

## Memorandum

**Date:** November 29, 2022

**Subject:** Cadmium (Cd) in Roasted Organic Seaweed Snack

**Re:** CMS Case # 646768, Task # 679653, Private laboratory sample # 3824305

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As requested by OFS, DRDA evaluated the safety of exposure to Cd in Organic Roasted Seaweed Snack (seaweed snack). A sample (#3824305) of the seaweed snack was analyzed by a private laboratory, Certified Laboratories, and found to contain 1.330 mg/kg ( $\mu\text{g/g}$ ) Cd. CMS work # 483723 stated that the Northeast Food and Feed Laboratory stated the analytical results were acceptable with borderline results, but a memorandum of review was not available to DRDA.

### DRDA Conclusion

DRDA concludes that the estimated exposure to Cd from consumption of the seaweed snack is likely to be a health concern for children (MF 0-6 y) but not for the general population (MF 2+ y).

### Consumption and Exposure Estimates

DRDA generally relies upon results of the National Health and Nutrition Examination Survey (NHANES), What We Eat In America (WWEIA) component for estimating dietary intakes of foods and for estimating contaminant exposures from intake of those foods. However, the number of WWEIA/NHANES respondents reporting dried seaweed consumption is too low to assure statistical reliability of estimates. Seaweed snacks generally are packaged as 5 g single servings, and DRDA generally estimates upper-level daily intake of seaweed snacks assuming consumption of one 5 g serving per day. The seaweed snack that is the subject of the current case is sold in 17

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g packages, with a labeled serving size of 1/5 package, or 3.4 g. However, for consistency, DRDA estimated upper-level daily intake of the dried seaweed snacks to be 5 g/day, for both adults and children.

Estimated Cd exposures from consumption of the seaweed snack are shown in Table 1.

**Table 1.** Estimated exposure to Cd from consumption of seaweed snack.

Contaminant	Population	Contaminant Concentration (µg/g)	Estimated Upper-Level Chronic Consumption of Seaweed Snack <sup>a</sup> (g/kg bw/day)	Estimated Upper-Level Chronic Contaminant Exposure from Seaweed Snack <sup>b</sup> (µg/kg bw/day)
Cd	MF 0-6 y	1.330	0.31	0.41
	MF 2+ y		0.07	0.09

<sup>a</sup> Estimated based on serving size of most single packages of seaweed snacks. Intakes were converted to g/kg bw/day using body weights of 75.4 kg for the general population and 16.1 kg for children (based on average body weights measured in NHANES 2017-2018).

<sup>b</sup> Concentration in sample (µg/g) \* upper-level consumption (g/kg bw/day) = estimated total exposure (µg/kg bw/day)

## Safety Assessment

### *Cadmium (Cd)*

Cd is an accumulative toxic element with a long biological half-life between 10 to 33 years in humans. Therefore, the toxicity of Cd generally results from chronic exposure. For the general population who are non-smokers, diet is the major source of Cd exposure. Chronic exposure to Cd in food may lead to its accumulation in the kidney (generally regarded as the most sensitive target for Cd toxicity), and this can cause renal tubular dysfunction and damage over time (WHO, 2011). EFSA has established a tolerable weekly intake (TWI) of 2.5 µg/kg bw/weekly for Cd, corresponding to **0.36 µg/kg bw/day** (EFSA, 2009). The TWI is based on a meta-analysis of human epidemiological studies assessing the relationship between urinary Cd and beta-2-microglobulin levels and a toxicological model to convert urinary Cd to dietary Cd exposure.

As shown in Table 1, regular consumption of the seaweed snack would result in estimated Cd exposure for children (MF 0-6 y) above 0.36 µg/kg bw/day, which is the EFSA TWI adjusted for daily exposure. Therefore, Cd exposure from consumption of the seaweed snack is likely to be a health concern for children. Regular consumption of the seaweed snack would result in estimated Cd exposure for the general population (MF 2+ y) below 0.36 µg/kg bw/day, and therefore, is not likely to be a health concern for this population.

## References

European Food Safety Authority (EFSA) (2009). Cadmium in Food. Scientific Opinion of the Panel on Contaminants in the Food Chain. *EFSA Journal* 980, 1-139.

World Health Organization (WHO) (2011). Cadmium. Safety evaluation of certain food additives and contaminants. WHO Food Additives Series, No. 64/FAO JECFA Monographs 8. World Health Organization, Geneva. Available at

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