EPA/600/R-09/052F
September 2011

EXPOSURE FACTORS HANDBOOK: 2011 EDITION

National Center for Environmental Assessment
Office of Research and Development
U.S. Environmental Protection Agency
Washington, DC 20460

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Preferred Citation:
U.S. Environmental Protection Agency (EPA). (2011) Exposure Factors Handbook: 2011 Edition. National Center for Environmental Assessment, Washington, DC; EPA/600/R-09/052F. Available from the National Technical Information Service, Springfield, VA, and online at http://www.epa.gov/ncea/efh.

FOREWORD

The U.S. Environmental Protection Agency (U.S. EPA), Office of Research and Development (ORD), National Center for Environmental Assessment's (NCEA) mission is to provide guidance and risk assessments aimed at protecting human health and the environment. To accomplish this mission, NCEA works to develop and improve the models, databases, tools, assumptions, and extrapolations used in risk assessments. NCEA established the Exposure Factors Program to develop tools and databases that improve the scientific basis of exposure and risk assessment by (1) identifying exposure factors needs in consultation with clients, and exploring ways for filling data gaps; (2) compiling existing data on exposure factors needed for assessing exposures/risks; and (3) assisting clients in the use of exposure factors data. The *Exposure Factors Handbook and* the *Child-Specific Exposure Factors Handbook*, as well as other companion documents such as *Example Exposure Scenarios*, are products of the Exposure Factors Program.

The *Exposure Factors Handbook* provides information on various physiological and behavioral factors commonly used in assessing exposure to environmental chemicals. The handbook was first published in 1989 and was updated in 1997. Since then, new data have become available. This updated edition incorporates data available since 1997 up to July 2011. It also reflects the revisions made to the *Child-Specific Exposure Factors Handbook*, which was updated and published in 2008. This edition of the handbook supersedes the information presented in the 2008 *Child-Specific Exposure Factors Handbook*. Each chapter in the 2011 edition of the *Exposure Factors Handbook* presents recommended values for the exposure factors covered in the chapter as well as a discussion of the underlying data used in developing the recommendations. These recommended values are based solely on NCEA's interpretations of the available data. In many situations, different values may be appropriate to use in consideration of policy, precedent, or other factors.

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The National Center for Environmental Assessment (NCEA), Office of Research and Development was responsible for the preparation of this handbook. Jacqueline Moya served as the Work Assignment Manager for the current updated edition, providing overall direction and technical assistance, and is a contributing author. The current draft was prepared by Westat Inc. under contract with the U.S. EPA (contract number GS-23F-8144H). Earlier drafts of this report were prepared by Versar, Inc.

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ACKNOWLEDGMENTS

The authors wish to acknowledge the important contributions of the following U.S. EPA individuals who conducted additional analyses for the revisions of this handbook:

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In addition, the U.S. EPA, ORD, National Exposure Research Laboratory (NERL) made an important contribution to this handbook by conducting additional analyses of the National Human Activity Pattern Survey (NHAPS) data. U.S. EPA input to the NHAPS data analysis came from Karen A. Hammerstrom and Jacqueline Moya from NCEA-Washington Division, William C. Nelson from NERL-Research Triangle Park, and Stephen C. Hern, Joseph V. Behar (retired), and William H. Englemann from NERL-Las Vegas.

The U.S. EPA Office of Water and Office of Pesticide Programs made important contributions by conducting an analysis of the U.S. Department of Agriculture (USDA) Continuing Survey of Food Intakes by Individual (CSFII) data in previous versions of the handbook. More recently, the Office of Pesticide Programs conducted an analysis of the National Health and Nutrition Examination Survey (NHANES) 2003−2006 to update the Food Commodity Intake Database (FCID) and food consumption chapters of this edition of the handbook.

The authors also want to acknowledge the following individuals in NCEA: Terri Konoza for managing the document production activities and copy editing, Vicki Soto for copy editing, and Maureen Johnson for developing and managing the Web page.

EXECUTIVE SUMMARY

Some of the steps for performing an exposure assessment are (1) identifying the source of the environmental contamination and the media that transports the contaminant; (2) determining the contaminant concentration; (3) determining the exposure scenarios, and pathways and routes of exposure; (4) determining the exposure factors related to human behaviors that define time, frequency, and duration of exposure; and (5) identifying the exposed population. Exposure factors are factors related to human behavior and characteristics that help determine an individual's exposure to an agent. This *Exposure Factors Handbook* has been prepared to provide information and recommendations on various factors used in assessing exposure to both adults and children. The purpose of the *Exposure Factors Handbook* is to (1) summarize data on human behaviors and characteristics that affect exposure to environmental contaminants, and (2) recommend values to use for these factors. This handbook provides nonchemical-specific data on the following exposure factors:

- Ingestion of water and other selected liquids (see Chapter 3),
- Non-dietary ingestion factors (see Chapter 4),
- Ingestion of soil and dust (see Chapter 5),
- Inhalation rates (see Chapter 6),
- Dermal factors (see Chapter 7),
- Body weight (see Chapter 8),
- Intake of fruits and vegetables (see Chapter 9),
- Intake of fish and shellfish (see Chapter 10),
- Intake of meat, dairy products, and fats (see Chapter 11),
- Intake of grain products (see Chapter 12),
- Intake of home-produced food (see Chapter 13),
- Total food intake (see Chapter 14),
- Human milk intake (see Chapter 15),
- Activity factors (see Chapter 16),
- Consumer products (see Chapter 17),
- Lifetime (see Chapter 18), and
- Building characteristics (see Chapter 19).

The handbook was first published in 1989 and was revised in 1997 (U.S. EPA, 1989, 1997). Recognizing that exposures among infants, toddlers, adolescents, and teenagers can vary significantly, the U.S. EPA published the *Child-Specific Exposure Factors Handbook* in 2002 (U.S. EPA, 2002) and its revision in 2008 (U.S. EPA, 2008). The 2008 revision of the *Child-Specific Exposure Factors Handbook* as well as this 2011 edition of the

Exposure Factors Handbook reflect the age categories recommended in the U.S. EPA *Guidance on Selecting Age Groups for Monitoring and Assessing Childhood Exposures to Environmental Contaminants* (U.S. EPA, 2005). This 2011 edition of the *Exposure Factors Handbook* also incorporates new factors and data provided in the 2008 *Child-Specific Exposure Factors Handbook* (and other relevant information published through July 2011. The information presented in this 2011 edition of the *Exposure Factors Handbook* supersedes the 2008 *Child-Specific Exposure Factors Handbook.*

The data presented in this handbook have been compiled from various sources, including government reports and information presented in the scientific literature. The data presented are the result of analyses by the individual study authors. However, in some cases, the U.S. EPA conducted additional analysis of published primary data to present results in a way that will be useful to exposure assessors and/or in a manner that is consistent with the recommended age groups. Studies presented in this handbook were chosen because they were seen as useful and appropriate for estimating exposure factors based on the following considerations: (1) soundness (adequacy of approach and minimal or defined bias); (2) applicability and utility (focus on the exposure factor of interest, representativeness of the population, currency of the information, and adequacy of the data collection period); (3) clarity and completeness (accessibility, reproducibility, and quality assurance); (4) variability and uncertainty (variability in the population and uncertainty in the results); and (5) evaluation and review (level of peer review and number and agreement of studies). Generally, studies were designated as "key" or "relevant" studies. Key studies were considered the most up-to-date and scientifically sound for deriving recommendations; while relevant studies provided applicable or pertinent data, but not necessarily the most important for a variety of reasons (e.g., data were outdated, limitations in study design). The recommended values for exposure factors are based on the results of key studies. The U.S. EPA also assigned confidence ratings of *low, medium, or high* to each recommended value based on the evaluation elements described above. These ratings are not intended to represent uncertainty analyses; rather, they represent the U.S. EPA's judgment on the quality of the underlying data used to derive the recommendations.

Key recommendations from the handbook are summarized in Table ES-1. Additional recommendations and detailed supporting information for these recommendations can be found in the individual chapters of this handbook. In providing recommendations for the various exposure factors, an attempt was made to present percentile values that are consistent with the exposure estimators defined in the *Guidelines for Exposure Assessment* (U.S. EPA, 1992) (i.e., mean and upper percentile). However, this was not always possible because the data available were limited for some factors, or the authors of the study did not provide such information. As used throughout this handbook, the term "upper percentile" is intended to represent values in the upper tail (i.e., between 90^{th} and 99.9^{th} percentile) of the distribution of values for a particular exposure factor. The 95^{th} percentile was used throughout the handbook to represent the upper tail because it is the middle of the range between 90^{th} and 99^{th} percentile. Other percentiles are presented, where available, in the tables at the end of each chapter. It should be noted that users of the handbook may use the exposure metric that is most appropriate for their particular situation.

The recommendations provided in this handbook are not legally binding on any U.S. EPA program and should be interpreted as suggestions that program offices or individual exposure/risk assessors can consider and modify as needed based on their own evaluation of a given risk assessment situation. In certain cases, different

values may be appropriate in consideration of policy, precedent, strategy, or other factors (e.g., more up-to-date data of better quality or more representative of the population of concern).

REFERENCES FOR THE EXECUTIVE SUMMARY

NCHS (National Center for Health Statistics). (1993) Joint policy on variance estimation and statistical reporting standards on NHANES III and CSFII reports: HNIS/NCHS Analytic Working Group recommendations. In: Analytic and reporting guidelines: the third National Health and Nutrition Examination Survey, NHANES III (1988-94). Centers for Disease Control and Prevention, Hyattsville, MD, pp. 39-45. Available online at http://www.cdc.gov/nchs/data/nhanes/nhanes3/nh3gui.pdf.

U.S. EPA (Environmental Protection Agency). (1989) Exposure factors handbook. Exposure Assessment Group, Office of Research and Development, Washington, DC; EPA/600/8-89/043. Available online at http://rais.ornl.gov/documents/EFH_1989_EPA600889043.pdf.

U.S. EPA (Environmental Protection Agency). (1992) Guidelines for exposure assessment. Risk Assessment Forum, Washington, DC; EPA/600/Z-92/001. Available online at http://cfpub.epa.gov/ncea/cfm/.cfm?deid=15263.

U.S. EPA (Environmental Protection Agency). (1997) Exposure factors handbook. Office of Research and Development, Washington, DC; EPA/600/P-95/002Fa,b,c. Available online at http://www.epa.gov/ncea/pdfs/efh/efh-complete.pdf.

U.S. EPA (Environmental Protection Agency). (2002) Child-specific exposure factors handbook. Interim final. National Center for Environmental Assessment, Washington, DC; EPA/P-00/002B. Available online at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=55145.

U.S. EPA (Environmental Protection Agency). (2005) Guidance on selecting age groups for monitoring and assessing childhood exposures to environmental contaminants. Risk Assessment Forum, Washington, DC; EPA/630/P-03/003F. Available online at http://www.epa.gov/raf/publications/pdfs/AGEGROUPS.PDF.

U.S. EPA (Environmental Protection Agency) (2008) Child-specific exposure factors handbook. National Center for Environmental Assessment Washington, DC; EPA/600/R-06/096F. Available online at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=199243.

Table ES-1. Summary of Exposure Factor Recommendations

Chapter 3	PER CAPITA INGESTION OF DRINKING WATER				CONSUMERS-ONLY INGESTION OF DRINKING WATER			
	Mean		95th Percentile		Mean		95th Percentile	
	mL/day	mL/kg-day	mL/day	mL/kg-day	mL/day	mL/kg-day	mL/day	mL/kg-day
Children								
Birth to 1 month	184	52	839[a]	232[a]	470[a]	137[a]	858[a]	238[a]
1 to <3 months	227[a]	48	896[a]	205[a]	552	119	1,053[a]	285[a]
3 to <6 months	362[a]	52	1,056	159	556	80	1,171[a]	173[a]
6 to <12 months	360	41	1,055	126	467	53	1,147	129
1 to <2 years	271	23	837	71	308	27	893	75
2 to <3 years	317	23	877	60	356	26	912	62
3 to <6 years	327	18	959	51	382	21	999	52
6 to <11 years	414	14	1,316	43	511	17	1,404	47
11 to <16 years	520	10	1,821	32	637	12	1,976	35
16 to <18 years	573	9	1,783	28	702	10	1,883	30
18 to <21 years	681	9	2,368	35	816	11	2,818	36
Adults								
>21 years	1,043	13	2,958	40	1,227	16	3,092	42
>65 years	1,046	14	2,730	40	1,288	18	2,960	43
Pregnant women	819[a]	13[a]	2,503[a]	43[a]	872[a]	14[a]	2,589[a]	43[a]
Lactating women	1,379[a]	21[a]	3,434[a]	55[a]	1,665[a]	26[a]	3,588[a]	55[a]

[a] Estimates are less statistically reliable based on guidance published in the *Joint Policy on Variance Estimation and Statistical Reporting Standards on NHANES III and CSFII Reports: NHIS/NCHS Analytical Working Group Recommendations* (NCHS, 1993).

Chapter 3	INGESTION OF WATER WHILE SWIMMING			
	Mean		Upper Percentile	
	mL/event[a]	mL/hour	mL/event	mL/hour
Children	37	49	90[b]	120[b]
Adults	16	21	53[c]	71[c]

[a] Participants swam for 45 minutes.
[b] 97th percentile
[c] Based on maximum value.

Chapter 4	MOUTHING FREQUENCY AND DURATION							
	Hand-to-Mouth				Object-to-Mouth			
	Indoor Frequency		Outdoor Frequency		Indoor Frequency		Outdoor Frequency	
	Mean contacts/ hour	95th Percentile contacts/ hour	Mean contacts/ hour	95th Percentile contacts/hour	Mean contacts/ hour	95th Percentile contacts/ hour	Mean contacts/ hour	95th Percentile contacts/ hour
Birth to 1 month	-	-	-	-	-	-	-	-
1 to <3 months	-	-	-	-	-	-	-	-
3 to <6 months	28	65	-	-	11	32	-	-
6 to <12 months	19	52	15	47	20	38	-	-
1 to <2 years	20	63	14	42	14	34	8.8	21
2 to <3 years	13	37	5	20	9.9	24	8.1	40
3 to <6 years	15	54	9	36	10	39	8.3	30
6 to <11 years	7	21	3	12	1.1	3.2	1.9	9.1
11 to <16 years	-	-	-	-	-	-	-	-
16 to <21 years	-	-	-	-	-	-	-	-

	Object-to-Mouth Duration	
	Mean minute/hour	95th Percentile minute/hour
Birth to 1 month	-	-
1 to <3 months	-	-
3 to <6 months	11	26
6 to <12 months	9	19
1 to <2 years	7	22
2 to <3 years	10	11
3 to <6 years	-	-
6 to <11 years	-	-
11 to <16 years	-	-
16 to <21 years	-	-

- No data.

Table ES-1. Summary of Exposure Factor Recommendations (continued)

Chapter 5 — SOIL AND DUST INGESTION

	Soil				Dust		Soil + Dust	
	General Population Central Tendency mg/day	High End						
		General Population Upper Percentile mg/day	Soil-Pica mg/day	Geophagy mg/day	Central Tendency mg/day	General Population Upper Percentile mg/day	General Population Central Tendency mg/day	General Population Upper Percentile mg/day
6 weeks to <1 year	30	-	-	-	30	-	60	-
1 to <6 years	50	-	1,000	50,000	60	-	100	-
3 to <6 years	-	200	-	-	-	100	-	200
6 to <21 years	50	-	1,000	50,000	60	-	100	-
Adult	20	-	-	50,000	30	-	50	-

- No data.

Chapter 6 — INHALATION

	Long-Term Inhalation Rates	
	Mean m^3/day	95th Percentile m^3/day
Birth to 1 month	3.6	7.1
1 to <3 months	3.5	5.8
3 to <6 months	4.1	6.1
6 to <12 months	5.4	8.0
1 to <2 years	5.4	9.2
Birth to <1year	8.0	12.8
2 to <3 years	8.9	13.7
3 to <6 years	10.1	13.8
6 to <11 years	12.0	16.6
11 to <16 years	15.2	21.9
16 to <21 years	16.3	24.6
21 to <31 years	15.7	21.3
31 to <41 years	16.0	21.4
41 to <51 years	16.0	21.2
51 to <61 years	15.7	21.3
61 to <71 years	14.2	18.1
71 to <81 years	12.9	16.6
≥81 years	12.2	15.7

	Short-Term Inhalation Rates, by Activity Level									
	Sleep or Nap		Sedentary/Passive		Light Intensity		Moderate Intensity		High Intensity	
	Mean m^3/ minute	95th m^3/ minute	Mean m^3/ minute	95th m^3/ minute	Mean m^3/ minute	95th m^3/ minute	Mean m^3/ minute	95th m^3/ minute	Mean m^3/ minute	95th m^3/ minute
Birth to <1year	3.0E–03	4.6E–03	3.1E–03	4.7E–03	7.6E–03	1.1E–02	1.4E–02	2.2E–02	2.6E–02	4.1E–02
1 to <2 years	4.5E–03	6.4E–03	4.7E–03	6.5E–03	1.2E–02	1.6E–02	2.1E–02	2.9E–02	3.8E–02	5.2E–02
2 to <3 years	4.6E–03	6.4E–03	4.8E–03	6.5E–03	1.2E–02	1.6E–02	2.1E–02	2.9E–02	3.9E–02	5.3E–02
3 to <6 years	4.3E–03	5.8E–03	4.5E–03	5.8E–03	1.1E–02	1.4E–02	2.1E–02	2.7E–02	3.7E–02	4.8E–02
6 to <11 years	4.5E–03	6.3E–03	4.8E–03	6.4E–03	1.1E–02	1.5E–02	2.2E–02	2.9E–02	4.2E–02	5.9E–02
11 to <16 years	5.0E–03	7.4E–03	5.4E–03	7.5E–03	1.3E–02	1.7E–02	2.5E–02	3.4E–02	4.9E–02	7.0E–02
16 to <21 years	4.9E–03	7.1E–03	5.3E–03	7.2E–03	1.2E–02	1.6E–02	2.6E–02	3.7E–02	4.9E–02	7.3E–02
21 to <31 years	4.3E–03	6.5E–03	4.2E–03	6.5E–03	1.2E–02	1.6E–02	2.6E–02	3.8E–02	5.0E–02	7.6E–02
31 to <41 years	4.6E–03	6.6E–03	4.3E–03	6.6E–03	1.2E–02	1.6E–02	2.7E–02	3.7E–02	4.9E–02	7.2E–02
41 to <51 years	5.0E–03	7.1E–03	4.8E–03	7.0E–03	1.3E–02	1.6E–02	2.8E–02	3.9E–02	5.2E–02	7.6E–02
51 to <61 years	5.2E–03	7.5E–03	5.0E–03	7.3E–03	1.3E–02	1.7E–02	2.9E–02	4.0E–02	5.3E–02	7.8E–02
61 to <71 years	5.2E–03	7.2E–03	4.9E–03	7.3E–03	1.2E–02	1.6E–02	2.6E–02	3.4E–02	4.7E–02	6.6E–02
71 to <81 years	5.3E–03	7.2E–03	5.0E–03	7.2E–03	1.2E–02	1.5E–02	2.5E–02	3.2E–02	4.7E–02	6.5E–02
≥81 years	5.2E–03	7.0E–03	4.9E–03	7.0E–03	1.2E–02	1.5E–02	2.5E–02	3.1E–02	4.8E–02	6.8E–02

Table ES-1. Summary of Exposure Factor Recommendations (continued)

Chapter 7 — SURFACE AREA

Total Surface Area

	Mean m^2	95th Percentile m^2
Birth to 1 month	0.29	0.34
1 to <3 months	0.33	0.38
3 to <6 months	0.38	0.44
6 to <12 months	0.45	0.51
1 to <2 years	0.53	0.61
2 to <3 years	0.61	0.70
3 to <6 years	0.76	0.95
6 to <11 years	1.08	1.48
11 to <16 years	1.59	2.06
16 to <21 years	1.84	2.33
Adult Males		
21 to <30 years	2.05	2.52
30 to <40 years	2.10	2.50
40 to <50 years	2.15	2.56
50 to <60 years	2.11	2.55
60 to <70 years	2.08	2.46
70 to <80 years	2.05	2.45
≥80 years	1.92	2.22
Adult Females		
21 to <30 years	1.81	2.25
30 to <40 years	1.85	2.31
40 to <50 years	1.88	2.36
50 to <60 years	1.89	2.38
60 to <70 years	1.88	2.34
70 to <80 years	1.77	2.13
≥80 years	1.69	1.98

Percent Surface Area of Body Parts

	Head	Trunk	Arms	Hands	Legs	Feet
	Mean Percent of Total Surface Area					
Birth to 1 month	18.2	35.7	13.7	5.3	20.6	6.5
1 to <3 months	18.2	35.7	13.7	5.3	20.6	6.5
3 to <6 months	18.2	35.7	13.7	5.3	20.6	6.5
6 to <12 months	18.2	35.7	13.7	5.3	20.6	6.5
1 to <2 years	16.5	35.5	13.0	5.7	23.1	6.3
2 to <3 years	8.4	41.0	14.4	4.7	25.3	6.3
3 to <6 years	8.0	41.2	14.0	4.9	25.7	6.4
6 to <11 years	6.1	39.6	14.0	4.7	28.8	6.8
11 to <16 years	4.6	39.6	14.3	4.5	30.4	6.6
16 to <21 years	4.1	41.2	14.6	4.5	29.5	6.1
Adult Males ≥21	6.6	40.1	15.2	5.2	33.1	6.7
Adult Females ≥21	6.2	35.4	12.8	4.8	32.3	6.6

Surface Area of Body Parts

	Head		Trunk		Arms		Hands		Legs		Feet	
	Mean m^2	95th m^2	Mean m^2	95th m^2	Mean m^2	95th m^2	Mean m^2	95th m^2	Mean m^2	95th m^2	Mean m^2	95th m^2
Birth to 1 month	0.053	0.062	0.104	0.121	0.040	0.047	0.015	0.018	0.060	0.070	0.019	0.022
1 to <3 months	0.060	0.069	0.118	0.136	0.045	0.052	0.017	0.020	0.068	0.078	0.021	0.025
3 to <6 months	0.069	0.080	0.136	0.157	0.052	0.060	0.020	0.023	0.078	0.091	0.025	0.029
6 to <12 months	0.082	0.093	0.161	0.182	0.062	0.070	0.024	0.027	0.093	0.105	0.029	0.033
1 to <2 years	0.087	0.101	0.188	0.217	0.069	0.079	0.030	0.035	0.122	0.141	0.033	0.038
2 to <3 years	0.051	0.059	0.250	0.287	0.088	0.101	0.028	0.033	0.154	0.177	0.038	0.044
3 to <6 years	0.060	0.076	0.313	0.391	0.106	0.133	0.037	0.046	0.195	0.244	0.049	0.061
6 to <11 years	0.066	0.090	0.428	0.586	0.151	0.207	0.051	0.070	0.311	0.426	0.073	0.100
11 to <16 years	0.073	0.095	0.630	0.816	0.227	0.295	0.072	0.093	0.483	0.626	0.105	0.136
16 to <21 years	0.076	0.096	0.759	0.961	0.269	0.340	0.083	0.105	0.543	0.687	0.112	0.142
Adult Males ≥21	0.136	0.154	0.827	1.10	0.314	0.399	0.107	0.131	0.682	0.847	0.137	0.161
Adult Females ≥21	0.114	0.121	0.654	0.850	0.237	0.266	0.089	0.106	0.598	0.764	0.122	0.146

Table ES-1. Summary of Exposure Factor Recommendations (continued)

Chapter 7	**MEAN SOLID ADEHERENCE TO SKIN (mg/cm^2)**				
	Face	Arms	Hands	Legs	Feet
Children					
Residential (indoors)[a]	-	0.0041	0.0011	0.0035	0.010
Daycare (indoors and outdoors)[b]	-	0.024	0.099	0.020	0.071
Outdoor sports[c]	0.012	0.011	0.11	0.031	-
Indoor sports[d]	-	0.0019	0.0063	0.0020	0.0022
Activities with soil[e]	0.054	0.046	0.17	0.051	0.20
Playing in mud[f]	-	11	47	23	15
Playing in sediment[g]	0.040	0.17	0.49	0.70	21
Adults					
Outdoor sports[i]	0.0314	0.0872	0.1336	0.1223	-
Activities with soil[h]	0.0240	0.0379	0.1595	0.0189	0.1393
Construction activities[j]	0.0982	0.1859	0.2763	0.0660	-
Clamming[k]	0.02	0.12	0.88	0.16	0.58

[a] Based on weighted average of geometric mean soil loadings for 2 groups of children (ages 3 to 13 years; *N* = 10) playing indoors.
[b] Based on weighted average of geometric mean soil loadings for 4 groups of daycare children (ages 1 to 6.5 years; *N* = 21) playing both indoors and outdoors.
[c] Based on geometric mean soil loadings of 8 children (ages 13 to 15 years) playing soccer.
[d] Based on geometric mean soil loadings of 6 children (ages ≥8 years) and 1 adult engaging in Tae Kwon Do.
[e] Based on weighted average of geometric mean soil loadings for gardeners and archeologists (ages 16 to 35 years).
[f] Based on weighted average of geometric mean soil loadings of 2 groups of children (age 9 to 14 years; *N* = 12) playing in mud.
[g] Based on geometric mean soil loadings of 9 children (ages 7 to 12 years) playing in tidal flats.
[h] Based on weighted average of geometric mean soil loadings of 3 groups of adults(ages 23 to 33 years) playing rugby and 2 groups of adults (ages 24 to 34) playing soccer.
[i] Based on weighted average of geometric mean soil loadings for 69 gardeners, farmers, groundskeepers, landscapers, and archeologists (ages 16 to 64 years) for faces, arms and hands; 65 gardeners, farmers, groundskeepers, and archeologists (ages 16 to 64 years) for legs; and 36 gardeners, groundskeepers, and archeologists (ages 16 to 62) for feet.
[j] Based on weighted average of geometric mean soil loadings for 27 construction workers, utility workers and equipment operators (ages 21 to 54) for faces, arms, and hands; and based on geometric mean soil loadings for 8 construction workers (ages 21 to 30 years) for legs.
[k] Based on geometric mean soil loadings of 18 adults (ages 33 to 63 years) clamming in tidal flats.
- No data.

Chapter 8	**BODY WEIGHT**
	Mean Kg
Birth to 1 month	4.8
1 to <3 months	5.9
3 to <6 months	7.4
6 to <12 months	9.2
1 to <2 years	11.4
2 to <3 years	13.8
3 to <6 years	18.6
6 to <11 years	31.8
11 to <16 years	56.8
16 to <21 years	71.6
Adults	80.0

Table ES-1. Summary of Exposure Factor Recommendations (continued)

Chapter 9 — FRUIT AND VEGETABLE INTAKE

	Per Capita		Consumers-Only	
	Mean g/kg-day	95th Percentile g/kg-day	Mean g/kg-day	95th Percentile g/kg-day
Total Fruits				
Birth to 1 year	6.2	23.0[a]	10.1	25.8[a]
1 to <2 years	7.8	21.3[a]	8.1	21.4[a]
2 to <3 years	7.8	21.3[a]	8.1	21.4[a]
3 to <6 years	4.6	14.9	4.7	15.1
6 to <11 years	2.3	8.7	2.5	9.2
11 to <16 years	0.9	3.5	1.1	3.8
16 to <21 years	0.9	3.5	1.1	3.8
21 to <50 years	0.9	3.7	1.1	3.8
≥50 years	1.4	4.4	1.5	4.6
Total Vegetables				
Birth to 1 year	5.0	16.2[a]	6.8	18.1[a]
1 to <2 years	6.7	15.6[a]	6.7	15.6[a]
2 to <3 years	6.7	15.6[a]	6.7	15.6[a]
3 to <6 years	5.4	13.4	5.4	13.4
6 to <11 years	3.7	10.4	3.7	10.4
11 to <16 years	2.3	5.5	2.3	5.5
16 to <21 years	2.3	5.5	2.3	5.5
21 to <50 years	2.5	5.9	2.5	5.9
≥50 years	2.6	6.1	2.6	6.1

[a] Estimates are less statistically reliable based on guidance published in the *Joint Policy on Variance Estimation and Statistical Reporting Standards on NHANES III and CSFII Reports: NHIS/NCHS Analytical Working Group Recommendations* (NCHS, 1993).

Chapter 10 — FISH INTAKE

	Per Capita		Consumers-Only	
	Mean g/kg-day	95th Percentile g/kg-day	Mean g/kg-day	95th Percentile g/kg-day
General Population—Finfish				
All	0.16	1.1	0.73	2.2
Birth to 1 year	0.03	0.0[a]	1.3	2.9[a]
1 to <2 years	0.22	1.2[a]	1.6	4.9[a]
2 to <3 years	0.22	1.2[a]	1.6	4.9[a]
3 to <6 years	0.19	1.4	1.3	3.6[a]
6 to <11 years	0.16	1.1	1.1	2.9[a]
11 to <16 years	0.10	0.7	0.66	1.7
16 to <21 years	0.10	0.7	0.66	1.7
21 to <50 years	0.15	1.0	0.65	2.1
Females 13 to 49 years	0.14	0.9	0.62	1.8
≥50 years	0.20	1.2	0.68	2.0
General Population—Shellfish				
All	0.06	0.4	0.57	1.9
Birth to 1 year	0.00	0.0[a]	0.42	2.3[a]
1 to <2 years	0.04	0.0[a]	0.94	3.5[a]
2 to <3 years	0.04	0.0[a]	0.94	3.5[a]
3 to <6 years	0.05	0.0	1.0	2.9[a]
6 to <11 years	0.05	0.2	0.72	2.0[a]
11 to <16 years	0.03	0.0	0.61	1.9
16 to <21years	0.03	0.0	0.61	1.9
21 to <50 years	0.08	0.5	0.63	2.2
Females 13 to 49 years	0.06	0.3	0.53	1.8
≥50 years	0.05	0.4	0.41	1.2

Table ES-1. Summary of Exposure Factor Recommendations (continued)				
General Population—Total Finfish and Shellfish				
All	0.22	1.3	0.78	2.4
Birth to 1 year	0.04	0.0[a]	1.2	2.9[a]
1 to <2 years	0.26	1.6[a]	1.5	5.9[a]
2 to <3 years	0.26	1.6[a]	1.5	5.9[a]
3 to <6 years	0.24	1.6[a]	1.3	3.6[a]
6 to <11 years	0.21	1.4	0.99	2.7[a]
11 to <16 years	0.13	1.0	0.69	1.8
16 to <21 years	0.13	1.0	0.69	1.8
21 to <50 years	0.23	1.3	0.76	2.5
Females 13 to 49 years	0.19	1.2	0.68	1.9
≥50 years	0.25	1.4	0.71	2.1
[a] Estimates are less statistically reliable based on guidance published in the *Joint Policy on Variance Estimation and Statistical Reporting Standards on NHANES III and CSFII Reports: NHIS/NCHS Analytical Working Group Recommendations* (NCHS, 1993).				
Recreational Population—Marine Fish—Atlantic				
	Mean g/day	95th Percentile g/day		
3 to <6 years	2.5	8.8		
6 to <11 years	2.5	8.6		
11 to <16 years	3.4	13		
16 to <18 years	2.8	6.6		
>18 years	5.6	18		
Recreational Population—Marine Fish—Gulf				
3 to <6 years	3.2	13		
6 to <11 years	3.3	12		
11 to <16 years	4.4	18		
16 to <18 years	3.5	9.5		
>18 years	7.2	26		
Recreational Population—Marine Fish—Pacific				
3 to <6 years	0.9	3.3		
6 to <11 years	0.9	3.2		
11 to <16 years	1.2	4.8		
16 to <18 years	1.0	2.5		
>18 years	2.0	6.8		
Recreational Population—Freshwater Fish—See Chapter 10				
Native American Population—See Chapter 10				
Other Populations—See Chapter 10				
Chapter 11	**MEATS, DAIRY PRODUCTS, AND FAT INTAKE**			
	Per Capita		Consumers-Only	
	Mean g/kg-day	95th Percentile g/kg-day	Mean g/kg-day	95th Percentile g/kg-day
Total Meats				
Birth to 1 year	1.2	5.4[a]	2.7	8.1[a]
1 to <2 years	4.0	10.0[a]	4.1	10.1[a]
2 to <3 years	4.0	10.0[a]	4.1	10.1[a]
3 to <6 years	3.9	8.5	3.9	8.6
6 to <11 years	2.8	6.4	2.8	6.4
11 to <16 years	2.0	4.7	2.0	4.7
16 to <21 years	2.0	4.7	2.0	4.7
21 to <50 years	1.8	4.1	1.8	4.1
≥50 years	1.4	3.1	1.4	3.1
Total Dairy Products				
Birth to 1 year	10.1	43.2[a]	11.7	44.7[a]
1 to <2 years	43.2	94.7[a]	43.2	94.7[a]
2 to <3 years	43.2	94.7[a]	43.2	94.7[a]
3 to <6 years	24.0	51.1	24.0	51.1
6 to <11 years	12.9	31.8	12.9	31.8
11 to <16 years	5.5	16.4	5.5	16.4
16 to <21 years	5.5	16.4	5.5	16.4
21 to <50 years	3.5	10.3	3.5	10.3
≥50 years	3.3	9.6	3.3	9.6

Table ES-1. Summary of Exposure Factor Recommendations (continued)

	Total Fats			
Birth to 1 month	5.2	16	7.8	16
1 to <3 months	4.5	12	6.0	12
3 to <6 months	4.1	8.2	4.4	8.3
6 to <12 months	3.7	7.0	3.7	7.0
1 to <2 years	4.0	7.1	4.0	7.1
2 to <3 years	3.6	6.4	3.6	6.4
3 to <6 years	3.4	5.8	3.4	5.8
6 to <11 years	2.6	4.2	2.6	4.2
11 to <16 years	1.6	3.0	1.6	3.0
16 to <21 years	1.3	2.7	1.3	2.7
21 to <31 years	1.2	2.3	1.2	2.3
31 to <41 years	1.1	2.1	1.1	2.1
41 to <51 years	1.0	1.9	1.0	1.9
51 to <61 years	0.9	1.7	0.9	1.7
61 to <71 years	0.9	1.7	0.9	1.7
71 to <81 years	0.8	1.5	0.8	1.5
≥81 years	0.9	1.5	0.9	1.5

[a] Estimates are less statistically reliable based on guidance published in the *Joint Policy on Variance Estimation and Statistical Reporting Standards on NHANES III and CSFII Reports: NHIS/NCHS Analytical Working Group Recommendations* (NCHS, 1993).

Chapter 12 GRAINS INTAKE

	Per Capita		Consumers-Only	
	Mean g/kg-day	95th Percentile g/kg-day	Mean g/kg-day	95th Percentile g/kg-day
Birth to 1 year	3.1	9.5[a]	4.1	10.3[a]
1 to <2 years	6.4	12.4[a]	6.4	12.4[a]
2 to <3 years	6.4	12.4[a]	6.4	12.4[a]
3 to <6 years	6.2	11.1	6.2	11.1
6 to <11 years	4.4	8.2	4.4	8.2
11 to <16 years	2.4	5.0	2.4	5.0
16 to <21 years	2.4	5.0	2.4	5.0
21 to <50 years	2.2	4.6	2.2	4.6
≥50 years	1.7	3.5	1.7	3.5

[a] Estimates are less statistically reliable based on guidance published in the *Joint Policy on Variance Estimation and Statistical Reporting Standards on NHANES III and CSFII Reports: NHIS/NCHS Analytical Working Group Recommendations* (NCHS, 1993).

Chapter 13 HOME-PRODUCED FOOD INTAKE

	Mean g/kg-day	95th Percentile g/kg-day
	Consumer-Only Home-Produced Fruits, Unadjusted[a]	
1 to 2 years	8.7	60.6
3 to 5 years	4.1	8.9
6 to 11 years	3.6	15.8
12 to 19 years	1.9	8.3
20 to 39 years	2.0	6.8
40 to 69 years	2.7	13.0
≥70 years	2.3	8.7
	Consumer-Only Home-Produced Vegetables, Unadjusted[a]	
1 to 2 years	5.2	19.6
3 to 5 years	2.5	7.7
6 to 11 years	2.0	6.2
12 to 19 years	1.5	6.0
20 to 39 years	1.5	4.9
40 to 69 years	2.1	6.9
≥70 years	2.5	8.2
	Consumer-Only Home-Produced Meats, Unadjusted[a]	
1 to 2 years	3.7	10.0
3 to 5 years	3.6	9.1
6 to 11 years	3.7	14.0
12 to 19 years	1.7	4.3
20 to 39 years	1.8	6.2
40 to 69 years	1.7	5.2
≥70 years	1.4	3.5

Table ES-1. Summary of Exposure Factor Recommendations (continued)

	Consumer-Only Home-Caught Fish, Unadjusted[a]			
1 to 2 years	-		-	
3 to 5 years	-		-	
6 to 11 years	2.8		7.1	
12 to 19 years	1.5		4.7	
20 to 39 years	1.9		4.5	
40 to 69 years	1.8		4.4	
≥70 years	1.2		3.7	
	Per Capita for Populations that Garden or (Farm)			
	Home-Produced Fruits[b]		Home-Produced Vegetables[b]	
	Mean g/kg-day	95th Percentile g/kg-day	Mean g/kg-day	95th Percentile g/kg-day
1 to <2 years	1.0 (1.4)	4.8 (9.1)	1.3 (2.7)	7.1 (14)
2 to <3 years	1.0 (1.4)	4.8 (9.1)	1.3 (2.7)	7.1 (14)
3 to <6 years	0.78 (1.0)	3.6 (6.8)	1.1 (2.3)	6.1 (12)
6 to <11 years	0.40 (0.52)	1.9 (3.5)	0.80 (1.6)	4.2 (8.1)
11 to <16 years	0.13 (0.17)	0.62 (1.2)	0.56 (1.1)	3.0 (5.7)
16 to <21 years	0.13 (0.17)	0.62 (1.2)	0.56 (1.1)	3.0 (5.7)
21 to <50 years	0.15 (0.20)	0.70 (1.3)	0.56 (1.1)	3.0 (5.7)
50+ years	0.24 (0.31)	1.1 (2.1)	0.60 (1.2)	3.2 (6.1)
	Per Capita for Populations that Farm or (Raise Animals)			
	Home-Produced Meats[b]		Home-Produced Dairy	
	Mean g/kg-day	95th Percentile g/kg-day	Mean g/kg-day	95th Percentile g/kg-day
1 to <2 years	1.4 (1.4)	5.8 (6.0)	11 (13)	76 (92)
2 to <3 years	1.4 (1.4)	5.8 (6.0)	11 (13)	76 (92)
3 to <6 years	1.4 (1.4)	5.8 (6.0)	6.7 (8.3)	48 (58)
6 to <11 years	1.0 (1.0)	4.1 (4.2)	3.9 (4.8)	28 (34)
11 to <16 years	0.71 (0.73)	3.0 (3.1)	1.6 (2.0)	12 (14)
16 to <21 years	0.71 (0.73)	3.0 (3.1)	1.6 (2.0)	12 (14)
21 to <50 years	0.65 (0.66)	2.7 (2.8)	0.95 (1.2)	6.9 (8.3)
50+ years	0.51 (0.52)	2.1 (2.2)	0.92 (1.1)	6.7 (8.0)

[a] Not adjusted to account for preparation and post cooking losses.
[b] Adjusted for preparation and post cooking losses.
- No data.

Chapter 14 — TOTAL PER CAPITA FOOD INTAKE

	Mean g/kg-day	95th Percentile g/kg-day
Birth to 1 year	91	208[a]
1 to <3 years	113	185[a]
3 to <6 years	79	137
6 to <11 years	47	92
11 to <16 years	28	56
16 to <21 years	28	56
21 to <50 years	29	63
≥50 years	29	59

[a] Estimates are less statistically reliable based on guidance published in the *Joint Policy on Variance Estimation and Statistical Reporting Standards on NHANES III and CSFII Reports: NHIS/NCHS Analytical Working Group Recommendations* (NCHS, 1993).

Chapter 15 — HUMAN MILK AND LIPID INTAKE

	Mean		Upper Percentile	
	mL/day	mL/kg-day	mL/day	mL/kg-day
	Human Milk Intake			
Birth to 1 month	510	150	950	220
1 to <3 months	690	140	980	190
3 to <6 months	770	110	1,000	150
6 to <12 months	620	83	1,000	130
	Lipid Intake			
Birth to 1 month	20	6.0	38	8.7
1 to <3 months	27	5.5	40	8.0
3 to <6 months	30	4.2	42	6.1
6 to <12 months	25	3.3	42	5.2

Table ES-1. Summary of Exposure Factor Recommendations (continued)

Chapter 16 **ACTIVITY FACTORS**

	Time Indoors (total) minutes/day		Time Outdoors (total) minutes/day		Time Indoors (at residence) minutes/day	
	Mean	95th Percentile	Mean	95th Percentile	Mean	95th Percentile
Birth to <1 month	1,440	-	0	-	-	-
1 to <3 months	1,432	-	8	-	-	-
3 to <6 months	1,414	-	26	-	-	-
6 to <12 months	1,301	-	139	-	-	-
Birth to <1 year	-	-	-	-	1,108	1,440
1 to <2 years	1,353	-	36	-	1,065	1,440
2 to <3 years	1,316	-	76	-	979	1,296
3 to <6 years	1,278	-	107	-	957	1,355
6 to <11 years	1,244	-	132	-	893	1,275
11 to <16 years	1,260	-	100	-	889	1,315
16 to <21 years	1,248	-	102	-	833	1,288
18 to <64 years	1,159	-	281	-	948	1,428
>64 years	1,142	-	298	-	1,175	1,440

	Showering minutes/day		Bathing minutes/day		Bathing/Showering minutes/day	
	Mean	95th Percentile	Mean	95th Percentile	Mean	95th Percentile
Birth to <1year	15	-	19	30	-	-
1 to <2 years	20	-	23	32	-	-
2 to <3 years	22	44	23	45	-	-
3 to <6 years	17	34	24	60	-	-
6 to <11 years	18	41	24	46	-	-
11 to <16 years	18	40	25	43	-	-
16 to <21 years	20	45	33	60	-	-
18 to <64 years	-	-	-	-	17	-
>64 years	-	-	-	-	17	-

	Playing on Sand/Gravel minutes/day		Playing on Grass minutes/day		Playing on Dirt minutes/day	
	Mean	95th Percentile	Mean	95th Percentile	Mean	95th Percentile
Birth to <1 year	18	-	52	-	33	-
1 to <2 years	43	121	68	121	56	121
2 to <3 years	53	121	62	121	47	121
3 to <6 years	60	121	79	121	63	121
6 to <11 years	67	121	73	121	63	121
11 to <16 years	67	121	75	121	49	120
16 to <21 years	83	-	60	-	30	-
18 to <64 years	0 (median)	121	60 (median)	121	0 (median)	120
>64 years	0 (median)	-	121 (median)	-	0 (median)	-

	Swimming minutes/month	
	Mean	95th Percentile
Birth to <1 year	96	-
1 to <2 years	105	-
2 to <3 years	116	181
3 to <6 years	137	181
6 to <11 years	151	181
11 to <16 years	139	181
16 to <21 years	145	181
18 to <64 years	45(median)	181
>64 years	40(median)	181

Table ES-1. Summary of Exposure Factor Recommendations (continued)

	Occupational Mobility	
	Median Tenure (years) Men	Median Tenure (years) Women
All ages, ≥16 years	7.9	5.4
16 to 24 years	2.0	1.9
25 to 29 years	4.6	4.1
30 to 34 years	7.6	6.0
35 to 39 years	10.4	7.0
40 to 44 years	13.8	8.0
45 to 49 years	17.5	10.0
50 to 54 years	20.0	10.8
55 to 59 years	21.9	12.4
60 to 64 years	23.9	14.5
65 to 69 years	26.9	15.6
≥70 years	30.5	18.8

	Population Mobility			
	Residential Occupancy Period (years)		Current Residence Time (years)	
	Mean	95th Percentile	Mean	95th Percentile
All	12	33	13	46

- No data.

Chapter 17 CONSUMER PRODUCTS - See Chapter 17

Chapter 18 LIFE EXPECTANCY

	Years
Total	78
Males	75
Females	80

Chapter 19 BUILDING CHARACTERISTICS

	Residential Buildings	
	Mean	10th Percentile
Volume of Residence (m^3)	492	154
Air Exchange Rate (air changes/hour)	0.45	0.18

	Non-Residential Buildings	
	Mean (Standard Deviation)	10th Percentile
Volume of Non-residential Buildings (m^3)		408
Vacant	4,789	510
Office	5,036	2,039
Laboratory	24,681	1,019
Non-refrigerated warehouse	9,298	476
Food sales	1,889	816
Public order and safety	5,253	680
Outpatient healthcare	3,537	1,133
Refrigerated warehouse	19,716	612
Religious worship	3,443	595
Public assembly	4,839	527
Education	8,694	442
Food service	1,889	17,330
Inpatient healthcare	82,034	1,546
Nursing	15,522	527
Lodging	11,559	1,359
Strip shopping mall	7,891	35,679
Enclosed mall	287,978	510
Retail other than mall	3,310	459
Service	2,213	425
Other	5,236	527
All Buildings	5,575	
Air Exchange Rate (air changes/hour)	1.5 (0.87) Range 0.3–4.1	0.60

ACRONYMS AND ABBREVIATIONS

AAP	=	American Academy of Pediatrics
ACH	=	Air Changes per Hour
ADAFs	=	Age Dependent Adjustment Factors
ADD	=	Average Daily Dose
AF	=	Adherence Factor
AHS	=	American Housing Survey
AIR	=	Acid Insoluble Residue
API	=	Asian and Pacific Islander
ASHRAE	=	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASTM	=	American Society for Testing and Materials
ARS	=	Agricultural Research Service
ASCII	=	American Standard Code for Information Interchange
ATD	=	Arizona Test Dust
ATSDR	=	Agency for Toxic Substances and Disease Registry
ATUS	=	American Time Use Survey
BI	=	Bootstrap Interval
BMD	=	Benchmark Dose
BMI	=	Body Mass Index
BMR	=	Basal Metabolic Rate
BTM	=	Best Tracer Method
BW	=	Body Weight
C	=	Concentration
CATI	=	Computer-Assisted Telephone Interviewing
CDC	=	Centers for Disease Control and Prevention
CDFA	=	California Department of Food and Drugs
CDS	=	Child Development Supplement
CHAD	=	Consolidated Human Activity Database
CI	=	Confidence Interval
cm^2	=	Square Centimeter
cm^3	=	Cubic Centimeter
CNRC	=	Children's Nutrition Research Center
CRITFC	=	Columbia River Inter-Tribal Fish Commission
CSFII	=	Continuing Survey of Food Intake by Individuals
CT	=	Central Tendency
CTFA	=	Cosmetic, Toiletry, and Fragrance Association
CV	=	Coefficient of Variation
DAF	=	Dosimetry Adjustment Factor
DARLING	=	Davis Area Research on Lactation, Infant Nutrition and Growth
DHHS	=	Department of Health and Human Services
DIR	=	Daily Inhalation Rate
DIY	=	Do-It-Yourself
DK	=	Respondent Replied "Don't Know"
DLW	=	Doubly Labeled Water
DOE	=	Department of Energy
DONALD	=	Dortmund Nutritional and Anthropometric Longitudinally Designed
E or EE	=	Energy Expenditure
EBF	=	Exclusively Breastfed
ECG	=	Energy Cost of Growth
ED	=	Exposure Duration

ACRONYMS AND ABBREVIATIONS (continued)

EFAST	=	Exposure and Fate Assessment Screening Tool
EI	=	Energy Intake
EPA	=	Environmental Protection Agency
ERV	=	Energy Recovery Ventilator
EVR	=	Equivalent Ventilation Rate
F	=	Fahrenheit
f_B	=	Breathing Frequency
FCID	=	Food Commodity Intake Database
FITS	=	Feeding Infant and Toddler Study
F/S	=	Food/Soil
g	=	Gram
GAF	=	General Assessment Factor
GM	=	Geometric Mean
GSD	=	Geometric Standard Deviation
H	=	Oxygen Uptake Factor
HEC	=	Human Equivalent Exposure Concentrations
HR	=	Heart Rate
HRV	=	Heat Recovery Ventilator
USHUD	=	United States Department of Housing and Urban Development
I	=	Tabulated Intake Rate
I_A	=	Adjusted Intake Rate
I-BEAM	=	Indoor Air Quality Building and Assessment Model
ICRP	=	International Commission on Radiological Protection
IEUBK	=	Integrated Exposure and Uptake Biokinetic Model
IFS	=	Iowa Fluoride Study
IOM	=	Institute of Medicine
IPCS	=	International Programme on Chemical Safety
IR	=	Intake Rate/Inhalation Rate
IRIS	=	Integrated Risk Information System
IUR	=	Inhalation Unit Risk
Kcal	=	Kilocalories
KJ	=	Kilo Joules
K-S	=	Kolmogorov-Smirnov
kg	=	Kilogram
L	=	Liter
L_1	=	Cooking or Preparation Loss
L_2	=	Post-cooking Loss
LADD	=	Lifetime Average Daily Dose
LCL	=	Lower Confidence Limit
LTM	=	Limiting Tracer Method
m^2	=	Square Meter
m^3	=	Cubic Meter
MCCEM	=	Multi-Chamber Concentration and Exposure Model
MEC	=	Mobile Examination Center
mg	=	Milligram
MJ	=	Mega Joules
mL	=	Milliliter
METS	=	Metabolic Equivalents of Work
MOA	=	Mode of Action
MSA	=	Metropolitan Statistical Area
MVPA	=	Moderate-to-Vigorous Physical Activity
N	=	Number of Subjects or Respondents

ACRONYMS AND ABBREVIATIONS (continued)

N_c	=	Weighted Number of Individuals Consuming Homegrown Food Item
N_T	=	Weighted Total Number of Individuals Surveyed
NAS	=	National Academy of Sciences
NCEA	=	National Center for Environmental Assessment
NCHS	=	National Center for Health Statistics
NERL	=	National Exposure Research Laboratory
NFCS	=	Nationwide Food Consumption Survey
NHANES	=	National Health and Nutrition Examination Survey
NHAPS	=	National Human Activity Pattern Survey
NHES	=	National Health Examination Survey
NIS	=	National Immunization Survey
NLO	=	Non-Linear Optimization
NMFS	=	National Marine Fisheries Service
NOAEL	=	No-Observed-Adverse-Effect-Level
NOPES	=	Non-Occupational Pesticide Exposure Study
NR	=	Not Reported
NRC	=	National Research Council
NS	=	No Statistical Difference
OPP	=	Office of Pesticide Programs
ORD	=	Office of Research and Development
PBPK	=	Physiologically-Based Pharmacokinetic
PC	=	Percent Consuming
PDIR	=	Physiological Daily Inhalation Rate
PFT	=	Perfluorocarbon Tracer
PSID	=	Panel Study of Income Dynamics
PTEAM	=	Particle Total Exposure Assessment Methodology
RAGS	=	Risk Assessment Guidance for Superfund
RDD	=	Random Digit Dial
RECS	=	Residential Energy Conservation Survey
RfD	=	Reference Dose
RfC	=	Reference Concentration
ROP	=	Residential Occupancy Period
RTF	=	Ready to Feed
SA	=	Surface Area
SA/BW	=	Surface Area to Body Weight Ratio
SAS	=	Statistical Analysis Software
SCS	=	Soil Contact Survey
SD	=	Standard Deviation
SDA	=	Soaps and Detergent Association
SE	=	Standard Error
SEM	=	Standard Error of the Mean
SES	=	Socioeconomic Status
SHEDS	=	Stochastic Human Exposure and Dose Simulation Model
SMBRP	=	Santa Monica Bay Restoration Project
SMRB	=	Simmons Market Research Bureau
SOCAL	=	Southern California
SPS	=	Statistical Processing System
t	=	Exposure Time
TDEE	=	Total Daily Energy Expenditure
TRF	=	Tuna Research Foundation

ACRONYMS AND ABBREVIATIONS (continued)

UCL	=	Upper Confidence Limit
USDA	=	United States Department of Agriculture
USDL	=	United States Department of Labor
VE	=	Volume of Air Breathed per Day
VO_2	=	Oxygen Consumption Rate
VOC	=	Volatile Organic Compounds
VQ	=	Ventilatory Equivalent
VR	=	Ventilation Rate
VT	=	Tidal Volume
WHO	=	World Health Organization
WIC	=	USDA's Women, Infants, and Children Program