ORIGINAL SUBMISSION

#622

GRN000622

mycell technologies

January 5, 2016

Paulette Gaynor, Ph.D.
Office of Food Additive Safety (HFS-200)
Center for Food Safety and Applied Nutrition
Food And Drug Administration
5100 Paint Branch Parkway
College Park, MD 20740-3835

Dear Dr. Gaynor:

In accordance with 21 CFR 170.36 (62 FR 18960; April 17, 1997), MyCell Technologies, LLC is hereby submitting notice of its determination based on scientific procedures that the use of its emulsified fish oil, as defined in the enclosed documents, is generally recognized as safe (GRAS) under specific conditions of use as an ingredient in multiple food categories, and that it is therefore exempt from the premarket approval requirement of the Federal Food, Drug, and Cosmetic Act.

Enclosed please find an electronic copy of the GRAS notice, which includes a comprehensive summary of data supporting the safety of the ingredient and the signed statement of an expert panel regarding the value of these data in supporting a GRAS determination.

My contact information is provided below. Please feel free to contact me[1] by phone or e-mail if you have any questions regarding this GRAS notice.

Sincerely,

(b) (6)

Volker Berl
CEO & Chief Technology Officer
Phone: 201.483.9102 ext. 511
Email: vberl@oceansomega.com

[1] Please note that MyCell Technologies, LLC has authorized Dr. David Bechtel (David.Bechtel@Intertek.com) from Intertek Scientific & Regulatory Consultancy, located at 100 Davidson Avenue, Suite 102, Somerset, NJ 08873, to engage in discussions about any issues related to the enclosed GRAS notice. Dr. Bechtel may be reached by e-mail (shown above), by telephone at (908) 429-9202, or by FAX at (908) 429-9260.

January 5, 2016

Paulette Gaynor, Ph.D.
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Enclosed please find an electronic copy of the GRAS notice, which includes a comprehensive summary of data supporting the safety of the ingredient and the signed statement of an expert panel regarding the value of these data in supporting a GRAS determination.

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GRAS EXEMPTION CLAIM

CLAIM THAT THE USE OF MYCELL'S EMULSIFIED FISH OIL IN SELECT FOOD CATEGORIES IS GENERALLY RECOGNIZED AS SAFE (GRAS)

Submitted to:

Food and Drug Administration
Center for Food Safety and Applied Nutrition
Office of Food Additive Safety

By:

MyCell Technologies, LLC
160 Summit Avenue
Suite 101
Montvale, NJ
07645

January 5, 2016

GRAS Exemption Claim

MyCell Technologies, LLC has determined that the use of its emulsified fish oil under specific conditions of use as an ingredient in multiple food categories entails a reasonable certainty of no harm and is generally recognized as safe (GRAS) based on scientific procedures. Consequently, the emulsions are exempt from the premarket approval requirement of the Federal Food, Drug, and Cosmetic Act.

Signature (b) (6) Date 01/08/2016

Volker Berl
Co-Founder / CEO & Chief Technology Officer

Name and Address of Notifier

MyCell Technologies, LLC
160 Summit Avenue
Suite 101
Montvale, NJ
07645

Contact Name: Volker Berl
Phone: +1 201.483.9102 ext. 511
E-mail: vberl@oceansomega.com

GRAS Substance

The subject of this GRAS notice is emulsified fish oil marketed by MyCell Technologies, LLC. Its composition is shown in Table 1.

Table 1 MyCell's Emulsified Fish Oil

Recipe Item Description	% of Total Recipe
Distilled Water	60.90
Ascorbic Acid	0.20
Calcium Disodium EDTA	0.63
Tocopherol Mix (Fortium MTD10)	1.57
PEG-40 hydrogenated Castor Oil	26.20
Nutegrity™ menhaden oil (60% Triglyceride Oil)	10.49 (minimum 5.25% DHA+EPA)

This product is manufactured under current good manufacturing practices (cGMP) (21 CFR, part 110). Inspections and testing are performed at various points during the manufacturing process; every lot is tested for compliance with the established specifications (*e.g.*, heavy metals, fatty acid content, and microbiological activity).

Intended Use and Projected Consumer Exposure

MyCell Technologies LLC intends to market its emulsified fish oil as a source of omega-3 polyunsaturated fatty acids, specifically, docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) at levels up to 0.04% in the food categories specified in Table 2.

Table 2 Summary of the individual proposed food-uses and use-levels for MyCell's emulsified fish oil in the U.S. (2011-2012 NHANES Data)

Food Category	Food-Uses	RACC* (g or mL)	DHA+EPA Level (mg/serving)	DHA+EPA Use-Levels (%)
Beverages and Beverage Bases	Energy, Sport, and Isotonic Drinks	240	32 to 100	0.013 to 0.04
	Meal Replacement Beverages	240	32 to 100	0.013 to 0.04
	Soft Drinks (Carbonated)	240	32	0.013
	Waters (Bottled, Enhanced, Fortified)	240	32 to 90	0.013 to 0.038
Coffee and Tea	RTD Tea Beverages	240	32	0.013
Gelatins, Puddings, and Fillings	Gelatin Desserts	120	32 to 250	0.03 to 0.21
Processed Fruits and Fruit Juices	Fruit Drinks and Ades	240	32 to 50	0.013 to 0.02
	Fruit Juices and Smoothies	240	32 to 50	0.013 to 0.02
	Fruit-Based Nectars	240	32 to 50	0.013 to 0.02

DHA = docosahexaenoic acid; EPA = eicosapentaenoic acid; NHANES = National Health and Nutrition Examination Surveys; RTD = ready-to-drink
*RACC = Reference Amounts Customarily Consumed per Eating Occasion (21 CFR §101.12 - CFR, 2014b). When a range of values is reported for a proposed food-use, particular foods within that food-use may differ with respect to their RACC.

160 Summit Avenue, Suite 101, Montvale, NJ 07645
Phone·201-483-9102 Fax·201-483-9104

Basis for GRAS Determination

To make the GRAS determination, MyCell Technologies compiled information about the substance, specifications, manufacturing, proposed uses, and evidence of safety into a comprehensive dossier (GRAS Dossier); and sought the opinion of qualified experts (*i.e.,* expert panel) in determining whether there is consensus among their peers that the use of this substance as described entails a reasonable certainty of no harm and is generally recognized as safe based on the available scientific evidence.

All data and information that are the basis for this GRAS determination are available for FDA's review and copying at reasonable times at Intertek Scientific & Regulatory Consultancy, 100 Davidson Avenue, Suite 102, Somerset, NJ 08873, and will be sent to FDA upon request.

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GRAS Expert Evaluation of Omega-3 Fatty Acid Emulsions in Select Food Categories

Background

The undersigned, an independent panel of recognized experts (hereinafter referred to as the Expert Panel), qualified by scientific training and relevant international experience to evaluate the safety of food and food ingredients, was commissioned by MyCell Technologies, LLC (hereafter MyCell) to evaluate the generally recognized as safe (GRAS) status of two omega-3 fatty acid emulsions consisting of polyethylene glycol (PEG)-40 hydrogenated castor oil (Cremophor® RH 40), an approved omega-3 fatty acid source (either Life'sDHA™ algal oil or Nutegrity™ fish oil), water, ascorbic acid, calcium disodium EDTA, ascorbyl palmitate, and Fortium MTD-10 (a tocopherol-based antioxidant mix). The emulsion will serve as a source of omega-3 polyunsaturated fatty acids, specifically, eicosapentaenoic acid (EPA) and docosahexanoic acid (DHA). The emulsion containing fish oil (OTEC 250CK-L, hereafter referred to as Emulsion 1) contains a minimum DHA+EPA content of 5.25% and is intended for use in energy, sport and isotonic drinks, meal replacement beverages, carbonated soft drinks, waters (bottled, enhanced, fortified), ready-to-drink tea beverages, gelatin desserts, fruit drinks and ades, fruit juices and smoothies, and fruit-based nectars. The second emulsion (OTEC 300-LDHA-S35, Emulsion 2 hereafter), containing algal oil as the source of omega-3 fatty acids) has a minimum DHA content of 3.23% and is intended for use in the same food categories as Emulsion 1 with additional uses in fruit snacks and concentrated beverage bases. These intended uses do not include infant formula or products intended for consumption solely by infants and children.

The Expert Panel, independently and collectively, critically evaluated information contained in a comprehensive package of scientific information and data from the literature and other sources compiled by Intertek Scientific & Regulatory Consultancy through January of 2015. In a conference call on February 16, 2015, the Expert Panel unanimously concluded that the intended uses of the emulsion, manufactured according to current Good Manufacturing Practices (cGMP) and meeting the food-grade specifications presented in the dossier, are Generally Recognized as Safe (GRAS) based on scientific procedures.

Projected Intakes

The Panel considered that, based on the proposed uses of Emulsion 1, on an all-user basis, the total U.S. population intakes of EPA+DHA were calculated at 252 and 602 mg/person/day (3.9 and 9.0 mg/kg body weight/day) at the mean and 90th percentile, respectively. Similarly, the total mean and 90th percentile DHA intakes based on the proposed uses of Emulsion 2 were estimated at 205 and 444 mg/person/day (3.2 and 6.5 mg/kg body weight/day). The Panel noted that these estimates are well below the limit of 3 g DHA+EPA/day established by U.S. Food and Drug Administration (FDA) for menhaden oil (see 21 CFR 184.1472—Menhaden oil).

Safety

The Expert Panel considered that the safety of MyCell's omega-3 emulsions can be adequately determined from consideration of the safety of its individual ingredients. Some of the components (*i.e.*, water, ascorbic acid, and Fortium MTD10) are themselves considered substances affirmed as GRAS under Part 182 of the FDA regulations, consistent with current good manufacturing practice (GMP) considerations. In addition, the Life'sDHA™ algal oil or Nutegrity™ fish oil fish used in the formulations are GRAS for many of MyCell's proposed uses; however, one cateogry (*i.e.*, ready-to-drink tea beverages) falls outside the current GRAS determinations for these products. Thus, although the safety of EPA and DHA at intakes of up to 3 g/day has been established, as has the safety of the fish and algal oils used in the emulsions as sources of omega-3 fatty acids, the safety of the additional intake resulting from the proposed added category is now being considered. The contribution to the overall omega-3 fatty acid intake from the ready-to-drink tea beverages category is neglible, and as intakes remain below the 3 g DHA+EPA/day limit, the proposed use of the emulsions in the added category does not raise any concern with regard to safety. Consequently, the safety review focused primarily on the remaining components, Cremophor® RH 40, calcium disodium EDTA, *Schizochytrium sp.* algae and algal oil derived from *Schizochytrium sp.* algae.

Cremophor® RH 40

Studies of the safety of Cremophor® RH 40, which included oral subchronic, mutagenicity, and reproductive toxicity studies that had been previously reviewed by the Cosmetic Ingredient Review Expert Panel, showed no indication of any toxicological concerns at the intake levels resulting from the proposed use of the emulsion. A considerable amount of publicly available information indicates that PEG derivatives of castor oil and related compounds are of low toxicity, and toxicity seems to be inversely related to molecular weight. No signs of toxicity were observed in rats receiving up to 100,000 ppm or in dogs receiving up to 5.0% PEG-40 hydrogenated castor oil in the diet for 6 months; studies in rodents indicate that PEG-40 hydrogenated castor oil is not teratogenic. While PEG castor oils and PEG hydrogenated castor oils have been reported to cause anaphylactic reactions when used in intravenous medicinal products, no such reactions were noted following oral or dermal applications.

Based on its review of polyoxyethylene (8) stearate and polyoxyethylene (40) stearate, the Joint Expert Committee on Food Additives (JECFA) established an acceptable daily intake (ADI) of 25 mg/kg bw/day for these related polyethylene glycol derivatives. As Emulsion 1 contains 26.20% Cremophor® RH 40, the proposed uses are expected to result in a mean all-user intake of 1.26 g/day (19.47 mg/kg/day), and in a 90th percentile all-user intake of 3.01 g/day (45.06 mg/kg/day). The proposed uses of Emulsion 2, containing 31.29% Cremophor® RH 40, would result in a mean and 90th percentile all-user intake of 1.97 g/day (19.47 mg/kg/day), and 4.29 g/day (63.4 mg/kg/day), respectively. While these 90th percentile estimates exceed the ADI of 25 mg/kg bw/day established for polyethylene glycol derivatives, they include worst-case -scenarios (*e.g.*, 100%

market penetration and maximum incorporation rates) and chronic intakes above the ADI which is not anticipated. In addition, the intakes of the emulsion were calculated using the *minimum* level of PUFAs in the respective oils in order to ensure the most conservative estimate of intake. Batch analysis data indicate that the omega-3 concentration of these oils typically exceeds the specified minimum. As a result, less emulsion would be necessary to achieve the target doses in the proposed food uses, indicating that the real-world exposure to this ingredient will be less than the worst-case estimates made herein. Furthermore, toxicity data for Cremophor® RH 40 suggested to the Panel that the ADI of 25 mg/kg/day assigned for the broader group of compounds may be overly conservative. No signs of toxicity were observed in rats receiving up to 100,000 ppm PEG-40 hydrogenated castor oil, or dogs receiving up to 5.0% PEG-40 hydrogenated castor oil in the diet for 6 months, suggesting to the Panel that an ADI in excess of 50 mg/kg/day could be justified.

Calcium Disodium EDTA

Calcium disodium EDTA is classified in the Code of Federal Regulations as a "Food Additive Permitted for Direct Addition to Food for Human Consumption" under 21 CFR §172.120. However, as the applications proposed herein fall outside it's currently approved uses, its safety in the proposed applications was considered by the Panel.

Metal ions in the EDTA-metal complex are freely exchanged in the digestive tract. Therefore, the various EDTA salt forms are expected to have essentially similar toxicological potential and metabolic fate in the body, regardless of whether EDTA is consumed as the calcium, sodium, or sodium-iron salt form. Hence, the Panel safety review focuses on EDTA, irrespective of the EDTA-metal complex to which exposure occurred. EDTA salts are approved for use in foods, for iron fortification, and as chelating agents in the treatment of heavy metal toxicity. EDTA is poorly absorbed from the gastrointestinal tract, poorly metabolized, and excreted unchanged, primarily in the feces. It has low acute toxicity following oral administration, with LD_{50} values ranging from 2,000 to 12,000 mg/kg/day in rats, mice, and dogs. Some adverse effects have been observed in *in vitro* studies and in experimental animals receiving low-mineral diets, but the effects have been attributed to EDTA's metal-chelating activity and the resulting depletion of essential trace elements.

The Expert Panel reviewed information related to estimated chronic daily exposure to EDTA resulting from its currently approved uses. These estimates were calculated using available food intake information and Monte Carlo simulation methodology, as well as estimates of the amount of EDTA utilized in the food supply. Using these data, the Expert Panel determined that 90th percentile exposure would not exceed 0.43 mg EDTA/kg body weight/day in any population group.

Since Emulsion 1 contains calcium disodium EDTA at a concentration of 0.63%, its use in the proposed applications is expected to result in a mean all-user intake of 30.24 mg/day and a 90th percentile all-person intake of 72.45 mg/day. Corresponding mean and 90th percentile intakes for Emulsion 2 (with a calcium disodium EDTA concentration of 0.70%), are 44.10 mg/day and 95.9

mg/day, respectively. Expressed on a body weight basis, the all-user 90th percentile intake for calcium disodium EDTA would be 1.08 mg/kg/day for Emulsion 1 and 1.41 mg/kg/day for Emulsion 2. Adding these 90th percentile estimates derived for MyCell's proposed uses to the 90th percentile exposure from the current uses use for all-users derived using the Monte Carlo technique (*i.e.*, 0.43 mg EDTA/kg bw/day), the Expert Panel determined that intakes of calcium disodium EDTA would remain below the JECFA ADI of 2.5 mg/kg/day.

***Schizochytrium sp.* algae and algal oil derived from *Schizochytrium sp.* algae**

DHA Algal oil from *Schizochytrium sp.* was considered GRAS for use in select food categories as described in GRAS Notification 137 by Martek. DHA Algal oil from *Schizochytrium sp.* was considered for use in the same food categories listed in 21 CFR 184.1472 for Menhaden oil. The use levels were 29% of those specified above, with incorporation rates adjusted to reflect differences in the omega-3 fatty acid composition of the two oils, as well as to reflect a maximum intake of 1.5 grams DHA+EPA/day, the highest level considered by Martek's Panel.

The current Panel noted that the safety of *Schizochytrium sp.* algae and algal oil derived from *Schizochytrium sp.* algae has been demonstrated in various toxicological studies. *Schizochytrium sp.* algae is not mutagenic. Likewise, no treatment-related effects were observed in rats in a 13-week dietary study. A no-observed-adverse-effect level (NOAEL) of 22,000 mg/kg bw was determined for maternal and developmental toxicity in rats, while NOAELs of 600 mg/kg bw and 18,000 mg/kg bw were established for maternal and developmental toxicity in rabbits, respectively. Similarly, algal oil derived from *Schizochytrium sp.* algae was found to be not mutagenic in Ames, chromosome aberration, and micronucleus assays. A NOAEL of 5% algal oil was estabished from a 90-day dietary study. A NOAEL of 5% DHA-rich algal oil was estabished from a study exposing rats *in utero* for 28 days and as F_1 rats for 90-days.

Conclusion

We, the Expert Panel, have independently and collectively critically evaluated the information summarized above and unanimously conclude that there is reasonable certainty that no harm will result from the use and intended use levels of MyCell's emulsions containing omega-3 ethyl esters in combination with polyethylene glycol (PEG)-40 hydrogenated castor oil (Cremophor® RH 40), or omega-3 fish oil, water, ascorbic acid, calcium disodium EDTA, ascorbyl palmitate, and Fortium MTD-10 (a tocopherol-based antioxidant mix). The two emulsions will serve as a sources of omega-3 polyunsaturated fatty acids, specifically, EPA and DHA, and is intended for use as a direct food ingredients in energy, sport and isotonic drinks, meal replacement beverages, carbonated soft drinks, waters (bottled, enhanced, fortified), ready-to-drink tea beverages, gelatin desserts, fruit drinks and ades, fruit juices and smoothies, and fruit-based nectars. Emulsion 2 will also be used in fruit snacks and concentrated beverage bases. .

We further conclude that the intended use and use levels of the emulsion containing omega-3 fatty acids in combination with the aforementioned food additives and ingredients, meeting the food-grade specifications presented in the dossier, is Generally Recognized As Safe (GRAS) based on scientific procedures.

(b) (6) _____ 3/11/15

Robert J. Nicolosi, Ph.D., C.N.S. Date
Professor Emeritus of Clinical Laboratory and Nutritional Sciences
Adjunct Professor, Department of Medicine
University of Massachusetts Medical School, MA

(b) (6) _____ 3/4/15

John A. Thomas, Ph.D. Date
Adjunct Professor, Department of Pharmacology & Toxicology
Indiana University School of Medicine Indianapolis, IN

(b) (6) _____ 3/13/15

David H. Bechtel, Ph.D. D.A.B.T. Date
Vice President
Intertek Scientific and Regulatory Consultancy
Bridgewater, NJ

GRAS DOSSIER

SUMMARY OF DATA SUPPORTING A DETERMINATION THAT THE USE OF EMULSIFIED FISH OIL IN SELECT FOOD CATEGORIES IS GENERALLY RECOGNIZED AS SAFE

Submitted to:

Food and Drug Administration
Center for Food Safety and Applied Nutrition
Office of Food Additive Safety

By:

MyCell Technologies, LLC
160 Summit Avenue
Suite 101
Montvale, NJ
07645

January 5, 2016

SUMMARY OF DATA SUPPORTING A DETERMINATION THAT THE USE OF EMULSIFIED FISH OIL IN SELECT FOOD CATEGORIES IN GENERALLY RECOGNIZED AS SAFE (GRAS)

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1.0 Introduction

1.1 Declaration of Intent

In the United States (U.S.), substances added to food are exempt from the definition of "food additive" and thus from the premarket approval requirements outlined in Section 201(s) of the Federal Food, Drug, and Cosmetic Act if their use is generally recognized as safe (GRAS). For substances not already on the list of GRAS substances[1] that are not considered harmful when added to food because of their intrinsic properties and/or because sufficient information about their safety exists, a proposed rule issued in 1997[2] provides a framework for self-determination of GRAS. A determination that a substance is GRAS requires both technical evidence of safety and a basis to conclude that this technical evidence of safety is generally known and accepted within the qualified scientific community. Self-determination of GRAS may be followed by notification to the Food and Drug Administration (FDA).

MyCell Technologies LLC previously self-affirmed through scientific procedures that the use of emulsified fish oil consisting of polyethylene glycol (PEG)-40 hydrogenated castor oil (Kolliphor™ RH 40)[3], Nutegrity™ fish oil, water, ascorbic acid, calcium disodium EDTA, ascorbyl palmitate, and a tocopherol-based antioxidant mix (Fortium MTD-10), in select food categories is GRAS. MyCell's emulsified omega-3 fish oil is intended to be used as sources of omega-3 polyunsaturated fatty acids, specifically, docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA). This notification is submittied along with a companion Notification for an omega-3 emulsion wherein the omega-3 fatty acids are derived from algal sources rather than from fish oil. One intake assessment, which separately estimated consumer exposure to the emulsified fish and algal oils, was prepared, and the Expert Panel considered the two ingredients under a single deliberation.

The emulsified fish oil ingredient contains a minimum DHA+EPA content of 5.25%. The proposed food uses for the emulsified fish oil (refer to Tables 4-1 for a summary of the individual proposed food uses and use-levels uses) result in mean all-user intakes of 252 mg DHA+EPA/person/day, a level that is well below the limit of 3 g DHA+EPA/day established by U.S. Food and Drug Administration (FDA) for menhaden oil (see 21 CFR 184.1472—Menhaden oil).

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[1] 21 CFR 182 – Substances generally recognized as safe; 21 CFR 184 – Direct food substances generally recognized as safe; 21 CFR 186 – Indirect food substances affirmed as generally recognized as safe.
[2] 62 FR 18938; April 17, 1997.
[3] Kolliphor™ RH40 was previously known by the trade name Cremophor® RH 40. While the current name is used in this notification, the previous name will appear in some references.

The present document summarizes the available information supporting the safety of the emulsified fish oil, and provides the basis for the GRAS determination.

2.0 Background Information

MyCell's emulsified fish oil allows for solubility of hydrophobic omega-3 fatty acids in water through the use of an emulifying agent, PEG-40 hydrogenated castor oil (sold under the trade name Kolliphor^{TM} RH 40), and features improved stability. Kolliphor^{TM} RH 40 and related analogs are manufactured by BASF. They are known to form ca. 15-20 nm micelles when dissolved in water. This requires, however, that it be present in an amount that exceeds its critical micelle concentration (0.009% wt/v). These hydrogenated castor oils are commonly used to assist in the solubilization of many types of compounds, including pharmaceuticals such a taxol. Hence, these materials are well recognized, including by the FDA, as a safe ingredient for use in a variety of oral formulations. PEG-40 hydrogenated castor oil's (Kolliphor^{TM} RH 40's) solubilizing properties can also be applied to water-insoluble lipids in the form of omega-3 fatty acids EPA and DHA. Once omega-3's are positioned inside micelles composed of this surfactant, their bioavailabilty is more efficinet than the process of digestion and absorption of fatty acids in the gut. That process relies on bile salts secreted into the stomach is to achieve exactly what PEG-hydrogenated castor oil (Kolliphor^{TM} RH40) has already done: form micellar arrays, as determined by Dynamic Light Scattering (DLS) measurements, that break up otherwise large fat globules, making it easier for triglycerides composed of EPA and DHA to be hydrolyzed into their component fatty acids by lipase. This leads to enhanced absorption of fatty acids that takes place by simple diffusion (*i.e*., passive transport) across the bilayers of membranes, both from the standpoint of rate as well as quantity. The size of the micelles present in the emulsion is of a similar size to the mixed micelles formed in the gut. Free fatty acids, cholesterol, lysophosphatides, 2-monoglycerdies, and glycerol combine with the bile phospholipid lecithin, bile salts, and cholesterol to form these mixed micelles which range in size from appxomatley 50 to 100 nm in diamter (Schauf *et al.,* 1990). However, once in the gut, the emulsifier woud be present below the criticial micelle concentration, and therefore would be unable to reform micelles. As a result, there is no anticipated effect on the bioavailability of other substances.

MyCell's emuilsified fish oil is a light yellow, viscous liquid free of foreign particles and possesses a neutral, bland, characteristic odor. The product formulation is shown in Table 2-1.

Table 2-1 MyCell's emulsified fish oil

Recipe Item Description	% of Total Recipe
Distilled Water	60.90
Ascorbic Acid	0.20
Calcium Disodium EDTA	0.63
Tocopherol Mix (Fortium MTD-10)	1.57
PEG-40 hydrogenated Castor Oil	26.20
Nutegrity™ menhaden oil (60% Triglyceride Oil)	10.49 (minimum 5.25% DHA+EPA)

In addition to the formulation shown above, future emulsion forumlations may be produced using more concentrated forms of the fish oil. As the intended uses are based on target omega-3 fatty acid levels/serving, use of more concentrated forms would not affect the intakes of EPA and DHA. The amount of emulsion necessary to achieve these targets would be reduced, thereby lowering exposure to the other components (*e.g.*, calcium disodium EDTA, PEG-40 hydrogenated castor oil).

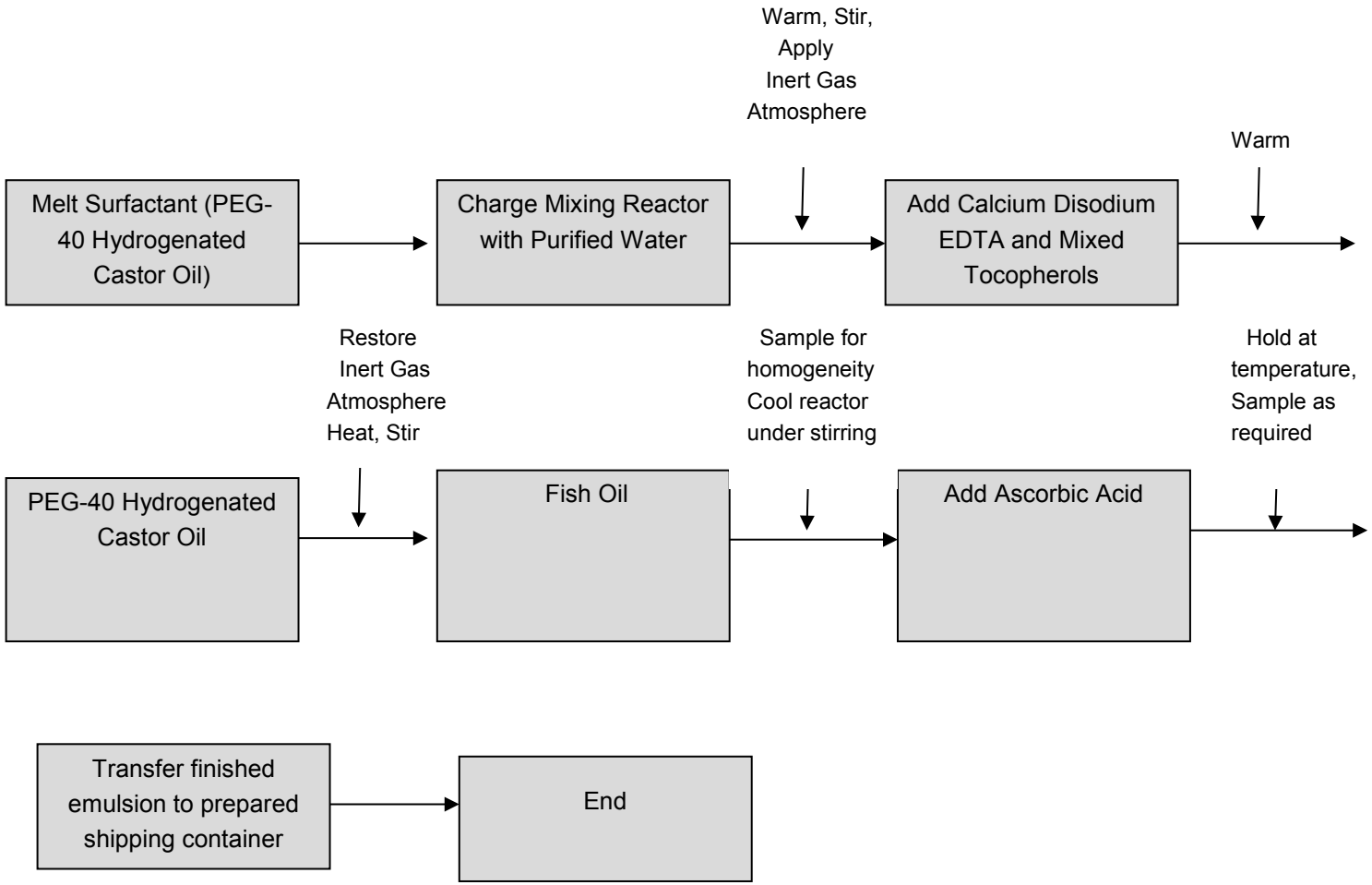
3.0 Manufacturing and GRAS Substance Characterization

3.1 Manufacturing Process

MyCell's emulsified fish oil is manufactured in compliance with current Good Manufacturing Practice (cGMP) regulations. Briefly, the bulk surfactant PEG-40 hydrogenated castor oil (Kolliphor™4 RH40) is melted in a hot box. After a standard GMP cleaning procedure, a jacketed mixing reactor, equipped with an impeller stirrer, vacuum connection and nitrogen sweep, is charged with water. The reactor is heated and a slight vacuum is applied to degas the reactor contents; the vacuum is broken with nitrogen to achieve an inert gas atmosphere. Calcium disodium EDTA and a mixed tocopherol based antioxidant (Fortium MTD-10) are added, followed by heating. The previously preheated surfactant is added, the reactor is closed, and the inert gas atmosphere is restored. Nutegrity™ fish oil is then added *via* a hose and metering pump, followed by sealing of the reactor and heating. The steam heating is switched off and the reactor content sampled as soon as the pressure has been released. The reactor is then cooled quickly, at which point ascorbic acid is added to the mixture. The formulation is allowed to cool to room temperature, sampled, and packaged according to customer requirements. Sampling and tests for homogeneity are performed regularly and at various points.

The manufacturing process is also depicted in Figure 3-1.

Figure 3-1 Manufacturing process MyCell's emulsified fish oil



3.2 Food-Grade Specifications and Chemical Analysis

Product specifications and the results of non-consecutive batch analyses representing MyCell's emulsified fish oil are shown in Table 3-1. The results demonstrate that the manufacturing process described above results in a finished product that reproducibly meet product specifications.

Table 3-1 Product specifications and batch analysis for MyCell's emulsified fish oil

OTEC-250CL-K			Lot # [redacted]	Lot # [redacted]	Lot # [redacted]
Test	**Specification**	**Test Method**	**Result**	**Result**	**Result**
Physical Properties					
Appearance	Light yelle viscous liquid	Visual	Conforms	Conforms	Conforms
Odor	Characteristic	Olfactory	Conforms	Conforms	Conforms
Gardner Color	NMT 6	AOCS Td 1a-64	3.8	3.8	2.9
Turbidity	FNU	NMT 300	67	67	32.25
Turbidity after dilution of 1 g in 250 mL water	FNU	NMT 50	3.33	3.33	Not reported
Fatty Acid Composition					
Total omega-3 fatty acids (mg/g as FFA)	Report only	Calculation	63.2	63.2	68.7
EPA + DHA (mg/g as FFA)	NLT 50	Calculation	52.5	52.5	Not reported
EPA (mg/g as FFA)	Report only	Calculation	29.0	29.0	31.5
DHA (mg/g as FFA)	Report only	Calculation	23.5	23.5	25.8
DPA (mg/g as FFA)	Report only	Calculation	4.3	4.3	Not reported
Approximate Analysis					
pH	Report only	-	4.7	4.7	4.81
Specific Gravity (g/mL)	Report only	-	1.02	1.02	1.04
Microbiological Analysis					
Aerobic Plate Count (cfu/g)	< 1000	AOAC 966.23	<10	< 10	< 10
Coliform (cfu/g)	< 3	AOAC 966.24	<3	< 3	< 3
E. coli-Enrichment (/10g)	Negative	USP/NF 62	Negative	Negative	Negative
Salmonella-PCR (/375 g)	Negative	AOAC-RI100201	Negative	Negative	Negative
Staph. Aureus (/ 25g)	Negative	USP/NF 62	Negative	Negative	Negative
Pseudomonas aeruginosa (/ 25g)	Negative	Current USP/NF 2022	Negative	Negative	Negative
Yeast and mold (cfu/g)	< 100	FDA BAM, 7th Ed.	<10	< 10	< 10
Heavy Metals					
Inorganic Arsenic	NMT 0.1	EPA 3050/6020/USP 730	<0.01	< 0.01	< 0.01
Cadmium	NMT 0.1	EPA 3050/6020/USP 730	<0.001	< 0.001	< 0.001
Lead	NMT 0.1	EPA 3050/6020/USP 730	<0.01	< 0.01	< 0.01
Mercury	NMT 0.1	EPA 3050/6020/USP 730	<0.005	< 0.005	< 0.005

3.3 Stability

Ongoing stability testing indicates MyCell's emulsified fish oil is stable over 18 months at room temperature in finished packaging (*i.e.,* high density polyethylene containers)

4.0 Proposed Use and Anticipated Consumer Intake

4.1 Proposed Uses

For the purpose of this GRAS notification, MyCell's emulsified fish oil, containing a minimum DHA+EPA content of 5.25%, manufactured in accordance with GMP as specified in 21 CFR 110, may be used at levels up to 0.04% in energy, sport and isotonic drinks, meal replacement beverages, carbonated soft drinks, waters (bottled, enhanced, fortified), ready-to-drink tea beverages, gelatin desserts, fruit drinks and ades, fruit juices and smoothies, and fruit-based nectars.

The intended uses of MyCell's emulsified fish oil are based on an EPA+DHA target level per serving and are shown in Table 4-1.

Table 4-1 Summary of the individual proposed food-uses and use-levels for MyCell's emulsified fish oil in the U.S. (2011-2012 NHANES Data)

Food Category	Food Uses	RACC* (g or mL)	DHA+EPA Level (mg/serving)	DHA+EPA Use Levels (%)
Beverages and Beverage Bases	Energy, Sport, and Isotonic Drinks	240	32 to 100	0.013 to 0.04
	Meal Replacement Beverages	240	32 to 100	0.013 to 0.04
	Soft Drinks (Carbonated)	240	32	0.013
	Waters (Bottled, Enhanced, Fortified)	240	32 to 90	0.013 to 0.038
Coffee and Tea	RTD Tea Beverages	240	32	0.013
Gelatins, Puddings, and Fillings	Gelatin Desserts	120	32 to 250	0.03 to 0.21
Processed Fruits and Fruit Juices	Fruit Drinks and Ades	240	32 to 50	0.013 to 0.02
	Fruit Juices and Smoothies	240	32 to 50	0.013 to 0.02
	Fruit-Based Nectars	240	32 to 50	0.013 to 0.02

DHA = docosahexaenoic acid; EPA = eicosapentaenoic acid; NHANES = National Health and Nutrition Examination Surveys; RTD = ready-to-drink
*RACC = Reference Amounts Customarily Consumed per Eating Occasion (21 CFR §101.12 - CFR, 2014b). When a range of values is reported for a proposed food-use, particular foods within that food-use may differ with respect to their RACC.

Estimates for the intake of MyCell's emulsified fish oil involved an initial assessment of DHA+EPA intakes with a subsequent calculation of total emulsion formulation based on the minimum PUFA content. The use of the *minimum* level of PUFAs ensured a conservative estimate of intake of the total emulsion, as it represents the highest potential intake of the emulsion formulation required to attain the target PUFA concentration.

Intakes were based on the proposed food-uses and use-levels of PUFAs for MyCell's emulsified fish oil in conjunction with food consumption data from the U.S. National Center for Health Statistics' (NCHS) National Health and Nutrition Examination Surveys (NHANES) 2011-2012 (CDC, 2014; USDA, 2014). Food codes representative of each proposed food-use were chosen from the NHANES 2011-2012 (CDC, 2014; USDA, 2014). Food codes were grouped in food-use categories according to Title 21, Section §170.3 of the Code of Federal Regulations (CFR, 2014a). Product-specific adjustment factors were developed based on data provided in the standard recipe file for the Continuing Survey of Food Intakes by Individuals (CSFII) 1994-1996, 1998 survey (USDA, 2000). All food codes included in the intake assessment are listed in Appendix 1. In all instances, the maximum DHA+EPA level was applied to the food codes.

Calculations for the mean and 90th percentile all-person and all-user intakes of PUFAs were performed for each of the individual proposed food-uses of the emulsified fish oil and the total intake from all proposed food-uses, with a subsequent calculation of the total emulsion exposure, based on the level of PUFAs in the ingredient.

4.2 Anticipated Consumer Intake of Omega-3 Fatty Acids

Estimates for the total daily intakes of DHA+EPA from proposed food-uses of MyCell's emulsified fish oil are provided in Table 4-2. Table 4-3 summarizes the estimated total intake of DHA+EPA on an absolute basis (mg/person/day) from all proposed food-uses of MyCell's emulsified fish oil in the U.S. population group. Table 4-4 presents this data on a per kilogram body weight basis (mg/kg body weight/day). As would be expected for a 2-day survey considering the proposed food uses (particularly soft drinks), the percentage of users was high among all age groups evaluated in the current intake assessment; greater than 65.5% of the population groups consisted of users of food products in which the emulsified fish oil is proposed for use. Children had the highest percentage users at 97.5%. Large user percentages within a population group typically lead to similar results for the all-person and all-user consumption estimates. Consequently, only the all-user intake results are discussed in detail.

Among the total population, the mean and 90th percentile all-user intakes of DHA+EPA were determined to be 252 and 602 mg/person/day, respectively. Of the individual population groups, male adults (aged 20 years and over) were determined to have the greatest mean and 90th percentile all-user intakes of DHA+EPA at 295 and 744 mg/person/day, respectively; while infants (aged 2 years and under) had the lowest mean and 90th percentile intakes of 110 and 248 mg/person/day, respectively (Table 4-2).

Table 4-2 Summary of the estimated daily intake of DHA+EPA from proposed food-uses of MyCell's emulsified fish oil in the U.S. by population group (2011-2012 NHANES data)

Population Group	Age Group (Years)	All Person Consumption (mg/day)			All Users Consumption (mg/day)		
		Mean	90th Percentile	% Users	n	Mean	90th Percentile
Infants	0 to 2	72	199	65.5	458	110	248
Children	3 to 11	137	313	97.5	1,478	140	314
Female Teenagers	12 to 19	238	524	96.7	506	246	529
Male Teenagers	12 to 19	252	570	96.5	505	262	571
Female Adults	20 and up	234	578	90.3	2,002	260	615
Male Adults	20 and up	267	717	90.6	1,903	295	744
Total Population	All Ages	229	573	91.1	6,852	252	602

On a body weight basis, intakes by the total population were estimated at 3.9 and 9.0 mg/kg body weight/day at the mean and 90th percentile. Infants were identified to have the highest mean and 90th percentile all-user intakes of any population group, of 8.8 and 19.7 mg/kg body weight/day, respectively. Male adults (aged 20 years and over) had the lowest mean intakes of 3.4 mg/kg body weight/day, whereas female adults (aged 20 years and over) had the lowest 90th percentile intakes of 8.3 mg/kg body weight/day (Table 4-3).

Table 4-3 Summary of the estimated daily per kilogram body weight intake of DHA+EPA from proposed food-uses of MyCell's emulsified fish oil in the U.S. by population group (2011-2012 NHANES data)

Population Group	Age Group (Years)	All Person Consumption (mg/kg bw/day)		All Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
Infants	0 to 2	5.8	16.1	65.4	455	8.8	19.7
Children	3 to 11	5.1	12.1	97.5	1,478	5.2	12.1
Female Teenagers	12 to 19	4.0	8.7	96.7	495	4.1	8.8
Male Teenagers	12 to 19	3.7	8.3	96.5	502	3.8	8.3
Female Adults	20 and up	3.2	8.0	90.3	1,981	3.5	8.1
Male Adults	20 and up	3.1	7.9	90.6	1,886	3.4	8.3
Total Population	All Ages	3.6	8.6	91.0	6,797	3.9	9.0

bw = body weight

4.3 Estimated Daily Intake of MyCell Emulsified Fish Oi Proposed Food Uses in the U.S.

The estimates of EPA and DHA intake presented above were used to calculate the exposure to the total emulsion considering the minimum content of EPA+DHA in the emulsion (*i.e.*, 5.25%). The estimated intakes of the emulsion on a per person and a body weight basis are summarized in Tables 4-4 and 4-5, respectively.

The total population intakes of the emulsion were 4.8 and 11.5 g/person/day at the mean and 90th percentile. As per the results for the PUFA intakes, male adults were determined to have the greatest mean and 90th percentile all-user intakes at 5.6 and 14.2 g/person/day, respectively, while infants had the lowest mean and 90th percentile all-user intakes of 2.1 and 4.7 g/person/day, respectively (Table 4-4).

Table 4-4 Summary of the estimated daily intake of the emulsion from proposed food-uses in the U.S. by population group (2011-2012 NHANES data)

Population Group	Age Group (Years)	All Person Consumption (g/day)		All Users Consumption (g/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
Infants	0 to 2	1.4	3.8	65.5	458	2.1	4.7
Children	3 to 11	2.6	6.0	97.5	1,478	2.7	6.0
Female Teenagers	12 to 19	4.5	10.0	96.7	506	4.7	10.1
Male Teenagers	12 to 19	4.8	10.9	96.5	505	5.0	10.9
Female Adults	20 and up	4.5	11.0	90.3	2,002	5.0	11.7
Male Adults	20 and up	5.1	13.7	90.6	1,903	5.6	14.2
Total Population	All Ages	4.4	10.9	91.1	6,852	4.8	11.5

When these intakes were expressed on a body weight basis, the total population intakes were calculated at 74.3 and 172.0 mg/kg body weight/day. Infants had the highest mean and 90th percentile intakes at 168.4 and 375.2 mg/kg body weight/day, respectively. Male adults had the lowest mean intakes at 65.3 mg/kg body weight/day, whereas the lowest 90th percentile intakes were noted by women at 154.9 mg/kg body weight/day (Table 4-5).

Table 4-5 Summary of the estimated daily per kilogram body weight intake of the emulsion from proposed food-uses in the U.S. by population group (2011-2012 NHANES data)

Population Group	Age Group (Years)	All Person Consumption (mg/kg bw/day)		All Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
Infants	0 to 2	110.3	306.7	65.5	458	168.4	375.2
Children	3 to 11	97.0	230.5	97.5	1,478	99.4	230.5
Female Teenagers	12 to 19	75.2	165.5	96.7	506	77.9	167.4
Male Teenagers	12 to 19	69.9	157.7	96.5	505	72.4	157.7
Female Adults	20 and up	60.4	151.6	90.3	2,002	66.9	154.9
Male Adults	20 and up	59.0	149.9	90.6	1,903	65.3	157.9
Total Population	All Ages	67.6	164.2	91.1	6,852	74.3	172.0

bw = body weight

The total U.S. population was identified as being significant consumers of soft drinks (16.3 to 64.1% users), waters (31.1 to 60.8% users), fruit juices and smoothies (33.9 to 58.3% users), and fruit drinks and ades (20.7 to 54.1%). In terms of contribution to total mean intake of the omega-3 emulsion, waters (contributed 38.3 to 65.4%), fruit juices and smoothies (contributed to 5.6 to 26.5%), soft drinks (contributed 2.7 to 18.1%), and fruit drinks and ades (contributed 5.7 to 17.2%) were the four main sources of intake across all population groups. Meal replacement beverages and fruit-based nectars individually contributed ≤ 1.4% to total mean DHA intakes across all population groups.

The estimated intake of omega-3 fatty acids based on the proposed uses of the emulsions are well below the of 3 g DHA+EPA/day established by the U.S.FDA for menhaden oil (see 21 CFR 184.1472—Menhaden oil). The contribution of the ready-to-drink tea beverages (the one category not included in the menhaden GRAS listing) to overall intake of omega-3 fatty acids is negligible, contributing no more than 3.4% to the total intake estimate in any population group (See Appendix 2 of the intake report).

Intake estimates for calcium disodium EDTA and PEG-40 hydrogenated castor oil from use of Mycell's emulsified fish oil in foods are discussed in the context of the ingredients' safety summaries in Section 5.0.

5.0 Safety

The safety of MyCell's omega-3 emulsified fish oil can be adequately determined from consideration of the safety of the individual components of the emulsion. Some of the components [*i.e.*, water, ascorbic acid, and mixed tocopherols (Fortium MTD-10)] are themselves considered substances affirmed as GRAS under Part 182 of the FDA regulations, consistent with current good manufacturing practice (GMP) considerations. In addition, the Nutegrity™ fish oil fish used in the formulations is GRAS for many of MyCell's proposed uses; however, one cateogry (*i.e.,* ready-to-drink tea beverages) falls outside the current GRAS determinations for menhaden oil (21 CFR 184.1472).

Thus, although the safety of EPA and DHA at intakes of up to 3 g/day has been established, as has the safety of the fish oil used in the emulsions as sources of omega-3 fatty acids, the safety of the additional intake resulting from the proposed added category is now being considered.

Of the ingredients used in MyCell's omega-3 emulsions, ascorbic acid, and mixed tocopherols (Fortium MTD-10) are GRAS substances that may be used as indicated in Table 5-1.

Table 5-1 Conditions under which ascorbic acid, and mixed tocopherols (*i.e.,* Fortium MTD-10) may be used in foods intended for the U.S. population

INGREDIENT AND APPLICABLE REGULATION	CONDITIONS/LIMITATIONS
Ascorbic Acid PART 182—SUBSTANCES GENERALLY RECOGNIZED AS SAFE Subpart D—Chemical Preservatives §182.3013—Ascorbic Acid Subpart I—Nutrients §182.8013--Ascorbic Acid	This substance is generally recognized as safe when used in accordance with good manufacturing practice.
MTD-10 (Kemin, Fortium MTD-10) Mixed Tocopherols PART 182—SUBSTANCES GENERALLY RECOGNIZED AS SAFE Subpart D—Chemical Preservatives §182.3890—Tocopherols Subpart I—Nutrients §182.8890—Tocopherols	This substance is generally recognized as safe when used in accordance with good manufacturing practice.

As such, the use of ascorbic acid and mixed tocopherols (Fortium MTD-10) in MyCell's emulsified fish iol can be reasonably anticipated to be safe. In addition, although the use of fish oil (*e.g.*, menhaden oil) is considered GRAS under 21 CFR 184.1472 (Table 1-4), one proposed application for MyCell's emulsified fish oil (*i.e.,* ready-to-drink tea bevearges) falls outside the current GRAS regulation for this product.Thus, the safety of the additional intake resulting from the proposed added category (*i.e.,* ready-to-drink tea bevearges) is considered herein.

The proposed usse of calcium disodium EDTA fall outside the conditions under which it may be used in foods (21 CFR 172.120, GRAS Notices 363 and 573); and The final ingredient, PEG-40 hydrogenated castor oil (Kolliphor™ RH 40), which is not the subject of a regulation, are discussed in greater detail herein.

5.1 Calcium Disodium EDTA

Although calcium disodium EDTA is classified in the Code of Federal Regulations as a "Food Additive Permitted for Direct Addition to Food for Human Consumption" under 21 CFR §172.120, its proposed use in the emulsified fish oil falls outside the current permitted uses. As such, its safety is reviewed herein. MyCell notes that there is currently a separate GRAS Notification (GRN 573) for calcium disodium EDTA (GRN 573). This notice proposes use of up

to 33 mg/kg EDTA in many of the beverage categories that are the subject of the MyCell submission. The FDA had no questions related to this Notice. MyCell's proposed use levels for its emulsified fish oil result in calcium disodium EDTA below this maximum use level. The safety of calcium disodium EDTA, disodium EDTA, and many other salts of EDTA has been reviewed by several authorities, including the FDA, the U.S. Environmental Protection Agency (EPA), the WHO/FAO Joint Expert Committee on Food Additives (JECFA), and the Cosmetics Ingredient Review Board (CIR, 2002).

Metal ions on the EDTA-metal complex are freely exchanged in the digestive tract. Therefore, the various EDTA salt forms are expected to have essentially similar toxicological potential and metabolic fate in the body, regardless of whether EDTA is consumed as the calcium, sodium, or sodium-iron salt form. Hence, the following safety review focuses on EDTA, irrespective of the EDTA-metal complex ingested.

5.1.1 Absorption, Distribution, Metabolism and Excretion

EDTA is poorly absorbed from the gastrointestinal tract, poorly metabolized, and excreted unchanged, primarily in the feces. Rats fed 50 mg radiolabeled calcium disodium EDTA/kg bw absorbed only 2 to 4%, while 80 to 90% was eliminated in the feces within 24 hours (Foreman *et al*., 1953). Similarly, Yang (1964) reported that following administration of diets containing disodium EDTA at levels of 0.5, 10, and 5.0% to rats, 99.4, 98.2 and 97.5% of excreted material was found in the feces. Following administration of ^{14}C-labeled calcium EDTA to rats, 88% of the administered dose was detected in the feces and 10% in the urine after 24 hours.

Poor absorption has also been reported in humans. Only 5% of a 1.5 mg dose of radiolabeled calcium disodium EDTA given in a capsule to normal healthy men was absorbed (Foreman and Trujullo, 1954). Within 3 days, 91% of the administered dose had been recovered unaltered in the feces, and 4% in the urine.

5.1.2 Preclinical Toxicity

5.1.2.1 Acute Toxicity

The acute oral median lethal dose (LD_{50}) of calcium disodium EDTA has been reported to be approximately 2000 to 2200 mg/kg bw in Wistar albino rats (Yang, 1964), 7000 mg/kg bw in rabbits (FDA, 1998), and 12,000 mg/kg bw in dogs (FDA, 1998). Rats receiving greater dosages exhibited intestinal haemorrhage (Yang, 1964). Hasegawa (1989) reported an acute oral LD_{50} of approximately 3700 mg/kg/bw for disodium EDTA in both male and female Wistar rats; ataxia, convulsions, and diarrhea were observed. Brednel *et al.* (1953) reported an acute oral LD_{50} of 400 mg/kg bw for disodium EDTA in mice, and 10,000 mg/kg of sodium EDTA in rats. The oral LD_{50} for trisodium EDTA ranged from 4000 to 8000 mg/kg bw in studies using rats

(Dow Chemical Company, 1987). No other details related to study design or results were reported in the review (CIR, 2002).

5.1.2.2 Subchronic Toxicity

Male and female rats (3/group) were fed low-mineral diets plus 1.5% disodium EDTA (equivalent to approximately 1500 mg/kg/day) for 4 months. Significantly reduced weight gain was seen compared to animals on the control diet, but no other differences in the general condition of animals were observed (Yang, 1964).

Administration of 5% disodium EDTA in the diet (fed *ad libitum*) to rats for 10 days or 1 month resulted in reduced body weights. Total leukocytes and lymphocytes and serum calcium were also decreased, while blood urea nitrogen was increased. Liver, spleen and thymus weights were decreased. Upon histopathological examination, parakeratosis was seen in the esophagus and forestomach on the 10^{th} day. Similar, albeit milder, changes were noted in rats fed 5.5% calcium disodium EDTA (Kawamata *et al*., 1980). Consumption of 1 and 2.25% disodium EDTA did not have the same effects (Kawamata *et al*., 1980). No other information was available from the abstract.

Yang (1964) administered disodium EDTA to albino rats (strain unspecified) in the diet of Purina Fox Chow at concentrations of 0, 0.5, 1, and 5% (equivalent to 500, 1000, and 50,000 mg/kg bw/day) for 90 days. Diarrhea and reduced food consumption were noted in the highest dose group of this study. Similarly, diarrhea and growth retardation were observed in weanling rats receiving 1% disodium EDTA in a low-mineral diet for 90 days (Chan, 1964). No other information was available in the review.

In an evaluation of the toxicity of a related compound (*i.e.*, ethylene glycol tetraacetic acid, EGTA), Wynn *et al.* (1970) administered 1, 5, or 10% disodium EDTA in Ground Purina Laboratory Chow to groups of 10 male Holtzman rats for 90 days. Half of the survivors were sacrificed at the end of the 13-week period, while the remaining animals were placed on control diets for an additional 4 weeks. Absorption was found to be less than 5% of the administered dose. A 60% mortality rate was observed at the 10% EDTA level; 20% of animals receiving diets with 5% disodium EDTA died. No significant findings were reported upon necropsy of these animals. Although food consumption in animals at the 1% group was similar to controls, it was significantly lower in the 5% and 10% groups. Weight gain was also significantly lower in these animals. Diarrhea was observed in the mid- and high-dose animals beginning on the third day and continuing throughout the experiment. Water intake in the 5% animals was more than double that of controls. Priapism was observed in 10% and 20% of the mid- and high-dose animals, respectively, beginning within the first 4 weeks of treatment and persisting through the remainder of the test period. The authors suggested this may have been due to irritation of the genitourinary tract, possibly related to EDTA exposure. Hematocrit and hemoglobin levels of

rats at the 10% level were slightly depressed at the end of the 4th week, but these values normalized by the end of the 13-week treatment period. No other differences in hematological findings were reported. With the exception of slightly pale livers in animals maintained on the 10% diets, no other changes were noted upon gross or histopathological examination. The lone animal in the 10% disodium group that continued into the recovery phase died within 1 week. Animals from the 5% dose group gained less weight and did so more slowly than controls during the recovery period. Upon cessation of treatment, EDTA was not detectable in the urine after 2 to 3 days, or in the feces after 7 days. No significant findings were seen at autopsy.

Fischer 344 rats and B6C3F1 mice (5 animals/sex/group) received 4640, 6800, 10,000 14,700, or 21,600 ppm (mg/kg) trisodium EDTA trihydrate for 7 weeks. This was followed by a 7-day observation period. Soft stools were seen in males fed doses of 10,000 ppm or above, and in females fed 14,700 ppm or above, considered to be related to trisodium EDTA trihydrate exposure. Body weights for all treated rats were comparable to controls at the end of the observation period, and no evidence of organ toxicity was seen. One male mouse in the high-dose group died. Significantly lower body weights were observed in high-dose males and in females receiving all but the lowest dose. No gross lesions were observed at necropsy (NTP, 1977). No other details were available in the review (CIR, 2002).

5.1.2.3 Reproductive and Developmental Toxicity

No resorptions or malformations were observed by Gray and Kavlock (1984) following oral administration of 1000 mg/k/day EDTA to CD-1 mice on Gestation Days 8 to 12. Likewise, no effects on litter size, sex ratio, organ or body weights, or the percentage of viable offspring were observed compared to controls. No other information was available in the review (CIR, 2002).

FDRL rats (25/sex/group) were fed diets containing 0, 50, 125, or 250 mg/kg bw calcium disodium for 2 years, through four successive generations. Rats were mated after 12 weeks of feeding and allowed to lactate for 3 weeks. After a 1-week rest, rats were mated again. Ten males and 10 females of each group through the F_1, F_2, and F_3 generations were allowed to produce 2 litters. Of the second litter of each generation, only the control and 250 mg/kg/day groups were maintained until the end of the 2-year study on the F_0 generation. No significant effects on appearance or behavior were observed. There were no significant differences in weight gain, food efficiency, or hematological and serum biochemistry parameters. No effects on organ weights or histopathological changes were noted. Fertility, lactation, and weaning were not adversely affected. There were no dose-related effects on mortality or tumor incidence. Finally, no evidence of any chelate effect on calcification of bone or teeth was seen (Oser *et al,* 1963).

Swenerton and Hurley (1971) administered diets containing 2% or 3% disodium EDTA (approximately 2000 and 3000 mg/kg/day, respectively) with 100 ppm of zinc supplementation

to pregnant Sprague-Dawley rats. Moderate to severe diarrhea was seen in all treated dams. In the 2% disodium EDTA group, a slight impairment of reproduction and an increased incidence of malformations (7% *vs.* 0% in controls) were observed. Malformations, including severe brain malformations, cleft palate, malformed digits, clubbed legs, and malformed tails were reported. The 3% diet severely affected reproduction, almost half of the implantation sites had dead fetuses or resorptions. Full-term litters were significantly smaller than controls and 100% were malformed that were exposed to the compound on gestational days 6-21. Dams exposed under the same conditions, administered 1000 ppm zinc carbonate on gestation days 6 through 21 exhibited no teratogenic effects, suggesting that a zinc deficiency may play a role in disodium EDTA toxicity.

The teratogenicity of EDTA was assessed following administration to pregnant CD rats in the diet, *via* gastric intubation, or subcutaneously. Pregnant females were given 20 g/day of a semipurified diet containing casein as a source of protein and deionized water *ad libitum*. After gestational day 18, dams were given Wayne Chow and deionized water *ad libitum*. EDTA (disodium salt) was administered on Days 7 through 14 of gestation at levels of 3% in the diet (equivalent to 954 mg/kg/day), 1250 or 1500 mg/kg/day *via* intubation (divided across 2 doses), or 375 mg/kg/day subcutaneous injection. Controls were included for each route (Kimmel, 1977). Animals were sacrificed on Gestation Day 21 and the condition of the conceptus at each implantation site was examined.

Maternal weights of rats exposed to EDTA *via* oral gavage were significantly less than materanal weights of rats in the control group. Maternal weight loss was also severly evident in rats receiving EDTA in the diet and *via* subcutaneous injection. Dietary administration produced no maternal deaths, but severe maternal toxicity (*e.g.,* maternal weight loss, diarrhea) was seen along with a significant proportion of fetal deaths and malformations in survivors. In contrast, gastric intubation produced maternal death in 36% of dams at the 1250 mg/kg/day dose level and in 87.5% of dams in the 1500 mg/kg/day. This route produced fewer malformations in offspring compared to dietary administration, as malformations occurred in 20.5% at 1250 mg/kg/day, while the one implant seen in the lone survivor at 1500 mg/kg/day was normal. The types of gross and internal malformations and skeletal anomalies were similar after dietary and gastric administration. Administration of 375 mg/kg/day subcutaneously was lethal to 24% of the dams. This route resulted in a large increase in fetal resorptions, but did not produce a significant number of fetal malformations. Average fetal weights were significantly less after dietary and subcutaneous administration as compared to controls. An insignificant decrease in fetal weight was noted in the gastric intubation. The author suggested that the differences in toxicity and teratogenicity could be explained by differences in absorption, interaction with essential metals, and stress associated with administration (Kimmel, 1977).

Schardein *et al.* (1981) compared the teratogenic potential of edetic acid and disodium, trisodium, calcium disodium, and sodium tetrasodium EDTA. Rats were maintained on a Purina Lab Chow and tap water *ad libitum*. On Days 7 to 14 of gestation, 20 inseminated female CD albino rats per group received in 2 evenly divided doses 2.3 or 2.4 mL of the various test compounds on an equimolar basis equivalent to 1000 mg/ edetic acid/kg body weight. Actual doses were 967 mg/kg edetic acid, 1243 mg/kg disodium EDTA, 1245 mg/kg trisodium EDTA, 1340 mg/kg calcium disodium EDTA, and 1374 mg/kg sodium edetate. Three rats in the disodium EDTA group died; however, no gross abnormalities were seen at necropsy. One animal each from the edetic acid and the trisodium edentate groups were sacrificed after injuries from dosing errors. Diarrhea was observed in all treated groups, with an incidence of 80% in the edetic acid group, 65% in the disodium EDTA group, 35% in the trisodium EDTA group 10% in the calcium disodium EDTA, and 90% in the sodium edetate group; it generally occurred daily following treatment and disappeared on the last day of dosing or the day after. Depressed motor activity was noted in 3 dams in the edetic acid group and in 1 dam in the trisodium EDTA group. Reduced weight gain was observed in all treatment groups, with the most severe weight depression seen with disodium edetate, edetic acid, and tetrasodium edentate. Recovery was noted in the post-treatment period, from Day 14 to sacrifice at Day 21. No effects on litter size, sex ratio, or fetal weights were observed. The mortality index of offspring as measured by post-implantation loss was similar across all groups. Dams were sacrificed on Day 21 of gestation. No treatment-related increases in the incidences of skeletal abnormalities were observed. The authors suggested that the teratogenicity observed by Kimmel (1977) and Swenerton and Hurley (1971) may have been related to EDTA's ability to chelate metals, particularly zinc, resulting in deficiency.

5.1.2.4 Genotoxicity

Trisodium EDTA (Dose unspecified; did not exceed 10 mg/plate.) was nonmutagenic in *Salmonella typhimurium* strains TA98, TA100, TA1535, TA1537, and TA1538 and *Escherichia coli* WP2 uvrA, either with or without metabolic activation (Dunkel *et al*., 1985). It did not increase the frequency of mutations in the L5178Y tk^+/tk^- mouse lymphoma cell forward mutation assay at concentrations up to 5000 µg/mL in the presence and absence of metabolic activation (McGregor *et al*., 1988). EDTA was also negative in *in vitro* tests for chromosomal aberration and sister chromatid exchanges in mammalian cells (NTP, unpublished).

Heimbach *et al.* (1993) reviewed available data related to the genotoxicity of EDTA and suggested that although some positive results were reported in the Ames assay and mouse lymphoma assay with some iron EDTA salts, overall, the data indicate that EDTA-metal complexes are not directly genotoxic under conditions that do not deplete essential trace elements required for normal cell function.

5.1.2.5 Chronic Toxicity and Carcinogenicity

The potential carcinogenicity of trisodium EDTA was examined by the National Cancer Institute (NCI, 1977). Fifty Fischer 344 rats and 50 B6C3F1 mice per sex were randomly assigned to low and high-concentration groups. Rats were housed 4/cage while mice were housed 5/cage. Diets were prepared using Wayne Lab Blox Meal and animal feed was available *ad libitum*. Body weights of male mice receivng the highest concentration were lower than the male mice in the receiving the control diet and body weights of female mice in all groups were slightly lower in a dose-dependent manner, however, the effect was very small. Administration to Fischer 344 rats and B6C3F1 mice at dietary concentrations of 0.375 and 0.75% for 103 weeks (equivalent to approximately 535 and 1070 mg/kg bw/day in mice and 375 and 750 mg/kg/day in rats) failed to produce any clinical signs of toxicity, adverse effects on survival, gross or microscopic changes, or dose-related increases in the incidences of non-neoplastic or neoplastic tumors. As a result, it was concluded that EDTA was not carcinogenic at the concentrations tested.

Albino rats from a 90-day subchronic toxicity study (Yang, 1964) were continued on diets containing 0.5 or 1% disodium EDTA or calcium disodium EDTA for an additional 115 days. Growth retardation was seen in high-dose animals fed both salts as well as increased blood coagulation times, blood serum calcium levels, and an anemic appearance in the group receiving 1.0% disodium EDTA. No gross or histopathological abnormalities were observed in the liver, kidney, or spleen. Dental erosion and lower ash content of bone were observed in animals receiving low mineral diets with 1% disodium EDTA, but similar effects were not observed when diets contained adequate mineral levels (Chan, 1964).

Sixteen Mongrel dogs receiving 0, 58, 130, or 338 mg/kg bw calcium EDTA for 12 months were considered to be in good health without significant changes in blood cells, hemoglobin, or urine. Dogs were maintained on a kibbled Purnia chow supplemented with 1% mixtures of water and oil-soluble vitamins. Water and feed wre provided *ad libitum*. No adverse changes were seen in bone, and there were no gross or histopatholgical changes (Oser, 1963).

The CIR also reported these findings in its summary of the literature. Rabbits were treated with 250 mg/kg/day calcium disodium EDTA for 2 years. Necropsies performed at Day 365, Day 546 and upon study completion failed to reveal any evidence of toxicity (U.S. FDA, 1998). No toxic effects were observed following administration of 375 mg/kg/day trisodium EDTA to rats for 721 days. In mice, 563 mg/kg/day trisodium EDTA for 721 days produced no toxic effects. Reduced body weight gain was seen in males at a dose of 1125 mg/kg/day (U.S. FDA, 1998). No other information provided in the review (CIR, 2002).

5.1.3 Clinical Safety

In addition to the approved food uses of disodium EDTA and calcium disodium EDTA in foods and the use of sodium iron EDTA for the purposes of iron fortification, further evidence of safety is offered by the use of calcium disodium EDTA and disodium EDTA as chelating agents in the treatment of heavy metal toxicity (JECFA, 1974).

5.1.4 Additional Considerations

JECFA (1974) considered the safety of numerous food additives, including calcium disodium EDTA. JECFA recommended that calcium disodium EDTA and disodium EDTA be permitted as food additives and established an acceptable daily intake (ADI) of 2.5 mg EDTA kg bw/day based on a NOAEL of 5000 ppm (0.5%) in the diet (equivalent to 250 mg/kg bw and application of a 100-fold safety factor). The ADI was set based on observations that EDTA salts are poorly absorbed in the gastrointestinal tract; EDTA salts have a history of use in treating metal poisoning in humans; and EDTA is essentially not metabolized (Heimbach *et al*, 2000). Sodium iron EDTA was approved by JECFA for use in iron fortification.

Information related to the background intake of EDTA comes from the FDA who reviewed and reassessed the estimated daily intake (EDI) for EDTA since it was originally established in 1969 (Whittaker *et al.* 1993). In 1992, the agency updated its estimate of chronic daily exposure to EDTA by utilizing available food intake information and Monte Carlo simulation methodology (Rubinstein, 1981) to calculate a 90^{th} percentile exposure. The Monte Carlo technique uses a distribution of values for a variable instead of a discrete value. The food intake distributions were taken from the Market Research Corporation of America (MRCA) Information Services (Northbrook, IL) 5-Year Menu Census (1982-1987), and portion sizes used from the 1987-1988 U. S. Department of Agriculture-Nationwide Food Consumption Survey (USDA-NFCS). For use level distribution, typical values were estimated to be 80-90% of the maximum; minimum values were estimated to be 60-70% of the maximum. The following two assumptions were employed when the expected mean values were calculated: “all foods that may contain EDTA under FDA’s regulation do contain EDTA, and the presence of EDTA in food does not affect a consumer’s choice relating to that food” (Whittaker *et al.* 1993).

Sources of exposure to EDTA from individually regulated foods are outlined in 21 CFR §172.120 and 21 CFR §172.135. Due to the multiplicity of uses for EDTA, all consumers are considered eaters of EDTA; therefore, eaters-only exposure is equivalent to the total-sample. Mean overall exposure to EDTA has been estimated to be 0.25 mg/kg/day. In the Monte Carlo simulation, the 90^{th} percentile exposure is 0.43 mg/kg/day and the 50^{th} is 0.22 mg/kg/day. The difference in formula weight between $CaNa_2EDTA$ and Na_2EDTA was not considered, as it would amount to no more than about 1 mg/person/day.

As a test of this method, the amount of EDTA utilized in the food supply was obtained. The total quantity of EDTA salt reported by weight in the NAS update for 1987 was 186,000 pounds (NAS, 1989). This amount yielded a per capita estimate of exposure of 1.6 mg/person/day, one-tenth of the Monte Carlo estimate. Thus, this test of the Monte Carlo method shows that it has not underestimated exposure but is likely over stating actual exposure to EDTA containing foods. Consequently, it is unlikely that even children with 90th percentile exposure would exceed 0.43 mg EDTA/kg body weight/day.

Since MyCell's emulsified fish oil contains calcium disodium EDTA at a concentration of 0.63%, its use in the proposed applications is expected to result in a mean all-user intake of 30.24 mg/day and a 90th percentile all-person intake of 72.45 mg/day. Expressed on a body weight basis, the all-user 90th percentile intake for calcium disodium EDTA would be 1.08 mg/kg/day. Adding this 90th percentile estimates derived for MyCell's proposed uses to the 90th percentile exposure from the proposed fortification use for all-users derived using the Monte Carlo technique (*i.e.*, 0.43 mg EDTA/kg bw/day), results in intakes of calcium disodium EDTA that remain below the JECFA ADI of 2.5 mg/kg/day. Furthermore, the proposed uses and use levels are consistent with those included in GRN 573, to which the FDA replied with no questions.

5.2 PEG-40 Hydrogenated Castor Oil (Kolliphor^{TM} RH 40)

5.2.1 Overview

PEG-30,-33,-35,-36, and -40 castor oil (generic CAS #: 61791-12-6) and PEG -30, -40 hydrogenated castor oil (generic CAS #: 61788-85-0) are polyethylene glycol derivatives of castor oil and hydrogenated castor oil, respectively. Both the United States Pharmacopeia (USP) and European Pharmacopeia (PhEur) have developed a monograph and specifications for macrogolglycerol hydroxystearate (polyoxyl 40 hydrogenated castor oil). PEG castor oils and PEG hydrogenated castor oils include various chain lengths, depending on the quantity of ethylene oxide used in synthesis. While not all polymer lengths have been studied, it is considered acceptable to extrapolate the results of the few that have been reviewed, taking into account the inverse relationship between toxicity and molecular weight.

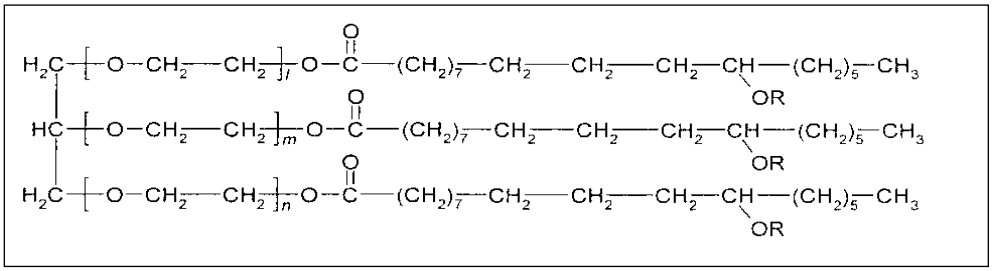
PEG-40 hydrogenated castor oil (HCO) is formed by reacting 45 moles of ethylene oxide with 1 mole of hydrogenated castor oil and is used primarily as an emulsifying or solubilizing agent in cosmetic formulations. The PEG-40 hydrogenated castor oil (Kolliphor^{TM} RH 40) utilized in MyCell's emulsified fish oil is manufactured by BASF and meets established purity specifications for residual ethylene oxide content (< 1 mg/kg).

Castor oil is a triglyceride containing approximately 87% ricinoleic acid, 7% oleic acid, 3% linoleic acid, 2% palmitic acid, 1% stearic acid and a trace amount of dihydroxystearic acid. Polyoxyl (polyethylene glycol) castor oil and polyoxyl hydrogenated castor oil are part of a family

of polyethylene glycol derivatives found in castor oil and hydrogenated castor oil. Depending on the quantity of ethylene oxide used in their synthesis, these derivatives contain various chain lengths. As castor oil primarily contains ricinoleic acid, polyoxyl hydrogenated castor oil is predominantly tri-12-hydroxyl-stearyl polyethylene glycol. Additionally, fatty acid esters of polyethylene glycols are also present, as well as hydrophilic polyethylene glycols and ethoxylated glycerol (Fruijtier-Polloth, 2005).

Macrogolglycerol hydroxystearate or polyoxyl 40 hydrogenated castor oil is the polyethylene glycol derivative of hydrogenated castor oil. The number associated with the name of the compound represents the average number of moles of ethylene oxide consumed in the reaction to form the parent compound. The chemical structures of polyethoxylated hydrogenated castor oils are analogous to polyethoxylated castor oil with the exception that the double bond in the fatty acid chain has been saturated by hydrogenation. The structural formula of the main constituent is presented in Figure 5-1.

Figure 5-1 Structural formula of macrogolglycerol hydroxystearate



***l* + *m* + *n* = 40-45 (nominal value); R = H or polyethylene glycol residue.**

The chemical similarity of macrogolglycerol hydroxystearate with similar family members of castor oil derivatives allows for the extrapolation and bridging of biological and toxicological data related to its safety.

A review paper authored by Fruijtier-Pölloth (2005) assessed the safety of polyethylene glycols (PEGs) and their derivatives as used in cosmetics. PEG castor oils and PEG hydrogenated castor oils have caused anaphylactic reactions when used in intravenous medicinal products. PEGs and its derivatives were found to have low mammalian toxicity with generally decreasing toxicity with increasing molecular weight. Overall, it was concluded that PEGs and its derivatives have extremely low acute and chronic toxicities and are safe for use in cosmetics.

5.2.2 Regulatory Review of PEG-40 Hydrogenated Castor Oil (Kolliphor™ RH 40)

The GRAS proposed rule (Federal Register/Vol. 62, No.74/April 17, 1997) indicates that the opinions or recommendations of an authoritative body may, in some cases, provide a basis for concluding that there is expert consensus regarding the safety of a substance for its intended

use in food. As discussed subsequently, PEG-40 hydrogenated castor oil (Kolliphor™ RH 40) has been reviewed by various authorities, including Joint FAO/WHO Expert Committee on Food Additives (JEFCA), the Cosmetic Ingredient Review Expert Panel, and the European Medicines Agency (EMEA). The following sections briefly describe the findings of these reviews. Additional safety information also included unpublished oral, mutagenic, and reproductive toxicity data provided by the manufacturer, BASF. Although details from these studies were limited, there was no indication that PEG-40 hydrogenated castor oil (Kolliphor™ RH 40) posed any toxicological concerns.

5.2.2.1 U.S. FDA

PEG-40 hydrogenated castor oil is present as an inactive ingredient in various oral pharmacuetical formulations. Furthermore, as previously mentioned, PEG-40 hydrogenated castor oil (Kolliphor™ RH 40) is not the subject of a U.S. food regulation *per se*, but it is related to hydrogenated castor oil, which is permitted for use in foods under various sections of Title 21 of the Code of Federal Regulations.

5.2.2.3 European Medicines Agency (EMEA)

EMEA's Committee for Veterinary Products concluded that there was no need to establish a maximum residue limit (MRL) for polyoxyl 40 hydrogenated castor oil and recommended its inclusion in Annex II of Council Regulation (EEC) No 2377/90 as shown in Table 5-1. The committee considered that:

- Polyoxyl hydrogenated castor oils (Kolliphor™ RH 40) are of low oral toxicity;
- Only low doses administered to the target species; and
- The incorporation of polyoxyl hydrogenated castor oil in medicinal products intended for use in food producing species is unlikely to result in residues in food products of animal origin at concentrations of toxicological relevance to the consumer.

Table 5-2 Annex II of Council Regulation (EEC) No. 2377/90

Pharmacologically active substance(s)	Animal Species	Other provisions
Polyoxyl castor oil with 30 to 40 oxyethylene units	All food producing species	For use as excipient
Polyoxyl castor oil with 40 to 60 oxyethylene units	All food producing species	For use as excipient

5.2.2.4 Health Canada

PEG-40 hydrogenated castor oil appears on Health Canada's List of Acceptable Non-Medicinal Ingredients in the Natural Health Products Ingredients Database. According to its listing, PEG-40 hydrogenated castor oil may be used as an emulsifying, solubilizing, or wetting agent. An upper limit of 25 mg/kg/day has been established based on the ADI set by JECFA for polyoxyethylene derivatives (Health Canada, 2012).

5.2.3 Preclinical Toxicity Studies of Kolliphor™ RH 40

Results from unpublished oral toxicity studies of PEG-40 hydrogenated castor oils (Kolliphor™ RH 40) in rats and dogs are presented in Tables 5-2 and 5-3. Additional details from 6-month studies in dogs and rats follow.

Table 5-3 Unpublished oral toxicity studies of PEG-40 hydrogenated castor oil (Kolliphor™ RH 40) in rats (from BASF)

Organism	Dosage (mg/kg body weight)	Duration	Route	Results
Rat	10,000	1 month	Oral	NOAEL >10,000 (mg/kg bw)
Rat	1,000	3 months	Oral	NOAEL >1000 (mg/kg bw)
Rat	0.01, 0.04, 0.16, 0.64, 2.5 and 5.0% PEG 40 HCO	3 months	Oral	NOAEL = 5% PEG-40 HCO
Rat	1830, 3650, 5700	6 months	Oral	NOAEL >5700 (mg/kg bw)
Rat	32,000; 64,000; 100,000 ppm	6 months	Oral	NOAEL = 100,000 ppm
Rat	2.0% PEG-25 HCO and 0.25% PEG-40 HCO	Not reported	Oral	LD_{50} >15 (g/kg)
Rat	3.0% PEG-60 HCO	Not reported	Oral	LD_{50} > 5 (g/kg)

HCO = hydrogenated castor oil; NOAEL = no-observable-adverse-effect level

Table 5-4 Unpublished oral toxicity studies of PEG-40 hydrogenated castor oil (Kolliphor™ RH 40) in dogs (from BASF)

Organism	Dosage (mg/kg body weight)	Duration	Route	Results
Dog	2000	4 month	Oral (capsule)	NOAEL >2000 (mg/kg bw)
Dog	300, 750, 1500	6 months	Oral (feed)	NOAEL >1500 (mg/kg bw)
Dog	0.04, 0.64, 5.0%	3 months	Oral	NOAEL = 5%
Dog	1.0, 2.5, 5.0%	6 months	Oral	NOAEL = 5%

HCO = hydrogenated castor oil; NOAEL = no-observable-adverse-effect level

5.2.3.1 Subchronic Toxicity

The subchronic oral toxicity of PEG-40 hydrogenated castor oil was investigated in Sprague-Dawley rats. Groups of rats (20 animals/sex) received diets containing 0, 32,000, or 64,000 ppm PEG-40 hydrogenated castor oil; twenty-five animals/ sex received diets containing 100,000 ppm PEG-40 hydrogenated castor oil. All animals survived the study period, and no significant effects on feed intake, body weight gain, or hematological parameters were observed. After 6 months, all animals in the control, low, and mid-dose groups were sacrificed, as were 20 animals/sex in the high-dose group. Body and organ weights were similar to controls and no gross or microscopic lesions were observed at necropsy. The remaining 5 animals/ sex received control feed for an additional 5 days before sacrifice. No signs of toxicity or lesions were observed upon necropsy (BASF, undated (a), as reviewed in CIR, 1997).

Similarly, the subchronic toxicity of PEG-40 hydrogenated castor oil was examined in a 6-month feeding study in dogs. Three male and 3 female beagles received diets containing 1.0, 2.5, or 5.0% PEG-40 hydrogenated castor oil. A control group received untreated feed. No changes in behavior, feed intake, or body weight were observed. Although one male in the low-dose group died, this was not considered to be treatment-related. Hematological and biochemical parameters and organ weights were similar in treated and control animals. No gross changes or microscopic lesions were observed (BASF, undated (b), as reviewed in CIR, 1997).

5.2.3.2 Reproductive and Development Toxicity

Teratogenic effects of PEG-40 hydrogenated castor oil were investigated in pregnant Sprague-Dawley rats. The rats were divided into 4 groups. Group 1 (*n* = 30) and group 2 (*n* = 27) were fed diets containing 50,000 and 100,000 ppm of PEG-40 hydrogenated castor oil (Kolliphor™ RH 40), respectively on Days 0 to 20 of gestation. The remaining 2 groups of 26 and 29 rats were designated as controls and fed untreated diets. All animals were observed for signs of toxicity during gestation and were sacrificed on Day 20 for evaluation of the uteri. No evidence of either maternal or fetal toxicity was observed. A slight but not statistically significant increase occurred in the number of resorptions in group 2. The type and number of malformations and

anomalies found in the fetuses of the experimental groups were similar to those found among the control groups. Investigators concluded PEG-40 hydrogenated castor oil (Kolliphor^{TM} RH 40) was not teratogenic (BASF, undated (c) as reviewed in CIR, 1997).

Negative results were also obtained in a teratogenicity study conducted on pregnant NMRI mice. Group 1 (*n* = 25) and Group 2 (*n* = 31) were fed diets containing either 5,000 or 10,000 ppm PEG-40 hydrogenated castor oil on Days 6 to 15 of gestation. Two groups of 26 and 28 mice were designated as the controls and fed untreated diets. There was no statistically significant evidence of either maternal or fetal toxicity. Malformations observed among the fetuses of the treated dams were considered similar in type and number to those found in the control groups.

5.2.4 Studies of Other Related Substances: PEG Castor Oil and PEG Hydrogenated Castor Oils

PEG castor oils and PEG hydrogenated castor oils are a family of polyethylene glycol derivatives of castor oil and hydrogenated castor oil used in cosmetics, pharmaceuticals, and foods, primarily as emulsifying and solubilizing agents. Although the toxicity of all members of the class has not been studied, it is considered acceptable to extrapolate data from those that have to all ingredients in the family, taking into account the inverse relationship between molecular weight and toxicity (CIR, 1997).

Due to their use as surfactants in cosmetic and pharmaceutical products, the toxicity of PEG castor oils and PEG hydrogenated castor oils *via* the dermal and intravenous routes has been investigated. These studies are not included in Table 5-4, however, as they are not considered directly relevant to the proposed use of PEG-40 hydrogenated castor oil (Kolliphor^{TM} RH 40) in foods. Furthermore, while adverse reactions were noted where the oil was used as a vehicle for injection of drugs, no such reactions were noted following oral or dermal applications.

Studies in Table 5-4 summarize toxicological data related to other PEG castor oils. No mutagenicity was observed in Ames, chromosome aberration, and micronucleus assays (Hirai *et al*., 1994; Au *et al*., 1991). No toxicity was observed in 90-day dietary study in rats (Villeneuve *et al*., 1985; Industrial Biology Research and Testing Laboratories, undated a) and Beagle dogs (Industrial Biology Research and Testing Laboratories, undated b). Some effects were observed on biochemical parameters and organ weights in mice (Borzelleca *et al*., 1985). Exposure to PEG castor oils also did not affect reproductive performance and reproductive indices (Lane *et al*., 1982) or growth, and development (Cusic & Dagg, 1984 and 1985). However, there was a noticeable increase in the ratio of dead fetuses to live fetuses reported in one multi-generation study (Lane *et al*., 1982).

In addition to the studies summarized in Table 5-4, PEG-30 and PEG-35 castor oil have also been used as negative vehicle controls in various mutagenicity studies (*e.g.* chromosomal aberration assay, dominant lethal tests, and micronucleus and sperm head abnormality assays) and carcinogenicity assays (CIR, 1997).

Table 5-5 Safety studies on related PEG-castor oils and hydrogenated castor oils

Material	Study Type	Test system/Species	Summary and Results	Reference
2.0% PEG-25 Hydrogenated Castor Oil	Acute toxicity	Rats (strain not specified)	LD_{50} > 15.0 g/kg	CTFA 1982a, 1982b
3.0% PEG-60 Hydrogenated Castor Oil	Acute toxicity	Rats (strain not specified)	LD_{50} > 5.0 g/kg	CTFA, 1976
PEG-40 Castor Oil	Subchronic (90-day) study	Sherman-Wistar rats	Groups of 15 rats (Strain, age, and gender not specified.) were fed diets containing 0.01%, 0.04%, 0.16%, 0.64%, 2.5%, or 5.0% (initially 10.0%, reduced after 1 week after animals stopped eating the feed). A control group of 30 rats received untreated feed. Weight gain, feed intake, and hematology results were similar between control and experimental groups. No significant gross or microscopic lesions were observed.	Industrial Biology Research and Testing Laboratories, undated a
PEG-40 Castor Oil	Subchronic (90-day) study	Beagle dogs	One animal each (Strain, age, and gender not specified.) was fed a diet containing 0.04%, 0.64%, or 5.0% PEG-40 Castor Oil. Three control animals received untreated feed. No significant differences were observed between treated and control animals in weight gain, feed intake, or hematologic values. Perilobular cellular infiltration and parasitic granulomas were observed at necropsy in both treated and control animals and were attributed to parasitic infection rather than a treatment-related effect.	Industrial Biology Research and Testing Laboratories, undated b

Table 5-5 Safety studies on related PEG-castor oils and hydrogenated castor oils (continued)

Material	Study Type	Test system/Species	Summary and Results	Reference
PEG Castor Oil*	Subchronic (90-day) study	CD-1 Mice	Forty mice (20/sex) received PEG castor oil as a vehicle control in their drinking water. A nontreated control received deionized water. All animals survived the duration of the study. Fluid consumption was significantly decreased in the PEG castor oil group. Terminal body weights were not significantly affected. Absolute and relative kidney and liver weights were significantly greater in the treated group than in the control group, while brain weight was significantly less. Treated males exhibited significantly greater hematocrit and significantly lower polymorphonuclear values. The percentage of calcium and creatinine and the BUN-creatinine ratio was lower in PEG castor oil-treated mice of both sexes. In addition, females also had greater cholesterol and albumin values and males exhibited greater plasma alkaline phosphatase values.	Borzelleca *et al*., 1985

*Number of moles of ethylene oxide not specified

Table 5-5 Safety studies on related PEG-castor oils and hydrogenated castor oils (continued)

Material	Study Type	Test system/Species	Summary and Results	Reference
PEG Castor Oil*	Subchronic (13-week) study	Sprague-Dawley rats	Ten animals/sex (Age not specified.)consumed 0.5% PEG Castor Oil as a vehicle control in drinking water for 13 weeks. All rats survived the duration of the study. Although treated rats had slightly lower water consumption, no significant effects on body weight gain were observed. Relative brain weights were lower in PEG castor oil-treated rats than in untreated controls. No significant effects in biochemical, hematologic, or histologic parameters were reported.	Villeneuve *et al*., 1985
PEG-30 Castor Oil	Multigeneration reproductive toxicity and teratogenicity study	ICR Swiss Mice	Ten male and 30 female ICR Swiss mice (F/0) consumed 1% PEG-30 Castor Oil in drinking water continuously throughout the study. After 35 days, mice were randomly mated to produce F/1A litters. Two weeks after weaning of the F/1A generation, F/0 mice were randomized and mated to produce F/1B litters. Similarly, two weeks after weaning of the F/1B litters, F/0 mice were randomized and mated to produce F/1C litters. Ten male and 30 female mice from the F/1B litter also received 1% solutions of PEG-30 castor oil in the drinking water and were mated as described above in nonsibling matches to produce F/2A and F/2B litters. No significant changes in reproductive performance were observed in any of the matings. No significant effects were observed on mean litter size, postnatal body weights, or survival indices. An increase in the ratio of dead fetuses to live fetuses was reported.	Lane *et al.,* 1982

*Number of moles of ethylene oxide not specified

Table 5-5 Safety studies on related PEG-castor oils and hydrogenated castor oils (continued)

Material	Study Type	Test system/Species	Summary and Results	Reference
PEG-35 Castor Oil	Teratogenicity	ICR and C57B1/10Dg mice	Groups of pregnant ICR and C57B1/10Dg mice (numbers not specified) received 0.05 mL/10 g bw 8% PEG-35 Castor Oil and 10% propylene glycol in water as a solvent control on either day 9, 10, or 22 of gestation. An untreated control group was used for comparison Animals were sacrificed on day 18 of gestation and the fetuses and placentas were examined. PEG-35 Castor Oil did not have any significant effects on growth or development in any of the treatment groups.	Cusic and Dagg, 1984, 1985
PEG-30 Castor Oil	Behavioral development evaluation	Albino ICR mice	PEG-30 Castor oil was used as a vehicle control in a behavioral development evaluation. Male and female albino ICR mice (Age and animal number not specified.) received 10 mL/kg of a solution containing one part PEG-30 Castor Oil and 8 parts saline daily. Mice were mated after 3 weeks of treatment and females continued to receive daily doses of PEG-30 throughout gestation and lactation. Following weaning, pups were continued on PEG-30 Castor Oil treatment for the duration of the study. From Day 7 to Day 21, pups were weighed and subjected to a battery of tests, including measurement of righting reflex, forepaw grasp, rooting reflex, cliff-drop aversion, auditory startle response, bar-holding ability, eye opening, motor performance and learning measures, and placing and grasping responses. In general, the pups experienced gradual weight gain and progressive neurobehavioral development.	Burkhalter and Balster, 1979
PEG-35 Castor Oil	Clastogenicity and co-clastogenic activity assay	ICR mice	Groups of 5 mice were given 0.1 mL/g of 0.03%, 0.3%, or 3.0% PEG-35 Castor Oil orally. Other groups of mice received benzene in olive oil or benzene in combination with various doses of PEG-35. A control group received olive oil alone. Exposure to PEG-35 Castor Oil did not cause any significant or dose-dependent increases in the frequency of micronuclei in polychromatic erythrocytes. When administered with benzene however, PEG-35 Castor Oil significantly enhanced the clastogenicity of benzene.	Au *et al*., 1991

Table 5-5 Safety studies on related PEG-castor oils and hydrogenated castor oils (continued)

Material	Study Type	Test system/Species	Summary and Results	Reference
PEG-60 Hydrogenated Castor Oil	Bacterial reverse mutation test	*Salmonella typhimurium* strains TA100, TA98, TA1535, and TA1537 and *Escherichia coli* WP2uvrA	Polyoxyethylene hydrogenated castor oil 60 did not induce reverse mutations in *Salmonella typhimurium* strains TA100, TA98, TA1535, or TA1537 or in *Escherichia coli WP2uvrA*, either in the presence or absence of metabolic activation.	Hirai *et al*., 1994
	Chromosome aberration test	Chinese hamster V79 cells	No chromosome aberrations were observed with or without metabolic activation.	
	Micronucleus test (*in vivo*)	BDF1 mice	Eight-week-old male and female mice (weighing 25.2 to 28.1 g and 19.0 to 22.1 g, respectively) received a single intraperitoneal dose of 2000 mg/kg polyoxyethylene hydrogenated castor oil 60. Mitomycin C and physiological saline were used as positive and negative controls. No increase in the frequency of micronucleated polychromatic erythrocytes or decrease in the ratio of polychromatic to normochromatic erythrocytes was seen in polyoxyethylene hydrogenated castor oil 60-treated animals. However, treatment with MMC resulted in a significant increase in the frequency of MN-PCE and a significant decrease of PN-ratio in both male and female mice. Together, these data indicated that polyoxyethylene hydrogenated castor oil 60 was not mutagenic or clastogenic under the conditions of these assays.	

5.2.5 Additional Considerations

As MyCell's emulsified fish oil contains 26.20% PEG-40 hydrogenated castor oil (Kolliphor™ RH 40), the proposed uses are expected to result in a mean all-user intake of 1.26 g/day (19.47 mg/kg/day), and in a 90th percentile all-user intake of 3.01 g/day (45.06 mg/kg/day).

JECFA has not established an ADI for PEG-40 hydrogenated castor oil. No signs of toxicity were observed in rats receiving up to 100,000 ppm PEG-40 hydrogenated castor oil, or dogs receiving up to 5.0% PEG-40 hydrogenated castor oil in the diet for 6 months, suggesting an ADI in excess of 50 mg/kg/day could be justified.

In addition, the intakes of MyCell's emulsified fish oil were calculated using the *minimum* level of PUFAs allowable under product specifications in order to ensure the most conservative estimate of intake. Batch analysis data indicate that the omega-3 concentration of these oils typically exceeds the specified minimum. As a result, less emulsion would be necessary to achieve the target doses in the proposed food uses, indicating that the real-world exposure to this ingredient will be less than the worst-case estimates made herein.

6.0 Summary and Conclusions

This document demonstrates that use of MyCell's emulsified fish oil consisting of PEG-40 hydrogenated castor oil (Kolliphor™ RH 40), Nutegrity™ fish oil, water, ascorbic acid, calcium disodium EDTA, ascorbyl palmitate, and a mixed tocopherol antioxidant mix (Fortium MTD-10), in select food categories is is GRAS.

The following constitute the basis for the GRAS determination:

The safety of MyCell's emulsified fish oil were evaluated based on safety data available for the individual ingredients. Some of the individual components of the emulsified fish oil (*i.e.*, water, ascorbic acid, and Fortium MTD-10) are themselves considered substances affirmed as GRAS under Part 182 of the FDA regulations, subject only to current good manufacturing practice (cGMP) considerations.

In addition, the Nutegrity™ fish oil fish is GRAS for many of MyCell's proposed uses; however, one cateogry (*i.e.,* ready-to-drink tea beverages) falls outside the current GRAS determinations for these products. Thus, although the safety of EPA and DHA at intakes of up to 3 g/day has been established, as has the safety of the fish oil used in the emulsions as sources of omega-3 fatty acids, the safety of the additional intake resulting from the proposed added category is now being considered. The contribution to the overall omega-3 fatty acid intake from the ready-to-drink tea beverages category is neglible, and as intakes remain below the 3 g DHA+EPA/day

limit, the proposed use of the emulsions in the added category does not raise any concern with regard to safety.

EDTA is poorly absorbed from the gastrointestinal tract, poorly metabolized, and excreted unchanged, primarily in the feces. It has low acute toxicity following oral administration, with LD_{50} values ranging from 2000 to 12,000 mg/kg/day in rats, mice, and dogs. Although there are early reports of teratogenic effects following exposure to EDTA and its salts, particularly when administered in lowmineral-containing diets, these findings have been attributed to EDTA's ability to chelate metals, particularly zinc. Subchronic administration of EDTA and its salts resulted in diarrhea and reduced food consumption. No evidence of carcinogenicity was observed in mice or rats. Although some positive results were reported in the Ames and mouse lymphoma assays with some iron EDTA salts, overall, the data indicate that EDTA-metal complexes are not directly genotoxic under conditions that do not deplete essential trace elements required for normal cell function. In addition to the approved food uses of disodium EDTA and calcium disodium EDTA, and the use of sodium iron EDTA for the purposes of iron fortification, further evidence of safety is offered by the use of calcium disodium EDTA and disodium EDTA as chelating agents in the treatment of heavy metal toxicity. The maximum incorproation rates of calcium disodium EDTA from the propsoed uses of the emulsion are cosnistent with the levels proposed in GRN 573, which rasied no questions by the FDA. When the 90th percentile estimates for EDTA intake derived for MyCell's proposed uses are added to the 90th percentile exposure from the proposed fortification use for all-users derived using the Monte Carlo technique (*i.e.*, 0.43 mg EDTA/kg bw/day), the intakes of calcium disodium EDTA that remain below the JECFA ADI of 2.5 mg/kg/day.

Studies of the safety of PEG-40 hydrogenated castor oil (Kolliphor^{TM} RH 40), which included oral, mutagenicity, and reproductive toxicity studies, showed no indication of any toxicological concerns. PEGs and related compounds have low mammalian toxicity, and toxicity seems to be inversely related to molecular weight. No signs of toxicity were observed in rats receiving up to 100,000 ppm PEG-40 hydrogenated castor oil, or dogs receiving up to 5.0% PEG-40 hydrogenated castor oil in the diet for 6 months. Studies in rats and mice indicate that PEG-40 hydrogenated castor oil is not teratogenic. PEG castor oils and PEG hydrogenated castor oils have caused anaphylactic reactions when used in intravenous medicinal products, however, no such reactions were noted following oral or dermal applications.

JECFA has not established an ADI for PEG-40 hydrogenated castor oils. No signs of toxicity were observed in rats receiving up to 100,000 ppm PEG-40 hydrogenated castor oil, or dogs receiving up to 5.0% PEG-40 hydrogenated castor oil in the diet for 6 months, suggesting an ADI in excess of 50 mg/kg/day could be justified. In addition, the intakes of the emulsion were calculated using the *minimum* level of PUFAs in the respective oils in order to ensure the most conservative estimate of intake. Batch analysis data indicate that the omega-3 concentration of

these oils typically exceeds the specified minimum. As a result, less emulsion would be necessary to achieve the target doses in the proposed food uses, indicating that the real-world exposure to this ingredient will be less than the worst-case estimates made herein.

The proposed uses of the emulsions result in mean all-user intakes of 252 mg DHA+EPA/person/day; This level is well below the limit of 3 g DHA+EPA/day established by U.S. Food and Drug Administration (FDA) for menhaden oil (see 21 CFR 184.1472—Menhaden oil).

Information summarized herein provides a basis for a determination that there is consensus among qualified experts that the intended use of MyCell's emulsified fish oil in select food categories entails a reasonable certainty of no harm and is generally recognized as safe (GRAS) by scientific procedures.

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APPENDIX 1

Estimated Daily Intake of Two
Omega-3 Containing Emulsions by the U.S. Population Based on Proposed Food Uses

Estimated Daily Intake of Two Omega-3 Containing Emulsions by the U.S. Population Based on Proposed Food Uses

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Estimated Daily Intake of Two Omega-3 Containing Emulsions by the U.S. Population Resulting from Proposed Food-Uses

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Estimated Daily Intake of Two Omega-3 Containing Emulsions by the U.S. Population Resulting from Proposed Food-Uses

1.0 INTRODUCTION

MyCell Technologies LLC (MyCell) proposes to use two omega-3 fatty acid containing emulsions in the United States (U.S.) in a range of foods and beverages[1]. The emulsions will serve as a source of omega-3 polyunsaturated fatty acids (PUFA), specifically docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA). The first omega-3 emulsion (hereafter referred to as Emulsion Formulation 1) contains a minimum DHA+EPA content of 5.25% and is intended for use in energy, sport, and isotonic drinks, meal replacement beverages, carbonated soft drinks, waters (bottled, enhanced, fortified), ready-to-drink tea beverages, gelatin desserts, fruit drinks and ades, fruit juices and smoothies, and fruit-based nectars. The second omega-3 emulsion (Emulsion Formulation 2) has a minimum DHA content of 3.23% (no significant EPA content) and is intended for use in the same food categories as Emulsion Formulation 1 with additional uses in fruit snacks and concentrated beverage bases.

Estimates for the intake of the 2 emulsions involved an initial assessment of DHA+EPA (both fatty acids for Emulsion Formulation 1 and DHA alone for Emulsion Formulation 2) intakes with a subsequent calculation of total emulsion formulation based on the minimum PUFA content. The use of the *minimum* level of PUFAs ensured a conservative estimate of intake of the total emulsion, as it represents the highest potential intake of the emulsion formulation required to attain the target PUFA concentration.

Intakes were based on the proposed food-uses and use-levels of PUFAs for the two emulsions in conjunction with food consumption data from the U.S. National Center for Health Statistics' (NCHS) National Health and Nutrition Examination Surveys (NHANES) 2011-2012 (CDC, 2014; USDA, 2014). Calculations for the mean and 90th percentile all-person and all-user intakes of PUFAs were performed for each of the individual proposed food-uses of the omega-3 emulsions and the total intake from all proposed food-uses of the respective omega-3 emulsions, with a subsequent calculation of the total emulsion exposure based on the level of PUFAs in the emulsion. Percent consumers were also reported for all uses. Intakes are reported on an absolute and body weight basis for the following population groups in this report:

Infants, ages 0 to 2;

[1] Emulsion 1 represents the Emulsified Fish Oil ingredient. Emulsion Formulation 2 represents the Emulsified Algal Oil Ingredient.

Children, ages 3 to 11;
Female teenagers, ages 12 to 19;
Male teenagers, ages 12 to 19;
Female adults, ages 20 and up;
Male adults, ages 20 and up; and
Total population (all age and gender groups combined).

2.0 FOOD CONSUMPTION SURVEY DATA

2.1 Survey Description

NHANES for the years 2011-2012 are available for public use. NHANES are conducted as continuous, annual surveys, and are released in 2-year cycles. Each year about 7,000 people from 15 different locations across the U.S. are interviewed, and approximately 5,000 complete the health examination component of the survey. Any combination of consecutive years of data collection is recognized and used as a nationally representative sample of the U.S. population. It is well-established that the length of a dietary survey affects the estimated consumption of individual users and that short-term surveys, such as a 1-day dietary survey, may overestimate consumption compared to surveys conducted over longer time periods (Anderson, 1988). Two 24-hour dietary recalls administered on 2 non-consecutive days are available from the NHANES 2011-2012 survey were used to generate estimates for the current intake analysis.

NHANES 2011-2012 survey data were collected from individuals and households *via* 24-hour dietary recalls administered on 2 non-consecutive days (Day 1 and Day 2) throughout all 4 seasons of the year. Day 1 data were collected in-person, and Day 2 data were collected by telephone in the following 3 to 10 days, on different days of the week, to achieve the desired degree of statistical independence. The data were collected by first selecting Primary Sampling Units (PSUs), which were counties throughout the U.S., of which 15 PSUs are visited per year. Small counties were combined to attain a minimum population size. These PSUs were segmented and households were chosen within each segment. One or more participants within a household were interviewed. For NHANES 2011-2012, 13,431 individuals were selected for the sample, 9,756 were interviewed (72.6%) and 9,338 were sampled (69.5%).

In addition to collecting information on the types and quantities of foods being consumed, NHANES 2011-2012 collected socio-economic, physiological and demographic information from individual participants in the survey, such as sex, age, height and weight, and other variables useful in characterizing consumption. The inclusion of this information allows for further assessment of food intake based on consumption by specific population groups of interest within the total population. The sample design for NHANES 2011-2012 includes an oversample of Asian Americans, however sample weights were incorporated to allow estimates from these

subgroups to be combined to obtain national estimates that reflect the relative proportions of these groups in the population as a whole (CDC, 2014; USDA, 2014).

2.2 Statistical Methods

Statistical analysis and data management were conducted in DaDiet Software (Dazult Ltd., 2014). DaDiet Software is a web-based software tool that allows accurate estimate of exposure to nutrients and substances added to foods, including contaminants, food additives and novel ingredients. The main input components are concentration (use level) data and food consumption data. Datasets are combined in the software to provide accurate and efficient exposure assessments.

For the intake assessment, consumption data from individual dietary records, detailing food items ingested by each survey participant, were collated by computer and used to generate estimates for the intake of DHA+EPA (from Emulsion Formulation 1) or DHA (from Emulsion Formulation 2) by the U.S. population using DaDiet Software. Estimates for the daily intake of PUFAs represent projected 2-day averages for each individual from Day 1 and Day 2 of NHANES 2011-2012 data; these average amounts comprise the distribution from which mean and percentile intake estimates were generated. Mean and percentile estimates were generated incorporating survey weights in order to provide representative intakes for the entire U.S. population. All-person intake refers to the estimated intake of PUFAs averaged over all individuals surveyed, regardless of whether they potentially consumed food products containing the omega-3 containing emulsions, and therefore includes individuals with "zero" intakes (*i.e*. those who reported no intake of food products containing the omega-3 emulsion during the 2 survey days). All-user intake refers to the estimated intake of PUFAs by only those individuals who reported consuming food products containing the emulsions, hence the "all-user" designation. Individuals were considered 'users' if they consumed 1 or more food products containing the omega-3 emulsion on either Day 1 or Day 2 of the survey. The estimated intakes of PUFAs were used to calculate maximum exposure to the omega-3 emulsion.

Mean and 90th percentile intake estimates based on sample sizes of less than 30 and 80, respectively, may not be considered statistically reliable due to the limited sampling size (LSRO, 1995). As such, the reliability of estimates for the intake of PUFAs (and omega-3 emulsion) based on the consumption of these foods may be questionable for certain individual population groups. These values were not considered when assessing the relative contribution of specific food uses to total omega-3 emulsion intakes and are marked with an asterisk in Appendices A, B, D, and E.

3.0 EMULSION FORMULATION 1

3.1 Food Usage Data

The individual proposed food-uses and use-levels for DHA+EPA from Emulsion Formulation 1 employed in the first intake analysis are summarized in Table 3.1-1. Food codes representative of each proposed food-use were chosen from the NHANES 2011-2012 (CDC, 2014; USDA, 2014). Food codes were grouped in food-use categories according to Title 21, Section §170.3 of the Code of Federal Regulations (CFR, 2014a). Product-specific adjustment factors were developed based on data provided in the standard recipe file for the Continuing Survey of Food Intakes by Individuals (CSFII) 1994-1996, 1998 survey (USDA, 2000). All food codes included in the intake assessment are listed in Appendix C. In all instances, the maximum DHA+EPA level was applied to the food codes.

Table 3.1-1 Summary of the Individual Proposed Food-Uses and Use-Levels for DHA+EPA from Emulsion Formulation 1 in the U.S. (2011-2012 NHANES Data)

Food Category	Food-Uses	RACC* (g or mL)	DHA+EPA Level (mg/serving)	DHA+EPA Use-Levels (%)
Beverages and Beverage Bases	Energy, Sport, and Isotonic Drinks	240	32 to 100	0.013 to 0.04
	Meal Replacement Beverages	240	32 to 100	0.013 to 0.04
	Soft Drinks (Carbonated)	240	32	0.013
	Waters (Bottled, Enhanced, Fortified)	240	32 to 90	0.013 to 0.038
Coffee and Tea	RTD Tea Beverages	240	32	0.013
Gelatins, Puddings, and Fillings	Gelatin Desserts	120	32 to 250	0.03 to 0.21
Processed Fruits and Fruit Juices	Fruit Drinks and Ades	240	32 to 50	0.013 to 0.02
	Fruit Juices and Smoothies	240	32 to 50	0.013 to 0.02
	Fruit-Based Nectars	240	32 to 50	0.013 to 0.02

DHA = docosahexaenoic acid; EPA = eicosapentaenoic acid; NHANES = National Health and Nutrition Examination Surveys; RTD = ready-to-drink
*RACC = Reference Amounts Customarily Consumed per Eating Occasion (21 CFR §101.12 - CFR, 2014b). When a range of values is reported for a proposed food-use, particular foods within that food-use may differ with respect to their RACC.

3.2 Food Survey Results

3.2.1 Estimated Daily Intake of DHA+EPA from All Proposed Food-Uses of Emulsion Formulation 1 in the U.S.

Estimates for the total daily intakes of DHA+EPA from proposed food-uses of Emulsion Formulation 1 are provided in Tables 3.2.1-1 and 3.2.1-2. Table 3.2.1-1 summarizes the estimated total intake of DHA+EPA on an absolute basis (mg/person/day) from all proposed

food-uses of Emulsion Formulation 1 in the U.S. population group. Table 3.2.1-2 presents this data on a per kilogram body weight basis (mg/kg body weight/day). As would be expected for a 2-day survey considering the proposed food uses (particularly soft drinks), the percentage of users was high among all age groups evaluated in the current intake assessment; greater than 65.5% of the population groups consisted of users of food products in which the emulsion is proposed for use. Children had the highest percentage users at 97.5%. Large user percentages within a population group typically lead to similar results for the all-person and all-user consumption estimates. Consequently, only the all-user intake results are discussed in detail.

Among the total population, the mean and 90th percentile all-user intakes of DHA+EPA were determined to be 252 and 602 mg/person/day, respectively. Of the individual population groups, male adults (aged 20 years and over) were determined to have the greatest mean and 90th percentile all-user intakes of DHA+EPA at 295 and 744 mg/person/day, respectively; while infants (aged 2 years and under) had the lowest mean and 90th percentile intakes of 110 and 248 mg/person/day, respectively (Table 3.2.1-1).

Table 3.2.1-1 Summary of the Estimated Daily Intake of DHA+EPA from Proposed Food-Uses of Emulsion Formulation 1 in the U.S. by Population Group (2011-2012 NHANES Data)

Population Group	Age Group (Years)	All-Person Consumption (mg/day)		All-Users Consumption (mg/day)			
		Mean	90th Percentile	% Users	n	Mean	90th Percentile
Infants	0 to 2	72	199	65.5	458	110	248
Children	3 to 11	137	313	97.5	1,478	140	314
Female Teenagers	12 to 19	238	524	96.7	506	246	529
Male Teenagers	12 to 19	252	570	96.5	505	262	571
Female Adults	20 and up	234	578	90.3	2,002	260	615
Male Adults	20 and up	267	717	90.6	1,903	295	744
Total Population	All Ages	229	573	91.1	6,852	252	602

On a body weight basis, intakes by the total population were estimated at 3.9 and 9.0 mg/kg body weight/day at the mean and 90th percentile. Infants were identified to have the highest mean and 90th percentile all-user intakes of any population group, of 8.8 and 19.7 mg/kg body weight/day, respectively. Male adults (aged 20 years and over) had the lowest mean intakes of 3.4 mg/kg body weight/day, whereas female adults (aged 20 years and over) had the lowest 90th percentile intakes of 8.3 mg/kg body weight/day (Table 3.2.1-2).

Table 3.2.1-2 Summary of the Estimated Daily Per Kilogram Body Weight Intake of DHA+EPA from Proposed Food-Uses of Emulsion Formulation 1 in the U.S. by Population Group (2011-2012 NHANES Data)

Population Group	Age Group (Years)	All-Person Consumption (mg/kg bw/day)		All-Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
Infants	0 to 2	5.8	16.1	65.4	455	8.8	19.7
Children	3 to 11	5.1	12.1	97.5	1,478	5.2	12.1
Female Teenagers	12 to 19	4.0	8.7	96.7	495	4.1	8.8
Male Teenagers	12 to 19	3.7	8.3	96.5	502	3.8	8.3
Female Adults	20 and up	3.2	8.0	90.3	1,981	3.5	8.1
Male Adults	20 and up	3.1	7.9	90.6	1,886	3.4	8.3
Total Population	All Ages	3.6	8.6	91.0	6,797	3.9	9.0

bw = body weight

3.2.2 Estimated Daily Intake of Emulsion Formulation 1 from Proposed Food-Uses in the U.S.

The estimates of EPA and DHA intake presented above were used to calculate the exposure to Emulsion Formulation 1 considering the minimum content of EPA+DHA in the emulsion (*i.e.*, 5.25%). The estimated intakes of Emulsion Formulation 1 on a per person and a body weight basis are summarized in Tables 3.2.2-1 and 3.2.2-2, respectively. Estimates for the daily intake of the emulsion from individual proposed food-uses n the U.S. are summarized in Tables A-1 to A-7 and B-1 to B-7 of Appendices A and B, respectively. Tables A-1 to A-7 provide estimates on a per person basis (g//person/day), whereas Tables B-1 to B-7 provide estimates on a per kilogram body weight basis (mg/kg body weight/day).

The total population intakes of Emulsion Formulation 1 were 4.8 and 11.5 g/person/day at the mean and 90th percentile. As per the results for the PUFA intakes, male adults were determined to have the greatest mean and 90th percentile all-user intakes at 5.6 and 14.2 g/person/day, respectively, while infants had the lowest mean and 90th percentile all-user intakes of 2.1 and 4.7 g/person/day, respectively (Table 3.2.2-1).

Table 3.2.2-1 Summary of the Estimated Daily Intake of Emulsion Formulation 1 from Proposed Food-Uses in the U.S. by Population Group (2011-2012 NHANES Data)

Population Group	Age Group (Years)	All-Person Consumption (g/day)		All-Users Consumption (g/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile

Table 3.2.2-1 Summary of the Estimated Daily Intake of Emulsion Formulation 1 from Proposed Food-Uses in the U.S. by Population Group (2011-2012 NHANES Data)

Population Group	Age Group (Years)	All-Person Consumption (g/day)		All-Users Consumption (g/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
Infants	0 to 2	1.4	3.8	65.5	458	2.1	4.7
Children	3 to 11	2.6	6.0	97.5	1,478	2.7	6.0
Female Teenagers	12 to 19	4.5	10.0	96.7	506	4.7	10.1
Male Teenagers	12 to 19	4.8	10.9	96.5	505	5.0	10.9
Female Adults	20 and up	4.5	11.0	90.3	2,002	5.0	11.7
Male Adults	20 and up	5.1	13.7	90.6	1,903	5.6	14.2
Total Population	All Ages	4.4	10.9	91.1	6,852	4.8	11.5

When these intakes were expressed on a body weight basis, the total population intakes were calculated at 74.3 and 172.0 mg/kg body weight/day. Infants had the highest mean and 90th percentile intakes at 168.4 and 375.2 mg/kg body weight/day, respectively. Male adults had the lowest mean intakes at 65.3 mg/kg body weight/day, whereas the lowest 90th percentile intakes were noted by women at 154.9 mg/kg body weight/day (Table 3.2.2-2).

Table 3.2.2-2 Summary of the Estimated Daily Per Kilogram Body Weight Intake of Emulsion Formulation 1 from Proposed Food-Uses in the U.S. by Population Group (2011-2012 NHANES Data)

Population Group	Age Group (Years)	All-Person Consumption (mg/kg bw/day)		All-Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
Infants	0 to 2	110.3	306.7	65.5	458	168.4	375.2
Children	3 to 11	97.0	230.5	97.5	1,478	99.4	230.5
Female Teenagers	12 to 19	75.2	165.5	96.7	506	77.9	167.4
Male Teenagers	12 to 19	69.9	157.7	96.5	505	72.4	157.7
Female Adults	20 and up	60.4	151.6	90.3	2,002	66.9	154.9
Male Adults	20 and up	59.0	149.9	90.6	1,903	65.3	157.9
Total Population	All Ages	67.6	164.2	91.1	6,852	74.3	172.0

bw = body weight

3.2.3 Estimated Daily Intake of Emulsion Formulation 1 from Individual Proposed Food-Uses in the U.S.

Estimates for the mean and 90th percentile daily intakes of Emulsion Formulation 1 from each individual proposed food-use categories are summarized in Tables A-1 to A-7 and B-1 to B-7 on a g/day and mg/kg body weight/day basis, respectively. The total U.S. population was identified as being significant consumers of soft drinks (16.3 to 64.1% users), waters (31.1 to 60.8%

users), fruit juices and smoothies (33.9 to 58.3% users), and fruit drinks and ades (20.7 to 54.1%).

In terms of contribution to total mean intake of the omega-3 emulsion, waters (contributed 38.3 to 65.4%), fruit juices and smoothies (contributed to 5.6 to 26.5%), soft drinks (contributed 2.7 to 18.1%), and fruit drinks and ades (contributed 5.7 to 17.2%) were the four main sources of intake across all population groups.

Meal replacement beverages and fruit-based nectars individually contributed ≤ 1.4% to total mean DHA intakes across all population groups (see Tables A-1 to A-7 and/or B-1 to B-7 for further details).

4.0 EMULSION FORMULATION 2

4.1 Food Usage Data

The individual proposed food-uses and use-levels for DHA from Emulsion Formulation 2 employed in the second intake analysis are summarized in Table 4.1-1. The proposed food uses were identical those utilized for Emulsion Formulation 1, with additional uses in fruit snacks and concentrated beverage bases. Food codes representative of each proposed food-use were chosen from the NHANES 2011-2012 (CDC, 2014; USDA, 2014). Food codes were grouped in food-use categories according to Title 21, Section §170.3 of the Code of Federal Regulations (CFR, 2014a). With regard to food codes available which were representative of the use category 'concentrated beverage bases', there was an overlap with food codes for 'fruit drink and ades'. On the basis that the use level was the same for both food groups, concentrated beverage bases were considered part of this food group and the use level was applied to all products within the category. Product-specific adjustment factors were developed based on data provided in the standard recipe file for the Continuing Survey of Food Intakes by Individuals (CSFII) 1994-1996, 1998 survey (USDA, 2000). All food codes included in the second intake assessment are listed in Appendix F. The maximum DHA use level for each food category was applied to all products within the group.

Table 4.1-1 Summary of the Individual Proposed Food-Uses and Use-Levels for DHA from Emulsion Formulation 2 in the U.S. (2011-2012 NHANES Data)				
Food Category	**Food-Uses**	**RACC* (g or mL)**	**DHA Level (mg/serving)**	**DHA Use-Levels (%)**
Beverages and Beverage Bases	Energy, Sport, and Isotonic Drinks	240	50	0.021
	Meal Replacement Beverages	240	50	0.021
	Soft Drinks (Carbonated)	240	50	0.021
	Waters (Bottled, Enhanced, Fortified)	240	50	0.021
Coffee and Tea	RTD Tea Beverages	240	50	0.021
Gelatins, Puddings, and Fillings	Gelatin Desserts	120	50	0.042
Processed Fruits and Fruit Juices	Fruit Drinks and Ades, Including Concentrated Products	240	50	0.021
	Fruit Juices and Smoothies	240	50	0.021
	Fruit-Based Nectars	240	50	0.021
Soft Candy	Fruit Snacks	30	50	0.167

DHA = docosahexaenoic acid; NHANES = National Health and Nutrition Examination Surveys; RTD = ready-to-drink
*RACC = Reference Amounts Customarily Consumed per Eating Occasion (21 CFR §101.12 - CFR, 2014b). When a range of values is reported for a proposed food-use, particular foods within that food-use may differ with respect to their RACC.

4.2 Food Survey Results

4.2.1 Estimated Daily Intake of DHA from All Proposed Food-Uses of Emulsion Formulation 2 in the U.S.

Table 4.2.1-1 summarizes the estimated intake of DHA (mg/person/day) from all proposed food-uses of Emulsion Formulation 2 in the total U.S. population group and by age category. Table 4.2.1-2 presents this data on a per kilogram body weight basis (mg/kg body weight/day). The percentage of users was high among all age groups evaluated, with greater than 65.8% of the population groups considered users (Table 4.1-1). Children had the greatest percentage of users at 97.6%. As per Emulsion Formulation 1, only the all-user intake results will be discussed in detail.

Among the total population, the mean and 90th percentile all-user intakes of DHA were determined to be 205 and 444 mg/person/day, respectively. Of the individual population groups, male adults (aged 20 years and over) were determined to have the greatest mean and 90th percentile all-user intakes of DHA on an absolute basis, at 247 and 525 mg/person/day, respectively; while infants (aged 2 years and under) had the lowest mean and 90th percentile intakes of 89 and 188 mg/person/day, respectively (4.2.1-1).

Table 4.2.1-1 Summary of the Estimated Daily Intake of DHA from Proposed Food-Uses of Emulsion Formulation 2 in the U.S. by Population Group (2011-2012 NHANES Data)

Population Group	Age Group (Years)	All-Person Consumption (mg/day)		All-Users Consumption (mg/day)			
		Mean	90th Percentile	% Users	n	Mean	90th Percentile
Infants	0 to 2	58.7	160	65.8	460	89	188
Children	3 to 11	117	228	97.6	1,481	120	230
Female Teenagers	12 to 19	199	349	96.8	507	206	350
Male Teenagers	12 to 19	207	397	96.6	506	214	407
Female Adults	20 and up	185	414	91.1	2,014	203	427
Male Adults	20 and up	225	506	91.0	1,913	247	525
Total Population	All Ages	188	429	91.5	6,881	205	444

The intakes of DHA on a body weight basis for the total population were 3.2 and 6.5 mg/kg body weight/day at the mean and 90th percentile. On a body weight basis, infants had the highest estimated mean and 90th percentile all-user intakes of all population groups, at 7.1 and 15.4 mg/kg body weight/day, respectively. Female adults (aged 20 years and over) had the lowest mean and 90th percentile all-user intake of 2.7 and 5.8 mg/kg body weight/day (Table 4.2.1-2).

Table 4.2.1-2 Summary of the Estimated Daily Per Kilogram Body Weight Intake of DHA from Proposed Food-Uses of Emulsion Formulation 2 in the U.S. by Population Group (2011-2012 NHANES Data)

Population Group	Age Group (Years)	All-Person Consumption (mg/kg bw/day)		All-Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
Infants	0 to 2	4.7	13.5	65.8	457	7.1	15.4
Children	3 to 11	4.4	8.7	97.6	1,481	4.5	8.7
Female Teenagers	12 to 19	3.3	6.6	96.7	496	3.4	6.6
Male Teenagers	12 to 19	3.0	6.0	96.5	503	3.2	6.1
Female Adults	20 and up	2.5	5.6	91.1	1,993	2.7	5.8
Male Adults	20 and up	2.6	5.8	91.0	1,896	2.9	5.9
Total Population	All Ages	2.9	6.3	91.5	6,826	3.2	6.5

bw = body weight

4.2.2 Estimated Daily Intake of Emulsion Formulation 2 from Proposed Food-Uses in the U.S.

Based on the minimum DHA content of Emulsion Formulation 2 (3.23%), it was possible to calculate the intake of this DHA-containing emulsion using the figures presented in Section

4.2.1. The calculated intakes are presented on a per person and a body weight basis is summarized in Tables 4.2.2-1 and 4.2.2-2, respectively.

Amongst the total population, mean and 90th percentile intakes were calculated at 6.3 and 13.7 g/day. In line with the results for estimates of DHA intake, male adults were determined to have the greatest mean and 90th percentile intakes at 7.6 and 16.3 g/person/day, respectively; while infants had the lowest intakes of 2.5 and 5.8 g/person/day, respectively (Table 4.2.2-1).

Table 4.2.2-1 Summary of the Estimated Daily Intake of Emulsion Formulation 2 from Proposed Food-Uses in the U.S. by Population Group (2011-2012 NHANES Data)

Population Group	Age Group (Years)	All-Person Consumption (g/day)		All-Users Consumption (g/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
Infants	0 to 2	1.8	5.0	65.8	460	2.8	5.8
Children	3 to 11	3.6	7.1	97.6	1,481	3.7	7.1
Female Teenagers	12 to 19	6.2	10.8	96.8	507	6.4	10.8
Male Teenagers	12 to 19	6.4	12.3	96.6	506	6.6	12.6
Female Adults	20 and up	5.7	12.8	91.1	2,014	6.3	13.2
Male Adults	20 and up	7.0	15.7	91.0	1,913	7.6	16.3
Total Population	All Ages	5.8	13.3	91.5	6,881	6.3	13.7

When intakes were calculated on a body weight basis, the intakes by the total population were 98.5 and 202.5 mg/kg body weight/day at the mean and 90th percentile intake. Infants were identified to have the highest mean and 90th percentile intakes at 220.4 and 476.8 mg/kg body weight/day, respectively. Female adults had the lowest mean and 90th percentile all-user intakes at 84.5 and 178.6 mg/kg body weight/day, respectively (Table 4.2.2-2).

Table 4.2.2-2 Summary of the Estimated Daily Per Kilogram Body Weight Intake of Emulsion Formulation 2 from Proposed Food-Uses in the U.S. by Population Group (2011-2012 NHANES Data)

Population Group	Age Group (Years)	All-Person Consumption (mg/kg bw/day)		All-Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
Infants	0 to 2	145.2	418.0	65.8	457	220.4	476.8
Children	3 to 11	135.3	268.4	97.6	1,481	138.4	269.0
Female Teenagers	12 to 19	100.9	205.0	96.7	496	104.3	205.0
Male Teenagers	12 to 19	94.1	187.0	96.5	503	97.5	189.5
Female Adults	20 and up	76.8	174.6	91.1	1,993	84.5	178.6
Male Adults	20 and up	80.5	179.3	91.0	1,896	88.5	183.6
Total Population	All Ages	90.1	195.4	91.5	6,826	98.5	202.5

bw = body weight

4.2.3 Estimated Daily Intake of Emulsion Formulation 2 from Individual Proposed Food-Uses in the U.S.

Estimates for the mean and 90th percentile daily intakes of Emulsion Formulation 2 from each individual food category are summarized in Tables D-1 to D-7 and E-1 to E-7 on a g/day and mg/kg body weight/day basis, respectively. The total U.S. population was identified as being significant consumers of soft drinks (16.3 to 64.1% users), waters (31.1 to 60.8% users), fruit juices and smoothies (33.9 to 58.3% users), and fruit drinks and ades (20.7 to 54.1%).

In terms of contribution to total mean intake of DHA, waters (contributed 25.9 to 45.7%), soft drinks (contributed 5.4 to 34.8%), fruit juices and smoothies (contributed to 7.0 to 34.2%), and fruit drinks and ades (contributed 7.1 to 21.8%) were the four main sources of intake across all population groups on both an absolute and on a body weight basis. Meal replacement beverages and fruit-based nectars individually contributed ≤1.0% to total mean DHA intakes across all population groups (see Tables D-1 to D-7 and/or E-1 to E-7 for further details). The additional category 'fruit snacks' contributed 0.7 to 5.7% of intakes.

5.0 CONCLUSIONS

Consumption data and information pertaining to the individual proposed food-uses of Emulsion Formulation 1 and 2 were used to estimate the maximum all-person and all-user intakes of PUFAs for the total U.S. population and for specific demographic groups. This information was subsequently used to estimate intakes of the total omega-3 containing emulsions, based on the *minimum* PUFA concentration in both emulsions. The use of the maximum level of PUFAs per food-use category ensures that the maximum intakes of EPA and DHA (for Emulsion Formulation 1; DHA alone for Emulsion Formulation 2) are considered The use of the minimum level of EPA and DHA to calculate total emulsion intakes by the U.S. population ensures the highest potential intake of these emulsions is considered based on the amount of the emulsion formulation required to attain the target PUFA concentration.

In summary, on an all-user basis, the total U.S. population intakes of EPA+DHA were calculated at 252 and 602 mg/person/day (3.9 and 9.0 mg/kg body weight/day) at the mean and 90th percentile respectively based on the proposed food-uses of Emulsion Formulation 1. The highest mean and 90th percentile intakes of these PUFAs, as observed in male adults (aged 20 years and older) were estimated to be 295 mg/day (3.4 mg/kg body weight/day) and 744 mg/day (8.3 mg/kg body weight/day), respectively. Among infants, intakes were estimated at 110 and 248 mg/person/day, equivalent to 8.8 and 19.7 mg/kg body weight/day. Using the minimum EPA+DHA concentration for Emulsion Formulation 1, these intakes corresponded with mean and 90th percentile all-user intakes of 4.8 and 11.5 g/person per day for the total population (74.3 and 172.0 mg/kg body weight/day); 5.6 and 14.2 g/person/day (65.3 and

157.9 mg/kg body weight/day) for male adults; and 2.1 and 4.7 g/person/day (168.4 and 375.2 mg/kg body weight/day) for infants.

Based on the proposed uses of Emulsion Formulation 2, the total mean and 90th percentile DHA intakes were estimated at 205 and 444 mg/person/day (3.2 and 6.5 mg/kg body weight/day). The highest mean and 90th percentile intakes of DHA were noted in male adults at 247 and 525 mg/person/day (2.9 and 5.9 mg/kg body weight/day), respectively. Among infants, these intakes were lower on an absolute basis at 89 and 188 mg/person/day but higher when considered on a body weight basis at 7.1 and 15.4 mg/kg body weight/day. Considering a minimum DHA content of 3.23%, the equivalent mean and 90th percentile all-user intakes of the Emulsion Formulation 2 for the total U.S. population are 6.3 and 13.7 g/person/day, equivalent to 98.5 and 202.5 mg/kg body weight/day. The mean and 90th percentile intakes among male adults are estimated to be 7.6 g/person/day (88.5 mg/kg body weight/day) and 16.3 g/person/day (183.6 mg/kg body weight/day). Among infants these intakes were calculated at 2.8 g/day (220.4 mg/kg body weight/day) and 5.8 g/day (476.8 mg/kg body weight/day) at the mean and 90th percentile.

6.0 REFERENCES

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Appendix A
Estimated Daily Intake of Emulsion Formulation 1 from Individual Proposed Food-Uses by Different Population Groups Within the U.S.

Table A-1 Estimated Daily Intake of Emulsion Formulation 1 from Individual Proposed Food-Uses of by Infants Aged 0 to 2 Years Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (g/day)		All-Users Consumption (g/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***1.4***	***3.8***	***65.5***	***458***	***2.1***	***4.7***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	4.8	0.1*	na	3.7	29	1.8*	4.2*
Meal Replacement Beverages	1.1	<0.1*	na	0.9	8	1.7*	1.4*
Soft Drinks (Carbonated)	2.7	<0.1	0.1	16.3	95	0.2	0.6
Waters (Bottled, Enhanced, Fortified)	38.3	0.5	1.8	31.1	237	1.7	3.9
Coffee and Tea							
RTD Tea Beverages	0.3	<0.1*	na	1.9	18	0.2*	0.6*
Gelatins, Puddings, and Fillings							
Gelatin Desserts	9.1	0.1*	na	4.6	24	2.7*	3.6*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	16.9	0.2	0.8	26.0	189	0.9	2.0
Fruit Juices and Smoothies	26.5	0.4	1.2	45.5	318	0.8	1.8
Fruit-Based Nectars	0.1	<0.1*	na	0.5	5	0.3*	0.2*

na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table A-2 Estimated Daily Intake of Emulsion Formulation 1 from Individual Proposed Food-Uses of by Children Aged 3 to 12 Years Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (g/day)		All-Users Consumption (g/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***2.6***	***6.0***	***97.5***	***1,478***	***2.7***	***6.0***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	7.4	0.2	na	10.0	142	1.9	3.9
Meal Replacement Beverages	1.4	<0.1*	na	1.3	14	2.9*	4.2*
Soft Drinks (Carbonated)	10.3	0.3	0.8	48.8	697	0.6	1.1
Waters (Bottled, Enhanced, Fortified)	43.2	1.1	3.6	44.4	793	2.5	5.5
Coffee and Tea							
RTD Tea Beverages	0.9	<0.1	na	4.6	97	0.5	1.0
Gelatins, Puddings, and Fillings							
Gelatin Desserts	3.8	0.1	na	2.7	45	3.7	7.5*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	17.2	0.4	1.2	54.1	872	0.8	1.6
Fruit Juices and Smoothies	15.4	0.4	1.1	58.3	929	0.7	1.4
Fruit-Based Nectars	0.1	<0.1*	na	0.5	12	0.7*	0.9*

na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table A-3 Estimated Daily Intake of Emulsion Formulation 1 from Individual Proposed Food-Uses of by Female Teenagers Aged 12 to 19 Years Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (g/day)		All-Users Consumption (g/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***4.5***	***10.0***	***96.7***	***506***	***4.7***	***10.1***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	8.5	0.4	1.3*	12.8	59	3.0	4.6*
Meal Replacement Beverages	<0.1	<0.1*	na	0.3	1	0.4*	na
Soft Drinks (Carbonated)	12.5	0.6	1.5	57.6	282	1.0	1.9
Waters (Bottled, Enhanced, Fortified)	57.6	2.6	7.4	60.8	309	4.3	9.3
Coffee and Tea							
RTD Tea Beverages	4.9	0.2	0.8	17.4	86	1.3	2.6
Gelatins, Puddings, and Fillings							
Gelatin Desserts	0.4	<0.1*	na	1.3	6	1.5*	2.4*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	8.8	0.4	1.5	35.9	227	1.1	1.9
Fruit Juices and Smoothies	7.2	0.3	1.0	43.9	236	0.7	1.3
Fruit-Based Nectars	0	na	na	0	0	na	na

na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table A-4 Estimated Daily Intake of Emulsion Formulation 1 from Individual Proposed Food-Uses of by Male Teenagers Aged 12 to 19 Years Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (g/day)		All-Users Consumption (g/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***4.8***	***10.9***	***96.5***	***505***	***5.0***	***10.9***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	13.8	0.7	2.4	24.5	94	2.7	5.1
Meal Replacement Beverages	0.3	<0.1*	na	0.5	5	2.6*	2.5*
Soft Drinks (Carbonated)	15.1	0.7	2.0	64.1	320	1.1	2.3
Waters (Bottled, Enhanced, Fortified)	52.8	2.5	7.3	48.2	270	5.3	12.7
Coffee and Tea							
RTD Tea Beverages	2.1	0.1	0.4*	15.9	76	0.6	1.1*
Gelatins, Puddings, and Fillings							
Gelatin Desserts	0.1	<0.1*	na	0.5	1	1.5*	na
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	8.7	0.4	1.6	36.4	222	1.1	2.4
Fruit Juices and Smoothies	7.0	0.3	1.0	37.9	201	0.9	2.0
Fruit-Based Nectars	<0.1	<0.1*	na	0.4	5	0.6*	0.6*

na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table A-5 Estimated Daily Intake of Emulsion Formulation 1 from Individual Proposed Food-Uses of by Female Adults Aged 20 Years and Over Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (g/day)		All-Users Consumption (g/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***4.5***	***11.0***	***90.3***	***2.002***	***5.0***	***11.7***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	3.1	0.1	na	5.7	97	2.4	4.6
Meal Replacement Beverages	1.4	0.1	na	2.8	76	2.2	4.2*
Soft Drinks (Carbonated)	14.5	0.6	1.8	55.4	1,194	1.2	2.5
Waters (Bottled, Enhanced, Fortified)	65.4	2.9	9.3	45.8	1,134	6.4	14.4
Coffee and Tea							
RTD Tea Beverages	2.5	0.1	0.4	13	306	0.9	1.6
Gelatins, Puddings, and Fillings							
Gelatin Desserts	1.9	0.1	na	3.1	64	2.7	5.0*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	5.7	0.3	0.9	20.9	547	1.2	2.7
Fruit Juices and Smoothies	5.6	0.2	0.8	35.5	788	0.7	1.4
Fruit-Based Nectars	<0.1	<0.1*	na	0.3	14	0.8*	0.9*

na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table A-6 Estimated Daily Intake of Emulsion Formulation 1 from Individual Proposed Food-Uses of by Male Adults Aged 20 Years and Over Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (g/day)		All-Users Consumption (g/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***5.1***	***13.7***	***90.6***	***1.903***	***5.6***	***14.2***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	8.6	0.4	1.4	12.2	220	3.6	6.7
Meal Replacement Beverages	1.2	0.1	na	2.2	64	2.8	7.8*
Soft Drinks (Carbonated)	18.1	0.9	2.3	62.4	1,250	1.5	3.2
Waters (Bottled, Enhanced, Fortified)	55.8	2.8	10.5	39.4	957	7.2	15.1
Coffee and Tea							
RTD Tea Beverages	3.7	0.2	0.6	14.4	279	1.3	3.4
Gelatins, Puddings, and Fillings							
Gelatin Desserts	1.4	0.1	na	1.3	34	5.6	12.3*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	5.7	0.3	1.0	20.7	466	1.4	3.3
Fruit Juices and Smoothies	5.6	0.3	1.0	33.9	760	0.8	1.7
Fruit-Based Nectars	<0.1	<0.1*	na	0.5	21	0.7*	1.4*

na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table A-7 Estimated Daily Intake of Emulsion Formulation 1 from Individual Proposed Food-Uses of by the Total U.S. Population (2011-2012 NHANES Data)							
Food-Use Category	**% Contribution to Total Mean Intake**	**All-Person Consumption (g/day)**		**All-Users Consumption (g/day)**			
		Mean	**90th Percentile**	**%**	**n**	**Mean**	**90th Percentile**
All	***100***	***4.4***	***10.9***	***91.1***	***6,852***	***4.8***	***11.5***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	6.6	0.3	na	9.9	641	2.9	5.3
Meal Replacement Beverages	1.2	0.1	na	2.1	168	2.5	4.3
Soft Drinks (Carbonated)	15.5	0.7	1.9	56.2	3,838	1.2	2.5
Waters (Bottled, Enhanced, Fortified)	58.1	2.5	8.7	43.8	3,700	5.8	13.5
Coffee and Tea							
RTD Tea Beverages	3.0	0.1	0.3	12.5	862	1.0	2.3
Gelatins, Puddings, and Fillings							
Gelatin Desserts	1.7	0.1	na	2.2	174	3.4	7.2
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	7.0	0.3	1.0	26.8	2,523	1.1	2.4
Fruit Juices and Smoothies	6.7	0.3	0.9	38.7	3,232	0.8	1.5
Fruit-Based Nectars	<0.1	<0.1	na	0.4	57	0.7	1.4*

na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Appendix B
Estimated Daily Per Kilogram Body Weight Intake of Emulsion Formulation 1 from Individual Proposed Food-Uses by Different Population Groups Within the U.S.

Table B-1 Estimated Daily Per Kilogram Body Weight Intake of Emulsion Formulation 1 from Individual Proposed Food-Uses by Infants Aged 0 to 2 Years Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (mg/kg bw/day)		All-Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***110.3***	***306.7***	***65.4***	***455***	***168.4***	***375.2***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	4.6	5.0*	na	3.7	29	135.8*	335.2*
Meal Replacement Beverages	1.2	1.3*	na	0.9	8	141.0*	111.0*
Soft Drinks (Carbonated)	2.5	2.7	10.5	16.3	94	16.6	36.4
Waters (Bottled, Enhanced, Fortified)	38.5	42.5	154.5	31.1	236	137.0	316.2
Coffee and Tea							
RTD Tea Beverages	0.3	0.4*	na	1.9	18	18.3*	41.0*
Gelatins, Puddings, and Fillings							
Gelatin Desserts	9.4	10.4*	na	4.6	24	226.7*	339.0*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	16.8	18.5	61.3	26.1	188	71.0	153.3
Fruit Juices and Smoothies	26.6	29.3	97.0	45.4	315	64.4	143.8
Fruit-Based Nectars	<0.1	0.1*	na	0.5	5	23.4*	24.8*

bw = body weight; na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table B-2 Estimated Daily Per Kilogram Body Weight Intake of Emulsion Formulation 1 from Individual Proposed Food-Uses by Children Aged 3 to 12 Years Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (mg/kg bw/day)		All-Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***97.0***	***230.5***	***97.5***	***1,478***	***99.4***	***230.5***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	6.6	6.4	na	10	142	63.8	155.8
Meal Replacement Beverages	1.3	1.2*	na	1.3	14	95.0*	157.5*
Soft Drinks (Carbonated)	9.1	8.8	27.2	48.8	697	18.1	37.0
Waters (Bottled, Enhanced, Fortified)	42.8	41.5	133.1	44.4	793	93.3	219.0
Coffee and Tea							
RTD Tea Beverages	0.7	0.7	na	4.6	97	15.5	27.4
Gelatins, Puddings, and Fillings							
Gelatin Desserts	4.1	4.0	na	2.7	45	148.0	329.5*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	17.1	16.6	46.3	54.1	872	30.7	59.6
Fruit Juices and Smoothies	18.2	17.6	46.1	58.3	929	30.1	63.2
Fruit-Based Nectars	0.1	0.1*	na	0.5	12	20.0*	28.2*

bw = body weight; na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table B-3 Estimated Daily Per Kilogram Body Weight Intake of Emulsion Formulation 1 from Individual Proposed Food-Uses by Female Teenagers Aged 12 to 19 Years Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (mg/kg bw/day)		All-Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***75.2***	***165.5***	***96.7***	***495***	***77.9***	***167.4***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	7.8	5.9	20.4*	12.8	56	46.1	88.2*
Meal Replacement Beverages	0	0	0	0	0	0	0
Soft Drinks (Carbonated)	11.6	8.7	21.5	57.4	275	15.2	28.0
Waters (Bottled, Enhanced, Fortified)	59.0	44.4	118.9	61	303	72.8	173.3
Coffee and Tea							
RTD Tea Beverages	4.5	3.4	10.1	17.8	85	19.0	53.7
Gelatins, Puddings, and Fillings							
Gelatin Desserts	0.5	0.4*	na	1.4	6	28.4*	47.4*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	9.0	6.8	23.8	35.7	223	19.0	33.9
Fruit Juices and Smoothies	7.5	5.6	18.4	43.4	229	13.0	25.0
Fruit-Based Nectars	0	0	0	0	0	0	0

bw = body weight; na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table B-4 Estimated Daily Per Kilogram Body Weight Intake of Emulsion Formulation 1 from Individual Proposed Food-Uses by Male Teenagers Aged 12 to 19 Years Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (mg/kg bw/day)		All-Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***69.9***	***157.7***	***96.5***	***502***	***72.4***	***157.7***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	14.5	10.2	37.7	24.6	94	41.3	94.9
Meal Replacement Beverages	0.3	0.2*	na	0.5	5	39.2*	36.2*
Soft Drinks (Carbonated)	15.3	10.7	27.4	64.0	318	16.7	34.1
Waters (Bottled, Enhanced, Fortified)	51.0	35.6	103.4	48.1	269	74.1	167.0
Coffee and Tea							
RTD Tea Beverages	2.1	1.5	5.4*	16.0	76	9.4	17.0*
Gelatins, Puddings, and Fillings							
Gelatin Desserts	0.2	0.1*	na	0.5	1	23.0*	na
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	9.3	6.5	23.0	36.3	221	18.0	39.4
Fruit Juices and Smoothies	7.3	5.1	17.3	37.9	199	13.4	33.7
Fruit-Based Nectars	0.1	<1*	na	0.4	5	9.6*	9.2*

bw = body weight; na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table B-5 Estimated Daily Per Kilogram Body Weight Intake of Emulsion Formulation 1 from Individual Proposed Food-Uses by Female Adults Aged 20 Years and Over Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (mg/kg bw/day)		All-Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***60.4***	***151.6***	***90.3***	***1,981***	***66.9***	***154.9***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	3.4	2.1	na	5.6	95	36.4	74.9
Meal Replacement Beverages	1.5	0.9	na	2.8	75	31.4	65.5*
Soft Drinks (Carbonated)	14.0	8.5	21.7	55.4	1,185	15.3	29.7
Waters (Bottled, Enhanced, Fortified)	65.3	39.4	124.4	45.7	1,120	86.3	190.5
Coffee and Tea							
RTD Tea Beverages	2.4	1.5	4.6	13	301	11.1	22.3
Gelatins, Puddings, and Fillings							
Gelatin Desserts	1.9	1.1	na	3	62	37.0	53.5*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	5.5	3.3	10.5	20.6	537	16.0	33.9
Fruit Juices and Smoothies	6.0	3.6	11.9	35.5	778	10.2	21.1
Fruit-Based Nectars	<0.1	<0.1*	na	0.3	14	10.4*	14.2*

bw = body weight; na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table B-6 Estimated Daily Per Kilogram Body Weight Intake of Emulsion Formulation 1 from Individual Proposed Food-Uses by Male Adults Aged 20 Years and Over Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (mg/kg bw/day)		All-Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***59.0***	***149.9***	***90.6***	***1,886***	***65.3***	***157.9***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	8.9	5.3	16.1	12.3	218	42.9	81.1
Meal Replacement Beverages	1.3	0.8	na	2.2	63	35.4	87.6*
Soft Drinks (Carbonated)	18.2	10.7	27.4	62.3	1,237	17.2	34.5
Waters (Bottled, Enhanced, Fortified)	55.5	32.8	115.4	39.2	946	83.8	184.2
Coffee and Tea							
RTD Tea Beverages	3.4	2.0	6.0	14.3	275	14.1	33.0
Gelatins, Puddings, and Fillings							
Gelatin Desserts	1.1	0.7	na	1.3	34	52.4	117.5*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	5.6	3.3	10.5	20.8	462	15.9	33.7
Fruit Juices and Smoothies	5.9	3.5	11.4	33.9	753	10.2	21.0
Fruit-Based Nectars	0.1	<0.1*	na	0.5	21	9.9*	23.4*

bw = body weight; na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table B-7 Estimated Daily Per Kilogram Body Weight Intake of Emulsion Formulation 1 from Individual Proposed Food-Uses by the Total U.S. Population (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (mg/kg bw/day)		All-Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***67.6***	***164.2***	***91.0***	***6,797***	***74.3***	***172.0***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	6.6	4.5	na	9.9	634	45.3	94.9
Meal Replacement Beverages	1.2	0.8	na	2.1	165	39.8	83.2
Soft Drinks (Carbonated)	13.6	9.2	25.3	56.1	3,806	16.4	32.8
Waters (Bottled, Enhanced, Fortified)	55.5	37.5	121.3	43.7	3,667	85.9	192.4
Coffee and Tea							
RTD Tea Beverages	2.4	1.6	4.6	12.5	852	13.1	26.9
Gelatins, Puddings, and Fillings							
Gelatin Desserts	2.3	1.6	na	2.2	172	71.2	178.3
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	8.7	5.9	18.4	26.7	2,503	21.9	46.9
Fruit Juices and Smoothies	9.5	6.4	17.9	38.7	3,203	16.7	37.0
Fruit-Based Nectars	0.1	<0.1	na	0.4	57	12.4	24.8*

bw = body weight; na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Appendix C
Representative NHANES Food Codes for Proposed Food-Uses of Emulsion Formulation 1 in the U.S.

Representative NHANES Food Codes for Proposed Beverage-Uses of Emulsion Formulation 1 in the U.S.

Beverages and Beverage Bases

Energy, Sport, and Isotonic Drinks
[DHA+EPA] = 0.04%

95310200	Full Throttle Energy Drink
95310400	Monster Energy Drink
95310500	Mountain Dew AMP Energy Drink
95310550	No Fear Energy Drink
95310555	No Fear Motherload Energy Drink
95310560	NOS Energy Drink
95310600	Red Bull Energy Drink
95310700	Rockstar Energy Drink
95310750	SoBe Energize Energy Juice Drink
95310800	Vault Energy Drink
95311000	Energy Drink
95312400	Monster Energy Drink, Lo Carb
95312500	Mountain Dew AMP Energy Drink, sugar-free
95312550	No Fear Energy Drink, sugar-free
95312555	NOS Energy Drink, sugar-free
95312560	Ocean Spray Cran-Energy Cranberry Energy Juice Drink
95312600	Red Bull Energy Drink, sugar-free
95312700	Rockstar Energy Drink, sugar-free
95312800	Vault Zero Energy Drink
95312900	XS Energy Drink
95312905	XS Gold Plus Energy Drink
95320200	Gatorade Thirst Quencher sports drink
95320500	Powerade sports drink
95321000	Fruit-flavored thirst quencher beverage
95322200	Gatorade G2 Thirst Quencher sports drink, low calorie
95322500	Powerade Zero sports drink, low calorie
95323000	Fruit-flavored sports drink or thirst quencher beverage, low calorie
95330100	Fluid replacement, electrolyte solution
95330500	Fluid replacement, 5% glucose in water
95341000	FUZE Slenderize fortified low calorie fruit juice beverage

Non-reconstituted Energy, Sport, and Isotonic Drinks
Adjusted for not being reconstituted, 16 g of powder to 240 mL of water
[DHA+EPA] = 0.60%

92900300	Fruit-flavored thirst quencher beverage, dry concentrate, not reconstituted

Meal Replacement Beverages
[DHA+EPA] = 0.04%

95101000	Boost, nutritional drink, ready-to-drink
95101010	Boost Plus, nutritional drink, ready-to-drink
95102000	Carnation Instant Breakfast, nutritional drink, regular, ready-to-drink
95102010	Carnation Instant Breakfast, nutritional drink, sugar free, ready-to-drink
95103000	Ensure, nutritional shake, ready-to-drink
95103010	Ensure Plus, nutritional shake, ready-to-drink

95104000 Glucerna, nutritional shake, ready-to-drink
95105000 Kellogg's Special K Protein Shake
95106000 Muscle Milk, ready-to-drink
95106010 Muscle Milk, light, ready-to-drink
95110000 Slim Fast Shake, meal replacement, regular, ready-to-drink
95110010 Slim Fast Shake, meal replacement, sugar free, ready-to-drink
95110020 Slim Fast Shake, meal replacement, high protein, ready-to-drink
95120000 Nutritional drink or meal replacement, ready-to-drink, NFS
95120010 Nutritional drink or meal replacement, high protein, ready-to-drink, NFS
95120020 Nutritional drink or meal replacement, high protein, light, ready-to-drink, NFS
95120050 Nutritional drink or meal replacement, liquid, soy-based

Non-reconstituted Meal Replacement Beverages
Adjusted for not being reconstituted, 16 g of powder to 240 mL of water
[DHA+EPA] = 0.60%

95201000 Carnation Instant Breakfast, nutritional drink mix, regular, powder
95201010 Carnation Instant Breakfast, nutritional drink mix, sugar free, powder
95201200 EAS Whey Protein Powder
95201300 EAS Soy Protein Powder
95201500 Herbalife, nutritional shake mix, high protein, powder
95201600 Isopure protein powder
95201700 Kellogg's Special K20 Protein Water Mix
95202000 Muscle Milk, regular, powder
95202010 Muscle Milk, light, powder
95210000 Slim Fast Shake Mix, powder
95210010 Slim Fast Shake Mix, sugar free, powder
95210020 Slim Fast Shake Mix, high protein, powder
95220000 Nutritional drink mix or meal replacement, powder, NFS
95220010 Nutritional drink mix or meal replacement, high protein, powder, NFS

Soft Drinks (Carbonated)
[DHA+EPA] = 0.013%

92400000 Soft drink, NFS
92400100 Soft drink, NFS, sugar-free
92410110 Carbonated water, sweetened
92410210 Carbonated water, unsweetened
92410250 Carbonated water, sweetened, with low-calorie or no-calorie sweetener
92410310 Soft drink, cola-type
92410315 Soft drink, cola type, reduced sugar
92410320 Soft drink, cola-type, sugar-free
92410330 Soft drink, cola-type, with higher caffeine
92410340 Soft drink, cola-type, decaffeinated
92410350 Soft drink, cola-type, decaffeinated, sugar-free
92410360 Soft drink, pepper-type
92410370 Soft drink, pepper-type, sugar-free
92410390 Soft drink, pepper-type, decaffeinated
92410400 Soft drink, pepper-type, decaffeinated, sugar-free
92410410 Cream soda
92410420 Cream soda, sugar-free
92410510 Soft drink, fruit-flavored, caffeine free
92410520 Soft drink, fruit-flavored, sugar free, caffeine free
92410550 Soft drink, fruit flavored, caffeine containing
92410560 Soft drink, fruit flavored, caffeine containing, sugar-free
92410610 Ginger ale

92410620 Ginger ale, sugar-free
92410710 Root beer
92410720 Root beer, sugar-free
92410810 Chocolate-flavored soda
92410820 Chocolate-flavored soda, sugar-free
92411510 Cola with fruit or vanilla flavor
92411520 Cola with chocolate flavor
92411610 Cola with fruit or vanilla flavor, sugar-free
92411620 Cola with chocolate flavor, sugar-free
92417010 Soft drink, ale type
93301031 Canadian Club and soda

Mixtures Containing Soft Drinks
Adjusted for a soft drink content of 18.05 to 73.82%
[DHA+EPA] = 0.0023 to 0.0096%

13120800 Ice cream soda, flavors other than chocolate
13120810 Ice cream soda, chocolate
93301080 High ball
93301150 Tom Collins
93301170 Bourbon and soda
93301190 Rum and cola
93301230 Sloe gin fizz
93301270 Fruit punch, alcoholic
93301280 Singapore Sling
93301330 Gin Rickey
93301600 Gin fizz
93404500 Sangria
93404600 Sangria, Puerto Rican style
93405000 Wine spritzer

Waters (Bottled, Enhanced, Fortified)
[DHA+EPA] = 0.038%

94100100 Water, bottled, unsweetened
94100200 Water, bottled, sweetened, with low or no calorie sweetener
94100300 Water, fruit flavored, sweetened, with high fructose corn syrup and low calorie sweetener
94210100 Propel Water
94210200 Glaceau Water
94210300 SoBe Lifewater
94220200 Glaceau Water, low calorie

Coffee and Tea

Ready-to-drink Tea Beverages
[DHA+EPA] = 0.013%

92301000 Tea, NS as to type, unsweetened
92301060 Tea, NS as to type, presweetened with sugar
92301080 Tea, NS as to type, presweetened with low calorie sweetener
92301100 Tea, NS as to type, decaffeinated, unsweetened
92301130 Tea, NS as to type, presweetened, NS as to sweetener
92301160 Tea, NS as to type, decaffeinated, presweetened with sugar
92301180 Tea, NS as to type, decaffeinated, presweetened with low calorie sweetener

92301190 Tea, NS as to type, decaffeinated, presweetened, NS as to sweetener

Gelatins, Puddings, and Fillings

Gelatin Desserts

[DHA+EPA] = 0.21%

91501010 Gelatin dessert
91501015 Gelatin snacks
91501020 Gelatin dessert with fruit
91501030 Gelatin dessert with whipped cream
91501040 Gelatin dessert with fruit and whipped cream
91501050 Gelatin dessert with cream cheese
91501060 Gelatin dessert with sour cream
91501070 Gelatin dessert with fruit and sour cream
91501080 Gelatin dessert with fruit and cream cheese
91501090 Gelatin dessert with fruit, vegetable, and nuts
91501110 Gelatin dessert with fruit and whipped topping
91501120 Gelatin dessert with fruit and vegetables
91511010 Gelatin dessert, dietetic, sweetened with low calorie sweetener
91511020 Gelatin dessert, dietetic, with fruit, sweetened with low calorie sweetener
91511030 Gelatin dessert, dietetic, with whipped topping, sweetened with low calorie sweetener
91511050 Gelatin dessert, dietetic, with cream cheese, sweetened with low calorie sweetener
91511060 Gelatin dessert, dietetic, with sour cream, sweetened with low calorie sweetener
91511070 Gelatin dessert, dietetic, with fruit and sour cream, sweetened with low calorie sweetener
91511080 Gelatin dessert, dietetic, with fruit and cream cheese, sweetened with low calorie sweetener
91511090 Gelatin dessert, dietetic, with fruit and vegetable(s), sweetened with low calorie sweetener
91511110 Gelatin dessert, dietetic, with fruit and whipped topping, sweetened with low calorie sweetener
91512010 Danish dessert pudding
91520100 Yookan (Yokan), a Japanese dessert made with bean paste and sugar
91560100 Haupia (coconut pudding)

Non-reconstituted Gelatin Desserts
Adjusted for not being reconstituted, 16 g dry gelatin to 100 g of water
[DHA+EPA] = 1.40%

91500200 Gelatin powder, sweetened, dry
91510100 Gelatin powder, dietetic, sweetened with low calorie sweetener, dry

Mixtures Containing Gelatin Desserts
Adjusted for a gelatin dessert content of 0.31 to 46.15%
[DHA+EPA] = 0.0006 to 0.097%

13250100 Mousse, not chocolate
14610200 Cheese, cottage cheese, with gelatin dessert
14610210 Cheese, cottage cheese, with gelatin dessert and fruit
14610250 Cheese, cottage cheese, with gelatin dessert and vegetables

Processed Fruits and Fruit Juices

Fruit Drinks and Ades

[DHA+EPA] = 0.02%

92307500 Half and Half beverage, half iced tea and half fruit juice drink (lemonade)
92307510 Half and Half beverage, half iced tea and half fruit juice drink (lemonade), low calorie
92431000 Carbonated juice drink, NS as to type of juice
92432000 Carbonated citrus juice drink
92433000 Carbonated noncitrus juice drink
92510610 Fruit juice drink
92510650 Tamarind drink, Puerto Rican (Refresco de tamarindo)
92510720 Fruit punch, made with fruit juice and soda
92510730 Fruit punch, made with soda, fruit juice, and sherbet or ice cream
92511010 Fruit flavored drink (formerly lemonade)
92511250 Citrus fruit juice drink, containing 40-50% juice
92512050 Frozen daiquiri mix, from frozen concentrate, reconstituted
92513000 Fruit flavored frozen drink
92530410 Fruit flavored drink, with high vitamin C
92530510 Cranberry juice drink or cocktail, with high vitamin C
92530610 Fruit juice drink, with high vitamin C
92530950 Vegetable and fruit juice drink, with high vitamin C
92531030 Fruit juice drink, with thiamin (vitamin B1) and high vitamin C
92541010 Fruit flavored drink, made from powdered mix
92542000 Fruit flavored drink, made from powdered mix,with high vitamin C
92550030 Fruit juice drink, low calorie, with high vitamin C
92550040 Fruit juice drink, low calorie
92550110 Cranberry juice drink or cocktail, low calorie, with high vitamin C
92550350 Light orange juice beverage, 40-50% juice, lower sugar and calories, with artificial sweetener
92550610 Fruit flavored drink, low calorie, with high vitamin C
92550620 Fruit flavored drink, low calorie
92552000 Fruit flavored drink, made from powdered mix, low calorie, with high vitamin C
92552010 Fruit flavored drink, made from powdered mix, low calorie
92552020 Fruit juice drink, reduced sugar, with thiamin (vitamin B1) and high vitamin C
92552030 Fruit juice drink, reduced sugar, with vitamin E
92582100 Fruit juice drink, with high vitamin C, plus added calcium
92582110 Fruit juice drink, with thiamin (vitamin B1) and high vitamin C plus calcium
95342000 MonaVie acai blend beverage

Non-reconstituted Dry Fruit Drinks and Ades
Adjusted for not being reconstituted, 16 g of powder to 240 mL of water
[DHA+EPA] = 0.3%

92900100 Tang, dry concentrate
92900110 Fruit-flavored beverage, dry concentrate, with sugar, not reconstituted
92900200 Fruit-flavored beverage, dry concentrate, low calorie, not reconstituted

Non-reconstituted Frozen Fruit Drinks and Ades
Adjusted for not being reconstituted, 1 cup of juice mix to 3 cups of water or 55 mL of frozen concentrated used to produce 240 mL beverage
[DHA+EPA] = 0.08 to 0.0872%

92511000 Lemonade, frozen concentrate, not reconstituted
92512040 Frozen daiquiri mix, frozen concentrate, not reconstituted

Fruit Juices and Smoothies
[DHA+EPA] = 0.02%

11552200 Orange Julius
11553000 Fruit smoothie drink, made with fruit or fruit juice and dairy products
11553100 Fruit smoothie drink, NFS
61201020 Grapefruit juice, NS as to form
61201220 Grapefruit juice, canned, bottled or in a carton
61201620 Grapefruit juice, frozen (reconstituted with water)
61204000 Lemon juice, NS as to form
61204200 Lemon juice, canned or bottled
61204600 Lemon juice, frozen
61207000 Lime juice, NS as to form
61207200 Lime juice, canned or bottled
61207600 Lime juice, frozen
61210000 Orange juice, NFS
61210220 Orange juice, canned, bottled or in a carton
61210250 Orange juice, with calcium added, canned, bottled or in a carton
61210620 Orange juice, frozen (reconstituted with water)
61210820 Orange juice, frozen, with calcium added (reconstituted with water)
61213000 Tangerine juice, NFS
61213220 Tangerine juice, canned
61213620 Tangerine juice, frozen (reconstituted with water)
61213800 Fruit juice blend, including citrus, 100% juice
61213900 Fruit juice blend, including citrus, 100% juice, with calcium added
64100100 Fruit juice, NFS
64100110 Fruit juice blend, 100% juice
64100200 Fruit juice blend, with cranberry, 100% juice
64104010 Apple juice
64104600 Blackberry juice
64105400 Cranberry juice, 100%, not a blend
64116020 Grape juice
64120010 Papaya juice
64121000 Passion fruit juice
64124020 Pineapple juice
64126000 Pomegranate juice
64132010 Prune juice
64132500 Strawberry juice
64133100 Watermelon juice
64134000 Fruit smoothie drink, made with fruit or fruit juice only (no dairy products)

Non-reconstituted Fruit Juices and Smoothies
Adjusted for not being reconstituted, 1 cup of juice mix to 3 cups of water
[DHA+EPA] = 0.08%

61210720 Orange juice, frozen, not reconstituted

Mixtures containing Fruit Juices and Smoothies
Adjusted for a juice content of 50.0 to 80.3%
[DHA+EPA] = 0.010 to 0.016%

91406500 Jams, preserves, marmalades, sweetened with fruit juice concentrates, all flavors
92550400 Vegetable and fruit juice drink, low calorie, with high vitamin C
92550405 Vegetable and fruit juice drink, low calorie, with high vitamin C plus added vitamin E and vitamin A
93301141 Seabreeze
93301180 Mixed Drinks (for recipe modifications)
93301270 Fruit punch, alcoholic
93301000 Cocktail, NFS

93301160 Whiskey sour
91361050 Duck sauce
93301370 Fuzzy Navel
93301140 Screwdriver

Mixtures containing Fruit Juices and Smoothies
Adjusted for a juice content of 3.52 to 44.26%
[DHA+EPA] = 0.0007 to 0.0089%

93404600 Sangria, Puerto Rican style
93404500 Sangria
93301280 Singapore Sling
93301150 Tom Collins
93301230 Sloe gin fizz
93404000 Wine cooler
93301600 Gin fizz
93301330 Gin Rickey
93301320 Tequila Sunrise
74406500 Cocktail sauce
91301050 Fruit syrup
93504100 Rum cooler
93301360 Long Island iced tea
93301030 Bloody Mary
93302100 Zombie
93301310 Mai Tai
93301100 Margarita
93301115 Mimosa
93301050 Gimlet
93301020 Bacardi cocktail
93301040 Daiquiri
91351020 Topping, dietetic
92512090 Pina Colada, nonalcoholic
92512110 Margarita mix, nonalcoholic
93301200 Pina Colada

Fruit-Based Nectars
[DHA+EPA] = 0.02%

64200100 Fruit nectar, NFS
64201010 Apricot nectar
64201500 Banana nectar
64202010 Cantaloupe nectar
64203020 Guava nectar
64204010 Mango nectar
64205010 Peach nectar
64210010 Papaya nectar
64213010 Passion fruit nectar
64215010 Pear nectar
64221010 Soursop (Guanabana) nectar

Appendix D
Estimated Daily Intake of Emulsion Formulation 2 from Individual Proposed Food-Uses by Different Population Groups Within the U.S.

Table D-1 Estimated Daily Intake of Emulsion Formulation 2 from Individual Proposed Food-Uses by Infants Aged 0 to 2 Years Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (g/day)		All-Users Consumption (g/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***1.8***	***5.0***	***65.8***	***460***	***2.8***	***5.8***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	3.1	0.1*	na	3.7	29	1.5*	3.6*
Meal Replacement Beverages	0.7	<0.1*	na	0.9	8	1.5*	1.2*
Soft Drinks (Carbonated)	5.4	0.1	0.3	16.3	95	0.6	1.6
Waters (Bottled, Enhanced, Fortified)	25.9	0.5	1.6	31.1	237	1.5	3.5
Coffee and Tea							
RTD Tea Beverages	0.6	<0.1*	na	1.9	18	0.6*	1.5*
Gelatins, Puddings, and Fillings							
Gelatin Desserts	2.2	<0.1*	na	4.6	24	0.9*	1.2*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	21.8	0.40	1.4	26.0	189	1.5	3.5
Fruit Juices and Smoothies	34.2	0.62	2.0	45.5	318	1.4	3.1
Fruit-Based Nectars	0.1	<0.1*	na	0.5	5	0.4*	0.4*
Soft Candy							
Fruit Snacks	5.7	0.1	0.5	16.0	84	0.7	1.3

na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table D-2 Estimated Daily Intake of Emulsion Formulation 2 from Individual Proposed Food-Uses by Children Aged 3 to 12 Years Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (g/day)		All-Users Consumption (g/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***3.6***	***7.1***	***97.6***	***1,481***	***3.7***	***7.1***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	4.5	0.2	na	10.0	142	1.6	3.4
Meal Replacement Beverages	0.9	<0.1*	na	1.3	14	2.5*	3.6*
Soft Drinks (Carbonated)	19.6	0.7	2.2	48.8	697	1.5	3.0
Waters (Bottled, Enhanced, Fortified)	27.9	1.0	3.3	44.4	793	2.3	4.9
Coffee and Tea							
RTD Tea Beverages	1.7	<0.1	na	4.6	97	1.3	2.6
Gelatins, Puddings, and Fillings							
Gelatin Desserts	0.9	<0.1	na	2.7	45	1.2	2.4*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	21.2	0.8	2.1	54.1	872	1.4	2.8
Fruit Juices and Smoothies	19.0	0.7	1.8	58.3	929	1.2	2.4
Fruit-Based Nectars	0.2	<0.1*	na	0.5	12	1.2*	1.5*
Soft Candy							
Fruit Snacks	4.3	0.2	0.7	18.1	243	0.9	1.5

na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table D-3 Estimated Daily Intake of Emulsion Formulation 2 from Individual Proposed Food-Uses by Female Teenagers Aged 12 to 19 Years Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (g/day)		All-Users Consumption (g/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***6.2***	***10.8***	***96.8***	***507***	***6.4***	***10.8***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	5.3	0.3	1.1*	12.8	59	2.6	4.0*
Meal Replacement Beverages	< 0.1	<0.1*	na	0.3	1	0.4*	na
Soft Drinks (Carbonated)	24.1	1.5	4.0	57.6	282	2.6	5.0
Waters (Bottled, Enhanced, Fortified)	38.1	2.3	6.6	60.8	309	3.9	8.3
Coffee and Tea							
RTD Tea Beverages	9.4	0.6	2.0	17.4	86	3.3	6.9
Gelatins, Puddings, and Fillings							
Gelatin Desserts	0.1	<0.1*	na	1.3	6	0.5*	0.8*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	11.1	0.7	2.6	35.9	227	1.9	3.3
Fruit Juices and Smoothies	9.0	0. 6	1.7	43.9	236	1.3	2.2
Fruit-Based Nectars	0	0	0	0	0	0	0
Soft Candy							
Fruit Snacks	2.7	0.2	0.7*	14.6	53	1.2	2.6*

na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table D-4 Estimated Daily Intake of Emulsion Formulation 2 from Individual Proposed Food-Uses by Male Teenagers Aged 12 to 19 Years Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (g/day)		All-Users Consumption (g/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***6.4***	***12.3***	***96.6***	***506***	***6.6***	***12.6***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	8.8	0.6	2.0	24.5	94	2.3	4.4
Meal Replacement Beverages	0.2	<0.1*	na	0.5	5	2.2*	2.1*
Soft Drinks (Carbonated)	29.7	1.9	5.3	64.1	320	3.0	6.0
Waters (Bottled, Enhanced, Fortified)	35.7	2.3	6.5	48.2	270	4.7	11.4
Coffee and Tea							
RTD Tea Beverages	4.1	0.3	1.0*	15.9	76	1.7	2.8*
Gelatins, Puddings, and Fillings							
Gelatin Desserts	<0.1	<0.1*	na	0.5	1	0.5*	na
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	11.1	0.7	2.7	36.4	222	2.0	4.2
Fruit Juices and Smoothies	8.9	0.6	1.8	37.9	201	1.5	3.4
Fruit-Based Nectars	0.1	<0.1*	na	0.4	5	1.0*	1.0*
Soft Candy							
Fruit Snacks	1.4	0.1	na	9.2	46	1.0	1.7*

na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table D-5 Estimated Daily Intake of Emulsion Formulation 2 from Individual Proposed Food-Uses by Female Adults Aged 20 Years and Over Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (g/day)		All-Users Consumption (g/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***5.7***	***12.8***	***91.1***	***2,014***	***6.3***	***13.2***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	2.1	0.1	na	5.7	97	2.1	3.9
Meal Replacement Beverages	0.9	0.1	na	2.8	76	1.9	3.6*
Soft Drinks (Carbonated)	29.7	1.7	4.7	55.4	1,194	3.1	6.4
Waters (Bottled, Enhanced, Fortified)	45.7	2.6	8.4	45.8	1,134	5.7	12.9
Coffee and Tea							
RTD Tea Beverages	5.2	0.3	1.0	13.0	306	2.3	4.2
Gelatins, Puddings, and Fillings							
Gelatin Desserts	0.5	<0.1	na	3.1	64	0.9	1.6*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	7.6	0.4	1.6	20.9	547	2.1	4.6
Fruit Juices and Smoothies	7.5	0.4	1.4	35.5	788	1.2	2.4
Fruit-Based Nectars	0.1	<0.1*	na	0.3	14	1.3*	1.5*
Soft Candy							
Fruit Snacks	0.9	<0.1	na	3.6	81	1.4	2.5

na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table D-6 Estimated Daily Intake of Emulsion Formulation 2 from Individual Proposed Food-Uses by Male Adults Aged 20 Years and Over Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (g/day)		All-Users Consumption (g/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***7.0***	***15.7***	***91.0***	***1,913***	***7.6***	***16.3***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	5.3	0.4	1.2	12.2	220	3.0	5.8
Meal Replacement Beverages	0.8	0.1	na	2.2	64	2.4	6.6*
Soft Drinks (Carbonated)	34.8	2.4	6.1	62.4	1,250	3.9	8.3
Waters (Bottled, Enhanced, Fortified)	36.5	2.5	9.4	39.4	957	6.5	13.6
Coffee and Tea							
RTD Tea Beverages	7.2	0.5	1.5	14.4	279	3.5	8.9
Gelatins, Puddings, and Fillings							
Gelatin Desserts	0.3	<0.1	na	1.3	34	1.8	4.0*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	7.1	0.5	1.6	20.7	466	2.4	5.7
Fruit Juices and Smoothies	7.0	0.5	1.6	33.9	760	1.4	2.9
Fruit-Based Nectars	0.1	<0.1*	na	0.5	21	1.2*	2.4*
Soft Candy							
Fruit Snacks	0.7	<0.1	na	3.6	71	1.4	2.8*

na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table D-7 Estimated Daily Intake of Emulsion Formulation 2 from Individual Proposed Food-Uses by the Total U.S. Population (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (g/day)		All-Users Consumption (g/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***5.8***	***13.3***	***91.5***	***6,881***	***6.3***	***13.7***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	4.3	0.2	na	9.9	641	2.5	4.5
Meal Replacement Beverages	0.8	<0.1	na	2.1	168	2.1	3.7
Soft Drinks (Carbonated)	30.4	1.8	5.0	56.2	3,838	3.2	6.5
Waters (Bottled, Enhanced, Fortified)	39.3	2.3	7.9	43.8	3,700	5.2	12.1
Coffee and Tea							
RTD Tea Beverages	5.9	0.3	0.9	12.5	862	2.7	6.2
Gelatins, Puddings, and Fillings							
Gelatin Desserts	0.4	<0.1	na	2.2	174	1.1	2.3
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	9.0	0.5	1.7	26.8	2,523	2.0	4.2
Fruit Juices and Smoothies	8.6	0.5	1.6	38.7	3,232	1.3	2.6
Fruit-Based Nectars	0.1	<0.1	na	0.4	57	1.2	2.4*
Soft Candy							
Fruit Snacks	1.3	0.1	na	6.7	578	1.1	2.4

na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Appendix E
Estimated Daily Per Kilogram Body Weight Intake of Emulsion Formulation 2 from Individual Proposed Food-Uses by Different Population Groups Within the U.S.

Table E-1 Estimated Daily Per Kilogram Body Weight Intake of Emulsion Formulation 2 from Individual Proposed Food-Uses by Infants Aged 0 to 2 Years Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (mg/kg bw/day)		All-Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***145.2***	***418.0***	***65.8***	***457***	***220.4***	***476.8***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	3.0	4.3*	na	3.7	29	116.1*	285.8*
Meal Replacement Beverages	0.8	1.1*	na	0.9	8	120.4*	94.7*
Soft Drinks (Carbonated)	4.9	7.1	27.5	16.3	94	43.7	95.7
Waters (Bottled, Enhanced, Fortified)	26.2	38.1	138.7	31.1	236	122.9	284.5
Coffee and Tea							
RTD Tea Beverages	0.6	0.9*	na	1.9	18	48.0*	107.7*
Gelatins, Puddings, and Fillings							
Gelatin Desserts	2.3	3.4*	na	4.6	24	73.7*	110.5*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	21.7	31.6	104.6	26.1	188	121.1	261.9
Fruit Juices and Smoothies	34.3	49.8	165.6	45.4	315	109.9	245.5
Fruit-Based Nectars	0.1	0.2*	na	0.5	5	39.9*	42.4*
Soft Candy							
Fruit Snacks	5.7	8.3	36.2	16.0	83	52.0	96.6

bw = body weight; na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table E-2 Estimated Daily Per Kilogram Body Weight Intake of Emulsion Formulation 2 from Individual Proposed Food-Uses by Children Aged 3 to 12 Years Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (mg/kg bw/day)		All-Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***135.3***	***268.4***	***97.6***	***1,481***	***138.4***	***269.0***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	4.0	5.4	na	10	142	54.5	132.8
Meal Replacement Beverages	0.8	1.1*	na	1.3	14	81.1*	134.4*
Soft Drinks (Carbonated)	17.1	23.2	71.2	48.8	697	47.7	97.2
Waters (Bottled, Enhanced, Fortified)	27.5	37.2	119.8	44.4	793	83.9	197.5
Coffee and Tea							
RTD Tea Beverages	1.4	1.9	na	4.6	97	40.6	71.8
Gelatins, Puddings, and Fillings							
Gelatin Desserts	1.0	1.3	na	2.7	45	48.0	106.8*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	20.9	28.3	78.9	54.1	872	52.3	101.9
Fruit Juices and Smoothies	22.2	30.0	78.6	58.3	929	51.4	108.0
Fruit-Based Nectars	0.1	0.2*	na	0.5	12	34.1*	48.3*
Soft Candy							
Fruit Snacks	4.8	6.5	23.7	18.1	243	35.9	74.3

bw = body weight; na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table E-3 Estimated Daily Per Kilogram Body Weight Intake of Emulsion Formulation 2 from Individual Proposed Food-Uses by Female Teenagers Aged 12 to 19 Years Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (mg/kg bw/day)		All-Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***100.9***	***205.0***	***96.7***	***496***	***104.3***	***205.0***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	5.0	5.0	17.4*	12.8	56	39.3	75.2*
Meal Replacement Beverages	0	0	0	0	0	0	0
Soft Drinks (Carbonated)	22.6	22.8	56.7	57.4	275	39.9	73.4
Waters (Bottled, Enhanced, Fortified)	39.6	39.9	106.8	61	303	65.3	155.7
Coffee and Tea							
RTD Tea Beverages	8.8	8.9	26.6	17.8	85	50.2	141.2
Gelatins, Puddings, and Fillings							
Gelatin Desserts	0.1	0.1*	na	1.4	6	9.2*	15.4*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	11.5	11.6	40.9	35.7	223	32.5	57.9
Fruit Juices and Smoothies	9.5	9.6	31.3	43.4	229	22.2	42.7
Fruit-Based Nectars	0	0	0	0	0	0	0
Soft Candy							
Fruit Snacks	2.9	2.9	14.7*	14.8	52	19.5	32.8*

bw = body weight; na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table E-4 Estimated Daily Per Kilogram Body Weight Intake of Emulsion Formulation 2 from Individual Proposed Food-Uses by Male Teenagers Aged 12 to 19 Years Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (mg/kg bw/day)		All-Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***94.1***	***187.0***	***96.5***	***503***	***97.5***	***189.5***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	9.2	8.7	32.2	24.6	94	35.3	81.1
Meal Replacement Beverages	0.2	0.2*	na	0.5	5	33.4*	30.9*
Soft Drinks (Carbonated)	29.8	28.0	72.1	64.0	318	43.7	89.5
Waters (Bottled, Enhanced, Fortified)	33.9	31.9	92.9	48.1	269	66.6	150.2
Coffee and Tea							
RTD Tea Beverages	4.2	3.9	14.2*	16.0	76	24.6	44.6*
Gelatins, Puddings, and Fillings							
Gelatin Desserts	<0.1	<0.1*	na	0.5	1	7.5*	na
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	11.8	11.1	39.3	36.3	221	30.7	67.2
Fruit Juices and Smoothies	9.2	8.7	29.6	37.9	199	22.9	57.6
Fruit-Based Nectars	0.1	0.1*	na	0.4	5	16.3*	15.7*
Soft Candy							
Fruit Snacks	1.5	1.5	na	9.3	46	15.7	33.1*

bw = body weight; na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table E-5 Estimated Daily Per Kilogram Body Weight Intake of Emulsion Formulation 2 from Individual Proposed Food-Uses by Female Adults Aged 20 Years and Over Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (mg/kg bw/day)		All-Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***76.8***	***174.6***	***91.1***	***1,993***	***84.5***	***178.6***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	2.3	1.7	na	5.6	95	31.0	64.1
Meal Replacement Beverages	1.0	0.8	na	2.8	75	26.9	56.0*
Soft Drinks (Carbonated)	28.9	22.2	57.0	55.4	1,185	39.9	78.3
Waters (Bottled, Enhanced, Fortified)	46.0	35.3	111.8	45.7	1,120	77.4	171.2
Coffee and Tea							
RTD Tea Beverages	5.0	3.8	12.1	13.0	301	29.2	58.5
Gelatins, Puddings, and Fillings							
Gelatin Desserts	0.5	0.4	na	3.0	62	12.0	17.4*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	7.3	5.6	17.9	20.6	537	27.3	57.9
Fruit Juices and Smoothies	8.1	6.2	20.4	35.5	778	17.5	35.9
Fruit-Based Nectars	0.1	<0.1*	na	0.3	14	17.8*	24.2*
Soft Candy							
Fruit Snacks	0.9	0.7	na	3.6	81	19.2	48.6

bw = body weight; na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table E-6 Estimated Daily Per Kilogram Body Weight Intake of Emulsion Formulation 2 from Individual Proposed Food-Uses by Male Adults Aged 20 Years and Over Within the U.S. (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (mg/kg bw/day)		All-Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***80.5***	***179.3***	***91.0***	***1,896***	***88.5***	***183.6***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	5.6	4.5	13.7	12.3	218	36.5	69.3
Meal Replacement Beverages	0.8	0.7	na	2.2	63	30.2	74.9*
Soft Drinks (Carbonated)	35.0	28.2	71.8	62.3	1,237	45.2	90.4
Waters (Bottled, Enhanced, Fortified)	36.6	29.5	103.7	39.2	946	75.2	165.3
Coffee and Tea							
RTD Tea Beverages	6.6	5.3	15.8	14.3	275	37.2	86.4
Gelatins, Puddings, and Fillings							
Gelatin Desserts	0.3	0.2	na	1.3	34	17.0	38.1*
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	7.0	5.7	17.9	20.8	462	27.2	57.6
Fruit Juices and Smoothies	7.4	5.9	19.4	33.9	753	17.5	35.6
Fruit-Based Nectars	0.1	0.1*	na	0.5	21	16.8*	39.9*
Soft Candy							
Fruit Snacks	0.7	0.5	na	3.6	71	14.6	28.5*

bw = body weight; na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Table E-7 Estimated Daily Per Kilogram Body Weight Intake of Emulsion Formulation 2 from Individual Proposed Food-Uses by the Total U.S. Population (2011-2012 NHANES Data)

Food-Use Category	% Contribution to Total Mean Intake	All-Person Consumption (mg/kg bw/day)		All-Users Consumption (mg/kg bw/day)			
		Mean	90th Percentile	%	n	Mean	90th Percentile
All	***100***	***90.1***	***195.4***	***91.5***	***6,826***	***98.5***	***202.5***
Beverages and Beverage Bases							
Energy, Sport, and Isotonic Drinks	4.2	3.8	na	9.9	634	38.7	81.1
Meal Replacement Beverages	0.8	0.7	na	2.1	165	34.1	70.9
Soft Drinks (Carbonated)	26.9	24.2	66.3	56.1	3,806	43.0	86.1
Waters (Bottled, Enhanced, Fortified)	37.5	33.7	109.0	43.7	3,667	77.1	172.1
Coffee and Tea							
RTD Tea Beverages	4.7	4.3	12.0	12.5	852	34.4	70.3
Gelatins, Puddings, and Fillings							
Gelatin Desserts	0.6	0.5	na	2.2	172	23.2	57.9
Processed Fruits and Fruit Juices							
Fruit Drinks and Ades	11.1	10.0	31.3	26.7	2,503	37.5	79.9
Fruit Juices and Smoothies	12.2	11.0	30.5	38.7	3,203	28.4	63.2
Fruit-Based Nectars	0.1	0.1	na	0.4	57	21.1	42.4*
Soft Candy							
Fruit Snacks	2.0	1.8	na	6.8	576	26.5	62.2

bw = body weight; na = not available; RTD = ready-to-drink.
* Indicates an intake estimate that may not be statistically reliable, as the sample size does not meet the minimum reporting requirements.

Appendix F
Representative NHANES Food Codes for Proposed Food-Uses of Emulsion Formulation 2 in the U.S.

Representative NHANES Food Codes for Proposed Beverage-Uses of Emulsion Formulation 2 in the U.S.

Beverages and Beverage Bases

Energy, Sport, and Isotonic Drinks
[DHA+EPA] = 0.021%

95310200	Full Throttle Energy Drink
95310400	Monster Energy Drink
95310500	Mountain Dew AMP Energy Drink
95310550	No Fear Energy Drink
95310555	No Fear Motherload Energy Drink
95310560	NOS Energy Drink
95310600	Red Bull Energy Drink
95310700	Rockstar Energy Drink
95310750	SoBe Energize Energy Juice Drink
95310800	Vault Energy Drink
95311000	Energy Drink
95312400	Monster Energy Drink, Lo Carb
95312500	Mountain Dew AMP Energy Drink, sugar-free
95312550	No Fear Energy Drink, sugar-free
95312555	NOS Energy Drink, sugar-free
95312560	Ocean Spray Cran-Energy Cranberry Energy Juice Drink
95312600	Red Bull Energy Drink, sugar-free
95312700	Rockstar Energy Drink, sugar-free
95312800	Vault Zero Energy Drink
95312900	XS Energy Drink
95312905	XS Gold Plus Energy Drink
95320200	Gatorade Thirst Quencher sports drink
95320500	Powerade sports drink
95321000	Fruit-flavored thirst quencher beverage
95322200	Gatorade G2 Thirst Quencher sports drink, low calorie
95322500	Powerade Zero sports drink, low calorie
95323000	Fruit-flavored sports drink or thirst quencher beverage, low calorie
95330100	Fluid replacement, electrolyte solution
95330500	Fluid replacement, 5% glucose in water
95341000	FUZE Slenderize fortified low calorie fruit juice beverage

Non-reconstituted Energy, Sport, and Isotonic Drinks
Adjusted for not being reconstituted, 16 g of powder to 240 mL of water
[DHA+EPA] = 0.315%

92900300	Fruit-flavored thirst quencher beverage, dry concentrate, not reconstituted

Meal Replacement Beverages
[DHA+EPA] = 0.021%

95101000	Boost, nutritional drink, ready-to-drink
95101010	Boost Plus, nutritional drink, ready-to-drink
95102000	Carnation Instant Breakfast, nutritional drink, regular, ready-to-drink
95102010	Carnation Instant Breakfast, nutritional drink, sugar free, ready-to-drink
95103000	Ensure, nutritional shake, ready-to-drink
95103010	Ensure Plus, nutritional shake, ready-to-drink

95104000 Glucerna, nutritional shake, ready-to-drink
95105000 Kellogg's Special K Protein Shake
95106000 Muscle Milk, ready-to-drink
95106010 Muscle Milk, light, ready-to-drink
95110000 Slim Fast Shake, meal replacement, regular, ready-to-drink
95110010 Slim Fast Shake, meal replacement, sugar free, ready-to-drink
95110020 Slim Fast Shake, meal replacement, high protein, ready-to-drink
95120000 Nutritional drink or meal replacement, ready-to-drink, NFS
95120010 Nutritional drink or meal replacement, high protein, ready-to-drink, NFS
95120020 Nutritional drink or meal replacement, high protein, light, ready-to-drink, NFS
95120050 Nutritional drink or meal replacement, liquid, soy-based

Non-reconstituted Meal Replacement Beverages
Adjusted for not being reconstituted, 16 g of powder to 240 mL of water
[DHA+EPA] = 0.315%

95201000 Carnation Instant Breakfast, nutritional drink mix, regular, powder
95201010 Carnation Instant Breakfast, nutritional drink mix, sugar free, powder
95201200 EAS Whey Protein Powder
95201300 EAS Soy Protein Powder
95201500 Herbalife, nutritional shake mix, high protein, powder
95201600 Isopure protein powder
95201700 Kellogg's Special K20 Protein Water Mix
95202000 Muscle Milk, regular, powder
95202010 Muscle Milk, light, powder
95210000 Slim Fast Shake Mix, powder
95210010 Slim Fast Shake Mix, sugar free, powder
95210020 Slim Fast Shake Mix, high protein, powder
95220000 Nutritional drink mix or meal replacement, powder, NFS
95220010 Nutritional drink mix or meal replacement, high protein, powder, NFS

Soft Drinks (Carbonated)
[DHA+EPA] = 0.021%

92400000 Soft drink, NFS
92400100 Soft drink, NFS, sugar-free
92410110 Carbonated water, sweetened
92410210 Carbonated water, unsweetened
92410250 Carbonated water, sweetened, with low-calorie or no-calorie sweetener
92410310 Soft drink, cola-type
92410315 Soft drink, cola type, reduced sugar
92410320 Soft drink, cola-type, sugar-free
92410330 Soft drink, cola-type, with higher caffeine
92410340 Soft drink, cola-type, decaffeinated
92410350 Soft drink, cola-type, decaffeinated, sugar-free
92410360 Soft drink, pepper-type
92410370 Soft drink, pepper-type, sugar-free
92410390 Soft drink, pepper-type, decaffeinated
92410400 Soft drink, pepper-type, decaffeinated, sugar-free
92410410 Cream soda
92410420 Cream soda, sugar-free
92410510 Soft drink, fruit-flavored, caffeine free
92410520 Soft drink, fruit-flavored, sugar free, caffeine free
92410550 Soft drink, fruit flavored, caffeine containing
92410560 Soft drink, fruit flavored, caffeine containing, sugar-free
92410610 Ginger ale

92410620 Ginger ale, sugar-free
92410710 Root beer
92410720 Root beer, sugar-free
92410810 Chocolate-flavored soda
92410820 Chocolate-flavored soda, sugar-free
92411510 Cola with fruit or vanilla flavor
92411520 Cola with chocolate flavor
92411610 Cola with fruit or vanilla flavor, sugar-free
92411620 Cola with chocolate flavor, sugar-free
92417010 Soft drink, ale type
93301031 Canadian Club and soda

Mixtures Containing Soft Drinks
Adjusted for a soft drink content of 18.05 to 73.82%
[DHA+EPA] = 0.0038 to 0.0154%

13120800 Ice cream soda, flavors other than chocolate
13120810 Ice cream soda, chocolate
93301080 High ball
93301150 Tom Collins
93301170 Bourbon and soda
93301190 Rum and cola
93301230 Sloe gin fizz
93301270 Fruit punch, alcoholic
93301280 Singapore Sling
93301330 Gin Rickey
93301600 Gin fizz
93404500 Sangria
93404600 Sangria, Puerto Rican style
93405000 Wine spritzer

Waters (Bottled, Enhanced, Fortified)
[DHA+EPA] = 0.021%

94100100 Water, bottled, unsweetened
94100200 Water, bottled, sweetened, with low or no calorie sweetener
94100300 Water, fruit flavored, sweetened, with high fructose corn syrup and low calorie sweetener
94210100 Propel Water
94210200 Glaceau Water
94210300 SoBe Lifewater
94220200 Glaceau Water, low calorie

Coffee and Tea

Ready-to-drink Tea Beverages
[DHA+EPA] = 0.021%

92301000 Tea, NS as to type, unsweetened
92301060 Tea, NS as to type, presweetened with sugar
92301080 Tea, NS as to type, presweetened with low calorie sweetener
92301100 Tea, NS as to type, decaffeinated, unsweetened
92301130 Tea, NS as to type, presweetened, NS as to sweetener
92301160 Tea, NS as to type, decaffeinated, presweetened with sugar
92301180 Tea, NS as to type, decaffeinated, presweetened with low calorie sweetener

92301190 Tea, NS as to type, decaffeinated, presweetened, NS as to sweetener

Gelatins, Puddings, and Fillings

Gelatin Desserts
[DHA+EPA] = 0.042%

91501010 Gelatin dessert
91501015 Gelatin snacks
91501020 Gelatin dessert with fruit
91501030 Gelatin dessert with whipped cream
91501040 Gelatin dessert with fruit and whipped cream
91501050 Gelatin dessert with cream cheese
91501060 Gelatin dessert with sour cream
91501070 Gelatin dessert with fruit and sour cream
91501080 Gelatin dessert with fruit and cream cheese
91501090 Gelatin dessert with fruit, vegetable, and nuts
91501110 Gelatin dessert with fruit and whipped topping
91501120 Gelatin dessert with fruit and vegetables
91511010 Gelatin dessert, dietetic, sweetened with low calorie sweetener
91511020 Gelatin dessert, dietetic, with fruit, sweetened with low calorie sweetener
91511030 Gelatin dessert, dietetic, with whipped topping, sweetened with low calorie sweetener
91511050 Gelatin dessert, dietetic, with cream cheese, sweetened with low calorie sweetener
91511060 Gelatin dessert, dietetic, with sour cream, sweetened with low calorie sweetener
91511070 Gelatin dessert, dietetic, with fruit and sour cream, sweetened with low calorie sweetener
91511080 Gelatin dessert, dietetic, with fruit and cream cheese, sweetened with low calorie sweetener
91511090 Gelatin dessert, dietetic, with fruit and vegetable(s), sweetened with low calorie sweetener
91511110 Gelatin dessert, dietetic, with fruit and whipped topping, sweetened with low calorie sweetener
91512010 Danish dessert pudding
91520100 Yookan (Yokan), a Japanese dessert made with bean paste and sugar
91560100 Haupia (coconut pudding)

Non-reconstituted Gelatin Desserts
Adjusted for not being reconstituted, 16 g dry gelatin to 100 g of water
[DHA+EPA] = 0.28%

91500200 Gelatin powder, sweetened, dry
91510100 Gelatin powder, dietetic, sweetened with low calorie sweetener, dry

Mixtures Containing Gelatin Desserts
Adjusted for a gelatin dessert content of 0.31 to 46.15%
[DHA+EPA] = 0.00013 to 0.019%

13250100 Mousse, not chocolate
14610200 Cheese, cottage cheese, with gelatin dessert
14610210 Cheese, cottage cheese, with gelatin dessert and fruit
14610250 Cheese, cottage cheese, with gelatin dessert and vegetables

Processed Fruits and Fruit Juices

Fruit Drinks and Ades, Including Concentrated Beverage Bases

[DHA+EPA] = 0.021%

92307500	Half and Half beverage, half iced tea and half fruit juice drink (lemonade)
92307510	Half and Half beverage, half iced tea and half fruit juice drink (lemonade), low calorie
92431000	Carbonated juice drink, NS as to type of juice
92432000	Carbonated citrus juice drink
92433000	Carbonated noncitrus juice drink
92510610	Fruit juice drink
92510650	Tamarind drink, Puerto Rican (Refresco de tamarindo)
92510720	Fruit punch, made with fruit juice and soda
92510730	Fruit punch, made with soda, fruit juice, and sherbet or ice cream
92511010	Fruit flavored drink (formerly lemonade)
92511250	Citrus fruit juice drink, containing 40-50% juice
92512050	Frozen daiquiri mix, from frozen concentrate, reconstituted
92513000	Fruit flavored frozen drink
92530410	Fruit flavored drink, with high vitamin C
92530510	Cranberry juice drink or cocktail, with high vitamin C
92530610	Fruit juice drink, with high vitamin C
92530950	Vegetable and fruit juice drink, with high vitamin C
92531030	Fruit juice drink, with thiamin (vitamin B1) and high vitamin C
92541010	Fruit flavored drink, made from powdered mix
92542000	Fruit flavored drink, made from powdered mix, with high vitamin C
92550030	Fruit juice drink, low calorie, with high vitamin C
92550040	Fruit juice drink, low calorie
92550110	Cranberry juice drink or cocktail, low calorie, with high vitamin C
92550350	Light orange juice beverage, 40-50% juice, lower sugar and calories, with artificial sweetener
92550610	Fruit flavored drink, low calorie, with high vitamin C
92550620	Fruit flavored drink, low calorie
92552000	Fruit flavored drink, made from powdered mix, low calorie, with high vitamin C
92552010	Fruit flavored drink, made from powdered mix, low calorie
92552020	Fruit juice drink, reduced sugar, with thiamin (vitamin B1) and high vitamin C
92552030	Fruit juice drink, reduced sugar, with vitamin E
92582100	Fruit juice drink, with high vitamin C, plus added calcium
92582110	Fruit juice drink, with thiamin (vitamin B1) and high vitamin C plus calcium
95342000	MonaVie acai blend beverage

Non-reconstituted Dry Fruit Drinks and Ades
Adjusted for not being reconstituted, 16 g of powder to 240 mL of water
[DHA+EPA] = 0.315%

92900100	Tang, dry concentrate
92900110	Fruit-flavored beverage, dry concentrate, with sugar, not reconstituted
92900200	Fruit-flavored beverage, dry concentrate, low calorie, not reconstituted

Non-reconstituted Frozen Fruit Drinks and Ades
Adjusted for not being reconstituted, 1 cup of juice mix to 3 cups of water or 55 mL of frozen concentrated used to produce 240 mL beverage
[DHA+EPA] = 0.084 to 0.092%

92511000	Lemonade, frozen concentrate, not reconstituted
92512040	Frozen daiquiri mix, frozen concentrate, not reconstituted

Fruit Juices and Smoothies
[DHA+EPA] = 0.021%

11552200	Orange Julius
11553000	Fruit smoothie drink, made with fruit or fruit juice and dairy products
11553100	Fruit smoothie drink, NFS
61201020	Grapefruit juice, NS as to form
61201220	Grapefruit juice, canned, bottled or in a carton
61201620	Grapefruit juice, frozen (reconstituted with water)
61204000	Lemon juice, NS as to form
61204200	Lemon juice, canned or bottled
61204600	Lemon juice, frozen
61207000	Lime juice, NS as to form
61207200	Lime juice, canned or bottled
61207600	Lime juice, frozen
61210000	Orange juice, NFS
61210220	Orange juice, canned, bottled or in a carton
61210250	Orange juice, with calcium added, canned, bottled or in a carton
61210620	Orange juice, frozen (reconstituted with water)
61210820	Orange juice, frozen, with calcium added (reconstituted with water)
61213000	Tangerine juice, NFS
61213220	Tangerine juice, canned
61213620	Tangerine juice, frozen (reconstituted with water)
61213800	Fruit juice blend, including citrus, 100% juice
61213900	Fruit juice blend, including citrus, 100% juice, with calcium added
64100100	Fruit juice, NFS
64100110	Fruit juice blend, 100% juice
64100200	Fruit juice blend, with cranberry, 100% juice
64104010	Apple juice
64104600	Blackberry juice
64105400	Cranberry juice, 100%, not a blend
64116020	Grape juice
64120010	Papaya juice
64121000	Passion fruit juice
64124020	Pineapple juice
64126000	Pomegranate juice
64132010	Prune juice
64132500	Strawberry juice
64133100	Watermelon juice
64134000	Fruit smoothie drink, made with fruit or fruit juice only (no dairy products)

Non-reconstituted Fruit Juices and Smoothies
Adjusted for not being reconstituted, 1 cup of juice mix to 3 cups of water
[DHA+EPA] = 0.084%

61210720	Orange juice, frozen, not reconstituted

Mixtures containing Fruit Juices and Smoothies
Adjusted for a juice content of 50.0 to 80.3%
[DHA+EPA] = 0.0105 to 0.0169%

91406500	Jams, preserves, marmalades, sweetened with fruit juice concentrates, all flavors
92550400	Vegetable and fruit juice drink, low calorie, with high vitamin C
92550405	Vegetable and fruit juice drink, low calorie, with high vitamin C plus added vitamin E and vitamin A
93301141	Seabreeze
93301180	Mixed Drinks (for recipe modifications)
93301270	Fruit punch, alcoholic
93301000	Cocktail, NFS

93301160 Whiskey sour
91361050 Duck sauce
93301370 Fuzzy Navel
93301140 Screwdriver

Mixtures containing Fruit Juices and Smoothies
Adjusted for a juice content of 3.52 to 44.26%
[DHA+EPA] = 0.0007 to 0.0093%

93404600 Sangria, Puerto Rican style
93404500 Sangria
93301280 Singapore Sling
93301150 Tom Collins
93301230 Sloe gin fizz
93404000 Wine cooler
93301600 Gin fizz
93301330 Gin Rickey
93301320 Tequila Sunrise
74406500 Cocktail sauce
91301050 Fruit syrup
93504100 Rum cooler
93301360 Long Island iced tea
93301030 Bloody Mary
93302100 Zombie
93301310 Mai Tai
93301100 Margarita
93301115 Mimosa
93301050 Gimlet
93301020 Bacardi cocktail
93301040 Daiquiri
91351020 Topping, dietetic
92512090 Pina Colada, nonalcoholic
92512110 Margarita mix, nonalcoholic
93301200 Pina Colada

Fruit-Based Nectars
[DHA+EPA] = 0.021%

64200100 Fruit nectar, NFS
64201010 Apricot nectar
64201500 Banana nectar
64202010 Cantaloupe nectar
64203020 Guava nectar
64204010 Mango nectar
64205010 Peach nectar
64210010 Papaya nectar
64213010 Passion fruit nectar
64215010 Pear nectar
64221010 Soursop (Guanabana) nectar

Soft Candy

Fruit Snacks
[DHA+EPA] = 0.167%

91708000	Fruit peel, candied
91708010	Date candy
91708020	Soft fruit confections
91708030	Fruit leather and fruit snacks candy
91708040	Fun Fruits Creme Supremes
91708100	Fruit snacks candy, with high vitamin C
91708150	Yogurt covered fruit snacks candy, with added vitamin C
91708160	Yogurt covered fruit snacks candy rolls, with high vitamin C
91709000	Gumdrops, chocolate covered
91745010	Gumdrops
91770010	Dietetic or low calorie gumdrops
91736000	Pineapple candy, Puerto Rican style
91739010	Raisins, chocolate covered
91739510	Raisins, carob covered
91739600	Raisins, yogurt covered
91760700	Wax candy, liquid filled
91770000	Dietetic or low calorie candy, NFS
91770030	Dietetic or low calorie candy, chocolate covered

SUBMISSION END