



**United States Environmental Protection Agency
Office of Pesticide Programs
Antimicrobials Division**

Indirect Dietary Residential Exposure Assessment Model (IDREAM) User Guide

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The Agency notes the following:

IDREAM was originally proposed with “incidental” in the title; however, after further review, the Agency has determined that “indirect” better describes the types of exposures that are assessed by this model. The model and User Guide were revised to reflect the change to “indirect”; however, the supporting documentation provided by the American Chemistry Council Biocides Panel and Exponent, Inc. have not been updated.

This manual contains materials directly taken from *A Tiered Model to Assess Incidental Ingestion Exposure to Residential Antimicrobial Cleaning Products*, December 16, 2013, as prepared by Exponent, Inc. for the American Chemistry Council Biocides Panel.

I. General Overview of IDREAM

The Indirect Dietary Residential Exposure Assessment Model (IDREAM) estimates indirect ingestion exposure to disinfectants used in residential settings on hard surfaces where there may be inadvertent transfer to edible items prepared on those surfaces. IDREAM was developed by the American Chemistry Council Biocides Panel (the Panel) in response to a need identified by the United States Environmental Protection Agency (US EPA), Antimicrobials Division. The first version was submitted and reviewed in detail by the EPA. A revised version was then developed and submitted to the EPA in December 2013. Since then, the EPA has reviewed this final version and determined that it is appropriate for regulatory use.

IDREAM was developed specifically to estimate potential acute and chronic indirect ingestion exposures resulting from the use of antimicrobial products on kitchen surfaces in the home. All underlying assumptions in IDREAM are based on behavior of consumers in the home using hard-surface disinfectants. These behaviors include how hard-surface disinfectants are used and how consumers prepare food in the home. This use of such products in the home does not result in potential residues in food subject to regulation under the Federal Food, Drug, and Cosmetic Act (FFDCA).

Specifically, IDREAM incorporates certain basic inputs and parameters that are specific to residential uses of hard-surface disinfectants and cleaners which are not applicable elsewhere (i.e., are irrelevant to commercial usage). It relies upon concepts of food consumption and preparation patterns in the home, categorizes foods based on physical form and likelihood of residential countertop contact, and incorporates several significant conservative assumptions and defaults. The food consumption rates (mg/kg bw/day) used in IDREAM are derived from the 2005-2010 cycles of the U.S. Department of Agriculture's (USDA's) National Health and Nutrition Examination Survey, What We Eat in America (NHANES/WWEIA).

This model applies only to uses of hard-surface antimicrobial products used in residential settings and cannot be used to assess exposures for other settings (i.e., soft surfaces, commercial settings, etc.).

The purpose of this User Guide is to provide some background information about IDREAM and to familiarize users with the inputs that are required to run the model. IDREAM is used for Tier 2 and Tier 3 assessments. The model consists of an Excel spreadsheet with several tabs that automatically calculate exposure and risk estimates based on limited data entry by the user.

Additional background information can be found in *A Tiered Model to Assess Incidental Ingestion Exposure to Residential Antimicrobial Cleaning Products* (Exponent, Inc.; December 16, 2013).

II. Brief Overview of Assessment Tiers

EPA uses a tiered approach when calculating acute and chronic indirect ingestion exposure estimates resulting from the use of disinfectants on kitchen surfaces in the home. Tier 1 analyses are unrefined and provide the most conservative exposure estimate. If a Tier 1 assessment

results in an exposure estimate that is <100% of the population-adjusted dose (PAD), then additional refinements are not required. However, if the exposure estimate is >100% of the PAD, then the exposure assessor incorporates additional refinements and conducts a Tier 2 assessment. This process is repeated until additional refinements are not available and/or the exposure and risk estimates are below the level of concern. IDREAM is used for Tier 2 and Tier 3 assessments.

- Tier 1A: Default SOP (100% Transfer)
- Tier 1B: First Refinement (Residue Adjustment Factor)
- Tier 2: Food Consumption Model (General Refinement)
- Tier 3: Food Consumption Model (with Chemical-Specific Refinements)
- Tier 4: Advanced Exposure Assessment Model(s)

Tier 1A assessments assume that 1 mg/cm² of product residue is present on the kitchen surface, that the kitchen surface work area is 2000 cm², and that all of the residues present on the countertop (i.e., 100%) transfer from the countertop into food consumed by each individual daily. **Tier 1B** assessments incorporate a residue adjustment factor (i.e., a reduction of the percent transfer of residues to food, a reduction of residues due to a potable water rinse, etc.). The Tier 1 calculations were derived from a modification of the US Food and Drug Administration (FDA) guidance for assessing exposure to food contact sanitizing solutions as indirect food additives. If the exposure estimates derived from a Tier 1 assessment are greater than 100% of the PAD, then a Tier 2 assessment is completed using IDREAM.

The **Tier 2** food consumption model relies on concepts of food consumption and preparation patterns, and it takes advantage of data and assumptions that are not chemical-specific and are therefore applicable to a broad range of situations. Consequently, the Tier 2 approach is a generic model. Food ingredients are categorized based on food type, physical form, method of preparation and likelihood of residential countertop contact. Assumed countertop residues are converted to estimated residues in foods contacting the countertops using a representative conversion factor for each food ingredient category as well as a representative default residue transfer efficiency for each category. The Tier 2 algorithm combines estimated countertop active ingredient surface residues (CSR, mg/cm²), national food consumption data (IR, g/kg bw/day), a conversion factor consisting of ratio of the surface area of food contacting a countertop to the corresponding weight of the food (CSA/FW, cm²/g), factors for the likelihood that food will contact a countertop surface (LC, %), and the transfer efficiency of residues from countertops to foods (RTE, %).

For Tier 2 assessments, surface residue concentrations are derived from a default assumption of 1 mg/cm² product residue adjusted for the percent of active ingredient at in-use concentrations¹. The default level of antimicrobial product residue is taken directly from the FDA Guidelines for

¹ If chemical- and/or product-specific surface residue data are available, the assessment would be completed as a Tier 3 assessment.

Sanitizing Solutions (FDA/FSAN, OPA, 1993²). This value is considered conservative because no reduction in residues due to rinsing (e.g., potable water rinse) of the treated countertop surface is included.

If the antimicrobial substance under evaluation does not pass the default-based Tier 2 model (i.e., estimated exposures result in risk estimates that are >100% of the PAD), it may be necessary to refine the exposure estimates further with chemical-specific data. Such a refinement would constitute a **Tier 3** assessment. The Tier 3 model uses the same methodology and algorithms as those in Tier 2, but the incorporation of chemical- and/or product-specific data in place of the Tier 2 defaults allows for less conservative assumptions to be made, which results in a more realistic estimate of indirect ingestion exposures (compared to Tiers 1 and 2). The two major types of chemical-specific data envisioned are measured surface residues (either with or without potable water rinse) and residue transfer efficiency for representative foods in the major food categories. An additional potential refinement for a Tier 3 assessment would be updated or product-specific information from consumer behavior surveys. A Tier 3 assessment will result when any one or more of these types of data are incorporated into the calculations.

Tier 4 assessments are the most refined and typically require the generation of substantial data and construction of appropriate algorithms to estimate exposures. They are completed on a case-by-case chemical- or product-specific basis.

III. Subpopulations of Interest

IDREAM estimates acute (90th and 95th percentile) and chronic indirect dietary exposures for nine subpopulations:

- General U.S. Population,
- All infants (<1 year old),
- Children 1-2 years old,
- Children 3-5 years old,
- Children 6-12 years old,
- Youth 13-19 years old,
- Adults 20-49 years old,
- Adults 50+ years old, and
- Females 13-49 year old.

IV. Food Ingredient Classification

Estimating the transfer of surface residues to each separate food is not feasible for a screening-level model. Therefore, to facilitate modeling, food ingredient categories were developed by Exponent's nutritionists based on a review of food descriptions in the 2005-2010 cycles of the NHANES/WWEIA survey. All food ingredients were assigned to categories based on

² U.S. Food and Drug Administration (FDA), Center for Food Safety and Applied Nutrition (CFSAN), OPA. 1993. Sanitizing Solutions: Chemistry Guidelines for Food Additive Petitions. Version 1.1.

consideration of food ingredient type, food preparation methods, food physical properties, and the potential for contact with residential countertop surfaces. Based on this work, 9 food ingredients categories were included in IDREAM: bread; cheese; fruit; meat; vegetables; semisolids; pieces; powders; and liquids. *A Tiered Model to Assess Incidental Ingestion Exposure to Residential Antimicrobial Cleaning Products* (Exponent, Inc.; December 16, 2013) provides a detailed discussion of the classification and definitions of the food ingredients included in IDREAM.

V. Additional Background Information About Tier 2 and Tier 3 Assessments

Tier 2 and Tier 3 assessments use an approach that is similar to one developed by the World Health Organization (WHO³), where two large food portions are used as a worst-case scenario for acute dietary risk assessments as a suitable approximation of acute exposures. Instead of using large portion sizes, per user one-day 90th and 95th percentile food consumption rates have been determined for each food category. Estimated exposure for each food category is a result of many factors, including contact surface area, food weight, likelihood of contact, residue transfer and consumption rate. Rather than selecting the food consumption rates for the food categories to include in the acute dietary assessment models at the 90th or 95th percentile based on any one of these variables, it is more appropriate to select the food categories based on estimated exposure. Thus, it is necessary to identify the two food categories that result in the highest per user exposure. The two food categories with the highest per user exposure are used in the assessment because inclusion of 90th or 95th percentile food consumption rates for each food category in the acute model would result in overall total food consumption that considerably exceeded the desired percentile. In other words, the sum of 90th or 95th percentile consumption rate estimates for each of the nine food categories is far greater than the corresponding per user 90th or 95th percentile ‘all foods combined’ food consumption estimate. Additional details about this approach can be found in *A Tiered Model to Assess Incidental Ingestion Exposure to Residential Antimicrobial Cleaning Products* (Exponent, Inc.; December 16, 2013).

In Tier 2 assessments, meat and fruit represent the food categories with the highest per user acute exposure estimates. In order to produce a realistic estimate of acute exposures, Tier 2 assessments use the per user 90th or 95th percentile food consumption rates for meat and fruit (i.e., the two food categories with the highest per user exposure estimates) and per capita mean consumption rates for all other food categories. For acute Tier 3 assessments, when the Tier 2 defaults are replaced in the spreadsheet templates with refined chemical-specific data, it is likely that a different pattern of exposure estimates may result. In other words, unlike the situation in Tier 2, meat and fruit may no longer be the food categories with the highest per user acute exposure estimates. In this case, the risk assessor will have to identify the two food categories with the highest acute exposure estimates (using the “Acute 90-contributors” and “Acute 95-contributors” tabs) and then insert the appropriate food consumption rate estimates into the acute model.

³ World Health Organization (WHO). 1992. “Chapter 7, Estimating dietary intake of pesticide residues, FAO Manual on submission and evaluation of pesticide residues data for the estimation of maximum residue levels in food and feed.” FAO Plant Production and Protection Paper 170, pp. 83-92. FAO, Rome.

The per user 90th and 95th percentile one-day food consumption rates can be found in Tables 1 and 2, respectively. These consumption values should be used in Tier 3 assessments for the two food categories with the highest acute per user exposure estimates. The per capita two-day average food consumption rate values in Table 3 should be used for the remaining food commodities in Tier 3 assessments once the two food categories with the highest acute exposure estimates have been determined. Additional considerations are not required for Tier 3 chronic assessments since these assessments are based on per capita two-day average consumption rates.

Table 1. Per User 90th Percentile One-Day Food Consumption Rates for Select Subpopulations.^{1,2}

Food Category	Per User 90th Percentile 1-Day Acute Food Consumption Rate (g/kg bw/day)								
	U.S. Population	Infants <1 year	Children 1-2 years	Children 3-5 years	Children 6-12 years	Youth 13-19 years	Adults 20-49 years	Adults 50+ years	Females 13-49 years
Bread	7.0	10.4	17.2	15.3	11.3	7.4	5.4	4.1	5.3
Cheese	1.8	3.5	4.9	4.6	2.8	1.8	1.4	1.2	1.4
Fruit	7.6	20.3	22.6	19	11.3	6.2	5.5	5.1	5.6
Meat	4.6	11.1	11.7	9.5	6.1	4.8	4.2	3.3	3.7
Vegetables	6.1	14.5	14.4	12.3	7.8	5.0	5.5	5.5	5.6
Semisolids	4.0	23.2	15.9	11.8	7.3	3.6	2.8	3.0	3.0
Pieces	3.5	8.2	8.5	6.8	5.0	3.3	3.0	2.3	2.8
Powders	1.2	1.0	2.0	2.4	1.8	1.2	1.1	0.9	1.1
Liquids	65.9	195.9	142.3	97.1	66.9	52.8	58.7	49.3	56.0

¹ Source: *A Tiered Model to Assess Incidental Ingestion Exposure to Residential Antimicrobial Cleaning Products* (Exponent, Inc.; December 16, 2013).

² Use these values for the two food categories that result in the highest acute per user exposure estimate for the 90th percentile.

Table 2. Per User 95th Percentile One-Day Food Consumption Rates for Select Subpopulations.^{1,2}

Food Category	Per User 95th Percentile 1-Day Acute Food Consumption Rate (g/kg bw/day)								
	U.S. Population	Infants <1 year	Children 1-2 years	Children 3-5 years	Children 6-12 years	Youth 13-19 years	Adults 20-49 years	Adults 50+ years	Females 13-49 years
Bread	9.8	15.3	20.9	18.8	14.1	9.6	7.0	5.3	6.7
Cheese	2.5	4.6	6.5	5.9	3.9	2.4	1.8	1.5	1.9
Fruit	11.2	37.1	28.6	23.3	14.8	8.4	7.0	6.6	7.3
Meat	6.0	18.8	15.3	12.7	8.0	6.3	5.3	4.3	4.9
Vegetables	8.2	18.6	18.5	16.4	10.3	6.6	7.2	6.9	7.3
Semisolids	6.3	32.6	22.0	16.1	9.9	5.0	3.8	3.9	4.1
Pieces	4.9	10.9	10.6	10.0	6.7	4.5	4.3	3.2	3.8
Powders	1.7	1.5	3.1	3.4	2.5	1.8	1.6	1.3	1.6
Liquids	84.9	225.6	167.1	109.7	80.4	65.9	71.7	58.9	67.9

¹ Source: *A Tiered Model to Assess Incidental Ingestion Exposure to Residential Antimicrobial Cleaning Products* (Exponent, Inc.; December 16, 2013).

² Use these values for the two food categories that result in the highest acute per user exposure estimate for the 95th percentile.

Food Category	Per Capita 2-day Average Chronic Food Consumption Rate (g/kg bw/day)								
	U.S. Population	Infants <1 year	Children 1-2 years	Children 3-5 years	Children 6-12 years	Youth 13-19 years	Adults 20-49 years	Adults 50+ years	Females 13-49 years
Bread	3.0	1.6	8.8	7.5	5.5	3.4	2.4	1.8	2.3
Cheese	0.5	0.2	1.5	1.3	0.7	0.5	0.4	0.3	0.4
Fruit	1.8	1.9	8.0	5.8	2.8	1.1	1.2	1.6	1.3
Meat	2.0	0.8	4.2	3.8	2.6	1.9	1.9	1.6	1.6
Vegetables	2.5	1.7	5.5	4.5	2.8	1.8	2.3	2.5	2.3
Semisolids	1.4	5.2	5.6	4.2	2.4	1.0	0.8	1.0	0.9
Pieces	1.1	0.3	1.2	2.9	1.9	1.1	0.9	0.7	0.9
Powders	0.4	0.1	0.7	0.7	0.6	0.4	0.4	0.3	0.4
Liquids	37.1	109.4	92.1	62.1	40.2	29.9	34.5	29.9	32.4

¹ Source: *A Tiered Model to Assess Incidental Ingestion Exposure to Residential Antimicrobial Cleaning Products* (Exponent, Inc.; December 16, 2013).

² After the two the two food categories that result in the highest acute per user exposure estimate have been determined, use these values for the remaining food categories for both the 90th and 95th percentile.

Several assumptions and translations were made to determine the default residue transfer efficiency (RTE) data that are used in IDREAM. As a result, when chemical-specific RTE data are available, these data may apply to more than one food category. Table 4 summarizes the sources of the default RTEs and when a chemical-specific RTE for one food ingredient category can be translated to another food ingredient category.

Food Ingredient Category	Default RTE	Source of RTE ¹ <i>Notes on Potential Translations</i>
Bread	20%	Based on the assumption that fruit roll-ups would constitute a worst-case surrogate for bread. <i>Can apply chemical-specific bread RTEs data to powders.</i>
Cheese	55%	Based on available cheese data. <i>Can apply chemical-specific cheese RTE data to pieces.</i>
Fruit	70%	Based on available fruit data. <i>Can apply chemical-specific fruit RTE data to vegetables.</i>
Meat	80%	Based on available meat data.
Vegetables	70%	Vegetables were assumed to have the same RTE as fruit (70%) based on likely similar water contents. <i>Can apply chemical-specific fruit RTE data to vegetables.</i>
Semisolids	100%	Assumed 100% RTE for semisolid foods based on the anticipated high RTE anticipated for liquids and “wet” foods.
Pieces	55%	Pieces were assumed to have the same RTE as cheese (55%) since many food items in the pieces category are candies which are included in the cheese category for children <3 years old. <i>Can apply chemical-specific cheese RTE data to pieces.</i>
Powders	20%	Powders were assumed to have the same RTE as bread. <i>Can apply chemical-specific bread RTE data to powders.</i>
Liquids	100%	Assumed 100% RTE for liquid foods based on the anticipated high RTE anticipated for liquids and “wet” foods.

¹ Additional details can be found on page 23 of *A Tiered Model to Assess Incidental Ingestion Exposure to Residential Antimicrobial Cleaning Products* (Exponent, Inc.; December 16, 2013).

VI. Getting Started: Performing a Tier 2 Assessment

Tier 2 assessments are considered to be generic and require minimal input on the part of the user. The following information is needed to complete a Tier 2 dietary assessment using IDREAM:

- The tier of the assessment (Tier 2);
- The name of the active ingredient;
- The in-use active ingredient concentration (from the label); and
- The acute and chronic population adjusted doses (aPAD⁴, cPAD).

The user will complete the following steps as part of a Tier 2 assessment:

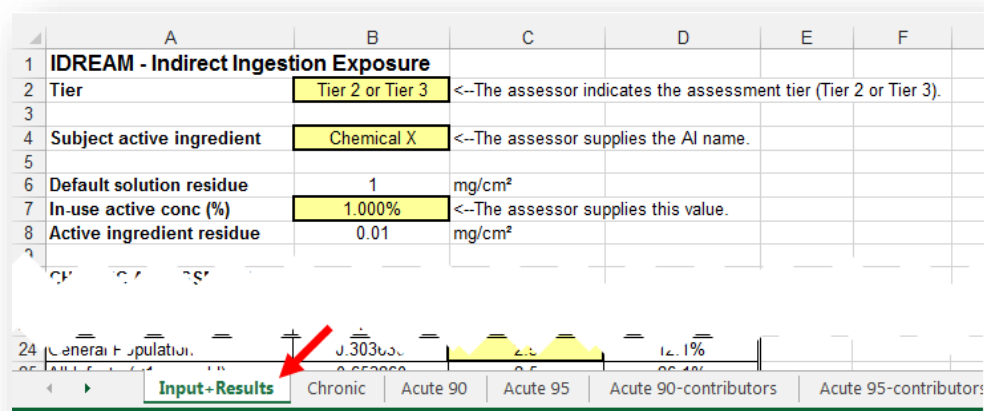
1. Open the “Inputs+Results” tab (Step 1).
2. Enter the background information (Step 2).
3. Add the chronic endpoint information to complete the chronic assessment (Step 3).
4. Add the acute endpoint information to complete the acute assessments (Step 4).

A detailed description of each step is provided below. For this example, we will use the information provided in Table 5.

Assessment Tier	Tier 2
Subject active ingredient	Chemical X
In-use active concentration (%)	1%
aPAD (for General U.S. population)	2.5 mg/kg/day
aPAD (for Females 13-49 years old)	1.4 mg/kg/day
cPAD (for all subpopulations)	0.6 mg/kg/day

Tier 2. Step 1: Opening the Inputs+Results Tab

Open the IDREAM spreadsheet and click on the “Inputs+Results” tab.



⁴ In some cases, there may be different aPADs for the general U.S. population and females 13-49 years of age. Different PADs can be used for all population subgroups in IDREAM, as needed.

Tier 2. Step 2: Entering Background Information

Type the assessment tier (i.e., Tier 2) into cell B2, the active ingredient name (i.e., Chemical X) into cell B4 and the in-use active ingredient concentration (i.e., 1%) into cell B7.

	A	B	C	D	E	F
1	IDREAM - Indirect Ingestion Exposure					
2	Tier	Tier 2	<--The assessor indicates the assessment tier (Tier 2 or Tier 3).			
3						
4	Subject active ingredient	Chemical X	<--The assessor supplies the AI name.			
5						
6	Default solution residue	1	mg/cm ²			
7	In-use active conc (%)	1.000%	<--The assessor supplies this value.			
8	Active ingredient residue	0.01	mg/cm ²			

Tier 2. Step 3: Conducting Chronic Assessments

For a **chronic** Tier 2 assessment, scroll down to the “Chronic Assessment” box on the “Inputs+Results” tab. Type the cPAD value (i.e., 0.6 mg/kg/day) into cell C12 and then press enter on your keyboard. Once the value is entered, the model will automatically populate the cPAD fields for each subpopulation and calculate the corresponding risk estimates (% cPAD). If a subpopulation has a cPAD value that is different from the general U.S. population cPAD value, this value can be manually entered into the cPAD cell for the subpopulation of interest. If the user manually enters a cPAD value for a specific subpopulation and then changes the general population cPAD value, the manually entered value for the other subpopulation will not change. Cell A10 will automatically be populated with the Tier information that is provided in cell B2.

	A	B	C	D
10	Tier 2	CHRONIC ASSESSMENT		
11	Subpopulation	Chronic Exposure (mg/kg/day)	cPAD (mg/kg/day)	% cPAD
12	General Population	0.041248	0.6	6.9%
13	All Infants (<1 year old)	0.030441	0.6	5.1%
14	Children 1-2 years old	0.117731	0.6	19.6%
15	Children 3-5 years old	0.099447	0.6	16.6%
16	Children 6-12 years old	0.062972	0.6	10.5%
17	Youth 13-19 years old	0.037825	0.6	6.3%
18	Adults 20-49 years old	0.033923	0.6	5.7%
19	Adults 50+ years old	0.031084	0.6	5.2%
20	Females 13-49 years old	0.032425	0.6	5.4%

Tier 2. Step 4: Conducting Acute Assessments

For an **acute** Tier 2 assessment, scroll down to the “Acute Assessment” boxes on the “Inputs+Results” tab. Assessments can be completed using the 90th percentile of exposure (the first acute assessment box) and the 95th percentile of exposure (the second acute assessment box). Enter the appropriate aPAD value(s) into cells C24, C32, C36, and C44. For this example,

the general U.S. population aPAD is 2.5 mg/kg/day and the females 13-49 years old aPAD is 1.4 mg/kg/day. If there is an aPAD for the general U.S. population only, enter it for both the general U.S. population and females 13-49 years old. Once the values are entered, the model will automatically populate the aPAD cells for the remaining subpopulations and calculate the corresponding risk estimates (% aPAD). Cells A22 and A34 will automatically be populated with the Tier information that is provided in cell B2.

	A	B	C	D
22	Tier 2	ACUTE ASSESSMENT (90th Percentile Inputs)		
23	Subpopulation	Acute Exposure (mg/kg/day)	aPAD (mg/kg/day)	% aPAD
24	General Population	0.303630	2.5	12.1%
25	All Infants (<1 year old)	0.653260	2.5	26.1%
26	Children 1-2 years old	0.813914	2.5	32.6%
27	Children 3-5 years old	0.683250	2.5	27.3%
28	Children 6-12 years old	0.430270	2.5	17.2%
29	Youth 13-19 years old	0.290340	2.5	11.6%
30	Adults 20-49 years old	0.255000	2.5	10.2%
31	Adults 50+ years old	0.215460	2.5	8.6%
32	Females 13-49 years old	0.239230	1.4	17.1%
33				
34	Tier 2	ACUTE ASSESSMENT (95th Percentile Inputs)		
35	Subpopulation	Acute Exposure (mg/kg/day)	aPAD (mg/kg/day)	% aPAD
36	General Population	0.388470	2.5	15.5%
37	All Infants (<1 year old)	1.088380	2.5	43.5%
38	Children 1-2 years old	0.997874	2.5	39.9%
39	Children 3-5 years old	0.835920	2.5	33.4%
40	Children 6-12 years old	0.530860	2.5	21.2%
41	Youth 13-19 years old	0.363840	2.5	14.6%
42	Adults 20-49 years old	0.307710	2.5	12.3%
43	Adults 50+ years old	0.264810	2.5	10.6%
44	Females 13-49 years old	0.297400	1.4	21.2%

Tier 2. Additional Information

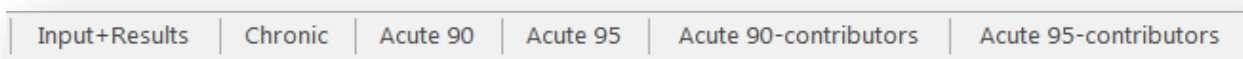
The five remaining tabs on the bottom of the spreadsheet window (“Chronic,” “Acute 90,” “Acute 95,” “Acute 90-contributors,” and “Acute 95-contributors”) provide the detailed calculations that are summarized in the “Input+Residue” tab. To better understand the calculations, the dietary assessor may want to review these tabs; however, no data inputs or revisions are required in order to complete a Tier 2 assessment.

Chronic	Acute 90	Acute 95	Acute 90-contributors	Acute 95-contributors
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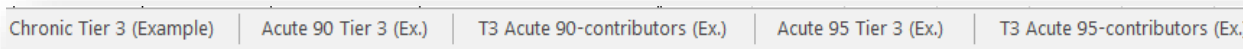
VII. Getting Started: Performing a Tier 3 Assessment

Tier 2 and Tier 3 assessments use the same set of spreadsheets. However, as part of a Tier 3 assessment, the user refines some of the Tier 2 defaults in the supporting tabs with chemical-specific refinement data and updates the food consumption rates, as needed. Examples of the chemical-specific refinement data include measured surface residues (either with or without potable water rinse), RTE data, and updated or product-specific information from consumer behavior surveys for representative foods in the major food categories. A Tier 3 analysis will result when one or more of these types of data are incorporated into the calculations. See Section V for additional background information about determining which food categories have the highest per user acute exposure estimates for Tier 3 assessments.

Users should work in the following tabs when completing a Tier 3 assessment:



The following tabs are included in the model as an example of how to conduct a Tier 3 assessment. The tabs correspond to the example outlined below.



The following information is needed to complete a Tier 3 dietary assessment using IDREAM:

- The tier of the assessment (Tier 3)
- The chemical name;
- The in-use active ingredient concentration;
- The acute and chronic population adjusted doses (aPAD, cPAD);
- Refinement data (i.e., refined consumer behavior data, chemical-specific residue data, and/or chemical-specific RTE data); and
- The 90th or 95th percentile food consumption rate estimates for the two food categories with the highest acute per user exposure estimates.

The user will complete the following steps as part of a Tier 3 assessment:

1. Open the “Inputs+Results” tab (Step 1).
2. Enter the background information (Step 2).
3. Update the “Chronic,” “Acute 90,” “Acute 95,” “Acute 90-contributors,” and “Acute 95-contributors” tabs with the chemical-specific data (Step 3).
4. Add the chronic endpoint information to complete the chronic assessment (Step 4).
5. Review the “Acute 90-contributors” and “Acute 95-contributors” tabs to determine if fruit and meat remain the highest acute per user exposure contributors for each subpopulation (Step 5).

6. If fruit and meat are still the highest contributors for each subpopulation, then the acute endpoint information is added and the acute assessments are complete (Steps 5A and 6).
7. If fruit and/or meat are no longer the highest acute per user exposure contributors for each subpopulation, then the food consumption rates for the subpopulations should be updated based on Tables 1-3. After the updates have been made, the acute endpoint information is added and the acute assessments are complete (Steps 5B and 6).

A detailed description of each step is provided below. For this example, we assume that chemical-specific CSR and RTE data for meat and bread have been provided. We will use the information outlined in Table 6.

Assessment Tier	Tier 3
Subject active ingredient	Chemical X
In-use active concentration (%)	0.1% ⁵
Measured maximum surface residues (CSR data)	0.0007 mg ai/cm ²
Measured RTE	Meat RTE: 40% (default = 80%) Bread ⁶ RTE: 5% (default = 20%)
aPAD (for General U.S. population)	2.0 mg/kg/day
aPAD (for Females 13-49 years old)	1.0 mg/kg/day
cPAD (for all subpopulations)	0.5 mg/kg/day

Tier 3. Step 1: Opening the Inputs+Results Tab

Open the IDREAM spreadsheet and click on the “Inputs+Results” tab.

	A	B	C	D	E	F
1	IDREAM - Indirect Ingestion Exposure					
2	Tier	Tier 3	<--The assessor indicates the assessment tier (Tier 2 or Tier 3).			
3						
4	Subject active ingredient	Chemical X	<--The assessor supplies the AI name.			
5						
6	Default solution residue	1	mg/cm ²			
7	In-use active conc (%)	0.100%	<--The assessor supplies this value.			
8	Active ingredient residue	0.0007	mg/cm ²			
9						
24	General Population	0.02	2.5	0.9%		

Navigation tabs: Input+Results, Chronic, Acute 90, Acute 95, Acute 90-contributors, Acute 95-contributors

⁵ Chemical X is applied at a concentration of 0.1%, so the default surface residue is 1 mg/cm² × 0.1% ai = 0.001 mg ai/cm², which is greater than the measured maximum surface residue of 0.0007 mg ai/cm². The Tier 3 assessment will use the measured maximum surface residue.

⁶ Note that the chemical-specific bread RTE data can be translated to powders. See Table 4.

Tier 3. Step 2: Entering Background Information

Type the assessment tier (Tier 3) into cell B2, the active ingredient name (i.e., Chemical X) into cell B4, the in-use active concentration (i.e., 0.1%) into cell B7, and the measured active ingredient residue (CSR data; 0.0007 mg ai/cm²) into cell B8. Note that the model uses the CSR value in cell B8 for the calculations. The model will still work if the user does not enter the in-use active concentration value in cell B7; however, it is recommended that the user still include this information for completeness.

	A	B	C	D	E	F
1	IDREAM - Indirect Ingestion Exposure					
2	Tier	Tier 3	<--The assessor indicates the assessment tier (Tier 2 or Tier 3).			
3						
4	Subject active ingredient	Chemical X	<--The assessor supplies the AI name.			
5						
6	Default solution residue	1	mg/cm ²			
7	In-use active conc (%)	0.100%	<--The assessor supplies this value.			
8	Active ingredient residue	0.0007	mg/cm ²			
9						

Tier 3. Step 3: Entering Chemical-Specific Data

The user will now need to replace the default RTEs with the chemical-specific RTE data. Use Table 4 to determine what chemical-specific RTE data can be translated to other food commodities. For this example, the bread chemical-specific RTE value of 5% can be translated to powders. The Example tabs (included in the model) highlight the RTE changes for meat, bread, and powders in blue.

Update the RTEs in the “Chronic,” “Acute 90,” and “Acute 95” tabs for the General U.S. population. Once the RTEs are updated for the General U.S. population, the other subpopulations will be automatically updated for each tab. Additionally, the “Acute 90-contributors,” and “Acute 95-contributors” tabs will be updated to reflect the RTEs in the “Acute 90” and “Acute 95” tabs, respectively.

	A	B	C	D	E	F	G	H	I	
1	CHRONIC	DIETARY EXPOSURE ASSESSMENT FOR						Chemical X		
2	Tier	Tier 3								
3										
4	GENERAL POPULATION									
5	Food Ingredient Category	Surface Area - Weight Ratio (cm ² /g)	Likelihood of Contact (%)	Residue Transfer Efficiency (%)	Residue Translation Factor (cm ² /g)	Mean Food Consumption Rate (g/kg bw/day)	Ingestion Exposure per Unit Surface Residue (mg/kg/d) / (mg/cm ²)	Active Surface Residue (mg/cm ²)	Ingestion Exposure (mg/kg/d)	
6										
7	Bread	3.6	57%	5%	0.103	3.0	0.308	0.0007	0.000215	
8	Cheese	3.2	30%	55%	0.528	0.5	0.264	0.0007	0.000185	
9	Fruit	1.5	36%	70%	0.378	1.8	0.680	0.0007	0.000476	
10	Meat	4.2	16%	40%	0.269	2.0	0.538	0.0007	0.000376	
11	Vegetables	1.1	24%	70%	0.185	2.5	0.462	0.0007	0.000323	
12	Semisolids	0.7	21%	100%	0.147	1.4	0.206	0.0007	0.000144	
13	Pieces	1.2	21%	55%	0.139	1.1	0.152	0.0007	0.000107	
14	Powders	3.2	21%	5%	0.034	0.4	0.013	0.0007	0.000009	
15	Liquids	n.a.	0%	100%	n.a.	37.1	n.a.	0.0007	n.a.	
16	General Population - Total Chronic Ingestion Exposure:								0.001836	

	A	B	C	D	E	F	G	H	I	
1	ACUTE (90th percentile) DIETARY EXPOSURE ASSESSMENT FOR:						Chemical X			
2	Tier		Tier 3							
3										
4	Note: Food consumption rates in <i>bold italics</i> at 90th Percentile, others at mean values.									
5	GENERAL POPULATION									
6										
7	Food Ingredient Category	Surface Area - Weight Ratio	Likelihood of Contact	Residue Transfer Efficiency	Residue Translation Factor	Food Consumption Rate	Ingestion Exposure per Unit Surface Residue	Active Surface Residue	Ingestion Exposure	
8		(cm ² /g)	(%)	(%)	(cm ² /g)	(g/kg bw)	(mg/kg/d) / (mg/cm ²)	(mg/cm ²)	(mg/kg/d)	
9	Bread	3.6	100%	5%	0.180	3.0	0.540	0.0007	0.000378	
10	Cheese	3.2	100%	55%	1.760	0.5	0.880	0.0007	0.000616	
11	Fruit	1.5	100%	70%	1.050	7.6	7.980	0.0007	0.005586	
12	Meat	4.2	100%	40%	1.680	4.6	7.728	0.0007	0.005410	
13	Vegetables	1.1	100%	70%	0.770	2.5	1.925	0.0007	0.001348	
14	Semisolids	0.7	100%	100%	0.700	1.4	0.980	0.0007	0.000686	
15	Pieces	1.2	100%	55%	0.660	1.1	0.726	0.0007	0.000508	
16	Powders	3.2	100%	5%	0.160	0.4	0.064	0.0007	0.000045	
17	Liquids	n.a.	0%	100%	n.a.	37.1	n.a.	0.0007	n.a.	
18	General Population - Total Acute Ingestion Exposure:								0.014576	

	A	B	C	D	E	F	G	H	I	
1	ACUTE (95th percentile) DIETARY EXPOSURE ASSESSMENT FOR						Chemical X			
2	Tier		Tier 3							
3										
4	Note: Food consumption rates in <i>bold italics</i> at 95th Percentile, others at mean values.									
5	GENERAL POPULATION									
6										
7	Food Ingredient Category	Surface Area - Weight Ratio	Likelihood of Contact	Residue Transfer Efficiency	Residue Translation Factor	Food Consumption Rate	Ingestion Exposure per Unit Surface Residue	Active Surface Residue	Ingestion Exposure	
8		(cm ² /g)	(%)	(%)	(cm ² /g)	(g/kg bw)	(mg/kg/d) / (mg/cm ²)	(mg/cm ²)	(mg/kg/d)	
9	Bread	3.6	100%	5%	0.180	3.0	0.540	0.0007	0.000378	
10	Cheese	3.2	100%	55%	1.760	0.5	0.880	0.0007	0.000616	
11	Fruit	1.5	100%	70%	1.050	11.2	11.760	0.0007	0.008232	
12	Meat	4.2	100%	40%	1.680	6.0	10.080	0.0007	0.007056	
13	Vegetables	1.1	100%	70%	0.770	2.5	1.925	0.0007	0.001348	
14	Semisolids	0.7	100%	100%	0.700	1.4	0.980	0.0007	0.000686	
15	Pieces	1.2	100%	55%	0.660	1.1	0.726	0.0007	0.000508	
16	Powders	3.2	100%	5%	0.160	0.4	0.064	0.0007	0.000045	
17	Liquids	n.a.	0%	100%	n.a.	37.1	n.a.	0.0007	n.a.	
18	General Population - Total Acute Ingestion Exposure:								0.018869	

Tier 3. Step 4: Conducting Chronic Assessments

After the chemical-specific RTE data have been added, to calculate the **chronic** Tier 3 exposure and risk estimates, return to the “Inputs+Results” tab and scroll down to the “Chronic Assessment” box. Enter the cPAD value (i.e., 0.5 mg/kg/day) into cell C12. Once the value is entered, the model will automatically populate the cPAD fields for each subpopulation and calculate the corresponding risk estimates (% cPAD). If a subpopulation has a cPAD value that is different from the general U.S. Population cPAD value, this value can be manually entered by the user for the subpopulation of interest. If the user manually enters a cPAD value for a specific subpopulation and then changes the general population cPAD value, the manually entered value for the other subpopulation will not change. Cell A10 will automatically be populated with the Tier information that is provided in cell B2.

	A	B	C	D
10	Tier 3	CHRONIC ASSESSMENT		
11	Subpopulation	Chronic Exposure (mg/kg/day)	cPAD (mg/kg/day)	% cPAD
12	General Population	0.001836	0.5	0.4%
13	All Infants (<1 year old)	0.001629	0.5	0.3%
14	Children 1-2 years old	0.005512	0.5	1.1%
15	Children 3-5 years old	0.004581	0.5	0.9%
16	Children 6-12 years old	0.002691	0.5	0.5%
17	Youth 13-19 years old	0.001529	0.5	0.3%
18	Adults 20-49 years old	0.001472	0.5	0.3%
19	Adults 50+ years old	0.001466	0.5	0.3%
20	Females 13-49 years old	0.001445	0.5	0.3%

Tier 3. Step 5A: Conducting Acute Assessments when Fruit and Meat Remain the Highest Acute per User Exposure Contributors

To complete the **acute** Tier 3 assessments, the user will need to identify the two food categories with the highest acute per user exposure estimates for each population subgroup (using the “Acute 90-contributors” and “Acute 95-contributors” tabs) and then insert the appropriate food consumption rate estimates into the acute model. To do this, use the “Acute 90-contributors” and “Acute 95-contributors” tabs. The RTE values in these tabs are automatically updated to reflect the RTEs in the “Acute 90” and “Acute 95” tabs.

Scroll down through the subpopulations to determine the two food categories that have the highest acute per user exposure estimates. The two highest acute per user exposure estimates will be highlighted in yellow for each subpopulation. For Tier 2 assessments, the highest per user exposure estimates are from the fruit and meat food categories. Since the Tier 2 and Tier 3 assessments use the same set of spreadsheets, the default highest acute per user exposure estimates for Tier 3 assessments are from fruit and meat. The user should determine if other

food categories have higher acute per user exposure estimates for each subpopulation after the chemical-specific data have been incorporated (see Section V for additional information).

For the Tier 3 example, fruit and meat remain the highest acute per user exposure contributors for all population subgroups; therefore, revisions are not required for the food consumption rates in the “Acute 90” and “Acute 95” tabs. Proceed to Step 6.

	A	B	C	D	E	F	G
1	ACUTE INGESTION EXPOSURES (90th percentile inputs)						
2	Tier	Tier 3					
3							
4	General Population						
5	Food Category	Surface Area - Weight Ratio	Likelihood of Contact	Residue Transfer Efficiency	Residue Translation Factor	Acute Food Consumption Rate	90th Percentile Ingestion Exposure per Unit Surface Residue
6		(cm ² /g)	(%)	(%)	(cm ² /g)	(g/kg bw/day)	(mg/kg/d) / (mg/cm ²)
7	Bread	3.6	100%	5%	0.18	7.0	1.3
8	Cheese	3.2	100%	55%	1.76	1.8	3.2
9	Fruit	1.5	100%	70%	1.05	7.6	8.0
10	Meat	4.2	100%	40%	1.68	4.6	7.7
11	Vegetables	1.1	100%	70%	0.77	6.1	4.7
12	Semisolids	0.7	100%	100%	0.70	4.0	2.8
13	Pieces	1.2	100%	55%	0.66	3.5	2.3
14	Powders	3.2	100%	5%	0.16	1.2	0.2
15	Liquids	1	0%	100%	0	65.9	0

The fruit and meat food categories are still the two categories with the highest acute per user exposure estimates, so additional changes are not required for this example to complete the acute analyses. This was the case for all population subgroups at the 90th and 95th percentiles. Only the 90th percentile general U.S. population has been shown.

Tier 3. Step 5B: Conducting Acute Assessments when Fruit and/or Meat Are Not the Highest Acute per User Exposure Contributors

If the highest acute per user exposure estimates are for food categories that are not fruit or meat, then the user will need to update the “Food Consumption Rate” cells for that subpopulation in the “Acute 90” and “Acute 95” tabs. The food categories with the two highest acute per user exposure estimates (highlighted in yellow) for each population subgroup should use the per user one-day food consumption rates from Table 1 (90th percentile) or Table 2 (95th percentile) in the “Acute 90” and “Acute 95” tabs for the food consumption rate. All other food categories should use the per-capita two-day average (Table 3) values for the food consumption rate.

For this part of the example, assume that chemical-specific RTE data are only available for fruit (5% transfer) and the measured maximum surface residues are 0.0007 mg ai/cm². Following Table 4, the fruit RTE data would be translated to vegetables. After the RTE data have been entered, it is determined that bread and meat are the two food categories with the highest per user exposure estimates at the 90th percentile (highlighted in yellow) for the general U.S. population, but meat and semisolids are the food categories with the highest per user exposure estimates at

the 90th percentile (highlighted in yellow) for all infants. The two food categories with the highest acute per user exposure estimate should be checked for **all** subpopulations at the 90th and 95th percentiles. Once the two highest contributors are identified for all subpopulations, the food consumption rates in the “Acute 90” and “Acute 95” tabs should be updated. After all of the updates have been made, the user should proceed to Step 6 to complete the acute assessments.

	A	B	C	D	E	F	G
1	ACUTE INGESTION EXPOSURES (90th percentile inputs)						
2	Tier	Tier 3					
3							
4	General Population						
5	Food Category	Surface Area - Weight Ratio	Likelihood of Contact	Residue Transfer Efficiency	Residue Translation Factor	Acute Food Consumption Rate	90th Percentile Ingestion Exposure per Unit Surface Residue
6		(cm ² /g)	(%)	(%)	(cm ² /g)	(g/kg bw/day)	(mg/kg/d) / (mg/cm ²)
7	Bread	3.6	100%	20%	0.72	7.0	5.0
8	Cheese	3.2	100%	55%	1.76	1.8	3.2
9	Fruit	1.5	100%	5%	0.08	7.6	0.6
10	Meat	4.2	100%	80%	3.36	4.6	15.5
11	Vegetables	1.1	100%	5%	0.06	6.1	0.3
12	Semisolids	0.7	100%	100%	0.70	4.0	2.8
13	Pieces	1.2	100%	55%	0.66	3.5	2.3
14	Powders	3.2	100%	20%	0.64	1.2	0.8
15	Liquids	1	0%	100%	0	65.9	0

	A	B	C	D	E	F	G
1	ACUTE INGESTION EXPOSURES (90th percentile inputs)						
2	Tier	Tier 3					
16							
17	All Infants (<1 yr)						
18	Food Category	Surface Area - Weight Ratio	Likelihood of Contact	Residue Transfer Efficiency	Residue Translation Factor	Acute Food Consumption Rate	90th Percentile Ingestion Exposure per Unit Surface Residue
19		(cm ² /g)	(%)	(%)	(cm ² /g)	(g/kg bw/day)	(mg/kg/d) / (mg/cm ²)
20	Bread	3.6	100%	20%	0.72	10.4	7.5
21	Cheese	3.2	100%	55%	1.76	3.5	6.2
22	Fruit	1.5	100%	5%	0.08	20.3	1.5
23	Meat	4.2	100%	80%	3.36	11.1	37.3
24	Vegetables	1.1	100%	5%	0.06	14.5	0.8
25	Semisolids	0.7	100%	100%	0.70	23.2	16.2
26	Pieces	1.2	100%	55%	0.66	8.2	5.4
27	Powders	3.2	100%	20%	0.64	1.0	0.6
28	Liquids	1	0%	100%	0	195.9	0

Even though the RTEs are the same for the general U.S. population and all infants, the two food categories that have the highest acute per user exposure estimate are different for these two subpopulations. Additionally, since fruit is no longer one of the two highest food category contributors, the “Acute 90” and “Acute 95” tabs will need to be updated. Only the Acute 90th contributor data have been shown. **All** subpopulations should be checked at the 90th and 95th percentiles.

	A	B	C	D	E	F	G	H	I	
1	ACUTE (90th percentile) DIETARY EXPOSURE ASSESSMENT FOR:						Chemical X			
2	Tier	Tier 3								
3										
4	Note: Food consumption rates in <i>bold italics</i> at 90th Percentile, others at mean values.									
5										
6	GENERAL POPULATION									
7	Food Ingredient Category	Surface Area - Weight Ratio (cm ² /g)	Likelihood of Contact (%)	Residue Transfer Efficiency (%)	Residue Translation Factor (cm ² /g)	Food Consumption Rate (g/kg bw)	Ingestion Exposure per Unit Surface Residue (mg/kg/d) / (mg/cm ²)	Active Surface Residue (mg/cm ²)	Ingestion Exposure (mg/kg/d)	
8										
9	Bread	3.6	100%	20%	0.720	<i>7.0</i>	5.040	0.0007	0.003528	
10	Cheese	3.2	100%	55%	1.760	0.5	0.880	0.0007	0.000616	
11	Fruit	1.5	100%	5%	0.075	<i>1.8</i>	0.135	0.0007	0.000095	
12	Meat	4.2	100%	80%	3.360	<i>4.6</i>	15.456	0.0007	0.010819	
13	Vegetables	1.1	100%	5%	0.055	2.5	0.138	0.0007	0.000096	
14	Semisolids	0.7	100%	100%	0.700	1.4	0.980	0.0007	0.000686	
15	Pieces	1.2	100%	55%	0.660	1.1	0.726	0.0007	0.000508	
16	Powders	3.2	100%	20%	0.640	0.4	0.256	0.0007	0.000179	
17	Liquids	n.a.	0%	100%	n.a.	37.1	n.a.	0.0007	n.a.	
18	General Population - Total Acute Ingestion Exposure: 0.016527									

Meat is still one of the top two contributors for the general U.S. population, so the food consumption rate stays the same. Fruit is no longer one of the top two contributors so the food consumption rate must be updated to reflect the general U.S. population per capita two-day average value in Table 3. Bread is now one of the top two contributors, so the food consumption rate should change from a per capita two-day average value (Table 3) to a per user 90th percentile one-day value (Table 1). This should be completed for **all** subpopulations at the 90th and 95th percentiles.

	A	B	C	D	E	F	G	H	I	
1	ACUTE (90th percentile) DIETARY EXPOSURE ASSESSMENT FOR:						Chemical X			
2	Tier	Tier 3								
3										
4	Note: Food consumption rates in <i>bold italics</i> at 90th Percentile, others at mean values.									
5										
20	ALL INFANTS (<1 YEAR OLD)									
21	Food Ingredient Category	Surface Area - Weight Ratio (cm ² /g)	Likelihood of Contact (%)	Residue Transfer Efficiency (%)	Residue Translation Factor (cm ² /g)	Food Consumption Rate (g/kg bw/day)	Ingestion Exposure per Unit Surface Residue (mg/kg/d) / (mg/cm ²)	Active Surface Residue (mg/cm ²)	Ingestion Exposure (mg/kg/day)	
22										
23	Bread	3.6	100%	20%	0.720	1.6	1.152	0.0007	0.000806	
24	Cheese	3.2	100%	55%	1.760	0.2	0.352	0.0007	0.000246	
25	Fruit	1.5	100%	5%	0.075	<i>1.9</i>	0.143	0.0007	0.000100	
26	Meat	4.2	100%	80%	3.360	<i>11.1</i>	37.296	0.0007	0.026107	
27	Vegetables	1.1	100%	5%	0.055	1.7	0.094	0.0007	0.000065	
28	Semisolids	0.7	100%	100%	0.700	<i>23.2</i>	16.240	0.0007	0.011368	
29	Pieces	1.2	100%	55%	0.660	0.3	0.198	0.0007	0.000139	
30	Powders	3.2	100%	20%	0.640	0.1	0.064	0.0007	0.000045	
31	Liquids	n.a.	0%	100%	n.a.	109.4	n.a.	0.0007	n.a.	
32	All Infants (<1 year old) - Total Acute Ingestion Exposure: 0.038877									

Meat is still one of the top two contributors for all infants, so the food consumption rate stays the same. Fruit is no longer one of the top two contributors so the food consumption rate must be updated to reflect the all infants per capita two-day average value in Table 3. Semisolids is now one of the top two contributors, so the food consumption rate should change from a per capita two-day average value (Table 3) to a per user 90th percentile one-day value (Table 1). This should be completed for **all** subpopulations at the 90th and 95th percentiles.

Tier 3. Step 6: Completing Acute Assessments

To complete the acute assessments, return to the “Inputs+Results” tab and scroll down to the “Acute Assessment” boxes on the “Inputs+Results” tab. Assessments can be completed using the 90th percentile of exposure (the first acute assessment box) and the 95th percentile of exposure (the second acute assessment box). Enter the aPAD value(s) into cells C24, C32, C36, and C44. For this example, the general U.S. population aPAD is 2.0 mg/kg/day and the females 13-49 years old aPAD is 1.0 mg/kg/day. If there is an aPAD for the general U.S. population only, enter it for both the general U.S. population and females 13-49 years old. Once the values are entered, the model will automatically populate the aPAD fields for the remaining subpopulations and calculate the corresponding risk estimates (% aPAD). Cells A22 and A34 will automatically be populated with the Tier information that is provided in cell B2.

	A	B	C	D
22	Tier 3	ACUTE ASSESSMENT (90th Percentile Inputs)		
23	Subpopulation	Acute Exposure (mg/kg/day)	aPAD (mg/kg/day)	% aPAD
24	General Population	0.014576	2.0	0.7%
25	All Infants (<1 year old)	0.032036	2.0	1.6%
26	Children 1-2 years old	0.039665	2.0	2.0%
27	Children 3-5 years old	0.033585	2.0	1.7%
28	Children 6-12 years old	0.020665	2.0	1.0%
29	Youth 13-19 years old	0.013259	2.0	0.7%
30	Adults 20-49 years old	0.011869	2.0	0.6%
31	Adults 50+ years old	0.010420	2.0	0.5%
32	Females 13-49 years old	0.011391	1.0	1.1%
33				
34	Tier 3	ACUTE ASSESSMENT (95th Percentile Inputs)		
35	Subpopulation	Acute Exposure (mg/kg/day)	aPAD (mg/kg/day)	% aPAD
36	General Population	0.018869	2.0	0.9%
37	All Infants (<1 year old)	0.053439	2.0	2.7%
38	Children 1-2 years old	0.048308	2.0	2.4%
39	Children 3-5 years old	0.040509	2.0	2.0%
40	Children 6-12 years old	0.025472	2.0	1.3%
41	Youth 13-19 years old	0.016640	2.0	0.8%
42	Adults 20-49 years old	0.014265	2.0	0.7%
43	Adults 50+ years old	0.012699	2.0	0.6%
44	Females 13-49 years old	0.014052	1.0	1.4%