BPA AND OTHER CHEMICALS USED IN FOOD CANS

Empty cells under health effects indicate an absence of data, not an absence of health effects.

Chemical Name	CAS	FDA FCN#	Company	Use	Percentage allowed in can coating	Other restrictions (e.g., not for use in infant formula)	IARC Known carcinogen[1]	IARC Probable carcinogen[2]	IARC Possible carcinogen[3]	Carcin (other source)	EU Endocrine Disurptor[4]	Reproductive Toxicity	Neurotoxicity	Respiratory toxicity
ACRYLICS														
Methacrylic Acid[5]	79-41-4													X[6]
Acrylic[7]	79-10-7						X							X[8]
A mixture of 2-ethylhexyl acrylate, acrylic acid, methacrylic acid, methyl methacrylate and styrene.	103-11-7 79-10-7; 79-41-4 80-62-6; 100-42-5	1387	Dow	As an epoxy resin modifier for use in thermoset coatings for light metal beverage packaging.	The acrylic portion will consist of <35 weight percent styrene and the total FCS mixture cannot exceed 20 weight percent of the epoxy resin.	Not for use in foods and beverages containing fatty foods, greater than 15% alcohol, or infant formula.			X	X[9]	X	X[10]	X[11]	X[12]
Ethylene-acrylic acid copolymer	9010-77-9	1315	Dow	As a component of metal coatings	The maleic anhydride, grafted polypropylene and 2-(dimethylamino) ethanol will be present in no more than 25%, 10% and 10% respectively.	Not for use with infant formula.								
Ethyl acrylate-glycidyl methacrylate-methacrylic acid-styrene copolymer	56990-26-2	1188	Akzo Nobel	Use in resin and polymer coatings on metal		May contact all types of beverages excluding those containing greater than 15% alcohol. Cannot be used in coatings that contain liquid formula.								
Co-polymer of methacrylic acid, ethyl acrylate, styrene, butyl methacrylate, and glycidyl methacrylate		1177	PPG	Use in resin and polymer coatings on metal		May not contact infant formula.			X		X[13]			
Copolymer of 2-ethylhexyl methacrylate (EHMA), ethyl acrylate (EA), styrene, hydroxypropyl methacrylate (HPMA), methacrylic acid (MAA), and glycerol dimethacrylate (GDMA).	688-84-6, 140-88-5, 100-42-5, 27813-02-1, 79-41-4, 1830-78-0	1145	Akzo Nobel	Component of coatings applied to metal surfaces	Up to 15% by volume may be used in coatings that contact aqueous, acidic and alcoholic beverages.	Not intended for use in contact with liquid infant formula.			X	X[14]	X[15]	X[16]		X[17]
Butyl acrylate-styrene-methacrylic acid-hydroxypropyl methacrylate-glycidyl methacrylate copolymer	1130609-14-1	1103	Akzo Nobel	For use in resinous and polymerous coatings applied to metal		Limited to single-use containers for beverages. Cannot be used in beverages containing greater than 15% alcohol or coatings in contact with infant formula.								

Chemical Name	CAS	FDA FCN#	Company	Use	Percentage allowed in can coating	Other restrictions (e.g., not for use in infant formula)	IARC Known carcinogen[1]	IARC Probable carcinogen[2]	IARC Possible carcinogen[3]	Carcin (other source)	EU Endocrine Disurptor[4]	Reproductive Toxicity	Neurotoxicity	Respiratory toxicity
ACRYLICS continued														
Acrylic resins derived from butyl acrylate, styrene, methacrylic acid, ethyl acrylate, glycidyl methacrylate, and hydroxypropyl methacrylate, cross-linked with phenolic resins listed under 21 CFR 175.300(b)(3)		1130	Valspar	Continuous film or enamel over the body of a metal		May not contact infant formula.			X		X[18]			
Methyl methacrylate polymer with butyl acrylate and glycidyl methacrylate.		1090	Valspar	Coatings applied to can ends		May not contact beverages and foods containing more than 15% alcohol by volume.								
Ethylene-acrylic acid copolymer	9010-77-9	1087	Dow	Component of metal coatings										
Butyl acrylate polymer with styrene, methacrylic acid, ethyl acrylate and glycidyl methacrylate		1074	Valspar	Resinous and polymerous coatings; not in infant formula		Coatings manufactured from the food-contact substance must meet the specifications of Title 21 CFR 175.300© when tested with the analytical methods described in 175.300(e) and (f).			X		X[19]			
PHENOLS														
Bisphenol A[20]	80-05-7									X[21]	X[22]	X[23]	X[24]	
Bisphenol AF (BPAF)[25,26]	1478-61-1										X[27]			
Epichlorohydrin[28,29]	106-89-8							X		X[30]	X[31]	X[32]		X[33]
PLANT-BASED														
Isosorbide (isosorbide diglycidyl ether)														
Oleoresin (oleoresinous c-enamel or vegetable enamel resin)														

Chemical Name	CAS	FDA FCN#	Company	Use	Percentage allowed in can coating	Other restrictions (e.g., not for use in infant formula)	IARC Known carcinogen[1]	IARC Probable carcinogen[2]	IARC Possible carcinogen[3]	Carcin (other source)	EU Endocrine Disurptor[4]	Reproductive Toxicity	Neurotoxicity	Respiratory toxicity
POLYESTERS (and additives from other chemical classes)														
Octadecanoic acid, 9(or 10)-hydroxyphenyl-	26102-12-5	1391	Akzo Nobel	For use as a co-reactant in the production of polyester resins applied to metal substrates for use in contact with food.	Polyesters containing the FCS are cured with phenolic resins. The coating cannot exceed 13.5% of the FCS.	Not for use in contact with infant formula and breast milk								
Maleic anhydride-grafted polyethylene	9006-26-2	1357	Dow	As a component of metal coatings	The level of maleic anhydride may not exceed 7.5 percent of the FCS by weight. The FCS may be used at a level not to exceed 10 percent by weight as a component of an aqueous dispersion of a polyethylene homopolymer.	Not for use in contact with infant formula and breast milk								
Maleic anhydride, polymer with ethene and 1-hexene	86286-09-1	1256	Dow	As a component of metal coatings	The level of maleic anhydride used to produce the FCS may not exceed 1.6 percent of the FCS by weight. The FCS may be used at a level not to exceed 20 percent by weight as a component of an aqueous dispersion of a polyethylene homopolymer.	Not for use in contact with infant formula and breast milk								
1H-Azepine-1-carboxamide, N,N',N''-[(2,4,6-trioxo-1,3,5-triazine-1,3,5(2H,4H,6H)-triyl) tris[methylene(3,5,5-trimethyl-3,1-cyclohexanediyl)]] tris[hexahydro-2-oxo-	68975-83-7	1268	Evonik Industries AG	To be used as a reactant with one or more of the polybasic acids or polyhydric alcohols in the formation of coatings on metal substrates in single use food-contact applications and any suitable substrate in repeated-use food-contact applications, complying with 21 CFR 175.300(b)(3)(vii).										

Chemical Name	CAS	FDA FCN#	Company	Use	Percentage allowed in can coating	Other restrictions (e.g., not for use in infant formula)	IARC Known carcinogen[1]	IARC Probable carcinogen[2]	IARC Possible carcinogen[3]	Carcin (other source)	EU Endocrine Disurptor[4]	Reproductive Toxicity	Neurotoxicity	Respiratory toxicity
POLYESTERS (and additives from other chemical classes) continued														
Pyromellitic dianhydride	89-32-7	1238	Valspar	The FCS may be safely reacted with monomers listed in 21 CFR 175.300(b)(3)(vii)(a, b, c, and d) and polybasic acids and their anhydride, monobasic acids, polyhydric alcohols, and monohydric alcohols that are authorized through an effective Food Contact Notification (FCN) for use as components of polyester coating resins.	May not exceed 1.6% weight of the coating. A specific migration of 0.05mg/kg (expressed as Pyromellitic acid) must be ensured.	Cannot be used in contact with infant formula.								
1H-Azepine-1-carboxamide, hexahydro-2-oxo-N-[3,3,5-trimethyl-5-[[tetrahydro-3,5-bis[(5-isocyanato-1,3,3-trimethylcyclohexyl) methyl]-2,4,6-trioxo-1,3,5-triazin-1(2H)-yl]methyl] cyclohexyl]	1262431-48-0	1229 REPLACES FCN 1167	Valspar	As a cross-linking agent in the manufacture of polyester/polyurethane resins for use as components of coatings for use on metal substrates.	Can represent a maximum of 13.9% by weight of the final coating.	May not be used in contact with foods and beverages containing greater than 15% alcohol. Not for use with infant formula.								
3a,4,7,7a-tetrahydro-4,7-methanoisobenzofuran-1,3-dione	826-62-0	1226	Valspar	The resin may be used in the production of coatings on (1) metal substrates for single use food-contact articles or (2) any substrate for repeated use food-contact articles.	May not exceed 8.7% by weight of the coating.	Cannot be used in contact with infant formula products.								
Tricyclodecanedimethanol	26896-48-0 26160-83-8	1192	Valspar	As a monomer used in the manufacture of polyester or polyester/polyurethane resins for use as components of coatings for use on metal substrates and repeated use food-contact surfaces.	May represent a maximum of 13.6% by weight of the final coating.	May not be used in contact with infant formula.								X[34]

Chemical Name	CAS	FDA FCN#	Company	Use	Percentage allowed in can coating	Other restrictions (e.g., not for use in infant formula)	IARC Known carcinogen[1]	IARC Probable carcinogen[2]	IARC Possible carcinogen[3]	Carcin (other source)	EU Endocrine Disurptor[4]	Reproductive Toxicity	Neurotoxicity	Respiratory toxicity
POLYESTERS (and additives from other chemical classes) continued														
Isophorone diisocyanate	4098-71-9	1191/1491	Valspar	As a monomer used in the manufacture of polyester/polyurethane resins for use as components of coatings for use on metal substrates and repeated use food-contact surfaces	Cannot exceed 7.2% by weight of the final coating.	Not for use in contact with infant formula and breast milk.								X[35]
1H-Azepine-1-carboxamide, hexahydro-2-oxo-N-[3,3,5-trimethyl-5-[[tetrahydro-3,5-bis[(5-isocyanato-1,3,3-trimethylcyclohexyl) methyl]-2,4,6-trioxo-1,3,5-triazin-1(2H)-yl]methyl] cyclohexyl]-	1262431-48-0	1167 *replaced by 1229	Valspar	Cross-linking agent for polyester/polyurethane in metal coatings	May represent a maximum of 13.9% by weight of final coating.	May not contact foods or beverages containing more than 15% alcohol. Not for use with infant formula.								
Pyromellitic dianhydride (PMDA)	89-32-7	1140	Valspar	Component of polyester can coatings	Cannot exceed 1.6% by weight of coating.									
3a,4,7,7a-tetrahydro-4,7-methanoisobenzofuran-1,3-dione	826-62-0	1138	Valspar	Component of polyester can coatings	Cannot exceed 8.7% by weight of coating formula.	May not come in contact with infant formula.								
Tripropylene glycol	24800-44-0	1071	Valspar	Monomer for polyester resins use as a component of metal coatings	Coatings cannot exceed 9.7% of the weight.					X[36]				X[37]
2-(2-Aminoethylamino) ethanol	111-41-1	1062	Valspar	Monomer for polyester resins use as a component of metal coatings – can ends only	May be used at a maximum concentration of 1.3% of the total coating.	May be applied only to the can ends of two-piece, aluminum and steel beverage containers.						X[38]		
2,2-Dimethylolpropionic acid	4767-03-7	1061	Valspar	Monomer for polyester resins use as a component of metal coatings	Coatings cannot exceed levels of 3% of total weight.									
Isophorone diisocyanate	4098-71-9	1060	Valspar	Monomer for polyester resins use as a component of metal coatings	Coatings cannot exceed 11% weight of the final coating.									X[39]

Chemical Name	CAS	FDA FCN#	Company	Use	Percentage allowed in can coating	Other restrictions (e.g., not for use in infant formula)	IARC Known carcinogen[1]	IARC Probable carcinogen[2]	IARC Possible carcinogen[3]	Carcin (other source)	EU Endocrine Disurptor[4]	Reproductive Toxicity	Neurotoxicity	Respiratory toxicity
POLYESTERS (and additives from other chemical classes) continued														
Blocked IPDI polymer consisting of trimer, pentamer, heptamer, and nonamer oligomers, with the primary component of interest being the trimer	103170-26-9	1039	Valspar	Monomer component in polyester urethane on metal	Cannot exceed 8.2% of total weight.	Not for used in contact with infant formula.								X[40]
1,6-Hexanediol	629-1-1-8	1015	WR Grace	Monomer in polyester coatings for metal	May be used at a maximum level of 54% weight of the polyhydric alcohols used as starting monomers of the finished polyester coating.	Not for use in contact with infant formula.								
Tricyclodecanedimethanol	26160-83-8	918	Evonik Degussa GmbH	Monomer in polyester coatings for metal		Not for use in contact with infant formula and breast milk.								
PVC-BASED														
Vinyl Acetate (Ethylene vinyl alcohol)	108-05-04									no[41]		X[42]	X[43]	X
Vinyl Chloride[44,45]	75-01-4						X			X[46]			X	X[47]
2-Propenoic acid, 2-methyl-, ethyl ester, polymer with 2-oxiranylmethyl 2-methyl-2-propenoate	40081-37-6	1164; 1131; 1117	Valspar	Stabilizing additive for PVC coatings on metal cans; seam stripes on metal cans; can ends	May not exceed 12% by weight of coating.	Not for use with beer, carbonated beverages or infant formula.								
UNSPECIFIED														
Latex/Silicone: 1,2-Benzisothiazolin-3-one	2634-33-5	1108/1453	Lanxess Thor GmBH	Biocide preservative in aqueous latex/ silcone formulations used for metal coatings										
Nylon: N,N,N',N'-tetrakis(2-hydroxypropyl)adipamide (9CI)	57843-53-5	~~1245~~/1353/ 1502	Dow	As a crosslinking agent used in conjunction with the dispersions described in FCNs 1087 and/ or 1095 (FCN No. 1245) or FCNs 1315, 1356, and 1357 (FCN No. 1353) to produce metal coatings or components of metal coatings.										

Chemical Name	CAS	FDA FCN#	Company	Use	Percentage allowed in can coating	Other restrictions (e.g., not for use in infant formula)	IARC Known carcinogen[1]	IARC Probable carcinogen[2]	IARC Possible carcinogen[3]	Carcin (other source)	EU Endocrine Disurptor[4]	Reproductive Toxicity	Neurotoxicity	Respiratory toxicity
UNSPECIFIED continued														
Metal substrates: Zirconium Oxide (CAS. Reg. No. 1314-23-4) and Tin(II) Phosphate (CAS. Reg. No. 15578-32-2) and Tin(II) Fluoride (CAS Reg. No. 7783-47-3).	1314-23-4 15578-32-2 7783-47-3	1253	Nippon Steel & Sumitomo Metal Corporation	As a conversion coating on the interior of tinplated steel containers (cans) with or without a polymeric topcoat.										
Polyphosphoric acids, polymers with hydroxyl-terminated epoxidized polybutadiene	1429907-37-8	1449	Akzo Nobel	As an adhesion promoter in resinous and polymeric coatings complying with 21 CFR 175.300 or effective notifications. Limitations/ Specifications*:	At a level not to exceed 6% (w/w) based on the solid content of the coating. Coatings containing the FCS may be applied onto the metal substrate for single-use applications in contact with beverages, Food Types I, II, IVB, and VI except those containing greater than 15 percent alcohol	Not for use with beer, carbonated beverages or infant formula.								
Hydroquinone	123-31-9	1246/1306/ 1452/1460	Valspar	For use as a monomer in the production of epoxy coating resins as described in 21 CFR 175.300(b)(3)(viii).	The resin may be used in the production of coatings for can-ends only and will be used in contact with aqueous, acidic, and alcoholic foods and beverages containing up to 15 percent alcohol by volume. The FCS may be used in combination with other substances authorized for this intended use in epoxy can coatings under FDA's food additive regulations and effective Food-Contact Substance Notifications.					X[48]				
2,4-hexadienoic acid, (2E,4E), aka sorbic acid	110-44-1	1305	Valspar	The resin containing the FCS may be used in the production of coatings for can-ends only in compliance with 21 CFR 175.300(b)(3)(viii).	The finished coatings may contact all food types except fatty foods, beverages containing greater than 15 percent alcohol by volume, and infant formula under Conditions of Use C through G as described in Table 2.					X[49]				X[50]

Chemical Name	CAS	FDA FCN#	Company	Use	Percentage allowed in can coating	Other restrictions (e.g., not for use in infant formula)	IARC Known carcinogen[1]	IARC Probable carcinogen[2]	IARC Possible carcinogen[3]	Carcin (other source)	EU Endocrine Disruptor[4]	Reproductive Toxicity	Neurotoxicity	Respiratory toxicity
D-Glucitol, 1-deoxy-1-(methylamino)-, reaction products with 4-ethenylphenol homopolymer and formaldehyde,1-hydroxyethylidene-1,1-diphosphonic acid, manganous oxide, phosphate, fluorotitanic and fluorozirconic salts.		1472	Henkel Adhesive Technologies	For use as a stabilizer to prevent oxidation of tinplated steel containers (cans) with or without a polymeric topcoat, except for containers containing the FCS used in contact with infant formula and breast milk.										
2-Propenoic acid, 2-methylpropyl ester, polymer with 1,1-dimethylethyl propionate	186454-07-9	1483	Watson Standard Company	As a component of resinous and polymeric coatings as described in 21 CFR 175.300, on metal substrates for single use food contact articles, or on any suitable substrate for repeat use food contact articles, except for use in contact with infant formula and breast milk (see Limitations/ Specifications).	May be used at a maximum level of 0.003mg/in^2 on a dry weight basis.	Not for use in contact with infant formula or breast and breast milk.								

TABLE 2: COATINGS DETECTED IN FOOD CANS BY FTIR: COMPLETE RESULTS

Product	Food Parent Company	Retailer	Retailer State	Exp. Date	Coatings Detected
365 Everyday Value Dark Red Kidney Beans	Whole Foods Market IP. LP.	Whole Foods Market	NY	3/15/2017	Styrene-Acrylic2 (Body); Polyester1 (Lid)
365 Everyday Value Organic Diced Tomatoes	Whole Foods Market IP. LP.	Whole Foods Market	NY	9/1/2017	PVC2 (Body); PVC2 (Lid)
365 Everyday Value Organic Jellied Cranberry Sauce	Whole Foods Market IP. LP.	Whole Foods Market	NY	8/8/2016	BPA Epoxy1+Styrene-Acrylic2 (Body); BPA Epoxy1 (Lid)
365 Everyday Value Pumpkin 100% Pure	Whole Foods Market IP. LP.	Whole Foods Market	ME	12/1/2017	Polyester1 (Body); Oleoresin (Lid)
365 Everyday Value Sweetened Condensed Milk	Whole Foods Market IP. LP.	Whole Foods Market	ME	12/18/2016	Polyester4 (Body); Polyester4 (Lid)
A Taste of Thai Coconut Milk	Andre Prost, Inc.	Fred Meyer	OR	1/20/2018	BPA Epoxy1 (Body); PVC1 (Lid)
A Taste of Thai Coconut Milk	Andre Prost, Inc.	Target	MN	12/26/2017	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
Amy's Organic Soups Lentil Vegetable	Amy's Kitchen, Inc.	Target	CT	4/1/2018	Styrene-Acrylic2 (Body); Polyester3 (Lid)
Annie's Homegrown Organic Cheesy Ravioli	General Mills, Inc.	Whole Foods Market	NY	7/29/2016	Styrene-Acrylic1 (Body); Polyester1 (Lid)
Annie's Homegrown Organic Cheesy Ravioli	General Mills, Inc.	Kroger	MI	9/23/2016	Styrene-Acrylic1 (Body); Polyester1 (Lid)
Aroy-D Coconut Milk	Thai Agri Foods Public Company Limited	Walmart	Ont., CA	4/16/2018	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
Aunt Penny's Organic Black Beans	Teasdale Quality Foods, Inc	99 Cents Only Stores	CA		BPA Epoxy1 (Body); Oleoresin+BPA Epoxy2 (Lid)
Blue Menu Chickpeas	Loblaws, Inc.	Loblaws	Ont., CA	4/1/2018	Oleoresin (Body); Oleoresin (Lid)
Blue Menu Green Beans	Loblaws, Inc.	Loblaws	Ont., CA	8/1/2017	BPA Epoxy1+Styrene-Acrylic2 (Body); BPA Epoxy1 (Lid)
Campbell's Chicken Broth	Campbell Soup Company	Walmart	Ont., CA	4/26/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Campbell's Chicken Broth	Campbell Soup Company	Tom Thumb	TX	11/23/2016	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1+Styrene-Acrylic1 (Lid)
Campbell's Chicken Gravy	Campbell Soup Company	Walmart	RI	6/18/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Campbell's Cream of Mushroom Soup	Campbell Soup Company	Kroger	MI	8/14/2017	BPA Epoxy1+Styrene-Acrylic2 (Body); BPA Epoxy1+Polyester1+PVC1 (Lid)
Campbell's Cream of Mushroom Soup	Campbell Soup Company	Albertsons	WA	4/6/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1+PVC2+Polyester1 (Lid)
Campbell's Cream of Mushroom Soup	Campbell Soup Company	Target	MN	8/5/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1+Polyester1+PVC1 (Lid)
Campbell's Pork & Beans	Campbell Soup Company	Dollar Tree	CA	4/19/2017	Epoxy2 (Body); Epoxy1 (Lid)
Campbell's Pork & Beans	Campbell Soup Company	Dollar Tree	TX	1/29/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1+Styrene-Acrylic1 (Lid)
Campbell's Spaghetti Os	Campbell Soup Company	Albertsons	OR	9/19/2015	BPA Epoxy1+Styrene-Acrylic2 (Body); BPA Epoxy1+Styrene-Acrylic1 (Lid)
Campbell's Tomato Soup	Campbell Soup Company	Dollar Tree	TX	1/22/2016	BPA Epoxy1+Styrene-Acrylic2 (Body); BPA Epoxy1 (Lid)
Campbell's Tomato Soup	Campbell Soup Company	99 Cents Only Stores	CA	7/7/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Campbell's Turkey Gravy	Campbell Soup Company	Fred Meyer	WA	10/14/2016	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Campbell's Turkey Gravy	Campbell Soup Company	Kroger	MI	6/1/2017	BPA Epoxy1+Styrene-Acrylic2 (Body); BPA Epoxy1 (Lid)
Carnation Evaporated Fat Free Milk	Nestlé S.A.	Kroger	MI	12/23/2015	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
Carnation Evaporated Milk	Nestlé S.A.	Walmart	MA	9/15/2016	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
Chef Boyardee Mini Ravioli	ConAgra Foods, Inc.	Safeway	CA	8/1/2017	Styrene-Acrylic2 (Body); Polyester1+PVC1 (Lid)
Clover Valley Asparagus	Dollar General Corporation	Dollar General	NM	4/11/2019	BPA Epoxy2 (Body); BPA Epoxy2 (Lid)
Clover Valley Black Beans	Dollar General Corporation	Dollar General	NM	4/1/2018	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy2 (Lid)
Clover Valley Black Beans	Dollar General Corporation	Dollar General	TX	4/21/2018	BPA Epoxy2 (Body); BPA Epoxy1 (Lid)

Product	Food Parent Company	Retailer	Retailer State	Exp. Date	Coatings Detected
Clover Valley Cut Green Beans	Dollar General Corporation	Dollar General	WV	12/1/2018	Polyester1 (Body); Polyester1 (Lid)
Clover Valley Light Red Kidney Beans	Dollar General Corporation	Dollar General	NM	4/6/2018	BPA Epoxy2 (Body); BPA Epoxy2 (Lid)
Clover Valley Mixed Vegetable	Dollar General Corporation	Dollar General	NM	12/1/2017	Oleoresin (Body); Oleoresin (Lid)
Clover Valley Pinto Beans	Dollar General Corporation	Dollar General	WV	1/15/2018	BPA Epoxy2 (Body); BPA Epoxy2 (Lid)
Clover Valley Pinto Beans	Dollar General Corporation	Dollar General	NM	4/24/2018	BPA Epoxy2 (Body); BPA Epoxy2 (Lid)
Clover Valley Sliced Beets	Dollar General Corporation	Dollar General	NM	12/1/2017	Oleoresin (Body); Oleoresin (Lid)
Clover Valley Sweet Peas	Dollar General Corporation	Dollar General	NM	12/17/2017	Oleoresin (Body); Oleoresin (Lid)
Clover Valley Sweet Peas	Dollar General Corporation	Dollar General	NM	12/1/2018	Oleoresin (Body); Oleoresin (Lid)
Clover Valley Tomato Condensed Soup	Dollar General Corporation	Dollar General	NM	1/26/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Clover Valley Tomato Condensed Soup	Dollar General Corporation	Dollar General	WV	1/26/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Compliments Chicken Broth	Empire Company Limited	FreshCo.	Ont., CA	7/9/2018	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Compliments French-Style Cut Green Beans	Empire Company Limited	FreshCo.	Ont., CA	8/1/2016	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Contadina Tomato Sauce	Del Monte Foods, Inc.	Albertsons	OR	8/2/2016	PVC2 (Body); PVC2 (Lid)
Corina Crushed Tomatoes	Red Gold, LLC	Dollar Tree	TX	8/28/2017	BPA Epoxy1+PVC2 (Body); BPA Epoxy1 (Lid)
Del Monte 100% Juice Fruit Cocktail	Del Monte Foods, Inc.	Kroger	MI	4/30/2018	Uncoated (Body); BPA Epoxy1+Polyester1+PVC2 (Lid)
Del Monte Cut Green Beans	Del Monte Foods, Inc.	Target	MN	6/29/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1+PVC1+Polyester1 (Lid)
Del Monte Cut Green Beans	Del Monte Foods, Inc.	Loblaws	Ont., CA	9/17/2016	Polyester1 (Body); Polyester1 (Lid)
Del Monte Cut Green Beans	Del Monte Foods, Inc.	Kroger	MI	4/18/2018	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1+Polyester1+PVC2 (Lid)
Del Monte Diced Tomatoes	Del Monte Foods, Inc.	Walmart	RI	9/1/2017	PVC2 (Body); PVC2 (Lid)
Del Monte French Style Green Beans	Del Monte Foods, Inc.	Fred Meyer	AK	7/13/2018	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
Del Monte Fruit Cocktail	Del Monte Foods, Inc.	Walmart	MA	4/20/2017	Uncoated (Body); Polyester3 (Lid)
Del Monte Pickled Green Beans	Del Monte Foods, Inc.	99 Cents Only Stores	CA	12/3/2015	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
Del Monte Sliced Peaches	Del Monte Foods, Inc.	Target	MN	4/29/2017	Uncoated (Body); BPA Epoxy1+Polyester1+PVC1 (Lid)
Del Monte Whole Kernel Corn	Del Monte Foods, Inc.	Albertsons	WA	9/30/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1+Polyester4+PVC2 (Lid)
Del Monte Whole Kernel Corn	Del Monte Foods, Inc.	Safeway	CA	7/30/2018	BPA Epoxy1+Styrene-Acrylic2 (Body); Polyester3 (Lid)
Del Monte Whole Kernel Corn	Del Monte Foods, Inc.	Walmart	MA	5/6/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1+Polyester4+PVC2 (Lid)
Dole Tropical Fruit in Light Syrup & Passion Fruit Juice	Dole Food Company, Inc.	Kroger	MI	10/1/2016	Uncoated (Body); Polyester1+PVC2 (Lid)
E.D. Smith Pure Pumpkin	E.D. Smith Foods, LTD.	Walmart	Ont., CA	10/24/2017	Oleoresin (Body); Oleoresin (Lid)
Eagle Brand Sweetened Condensed Milk	J.M. Smuckers Company	Kroger	MI	1/13/2017	BPA Epoxy1 (Body); BPA Epoxy1+PVC2+Acrylic3 (Lid)
Eden Organics Cannellini White Kidney Beans	Eden Foods, Inc.	Fred Meyer	AK	3/17/2018	Oleoresin (Body); Oleoresin (Lid)
Essential Everyday Chicken Broth	Supervalu Inc.	Albertsons	WA	3/7/2017	BPA Epoxy2 (Body); BPA Epoxy1 (Lid)
Essential Everyday Chicken Noodle Soup	Supervalu Inc.	Albertsons	TX	3/2/2017	BPA Epoxy1+Styrene-Acrylic2 (Body); BPA Epoxy1+PVC1+Polyester1 (Lid)
Essential Everyday Cut Green Beans	Supervalu Inc.	Albertsons	OR	7/1/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Essential Everyday Fruit Cocktail in Heavy Syrup	Supervalu Inc.	Albertsons	OR	9/1/2017	Uncoated (Body); Polyester3 (Lid)
Essential Everyday Fruit Cocktail in Peach Juice	Supervalu Inc.	Albertsons	OR	9/1/2017	Uncoated (Body); Polyester3 (Lid)

Product	Food Parent Company	Retailer	Retailer State	Exp. Date	Coatings Detected
Essential Everyday Garbanzo Beans	Supervalu Inc.	Albertsons	WA	12/1/2018	BPA Epoxy1+Styrene-Acrylic2 (Body); BPA Epoxy1 (Lid)
Essential Everyday Turkey Gravy	Supervalu Inc.	Albertsons	WA	7/23/2016	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1+Polyester1+PVC2 (Lid)
Family Gourmet Black Beans	Dollar Tree, Inc	Family Dollar	WV	3/18/2018	BPA Epoxy2 (Body); BPA Epoxy2 (Lid)
Family Gourmet Cut Green Beans	Dollar Tree, Inc	Family Dollar	WV	12/1/2018	Polyester1 (Body); Polyester1 (Lid)
Family Gourmet Pinto Beans	Dollar Tree, Inc	Family Dollar	WV	7/27/2018	BPA Epoxy2 (Body); BPA Epoxy2 (Lid)
Family Gourmet Pork & Beans	Dollar Tree, Inc	Family Dollar	TX	10/20/2016	BPA Epoxy2 (Body); BPA Epoxy2 (Lid)
Family Gourmet Sliced Peaches	Dollar Tree, Inc	Family Dollar	TX	7/29/2017	Uncoated (Body); BPA Epoxy1 (Lid)
Family Gourmet Tomato Condensed Soup	Dollar Tree, Inc	Family Dollar	WV	3/4/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Farmer's Market Organic Pumpkin	Farmer's Market Foods, Inc.	Whole Foods Market	ME	10/1/2016	Oleoresin (Body); Oleoresin (Lid)
Fred Meyer Cut Yams	The Kroger Co.	Fred Meyer	AK	9/17/2017	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
GFS Dark Red Kidney Beans	Gordon Food Service	Gordon Food Service Store	MI		BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
GFS Tomato Puree	Gordon Food Service	Gordon Food Service Store	MI	9/24/2015	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
Globe Brand Coconut Milk	Thai Agri Foods Public Company Limited	FreshCo.	Ont., CA	6/13/2018	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
Goya Black Beans	Goya Foods, Inc.	Target	MN	6/12/2020	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1+PVC2+Acrylic3 (Lid)
Goya Coconut Milk	Goya Foods, Inc.	Walmart	RI	3/1/2019	BPA Epoxy1 (Body); BPA Epoxy1+PVC2+Acrylic3 (Lid)
Great Value Black Beans	Wal-Mart Stores, Inc.	Walmart	NJ	7/23/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Great Value Chick Peas Garbanzos	Wal-Mart Stores, Inc.	Walmart	NJ	8/11/2017	BPA Epoxy1+Styrene-Acrylic2 (Body); BPA Epoxy1 (Lid)
Great Value Cranberry Sauce	Wal-Mart Stores, Inc.	Walmart	MA	11/24/2016	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Great Value Cut Green Beans	Wal-Mart Stores, Inc.	Walmart	Ont., CA	9/1/2017	BPA Epoxy1+Styrene-Acrylic2 (Body); BPA Epoxy1 (Lid)
Great Value Dark Red Kidney Beans	Wal-Mart Stores, Inc.	Walmart	Ont., CA	7/1/2018	BPA Epoxy1 (Body); Oleoresin (Lid)
Great Value Diced Tomatoes	Wal-Mart Stores, Inc.	Walmart	RI	4/2/2017	PVC2 (Body); PVC2 (Lid)
Great Value Pinto Beans	Wal-Mart Stores, Inc.	Walmart	NJ	4/22/2017	BPA Epoxy2 (Body); BPA Epoxy2 (Lid)
Great Value Whole Berry Cranberry Sauce	Wal-Mart Stores, Inc.	Walmart	Ont., CA	9/15/2016	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Green Giant Corn Niblets	General Mills, Inc.	Loblaws	Ont., CA	10/14/2018	PVC1 (Body); Oleoresin (Lid)
Green Giant French Style Green Beans	General Mills, Inc.	Walmart	MA	9/22/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Green Giant Steam Crisp Mexicorn	General Mills, Inc.	Fred Meyer	AK	9/6/2018	PVC1 (Body); PVC1 (Lid)
Green Giant Whole Kernel Sweet Corn	General Mills, Inc.	Kroger	MI	10/5/2018	BPA Epoxy1+Styrene-Acrylic2 (Body); BPA Epoxy1 (Lid)
Grown Right Organic Jellied Cranberry Sauce	Clement Pappas & Co., Inc.	Whole Foods Market	ME	8/26/2016	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Harris Teeter Cream of Mushroom Condensed Soup	The Kroger Co.	Harris Teeter	MD	6/8/2017	BPA Epoxy1+Styrene-Acrylic2 (Body); BPA Epoxy1+PVC1 (Lid)
Harris Teeter Italian Green Beans	The Kroger Co.	Harris Teeter	MD	12/1/2017	Polyester1 (Body); Polyester1 (Lid)
Harris Teeter Organics Black Beans	The Kroger Co.	Harris Teeter	MD	12/1/2018	Oleoresin (Body); Oleoresin (Lid)
Harris Teeter Organics Whole Kernel Corn	The Kroger Co.	Harris Teeter	MD	12/1/2018	Oleoresin (Body); Oleoresin (Lid)
Harris Teeter Sweetened Condensed Milk	The Kroger Co.	Harris Teeter	MD	6/9/2017	BPA Epoxy1 (Body); BPA Epoxy1+PVC2+Acrylic3 (Lid)

Product	Food Parent Company	Retailer	Retailer State	Exp. Date	Coatings Detected
Harris Teeter Whole Peeled Tomatoes	The Kroger Co.	Harris Teeter	MD	2/28/2017	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
Hartford House Chili with Beans	Dollar General Corporation	Dollar Tree	WV	2/16/2016	BPA Epoxy2 (Body); PVC1 (Lid)
Health Valley Cream of Chicken Soup	The Hain Celestial Group, Inc.	Fred Meyer	OR	6/2/2016	Polyester1 (Body); Polyester1 (Lid)
Heinz Homestyle Baked Beans	The Kraft Heinz Company	99 Cents Only Stores	CA	4/28/2016	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Hunt's Tomato Paste	ConAgra Foods, Inc.	Walmart	RI	12/27/2016	Styrene-Acrylic2 (Body); Polyester1 (Lid)
Kroger Black Beans	The Kroger Co.	Kroger	MI	8/21/2017	BPA Epoxy1+Styrene-Acrylic2 (Body); BPA Epoxy1 (Lid)
Kroger Chicken Broth	The Kroger Co.	Fred Meyer	AK	10/16/2016	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
Kroger Chicken Broth	The Kroger Co.	Kroger	MI	2/12/2017	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
Kroger Cream of Mushroom Soup	The Kroger Co.	Fred Meyer	OR	4/22/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1+Polyester1+PVC2 (Lid)
Kroger Diced Peeled Tomatoes in Tomato Juice	The Kroger Co.	Kroger	MI	2/28/2018	Polyester1 (Body); Polyester4 (Lid)
Kroger Diced Tomatoes in Tomato Juice	The Kroger Co.	Fred Meyer	WA	9/1/2017	PVC2 (Body); Polyester2 (Lid)
Kroger Evaporated Milk	The Kroger Co.	Fred Meyer	WA	6/15/2016	BPA Epoxy1 (Body); PVC2+BPA Epoxy1 (Lid)
Kroger Lite Fruit Cocktail	The Kroger Co.	Fred Meyer	OR	12/1/2017	Uncoated (Body); Polyester3 (Lid)
Kroger Seasoned Black Beans	The Kroger Co.	Fred Meyer	AK	4/29/2018	BPA Epoxy2 (Body); BPA Epoxy1 (Lid)
Kroger Sweet Golden Corn Whole Kernel	The Kroger Co.	Fred Meyer	OR	12/1/2016	BPA Epoxy1+Styrene-Acrylic2 (Body); BPA Epoxy1+Polyester1+PVC2 (Lid)
Kroger Whole Berry Cranberry Sauce	The Kroger Co.	Fred Meyer	OR	5/4/2016	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
La Costena Black Beans	Vilore Foods Company Inc.	Dollar Tree	CA	3/31/2018	BPA Epoxy2 (Body); BPA Epoxy1+Polyester1+PVC2 (Lid)
La Costena Black Beans	Vilore Foods Company Inc.	Dollar Tree	TX	7/29/2018	BPA Epoxy2 (Body); BPA Epoxy1+Polyester1+PVC1 (Lid)
Libby's 100% Pure Pumpkin	Seneca Foods Corporation	Kroger	MI	2/1/2018	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Libby's 100% Pure Pumpkin	Seneca Foods Corporation	Albertsons	OR	2/1/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Libby's Green Beans	Seneca Foods Corporation	Dollar Tree	TX	12/1/2018	Polyester1 (Body); Polyester1 (Lid)
Libby's Green Beans	Seneca Foods Corporation	Dollar Tree	WV	12/1/2018	Polyester1 (Body); Polyester1 (Lid)
Libby's Green Beans	Seneca Foods Corporation	Dollar Tree	CA	12/1/2018	Polyester1 (Body); Polyester1 (Lid)
Market Pantry Evaporated Milk	Target Corporation	Target	CT	1/7/2016	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
Market Pantry Garbanzo Beans	Target Corporation	Target	MN	6/23/2018	BPA Epoxy2 (Body); BPA Epoxy1 (Lid)
Market Pantry Petite Diced Tomatoes	Target Corporation	Target	CT	2/28/2017	BPA Epoxy1 (Body); BPA Epoxy1+PVC1 (Lid)
Market Pantry Pumpkin	Target Corporation	Target	CT	11/2/2017	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
Market Pantry Whole Kernel Corn	Target Corporation	Target	MN	6/7/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Meijer 100% Pure Pumpkin	Meijer, Inc.	Meijer	MI	12/1/2017	Oleoresin (Body); Oleoresin (Lid)
Meijer Cream of Mushroom Soup	Meijer, Inc.	Meijer	MI	8/12/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy2+PVC2+Polyester1 (Lid)
Meijer Green Beans	Meijer, Inc.	Meijer	MI	2/1/2018	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Meijer Jellied Cranberry Sauce	Meijer, Inc.	Meijer	MI	1/7/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Meijer Naturals Diced Tomatoes	Meijer, Inc.	Meijer	MI	2/28/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Meijer Pinto Beans	Meijer, Inc.	Meijer	MI	8/4/2017	BPA Epoxy1+Styrene-Acrylic2 (Body); BPA epoxy1 (Lid)
Muir Glen Organic Diced Tomatoes Fire Roasted	General Mills, Inc.	Albertsons	OR	2/19/2017	PVC2 (Body); PVC2 (Lid)

Product	Food Parent Company	Retailer	Retailer State	Exp. Date	Coatings Detected
Muir Glen Organic Tomato Paste	General Mills, Inc.	Kroger	MI	3/4/2017	PVC2 (Body); PVC2 (Lid)
Native Forest Tropical Fruit Salad	Edward & Sons Trading Company, Inc.	Whole Foods Market	ME	6/17/2017	BPA Epoxy2 (Body); BPA Epoxy1+PVC2 (Lid)
Native Forest Unsweetened Organic Coconut Milk Light	Edward & Sons Trading Company, Inc.	Whole Foods Market	NY	9/30/2016	Polyester3 (Body); Polyester3 (Lid)
Nestle Carnation Sweetened Condensed Millk	Nestlé S.A.	Albertsons	OR	10/1/2016	BPA Epoxy2 (Body); BPA Epoxy1 (Lid)
No Name 100% Pure Pumpkin Canada Fancy	Loblaw Companies Limited	Loblaws	Ont., CA	10/1/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
No Name Chicken Broth	Loblaw Companies Limited	Loblaws	Ont., CA	6/22/2017	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
No Name Whole Berry Cranberry Sauce	Loblaw Companies Limited	Loblaws	Ont., CA	8/16/2016	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
NuPak Red Kidney Beans	Prairie Industries, Inc	FreshCo.	Ont., CA	8/26/2018	BPA Epoxy2 (Body); BPA Epoxy2 (Lid)
O Organics Diced Tomatoes	AB Acquisition, LLC	Safeway	CA	9/1/2017	PVC2 (Body); PVC2 (Lid)
O Organics Garbanzo Beans	AB Acquisition, LLC	Safeway	CA	8/11/2017	Polyester1 (Body); Polyester4 (Lid)
Ocean Spray Whole Berry Cranberry Sauce	Supervalu Inc.	Albertsons	WA	10/16/2016	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Ocean Spray Whole Berry Cranberry Sauce	Ocean Spray Cranberries, Inc.	FreshCo.	Ont., CA	3/11/2016	BPA Epoxy1+Styrene-Acrylic2 (Body); BPA Epoxy1 (Lid)
Ocean Spray Whole Berry Cranberry Sauce	Ocean Spray Cranberries, Inc.	Anica Savoonga Native Store	AK	4/29/2016	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
p$$t Turkey Gravy	The Kroger Co.	Kroger	MI	1/14/2017	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
Progresso Chicken and Homestyle Noodles	General Mills, Inc.	Anica Savoonga Native Store	AK	4/17/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1+Polyester1+PVC2 (Lid)
Progresso Light Chicken Corn Chowder	General Mills, Inc.	Walmart	MA	5/20/2017	BPA Epoxy1+Styrene-Acrylic2 (Body); Polyester1+BPA Epoxy1+PVC2 (Lid)
Progresso Vegetable Classics Creamy Mushroom Soup	General Mills, Inc.	Publix	FL	6/23/2017	BPA Epoxy1 (Body); BPA Epoxy1+Polyester1+PVC2 (Lid)
Progresso Vegetable Classics Hearty Tomato	General Mills, Inc.	Dollar Tree	CA	1/31/2016	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1+Polyester1+PVC2 (Lid)
Publix Black Beans in Seasoned Sauce	Publix Super Markets, Inc.	Publix	FL	9/22/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Publix Chicken Broth	Publix Super Markets, Inc.	Publix	FL	6/8/2017	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
Publix Great Northern Beans	Publix Super Markets, Inc.	Publix	FL	9/29/2017	BPA Epoxy2 (Body); BPA Epoxy2 (Lid)
Publix Green Wise Organic Diced Tomatoes	Publix Super Markets, Inc.	Publix	FL	9/1/2017	PVC2 (Body); PVC2 (Lid)
Publix Jellied Cranberry Sauce	Publix Super Markets, Inc.	Publix	FL	6/14/2017	BPA Epoxy1+Arcylic1 (Body); BPA Epoxy1 (Lid)
Publix Whole Kernel Sweet Corn	Publix Super Markets, Inc.	Publix	FL	12/1/2017	Oleoresin (Body); Oleoresin (Lid)
Read 3 Bean Salad	Seneca Foods Corporation	Dollar Tree	TX	12/1/2016	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
S!gnal Cream Style Corn	Empire Company Limited	FreshCo.	Ont., CA	9/1/2017	BPA Epoxy1 (Body); Oleoresin+BPA Epoxy1 (Lid)
S&W Black Beans	La Costeña	99 Cents Only Stores	CA	4/8/2016	BPA Epoxy2 (Body); BPA Epoxy2 (Lid)
Safeway Kitchens Diced Tomatoes	AB Acquisition, LLC	Safeway	CA	9/1/2017	PVC2 (Body); PVC2 (Lid)
Safeway Kitchens Diced Tomatoes	AB Acquisition, LLC	Randalls	TX	2/28/2017	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Safeway Kitchens French Style Green Beans	AB Acquisition, LLC	Anica Savoonga Native Store	AK	12/1/2017	Polyester1 (Body); Polyester1 (Lid)
Safeway Kitchens Kidney Beans	AB Acquisition, LLC	Randalls	TX	5/20/2017	BPA Epoxy2 (Body); BPA Epoxy1 (Lid)

Product	Food Parent Company	Retailer	Retailer State	Exp. Date	Coatings Detected
Safeway Kitchens Petite Diced Tomatoes	AB Acquisition, LLC	Anica Savoonga Native Store	AK	2/1/2017	Polyester1 (Body); Polyester4 (Lid)
Seneca Mixed Vegetables	Seneca Foods Corporation	99 Cents Only Stores	TX	12/1/2017	Oleoresin (Body); Oleoresin (Lid)
Simple Truth Organic Black Beans	The Kroger Co.	Kroger	TX	8/10/2018	Polyester1 (Body); Polyester4 (Lid)
Simple Truth Organic Great Northern Beans	The Kroger Co.	Kroger	MI	5/27/2018	Polyester1 (Body); Polyester4 (Lid)
Southgate Beans and Franks	Choice Food of America, Inc	Dollar Tree	WV	10/1/2019	BPA Epoxy1+Styrene-Acrylic1 (Body); BPA Epoxy1 (Lid)
Swanson Chicken Broth	Campbell Soup Company	Walmart	RI	11/17/2016	BPA Epoxy1+Styrene-Acrylic2 (Body); BPA Epoxy1 (Lid)
Swanson Chicken Broth	Campbell Soup Company	Target	MN	5/10/2017	BPA Epoxy1+Styrene-Acrylic2 (Body); BPA Epoxy1+Styrene-Acrylic2 (Lid)
Thai Kitchen Coconut Milk	McCormick & Company, Incorporated	Loblaws	Ont., CA	8/26/2016	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
Thai Kitchen Coconut Milk	McCormick & Company, Incorporated	Albertsons	WA	1/24/2017	BPA Epoxy1 (Body); BPA Epoxy1 (Lid)
Thai Kitchen Organic Coconut Milk	McCormick & Company, Incorporated	Safeway	CA	3/24/2017	BPA Epoxy1 (Body); BPA Epoxy1+Styrene-Acrylic1 (Lid)
The Allens Seasoned Turnip Greens	Del Monte Foods, Inc.	Dollar General	NM	12/17/2017	BPA Epoxy2 (Body); BPA Epoxy2 (Lid)
	Aldi Nord	Trader Joe's	ME	3/5/2017	BPA Epoxy2 (Body); BPA Epoxy1 (Lid)
Trader Joe's Coconut Cream	Aldi Nord	Trader Joe's	NJ	7/2/2017	BPA Epoxy1 (Body); PVC2+BPA Epoxy1 (Lid)
Trader Joe's Organic Black Beans	Aldi Nord	Trader Joe's	NJ	12/1/2018	Polyester2 (Body); Polyester2 (Lid)
Trader Joe's Organic Joe's O's Pasta	Aldi Nord	Trader Joe's	ME	11/1/2016	BPA Epoxy1+Styrene-Acrylic2 (Body); Polyester1 (Lid)
Trader Joe's Organic Pinto Beans	Aldi Nord	Trader Joe's	NJ	12/1/2017	Polyester2 (Body); Polyester2 (Lid)
Trader Joe's Organic Pumpkin	Aldi Nord	Trader Joe's	NJ	7/1/2017	Polyester1 (Body); Polyester1 (Lid)
Trader Joe's Organic Sweetened Condensed Milk	Aldi Nord	Trader Joe's	ME	8/1/2017	Polyester4 (Body); Polyester4 (Lid)
Trader Joe's Unsalted Whole & Peeled Plum Tomatoes	Aldi Nord	Trader Joe's	NJ	4/7/2017	PVC2 (Body); PVC2 (Lid)
Trader Joe's Whole Kernel Corn	Aldi Nord	Trader Joe's	NJ	12/1/2017	Oleoresin (Body); Oleoresin (Lid)
Unico Chick Peas	Unico Inc.	Walmart	Ont., CA	6/19/2018	BPA Epoxy2 (Body); BPA Epoxy2 (Lid)
Wegmans Organic Black Beans	Wegmans Food Markets, Inc.	Wegmans	NY	3/1/2017	Oleoresin (Body); Oleoresin (Lid)
Wegmans Organic Diced Tomatoes	Wegmans Food Markets, Inc.	Wegmans	NY	9/1/2017	Polyester1 (Body); PVC2 (Lid)
Wegmans Organic Whole Kernel Corn	Wegmans Food Markets, Inc.	Wegmans	NY	12/1/2017	Oleoresin (Body); Oleoresin (Lid)
Wild Harvest Organic Garbanzo Beans	Supervalu Inc.	Albertsons	WA	9/23/2017	Polyester1 (Body); Polyester4 (Lid)

BPA AND OTHER CHEMICALS USED IN FOOD CANS (ENDNOTES)

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