

Four Metals Is No Longer Enough

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THE CLAIM

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The regulators moved to eight metals. A certificate that stayed at four certifies the past — and hands the brands wearing it a blind spot they pay for without being told it is there.

Abstract

In February 2021, a subcommittee of the House Committee on Oversight and Reform did the thing a congressional inquiry is built to do. It took a body of accumulating toxicological evidence, years in the making, and converted it into a public-policy artifact. The staff report was titled "Baby Foods Are Tainted with Dangerous Levels of [Arsenic](#), [Lead](#), [Cadmium](#), and [Mercury](#)," and it named four metals ^[1]. Industry anchored to those four. So did the regulators who drafted the FDA's [Closer to Zero](#) program ^[2], and so did the first generation of third-party heavy-metal certification.

That anchoring was rational in 2021. Four metals were what the subpoenaed data covered and what the headline could carry. But a certification mark is not a headline, and the thing about an anchor is that it holds you in place while the water moves. Five years on, the water has moved. The question this briefing puts to anyone who certifies, buys, or sells on a heavy-metals claim is narrow and uncomfortable: what does a four-metal certificate actually certify in 2026, when the regulators who write the rules your products ship under are already working from a list of eight?

While the frame held still

Here is what happened while the four-metal frame held still.

The European Union has set maximum levels for [nickel](#) in food, and in March 2024 its Commission went further, issuing a signed act that directs every member state to monitor nickel through 2027 in the foods most likely to carry it ^[3]. The trigger was EFSA's own finding that dietary nickel already exceeds the tolerable intake in most surveyed groups of toddlers and young children ^[4]. Australia and New Zealand had by then been binding [aluminum](#) in infant formula for years, written into the [Food Standards Code](#) ^[5]. China's

omnibus contaminant standard, the one every product entering the world's largest food market is measured against, sets limits not only for the familiar four but for [tin](#), nickel, and [chromium](#) besides ^[6], and India's food-contaminant regulations cap the same three ^[7]. California set the first hexavalent-chromium-specific drinking-water limit in the United States in October 2024 ^[8], and lists both nickel and hexavalent chromium as [Proposition 65](#) carcinogens ^[9]. Each is a metal the 2021 report did not name, and each is now a line in a regulation a brand's products are measured against somewhere they are sold.

None of this is speculative. It is published law in jurisdictions your brands already sell into. The four-metal frame did not merely freeze at one moment's science; it froze while the regulators moved to eight. And the enforcement machinery that turns a regulatory list into a legal exposure is already running. The metals are listed. A hexavalent-chromium enforcement wave is firing right now, in leather. Aluminum has already been argued inside the federal baby-food litigation. The list is loaded. It simply has not been pointed at the food aisle yet.

The four metals

Take them in turn.

Nickel is the metal in chocolate, in oats, in soy and legumes and the dark leafy greens a generation of nutrition advice has pushed people toward. Cocoa carries more of it than any common food, oats among the most, and the legume-and-leafy-green staples of a plant-forward diet sit near the top of the list ^[10]. EFSA's 2020 assessment set the tolerable daily intake at 13 micrograms per kilogram of body weight and then reported that real diets already cross it, routinely, in toddlers and young children ^[4]. That finding moved the EU to act. It set maximum levels for nickel in food, and in a signed 2024 Commission Recommendation it directed every member state to monitor nickel in exactly these foods, chocolate and cocoa, breakfast cereals and oat products, tea, soy, pulses and nuts, through 2027, with the stated aim of protecting children and the roughly one in seven people who are nickel-sensitized ^[3]. The recommendation quotes EFSA's conclusion back to itself: the tolerable intake is exceeded in toddlers and children, and the protective margin for the sensitized is not met. The endpoint most people know, the rash from a watch back, is the wrong one for the dietary question; the regulatory endpoint is reproductive and developmental, and the dietary file has only widened since, a 2024 meta-analysis of more than forty-six thousand participants now tying nickel to diabetes risk ^[11]. The United States sets no nickel limit in food at all. The nickel-sensitized adult, and the parent of a toddler already over the tolerable intake, is protected in Brussels and unprotected in a US aisle carrying a heavy-metals certificate that never measured nickel.

Aluminum is the metal in the formula tin and the teacup, and in the additives that leaven and bind processed food. Its clearest human harms, the dialysis encephalopathy and bone disease of the 1970s, were established in patients who could not excrete it ^[12]; at the contested edge sits a decades-old Alzheimer's signal that has never resolved into proven causation ^[13]. But the regulators did not wait for that argument to settle. EFSA cut the tolerable weekly intake sevenfold in 2008 and found even the lower figure exceeded across much of the population ^[12]; the EU restricted aluminum-containing food additives in 2012 for that reason ^[14]. Australia and New Zealand went further and wrote a binding aluminum ceiling into infant formula: half a milligram per kilogram, twice that for soy formula, tighter still for preterm formula ^[5]. It is a ceiling worth having: surveys of prescription infant formulas have found aluminum spanning roughly fortyfold across products fed to medically fragile infants ^[15]. Again the United States sets no aluminum limit in food. The contrast is not subtle. A binding number exists; it simply does not exist here.

Tin is the oldest story and the most globally settled. It dissolves out of the lining of a can into whatever acid the can holds, tomato and citrus and canned fruit, and its harm is gastrointestinal rather than systemic. The world agrees on the number: the European Union ^[16], China ^[6], Australia and New Zealand ^[5], and the Codex standard that underwrites international trade ^[17] all cap tin in canned food in the range of 200 to 250 milligrams per kilogram, a quarter of that for foods for infants. Tin is the case that exposes the gap most plainly, because there is no scientific controversy left to hide behind. A 2026 Chinese provincial survey measured tin across more than two thousand food samples ^[18]; the occurrence record that was thin a decade ago is thin no longer. The ceiling is harmonized across four major regulatory systems. The United States is the one that sets no limit at all.

Chromium is where the argument turns from which metals to which numbers. Food chromium is mostly the comparatively benign trivalent form. The hazard is hexavalent chromium, which enters cells through sulfate channels and is reduced inside them, by the cell's own ascorbate, into intermediates that bind chromium into DNA ^[19]. The endpoint of that reduction is the inert trivalent form, so a single total-chromium measurement reports the carcinogen and its own spent product as one number. The lung cancers of chromate workers are the long-settled proof of its carcinogenicity ^[19], and toxicogenomic work now maps the ingested route specifically to colorectal and gastrointestinal endpoints ^[20]. This is why no jurisdiction sets a hexavalent-chromium maximum level in food: the speciated measurement is hard, and the food rules that exist, China's among them, govern total chromium ^[6]. When EFSA assessed chromium in food in 2014, it found no occurrence data on hexavalent chromium in food and no validated method to measure it, and so it assumed, for the entire risk assessment, that all the chromium in food was the benign trivalent form ^[21]. The regulator's own workaround is the proof of the problem: the hazardous species goes unmeasured in food because it cannot yet be measured at scale. But where regulators can speciate, they act. California set a hexavalent-chromium-specific drinking-water limit of ten micrograms per liter in 2024 ^[8] and lists the species as both a carcinogen and a reproductive toxicant ^[9]. A certificate that reports total chromium in food is doing the one thing the regulators specifically moved away from. It is naming a number that does not bind to the hazard.

What a four-metal certificate leaves uncovered

Step back from the metal-by-metal walk, because the pattern is the argument. A product can carry a four-metal heavy-metals certificate today and still fail a Chinese contaminant check on tin, an EU check on nickel, an Australian check on aluminum, all on metals the certificate never measured. The certificate is not wrong about the four it covers. It is silent about the four it does not, and silence on a contaminant a regulator already limits is not a neutral omission. It is a gap the brand inherits without being told it is there.

This is the part worth saying plainly, because the first generation of heavy-metal certification has not said it. Freezing a scope at the 2021 four was a defensible choice in 2021 and an indefensible one by 2026, and the difference was passed, quietly, to the brands that paid for the mark. The job of a certification program is to see the exposure coming and prepare the brand for it. A program that certifies against a list the regulators have already moved past does the opposite: it hands a brand a document that reads as protection and functions as a blind spot.

For a regulatory-affairs lead the exposure is concrete and present-tense. A product formulated and certified to a four-metal standard, then shipped into the EU, can be stopped at a border on a nickel level the certificate never looked at. For a brand's counsel it is concrete in a different way: the metal that puts a

competitor's product in front of a jury three years from now is, almost by definition, one nobody is being asked to test for today.

And the exposure is coming. The pattern that produced the baby-food litigation is not exotic; it is a sequence. A metal is listed. Its occurrence is surveyed. The surveys become exhibits. Lead, cadmium, arsenic, and mercury ran that sequence to a multidistrict litigation ^[1]. It took those four barely a decade to travel from a congressional table to a federal courtroom, and the surveys that first named them in baby food now sit in the record as exhibits. Nickel and hexavalent chromium are already listed under Proposition 65 ^[9]; a hexavalent-chromium enforcement wave is already running in leather goods ^[23]; the California Attorney General is himself in court over the species, suing a metal foundry under Proposition 65 for emitting it into a neighborhood's air ^[24]; aluminum has already been argued, and for now struck, inside the baby-food MDL itself ^[22]. The machinery is built and the metals are loaded into it. A four-metal certificate is a bet that the sequence stops, this time, at four.

A standard that reads the leading indicators

This is the test the Heavy Metal Tested and Certified program was built to pass, and the way it passes is structural, not promotional.

HMTc certifies against eight metals, not four: lead, cadmium, arsenic, and mercury, plus the nickel, aluminum, tin, and hexavalent chromium this briefing has walked through. Expressed as analytes rather than elements it is ten, because the species discipline is written into the list. Arsenic is carried as both inorganic and total. Mercury as both methylmercury and total. Chromium specifically as hexavalent. That is what it looks like for a standard to track the hazard rather than the convenient measurement ^[25].

The scope was not chosen to be longer. It was chosen to be current. Each metal past the 2021 four is one a major regulator already limits or lists: nickel in the EU, aluminum in Australia and New Zealand, tin across four regulatory systems, hexavalent chromium in California. The list reads the leading indicators, the published law and the standing listings, rather than waiting for the lagging one, the lawsuit, to arrive. And the methodology is built to admit the next analyte the same way, because each limit defaults to that analyte's strictest applicable government maximum, with the program's own occurrence analysis tightening the toxics wherever a clean market beats the law and covering any analyte no government yet regulates; the framework does not hard-code which metals exist, and the limits ratchet tighter over time but never loosen ^[25]. For a brand, the value of a standard that reads ahead is plain: the reformulation done to meet it is the reformulation that would otherwise be done under subpoena. A brand certified to eight is not betting that the regulatory field stops where it is. It is already standing where the field is moving.

What credible standards require

There is a reason systematic reviews sit atop the evidence hierarchy, and it is not that any one review captured its field perfectly on the day it was written. It is that the apparatus is built to be re-run as the field moves. A certification standard earns credibility the same way. The 2021 four-metal frame was not wrong; it was a photograph, and a photograph is only a problem when it is mistaken for a living apparatus and hung on the wall as though the room will never change.

The room has changed. The regulators are working from eight. The enforcement machinery is loaded. The only question left is whether a brand learns this from its certifier or from a complaint. The test of a certification standard was never what it covered on the day it was written. It is what it can incorporate, honestly and with its uncertainties labeled, as the science and the law move underneath it. Eight metals is not the end of that list; it is the current state of it, and the apparatus that produced eight is built to produce the ninth when the evidence and the law call for it. A standard that can only certify the four metals of 2021 is certifying the past, and the brands wearing it are exposed to the present.

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References

Works cited in this briefing’s text, in first-appearance order. This is not the full evidence base for the underlying standard; it is only what the prose above draws on. Every range in the briefing is a model built on one of these published anchors. Where a work carries a DOI or a public URL, its title and domain link to it; primary legal documents and published standards are named but not linked to a corpus record.

[1]	Baby Foods Are Tainted with Dangerous Levels of Arsenic, Lead, Cadmium, and Mercury	GOVERNMENT
	U.S. House of Representatives, Committee on Oversight and Reform, Subcommittee on Economic and Consumer Policy, Staff Report, Feb. 4, 2021.	
[2]	Closer to Zero: Reducing Childhood Exposure to Contaminants from Foods	GOVERNMENT
	U.S. Food and Drug Administration, action-plan scope covering lead, cadmium, inorganic arsenic, and mercury, 2021.	
[3]	Commission Recommendation (EU) 2024/907 of 22 March 2024 on the monitoring of nickel in food	GOVERNMENT
	<i>Official Journal of the European Union</i> , L series, Mar. 26, 2024. ELI: data.europa.eu/eli/reco/2024/907/oj . · data.europa.eu/	
[4]	Update of the risk assessment of nickel in food and drinking water	GOVERNMENT
	EFSA Panel on Contaminants in the Food Chain (CONTAM), <i>EFSA Journal</i> 2020;18(11):6268. doi: 10.2903/j.efsa.2020.6268. · doi.org/	
[5]	Australia New Zealand Food Standards Code, Schedule 19 — Maximum levels of contaminants and natural toxicants	GOVERNMENT

Food Standards Australia New Zealand, in force from Mar. 1, 2016 (aluminium in infant formula products; inorganic tin in canned foods).

-
- [6] **National Food Safety Standard — Maximum Levels of Contaminants in Foods, [GB 2762](#)-2022** GOVERNMENT
- National Health Commission and State Administration for Market Regulation (People's Republic of China), in force June 30, 2023.
-
- [7] **[Regulation in India of Heavy Metals in Food Items: A Critical Analysis](#)** JOURNAL
- M. Sadhya and M. Saha, *Environmental Analysis & Ecology Studies*, 2023, reproducing the Food Safety and Standards (Contaminants, Toxins and Residues) Regulations 2011 (as amended 2020). doi: 10.31031/EAES.2023.11.000771. · [doi.org](#)
-
- [8] **Hexavalent Chromium Maximum Contaminant Level (10 µg/L)** GOVERNMENT
- California State Water Resources Control Board, effective Oct. 1, 2024; California Office of Environmental Health Hazard Assessment Public Health Goal (0.02 µg/L), 2011.
-
- [9] **Proposition 65 list (Safe Drinking Water and Toxic Enforcement Act of 1986)** GOVERNMENT
- California Office of Environmental Health Hazard Assessment: nickel and nickel compounds (carcinogen; soluble nickel compounds, reproductive toxicant); hexavalent-chromium compounds (carcinogen, 1987; developmental and reproductive toxicant, 2008).
-
- [10] **Nickel Content of Food and Estimation of Dietary Intake** JOURNAL
- M.-A. Flyvholm, G. D. Nielsen, and A. Andersen, *Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 1984;179(6):427–431.
-
- [11] **[Association between nickel exposure and diabetes risk: an updated meta-analysis of observational studies](#)** JOURNAL
- H. Lu, X. Shi, L. Han, X. Liu, and Q. Jiang, *Frontiers in Public Health* 2024;12:1463880. doi: 10.3389/fpubh.2024.1463880. · [doi.org](#)
-
- [12] **Safety of aluminium from dietary intake — Scientific Opinion** GOVERNMENT
- EFSA Panel on Food Additives, Flavourings, Processing Aids and Materials in Contact with Food (AFC), *EFSA Journal* 2008;754:1–34.
-

- [13] [The Health Effects of Aluminum Exposure](#)  JOURNAL
- K. Klotz, W. Weistenhöfer, F. Neff, A. Hartwig, C. van Thriel, and H. Drexler, *Deutsches Ärzteblatt International* 2017;114(39):653–659. doi: 10.3238/arztebl.2017.0653. · [doi.org](https://doi.org/10.3238/arztebl.2017.0653) 
-
- [14] Commission Regulation (EU) No 380/2012 of 3 May 2012 amending Annex II to Regulation (EC) No 1333/2008 as regards the conditions of use and the use levels for aluminium-containing food additives GOVERNMENT
-
- [15] Prescription Infant Formulas Are Contaminated with Aluminium JOURNAL
- J. Redgrove, I. Rodriguez, S. Mahadevan-Bava, and C. Exley, *International Journal of Environmental Research and Public Health* 2019;16(5):899.
-
- [16] Commission [Regulation \(EU\) 2023/915](#) of 25 April 2023 on maximum levels for certain contaminants in food and repealing [Regulation \(EC\) No 1881/2006](#) GOVERNMENT
- (inorganic tin: 200 mg/kg canned foods, 100 mg/kg canned beverages, 50 mg/kg canned infant and baby food).
-
- [17] General Standard for Contaminants and Toxins in Food and Feed GOVERNMENT
- Codex Alimentarius Commission, [CXS 193](#)-1995 (inorganic tin in canned foods).
-
- [18] Occurrence of Tin in Foods and Dietary Exposure Assessment in Zhejiang Province, China DATASET
- S. Ye, J. Chen, R. Zhang, et al., *Foods*, 2026 (n = 2,014 samples).
-
- [19] [Genetic and Epigenetic Mechanisms in Metal Carcinogenesis and Cocarcinogenesis: Nickel, Arsenic, and Chromium](#)  JOURNAL
- K. Salnikow and A. Zhitkovich, *Chemical Research in Toxicology* 2008;21(1):28–44. doi: 10.1021/tx700198a. · [doi.org](https://doi.org/10.1021/tx700198a) 
-
- [20] [Adverse Human Health Effects of Chromium by Exposure Route: A Comprehensive Review Based on Toxicogenomic Approach](#)  JOURNAL

D. Y. Shin, S. M. Lee, Y. Jang, J. Lee, C. M. Lee, E.-M. Cho, and Y. R. Seo,
International Journal of Molecular Sciences 2023;24(4):3410. doi:
10.3390/ijms24043410. · [doi.org](https://doi.org/10.3390/ijms24043410)

[21]	Scientific Opinion on the risks to public health related to the presence of chromium in food and drinking water	GOVERNMENT
EFSA Panel on Contaminants in the Food Chain (CONTAM), <i>EFSA Journal</i> 2014;12(3):3595. doi: 10.2903/j.efsa.2014.3595. · doi.org		
[22]	In re: Baby Food Products Liability Litigation	LITIGATION
MDL No. 3101, U.S. District Court for the Northern District of California (amended order striking aluminum and infant-formula references from the Master Complaint, Apr. 2, 2025).		
NO SOURCE RECORD – PRIMARY LEGAL DOCUMENT, NOT CORPUS LITERATURE		
[23]	Proposition 65 industry-wide settlement on hexavalent chromium in chrome-tanned leather footwear and gloves	CASE
Center for Environmental Health, Alameda County Superior Court (approved Apr. 2024).		
NO SOURCE RECORD – PRIMARY LEGAL DOCUMENT, NOT CORPUS LITERATURE		
[24]	People of the State of California v. McWane, Inc. (dba AB&I Foundry)	CASE
Complaint for Injunctive Relief and Civil Penalties (Proposition 65; hexavalent-chromium air emissions), Superior Court of California, County of Alameda, filed Feb. 15, 2022.		
NO SOURCE RECORD – PRIMARY LEGAL DOCUMENT, NOT CORPUS LITERATURE		
[25]	HMTc Infant and Child Foods Program Manual	REPORT
K. Pendergrass, 2026 Edition, the Institute of Contaminant Standards (ICS), 2026.		

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