ExpoFIRST

EPA'S EXPOSURE FACTORS INTERACTIVE RESOURCE FOR SCENARIOS TOOL

FREQUENTLY ASKED QUESTIONS

This document provides answers to frequently asked questions submitted by ExpoFIRST reviewers. The questions are organized by general questions in the first section with subsequent sections organized around each tab in ExpoFIRST; where applicable route-specific questions are noted.

Additional supporting documentation for ExpoFIRST users is provided in the tool. From the ExpoFIRST homepage select 'User's Guide and Other Resources' to access all ExpoFIRST user resources.

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1.0   GENERAL ExpoFIRST QUESTIONS

1.1   What is the purpose of the ExpoFIRST tool?

The purpose of the Exposure Factors Interactive Resource for Scenarios Tool (ExpoFIRST) is to allow users to draw on data found in the 2011 Exposure Factors Handbook (EFH), as updated,[1] to develop user-defined scenarios based on route of exposure, medium, receptor(s), timeframe, and dose metric for a contaminant of concern. The EFH provides data on drinking water consumption; soil ingestion; inhalation rates; dermal factors including skin area and soil adherence factors; intake of fruits and vegetables, fish, meats, dairy products, homegrown foods, and breast milk; activity patterns; body weight; consumer product use; and life expectancy.

ExpoFIRST pulls from a subset of the information provided in the EFH—primarily the recommended values given at the beginning of each EFH chapter. Assessors can modify initial parameters pulled from the EFH as appropriate to account for assessment specific knowledge and use the tool to calculate deterministic dose estimates as point estimates. Contaminant concentration and other information required to calculate dose that is not available in the EFH must be entered by the user.

1.2   Who is the intended audience for the ExpoFIRST tool?

ExpoFIRST was designed for exposure assessors for estimating human dose associated with commonly encountered exposure pathways using key data sets in the EFH. An understanding of general concepts of exposure assessment is assumed. For additional information on exposure assessment and related concepts, users are encouraged to see the 'Glossary' and 'User's Guide and Other Resources' links on the ExpoFIRST homepage. Definitions for many of the key terms used in exposure assessment are provided. Many of these definitions are taken directly from EPA's Guidelines for Exposure Assessment (U.S. EPA, 1992) or EPA's Exposure Factors Handbook (U.S. EPA, 2011). A comprehensive list of EPA resources (with hyperlinks) is available from the 'User's Guide and Other Resources' link to help users in conducting exposure and risk assessments.

1.3   What is the source of exposure factors for ExpoFIRST?

ExpoFIRST allows users to draw on data found in the Exposure Factors Handbook (EFH) only. Assessors can modify initial parameters pulled from the EFH as appropriate to account for assessment specific knowledge and use the tool to calculate deterministic dose estimates as point estimates. Exposure factors provided in other sources (e.g., OSWER's Standard Default Exposure Factors, regional or state documents) can be incorporated by users at their discretion. On the *Exposure Factors* tab, the user can view

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[1] EPA has updated selected chapters of the 2011 EFH. In this document "EFH" refers to the 2011 EFH as updated as of April 2019. All current EFH chapters are available at https://www.epa.gov/expobox/about-exposure-factors-handbook.

exposure factor values and parameter specific notes and can modify this information to be more scenario-specific.

1.4   How do I save my scenario?

New scenarios are saved automatically by ExpoFIRST. A list of all of user scenarios can be viewed by selecting 'My Scenarios' from the left-hand side of the ExpoFIRST home page or by selecting a scenario from the 'Go to Scenario' dropdown on the upper right corner of the tool.

Under 'My Scenarios', a list of all scenarios can be viewed along with the exposure route, dose metric, exposure descriptor, and medium for each scenario. At this screen, a user can view, delete, or search for saved scenarios interest. From this screen, results of one or more scenarios of interest can also be exported to an Excel report. Scenarios of interest can be selected by clicking the check boxes to the left of each scenario name. Use 'select all' to select all scenarios or 'clear all' to clear all selections. After all scenarios of interest are selected, click 'Export' to view the ExpoFIRST report in MS Excel.

1.5   How do I export my results to a report in MS Excel?

Saved scenarios can be exported to the MS Excel ExpoFIRST report by selecting one or more scenarios from the 'My Scenarios' link on the ExpoFIRST home page. Selecting 'Export to Excel' from the *Results* tab can also be used to access the 'My Scenarios' page where one or more scenarios can be chosen to export to an ExpoFIRST report.

Scenarios of interest can be selected by clicking the check boxes to the left of each scenario name. Use 'select all' to select all saved scenarios or 'clear all' to clear all selections. After all scenarios of interest are selected, click 'Export' to view the ExpoFIRST report in MS Excel.

The ExpoFIRST report provides: scenario name and description; a summary of all inputs and selections; the dose metric algorithm; exposure factors, sources, assumptions, and other important notes; and calculated dose estimates for all receptors. Dose equations are programmed into the ExpoFIRST report allowing users to make changes to input parameters and view resulting changes to the dose metric. See the *README* tab of the ExpoFIRST report for more information. The information from the *README* tab is also accessible from the ExpoFIRST home page by selecting 'User's Guide and Other Resources' and choosing 'User's Guide: Report Notes'.

1.6   What does 'Go to Scenario' do?

The 'Go to Scenario' dropdown menu that is located in the upper right portion of the ExpoFIRST screen provides users quick access to all saved scenarios.

1.7   How are "exposure" and "dose" different?

Exposure is the contact of a chemical, physical, or biological agent with the outer boundary of an organism. Exposure is quantified as the concentration of the agent in

the medium in contact integrated over the time duration of the contact. Dose is defined as the amount of a substance available for interaction with metabolic processes or biologically significant receptors after crossing the outer boundary of an organism. ExpoFIRST is used to estimate the dose.

1.8 Does the tool estimate dose for more than one route at a time?

No. Separate scenarios need to be run for each exposure route of interest. The 'Export to MS Excel' option allows users to view results in a report for multiple routes side by side, and can be used to combine values for multiple scenarios, if appropriate to estimate aggregate or cumulative doses.

1.9 Does the tool estimate dose for more than one exposure descriptor at a time?

No. Separate scenarios need to be run for each exposure descriptor of interest. The 'Export to MS Excel' option allows users to view results in a report for multiple exposure descriptors side by side to facilitate comparison.

1.10 Does the tool sum doses across lifestages (age groups)?

Yes. On the *Results* tab, ExpoFIRST provides a summary of dose estimates by contaminant and receptor group—including the dose estimate across all age groups. The MS Excel ExpoFIRST report also provides the dose estimate across all age groups on the *Summary* tab.

1.11 Will the tool incorporate national regulatory requirements that may apply to certain scenarios (e.g., drinking water standards) or toxicity information?

No. ExpoFIRST is a tool for estimating dose, but does not apply regulatory or toxicity values (e.g., maximum contaminant limits [MCLs], reference doses [RfDs], cancer slope factors [CSFs]) or incorporate steps to characterize risks.

1.12 Once I have left the *Scenario Description* tab, how can I see a log (on every page) of the selections made to date?

A log of user selections can be viewed at the top of each tab. This information is shown under the ExpoFIRST header in the 'Current Scenario' banner.

1.13 Where can I find more guidance on conducting exposure assessments?

Visit the 'User's Guide and Other Resources' link on the ExpoFIRST homepage, which provides a comprehensive list of EPA resources (with hyperlinks) to help users in conducting exposure and risk assessments.

1.14   How can I track scenario specific notes as I construct a scenario?

Click the button 'Record Scenario Notes' that is available on each tab of ExpoFIRST. The user can add notes at any stage of developing an exposure scenario. All scenario specific notes are exported to the MS Excel ExpoFIRST report.

1.15   Does ExpoFIRST include any default scenarios?

Default scenarios are not included in ExpoFIRST, but annotated screenshots for a selection of sample scenarios are included in the supporting materials. Select the 'User's Guide and Other Resources' button on the ExpoFIRST home page to view annotated screenshots for the sample scenarios.

1.16   Why does my ExpoFIRST screen look distorted or have text cut off?

Your screen size or the font size you are using may not be optimal for viewing ExpoFIRST pages. Try reducing the font size on your computer or reducing the screen display to 100 percent to correct the problem.

1.17   What happens if I go back and try to change some parameters in my scenario? Why do my selections clear even when I select no when asked if I want to continue?

All downstream parameters will be cleared. This is a function of how the tool was designed in MS Access. You will get the prompt shown below noting that all subsequent selections will be cleared if you make a change.

All selections will clear even when you select no if the screen is not complete and you move to the next screen. To retain your selections, you must fill in all information on the tab and go to next page. Then, if you return to the tab, make a change, but select no at this prompt your selections will be retained. (Also see FAQ 2.5.)
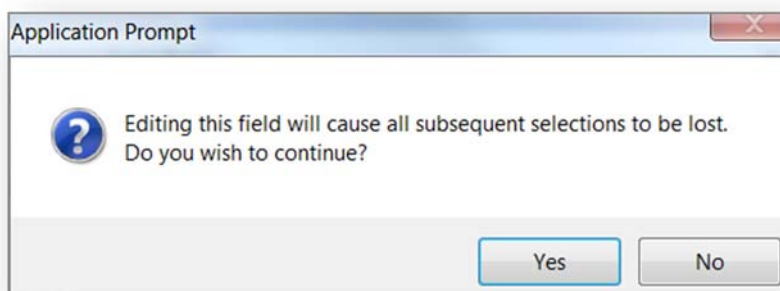
1.18 What is the rationale for the units used in the equations shown at the top of the *Exposure Factors* and *Results* tabs?

To maximize transparency the equations shown on the *Exposure Factors* and *Result* tabs contain the units used in the corresponding EFH table with conversion factors included as necessary. (Also see FAQ 5.9.)

2.0   SCENARIO DESCRIPTION TAB

General

2.1 How is the 'Scenario Name' field used? How should I name my scenario?

The scenario name field at the top of the *Scenario Description* tab is used to identify a given scenario using 'My Scenarios' on the home page or 'Go to Scenario' in the top right corner of all tabs. The scenario name can be added or changed at any point in building the scenario without losing downstream selections; however users must select a unique scenario name for each scenario.

When exporting multiple scenarios to the MS Excel ExpoFIRST report, the scenario name will be used as the sheet name in Excel. Users may find it helpful to number scenarios to facilitate referencing between the full scenario details sheet and the summary of all scenarios sheet in the report. See the 'Annotated Screenshots' for a Selection of Sample Scenarios by clicking the 'User's Guide and Other Resources' button on the ExpoFIRST home page for more details.

2.2 What is the difference between ADR, ADD, LADD, and AdjAir?

Average daily dose (ADD), lifetime average daily dose (LADD), and acute dose rate (ADR) are dose metrics used to calculate dose. The difference between these three metrics is the averaging time (AT). The ADD, which is used for many noncancer effects, averages doses over the period of time during which exposure occurred. The LADD is typically used for cancer assessments where the LADD is usually described in terms of lifetime probabilities, even though the exposure may not occur over the entire lifetime. For LADD, AT is replaced with lifetime. In ExpoFIRST, LADD scenarios use a default of 70 years for AT. If a scenario spans more than 70 years, AT will be blank and must be defined by the user. Scenarios that calculate ADR, AT is set to one day.

Inhalation risk assessments may require that an adjusted air (adjAir) concentration be used to represent continuous exposure. For noncarcinogens, the air concentration is adjusted based on the exposure duration. For carcinogens, the concentration is averaged over the lifetime of the exposed individual (often assumed to be 70 years). In ExpoFIRST, the user has adjAir concentration lifetime and less-than-lifetime options. Adjusted air lifetime scenarios use a default of 70 years.

2.3   How do the different exposure metric descriptors (central tendency, high-end, bounding) impact the resulting dose estimate?

Exposure descriptors account for individual and population variability and represent points on the distribution of doses.

- **Central tendency** potential dose rates may be estimated using central tendency values for all the input values in the algorithm.
- A **high-end** potential dose rate is a reasonable approximation of dose at the upper end of the distribution of doses. High-end values are estimated by setting some, but not all, input parameters to upper-end values.
- **Bounding** potential dose rates are estimated to be greater than the highest individual exposure in the population of interest. Bounding estimates use all upper-percentile inputs and are often used in screening-level assessments.

2.4   What are the percentiles used for "high end?"

If selected, ExpoFIRST typically uses the 95th percentile intake for a high-end scenario. In some instances, a 95th percentile value is not available in the EFH; in this case, 90th or 99th percentile values will be used when upper percentile values are selected. The input source is noted on the *Exposure Factors* tab and the user can modify all input values from this tab.

2.5   If I go back and reset an exposure parameter on the *Scenario Description* tab, why aren't all the downstream parameters retained?

This is a function of how the tool is designed in MS Access. (Also see FAQ 1.17.)

Ingestion Specific

2.6   Ingestion specific: Can I build a scenario for unintentional ingestion in ExpoFIRST?

Yes. ExpoFIRST includes multiple scenarios for unintentional ingestion including ingestion of water during swimming and ingestion of soil and dust. Choose ingestion as the route on the *Scenario Description* tab. On the *Media & Receptors* tab users can choose from Swimming (Unintentional) or Soil or Dust (Unintentional or Activity-Related).

Inhalation Specific

2.7   Inhalation specific: What is the difference between adjusted air scenarios and other available inhalation scenarios?

Current EPA methodology uses the principles of inhalation dosimetry to determine the human equivalent concentration (HEC) for calculating a Reference Concentration (RfC)

or Inhalation Unit Risk (IUR). According to these procedures, it is unnecessary to calculate inhaled dose when using dose-response factors from the Integrated Risk Information System (IRIS) in a risk assessment. However, there may be cases where an inhalation dose is of interest. Estimations of cumulative doses or analyses of relative pathway contributions are examples where an inhaled dose may be necessary. When developing an inhalation scenario in ExpoFIRST, the user can choose from several dose metrics. Each metric uses a different approach as noted in Table 1 below.

Table 1: Comparison of Inhalation Dose Metrics

Inhalation Dose Metric	Averaging Time (AT)	Uses Inhalation Rates?
Acute (ADR)	1 day	Yes; users can choose from short-term (activity specific) or long-term (daily) rates
Average Daily Dose (ADD)	Set equal to Exposure Duration (ED)	
Lifetime Average Daily Dose (LADD)	Set to 70 years[*]	
Adj. Air Conc: Less than Lifetime	Set equal Exposure Duration (ED)	No
Adj. Air Conc: Lifetime	Set to 70 years[*]	No

[*]For scenarios spanning more than 70 years, user must define AT.

For an acute (1-day) scenario using the adjusted air approach, dose is equal to the contaminant concentration. Because no exposure factors are needed for this scenario, a dose metric is not available in ExpoFIRST.

Dermal Specific

2.8 Dermal specific: What dermal scenarios are available in ExpoFIRST?

ExpoFIRST includes scenarios for water, sediment, soil, and dust. Scenarios for dermal exposure to consumer products are not included as these scenarios require few data from the 2011 Exposure Factors Handbook. Further, dermal scenarios for consumer products are approached differently across EPA offices based on office-specific policy or guidance.

3.0   MEDIA & RECEPTORS TAB

General

3.1 Why are media and receptors on the same tab?

The *Media & Receptors* tab collects information that will be used to build the dose algorithm. ExpoFIRST selects the appropriate algorithm and parameters based on the selection of 'Media Type'. The exposure factor inputs to the algorithm will be populated based on the user's receptor specific selections such as gender, age, activity/location type, and/or body surface area (dermal).

3.2   How do I define my receptor(s) of interest?

First, define age bins for the population of interest. These selections will be used to determine Exposure Time (ET), Ingestion Rate (IR), Surface Area (SA), or Inhalation Rate (InhR) as appropriate. The individual age bins selected must be continuous. The user cannot choose age bins that are discontinuous within a single scenario. For example, to run the same exposure scenario for children (ages 1–6 only) and adults, two separate scenarios would have to be run.

ExpoFIRST uses EPA's standardized age bins for children (individuals <21 years of age) that may be restored at any time. If an error has been made in constructing age bins, the user can 'delete all age bins' and redefine them.

Note that when calculating LADD, individual age bins are not necessary as the tool will combine all age groups to calculate LADD.

'Other population group' options that are available in the EFH might include race/ethnicity, pregnancy/lactation, socioeconomic status, disease status, and geographic location. The EFH does not provide exposure factor data by 'other population groups' and also by age. However, for some factors, data are available by age and gender. Users can access these data by building a gender specific scenario and selecting age groups.

3.3   Do I need to choose continuous age groups?

Yes. The individual age bins selected must be continuous. The user cannot choose age bins that are discontinuous within a single scenario. For example, to run the same exposure scenario for children (ages 1–6 only) and adults, two separate scenarios would have to be run.

3.4   Why doesn't my scenario provide dose estimates by age for my 'other population groups?'

ExpoFIRST provides estimates for age groups and 'other population groups' for which data are available in the EFH. Other than gender, the EFH does not provide exposure factor data by other population groups (e.g., ethnicity, region, season) and also by age. For some scenarios, data are available by age and gender. Users can access these data by building a gender specific scenario and selecting age groups.

3.5   Do I need to choose age bins *and* 'other population groups?'

No. Age groups and other population groups are independent of one another. Users can choose age bins, other population groups, or both, but results will be calculated for each group independently.

Other than gender, the EFH does not provide exposure factor data by 'other population groups' (e.g., ethnicity, region, season) and also by age. For some scenarios, data are available by age and gender. Users can access these data by building a gender specific scenario and selecting age groups.

3.6   What is the benefit of 'Restore Defaults' option on the age bin pop-up?

Users can modify the total age range and the individual age bins. If an error has been made in constructing the age bins, the user can 'restore defaults' to redefine them. The tool will default back to EPA's standardized age bins for children under age 21.

3.7   Why are there options to build both gender specific scenarios and scenarios for males and females combined for some exposure pathways, but not others?

EFH data are not gender specific (i.e., males only or females only) for all exposure factors. In many instances data are only available for males and females combined.

3.8   Why do I get a pop-up error when selecting age bins or 'other population groups' on the *Media & Receptors* tab?

This pop-up is a notification of missing data (i.e., the data are not available in the Exposure Factors Handbook). In these cases, the user will need to provide the missing data on the *Exposure Factors* tab to complete the scenario calculations. Here are some examples for missing data that must be user defined on the *Exposure Factors* tab:

- **Data are not found in the EFH**: exposure frequency (EF) of days per year on airplanes
- **Data are found in the EFH, but not for all age groups**: exposure time (ET) on airplanes for children aged birth to 12 years

Inhalation Specific

3.9   Inhalation specific: What categories are available when constructing an inhalation scenario?

When constructing an inhalation scenario, users can choose from 12 locations, activities, or products (e.g., household solvents) and 142 location, activity, or product subgroups (e.g., adhesive removers). Many items are cross-listed to make them easier to find. For example, indoors at school is listed under 'Other Indoor Location' and 'School'. Users can also search categories on the *Media & Receptors* tab when constructing inhalation scenarios.

3.10   Inhalation specific: Why is the event frequency the same for all ages in certain inhalation scenarios (i.e., household solvents and some cleaning activities)?

Data on uses/year or events/year for certain products or tasks from Tables 17.4 and 17.10 of the 2011 EFH are programmed into ExpoFIRST. These data are for whole population; they are not defined for particular age groups or populations.

When no other data are available, ExpoFIRST will populate event frequency for all age bins with data for the whole population. Users can easily override this default approach on the *Exposure Factors* tab. ExpoFIRST uses data from 17.4 and 17.10 for ADD and LADD scenarios when appropriate.

Table 17-4.   Frequency of Use for Household Solvent Products (users only)
Table 17‑10.   Mean Percentile Rankings for Frequency of Performing Household Tasks

Ingestion Specific

3.11 Ingestion specific: When constructing an ingestion scenario for unintentional or activity-related ingestion: soil and dust why don't I see all of the options for media subgroup?

For this scenario, users can choose from the following media subgroups:

- Geophagy
- Indoor Settled Dust
- Soil
- Soil and Dust
- Soil-Pica

However, note that central tendency data are not available for geophagy and soil-pica and will not appear in the dropdown list if the user chooses central tendency for ingestion rate. All media subgroups contain upper percentile data and are available on the media subgroup dropdown menu when constructing a scenario that uses upper percentile ingestion rates.

3.12 Ingestion specific: What is the difference between an ingestion and ingestion activity-related scenario?

Both of these scenarios use the same general model. Ingestion of food or water uses ingestion rates from Chapters 3, 9, 10, 11, 12, 13, and 15 of the EFH. These scenarios can be built using the 'ingestion' scenario selection. Users can also build a scenario for unintentional or activity-related ingestion using the 'ingestion' scenario selection and then selecting 'swimming (unintentional)' or 'soil or dust (unintentional or activity-related)' from the 'media type' dropdown menu.

3.13 Ingestion specific: Why are some data used in ingestion scenarios adjusted for body weight and other data are not?

In general, intake units (e.g., g/day or g/kg-day) are based on what is provided in the EFH tables. In cases where body weight-adjusted intake rates are available in the EFH, ExpoFIRST will select those intake rates rather than unadjusted rates. In cases where body weight-adjusted data are unavailable, unadjusted values (e.g., g/day) are used.

3.14 Ingestion specific: What is the difference between per capita and consumer-only as it pertains to receptor consumer type?

The EFH defines **consumer-only intake rate** as "the average quantity of food consumed per person in a population composed only of individuals who ate the food item of interest during a specified period."

The **per capita intake rate** refers to "the average quantity of food consumed per person in a population composed of both individuals who ate the food during a specified time period and those that did not."

3.15 Ingestion specific: Why is the consumer-only option sometimes not available or does not have age-specific ingestion rates?

There are two reasons why this might occur, including:

1. The data may not be available in the EFH. For example, consumer-only intake data for home-produced protected fruits are not available for children aged 1–2, 3-5, and 6-11 years old due to a low number of observations for those age groups.

2. The data may be available in the EFH, but the data are not programmed into ExpoFIRST. For example, at this time, consumer-only ingestion rates for individual fruits and vegetables are not available in ExpoFIRST, but are available in the EFH and could be entered by the user on the *Exposure Factors* tab.

3.16 Ingestion specific: Why are there only options for bottled and community water?

These are the only data available in the EFH. If your scenario involves private well water or non-community public water supplies you may input your own data or choose intake rates for bottled or community water.

3.17 Ingestion specific: Why is there no option for males only for water ingestion scenarios?

At this time ExpoFIRST only includes tables from the EFH with water ingestion rates for males and females combined and pregnant and lactating women.

Dermal Specific

3.18 Dermal specific: Does the tool allow users to estimate exposures to surface residues (e.g., from consumer spray products)?

No. Dermal scenarios for exposure to surface residues are not included in ExpoFIRST at this time.

3.19 Dermal specific: How were the list of activities/locations derived for Dermal: Solids scenarios and what do they mean (e.g., construction activities, activities with soil)?

Users can select from 10 activity/locations options when developing a dermal: solids scenario. These selections are based on the options in Table 7-4 of the EFH, which provides soil adherence factor data by body part for multiple activities and locations.

Users can pull up Table 7-4 of the EFH from the *Media and Receptors* tab of ExpoFIRST to see a description of each activity. ExpoFIRST also pulls this information into the description field for soil adherence.

For example, according to Table 7-4 of the EFH, 'Construction Activities: Adults' is based on a "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) for legs."

3.20 Dermal specific: For Dermal-Solids, why is there no residential (indoors) option for adults?

There are no recommended values for mean solids adherence to skin for residential adults indoors. See Table 7-4 in the EFH.

3.21 Dermal specific: What does 'Surface Area' refer to for a dermal contact exposure scenario?

The dermal dose algorithm includes a parameter for surface area of the skin that is exposed. ExpoFIRST loads data from the 2011 Exposure Factors Handbook on the average body surface area for total and individual body parts when developing dermal scenarios.

3.22 Dermal specific: Why isn't Total Surface Area available for Dermal-Solids?

Dermal Solids scenarios are based on activities and locations that have soil adherence factor data available in Table 7-4. All of the activities and locations assume exposure will be to one or more body parts only (e.g., hands and feet)—not to the total body. Dermal water scenarios allow the user to select total body for surface area which may be applicable for swimming and showering scenarios.

3.23 Dermal specific: What should I consider when choosing body parts for estimating dermal doses?

Users should make selections for body parts based on professional judgment for the scenario of interest. For example, for Dermal: Water scenarios, users can select total body, one or more body parts, or enter a user-defined value. For Dermal: Solids scenarios, users can select one or more body parts based on the availability of soil adherence data in Table 7-4 or enter a user-defined value.

3.24 Dermal specific: What does the "User-defined" option do under 'Surface Area'?

When user-defined is selected for surface area in dermal scenarios on the *Media & Receptors* tab, the user will be required to enter a value for surface area of the skin on the *Exposure Factors* tab. Note that because the selection for surface area of the skin dictates the value for soil adherence factor that the tool will use in Dermal: Solids scenarios, the tool will also require the user to enter soil adherence factors on the *Exposure Factors* tab when 'user defined' is selected for surface area.

4.0 CONTAMINANT TAB

4.1 How do I add contaminants?

The 'Manage Contaminants' feature in ExpoFIRST allows users to add contaminants and corresponding chemical specific data (e.g., molecular weight, dermal permeability coefficient), as needed for the scenario of interest. These data will be automatically loaded into algorithms where applicable whenever this contaminant is selected. Users can also delete or modify chemical specific data using the 'Manage Contaminants' feature in ExpoFIRST.

4.2 Why do I have to convert my contaminant concentrations?

Contaminant concentrations and values for other exposure factors in the dose algorithms must be expressed in consistent units. ExpoFIRST includes a 'Unit Conversion' feature that can be accessed by clicking the 'Unit Conversions' button in the upper right-hand corner of all tabs in ExpoFIRST.

4.3 Will chemical specific information be incorporated into the tool?

ExpoFIRST was designed to incorporate exposure factor data from the EFH. Chemical specific information must be entered by the user.

4.4 Does the tool allow characterization of dose using potency differences as per the 2005 cancer supplemental guidance?

No. This feature is beyond the scope of ExpoFIRST.

Ingestion Specific

4.5   Ingestion specific: For some food ingestion scenarios, why do I need to specify wet weight (WW) or dry weight (DW)? How is percent moisture used?

In the EFH, food intake data are reported in units of wet weight (WW). If contaminant concentration is entered in dry weight (DW) or lipid weight (LW), the user must also enter the conversion factor. If a DW concentration is entered, the user will be required to enter the percent moisture so that concentration can be converted to WW. ExpoFIRST provides access to EFH data on moisture content for specific foods on the *Contaminant* tab to assist the user with selecting the appropriate percent moisture.

Similarly, if contaminant concentration is entered by the user as mg/g fat for an ingestion scenario, ExpoFIRST provides access to EFH Table 10-125 for fish and Table 11-38 for meats and dairy to assist the user with selecting the appropriate percent fat.

Dermal Specific

4.6   Dermal specific: How is DA$_{event}$ calculated?

For a dermal water contact scenario, the approach to estimate DA$_{event}$ differs with respect to inorganic and organic chemicals. This is consistent with current EPA policy directives. For inorganics, EPA recommends using the steady state approach to estimate dermally absorbed doses. For organics, EPA provides two equations, and these equations are different based on the event duration (t$_{event}$) versus the lag time per event (τ). Guidance for using these equations is provided in EPA'S RAGS, Part E (2004; https://www.epa.gov/risk/risk-assessment-guidance-superfund-rags-part-e).

All DA$_{event}$ equations are provided on the *Contaminant* tab. The DA$_{event}$ values by exposure group and the equation used are shown on the *Results* tab.

5.0   EXPOSURE FACTORS TAB

5.1   Why is the exposure factor value in the tool different from what I see in the corresponding EFH table?

The age group(s) used in the EFH table may not correspond to the standardized age bin(s) that EPA has developed for children. In cases like this, ExpoFIRST uses a weighted average exposure factor value that is representative of a particular EPA age bin.

5.2 How can I view the EFH table(s) from which exposure factors are pulled?

The EFH table used by ExpoFIRST to calculate dose is indicated in the description field on the *Exposure Factors* tab.

5.3 Can exposure factors used by the tool be changed?

Yes. Users can modify all parameters on the *Exposure Factors* tab. Users can also modify information in the description field if necessary.

5.4 What is the benefit of the 'Bulk Modify Parameters' option?

The 'bulk modify parameters' button on the *Exposure Factors* tab allows users to enter, in one step, missing data for all exposure groups. For example, Exposure Frequency (EF) in days per year is typically user defined. A value for EF that applies to all exposure groups can be entered in one step using the 'bulk modify parameters' feature.

5.5 On the *Exposure Factors* tab, what are the Quick Reference Tables?

ExpoFIRST provides access to several EFH tables that may be useful for estimating certain exposure factors. Data from these tables are not programmed into ExpoFIRST because their selection requires professional judgment. Quick Reference tables are only available for particular scenarios. Here is a complete list of all quick reference tables and potential applications available in ExpoFIRST.

Table 2: Quick Reference Tables Available in ExpoFIRST

Table	Title	Potential Application	Tab Location(s) in ExpoFIRST
7-4	Recommended Values for Mean Solids Adherence to Skin	Dermal: Solids	• *Media & Receptors* • *Contaminant*
9-53	Mean Moisture Content of Selected Food Groups Expressed as Percentages of Edible Portions	Ingestion > Fruits or Vegetables	• *Contaminant*
10-125	Mean Percent Moisture and Total Fat Content for Selected Species	Ingestion > Fish	• *Contaminant*
11-42	Mean Percent Moisture and Total Fat Content of Selected Meat and Dairy Products	Ingestion > Meat or Dairy	• *Contaminant*
12-38	Mean Moisture Content of Selected Grain Products Expressed as Percentages of Edible Portions (grams per 100 grams of edible portion)	Ingestion > Grains	• *Contaminant*
16-28	Number of Showers Taken per Day, by Children <21 Years	Dermal > Water > Showering	• *Exposure Factors*
16-31	Number of Times Respondent Took Shower, Doers Only		
16-33	Number of Baths Given or Taken in One Day by Number of Respondents	Dermal > Water > Bathing	• *Exposure Factors*

Table	Title	Potential Application	Tab Location(s) in ExpoFIRST
16-39	Number of Times Swimming in a Month in Freshwater Swimming Pool, Children <21 Years	Dermal > Water > Swimming Ingestion > Unintentional Ingestion > Swimming	• *Exposure Factors*
16-41	Time Spent (minutes/month) Swimming in Freshwater Swimming Pool, Children <21 Years		
16-42	Time Spent (minutes/month) in Freshwater Swimming Pool, Doers Only		
16-103	Occupational Tenure of Employed Individuals by Age and Sex	Inhalation > Occupational	• *Exposure Factors*
16-106	Occupational Tenure of Employed Individuals Grouped by Major Occupational Groups and Age		
16-108	Descriptive Statistics for Residential Occupancy Period (years)	Inhalation > Residential	• *Exposure Factors*

5.6 On the *Exposure Factors* tab, what is that button next to the 'Description' field?

This button allows users to expand the description field to view all notes, including the original data source, the EFH table, and additional information that may be useful. Users can modify information in the description field if necessary.

5.7 Where exposure factors data are missing in the EFH, can the tool provide an estimate along with a note describing the uncertainty associated with the value?

Where data are missing, it is because data are not available in the EFH or the data have not been programmed into ExpoFIRST at this time; values for the missing data must then be entered by the user. However, ExpoFIRST provides access to the EFH tables that might be helpful to the user for selecting an appropriate value. Many tables in the EFH provide mean values, standard deviations, and distributions that may be useful for characterizing variability and uncertainty.

5.8 If I'm constructing a gender specific scenario, why does ExpoFIRST show available data for males and females combined, and use these values in the equation?

For some gender specific scenarios, only data for males and females combined are available in the EFH. ExpoFIRST uses these values in lieu of gender specific data.

For example, an inhalation ADD scenario for females only attending school full-time uses gender specific inhalation rates for females, but exposure time (ET) data for males and females combined because gender specific data are not available and these are the best data available.

The source of data, including whether it is based on data for males, females, or both genders is indicated in the description field on the *Exposure Factors* tab. The user can modify these values if needed on the *Exposure Factors* tab.

Inhalation Specific

5.9 Inhalation specific: For the final equation shown at the top of the *Exposure Factors* and *Results* tabs, why are units not consistent across all inhalation scenarios?

To maximize transparency the equations shown on the *Exposure Factors* and *Results* tabs uses the units from the corresponding EFH table. For example, exposure time (ET) for inhalation scenarios may be provided in any of the following units:

- hours/month
- hours/week
- hours/year
- min/day
- min/event
- min/month
- min/use

The equation shown in ExpoFIRST represents the steps necessary, including conversion factors, for each combination of units to calculate dose in units of mg/kg-day.

Ingestion Specific

5.10 Ingestion specific: For ingestion scenarios, why does ExpoFIRST use an Exposure Frequency (EF) of 365 days/year for age bins that are less than 1 year?

For food and drinking water ingestion scenarios in ExpoFIRST, exposure frequency (EF) is set to 365 days per year for each age range. When a long-term daily ingestion rate is used, 365 days/year must be used as the EF because the intake rate represents the average daily intake over a year—including both days when the food was consumed and days when the food was not consumed. For infants with age bins less than 1 year, the EF value is weighted by the exposure duration (ED). For example, for infants aged 6 months to 1 year, the EF of 365 days/year is multiplied by the ED of 0.5 years to yield 182.5 days as a weighted value.

6.0   RESULTS TAB

6.1   How can a user calculate total doses (i.e., multiple chemicals and multiple pathways)?

The ExpoFIRST report feature allows users to view results for multiple chemicals or multiple routes in MS Excel. Within the MS Excel report, users can sum doses across multiple chemicals or routes, if appropriate.

6.2   Why is the dose value calculated by ExpoFIRST for combined age groups on the *Results* tab different from what is shown in the *All Scenarios* tab of the ExpoFIRST report for the same group?

When calculating dose for age groups combined, ExpoFIRST takes a weighted average of the dose values for the individual age bins. Similarly, in the ExpoFIRST Excel report the dose for age groups combined is calculated in Excel using a weighted average of the dose values for the individual age bins.

In some instances there will be a minor difference in the weighted calculation from ExpoFIRST (MS Access) and the report in MS Excel due to differences in rounding. Dose values for the individual exposure groups will be identical in the *Results* tab of ExpoFIRST and the MS Excel report.

Ingestion Specific

6.3   Ingestion specific: On the *Results* tab the equation lists a "DW" input, but that input does not appear in the dose equation on the *Scenario Description* tab. Why?

The *Scenario Description* tab includes the general dose equation. If a dry weight-to-wet weight conversion is needed, it will appear in the final equation that is shown on the *Exposure Factors* and *Results* tabs.

Dermal Specific

6.4   Dermal specific: Why does DA$_{event}$ appear on the *Results* tab for Dermal: Water scenarios?

DA$_{event}$ appears on the results page because it is based on exposure time for each exposure group. ExpoFIRST does not calculate the DA$_{event}$ parameter until the *Results* tab is opened. To maximize transparency the DA$_{event}$ value and the equation used are shown on the *Results* tab.

The equation used may be inorganic, organic equation 1, or organic equation 2 depending on the contaminant and whether exposure time is more or less than the time to reach steady state. The equations and explanations are shown on the *Contaminant* tab in ExpoFIRST.

6.5 Dermal specific: Why is there no DA$_{event}$ value shown for the combined age group on the *Results* tab for Dermal: Water scenarios?

When calculating dose for age groups combined, ExpoFIRST takes a weighted average of the dose values for the individual age bins. DA$_{event}$ and other individual parameters are not calculated for all age groups combined; therefore, DA$_{event}$ is not shown on the *Results* tab for the all age bins combined. Similarly, exposure factors for all the age groups combined are not shown on the *Exposure Factors* tab in ExpoFIRST or in the ExpoFIRST Excel Report.