Comments of
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Defend Our Health
on the draft Toxics in Food Packaging:
Food Contact Chemicals of High Concern
Criteria Documentation
prepared by Maine Department of Environmental Protection
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Defend Our Health, formerly known as Environmental Health Strategy Center, is a nonprofit public health organization that works to create a world where all people are thriving, with equal access to safe food and drinking water, healthy homes, and products that are toxic-free and climate-friendly.

1. We support the draft list of Food Contact Chemicals of High Concern, with changes

Defend Our Health strongly supported "An Act to Further Reduce Toxic Chemicals in Packaging" (Public Law, Chapter 277), which the Maine Legislature enacted and Governor Mills signed into law in 2019. The legislative intent of this statute is to phase out the ongoing use of toxic chemicals in food packaging in favor of safer alternatives.

Under this law, pursuant to Chapter 26-B, Toxic Chemicals in Food Packaging, the Maine Department of Environmental Protection (DEP) must first publish a list of no more than ten food contact chemicals of high concern (32 MRSA §1742).

DEP's proposed list of Food Contact Chemicals of High Concern meet the listing criteria set forth in the statute. The draft list provides a sound starting point for full and timely implementation of the statute.

That said, we also recommend some changes to strengthen the final list of Food Contact Chemicals of High Concern. These are described further below.

2. DEP should add a note that describes the statutory listing of PFAS and phthalates

To avoid confusion on the part of the regulated community and other stakeholders, we urge DEP to add a non-binding "note" at the beginning of the list of Food Contact Chemicals of High Concern to indicate that the Legislature has already effectively listed per- and polyfluoroalkyl substances (PFAS) and *ortho*-phthalates as priority food contact chemicals of high concern by statute.

As you know, the same law prohibits the sale of food packaging that contains:

- Phthalates, effective January 1, 2022 (32 MRSA §1733, sub-§3-A)

- PFAS, two years after safer alternatives are deemed available (32 MRSA §1733, sub-§3-B)

The preface to the final list of Food Contact Chemicals of High Concern should clearly inform the reader that those two classes of food contact chemicals of high concern have already been prioritized for restrictions in food packaging, with reference to those sections of the statute.

The failure of DEP to do this may mislead stakeholders, including food companies and other states, who only refer to the list of Food Contact Chemicals of High Concern, not the entire statute.

Since many other states have not yet restricted PFAS or phthalates in food packaging, it needs to be clearly understood that the Maine Legislature deemed those chemical classes of highest importance. Other states and the food industry would benefit from a clear upfront reference to those existing statutory restrictions on food contact chemicals.

3. DEP properly lists a chemical class as one Food Contact Chemical of High Concern

The law defines "chemical" broadly to include entire classes of related chemicals and their breakdown products:

> "Chemical" means a substance with a distinct molecular composition or a group of structurally related substances and includes the breakdown products of the substance or substances that form through decomposition, degradation or metabolism." (32 MRSA §1732, sub-§1-C)

The draft list prepared by DEP includes several Food Contact Chemicals of Concern that each consist of a class of structurally related substances. These include:

- Bisphenols (four structurally related substances)
- Parabens (four structurally related substances)

We strongly support this class-based approach, which is further bolstered by other sections of the 2019 law that presumptively phase out the use of per- and polyfluoroalkyl substances (PFAS) and prohibit the use of all *ortho*-phthalates in food packaging. PFAS are a large class of some 5,000 structurally related compounds in more than 600 commercial products, some of which are used in food packaging. *ortho*-Phthalates are a large class of structurally related substances, 28 of which the U.S. Food and Drug Administration permitted the use of in food packaging prior to 1985 (but has never looked back to reassess their safety.)

Given this clear foundational intent of the statute, DEP must also take a class-based approach whenever substances are structurally related. We applaud the agency for doing do for bisphenols and parabens.

4. DEP must group more food contact chemicals of high concern into a single class

Given the statutory definition of "chemical" and the clear legislative intent that substances like PFAS and phthalates be treated as a class, Maine DEP is compelled to list all structurally related substances as a single Food Contact Chemical of High Concern.

There are two cases in the draft list of Food Contact Chemicals of High Concern in which DEP has erred in failing to group structurally related compounds together into a single entry.

First, from DEP's draft list, **benzene** and **toluene** should be grouped together as a single Food Contact Chemical of High Concern. That group should be called either "solvents" or "BTX".

These compounds are clearly structurally related. Toluene, also known as methylbenzene, is simply a benzene (or phenyl) ring with one additional methyl group attached.[1]

Benzene and toluene are commonly treated as members of a chemical class known as BTX by the petrochemical industry and are often co-produced by the same refining process.[2] BTX is an acronym for benzene, toluene and xylenes.

In food packaging, both benzene and toluene may be used as a solvent in printing inks. Although intentional use of benzene has largely ended, toluene is still widely used in printing inks for food contact materials.[3]

Second, from DEP's draft list, **4-octyl phenol** and **nonylphenol** should be grouped together as a single Food Contact Chemical of High Concern. That group should be called "alkylphenols" or "long-chain alkylphenols."

Clearly, these two compounds (and their isomers) are structurally related substances. Both share the phenol structure, i.e. a benzene ring with a hydroxyl group. The only difference is in the hydrocarbon chain length. 4-Octyl phenol has eight carbon atoms in its hydrocarbon chain. Nonylphenols all have nine carbons in their hydrocarbon chain.[4]

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[1] https://en.wikipedia.org/wiki/Toluene

[2] U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, "Chapter 4, The BTX Chain: Benzene, Toluene, Xylene," *in* Energy and Environmental Profile of the U.S. Chemical Industry (May 2000) https://wayback.archive-it.org/all/20131021081309/http://www1.eere.energy.gov/manufacturing/resources/chemicals/pdfs/profile_chap4.pdf

[3] Food Packaging Forum, "Indian draft FCM standard for printing inks," September 6, 2019. https://www.foodpackagingforum.org/news/indian-draft-fcm-standard-for-printing-inks.

[4] Kochukov, M. Y., Jeng, Y. J., & Watson, C. S. (2009). Alkylphenol xenoestrogens with varying carbon chain lengths differentially and potently activate signaling and functional responses in GH3/B6/F10 somatomammotropes. *Environmental Health Perspectives*, *117*(5), 723–730. https://doi.org/10.1289/ehp.0800182

These compounds that are in the same class also have similar uses in food contact materials.[5]

DEP's failure to treat these compounds as class creates a conflict with clear legislative intent and remains inconsistent with the agency's own treatment of bisphenols and parabens in the same draft list of Food Contact Chemicals of High Concern.

The proposed parsing apart of these compounds from their proper class of structurally related substances cannot be justified on either policy or scientific grounds.

5. DEP must list Perchlorate (and salts) as a Food Contact Chemical of High Concern

The most glaring deficiency in DEP's proposed list is the exclusion of perchlorate as a Food Contact Chemical of High Concern. Perchlorate, the anion of several structurally related salts, is one of the most potent anti-thyroidgenic compounds in common use, including in food contact materials as an anti-static cling agent in certain types of packaging.

Perchlorate is a "bad boy" poster child for endocrine disrupting compounds (EDCs). Like other salts, the anion perchlorate is readily freed when dissolved or otherwise subject to moisture. It's the perchlorate anion that is the active EDC. The inherent hazard of perchlorate salts derives from the perchlorate anion. The type of salt (with cations such as ammonium, sodium and potassium) is irrelevant to the inherent hazard of perchlorate.[6]

As such, perchlorate (including all of its salts) should be treated as a single Food Contact Chemical of High Concern.

Strong credible scientific evidence shows that perchlorate and its salts meet each of three necessary criteria for listing as a Food Contact Chemical of High Concern. Here's a summary of some of that evidence with links to authoritative sources:

Criteria	**Evidence**
"identified by an authoritative government entity … as being … an endocrine disruptor" 32 MRSA §1742.1(A)(3)	1. The U.S Environmental Protection Agency (EPA) has identified perchlorates as an endocrine disruptor in its Integrated Risk Information System (IRIS) program. EPA's IRIS evaluation of "Perchlorate and Perchlorate Salts" identifies the target as the Endocrine System, and the compound's reference dose is based on its endocrine disrupting impacts.[7] 2. EPA's Office of Land and Emergency Management also identified perchlorate as endocrine disruptors, and stated that: "Perchlorate can interfere with iodide uptake

[5] WWF Detox Campaign, Factsheet: Chain of Contamination: The Food Link, "Alkylphenols (octylphenol and nonylphenol isomers)" https://wwfeu.awsassets.panda.org/downloads/fact_sheet__alkylphenols_food.pdf

[6] https://en.wikipedia.org/wiki/Perchlorate

[7] U.S. Environmental Protection Agency, Integrated Risk Information System, "Perchlorate (ClO_4) and Perchlorate Salts, CASRN 7790-98-9" (see also this website's links to supporting documents) https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=1007

	into the thyroid gland at high enough exposures, disrupting the functions of the thyroid and potentially leading to a reduction in the production of thyroid hormones."[8] 3. The European Chemicals Agency (ECHA) completed an assessment for both ammonium perchlorate and sodium perchlorate and concluded that both have endocrine disrupting properties.[9] 4. The New Zealand Environmental Protection Authority formally classified ammonium perchlorate as producing "toxic human reproductive or developmental effects on or via lactation" based on a key study that found that: "Perchlorate induced thyroid hormonal changes in pregnant and lactating female rats, fetuses and nursing pups."[10]
"strong credible scientific evidence that chemical is a … endocrine disruptor" 32 MRSA §1742.1(B)	A scientific review reported on the endocrine disrupting effects of perchlorate and other EDCs on thyroid function.[11] There is ample scientific literature on the adverse effects on perchlorate on thyroid function in the environment and humans.
"the chemical has been added to or is present in food packaging" 32 MRSA §1742.1(C)	The U.S. Food and Drug Administration documented widespread contamination of food products with perchlorates. Increased exposure to perchlorates in food for infant and toddlers followed the agency's decision to allow the use of perchlorates as an anti-static cling agent in some plastic food packaging.[12]

Clearly, perchlorate and its salts meet the criteria for listing as a Food Contact Chemical of High Concern, and should be so designated.

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[8] U.S Environmental Protection Agency, Office of Land and Emergency Management, Technical Fact Sheet – Perchlorate, November 2017. https://www.epa.gov/sites/production/files/2017-10/documents/perchlorate_factsheet_9-15-17_508.pdf

[9] European Chemicals Agency (ECHA), Endocrine disruptor assessment list: ammonium perchlorate, 03/02/2021, https://www.echa.europa.eu/web/guest/ed-assessment/-/dislist/details/0b0236e180de5404; Endocrine disruptors assessment list: sodium perchlorate, https://www.echa.europa.eu/web/guest/ed-assessment/-/dislist/details/0b0236e180de53b3, 03/02/2021

[10] New Zealand Environmental Protection Authority, Chemical Classification and Information Database: Perchloric acid, ammonium salt; Classification 6.8C. https://www.epa.govt.nz/database-search/chemical-classification-and-information-database-ccid/view/716

[11] Zoeller RT and vom Saal FS (2020) "Endocrine Disrupting Chemicals: Brain-Behavior Effects on Thyroid and Sexual Differentiation," *in* McBurney JW and Ruhoy IS, eds., Integrative Neurology, Oxford University Press. https://books.google.com/books?hl=en&lr=&id=nST3DwAAQBAJ&oi=fnd&pg=PA426&dq=perchlorate+thyroid+endocrine+disruption&ots=B1zSoRigC9&sig=cF-NRfYbYDmWqi5xwdcu0CVi25I#v=onepage&q=perchlorate%20thyroid%20endocrine%20disruption&f=false

[12] Environmental Defense Fund, Tom Neltner and Maricel Maffini, "FDA finds more perchlorate in more food, especially bologna, salami and rice cereal," January 9, 2017, http://blogs.edf.org/health/2017/01/09/fda-finds-more-perchlorate-in-more-food/; Tom Neltner, "Protecting industry or people? FDA refuses to ban toxic chemical in packaging for baby cereal," May 4, 2017, https://www.edf.org/blog/2017/05/04/protecting-industry-or-people-fda-refuses-ban-toxic-chemical-packaging-baby-cereal; Tom Neltner, "EDF joins court challenge of FDA's refusal to ban the use of perchlorate in food contact materials," October 29, 2019, http://blogs.edf.org/health/2019/10/29/edf-joins-court-challenge-of-fdas-refusal-to-ban-use-of-perchlorate-in-food-contact-materials/