Memorandum

Date: October 31, 2022

From: FDA Food Traceability Rule Workgroup

Subject: Designation of the Food Traceability List Using the Risk-Ranking Model for Food Tracing (2022 version)

To: Memorandum for the Record

The FDA Food Safety Modernization Act (FSMA) section 204 (21 U.S. Code § 2223) requires the Food and Drug Administration ("FDA") to designate high-risk foods for which additional recordkeeping requirements are appropriate and necessary to protect the public health. FDA developed a Risk-Ranking Model for Food Tracing ("the Model"), a data-driven science-based decision support tool to assist the Agency in the process of designating a Food Traceability List. This document describes several key aspects about how the Model was used to develop the Food Traceability List (Table 1). The Model scores commodity-hazard pairs according to data and information relevant for seven criteria: (C1) frequency of outbreaks and occurrence of illnesses, (C2) severity of illness, (C3) likelihood of contamination, (C4) growth potential, with consideration of shelf life, (C5) manufacturing process contamination probability and industry-wide intervention, (C6) consumption, and (C7) cost of illness, as described in the technical report entitled "Methodological Approach to Developing a Risk-Ranking Model for Food Tracing FSMA Section 204" (Ref.1). These criteria account for the specific statutory factors required in section 204(d)(2)(A) (21 U.S. Code § 2223(d)(2)(A)).

Types of Hazards Considered

The Model was designed to be flexible and to consider a wide range of hazards including microbial and chemical contaminants in FDA-regulated human foods. This approach is consistent with requirements under Section 204 to consider, among other factors, "the likelihood that a particular food has a high potential risk for microbiological or chemical contamination." For traceability purposes, FDA efforts generally focus on foods contaminated with biological or acute chemical toxins which present an immediate public health risk. For example, leafy greens potentially contaminated with *E. coli* O157:H7 or reef finfish potentially contaminated with ciguatoxin could cause illnesses for which traceability would be necessary to rapidly identify the source of contamination and prevent additional illnesses.

In contrast, enhanced recordkeeping for traceability would not be similarly useful for addressing adverse health effects from chronic exposure to chemical hazards (such as lead or other toxic elements). As such, FDA determined that for the purposes of developing the Food Traceability List, the Agency would only consider results from the Model for microbial hazards and acute chemical toxins.

Similarly, FDA decided not to include results from the Model regarding food allergens. Typically, consumers with food allergies can identify the food or ingredient that most likely caused the allergic reaction, including the brand and packaging of the food in most cases. FDA can then rapidly identify the source of the allergen-containing food and take appropriate regulatory action. Therefore, enhanced recordkeeping for traceability would not greatly enhance FDA's ability to identify and respond to undeclared allergens in food.

Outbreaks Related to Contamination at Retail or Point-of-Service

Within the data used for the Model, outbreaks for certain commodity-hazard pairs, such as *C. perfringens* in fresh soup or Norovirus in cakes, were attributed to contamination and/or growth of pathogens in the food at retail or point-of-service. Such contamination is generally due to unsafe food practices at retail or point-of-service, such as lack of time/temperature control, ill food workers, or improper cleaning and sanitizing of food surfaces. For the purposes of this rulemaking, enhanced recordkeeping requirements for foods contaminated at retail or point-of-service would not significantly improve traceability because in such situations, once the retail or point-of-service location has been identified, there is no need to further trace the source of the food. For the purposes of ranking commodities as part of the Food Traceability List, FDA made the determination to not include outbreak data on commodity-hazard pairs for which outbreaks were attributed to contamination or growth of pathogens in the food at retail or point-of-service.

Granularity of Foods Identified

The Model output allows calculation of risk scores for commodity-hazard pairs, and aggregated risk scores at two levels of granularity: "commodity category" (e.g., produce-Raw Agricultural Commodity) or "commodity" (e.g., leafy greens). A level of granularity more specific than "commodity" is not feasible due to insufficient data.

For the purposes of the Food Traceability List, FDA determined that the appropriate level of granularity is at the level of "commodity". Food items within the same "commodity" designation generally have similar characteristics, associated hazards, and production and supply-chain practices and conditions. Further, data used to assess components of the model (e.g., outbreak and illness data, likelihood of contamination, degree to which product supports growth, consumption, and annual cost of illness) are available and adequate at the "commodity" level of granularity. This approach results in a more targeted Food Traceability List than one based on the "commodity category" level. It also focuses recordkeeping requirements on the commodities for which improved recordkeeping would be most beneficial for reducing food safety risks through tracing.

Identifying Foods for the Food Traceability List

To identify commodities for the Food Traceability List, the commodities and associated commodity-hazard pairs produced by the Model were ranked. Commodities with associated commodity-hazard pairs with criteria scores in the moderate to strong range were considered (Table 1) for inclusion on the List. Appendix I below provides the risk score, determined with

the Model, for each commodity on the Food Traceability List, the risk scores for commodity-hazard pairs associated with each commodity, and the individual criterion scores (criteria 1 through 7 or C1 through C7) for each commodity-hazard pair. For more detailed information on the risk-based scoring criteria and how the risk score for a commodity is determined, see the reference methodology document for the Model (Ref 1).

A commodity was included on the Food Traceability List if its risk score, aggregated across all associated hazards, was 330 or higher in the Model. This commodity risk score corresponds to, for one or more associated commodity-hazard pairs, the equivalent of at least two criterion scores each equal to 9 (criterion scores were "strong") and the remaining five criterion scores each equal to 3 (criterion scores were "moderate"), providing evidence for a significant public health risk. A commodity was also included on the Food Traceability List if the outbreaks and illnesses (C1) and cost of illness (C7) criterion scores for one or more associated commodity-hazard pairs were "strong" (criterion scores of C1 and C7 each equal to 9), also providing evidence of a significant public health risk.

The scores for many of the commodities on the Food Traceability List met both conditions. FDA believes that focusing the requirements of the rule on those foods for which there is evidence of significant public health risk is consistent with the mandate of FSMA Section 204 to designate foods for which additional recordkeeping is necessary and appropriate to protect public health.

This approach results in the designation of commodities on the Food Traceability List as posted to FDA's website at www.fda.gov.

Table 1. Moderate and strong score definitions for each of the seven criteria in the model

Criteria	Moderate (criteria score=3)	Strong (criteria score=9)
Outbreaks and illnesses (C1)[a]	• >1-10 outbreaks and hundreds of cases since 1999; OR • ≥10 outbreaks and tens of cases since 1999; OR • ≤1 outbreak and thousands of cases since 1999	• ≥10 outbreaks and hundreds or thousands of cases since 1999; OR • >1-10 outbreaks and thousands of cases since 1999
Severity of illness (C2)	• Hospitalization rate >10-20% and mortality rate 0%; OR • Hospitalization rate ≤20% and mortality rate >0% to ≤0.5%	• Hospitalization rate >20% OR mortality rate >0.5%
Likelihood of contamination (C3)[b]	• Contamination rate >0.1-1%; OR • >1-10 RFR[c] reports/year; OR • >5-10 recalls/year	• Contamination rate >1%; OR • >10 RFR reports/year; OR • >10 recalls/year
Growth potential with consideration of shelf life (C4)	• 1-3 $\log_{10}$ CFU (colony forming unit) increase given customary shelf life	• ≥3 $\log_{10}$ CFU increase given customary shelf life
Manufacturing process contamination probability and industry-wide intervention (C5)	• Recurring or frequent detection of contamination; control measures available and adequate, evidence for consistent implementation in industry; OR • Known history of contamination; control measures available but lack of an adequate kill step, lack of evidence for consistent implementation, or evidence for inconsistent implementation in industry; OR • Infrequent detection of contamination; lack of adequate control measures, or evidence of poor implementation of control measures in industry	• Recurring or frequent detection of contamination; lack of adequate control measures, or evidence of poor implementation of control measures in industry; OR • Recurring or frequent detection of contamination; control measures available but lack of an adequate kill step, lack of evidence for consistent implementation, or evidence for inconsistent implementation in industry; OR • Known history of contamination; lack of adequate control measures, or evidence of poor implementation of control measures in industry
Consumption (C6)	• >10% consumers and >0-10 g/serving; OR • >5-10% consumers and >10-100 g/serving; OR • 1-5% consumers and > 100 g/serving	• >10% consumers and >10 g/serving; OR • >5-10% consumers and >100 g/serving
Cost of illness (C7)	• >$1M to 10M/year	• >$10M/year

[a] Weighted by year of outbreak; [b] Weighted by number of samples, geographic location and year;
[c] Reportable Food Registry

References

Ref. 1. Food and Drug Administration (2022)." Methodological Approach to Developing a Risk-Ranking Model for Food Tracing FSMA Section 204 (21 U.S. Code § 2223). September 2022. Available at www.fda.gov."

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Appendix I. Commodities on the Food Traceability List and associated commodity-hazard pairs, criteria and risk scores for each commodity-hazard pair, and commodity risk score

Commodity	Hazard	C1	C2	C3	C4	C5	C6	C7	Commodity -Hazard Risk Score	Commodity Risk Score
Cheese (made from pasteurized milk), fresh soft or soft unripened	*Campylobacter* spp.	0	3	1	1	1	9	0	150	430
Cheese (made from pasteurized milk), fresh soft or soft unripened	*Clostridium botulinum* and toxin	0	9	1	0	1	9	0	200	430
Cheese (made from pasteurized milk), fresh soft or soft unripened	*Listeria monocytogenes*	1	9	3	9	9	9	3	430	430
Cheese (made from pasteurized milk), fresh soft or soft unripened	Mycotoxins - Aflatoxin M1	0	9	1	0	3	9	0	220	430
Cheese (made from pasteurized milk), fresh soft or soft unripened	*Salmonella* spp.	1	9	1	1	1	9	1	230	430
Cheese (made from pasteurized milk), fresh soft or soft unripened	*Staphylococcus aureus* and toxin	0	3	1	3	3	9	0	190	430
Cheese (made from pasteurized milk), soft ripened or semi-soft	*Bacillus cereus* and toxin	0	1	1	3	1	9	0	150	490
Cheese (made from pasteurized milk), soft ripened or semi-soft	*Listeria monocytogenes*	1	9	9	9	3	9	9	490	490
Cheese (made from pasteurized milk), soft ripened or semi-soft	Mycotoxins - Aflatoxin M1	0	9	1	0	3	9	0	220	490
Cheese (made from pasteurized milk), soft ripened or semi-soft	*Salmonella* spp.	1	9	3	1	1	9	0	240	490

Commodity	Hazard	C1	C2	C3	C4	C5	C6	C7	Commodity -Hazard Risk Score	Commodity Risk Score
Cheese (made from pasteurized milk), soft ripened or semi-soft	Scombroid toxin (Histamine)	0	1	3	1	3	9	0	170	490
Cheese (made from pasteurized milk), soft ripened or semi-soft	*Staphylococcus aureus* and toxin	0	3	1	1	1	9	0	150	490
Cheese (made from pasteurized milk), soft ripened or semi-soft	STEC O157	1	9	1	1	1	9	3	250	490
Cheese (made from unpasteurized milk), other than hard cheese	*Brucella* spp.	1	9	1	1	9	1	0	220	410
Cheese (made from unpasteurized milk), other than hard cheese	*Listeria monocytogenes*	1	9	9	3	9	1	9	410	410
Cheese (made from unpasteurized milk), other than hard cheese	*Salmonella* spp.	1	9	1	1	3	1	1	170	410
Cheese (made from unpasteurized milk), other than hard cheese	*Staphylococcus aureus* and toxin	0	3	9	3	9	1	0	250	410
Cheese (made from unpasteurized milk), other than hard cheese	STEC O157	1	9	1	1	3	1	1	170	410
Shell Eggs	Norovirus	0	3	0	0	3	9	0	150	450
Shell Eggs	*Salmonella* spp.	9	9	3	3	3	9	9	450	450
Nut Butters	*Listeria monocytogenes*	0	9	1	0	1	9	0	200	420
Nut Butters	Mycotoxins - Aflatoxins	1	9	1	0	3	9	0	230	420
Nut Butters	Norovirus	0	3	1	0	1	9	0	140	420

Commodity	Hazard	C1	C2	C3	C4	C5	C6	C7	Commodity -Hazard Risk Score	Commodity Risk Score
Nut Butters	*Salmonella* spp.	9	9	3	0	3	9	9	420	420
Nut Butters	*Staphylococcus aureus* and toxin	0	3	1	0	1	9	1	150	420
Nut Butters	STEC O157	1	9	1	0	1	9	3	240	420
Ready-to-eat Deli Salads	*Bacillus cereus* and toxin	0	1	3	3	1	9	0	170	330
Ready-to-eat Deli Salads	*Campylobacter* spp.	0	3	0	1	1	9	0	140	330
Ready-to-eat Deli Salads	*Clostridium perfringens* and toxin	0	3	1	1	1	9	0	150	330
Ready-to-eat Deli Salads	*Cryptosporidium parvum* or other spp.	0	9	1	0	1	9	0	200	330
Ready-to-eat Deli Salads	*Cyclospora cayetanensis*	0	1	1	0	1	9	0	120	330
Ready-to-eat Deli Salads	Hepatitis A virus	0	9	9	0	1	9	0	280	330
Ready-to-eat Deli Salads	*Listeria monocytogenes*	1	9	9	3	1	9	1	330	330
Ready-to-eat Deli Salads	Norovirus	1	3	1	0	1	9	0	150	330
Ready-to-eat Deli Salads	*Salmonella* spp.	3	9	1	1	1	9	3	270	330
Ready-to-eat Deli Salads	Scombroid toxin (Histamine)	1	1	1	0	3	9	1	160	330
Ready-to-eat Deli Salads	*Shigella* spp.	0	9	1	3	1	9	0	230	330
Ready-to-eat Deli Salads	*Staphylococcus aureus* and toxin	0	3	1	1	1	9	0	150	330
Ready-to-eat Deli Salads	STEC O157	0	9	1	3	1	9	0	230	330
Fruits (fresh-cut)	*Campylobacter* spp.	0	3	0	1	1	9	0	140	370

Commodity	Hazard	C1	C2	C3	C4	C5	C6	C7	Commodity -Hazard Risk Score	Commodity Risk Score
Fruits (fresh-cut)	*Cyclospora cayetanensis*	0	1	1	0	1	9	0	120	370
Fruits (fresh-cut)	*Giardia* spp.	0	3	3	0	1	9	0	160	370
Fruits (fresh-cut)	Hepatitis A virus	0	9	1	0	1	9	0	200	370
Fruits (fresh-cut)	*Listeria monocytogenes*	1	9	3	9	3	9	3	370	370
Fruits (fresh-cut)	Mycotoxins - Patulin	0	1	3	0	1	9	0	140	370
Fruits (fresh-cut)	Norovirus	0	3	1	0	1	9	0	140	370
Fruits (fresh-cut)	*Salmonella* spp.	1	9	1	3	3	9	3	290	370
Fruits (fresh-cut)	STEC non-O157	0	3	0	1	1	9	0	140	370
Fruits (fresh-cut)	STEC O157	0	9	1	3	1	9	0	230	370
Leafy Greens (fresh-cut)	*Campylobacter* spp.	0	3	1	1	1	9	0	150	390
Leafy Greens (fresh-cut)	*Cryptosporidium parvum* or other spp.	0	9	9	0	1	9	0	280	390
Leafy Greens (fresh-cut)	*Cyclospora cayetanensis*	1	1	9	0	1	9	9	300	390
Leafy Greens (fresh-cut)	*Giardia* spp.	0	3	9	0	1	9	0	220	390
Leafy Greens (fresh-cut)	Hepatitis A virus	0	9	1	0	1	9	0	200	390
Leafy Greens (fresh-cut)	*Listeria monocytogenes*	1	9	3	9	3	9	3	370	390
Leafy Greens (fresh-cut)	Norovirus	0	3	0	0	1	9	0	130	390
Leafy Greens (fresh-cut)	*Salmonella* spp.	3	9	3	9	3	9	3	390	390
Leafy Greens (fresh-cut)	*Shigella* spp.	0	9	1	9	1	9	0	290	390
Leafy Greens (fresh-cut)	STEC non-O157	1	3	3	3	3	9	1	230	390
Leafy Greens (fresh-cut)	STEC O157	3	9	1	3	3	9	3	310	390

Commodity	Hazard	C1	C2	C3	C4	C5	C6	C7	Commodity -Hazard Risk Score	Commodity Risk Score
Vegetables other than leafy greens (fresh-cut)	*Cyclospora cayetanensis*	1	1	1	0	1	9	3	160	430
Vegetables other than leafy greens (fresh-cut)	*Giardia* spp.	0	3	3	0	1	9	0	160	430
Vegetables other than leafy greens (fresh-cut)	*Listeria monocytogenes*	1	9	9	9	3	9	3	430	430
Vegetables other than leafy greens (fresh-cut)	Norovirus	0	3	1	0	1	9	0	140	430
Vegetables other than leafy greens (fresh-cut)	*Salmonella* spp.	3	9	1	3	1	9	9	350	430
Vegetables other than leafy greens (fresh-cut)	*Shigella* spp.	0	9	1	3	1	9	0	230	430
Vegetables other than leafy greens (fresh-cut)	STEC O157	1	9	1	1	1	9	1	230	430
Vegetables other than leafy greens (fresh-cut)	*Yersinia pseudotuberculosis*	0	9	1	3	1	9	0	230	430
Cucumbers	*Campylobacter* spp.	0	3	1	1	1	3	0	90	430
Cucumbers	*Listeria monocytogenes*	0	9	9	3	3	3	0	270	430
Cucumbers	Norovirus	0	3	0	0	1	3	0	70	430
Cucumbers	*Salmonella* spp.	9	9	9	3	1	3	9	430	430
Cucumbers	STEC O157	1	9	1	1	1	3	1	170	430
Herbs (fresh)	*Cyclospora cayetanensis*	9	1	1	0	3	1	9	240	240
Herbs (fresh)	*E. coli*, other pathogenic (ETEC)	0	1	3	3	1	1	0	90	240
Herbs (fresh)	*Listeria monocytogenes*	0	9	1	1	3	1	0	150	240

Commodity	Hazard	C1	C2	C3	C4	C5	C6	C7	Commodity -Hazard Risk Score	Commodity Risk Score
Herbs (fresh)	Norovirus	0	3	0	0	1	1	0	50	240
Herbs (fresh)	*Salmonella* spp.	1	9	3	3	3	1	3	230	240
Herbs (fresh)	*Shigella* spp.	0	9	1	3	1	1	0	150	240
Herbs (fresh)	STEC non-O157	1	3	9	1	1	1	3	190	240
Herbs (fresh)	STEC O157	1	9	1	1	1	1	3	170	240
Leafy Greens	*Campylobacter* spp.	0	3	1	1	1	9	0	150	430
Leafy Greens	*Clostridium perfringens* and toxin	0	3	0	0	1	9	0	130	430
Leafy Greens	*Cryptosporidium parvum* or other spp.	0	9	3	0	1	9	0	220	430
Leafy Greens	*Cyclospora cayetanensis*	3	1	9	0	1	9	9	320	430
Leafy Greens	*Giardia* spp.	0	3	1	0	1	9	0	140	430
Leafy Greens	Hepatitis A virus	0	9	1	0	1	9	0	200	430
Leafy Greens	*Listeria monocytogenes*	0	9	3	9	3	9	0	330	430
Leafy Greens	Norovirus	0	3	9	0	1	9	0	220	430
Leafy Greens	*Salmonella* spp.	1	9	3	9	3	9	1	350	430
Leafy Greens	*Shigella* spp.	0	9	1	1	1	9	0	210	430
Leafy Greens	STEC non-O157	1	3	1	1	3	9	1	190	430
Leafy Greens	STEC O157	9	9	1	3	3	9	9	430	430
Melons	*Campylobacter* spp.	0	3	1	1	1	9	0	150	430
Melons	*Listeria monocytogenes*	1	9	3	9	3	9	9	430	430
Melons	Norovirus	0	3	1	0	1	9	0	140	430

Commodity	Hazard	C1	C2	C3	C4	C5	C6	C7	Commodity -Hazard Risk Score	Commodity Risk Score
Melons	*Salmonella* spp.	9	9	3	3	1	9	3	370	430
Melons	*Shigella* spp.	1	9	1	1	1	9	1	230	430
Melons	STEC O157	0	9	1	1	1	9	0	210	430
Peppers	*Listeria monocytogenes*	0	9	1	9	3	3	0	250	370
Peppers	*Salmonella enterica* - Serovar paratyphi	1	9	1	3	1	3	3	210	370
Peppers	*Salmonella* spp.	9	9	3	3	1	3	9	370	370
Peppers	STEC non-O157	0	3	1	1	1	3	0	90	370
Sprouts	*Listeria monocytogenes*	1	9	3	3	3	0	3	220	420
Sprouts	*Salmonella* spp.	9	9	3	9	3	0	9	420	420
Sprouts	STEC non-O157	1	3	1	9	3	0	1	180	420
Sprouts	STEC O157	1	9	1	9	3	0	3	260	420
Tomatoes	*Campylobacter* spp.	0	3	0	1	1	9	0	140	430
Tomatoes	Hepatitis A virus	0	9	1	0	1	9	0	200	430
Tomatoes	*Listeria monocytogenes*	0	9	1	1	3	9	0	230	430
Tomatoes	Norovirus	0	3	9	0	1	9	0	220	430
Tomatoes	*Salmonella* spp.	9	9	1	3	3	9	9	430	430
Tomatoes	*Shigella* spp.	0	9	1	1	1	9	0	210	430
Tropical Tree Fruits	*Listeria monocytogenes*	0	9	1	9	3	3	0	250	370
Tropical Tree Fruits	*Salmonella enterica* - Serovar typhi	0	9	1	1	1	3	0	150	370
Tropical Tree Fruits	*Salmonella* spp.	9	9	3	9	1	3	3	370	370

Commodity	Hazard	C1	C2	C3	C4	C5	C6	C7	Commodity -Hazard Risk Score	Commodity Risk Score
Finfish, species not associated with histamine or ciguatoxin	*Aeromonas* spp.	0	3	9	9	1	9	0	310	370
Finfish, species not associated with histamine or ciguatoxin	*Anisakis simplex*	0	1	9	0	3	9	1	230	370
Finfish, species not associated with histamine or ciguatoxin	*Bacillus cereus* and toxin	0	1	1	9	1	9	0	210	370
Finfish, species not associated with histamine or ciguatoxin	*Campylobacter* spp.	0	3	0	1	1	9	0	140	370
Finfish, species not associated with histamine or ciguatoxin	Cestodes	0	9	3	0	3	9	0	240	370
Finfish, species not associated with histamine or ciguatoxin	*Listeria monocytogenes*	0	9	9	9	1	9	0	370	370
Finfish, species not associated with histamine or ciguatoxin	Norovirus	0	3	0	0	1	9	0	130	370
Finfish, species not associated with histamine or ciguatoxin	*Plesiomonas shigelloides*	0	1	9	1	1	9	0	210	370
Finfish, species not associated with histamine or ciguatoxin	Rhabdomyolysis	1	3	3	0	3	9	0	190	370
Finfish, species not associated with histamine or ciguatoxin	*Salmonella* spp.	1	9	9	1	3	9	1	330	370
Finfish, species not associated with histamine or ciguatoxin	*Shigella* spp.	0	9	1	1	1	9	0	210	370
Finfish, species not associated with histamine or ciguatoxin	*Staphylococcus aureus* and toxin	0	3	9	1	1	9	0	230	370
Finfish, species not associated with histamine or ciguatoxin	STEC O157	0	9	0	1	1	9	0	200	370
Finfish, species not associated with histamine or ciguatoxin	Tetrodotoxin	1	9	1	0	3	9	0	230	370

Commodity	Hazard	C1	C2	C3	C4	C5	C6	C7	Commodity -Hazard Risk Score	Commodity Risk Score
Finfish, species not associated with histamine or ciguatoxin	Trematodes	0	3	9	0	1	9	0	220	370
Finfish, species not associated with histamine or ciguatoxin	*Vibrio parahaemolyticus*	1	9	9	3	3	9	0	340	370
Finfish, histamine-producing species	*Aeromonas* spp.	0	3	9	9	1	9	0	310	430
Finfish, histamine-producing species	Amnesic shellfish poisoning (ASP)	1	3	3	0	3	9	0	190	430
Finfish, histamine-producing species	Escolar toxin	1	1	3	0	9	9	0	230	430
Finfish, histamine-producing species	Hepatitis A virus	0	9	1	0	3	9	0	220	430
Finfish, histamine-producing species	*Listeria monocytogenes*	0	9	9	9	1	9	0	370	430
Finfish, histamine-producing species	*Salmonella* spp.	3	9	9	1	3	9	3	370	430
Finfish, histamine-producing species	Saxitoxin (PSP)	0	9	3	0	3	9	0	240	430
Finfish, histamine-producing species	Scombroid toxin (Histamine)	9	1	9	3	3	9	9	430	430
Finfish, species potentially contaminated with ciguatoxin	Ciguatoxin	9	3	9	0	3	0	9	330	330
Finfish, species potentially contaminated with ciguatoxin	*Listeria monocytogenes*	0	9	9	9	1	0	0	280	330
Finfish, species potentially contaminated with ciguatoxin	*Salmonella* spp.	0	9	9	1	3	0	0	220	330
Smoked Finfish	*Listeria monocytogenes*	0	9	9	9	9	0	0	360	360

Commodity	Hazard	C1	C2	C3	C4	C5	C6	C7	Commodity -Hazard Risk Score	Commodity Risk Score
Smoked Finfish	Norovirus	0	3	0	0	1	0	0	40	360
Smoked Finfish	Parasites	0	1	3	0	3	0	0	70	360
Smoked Finfish	*Salmonella* spp.	0	9	1	3	1	0	0	140	360
Smoked Finfish	Scombroid toxin (Histamine)	1	1	3	3	3	0	0	110	360
Crustaceans	*Aeromonas* spp.	0	3	9	9	1	9	0	310	430
Crustaceans	*Bacillus cereus* and toxin	0	1	1	1	1	9	0	130	430
Crustaceans	*E. coli*, other pathogenic (EA)	0	3	9	1	1	9	0	230	430
Crustaceans	Hepatitis A virus	3	9	1	0	3	9	3	280	430
Crustaceans	*Listeria monocytogenes*	0	9	9	9	3	9	0	390	430
Crustaceans	Norovirus	0	3	1	0	3	9	0	160	430
Crustaceans	*Paragonimus* spp.	1	3	1	0	1	9	0	150	430
Crustaceans	*Salmonella* spp.	1	9	9	3	1	9	3	350	430
Crustaceans	*Staphylococcus aureus* and toxin	0	3	3	1	1	9	0	170	430
Crustaceans	*Vibrio cholerae*	1	9	9	1	1	9	0	300	430
Crustaceans	*Vibrio parahaemolyticus*	9	9	9	3	1	9	3	430	430
Crustaceans	*Vibrio vulnificus*	0	9	9	1	1	9	0	290	430
Molluscan Shellfish, bivalves	Amnesic shellfish poisoning (ASP)	1	3	3	0	3	0	0	100	380
Molluscan Shellfish, bivalves	Azaspiracid shellfish poisoning (AZP)	1	3	9	0	3	0	1	170	380
Molluscan Shellfish, bivalves	Brevitoxins (NSP)	1	3	3	0	3	0	0	100	380

Commodity	Hazard	C1	C2	C3	C4	C5	C6	C7	Commodity -Hazard Risk Score	Commodity Risk Score
Molluscan Shellfish, bivalves	*Campylobacter* spp.	1	3	3	1	1	0	3	120	380
Molluscan Shellfish, bivalves	*Clostridium perfringens* and toxin	0	3	1	1	1	0	0	60	380
Molluscan Shellfish, bivalves	Hepatitis A virus	3	9	3	0	3	0	3	210	380
Molluscan Shellfish, bivalves	*Listeria monocytogenes*	0	9	1	3	3	0	0	160	380
Molluscan Shellfish, bivalves	Norovirus	9	3	9	0	3	0	0	240	380
Molluscan Shellfish, bivalves	Okadaic acid (DSP)	1	9	9	0	3	0	1	230	380
Molluscan Shellfish, bivalves	*Plesiomonas shigelloides*	1	1	9	3	1	0	1	160	380
Molluscan Shellfish, bivalves	*Salmonella enterica* - Serovar typhi	1	9	9	1	1	0	0	210	380
Molluscan Shellfish, bivalves	*Salmonella* spp.	0	9	9	3	1	0	0	220	380
Molluscan Shellfish, bivalves	Saxitoxin (PSP)	1	9	1	0	3	0	1	150	380
Molluscan Shellfish, bivalves	*Shigella* spp.	0	9	1	1	1	0	0	120	380
Molluscan Shellfish, bivalves	*Vibrio cholerae*	1	9	1	1	1	0	0	130	380
Molluscan Shellfish, bivalves	*Vibrio parahaemolyticus*	9	9	9	1	1	0	9	380	380
Molluscan Shellfish, bivalves	*Vibrio vulnificus*	1	9	9	3	1	0	3	260	380