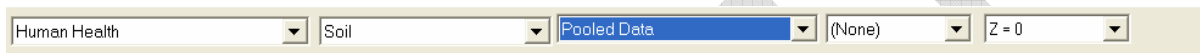


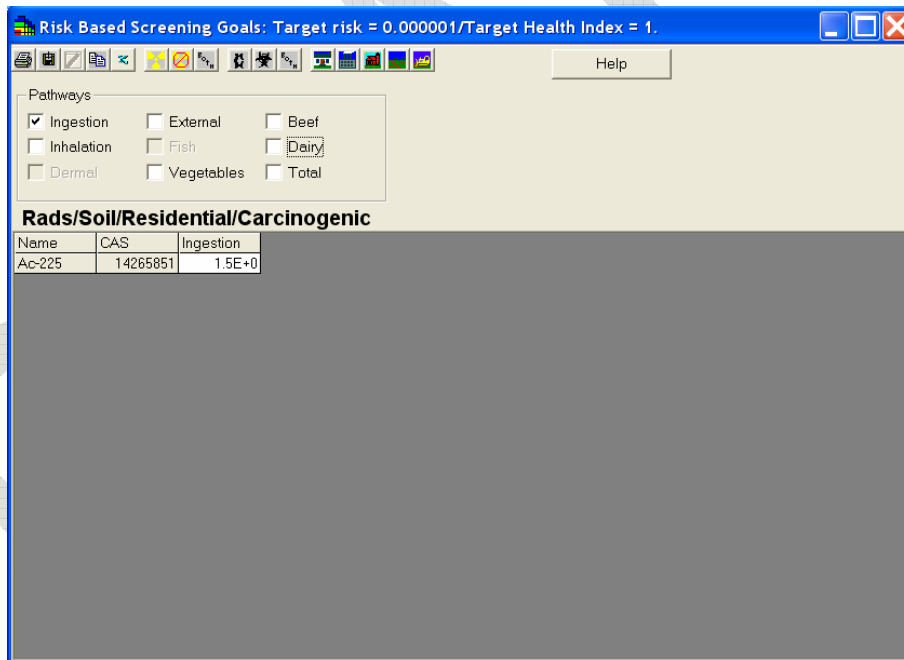
Chapter 20: Tabular PRG, Screen, and Risk Calculations

Now that you have setup and calibrated the risk model, you can begin doing some risk calculations. One of the first things assessors do is perform calculation of PRG values and then conduct a screening of their data to identify risk drivers. This allows users to par down lengthy lists of contaminants to just those few causing considerable problems. If you have a list of PRGs or equivalent already available for your site outside of SADA you will want to bring those in as a custom analysis instead of this method (see Chapters 14-16).

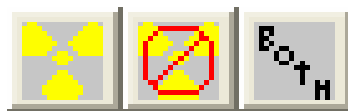
Let's begin by calculating PRG values with our newly calibrated model. You can calculate PRG's one at a time for each contaminant or you can calculate them for all contaminants in a given media at once. Let's do the latter. Close out any SADA file you are working with and open TabularRiskResults.sda. Select human health as your analysis, soil as the media, and then pool your soil contaminants.



From the main menu select Human Health→PRG Table. The PRG table is presented and populated with relevant PRG values in units of mg/kg, mg/L, pCi/g and pCi/L depending on whether the contaminant is a radionuclide or not and depending on the media type. Here we are working with soil so units will be either mg/kg for non-rads and pCi/kg for rads.



The first question that may arise is why does the result show only Ac-225? SADA organizes the risk results by categories. In particular the categories are , rad or nonrad, then carcinogen, noncarcinogen or both. You can elect to choose either rad, nonrad or both by selecting one of the following buttons respectively.



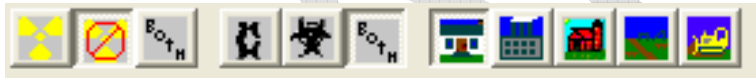
Following this selection you choose to see either carcinogenic, noncarcinogenic, or both PRGs by choosing one of these buttons respectively



To see how these categories behave, select the Rad button first. Notice that the carcinogen/noncarcinogen/both trio of buttons becomes disabled. This is because under a radionuclide contaminant only carcinogenic effects are considered. Therefore the choice is really not left up to the user. Since the only radionuclide is Ac-225, we see only one entry when the rad button is selected.

Now select the NonRad button. Notice that the carcinogen/noncarcinogen/both trio of buttons becomes enabled. Among our soil contaminants there is only one carcinogen – Arsenic. Press the noncarcinogenic button next. Now three of our soil contaminants appear – Barium, Arsenic, Anthracene. Finally view both carcinogenic and noncarcinogenic with the last button. The same three appear (only some additional columns are added, more on this shortly).

Now return to the rad/nonrad/both trio and select Both. When you are looking at both only carcinogenic results are considered because they are common to rads and nonrads. Notice that the carcinogen/noncarcinogen/both trio of buttons is once again disabled. We have only two carcinogenic contaminants in our soil (Ac-225 which is a rad and Arsenic which is a nonrad.) Select NonRad and Both.



SADA also organizes based on landuse. So beginning with the first button to the right of the carcinogen/noncarcinogen/both trio of buttons we have residential, industrial, agricultural, recreational, and agricultural landuse scenarios. Try switching between these results and notice the PRG values change.

Finally we have options for which exposure pathways to include. These are found in the pathways parameter block.



Some pathways are not permitted under certain conditions. For example, Fish is disabled because we are dealing with soil data. External is disabled because we are not using radiological contaminants (we have the nonrads button pressed). Try checking inhalation and notice that an inhalation column is added. Now add the Dermal column. The last option is the Total option. If you check this box, then the total PRG is calculated which includes all the exposure pathways that you have currently selected.

Risk Based Screening Goals: Target risk = 0.000001/Target Health Index = 1.

Pathways:
 Ingestion External Beef
 Inhalation Fish Dairy
 Dermal Vegetables Total

Nonrads/Soil/Residential/Carcinogenic and Noncarcinogenic

Name	CAS	Ingestion		Risk	Inhalation		Dermal		Total	
		Hazard (Adult)	Hazard (Child)		Hazard (Adult)	Risk	Hazard (Adult)	Risk	Hazard (Adult)	Risk
Anthracene	120127	2.2E+5	2.3E+4				3.1E+5		1.3E+5	
Arsenic, Inorganic	7440382	2.2E+2	2.3E+1	4.3E-1		7.5E+2	1.7E+3	8.8E+0	1.9E+2	4.1E-1
Barium	7440393	5.1E+4	5.5E+3		6.9E+5		6.7E+4		2.8E+4	

As an example of how to read this table – we have a value of 8.8E+0 for Arsenic, Inorganic when exposed by dermal contact for carcinogenic risk. What this means is that in order to be protective of human dermal contact with the soil, the concentration in the soil will need to be less than 8.8mg/kg.

Some of the cells are blank. This is usually because there isn't enough information to calculate a value for every exposure pathway. This is sometimes limited by the toxicological information.

Your turn: Notice that the risk for residential ingestion of arsenic is .043mg/kg. Now go back now to the scenario parameters and change the exposure frequency from 350 days per year to only 50 days per year. Regenerate the PRG table and notice that the risk for residential ingestion of arsenic is now 3.0mg/kg, a considerable increase. From a risk perspective, the limit can be raised because the receptor will only be living there 50 days out of each year rather than 350. Return to the scenario parameters page and change the value back to 350.

Tabular Screens

Once you are comfortable with using the PRG calculation feature, the tabular screening feature works exactly the same. Using the statistical choice for the representative screening concentration specified in the Human Health→Configure Human Health→Set Screening Statistics (see chapter 19), SADA will now compare this value with each of the PRG values seen in the previous exercise. To perform a screen, select Human Health→PRG Screen Table or press the Screen button . The tabular screen window appears.

Screening Results: Target risk = 0.000001/Target Health Index = 1.

Pathways:
 Ingestion External Beef
 Inhalation Fish Dairy
 Dermal Vegetables Total

Nonrads/Soil/Residential/Noncarcinogenic

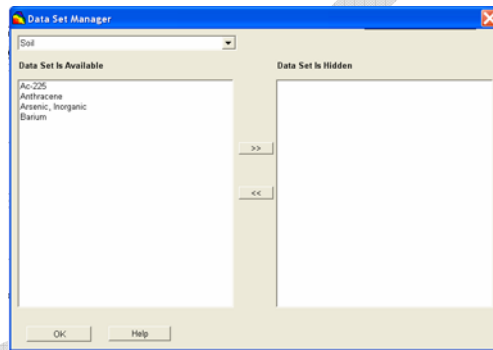
Name	CAS	Conc	Ingestion		Inhalation		Dermal		Total	
			Hazard (Adult)	Hazard (Child)	Hazard (Adult)	Hazard (Adult)	Hazard (Adult)	Hazard (Adult)		
Anthracene	120127	5.5	No	No			No		No	
Arsenic, Ino	7440382	53.6	No	Yes			No		No	
Barium	7440393	104.8	No	No	No		No		No	

Instead of PRG values, the table is populated with “No”, “Yes”, or blanks. If a cell contains a “Yes” then this contaminant is exceeding the acceptable screening criteria (PRG). A value of “No” means that it does not exceed the PRG value. A blank value means that the PRG was not available. This table is organized exactly the same as the PRG values table:

Rad/Nonrad/Both or Carcinogen/Noncarcinogen/Both. To export these results to Excel, simply press the Excel button.

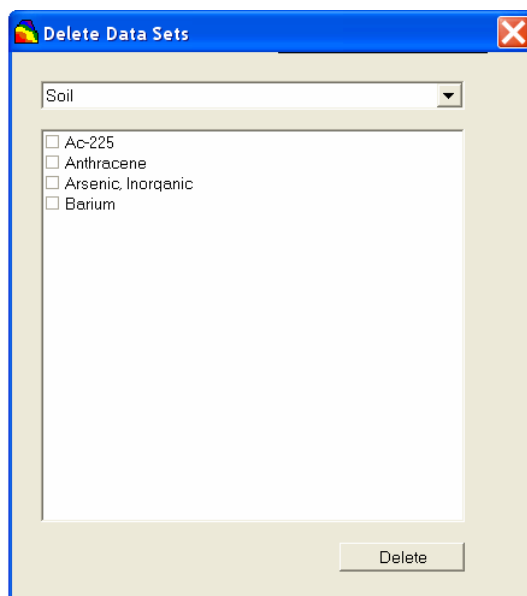
In some cases, project managers may exclude any contaminant that does not exceed the PRG. If this is the case, you can determine from this table which values do not exceed the PRG. Within SADA you can choose to *uninclude* or *delete* specific contaminants. Chapter 9 covers this in greater detail. For the sake of completeness, we will repeat some of those concepts here. In general, it is advisable to only uninclude the contaminant rather than delete them. If they are deleted they cannot be recovered without reimporting them. If they are unincluded, they are simply hidden and can be re-included at any time. Close your PRG Screen table.

To uninclude data, select from the main menu Data→Data Set Management→Choose Included Data Sets.



Using the arrows move selected contaminants to and from the hidden group. If a contaminant is hidden, the data is not deleted nor are any of the modeling parameters. Rather it is simply not included in the data set list boxes or in any output. Close this window.

To delete a contaminant entirely, select from the main menu Data→Data Set Management→Delete Data Sets.



In this window, check the box next to the contaminants you wish to delete and press the Delete button. You will be asked to confirm deleting. Close this window without deleting any data sets.

Forward Risk

A major result in a risk assessment is the forward calculation of risk. In this case, the representative exposure concentration specified by the choice in Human Health→Configure Human Health→Set Exposure Statistics is used in the forward calculation of risk. The outcome will be a risk value for carcinogens and a health index value for noncarcinogens.

Note: As previously mentioned, if you are using an outside method for calculating exposure concentrations, you should import these exposure values into a separate SADA file as if they were “data” values. You will need to provide a fake coordinate for each concentration value (e.g. 0,0). You will then choose to use in SADA to use the maximum value for the representative concentration. This will obviously be equal to the exposure value you imported.

To execute a forward risk calculation, select Human Health→Risk Table or press the Risk toolbar button (). The risk table is generated and is organized in exactly the same format as both the PRG and Screening table.

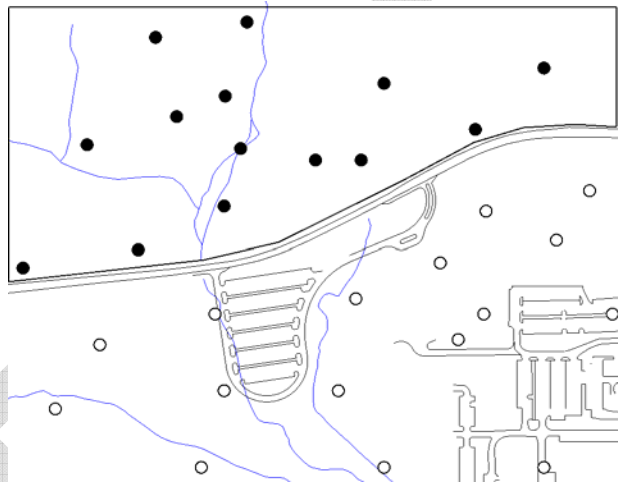
Name	CAS	Conc	Ingestion			Inhalation		Dermal		Total	
			Hazard (Adult)	Hazard (Child)	Risk	Hazard (Adult)	Risk	Hazard (Adult)	Risk	Hazard (Adult)	Risk
Anthracene	120127	2.9594958	1.4E-5	1.3E-4			9.4E-6				2.3E-5
Arsenic, Ino	7440382	33.6729561	1.5E-1	1.4E+0	7.9E-5		4.5E-8		2.1E-2	3.8E-6	1.7E-1
Barium	7440393	74.2578446	1.5E-3	1.4E-2		1.1E-4			1.1E-3		2.7E-3
Total			1.6E-1	1.4E+0	7.9E-5	1.1E-4	4.5E-8		2.1E-2	3.8E-6	1.8E-1

These results can be exported directly to Excel by pressing the Excel button. There they can be formatted as you wish. You can also print them (🖨️), copy them to the clipboard (📄), save them to a comma delimited file (📄), or add them to your report document (📄, see Autodocumentation chapter).

Performing Risk Assessments on Sub-Areas of the site

Suppose you want to conduct a risk assessment only on a subset of the site. This is easy to do in SADA using simply polygon drawing elements. First review the section on Working with Polygons in Chapter 4. Once you have reviewed how to create a polygon continue reading.

Close out any tabular risk window you may have open. In the steps window, select "Setup the site" and draw your attention to the "Current layer polygons" parameter block in the parameters window. Add a new polygon called "North of the Road". Draw a polygon similar to the one below.



So we will exclude all points south of the road. Now revisit the PRG Table, Screen Table, and Risk table discussed above. Notice the changes in values? You can focus your risk assessment on any subarea of the site as easy as this.

Moving Toward Spatial Risk

Tabular results are useful in getting a handle on what contaminants may be driving risk. But these results do not indicate *where* risk exceedances may exist. Localized events may be driving the risk. Special attention to those areas particularly in the remedial design phase can more efficiently target the area of concern. The next chapters begin the discussion on this approach and it is continued later in the chapters on decision analysis.