

Chapter 19: Calibrating The Risk Model

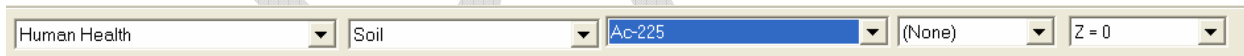
Once your SADA file has been setup for human health risk, the next step is to check that the risk model parameters are exactly what you need for your current assessment. The values that are sent with the ToxicologicalParameters.mdb and ScenarioParameters.mdb are primarily default EPA values for the southeastern US. These may not necessarily be the site specific values you'll need for your site.

There are two ways to customize your analysis. If you are going to do a number of small projects using the same customized set of parameter values, then you should directly modify the databases themselves using Microsoft Access. The fields are self-explanatory and their values can be modified to suit your needs. Name this modified database something different before you begin so you retain your copy of the original database. Be sure to not modify the table structures in anyway. SADA will not behave predictably if structural changes are made such as reordering fields, renaming fields, renaming tables, deleting tables and so forth. Once the database has been modified for your needs you can use it from now to setup the human health risk module in each new SADA file you create.

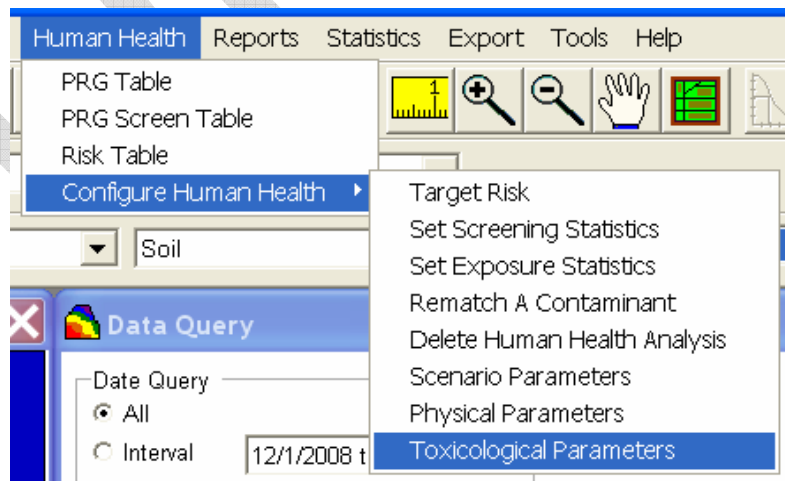
If this is not the case or if you feel uncomfortable dealing directly with the databases, you can calibrate the parameter values within each SADA file. There are some friendly windows in SADA that help you do this. Be aware though that the original database will not be modified during these changes – only the values within your SADA file. We will now cover how to modify or calibrate the model in SADA. Let's begin with the toxicological profile data.

Setting toxicological parameters

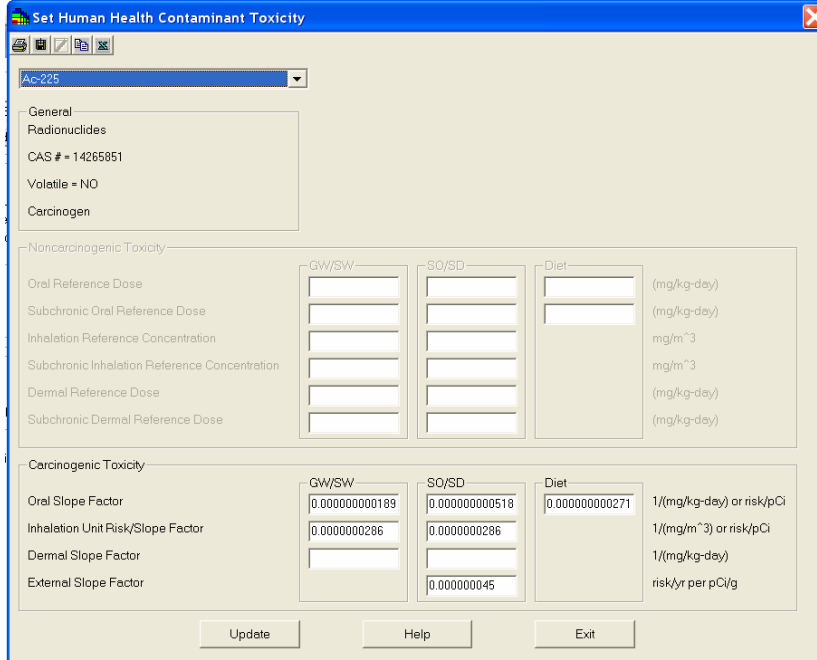
Begin by opening the file CalibratingHHRiskModel.sda. This is the same file you created in the last chapter called HumanHealthRisk.sda. Select Human Health from the analysis drop list and make sure you have selected Soil and Ac-225.



From the main menu select Human Health→Configure Human Health→Toxicological Parameters



You will be presented with the toxicological parameters window. In this window all the contaminants for the currently selected media type are presented. You can select the individually by choosing them from the drop list in the upper left hand corner.



In the first information block some basic information about the contaminant is provided. In the case of Ac-225 we are told it is radionuclide and a carcinogen. Because it is not a noncarcinogen (some contaminants are both), the noncarcinogen parameter set is grayed out. Here you can modify the carcinogenic toxicity/radiological values. Make changes as necessary and press the Update button before switching to another contaminant. Options for printing the results, saving the results to a text file, adding to autodocumentation, copying to the clipboard, and exporting directly to excel are found in the toolbar buttons at the top. A complete explanation of the risk parameters are found in the help file and are not repeated here.

Switch now to Arsenic, Inorganic and notice that both carcinogenic and non-carcinogenic parameters are now enabled.

Physical Parameters

Now we will modify some contaminant specific physical parameters that characterize how the contaminant behaves in the environment. These are important in exposure modeling. Select from the main menu Health Risk → Configure Human Health → Physical Parameters. You will be presented with the physical parameters window.

Set Human Health Contaminant Physical Parameters

Anthracene

General
Organics
CAS # = 120127
Volatile = YES

Physical Contaminant Parameters

Soil-to-air Volatilization Factor (VF)	696000	m ³ /kg
Soil-to-air Particulate Emission Factor (PEF)	1320000000	m ³ /kg
Dermal Absorption Factor (ABS)	0.01	unitless
Permeability Constant (KP)	0.225	cm/hr
Saturation Coefficient (CSAT)		mg/kg
Half-life		days
Inhalation Exposure Factor (Rad)		(L-hr)/(m ³ -day)

Food Chain Contaminant Parameters

Soil-to-plant wet uptake (BV Wet)	0.0216	(mg/kg)/(mg/kg)
Soil-to-plant dry uptake (BV Dry)	0.107	(mg/kg)/(mg/kg)
Milk transfer coefficient (Milk BTF)	0.0002	day/kg
Beef transfer coefficient (Beef BTF)	0.00063	day/kg
Fish bioaccumulation factor (Fish BTF)	533	L/kg

Update Help Exit

You can scroll through the different parameter values for each contaminant in soil by switching the selection in the drop list in the upper left hand corner. Options for printing the results, saving the results to a text file, adding to autodocumentation, copying to the clipboard, and exporting directly to excel are found in the toolbar buttons at the top.

Scenario Parameters

Unlike the first two parameter sets, these parameters characterize the behavior of the exposed rather than the attributes of the contaminant. From the main menu select Human Health→Configure Human Health→Scenario Parameters. The scenario parameters window appears.

Exposure Parameters - Soil						
	Residential	Industrial	Recreational	Excavation	Agricultural	
Exposure frequency	350	250	40	20	350	days/yr
Adult exposure duration	24	25	24	1	24	years
Child exposure duration	6	0	6	0	6	years
Total exposure duration	30	25	30	1	30	years
Adult soil ingestion rate	100	100	100	480	100	mg/day
Child soil ingestion rate	200	0	200	0	200	mg/day
Fraction ingested	1	1	1	1	1	unitless
Inhalation rate	20	20	20	20	20	m ³ /day
Adult surface area	0.53	0.316	0.53	0.53	0.53	m ² /day
Adherence factor	1	1	1	1	1	mg/cm ²
Gamma exposure factor	1	0.3333	0.041667	0.3333	1	unitless
Gamma shielding factor	0.2	0.2	0.2	0.2	0.2	unitless

General			Mass loading factors				
Body weight	Adult: 70	Child: 15	kg	Plant MLF	Residential: 0.26	Agricultural: 0.26	unitless
Lifetime	70	years		Pasture MLF	Residential: 0.26	Agricultural: 0.26	unitless

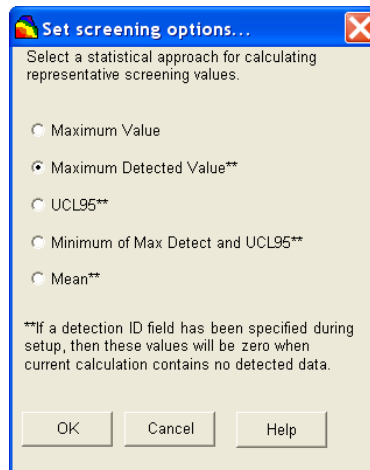
Milk food chain pathway (Dairy cattle)			Beef food chain pathway (Beef cattle)				
Fraction on-site	Residential: 1	Agricultural: 1	unitless	Fraction on-site	Residential: 1	Agricultural: 1	unitless
Fraction feed from site	Residential: 1	Agricultural: 1	unitless	Fraction feed from site	Residential: 1	Agricultural: 1	unitless
Quantity pasture ingested	Residential: 16.1	Agricultural: 16.1	kg/day	Quantity pasture ingested	Residential: 7.2	Agricultural: 7.2	kg/day
Quantity soil ingested	Residential: 1	Agricultural: 1	kg/day	Quantity soil ingested	Residential: 1	Agricultural: 1	kg/day

Here you can customize scenario or behaviour specific parameters for five different land uses: Residential, Industrial, Recreational, Excavation, and Agricultural. In addition, a number of other exposure related scenario parameters are presented. A full explanation of these is beyond the scope of this user guide. If you do not see the land use you are interested in, simply choose one of the existing land uses and calibrate it to your specific land use. You will not be able to rename it but the model will be calibrated to your exact situation. In the final report, you'll simply need to change the land use to its proper name.

Choosing the Representative Concentration

The representative concentration is a single concentration value that is statistically representative of the data set. There are four statistical values that can be used to calculate this value and can be established separately for exposure concentrations and screening concentrations.

Select from the main menu Human Health Risk → Configure Human Health → Set Screening Statistics. You will be presented with five options.

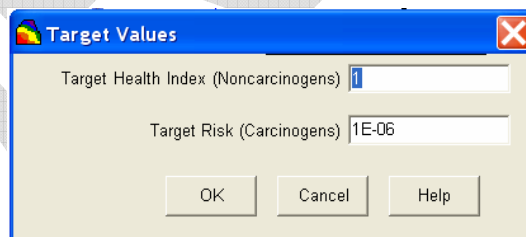


Choose from the maximum value, maximum detected value, UCL95, minimum of max detect and UCL95 and Mean. By convention if no data are detected for a given contaminant, the representative concentration for the purposes of screening will be zero for all choices but maximum value.

Select from the main menu Human Health Risk → Configure Human Health → Set Exposure Statistics. You will be presented with the same five options.

Setting The Target Risk/Index (for PRG calculations)

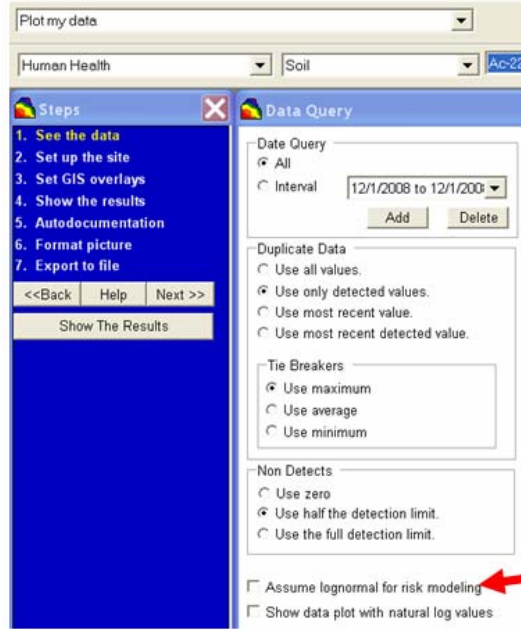
If you are calculating PRG values you will need to set the target risk and/or target health index. From these two values, the models may be run in reverse to determine the concentration that would correspond to this risk/index value. From the main menu select Human Health → Configure Human Health → Target Risk.



In this window enter the target health index for noncarcinogens and the target risk for carcinogens. We will leave these as 1 and 1E-06 for now. Press OK.

Setting the Distribution for Each Contaminant

For representative concentrations that require an assumption about the underlying contaminant distribution, SADA provides two options: normal and lognormal. You will need to specify this for each contaminant under the See The Data step.



Its easy enough to declare assume a lognormal distribution by just checking this option. If this option is blank, then a normal distribution is assumed. You should check the histogram of data to help guide you in making this choice.

Recent guidance from US EPA suggests using the PROUCL95 package to determine what the distribution for the data should be and what the resulting exposure concentration value would look like. If you are required to use this guidance, then you will need to use the PROUCL95 package outside of SADA to generate the exposure concentrations and import them in as single "data" points, one for each contaminant. When you set the exposure statistics, select maximum and you will be using the representative exposure value directly in the model.

When the model has been calibrated and distribution choices made for each contaminant, you are ready to start conducting risk assessments.