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Chemicals of Interest in the Food and Beverage Industry: Understanding Risks Beyond Detection

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Food manufacturers, processors, distributors, and retailers continue to face heightened scrutiny regarding the presence of naturally occurring and anthropogenic contaminants in food and beverage products.

In addition to continued increase of Notices of Violation (NOVs) under California Safe Drinking Water and Toxic Enforcement Act of 1986 (commonly referred to as "Prop 65") the food and beverage industry is also seeing an increase in false advertising claims, greenwashing, and other litigation challenges related to chemicals of interest. This is a similar trend that has been observed in recent years for consumer products, with purported detections of many of the same chemicals of interest.

Media coverage and plaintiff allegations often focus on the mere presence of a chemical without adequately evaluating actual hazard or exposure levels, which are necessary to evaluate potential health risks. Detection alone does not establish risk. For a meaningful health concern to exist, there must be exposure at a level that scientific evidence indicates may cause harm.

Further, testing food and beverage products for many organic chemicals of interest (e.g., per- and polyfluoroalkyl substances (PFAS) and aflatoxins) can be challenging and requires careful evaluation of the analytical testing data. Naturally occurring and anthropogenic contaminants in food can enter the food supply at many different points, from before harvest through food processing.

Because of this, it can be challenging for organizations to understand when and where to sample when implementing quality assurance programs or conducting root cause analysis.

Accurate analytical testing, exposure assessment, and toxicological evaluation are critical components of any risk assessment, quality assurance and management program, or litigation strategy. Below, we discuss some of the considerations for current and emerging chemicals of interest in the food and beverage industry.

Aflatoxins and Other Mycotoxins

Mycotoxins are a group of naturally occurring compounds that are produced by fungi or mold. Aflatoxins are a specific type of mycotoxin produced by certain Aspergillus molds. Mycotoxins can develop on agricultural commodities before harvest, and continue growing during harvesting, storage, transportation, and processing — particularly in warm, humid environments. Nuts, grains, seeds, and similar commodities are among the products most associated with aflatoxin concerns.

Of the mycotoxins found in food and food products, aflatoxins tend to be subject to more regulatory scrutiny and mitigation.

Under Prop 65, aflatoxins have been listed as chemicals known to cause cancer since January 1, 1988[1]. While no NOVs were issued for aflatoxins between August 2020 and August 2025, 132 NOVs were issued between August 2025 and August 2026 for aflatoxins in spices, nut butters, snack foods, and other common household food products. The recent increase in enforcement activity highlights renewed attention to aflatoxins in the food supply.

The FDA has set action levels and guidance values for aflatoxins and other mycotoxins. However, for aflatoxins, like many chemicals listed under Prop 65, California's Office of Environmental Health Hazard Assessment (OEHHA) has not established a No Significant Risk Level (NSRL), which is the exposure above which is considered significant (according to Prop 65 guidelines and precedent) such that a warning label is required on a product.

In the absence of an established NSRL, businesses must evaluate potential exposures through product-specific risk assessments and consider deriving an NSRL or issuing an warning obligation.

While Prop 65 enforcement activity has increased significantly, regulatory attention to aflatoxins extends beyond California. Federal agencies also continue to expand monitoring and data collection efforts related to mycotoxin contamination. The U.S. Food and Drug Administration (FDA) actively monitors mycotoxins in foods, and works with the food and beverage industry to mitigate the presence of mycotoxins in the food supply.

In 2024, the FDA revised its multi-mycotoxin method (LC-MS/MS method C-003.03), reducing the reporting limit for aflatoxins and other mycotoxins from 5 ng/g to 2.5 ng/g. The FDA also explained that the updated compliance program is intended to generate data to support enforcement actions and risk assessments, and to provide information on mycotoxin incidence, extent of contamination, and co-occurrence.

In addition to the heightened regulatory scrutiny, the lower reporting limits introduced through this updated methodology can lead to additional litigation risk, and, further, may be contributing to the increase in aflatoxin-related NOVs in a variety of food products.

Even when appropriate toxicological benchmarks are identified, determining whether an aflatoxin or mycotoxin detection accurately represents a product can present additional challenges.

As aflatoxin and mycotoxin detections are reported at increasingly lower concentrations, careful review of the analytical results and supporting quality-control data becomes even more important to assess the reliability and significance of those low detections — particularly where the results may have regulatory or legal implications.

Unlike many food contaminants, identifying the source of aflatoxin detections often requires greater consideration of sampling variability and artifacts[2] rather than analytical limitations. Contamination may be highly localized within a shipment or storage container, creating significant variability in test results depending on where and how samples are collected.

A single contaminated area within a grain silo or supersack may not be represented in routine sampling, while another sample may detect elevated concentrations. As a result, representative sampling design, testing frequency, and supply chain monitoring practices are often as important as the laboratory analysis itself.

Heavy Metals

Heavy metals, including lead, mercury, cadmium, and arsenic, remain among the most frequently scrutinized in food safety and Prop 65 enforcement actions.[3] However, these contaminants originate from different sources and therefore require different risk assessment and mitigation strategies:

- Lead[4] and mercury[5] are largely associated with environmental contamination and may enter the food chain through industrial emissions, historical transportation-related deposition, contaminated soils, manufacturing processes, and ingredient sourcing. Mercury is often associated with bioaccumulation in seafood.

1 https://oehha.ca.gov/proposition-65/chemicals/aflatoxins
2 https://pubs.acs.org/jafcau/article/72/15/8380/173873/Challenges-and-Future-State-for-Mycotoxin-Analysis
3 https://www.p65warnings.ca.gov/fact-sheets/foods-and-beverages
4 https://www.fda.gov/food/environmental-contaminants-food/lead-food-and-foodwares
5 https://www.fda.gov/food/environmental-contaminants-food/mercury-food

- Arsenic[6] and cadmium[7] frequently occur naturally in the environment and can be absorbed by plants and marine life. Examples include arsenic in rice-growing regions and cadmium in foods such as spinach, cocoa products, seafood, and seaweed.

Importantly, toxicological considerations vary substantially among these metals. For example, potential health concerns associated with cadmium generally involve chronic, long-term exposure rather than isolated consumption events. Understanding these distinctions is essential when evaluating consumer exposure and defending product safety claims.

While laboratory analysis for metals is generally well-established, relatively inexpensive, and capable of producing results within days, interpreting the significance of those results requires a more nuanced understanding of source attribution, exposure pathways, and toxicological thresholds.

Per- and Polyfluoroalkyl Substances (PFAS)

PFAS continue to receive significant public attention despite substantial scientific uncertainties regarding exposure, health effects, and regulatory standards. Only three PFAS — Perfluorononanoic acid (PFNA) and its salts, Perfluorooctane Sulfonate (PFOS), and Perfluorooctanoic Acid (PFOA) — have been listed under Prop 65.

In its carcinogen listing, PFOS was also listed as "Perfluorooctane Sulfonic Acid (PFOS) and Its Salts and Transformation and Degradation Precursors," therefore including any PFAS that could potentially form PFOS. However, the PFAS landscape extends far beyond the compounds that have been specifically listed or evaluated by regulators.

Outside of Prop 65, PFAS presents unique challenges because thousands of compounds may fall within various regulatory definitions. Additionally, toxicity information exists for only a small subset of well-characterized PFAS compounds. Further, testing is limited to only certain specific PFAS compounds. These scientific and analytical limitations have shaped how regulators approach PFAS monitoring and risk evaluation.

The FDA validated and made available a methodology for testing 30 specific PFAS in foods and is actively testing PFAS in foods on the market[8] — primarily through samples collected through the Total Diet Study (TDS) program. The FDA also provides technical assistance to states, including testing foods grown, raised, or processed in known areas of contamination.

When PFAS are detected, the FDA may assess potential human health concerns for individual PFAS for which Toxicological Reference Values (TRVs) are available. The FDA has also worked with industry to voluntarily phase out PFAS-containing food contact substances. Despite these ongoing efforts, PFAS continue to be the focus of regulatory scrutiny and litigation.

To date, there have been a limited number of recalls and import alerts for PFAS, but there have been dozens of Prop 65 NOVs. In addition, there have been many false advertising claims related to the purported presence of PFAS. Given the scientific complexities and uncertainties surrounding PFAS, these claims often raise questions about how detections should be evaluated and interpreted.

When purported PFAS detections occur, it is critical to confirm analytical accuracy. Beverages and foods can be particularly challenging to test, and several factors can affect the accuracy of reported results. The testing method, quality-control information, and, where appropriate, confirmatory testing should therefore be carefully reviewed. Even when detections are confirmed, the presence of PFAS alone does not identify its source or establish the level of consumer exposure.

These factors should be evaluated before drawing conclusions about potential risk.

Microplastics

As it relates to proactively addressing consumer concerns or litigation, microplastics present an even greater challenge for the food and beverage industry. There are currently no standardized definitions or corresponding analytical methods for microplastics, and therefore, health-based exposure thresholds remain under development.

6 https://www.fda.gov/food/environmental-contaminants-food/arsenic-food
7 https://www.fda.gov/food/environmental-contaminants-food/cadmium-food-and-foodwares
8 https://www.fda.gov/food/environmental-contaminants-food/and-polyfluoroalkyl-substances-pfas

On its website, the FDA has stated, "some evidence suggests that microplastics and nanoplastics are entering the food supply, primarily through the environment."[9] While analytical methodologies and reporting vary, studies have also suggested that meat and seafood are potential dietary sources of microplastics.

A recent research study also suggests that highly processed protein products may contain higher microplastics concentrations than minimally processed products;[10] but the researchers in this study did not find evidence that packaging was the source of microplastics in meat and seafood. Significant scientific questions remain regarding measurement methodologies and toxicological relevance.

As a result, both reporting and testing data pertaining to microplastics must be interpreted cautiously and within the context of evolving scientific understanding.

Acrylamide

Acrylamide has been one of the most litigated Prop 65 issues involving food products.[11] Unlike environmental contaminants, acrylamide is formed naturally during cooking, roasting, baking, and frying processes. Foods such as coffee, potato chips, crackers, cereals, and baked goods may contain acrylamide because of standard manufacturing practices. Acrylamide is also formed when you bake bread and other food in your home kitchen.

Recent litigation has also called into question whether California can require certain Prop 65 cancer warnings for dietary acrylamide.[12] This ongoing debate highlights an important distinction between hazard identification and actual risk. While the compound may be present in a product, exposure assessments remain critical in determining whether the levels create a meaningful health concern under real-world consumption scenarios.

Looking Beyond Detection

As contaminant-related litigation and Prop 65 enforcement continue to expand in the food and beverage industry, companies face increasing pressure to understand the risks associated with contaminants of interest. Effective risk management requires more than simply detecting a constituent of concern. A reported detection is often the beginning of the evaluation, not the conclusion.

EVALUATING THE DETECTION

Testing strategies should be tailored to the specific constituent, ingredients, and final product. Before drawing conclusions from a reported detection, companies should consider whether:

- The analytical method is appropriate for the chemical and product being evaluated;
- The result is reliable and representative of the product; and
- Sampling, product composition, or other analytical factors could have influenced the result.

These considerations vary by contaminant. Testing for metals is generally well established, while PFAS and mycotoxins may present additional analytical and sampling challenges. For emerging contaminants such as microplastics, standardized definitions, analytical methods, and health-based benchmarks remain under development.

UNDERSTANDING THE SOURCE

Once a detection is confirmed, understanding where the contaminant came from may be equally important. Naturally occurring and anthropogenic contaminants can enter products through raw ingredients, environmental sources, manufacturing and processing, storage and transportation, packaging, or other points along the supply chain. In some cases, it may also form during manufacturing or processing rather than originate from an external source, as can occur with acrylamide.

9 https://www.fda.gov/food/environmental-contaminants-food/microplastics-and-nanoplastics-foods

10 https://www.sciencedirect.com/science/article/pii/S0269749123022352

11 https://www.steptoe.com/en/news-publications/california-consumer-chemicals-law-blog/the-end-of-prop-65s-half-baked-acrylamide-cancer-warning-requirement.html

12 https://www.sidley.com/en/insights/newsupdates/2025/05/california-federal-court-finds-prop-65-warnings-for-dietary-acrylamide-violate-first-amendment

Depending on the circumstances, targeted sampling and evaluation of chemical patterns or other source-specific information may help distinguish among potential sources and identify appropriate mitigation measures.

The science surrounding contaminants such as aflatoxins, heavy metals, PFAS, microplastics, and acrylamide are complex and food and beverage product-specific. Regulatory compliance, litigation defense, and risk communication increasingly depend on the ability to explain not only what was detected, but also what the detection means from a scientific, toxicological, and exposure perspective.

How Secretariat Can Help

Secretariat's multidisciplinary team of toxicologists, environmental scientists, chemists, industrial hygienists, and health exposure assessors assists clients in evaluating contaminant detections, conducting exposure and risk assessments, reviewing analytical methodologies, assessing supply chain sources, and developing scientifically defensible strategies for Prop 65 compliance, NOV response, litigation support, and regulatory investigations.

We help clients move beyond headline-driven narratives and focus on the full scientific evaluation necessary to understand actual risk and make informed business decisions.

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