Tour Guide for the ATSDR Dose Calculator Tool

June 2014

ATSDR

Who We Are - ATSDR

- ATSDR is a federal public health agency of the U.S. Department of Health and Human Services.
- Our goal is to prevent harmful exposures and diseases related to toxic substances.
- Our Brownfields/Land Reuse Initiative integrates public health principles into redevelopment.

ATSDR Dose Calculator

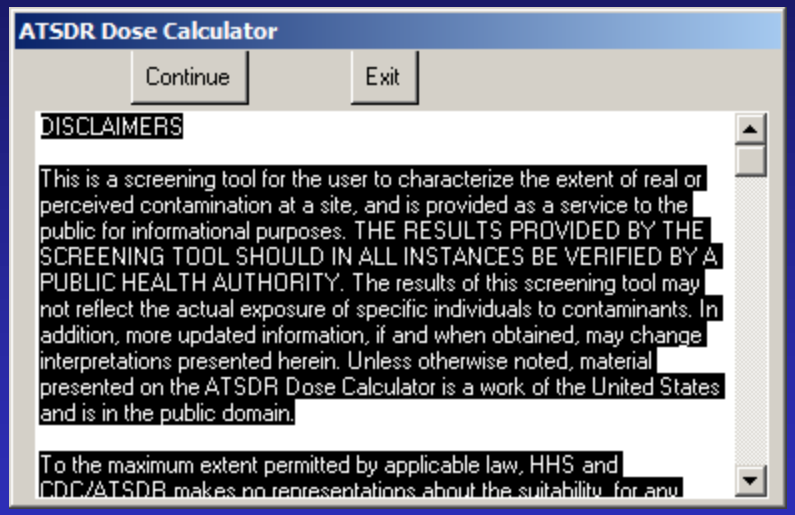
The ATSDR Dose Calculator is a computer program that allows users to calculate the amount of a toxic substance an individual may be exposed to (dose).

ATSDR Dose Calculator—Features

- Save and retrieve doses
- Select from 4 scenarios: Air, Soil, Water, Fish consumption
- Allows users to customize exposure parameters (e.g., age of people exposed, quantity of soil/water/fish ingested, number of days exposed (arms, legs, feet, hands, arms, torso, head)
- Incorporates sophisticated computational algorithms to calculate exposure doses for skin contact scenarios
- Calculates cancer risk estimations for chemicals containing cancer risk factors
- Displays ATSDR and EPA health comparison values
- Assist reviewers of Brownfields/Land Reuse data

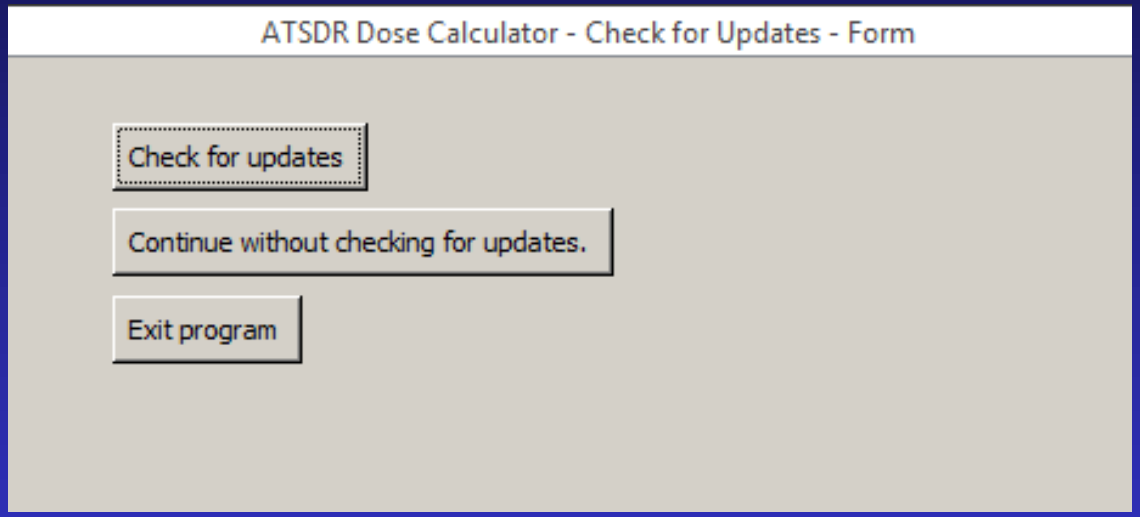
ATSDR Dose Calculator

The first screen displayed is the disclaimer. Select either continue (to proceed with the dose calculator) or exit (to quit the program).



ATSDR Dose Calculator

The next screen displayed provides the user with the ability to check for upgrades or continue without checking.



ATSDR Dose Calculator

This screen depicts several options:

- Specify the exposure route to calculate the dose;
- Import a saved dose from another version of this program;
- View saved Doses; and
- Exit

ATSDR Dose Calculator-Air

Enter Chemical by selecting either name, synonym or CASN

Enter Units

Enter molecular weight and value source (both are optional).

Click here to close this exposure module

Enter Concentration

Click here to save this dose

Enter Exposure Factor (between 0 and 1)

Enter notes here

Click here to calculate dose

Enter exposure duration in years here

Click here to calculate cancer risk (if applicable)

Exposure Dose Calculator

Air Exposure Dose Equation: ED = (C x IR x EF x CF) /BW

** Equation and all default values are taken from ATSDR's Public Health Assessment Guidance Manual.

Exposure Dose Calculator will automatically convert units to standard units.

Contaminant:
Synonym:
CASN:
Mol Wt.: g/mol
Value Source:
Close
Save Dose

Exposure Dose Calculation | Health Comparison Values | Cancer Classification | Alternative Comparison Values

Air Inhalation Exposure Dose Equation (choose one):
Direct Comparison to CVs (ED=C)
Calculate Using Exposure Factors ED = (C x IR x EF x CF) /BW

C=Contaminant Concentration:

IR = Intake Rate of Contaminated Air:
Specify Amount of Air Inhaled Per Day
Use Standard Intake Rate

Useful equations :

1) $C\mu g/m^3 = Cppb * \frac{Mol\ Wt}{24.45}$

2) $Cppb = C\mu g/m^3 * \frac{24.45}{Mol\ Wt}$

EF = Exposure Factor (unitless): 1
CF = Conversion Factor:

BW = Body Weight:
Specify body weight kg
Standard body weight

Notes:

Results for

Calculate Exposure Dose

ED = Exposure Dose:	Unbound	(mg/kg/day)
ED = Exposure Dose:	Unbound	µg/m3
ED = Exposure Dose:	Unbound	ppb
Daily Intake:	Unbound	(mg/day)

Cancer Risk (Optional) CR = ED x Unit Risk Factor * (Exposure Years / 70)

ED = Exposure Duration (in years):
Calculate Cancer Risk
Ca risk

ATSDR

ATSDR Dose Calculator-Soil Ingestion

Enter Chemical by selecting either name, synonym or CASN

Enter Units

Enter molecular weight and value source (both are optional).

Click here to close this exposure module

Enter Concentration

Click here to save this dose

Enter Intake rate or select from the list of standard intake rates

Enter Exposure, and Bioavaility factors (pre-populated with 1 (may be customized from values between 0 and 1)

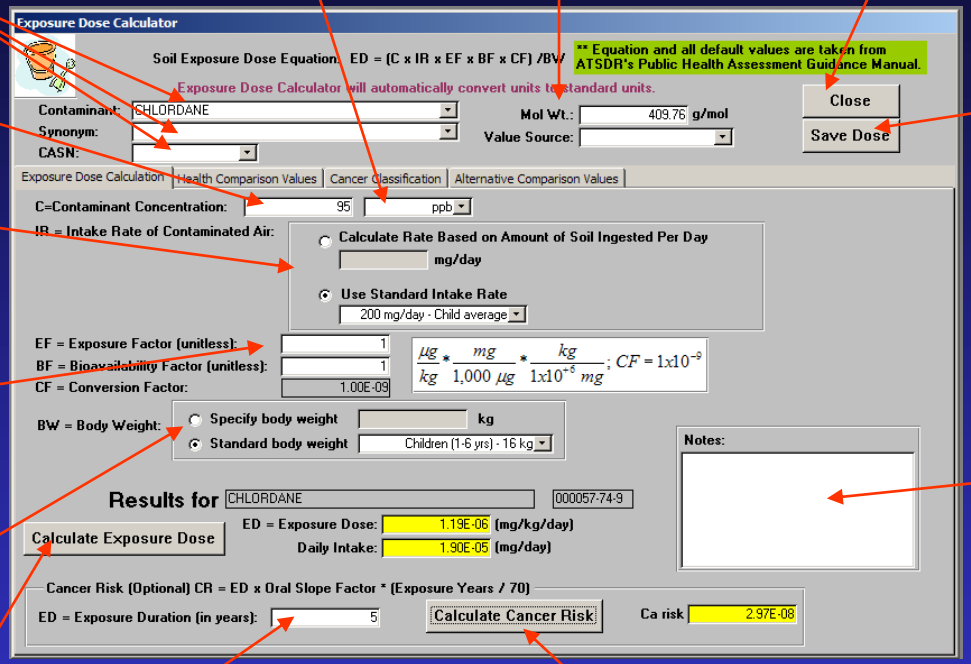
Enter notes here

Enter body weight of select from the list of standard body weights.

Click here to calculate dose

Enter exposure duration in years here

Click here to calculate cancer risk (if applicable)



ATSDR

ATSDR Dose Calculator-Soil Dermal

Enter Chemical by selecting either name, synonym or CASN

Enter Concentration

Enter Days and Years exposed

Enter Bioavaility factors (pre-populated with 0.1) (may be customized from values between 0 and 1).

Specify what surface is being exposed

Click here to calculate dose

Enter exposure duration in years here

Enter Units

Enter molecular weight and value source (both are optional).

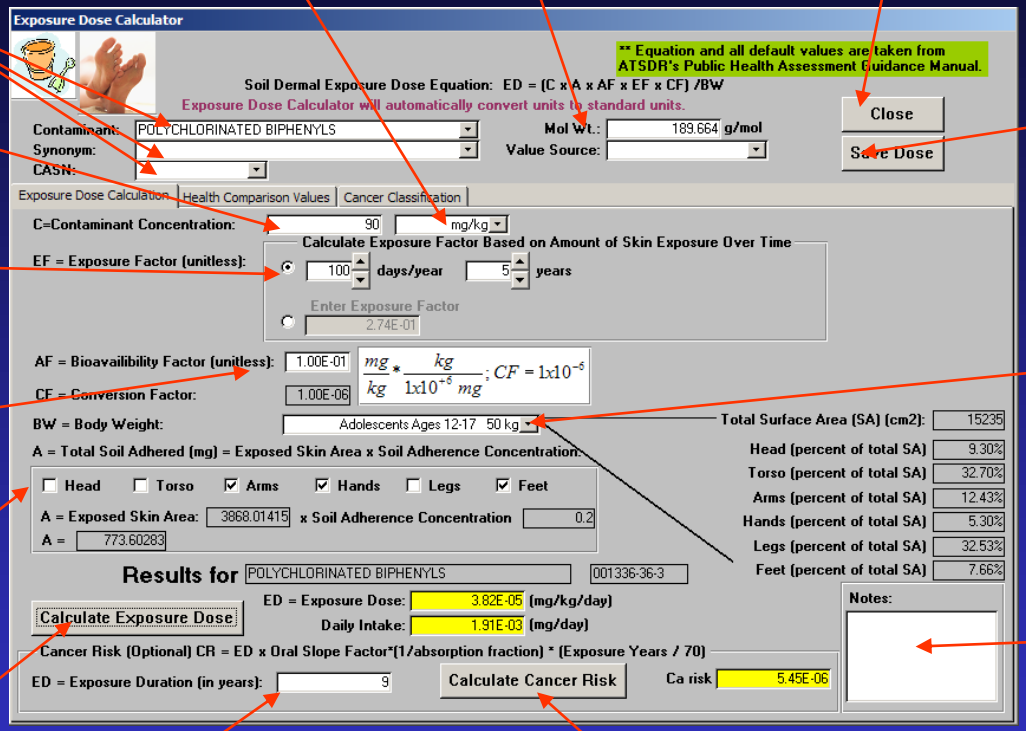
Click here to close this exposure module

Click here to save this dose

Enter body weight of select from the list of standard body weights.

Enter notes here

Click here to calculate cancer risk (if applicable)



ATSDR

ATSDR Dose Calculator-Water Ingestion

Enter Chemical by selecting either name, synonym or CASN

Enter Units

Enter molecular weight and value source (both are optional).

Click here to close this exposure module

Enter Concentration

Click here to save this dose

Enter Intake rate or select from the list of standard intake rates

Enter Exposure, and Bioavaility factors (pre-populated with 1 (may be customized from values between 0 and 1)

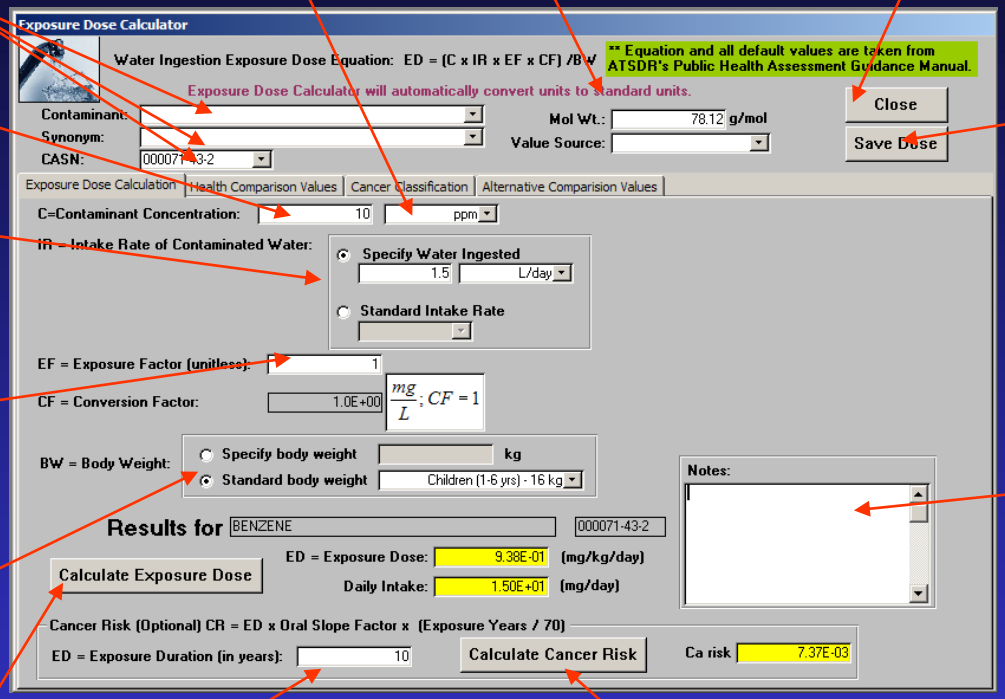
Enter notes here

Enter body weight of select from the list of standard body weights.

Click here to calculate dose

Enter exposure duration in years here

Click here to calculate cancer risk (if applicable)



ATSDR

ATSDR Dose Calculator-Water Dermal

Enter Chemical by selecting either name, synonym or CASN

Enter Concentration

Enter exposure time

Enter permeability coefficient if not already populated.

Specify what surface is being exposed

Click here to calculate dose

Enter exposure duration in years here

Enter Units

Enter molecular weight and value source (both are optional).

Click here to close this exposure module

Click here to save this dose

Enter body weight of select from the list of standard body weights.

Enter notes here

Click here to calculate cancer risk (if applicable)

Exposure Dose Calculator

** Equation and all default values are taken from ATSDR's Public Health Assessment Guidance Manual.

Water Dermal Exposure Dose Equation: ED = (C x P x SA x ET x CF) /BW

Exposure Dose Calculator will automatically convert units to standard units.

Contaminant: BENZENE

Synonym:

CASN:

Mol Wt.: 78.12 g/mol

Value Source:

Close

Save Dose

Exposure Dose Calculation | Health Comparison Values | Cancer Classification

C=Contaminant Concentration: 10 ppm

Calculate Exposure Factor Based on Amount of Skin Exposure Over Time

ET = Exposure Time (unitless): 20 mins/day 1 hours/day 45 days/year 10 years

Enter Exposure Time 1.33E+00

P = Permeability Coefficient: 5.95E-04 cm/hr source: http://www.epa.gov/oswer/riskassessment/ragse/pdf/org04_01.xls

CF = Conversion Factor: 1.00E-03 $\frac{mg}{L} * \frac{L}{1{,}000\ cm^3}$; $CF = 1x10^{-3}$

BW = Body Weight: Adolescents Ages 12-17 50 kg kg

SA = Exposed Body Surface Area (cm2):

☐ Head ☑ Torso ☑ Arms ☑ Hands ☑ Legs ☑ Feet

A = Exposed Skin Area: 1.38E+04

Total Surface Area (SA) (cm2): 15235

Head (percent of total SA) 9.30%

Torso (percent of total SA) 32.70%

Arms (percent of total SA) 12.43%

Hands (percent of total SA) 5.30%

Legs (percent of total SA) 32.53%

Feet (percent of total SA) 7.66%

Results for BENZENE 000071-43-2

Calculate Exposure Dose

ED = Exposure Dose: 2.19E-03 (mg/kg/day)

Daily Intake: 1.10E-01 (mg/day)

Cancer Risk (Optional) CR = ED x Oral Slope Factor * (Exposure Years / 70)

ED = Exposure Duration (in years): 10

Calculate Cancer Risk

Ca risk 1.72E-05

Notes:

ATSDR

ATSDR Dose Calculator-Fish Ingestion

Enter Chemical by selecting either name, synonym or CASN

Enter Units

Enter molecular weight and value source (both are optional).

Click here to close this exposure module

Enter Concentration

Click here to save this dose

Enter Intake rate (grams per day, grams per meal or standard intake rates).

Enter Exposure, and Bioavaility factors (pre-populated with 1 (may be customized from values between 0 and 1)

Enter notes here

Enter body weight of select from the list of standard body weights.

Click here to calculate dose

Enter exposure duration in years here

Click here to calculate cancer risk (if applicable)

Exposure Dose Calculator

Fish Ingestion Exposure Dose Equation: ED = (C x IR x AF x EF x CF) / BW

** Equation and all default values are taken from ATSDR's Public Health Assessment Guidance Manual.

Exposure Dose Calculator will automatically convert units to standard units.

Contaminant: MERCURY

Synonym:

CASN:

Mol Wt.: 439.84 g/mol

Value Source:

Close

Save Dose

Exposure Dose Calculation | Health Comparison Values | Cancer Classification | Alternative Comparison Values

C=Contaminant Concentration: 22 ppm

IR = Intake Rate of Contaminated Fish:

Calculate Rate Based on Amount of Fish Per Day Consumed Over Time

22 g/day for 45 days/year over 2 years

Calculate Rate Based on Fish Meals Per Week Consumed Over Time

for 0 meals/week and 0 weeks/year for 0 years

Use Standard Intake Rate:

EF = Exposure Factor (unitless): 1.26E-01

AF = Bioavailability Factor (unitless): 1.00E-01

CF = Conversion Factor: 1.00E-06

$$\frac{mg}{kg} * \frac{kg}{1x10^{-6}\ mg};\ CF = 1x10^{-6}$$

BW = Body Weight:

Specify body weight kg

Standard body weight Adults - 70 kg

Results for MERCURY 007439-97-6

Calculate Exposure Dose

ED = Exposure Dose: 8.74E-05 (mg/kg/day)

Daily Intake: 6.12E-03 (mg/day)

Cancer Risk (Optional) CR = ED x Oral Slope Factor * (Exposure Years / 70)

ED = Exposure Duration (in years): 2

Calculate Cancer Risk

Ca risk

Notes:

ATSDR

For more information

- ATSDR Brownfields/ Land Reuse Team: atsdr.landreuse@cdc.gov