

# Mini-Module: Estimating Exposure Point Concentrations (EPCs)



# Introduction to Estimating EPCs

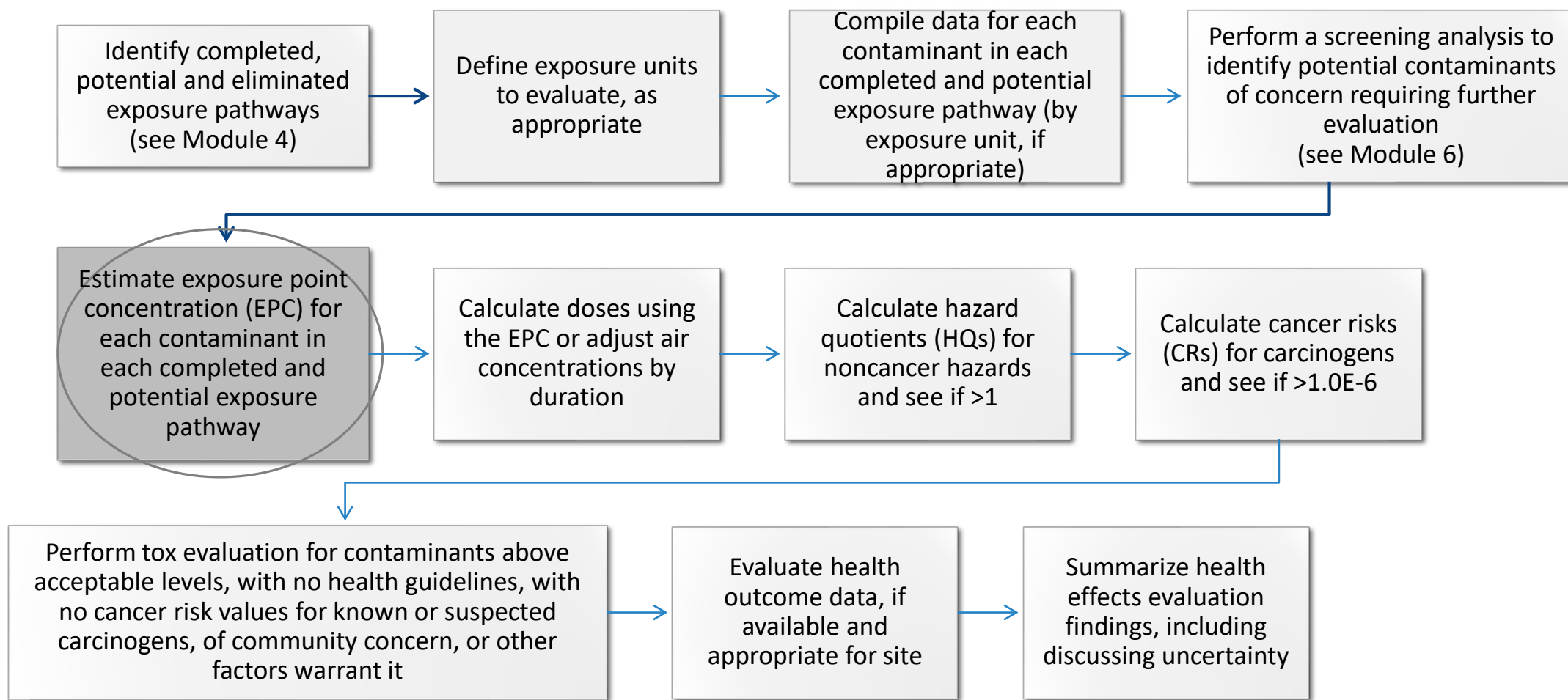
Module 7 teaches you that an exposure point concentration, commonly referred to as an EPC, is a representative concentration of a contaminant. An EPC is calculated for each

- Exposure unit or area;
- Individual completed and potential exposure pathway; and
- Exposure duration: acute (0-14 days), intermediate (15-364 days), or chronic (365 or more days).

You'll need to know the detailed information in this mini-module when performing a health effects evaluation. Let's look at the public health evaluation process, and see where the topic in this mini-module — estimating EPCs — fits in. As you will see, this part of the process is circled in the flow chart on the next page. The topic of estimating EPCs is Step 3 in Module 7.



# Steps of the Public Health Evaluation Process



This figure shows the overall steps involved in ATSDR's public health evaluation.

# Steps of the Public Health Evaluation Process

## (cont.)

The public health assessment (PHA) process has many steps. Typically, the four primary technical components involve evaluations of 1) exposure pathways, 2) screening analyses, 3) EPCs and exposure calculations, and 4) in-depth toxicological effects.

The sequence of steps laid out in the previous figure may differ slightly, depending on site-specific factors. For instance, health assessors may define an exposure unit before or after the screening analysis.

With large data sets, the health assessor may decide to complete the media-specific screening on the entire data set to identify potential contaminants of concern at the site, and then define appropriate exposure units for further analysis. For smaller or more defined data sets, the health assessor may decide to define the exposure units before the screening analysis.

Health assessors will use professional judgement to decide when to define exposure units; however, they must define them before determining EPCs.

# Overview of Estimating EPCs

ATSDR has developed specific guidance that teaches health assessors how to estimate EPCs for either **discrete sampling** or **non-discrete sampling** data (see text box on next slide).

This training will provide general information on how to estimate EPCs for some example scenarios. However, the calculations you do will depend on your specific data set (such as the number of samples or the amount of non-detect data). When it comes time to do your health effects evaluations, always refer to “ATSDR’s Exposure Point Concentration Guidance for Discrete Sampling” and “ATSDR’s Exposure Point Concentration Guidance for Non-Discrete Sampling.” You can find final guidance in the “Resources” section of PHAST (Public Health Assessment Site Tool). Remember you need to request access to PHAST by emailing [phast@cdc.gov](mailto:phast@cdc.gov).

These guidance documents will outline how to calculate EPCs for your specific scenarios. The Associate Director for Science (ADS) group is a good source of information if you have questions about EPC estimates.

# Discrete and Non-Discrete Sampling

**Remember:** A **discrete sample** is an individual environmental sample from a given point and time that is independent of other samples.

ATSDR's guidance on **non-discrete sampling** refers to composite sampling and the incremental sampling methodology (ISM). Composite sampling involves combining multiple discrete environmental samples for analysis. ISM is a structured form of composite sampling, designed to characterize the overall contamination level within an area of interest, where numerous incremental soil samples (typically 30 or more) are collected and combined to form a single ISM sample for laboratory processing and analysis.



# Statistics for EPCs

ATSDR recommends different statistics for EPCs depending on the way that samples were collected (discrete or non-discrete sampling approaches) and the characteristics of the dataset (sample size, number of non-detect results, distribution of the data).

The following are types of statistics that ATSDR uses for EPCs:

- Maximum concentration (discrete sampling)
- 95 percent upper confidence limit of the arithmetic mean (95UCL) (discrete sampling)
- Arithmetic mean (non-discrete sampling)
- Weighted mean (non-discrete sampling)

During this process, be sure to review the sampling design, and contact an ATSDR statistician if you need assistance estimating EPCs. Whenever feasible, it is key for ATSDR scientists to provide input to partners during the sampling design process.

Now, let's talk more about the types of EPCs ATSDR uses, and how to decide which is most appropriate based on your sampling data. We will begin by discussing discrete sampling.



# Discrete Sampling EPC Calculations

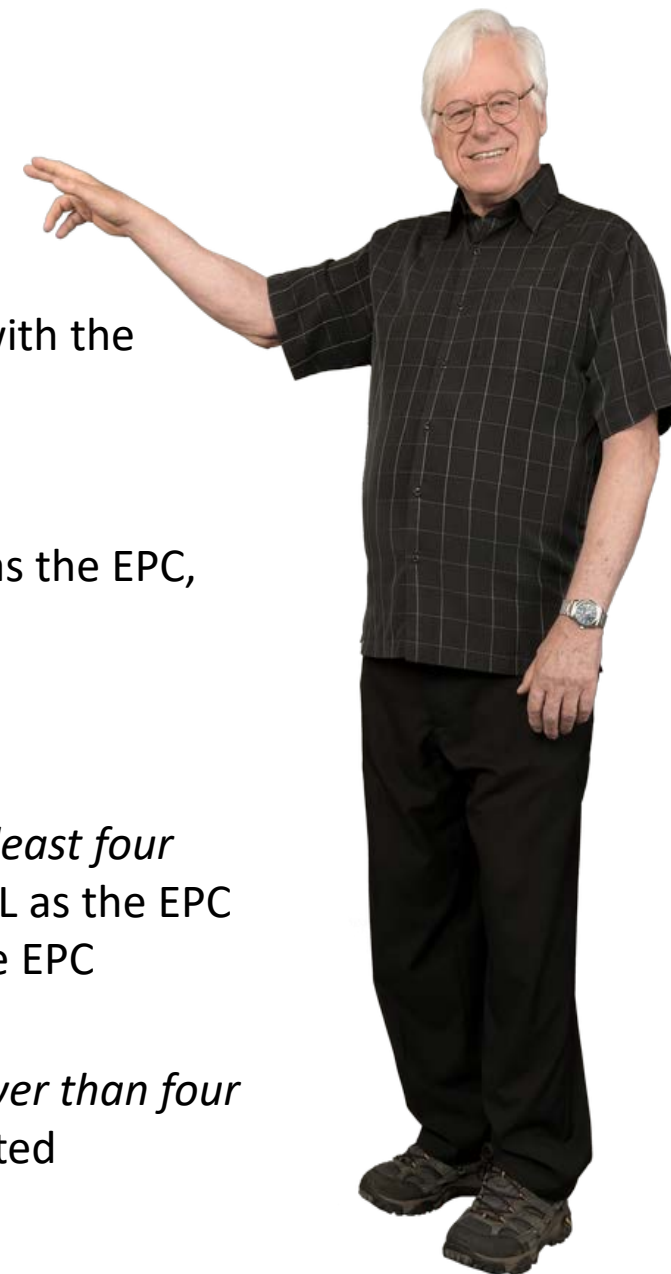
## EPC Guidance for DISCRETE Sampling Data

### Acute Exposures

- Use the statistic (maximum detected concentration or 95UCL) that best aligns with the sample media and applicable toxicity data as the EPC.

### Intermediate or Chronic Exposures

- For a data set with *fewer than eight samples*, use the maximum concentration as the EPC, and
  - Consider recommending additional sampling
  - Consult with the ADS group on your evaluation
- For a data set with *eight or more samples, with the contaminant detected in at least four samples and detected at least 20 percent of the time*, use the appropriate 95UCL as the EPC based on the sample size, number of detects, and data distribution. Refer to the EPC guidance for more details.
- For a data set with *eight or more samples, with the contaminant detected in fewer than four samples and detected less than 20 percent of the time*, use the maximum detected concentration as the EPC.





# Discrete Sampling EPC Calculations (cont.)

**Note:** “ATSDR’s Discrete Sampling Guidance” does not apply to all contaminants and types of sampling.

- Refer to SMEs when evaluating asbestos and lead.
- Refer to “ATSDR’s Toxic Equivalents Guidance for Dioxin and Dioxin-like Compounds” for dioxins.
- Refer to “ATSDR’s Non-Discrete Sampling Guidance” for multi-incremental and composite sampling data.
- Refer to “ATSDR’s Guidance for Calculating Benzo(a)pyrene Equivalents for Environmental Samples Analyzed for PAHs.”
- Refer to the ADS group for EPC guidance when evaluating **dependent data**. These are instances where the results of one sample at least partially predict the results of another sample.
- You can find all final guidance in the “Resources” section of PHAST.

# Discrete Sampling EPC Calculations (cont.2)

## EPC Guidance for DISCRETE Sampling Data

### Soil Pica Exposures

Pica is defined as the persistent eating of non-nutritive substances such as dirt or paint. Incidental ingestion of soil occurs in all age groups, particularly in children (who have more hand-to-mouth contact). ATSDR evaluates pica only under certain circumstances, such as when this behavior is known or suspected to have occurred and a pica CV is met or exceeded. The following guidance applies for calculating EPCs for soil pica exposures:

1. Run a default pica intermediate and acute residential scenario in the PHAST Soil/Sediment Dose Calculator. You will use an EPC that represents the maximum concentration of surface soil that a child could access. The default scenario in PHAST assumes an exposure of 3/7 days a week and an intake rate of 5,000 mg/kg for acute and intermediate scenarios.

\*If PHAST indicates the default scenario using the maximum concentration exceeds acute and/or intermediate health guidelines (as indicated by a health quotient > 1 in PHAST) go to step 2.

# Discrete Sampling EPC Calculations (cont.3)

## EPC Guidance for DISCRETE Sampling Data

### Soil Pica Exposures (continued)

2. Enter site-specific parameters, if available, in PHAST to determine whether a **single pica event** is a health concern. Note that site-specific data are not often available and are not required to evaluate this one time dose. Typically, this one-time dose uses an exposure of 1 day and the default intake of 5,000 mg/kg.

In your documents, report the pica results for all scenarios that you evaluated. Refer to “ATSDR’s Discrete Sampling Guidance” and “ATSDR’s Soil and Sediment Ingestion EDG” for more information. You can find these documents in the “Resources” section of PHAST.



# Discrete Sampling: EPC Calculations of 95UCLs

## EPC Guidance for 95UCLs for Discrete Sampling Data

Health assessors will use a software application or programming language to calculate the 95UCL for the EPC. While many different software applications and programming languages are available, ATSDR recommends two statistical tools:

- [EPA's ProUCL](#) : A free software program developed by the U.S. Environmental Protection Agency (EPA) to calculate 95UCLs for sampling data sets.
- [R](#) : This downloadable, free programming language has many applications for conducting statistical analyses on sampling data but requires more effort to learn compared to EPA's ProUCL. In this mini-module, we will show some examples to calculate 95UCLs as EPCs using ProUCL.

# Discrete Sampling: EPC Calculations of 95UCLs (cont.)

## **EPC Guidance for 95UCLs for Discrete Sampling Data**

### Rules for Handling Non-Detects in Your Data Sets When Calculating 95UCLs

1. Do not delete non-detect observations from data sets.
2. Do not consider non-detect observations with extremely high detection limits.
3. Do not replace non-detect observations with a single surrogate value.
4. Do not calculate 95UCLs for contaminants containing fewer than 20 percent detections and fewer than four detections.

# Discrete Sampling: EPC Calculations of 95UCLs (cont.2)

## **EPC Guidance for 95UCLs for Discrete Sampling Data (continued)**

### Initial Data Processing Steps for 95UCL Calculations

- Perform a data quality review.
- Identify and process non-detect observations.
- Identify and process lower-bound concentration data points.
- Identify and process duplicate samples and replicate analyses.
- Plot environmental data to visualize the measurements' distribution.

Refer to “ATSDR’s Discrete Sampling Guidance” (in the “Resources” section of PHAST) for more information on the concepts outlined here, and on the statistical tools for performing your 95UCL calculations and selecting the appropriate 95UCL based on the characteristics of the dataset.



# Non-Discrete Composite Sampling EPC Calculations

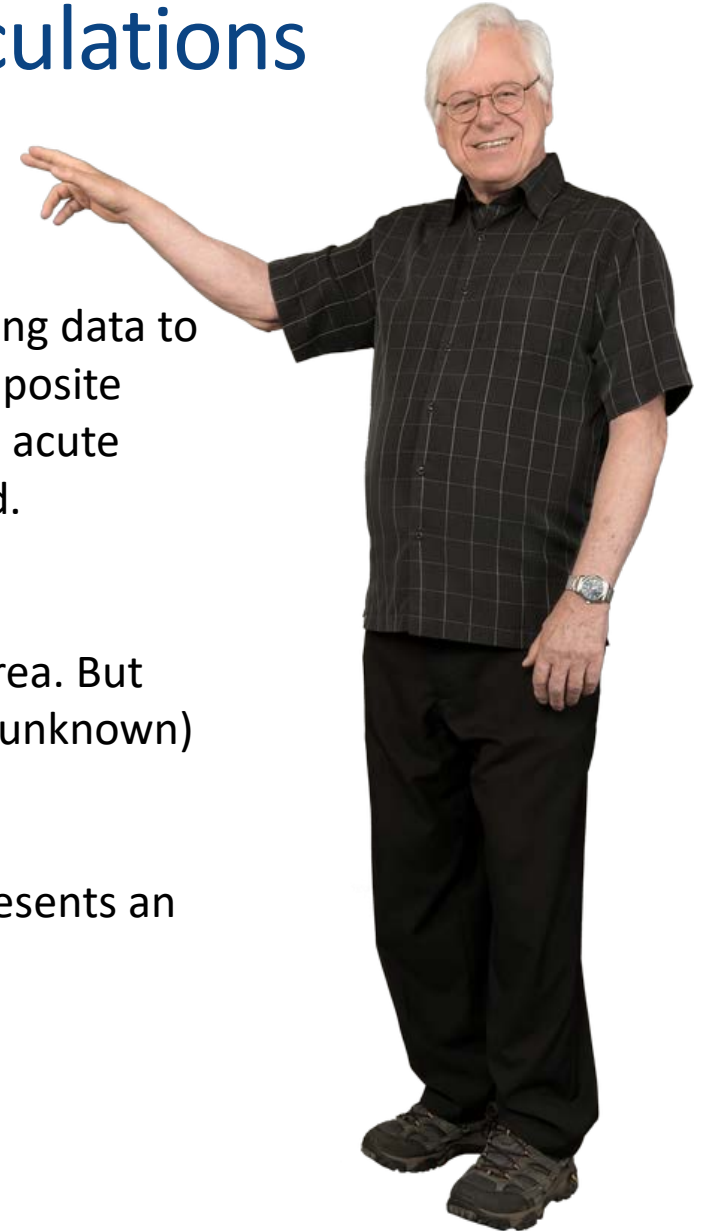
## EPC Guidance for Non-Discrete Composite Sampling

### Acute Exposures

- ATSDR recommends examining the appropriateness of using composite sampling data to evaluate acute exposures on a case by case basis. You must be sure that a composite sample truly represents only the area where one might have exposure over an acute duration. Refer to the Guidance, and contact the ADS group for help, if needed.

### Intermediate or Chronic Exposures

- *Single composite sample*: Use if you determined it accurately represents the area. But acknowledge any **uncertainty** (referring to when information is incomplete or unknown) with its use in your report.
- *Multiple composite samples*: Determine whether each composite sample represents an equal size area of the exposure unit.
  - Unequal size: Use a weighted average as the EPC.
  - Equal size: Use an average as the EPC.



# Non-Discrete Incremental Sampling Methodology (ISM) Data: EPC Calculations

## **EPC Guidance for Non-Discrete Incremental Sampling Methodology (ISM) Data:**

### Acute Exposures

- Use the result of a single ISM or average of multiple ISMs as EPCs under certain scenarios.

### Intermediate or Chronic Exposures

- Use the result of a single ISM or average of multiple ISMs as EPCs, as long as they adequately represent the exposure unit and were collected and analyzed in a manner consistent with data quality objectives (DQOs).

Refer to “ATSDR’s Non-Discrete Sampling Guidance” for more information on calculating EPCs for composite sampling and ISM data. Consult with the ADS group if you encounter site-specific scenarios or other conditions that are not covered in the guidance.

# Non-Discrete Composite and ISM Sampling EPC Calculations

**Note:** “ATSDR’s Non-Discrete Sampling Guidance” does not apply to all contaminants and types of sampling.

- Refer to SMEs when evaluating asbestos and lead.
- Refer to “ATSDR’s Toxic Equivalents Guidance for Dioxin and Dioxin-like Compounds” for dioxins.
- Refer to “ATSDR’s Discrete Sampling Guidance” for discrete sampling data (individual samples from a given point and time).
- Refer to “ATSDR’s Guidance for Calculating Benzo(a)pyrene Equivalents for Environmental Samples Analyzed for PAHs.”
- Refer to the ADS group for EPC guidance when evaluating **dependent data**. These are instances where the results of one sample at least partially predict the results of another sample.
- You can find all final guidance in the “Resources” section of PHAST.

# Estimating EPCs for Composite and Discrete Sampling Results

You might have a site-specific data set that contains composite and discrete sampling results. For example, composite samples may be collected across a large residential property to evaluate average concentrations and discrete samples may be collected from certain areas that the property owner believes are unique relative to the remainder of the property (e.g., play areas, hotspots, the center of a soccer field with barren soil).

**It is not appropriate to combine these results into a single data set.**

In this case, it is not statistically appropriate to combine results collected from the two methods into a single dataset. This would weight discrete samples more heavily in the dataset. The resulting concentration might be biased toward the average of the discrete samples. Health assessors may, however, gain valuable insight by evaluating the magnitude of difference between composite and discrete sampling data. If you need assistance on this topic, contact an ATSDR statistician.



# Estimating EPCs: Practice

Now, let's use what you learned to calculate an EPC for our classroom case study data. We talked about how you will calculate EPCs differently, depending on the type of samples you have.

For this practice, we will use our class exercises from Module 6, where we identified certain contaminants requiring further evaluation here in Module 7.

- First, we will practice together, using the class exercise that focused on carbon tetrachloride detected in discrete samples collected from drinking water at a private residence.
- Then, you will do a case study exercise, where you will calculate an EPC on your own, using the data on arsenic detected in discrete soil samples collected from the daycare center.



# Estimating EPCs: Practice (cont.2)

As a reminder, the following are the steps conducted before this Step 3:

- *Step 1: Define exposure units to evaluate.* You defined the exposure units—the six drinking water wells (PW-1 through PW-6). For our example, we are using PW-3.
- *Step 2: Compile data for each exposure unit.* For the purposes of this example, we are focusing on carbon tetrachloride, the one potential contaminant of concern (COC) that exceeded its CV during the screening (Module 6). We are also focusing on one exposure pathway: drinking water ingestion. The carbon tetrachloride data for PW-3 are summarized in the table here.

| Carbon tetrachloride sampling results in parts per billion (ppb) for PW-3 by sampling date |      |      |      |      |      |      |       |       |       |
|--|------|------|------|------|------|------|-------|-------|-------|
| 1/15   | 3/15 | 5/15 | 6/15 | 7/15 | 8/15 | 9/15 | 10/15 | 11/15 | 12/15 |
| 280  | 260  | 275  | 190  | 210  | 180  | 220  | 290   | 265   | 230   |



# Estimating EPCs: Practice (cont.3)

Now, you're ready to estimate the EPC. But first, you need to know about your exposure groups and their duration of exposure. In this example, we will focus on two groups (this is discussed further in Module 7):

- Residents with chronic exposure
- A house guest with intermediate exposure

So, based on the EPC guidance we talked about and the information on our example site, what do we know that will help us calculate the EPC?

- These are discrete samples, collected at a single exposure unit.
- There are more than eight samples for the exposure unit.
- There are no non-detect data points.
- The 95UCL should be used as the EPC for chronic and intermediate exposures.

Note: Example data sets were simplified for this training, and do not include data with non-detects. For real sites with non-detect data, refer to the EPC Guidance documents for information on how to handle them.

## Estimating EPCs: Practice (cont.4)

To calculate the 95UCL for the EPC, you will need to use available software programs. These are all outlined in “ATSDR’s Discrete Sampling Guidance.” For our exercise, we followed the guidance for exposure units with 8 to 19 samples and no non-detects and used [EPA’s ProUCL software program](#).

For these criteria and because the data best fit to a normal distribution, ATSDR’s guidance is to select the 95% Student’s t UCL, which is 262.7 ppb. (See spreadsheet on next slide.) This will be the EPC for our case exercise for intermediate and chronic exposures. See the EPC guidance for more information.



# Estimating EPCs: Practice (cont.5)

The following is a sample output for this example from EPA's ProUCL software program.

|    |   |       |   |       |
|----|---|-------|---|-------|
| 10 | Carbon tetrachloride                        |       |   |       |
| 11 |   |       |   |       |
| 12 | General Statistics                          |       |   |       |
| 13 | Total Number of Observations                | 10    | Number of Distinct Observations             | 10    |
| 14 |   |       | Number of Missing Observations              | 0     |
| 15 | Minimum                                     | 180   | Mean  | 240   |
| 16 | Maximum                                     | 290   | Median                                      | 245   |
| 17 | SD  | 39.23 | SD of logged Data                           | 0.169 |
| 18 | Coefficient of Variation                    | 0.163 | Skewness                                    | -0.28 |
| 19 |   |       |   |       |
| 20 | Normal GOF Test                             |       |   |       |
| 21 | Shapiro Wilk Test Statistic                 | 0.928 | Shapiro Wilk GOF Test                       |       |
| 22 | 5% Shapiro Wilk Critical Value              | 0.842 | Data appear Normal at 5% Significance Level |       |
| 23 | Lilliefors Test Statistic                   | 0.195 | Lilliefors GOF Test                         |       |
| 24 | 5% Lilliefors Critical Value                | 0.262 | Data appear Normal at 5% Significance Level |       |
| 25 | Data appear Normal at 5% Significance Level |       |   |       |
| 26 |   |       |   |       |
| 27 | Assuming Normal Distribution                |       |   |       |
| 28 | 95% Normal UCL                              |       | 95% UCLs (Adjusted for Skewness)            |       |
| 29 | 95% Student's-t UCL                         | 262.7 | 95% Adjusted-CLT UCL (Chen-1995)            | 259.2 |
| 30 |   |       | 95% Modified-t UCL (Johnson-1978)           | 262.6 |
| 31 |   |       |   |       |
| 32 | Suggested UCL to Use                        |       |   |       |
| 33 | 95% Student's-t UCL                         | 262.7 |   |       |

# Case Study Exercise: Estimating EPCs

In Module 7, you learned about various steps in the public health evaluation process. As you learned, the topic in this mini-module — estimating EPCs — is included as Step 3 in Module 7.

Now that you finished the class exercise on water, use what you've learned to calculate an EPC for the independent case study exercise. As we mentioned before, this independent exercise will focus on working with the arsenic data for soil at the daycare center, which you screened in Module 6.



# Case Study

## Exercise:

### Estimating EPCs

(cont.)

As a reminder, the following steps before this Step 3 were included in Module 7:

- *Step 1: Define exposure units to evaluate.* You defined a single exposure unit, being the entire outside area of the daycare center.
- *Step 2: Compile data for each exposure unit.* For this example, we are focusing on arsenic, the one potential COC that exceeded its CV during the screening (Module 6) and one exposure pathway, soil ingestion. The discrete surface soil sampling data for arsenic are summarized in this table.

## Surface Soil Sampling Results for Off-Site Daycare Center

| Sample Location | Date Sampled | Arsenic (mg/kg) |
|-----------------|--------------|-----------------|
| SS-GL-DC-1      | 12/12/15     | 1.3             |
| SS-GL-DC-2      | 12/12/15     | 350             |
| SS-GL-DC-3      | 12/12/15     | 400             |
| SS-GL-DC-4      | 12/12/15     | 2.6             |
| SS-GL-DC-5      | 12/12/15     | 31              |
| SS-GL-DC-6      | 12/12/15     | 350             |
| SS-GL-DC-7      | 12/13/15     | 560             |
| SS-GL-DC-8      | 12/13/15     | 280             |
| SS-GL-DC-9      | 12/13/15     | 290             |
| SS-GL-DC-10     | 12/13/15     | 550             |
| SS-GL-DC-11     | 12/13/15     | 520             |
| SS-GL-DC-12     | 12/13/15     | 460             |
| SS-GL-DC-13     | 12/14/15     | 840             |
| SS-GL-DC-14     | 12/14/15     | 1,020           |
| SS-GL-DC-15     | 12/14/15     | 950             |
| SS-GL-DC-16     | 12/14/15     | 430             |
| SS-GL-DC-17     | 12/14/15     | 360             |
| SS-GL-DC-18     | 12/14/15     | 270             |



## Case Study Exercise: Estimating EPCs (cont.2)

Now you will use the data you compiled in Step 2 to estimate an EPC for arsenic in soil at the single exposure unit at the daycare center. As explained earlier, you need to follow ATSDR's guidance to estimate EPCs. ATSDR has different guidance based on the type of samples in a data set. For this example, we will follow the EPC Guidance for Discrete Sampling. Always ensure you refer to the guidance that applies to your site-specific data.



## Case Study Exercise: Estimating EPCs (cont.3)

There are many things to consider when estimating an EPC. We explained some main concepts earlier (in slide 6), and the guidance from “ATSDR’s Exposure Point Concentration Guidance for Discrete Sampling” will apply here.

Choose the correct answer that relates to calculating the EPC for this exercise:

- ☐ A) Calculate an EPC for acute exposures only.
- ☐ B) Calculate the 95UCL as the EPC for pica (acute/intermediate) initially.
- ☐ C) Use the maximum concentration for the EPC to assess chronic exposures because there are too few samples.
- ☐ D) Use the 95UCL as the EPC to assess chronic exposures because arsenic was analyzed in  $\geq 8$  samples, detected in  $\geq 4$  samples, and detected in  $\geq 20\%$  of samples.

Go to the next slide for the answer.

# Case Study Exercise — Answer

**The correct answer is “D.”**

Option “A” is incorrect because based on the site information in Step 1, you learned that there are pica (acute and intermediate) and chronic exposures to evaluate.

Option “B” is incorrect because you learned that the maximum concentration is used as the EPC for pica.

Finally, option “C” is incorrect because as you saw in Step 2, there are 18 samples in the data set.

# Case Study Exercise: Estimating EPCs (cont.4)

We will help you a bit by listing a few other items you'll need to know.

- You will be evaluating a soil-pica scenario. As ATSDR guidance states, the first step is to run a default pica scenario in PHAST using the maximum concentration as the EPC. Based on the site data for this case exercise, the maximum arsenic concentration in soil is 1,020 mg/kg.
  - Note: In this first step, the default pica scenario in PHAST assumes an exposure of 3/7 days a week and an intake of 5,000 mg/kg: We won't do this for our exercise. However, at a real site, if the default pica scenario using the maximum concentration is a health concern, you would perform a second step to determine if a single pica event is a concern. This involves entering site-specific parameters, if available, in PHAST. However, site-specific data are not often available and are not required to evaluate this one-time dose. Typically, this one-time dose uses a 1-day exposure and a default intake of 5,000 mg/kg.
- This data set does not have any non-detect results. Therefore, you don't need to follow any steps for handling non-detects in this exercise.
- For a real site, you would use a software program, such as [ProUCL](#), to calculate the 95UCL for our chronic exposure. For this exercise, we will do this for you.

# Case Study Exercise: Estimating EPCs (cont.5)

Based on our review of the discrete sampling guidance, we know we are calculating the 95UCL to assess chronic exposures. We are using the maximum concentration to assess soil-pica exposures (acute and intermediate) for this exercise.

We will use [EPA's ProUCL](#) software program for the 95UCL calculation, like we did during our practice exercise earlier and will do the steps in ProUCL for you. As described in the EPC Guidance, we will elect the appropriate 95UCL for the dataset based on the sample size and distribution of the data.

You can download a [ProUCL User Guide](#) to help you. You can also refer to the EPC Guidance, which includes step-by-step directions for using ProUCL, with screenshots and case study examples.

Next, we present the ProUCL output based on our arsenic sampling data.



# Case Study Exercise: Estimating EPCs (cont.6)

| Arsenic                                     |       |   |       |
|---|-------|---|-------|
| General Statistics                          |       |   |       |
| Total Number of Observations                | 18    | Number of Distinct Observations             | 17    |
|   |       | Number of Missing Observations              | 0     |
| Minimum                                     | 1.3   | Mean  | 425.8 |
| Maximum                                     | 1020  | Median                                      | 380   |
| SD  | 290.9 | SD of logged Data                           | 1.891 |
| Coefficient of Variation                    | 0.683 | Skewness                                    | 0.553 |
| Normal GOF Test                             |       |   |       |
| Shapiro Wilk Test Statistic                 | 0.928 | Shapiro Wilk GOF Test                       |       |
| 5% Shapiro Wilk Critical Value              | 0.897 | Data appear Normal at 5% Significance Level |       |
| Lilliefors Test Statistic                   | 0.156 | Lilliefors GOF Test                         |       |
| 5% Lilliefors Critical Value                | 0.202 | Data appear Normal at 5% Significance Level |       |
| Data appear Normal at 5% Significance Level |       |   |       |
| Assuming Normal Distribution                |       |   |       |
| 95% Normal UCL                              |       | 95% UCLs (Adjusted for Skewness)            |       |
| 95% Student's-t UCL                         | 545.1 | 95% Adjusted-CLT UCL (Chen-1995)            | 548.2 |
|   |       | 95% Modified-t UCL (Johnson-1978)           | 546.6 |
| Suggested UCL to Use                        |       |   |       |
| 95% Student's-t UCL                         | 545.1 |   |       |



## Case Study Exercise: Estimating EPCs (cont.7)

For exposure units with 8 to 19 samples and no non-detects that are best fit by normal distributions, ATSDR's guidance is to select the 95% Student's t UCL.

Based on that, what would you choose from the ProUCL output as the EPC for your data set?

\_\_\_A) 548.2 mg/kg

\_\_\_B) 545.1 mg/kg

\_\_\_C) 546.6 mg/kg

Go to the next slide for the answer.

# Case Study Exercise Answer

**The correct answer is “B.”**

ProUCL provided the following UCLs for the normal distribution:

- 95% Student's t UCL of 545.1 mg/kg
- 95% Adjusted-CLT UCL of 548.2 mg/kg
- 95% Modified-t UCL of 546.6 mg/kg

Per ATSDR's guidance, with 8 to 19 samples and no non-detects that are best fit by normal distributions, health assessors are to choose the 95% Student's t UCL, which is 545.1 mg/kg.

# End of Estimating EPCs

Congratulations! You finished this mini-module on estimating EPCs.

Now, remember that you will need this information to complete the health effects evaluation process.



For more information, contact ATSDR  
1-800-CDC-INFO (232-4636)  
TTY: 1-888-232-6348 [www.atsdr.cdc.gov](http://www.atsdr.cdc.gov)  
Follow us on Twitter @CDCEnvironment

