ATSDR Newsletter for Health Assessors

Including APPLETREE Partners

Guidance & Clearance News

June 2024

Welcome!

The purpose of this newsletter is to keep you informed about the guidance and resources that are available for use in your health evaluations.

What is in this Newsletter?

The following topics are included in this edition of the ATSDR Newsletter for Health Assessors. An index of all topics covered in previous newsletters has been added to the Public Health Assessment Site Tool (PHAST) resources page under the heading of ATSDR Health Assessor Newsletter.

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Updated Public Health Assessment (PHA) Webinars Training Series

The Office of Capacity Development & Applied Prevention Science (OCDAPS) developed a series of webinars as a follow-up to the Public Health Assessment Training (PHAT) online modules.

The series reinforces the information presented in the PHAT modules and highlights ATSDR subject matter experts' experiences while conducting public health assessments at various contaminated sites.

Where: Click on this series of PHA webinars to learn more about the webinars' content, how to register for each webinar, and how to obtain continuing education.

What: The six webinars include these topics:

1. Introduction to ATSDR and the Public Health Assessment Process
2. Engaging the Community

3. Exposure Pathway Evaluation
4. Selection of Sampling Data
5. Data Screening Analysis
6. Exposure Units and Exposure Point Concentrations

Continuing Education: After completing each webinar in CDC TRAIN, you can obtain a Certificate of Completion or continuing education. You can complete the post-test and submit the evaluation to obtain credits for:

- Continuing Medical Education (CME)
- Continuing Nursing Education (CNE)
- Continuing Education Contact Hours (CECH)
- Continuing Education Unit (CEU)
- Certified in Public Health (CPH)

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Use Custom Features in ATSDR's SHOWER Model to Answer Residents Questions

Health assessors typically run the default scenario when estimating daily exposures from taking a shower. The default scenario is built into ATSDR's Shower and Household Water-Use Exposure (SHOWER) Model and provides reasonable maximum exposure (RME) results for the most highly exposed person in a 4-person household. RME results for 1-, 2-, and 3-person households are also included for additional information, as are central tendency exposure (CTE) results for households with 1-, 2-, 3-, and 4-persons.

The **RME** default scenario assumes three people take 10-minute showers and the fourth person takes a 15-minute shower, all followed by 5-minute bathroom stays. The **CTE** scenario assumes each person takes a 7-minute morning shower followed by a 5-minute bathroom stay. For each household, the person taking the last shower in the morning is the most highly exposed person and results reported for each household apply to this last person.

Once you explain this to residents or to fellow scientists, they may ask:

> "Well, I have a family member that takes very long showers and remains in the bathroom even longer. What about their exposure?"

The good news is that the SHOWER model is very flexible and can simulate exposures for a variety of site-specific scenarios, including taking a long shower or bath. Follow the instructions below to customize household exposures.

On the “Simulation Type Screen” where you select “Run Default Scenario (recommended),” you can select “Run Custom Scenario (optional)”. This option gives you the ability to change most of the parameters in the model, including shower duration.

The next screen remains the same. Enter your contaminant name and concentration and select the units for the outputs (µg/m3 or ppb) before going to the “Household Scenarios” screen. On the “Household Scenarios” screen, select the number of persons in the household from the dropdown list (see Figure 1 and Figure 2). Then, select from four pre-programmed scenarios (see Figure 3):

1. Four morning showers
2. Two morning showers and two evening showers
3. Two morning showers and two evening baths (persons not helping with tub baths)
4. Two morning showers and two evening baths (persons help with tub baths)

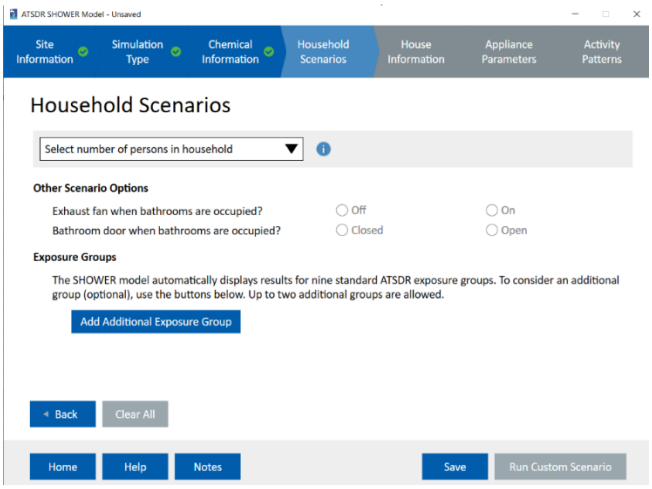

Figure 1. Household Scenarios screen

In this example, we selected the second radio button: two morning and two evening showers (see Figure 3). If we were interested in exposures for household members who take baths, we would have selected the third or fourth radio button. An added feature to the bathing scenario is that you can simulate exposures for adults who help their children take baths by selecting the fourth radio button. Also, you can simulate exposure for children or adults who take baths without assistance by selecting the third radio button. Considerable flexibility exists on this screen for you to load pre-programmed scenarios that are different from the default morning shower scenarios. You can still modify these programs in later screens to make your scenario even more site-specific.

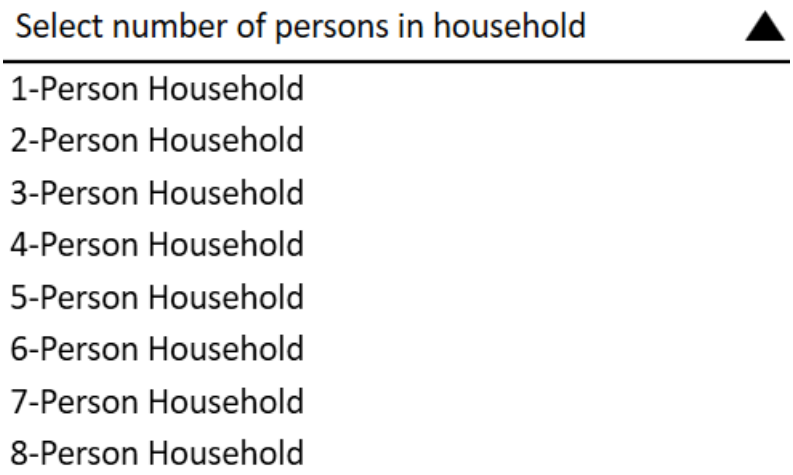

Figure 2. Household Scenarios dropdown list

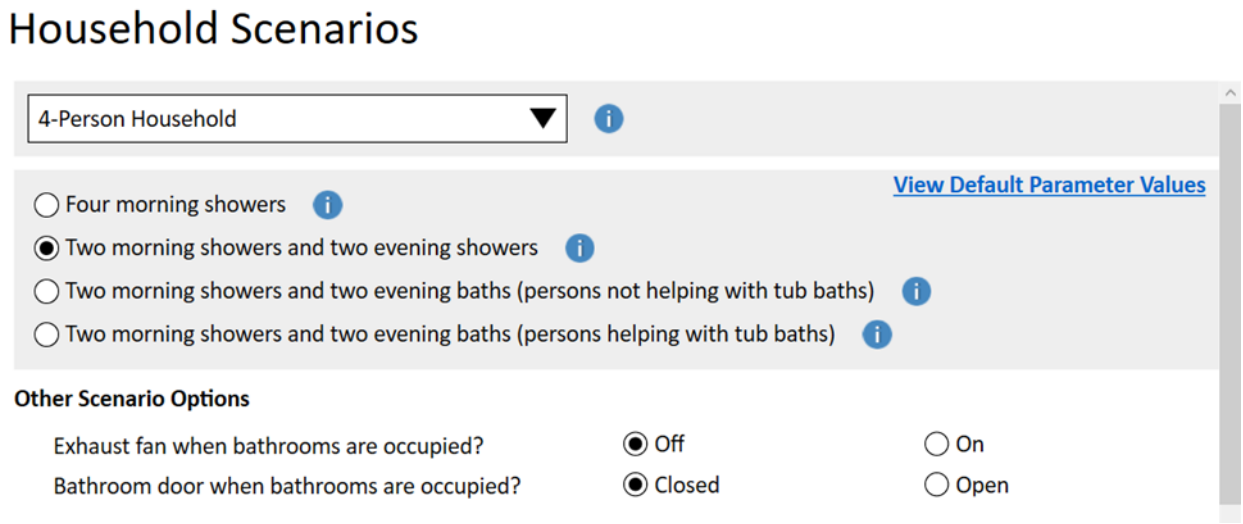

Figure 3. Pre-programmed scenarios for various combinations of showers and tub baths

The next two screens in the SHOWER model show the default parameters for "House Parameters" and "Appliance Parameters." We're going to skip these two screens because we're not changing any of the default values on these screens. Just click "next" on the bottom right of the screen.

The last screen before running the model is the "Activity Patterns" screen. You'll notice in Figure 4 that the model already shows the activity type (two morning showers, two evening showers) based on the radio button selected in Figure 3. The activity duration automatically defaults to the CTE shower duration of 7 minutes and a bathroom stay of 5 minutes. However, you can change these numbers very easily.

Let's say we want person 4 to take a 40-minute bath instead of a shower. We can use the dropdown menu to change the shower to a bath. Notice the default bath duration is 20

minutes. We can replace 20 with 40 for the activity duration. We can leave the time in bathroom after the activity at 5 or change it to another value. In this case, I changed it to 20 minutes. So now, the fourth person takes a 40-minute bath and is in the bathroom for 20 minutes afterward. Figure 5 shows the new values for person 4.

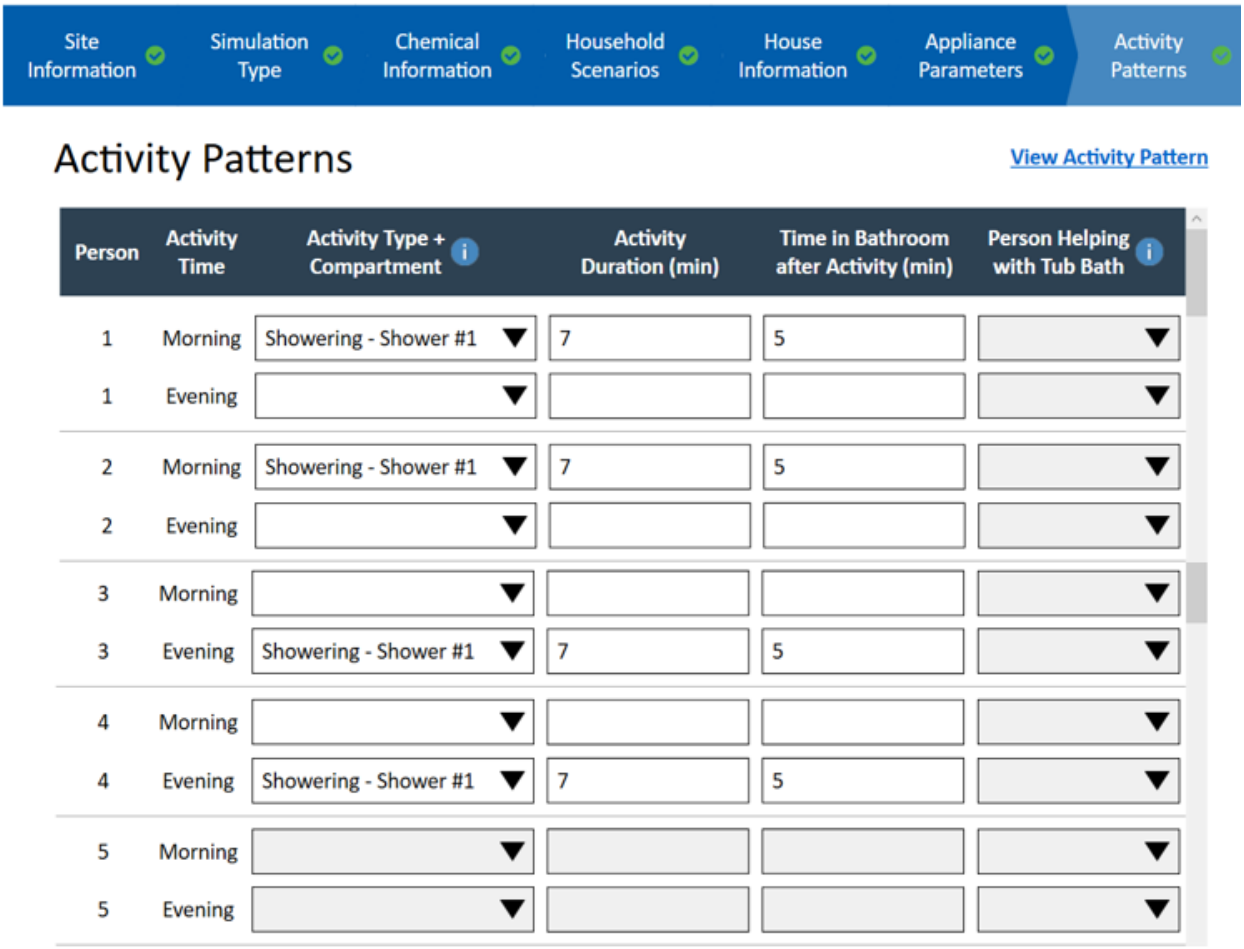

Figure 4. The "Activity Patterns" screen showing type of activity of activity duration

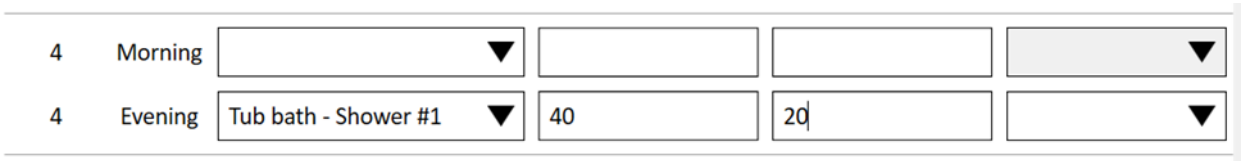

Figure 5. The parameters for person 4 have now been changed to be site-specific values for someone taking a long bath.

Now here's a very important part of the screen. Below the activity pattern table shown in Figure 4, users will see an option for selecting the target person (see Figure 6). This is the person for whom the model will simulate exposures. The default selection is always the "Most

Highly Exposed Person" because we assume that's the person you're most interested in protecting.

But, in this case, you're answering a question from the community or a fellow scientist, and they want to know what the exposure is for the person who takes a long bath. You can select person 4 from the dropdown because that's the person you specified as taking a 40-minute bath and staying in the bathroom for 20 minutes afterwards. Once selected, person 4 becomes the target person that the results apply to.

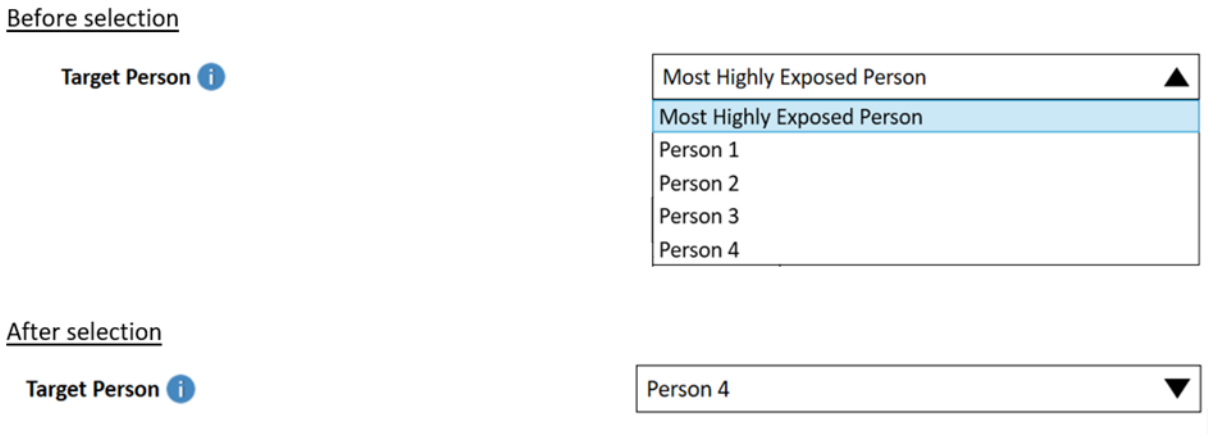

Figure 6. Dropdown menu showing the user the options for selecting the target person.

Once you run the model, it will generate a report that shows the results for all persons in the household, including the target person you selected. You can see all the results by looking at Table 1 in the report (Figure 7). Table 1 will show the average daily exposure concentration for each person in the household and will indicate with an "X" the person you selected as the target person.

Table 1. Average daily exposure concentration in µg/m³ for each person in the house

Person	Target Person	Main Activities	Average Daily Exposure Concentration
1	—	Showering in Shower #1 at 6:48 a.m.	23
2	—	Showering in Shower #1 at 7:01 a.m.	32
3	—	Showering in Shower #1 at 6:30 p.m.	26
4	X	Tub bath in Shower #1 at 6:43 p.m.	89

Abbreviations: µg/m³ = micrograms chemical per cubic meter air

Figure 7. Shows average daily exposure concentration for each person in the house

It's sometimes difficult to remember shower and bath durations for each person in the household, especially when you are running a custom scenario and making changes to shower duration and bathroom stays. Table 10 in the report shows shower duration and bathroom stay times for each person in the scenario.

The custom features in the SHOWER model are designed to allow health assessors to answer specific questions from the community and from other scientists. In addition, the flexibility built into changing almost all the parameters in the model allows health assessors to conduct site-specific sensitivity analyses by changing a parameter and observing the effect that change will have on exposure estimates.

ATSDR's SHOWER model is a powerful tool in simulating household exposures from using contaminated water for a variety of indoor purposes. The model is easy to use because of built-in default parameters and scenarios. One of its major advantages, though, is the flexibility built into the custom features of the model that allows health assessors to easily change parameters to conduct a sensitivity analysis of individual parameters. Built-in scenarios can also be easily changed to answer questions about individual bathing activities.

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Be Sure to Update Your Public Health Documents with These New MRLs

In September and August 2023, ATSDR released eight toxicological profiles:

- Acrylonitrile (107-13-1)
- Beryllium (7440-41-7)
- Chloromethane (74-87-3)
- Creosote (8001-58-9)
- 1,2-dichloroethenes (156-59-2, 156-60-5)
- Methyl tert-butyl ether (1634-04-4)
- Nickel (7440-02-0)
- Vinyl acetate (108-05-4)

The minimal risk levels (MRLs) for acrylonitrile, 1,2-dichloroethene, nickel, and vinyl acetate are provisional because these profiles were released for public comment. Provisional MRLs can be used in your public health documents. The profile for creosote was also released for public comment but contained no MRLs. The tox profiles for beryllium, chloromethane, and methyl tert-butyl ether are now final, changing their MRLs from provisional to final MRLs.

It's easy to identify newly released toxicological profiles by periodically checking ATSDR's toxicological profiles website. You can receive email updates by providing your email address to our tox profile group. Look for the 'Get Email Updates' on the bottom right of the website.

If you are currently working on a public health document where these chemicals are found, you should review your screening process to see if any duration- or route-specific MRLs changed. Some duration-specific MRLs are now lower (acrylonitrile, methyl tert-butyl ether, nickel), which will lower the EMEG used to screen your data for noncancer endpoints. Three new MRLs were released for the first time so your data should be screened against these new EMEGs (acrylonitrile, chloromethane, vinyl acetate). Sometimes, a new duration-specific MRL will actually be higher than the older MRL, which is the case for three MRLs (acrylonitrile, trans-1,2-dichloroethene, vinyl acetate). See Table 1 for details for which duration- or route-specific MRLs changed.

If you had previously selected these chemicals as a potential contaminant of concern (COC) and if the MRL changed, you'll also need to update your toxicological evaluation, list the new MRL, and evaluate whether harmful effects are possible.

Another way to check for changes in MRLs is to click "Contaminant Updates" on the public health assessment site tool (PHAST) home page (see Figure 8). You can then open an Excel file that will show recent updates to the PHAST database, including changes to MRLs. The file will show the old and new MRLs and provide information about other changes to PHAST.

If MRLs change while your document is being developed or cleared, you will need to update your document to the new MRL, even if it's in eClearance. If you have questions, talk to your Associate Director for Science (ADS) office or technical project officer (TPO).

Table 1. Summary of the MRLs released in August and September 2023 compared to their previous MRL

Chemical	Route, Duration	Previous MRL	Current MRL	Current MRL Is Different
Acrylonitrile	Inhalation, acute	100 ppb	None	Yes
Acrylonitrile	Inhalation, intermediate	None	0.9 ppb	*New*
Acrylonitrile	Oral, acute	0.1 mkd	0.09 mkd	Yes
Acrylonitrile	Oral, intermediate	0.01 mkd	0.02 mkd	Yes
Acrylonitrile	Oral, chronic	0.04 mkd	0.00009 mkd	Yes
Beryllium	Inhalation, chronic	1 ng/m^3	1 ng/m^3	No
Chloromethane	Inhalation, acute	0.5 ppm	0.5 ppm	No
Chloromethane	Inhalation, intermediate	None	0.3 ppm	*New*
Chloromethane	Inhalation, chronic	0.03 ppm	0.03 ppm	No

Creosote	Inhalation, oral (all durations)	None	None	No
cis-1,2-dichloroethene	Oral, acute	1 mkd	None	Yes
cis-1,2-dichloroethene	Oral, intermediate	0.3 mkd	None	Yes
trans-1,2-dichloroethene	Inhalation, acute	0.2 ppm	3 ppm	Yes
trans-1,2-dichloroethene	Inhalation, intermediate	0.2 ppm	None	Yes
trans-1,2-dichloroethene	Oral, intermediate	0.2 mkd	0.2 mkd	No
Methyl tert-butyl ether	Inhalation, acute	2 ppm	2 ppm	No
Methyl tert-butyl ether	Inhalation, intermediate	1 ppm	1 ppm	No
Methyl tert-butyl ether	Inhalation, chronic	1 ppm	1 ppm	No
Methyl tert-butyl ether	Oral, intermediate	0.6 mkd	0.4 mkd	Yes
Nickel	Inhalation, intermediate	0.2 µg/m^3	0.03 µg/m^3	Yes
Nickel	Inhalation, chronic	0.09 µg/m^3	0.01 µg/m^3	Yes
Vinyl acetate	Inhalation, acute	None	1 ppm	*New*
Vinyl acetate	Inhalation, intermediate	0.01 ppm	0.7 ppm	Yes
Vinyl acetate	Inhalation, chronic	None	0.3 ppm	*New*

ppb = parts per billion; ppm = part per million; mkd = mg/kg/day; ng/m^3 = nanogram per cubic meter; µg/m^3 = micrograms per cubic meter

As this newsletter was being developed, ATSDR released four more profiles in January 2024. See Table 2 for details for which duration- or route-specific MRLs changed.

Table 2. Summary of the MRLs released in January 2024 compared to their previous MRL

Chemical	Route, Duration	Previous MRL	Current MRL	Current MRL Is Different
Chloroethane	Inhalation, acute	15 ppm	13 ppm	Yes
Chloroethane	Inhalation, intermediate	None	15 ppm	*New*
Chloroform	Inhalation, acute	100 ppb	1 ppb	Yes
Chloroform	Inhalation, intermediate	50 ppb	0.8 ppb	Yes
Chloroform	Inhalation, chronic	20 ppb	0.4 ppb	Yes
Chloroform	Oral, acute	0.3 mkd	0.3 mkd	No
Chloroform	Oral, intermediate	0.1 mkd	0.1 mkd	No
Chloroform	Oral, chronic	0.01 mkd	0.02 mkd	Yes
Nitrobenzene	Inhalation, acute	0.04 ppm	0.1 ppm	Yes
Nitrobenzene	Inhalation, intermediate	0.003 ppm	0.003 ppm	No
Nitrobenzene	Inhalation, chronic	0.001 ppm	0.002 ppm	Yes
Nitrobenzene	Oral, acute	0.05 mkd	0.05 mkd	No
Nitrobenzene	Oral, intermediate	0.02 mkd	0.02 mkd	No
Vinyl chloride	Inhalation, acute	0.5 ppm	0.5 ppm	No

Vinyl chloride	Inhalation, intermediate	0.02 ppm	0.02 ppm	No
Vinyl chloride	Oral, chronic	0.003 mkd	0.003 mkd	No

ppm = part per million; ppb = parts per billion; mkd = mg/kg/day

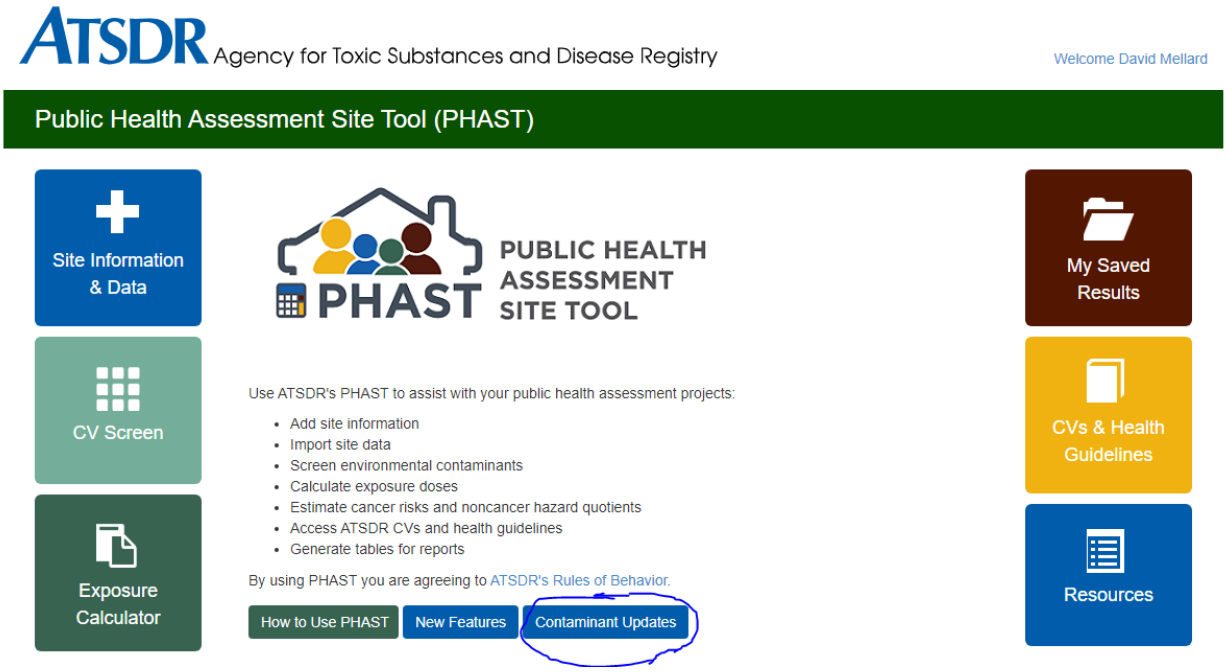

Figure 8. The PHAST home screen

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Nitrogenous Data Are Not All Equal

The multifarious nitrogen analyses conducted by laboratories can lead to confusion due to the similarity of the analysis's names; however, there are some major differences that potentially impact health assessments if not handled properly.

The most commonly confused data sets are those when the chemical name appears as "analyte-nitrogen," such as nitrate-nitrogen or nitrite-nitrogen. These data show only the concentration of the nitrogen, not the ion. This type of analysis is requested for ecological assessments to quantify the total amount of bioavailable nitrogen in an ecosystem. Using these as concentrations for human health assessments will result in an erroneous and less protective assessment, because the units between the dataset and comparison values are not the same. To transform the data into a useful concentration one must revisit some general chemistry principles and utilize the equation:

$$[nitrogenous\ analyte] = [nitrogenous\ analyte\text{-}nitrogen] \times \frac{MW_{nitrogenous\ analyte}}{MW_{nitrogen}}$$

Where the brackets indicate a concentration unit, $MW_{nitrogen}$, is the molecular weight of nitrogen, or 14.007 atomic mass units (amu), and $MW_{nitrogenous\ analyte}$ is the molecular weight for the analyte in question. For example, if given a data set where the measured concentration of nitrate-nitrogen is 1.45 mg/L then the equivalent concentration in nitrate would be

$$1.45\ mg\ nitrate\text{-}nitrogen/L \times \frac{62.005}{14.007} = 4.53\ mg\ nitrate/L$$

And here with the same measured concentration as nitrite-nitrogen

$$1.45\ mg\ nitrite\text{-}nitrogen/L \times \frac{46.006}{14.007} = 4.76\ mg\ nitrite/L$$

Demonstrating the difference between the two analytes molecular weights will result in a different concentration. Caution must be exercised to ensure the appropriate analyte is chosen.

Other times the nitrogen oxyanion data, for nitrate and nitrite, are presented as a sum because of the short sample holding time of 48 hours. Unfortunately, with only this information the interpretation of the potential hazard is greatly hampered. Nitrite is more toxic than nitrate, with minimal risk levels of 0.1 and 4.0 mg/kg/day, respectively. When concentrations are reported as nitrate and nitrite combined, the health protective approach would therefore be to assume all the combined data are from nitrite. If this approach would require further investigation, only additional sampling can be recommended where the data for the two ions are determined individually. However, this will be difficult, often insurmountably so, given the logistics of taking a sample, shipping to a laboratory, and determining the nitrate and nitrite concentrations in less than 48 hours.

Health assessors should not use EPA's nitrate RfD of 1.6 mg/kg/day as this value only represents the nitrogen portion of the nitrate ion. Instead, if data are reported as nitrate-nitrogen, health assessors should convert the values to nitrate concentrations and use ATSDR's MRL (4 mg/kg/day).

There are other analyses for nitrogen containing data as well that should be questioned prior to making assumptions. Total nitrogen, a sum of ammonia, nitrite, nitrate, and organic nitrogen (e.g., amino acids, proteins, etc.) and Total Kjeldahl Nitrogen, a sum of ammonia and organic nitrogen, are two such analyses. These are not frequently encountered for environmental samples.

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Exceptions for Adjusting Intermittent Exposure to Continuous Exposure

> This article was originally published in the May 2022 health assessor newsletter. Since that time, four chemicals (toluene, xylenes, trans-1,2-dichloroethene, and acrolein) have been added to the table as exceptions to the standard exposure factor adjustments.
>
> A current version of this article can also be found on the PHAST resource page in the section 'Contaminant-specific Guidance and Resources' under the name 'Air Inhalation Pathway - Exceptions for Exposure Factor Adjustment'. An easy way to locate the article is to search the resource page using 'exposure factor.'

Now that the PHAST Air Module is functional, you need to know some important facts about exposure factors and the role they have in estimating exposure concentrations. Exposures that occur at home have a default exposure factor (EF) of 1 because we assume that exposure occurs daily, 24 hours a day, every day of the year. However, when exposure occurs at work or school, the EF will be less than 1 because it's a function of how many hours each day and how many days each week people are exposed. This results in an EF that's calculated like this: EF = 8/24*5/7. For several chemicals, however, exceptions exist to applying exposure factors that convert intermittent exposures to continuous exposures. These exceptions result because of the toxicology of the chemical. Health assessors should be mindful of how EFs affect exposure point concentrations (EPCs) for these chemicals. These exceptions are described in greater detail below.

Guidance Documents About Exposure Factors

Two exposure dose guidance (EDG) documents provide a detailed explanation for how standard EF adjustments are typically made when estimating exposure:

- The Exposure Dose Guidance for Determining Life Expectancy and Exposure Factor [ATSDR 2016]
- The Guidance for Inhalation Exposures [ATSDR 2020].

These EDG documents provide a detailed explanation of the standard formulas used to make EF adjustments for acute, intermediate, and chronic durations. They also include examples of converting intermittent (e.g., <24 hours or < 7 days/week) to continuous (daily) exposure using EFs.

In general, EFs are calculated by multiplying the exposure frequency with the exposure duration and dividing by the time during which the dose or concentration is to be averaged (the averaging time). Although EFs are typically 1 for residential scenarios, EFs can be less than 1 when exposures are intermittent. EFs are often less than 1 for occupational and school scenarios where exposure is typically 5 days a week. For certain inhalation scenarios (work and schools), exposures are typically less than 24 hours per day, which also requires an adjustment (e.g., 8.5 hr/24 hr).

As an example, the default parameters for central tendency exposure (CTE) and reasonable maximum exposure (RME) used to estimate EF for a daycare are shown in the following screenshot from the PHAST Air Module (Figure 9).

Exposure Group	Daily (hours/day)			Weekly (days/week)			Annually (weeks/year)			Exposure Duration (years)		
	CTE	RME	Site-specific	CTE	RME	Site-specific	CTE	RME	Site-specific	CTE	RME	Site-specific
Birth to < 1 year	5.2	11.8		5	5	Select...	50	52.14		1	1	
1 to < 2 years	4.8	9.9		5	5	Select...	50	52.14		1	1	
2 to < 6 years	6.4	9.6		5	5	Select...	50	52.14		4	4	
Full time worker	8.5	11.8		5	5	Select...	50	52.14		5	20	
Part time worker	5.1	NA		5	NA	Select...	50	NA		3.1	NA	

CTE = central tendency exposure; RME = reasonable maximum exposure

Figure 9. PHAST Screen

Exceptions to Standard EF Adjustments

Exceptions exist to these standard rules for adjusting intermittent to continuous exposure because of the inherent toxicity of some chemicals. So far, we've identified ten chemicals where EF exceptions apply. Table 3 provides a summary of how EFs are applied by duration to each of these chemicals.

For acute exposure, the EF is one for all ten chemicals. This means that for intermittent exposure scenarios, the site-specific EPC should **not** be adjusted to a continuous 24-hr exposure because the acute inhalation MRL was derived using the unadjusted study concentration. That is, the toxicity value used to derive the MRL was not adjusted to a continuous 24-hr exposure. For these chemicals, the MRL worksheet provides explanations for why the study concentration was not adjusted to a 24-hr concentration. The chemical could be a point-of-contact (POC) irritant or could quickly reach steady state and quickly be eliminated when exposure stops. For example, the MRL for sulfur dioxide is based on effects in exercising asthmatics for durations of

5–10 minutes. If health assessors adjust their EPC to 24 hours, they could miss the window of peak exposure captured by the MRL and potentially make an incorrect health determination.

The same reasoning is true for intermediate and chronic exposure for formaldehyde, xylenes, and sulfur dioxide. The site-specific EPC for these three chemicals should not be adjusted from intermittent to continuous exposure because the intermediate and chronic MRLs for these chemicals used the unadjusted study concentration to derive the MRL. Thus, the noncancer EF for these chemicals should be one for acute, intermediate, and chronic durations. However, when calculating cancer risk, the chronic cancer EF for the one carcinogen in the list (formaldehyde) should be adjusted.

Table 3. Exceptions to the Standard EF Rule by Chemical and Duration

Chemical	ACU HG	ACU EF	INT HG	INT EF	CHR HG	CHR $EF_{nonancer}$	CHR IUR	CHR EF_{cancer}	EF = 1 Justification
Acetone	Y	1	N	Standard	N	Standard	N	NA	Evenly distributed; Fast steady state, fast elimination
Acrolein	Y	1	Y	Standard	Y	Standard	N	NA	POC irritant
Ammonia	Y	1	N	Standard	Y	Standard	N	NA	POC irritant
2-butanone	Y	1	N	Standard	N	Standard	N	NA	POC irritant
Hydrogen sulfide	Y	1	Y	Standard	Y	Standard	N	NA	POC irritant
Toluene	Y	1	N	Standard	N	Standard	N	NA	PBPK Modeling
Trans-1,2-dichloroethene	Y	1	N	Standard	N	Standard	N	NA	POC irritant
Sulfur dioxide	Y	1	N	1	N	1	N	NA	POC irritant
Formaldehyde	Y	1	Y	1	Y	1	Y	Standard	POC irritant
Xylenes (o, m, p, mixed, total)	Y	1	Y	1	Y	1	Y	NA	Rapid clearance from the body

ACU = acute; INT = Intermediate; CHR = Chronic; HG = health guideline (e.g., minimal risk level or reference concentration); EF = exposure factor; IUR = inhalation unit risk; Y = yes; N = no; NA = not applicable; POC = point of contact; PBPK = physiologically based pharmacokinetic.

NOTE: For hydrogen sulfide (intermediate and chronic) and for ammonia (chronic), the MRL worksheet adjusted the critical study concentration to a 24-hr concentration. Therefore, intermittent exposure should be adjusted to a 24-hr concentration when evaluating hydrogen sulfide for intermediate exposure. When evaluating hydrogen sulfide and ammonia for chronic exposures, the exposure point concentration should be adjusted to an annual EPC.

For acetone, toluene, trans-1,2-dichloroethene, and 2-butanone, no health guidelines are available to guide whether to adjust intermittent to continuous exposure. However, a review of the toxicology of each chemical shows that intermittent exposures should be adjusted to a 24-hr concentration when evaluating intermediate and chronic exposures for acetone, toluene, trans-1,2-dichloroethene, and 2-butanone.

The Good News

The good news is that PHAST automatically calculates and applies the correct EF for each of these chemicals. Because the EF can sometimes vary by duration, depending on the chemical, we recommend that you enter information on the exposure factors screen in PHAST based on your scenario. For example, if your scenario is exposure at work, you will select standard defaults (e.g., 8.5 hr/day, 5 days/week) or enter site-specific defaults (e.g., 4 hr/day; 3 days/week) and PHAST will automatically apply the correct EF.

History

January 2024	Removed chloroform (implemented with PHAST v2.4)
October 2023	Added acrolein (implemented with PHAST v2.4)
August 2023	Added trans-1,2-dichloroethene (implemented with PHAST v2.4)
July 2022	Added toluene and xylenes
May 2022	The original article was cleared and published in the May 2022 health assessor newsletter with seven chemicals listed as exception to the EF rules. The seven chemicals were 1) hydrogen sulfide, 2) ammonia, 3) acetone, 4) 2-butanone, 5) sulfur dioxide, 6) chloroform, and 7) formaldehyde.

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Referencing ATSDR Tools

If you'd like to cite PHAST, the EPC tool, or the SHOWER model in your public health documents, you can use the citations that follow. You'll need to insert the version number. Remember to delete the brackets around "[insert v#]."

[ATSDR] Agency for Toxic Substances and Disease Registry. 2017. Public Health Assessment Site Tool, [insert v#]. Atlanta: Agency for Toxic Substances and Disease Registry

[ATSDR] Agency for Toxic Substances and Disease Registry. 2022. Exposure Point Concentration Tool, [insert v#]. Atlanta: Agency for Toxic Substances and Disease Registry.

[ATSDR] Agency for Toxic Substances and Disease Registry. 2024. Shower and Household Water-use Exposure (SHOWER) Model, [insert v#]. Atlanta: Agency for Toxic Substances and Disease Registry.

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Cross-Referencing Hyperlinked Footnotes in a Table

Recent adjustments to the 508-compliance process now require footnotes used more than once in a table be cross-referenced. These "footnotes" are not entered into a Word document in the same manner as the footnote function and will require more extensive use of the cross-referencing functions. In this article, Table 4 will be the example with some general information about this newsletter's contributors and authors.

Table 4. Contributors to this edition of the Health Assessors Newsletter

Name	Office
Lee Moores[a]	OCHHA
David Mellard[a]	OCDAPS
Carole Hossom[b]	OCHHA
Tonia Burk[a]	OCHHA
John Truhe[b]	OCDAPS
Sandra Lopez-Carreras[a]	OCDAPS

[a] – is in an Associate Director of Science office

[b] – is not in an Associate Director of Science office

The footnotes in Table 4, a and b, are each used more than once in the table and therefore require the **first** instance, and only this instance, to be cross-referenced. To do this, highlight the footnote letter in the footnote beneath the table with your mouse as shown in panel A of Figure 10. Once highlighted, click "Bookmark" under the Insert tab to open the new window, shown in panels B and C, respectively. Initially, there will be nothing in the Bookmark name box shown in panel C, but here it is shown as a1 since that was typed in prior to taking the screenshot. The 1 was specifically added here for instances where multiple tables will potentially have footnotes with the same designation but different meaning/definition, so it will be important for authors to add in the table number to have the footnotes link to different locations in the document. After naming the bookmark, simply click the "Add" button to continue.

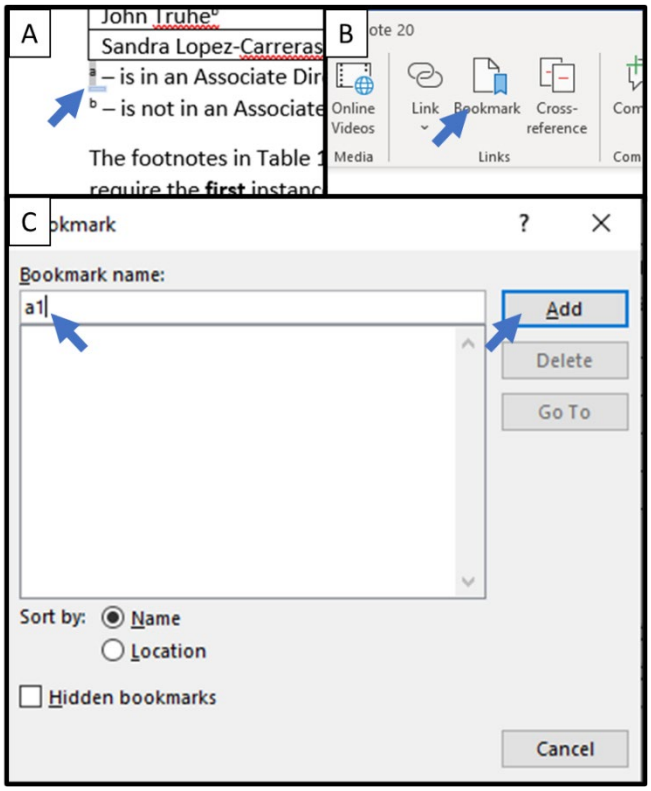

Figure 10. Screenshots depicting how to create a bookmark in Word

Now that a bookmark has been created, place the cursor where the footnote should be located in the table as shown in panel A in *Figure 11.* The next step is to add in a cross-reference by clicking the button as indicated in panel B. This will open another window, shown in panel C, where the author must select “Bookmark” and “Bookmark text” from the left and right dropdown menus, respectively. Clicking “Insert” will add in the cross-reference hyperlink to the location where the mouse cursor was. The final step will be to format the hyperlink to the same style as the rest of the table.

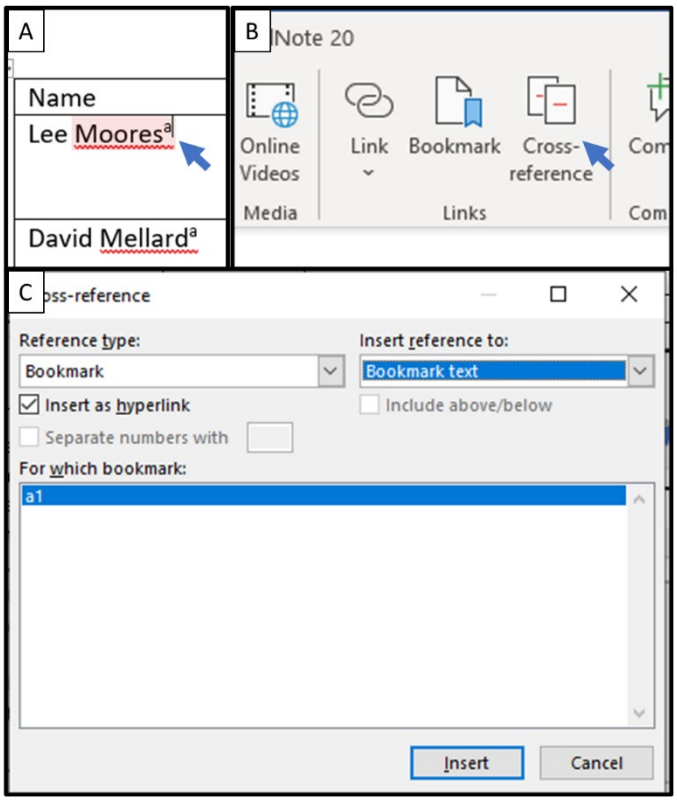

Figure 11. Screenshots showing the steps for inserting a hyperlinked cross-reference to a table with footnotes

This process enables readers to rapidly access the footnotes by simply clicking the first instance of the footnote reference in the table and, more importantly, a screen reader will read the first instance of the cross-referenced footnote aloud for visually impaired authors.

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References

[ATSDR] Agency for Toxic Substances and Disease Registry. 2016. Exposure Dose Guidance for Determining Life Expectancy and Exposure Factor. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service, Oct 26.

[ATSDR] Agency for Toxic Substances and Disease Registry. 2020. Guidance for Inhalation Exposures. Atlanta, Ga: U.S. Department of Health and Human Services, Public Health Service, December 1.