5. View, Export, and Save Results

Once a run is complete, view the results and input parameters used for the run by clicking on the VIEW RESULTS button on the MAIN MENU. This will open the RESULTS window. When you are done viewing results, click on the × at the top right corner of the RESULTS window to close it and return to the MAIN MENU shown in Figure 6.

Note that the Tool shows all results and inputs in a tabular format; graphical outputs are beyond the scope of the Tool (as well as the software used to implement it). However, all results and inputs can easily be exported to Excel (see **Section 5.2**). Once exported to Excel, you can create whatever graphs serve your specific needs, or save the data to a comma separated value file to import it into more sophisticated graphing software.

5.1   View Results

The RESULTS window displays results separately for the LAU and surface disposal units. Buttons at the top of the RESULTS window allow you to switch between LAU and surface disposal results. **Figure 27** shows the top of the RESULTS window for LAU results; the surface disposal window is essentially the same, except that the ecological results pane will always be empty, since ecological receptors are not modeled for the surface disposal unit. Depending on your display settings, you may need to make the RESULTS window bigger to see all columns.

Figure 27. RESULTS window showing LAU results.

The RESULTS window includes three tables: human results, ecological results, and model inputs.

The tables for HUMAN RESULTS AND ECOLOGICAL RESULTS are shown in Figure 27. The results can be sorted or filtered by clicking on the column headers, as illustrated in Figure 26, which shows the drop down for sorting or filtering human results by scenario. Note the ECOLOGICAL RESULTS table will be empty for LAU if no ecological receptors were selected, and is always empty for surface disposal, as ecological receptors are not modeled.

These tables show the following information:

- **Scenario:** for LAU, this is crop, pasture, reclamation (all may be selected for a run); for surface disposal, liner type.
- **Climate:** dry, average, wet (only one may be selected for a run)
- **CAS Number and Chemical Name** (one or more may be selected for a run)
- **Receptor:** for human results, either Adult Farmer or Child of Farmer; for ecological results, results for all selected receptors will be shown.
- **Pathway:** the exposure pathway. You will only see pathways you selected, plus total ingestion for LAU. Note that total ingestion will only include ingestion pathways selected. The pathways are named for the exposure medium (e.g., air, exposed fruit). The surface disposal results include only one ingestion pathway (groundwater), thus total ingestion is the same as groundwater.
- **Endpoint (human only):** either cancer and noncancer; if a chemical has both types of health toxicity value, results are calculated for both and they appear on separate rows.
- **Risk/HQ:** if the endpoint is cancer, this is a risk; if it is noncancer, this is an HQ. All ecological results are HQs. A zero value may indicate one of two things: (1) that the media concentration was so low that it was truncated to zero by the underlying computational model (this happens a lot with groundwater) or (2) that the BCF/BAF for this pathway is missing or zero. This latter case would be indicated by a value of "missing" in the BCF/BAF warning column (see below).
- **Media Concentration and Concentration Units:** the media concentration used to calculate the risk or HQ, along with the units. The pathway identifies the medium associated with this concentration. So, if the pathway is "ExFruit" (exposed fruit), then the media concentration is the concentration of the chemical in exposed fruit. Note that the total ingestion pathway risk or HQ has no associated media concentration, because it is the sum of the individual ingestion pathway risks or HQs (and so, based on the media concentrations for all of those).
- **Warning:** for human results, this may display various warnings or be blank (if there are no warnings). Warnings that may be displayed here include:
  - *Solubility limit exceeded:* For LAUs, this warning indicates that the solubility in soil porewater was exceeded in the LAU source model. The LAU model does not cap the porewater concentration at the solubility, but completes the run with the concentrations as calculated, but the results should be used with caution. This typically only occurs for constituents with very, very low solubilities when the application rate has been set to or near the high-end values.
  - *BCF/BAF bounded low (or high):* For organics, this warning indicates that the log K_{ow} used to estimate the BCF/BAF fell outside the applicable range of the correlation

equation used, so the log K_{ow} was bounded at the corresponding end of the applicable range of log K_{ow} before estimating the BCF/BAF. For example, the correlation equation for estimating soil to above-ground crop uptake (Br) has a valid log K_{ow} range of 1.15 to 9.35; the Br for a constituent with a log K_{ow} of 1 would be estimated based on the low end of the log K_{ow} range (log K_{ow} = 1.15) and be flagged as "bounded low". The "low" or "high" designation refers to the *input* parameter (log K_{ow} or, for air-to-plant transfer [Bv], HLC), *not* the resulting BCF/BAF. The different BCFs/BAFs have different relationships to log K_{ow} (or HLC): for soil to root vegetable uptake, the root concentration factor (RCF) increases as log K_{ow} increases; Br decreases as as log K_{ow} increases; Bv increases as log K_{ow} increases and decreases as HLC increase; and finally, the BCFs/BAFs for beef and milk increase as log K_{ow} increases from -0.67 (the lower end of the valid range) to 5, then decreases as log K_{ow} increases from 5 to 8.2 (the upper end of the valid range)..

– *BCF/BAF estimated:* for organics for the fish pathway, this warning indicates that the fish BCF was estimated using EPISuite, rather than based on data. Data-based values are always preferred if available.

– *BCF/BAF is surrogate:* for the fish pathway, this warning indicates that a fish BCF*/BAF* was available for only one trophic level (rather than both) and was used for both, or that fish BCFs*/BAFs* were available only for whole fish and those were used for filet for human consumption.

– *BCF/BAF missing*: for inorganics for the fish pathway, this warning indicates that no data were available for fish BCF*/BAF*. EPISuite cannot be used to estimate properties for inorganics, so missing fish BCFs*/BAFs* cannot be estimated as they are for organics. This warning may also appear for inorganics for plant, beef, or milk pathways, where it also indicates that no BCF*/BAF* is available for that pathway. Missing plant or animal BCFs*/BAFs* cannot be estimated from log K_{ow} as they are for organics.

The first six tabs of the MODEL INPUTS section of the RESULTS window are laid out identically to those shown in Figures 20–26 so are not repeated here. However, on the CHEMICAL INPUTS tab on the RESULTS screen, parameters with missing values are displayed in red, to make it easier to see them and determine what impact the missing data might have on the results. For example, if both the RfC and IUR are missing for a chemical, there will be no air results for that chemical. In addition, the MODEL INPUTS section of the RESULTS window includes two tabs to document the human pathways and ecological receptors selected for the run; these are not included in the INPUTS tab in the CONFIGURE MODEL window, because these choices can be viewed on the HUMAN EXPOSURE and ECOLOGICAL EXPOSURE tabs of the CONFIGURE MODEL window (see Figures 16 and 17).

> **IMPORTANT!** The MODEL INPUTS tabs in the RESULTS window and the INPUTS tabs in the CONFIGURE MODEL window are laid out the same way, but may not contain the same values:
>
> - The MODEL INPUTS tabs in the RESULTS window reflect the inputs used in the most recent model run (so the input values associated with the results shown).
> - The INPUTS tabs in the CONFIGURE MODEL window reflect the latest changes to the inputs, which may not have been run yet.
>
> Immediately after a run, these two sets of INPUTS tabs will have identical content. However, as soon as you go back to the CONFIGURE MODEL window and revise any inputs, including chemical selections, those changes will be reflected in the INPUTS tab of the CONFIGURE MODEL window, but they will *not* be reflected in the INPUTS table on the RESULTS window until you rerun the model.

5.2   Export Results and Associated Inputs

You can export the results and associated inputs by clicking on the EXPORT TO EXCEL button at the top left of the RESULTS window (see Figure 27). Note that this exports only the results and inputs for the selected unit type (LAU or SI). To export both, you will need to export two files, one from each screen.

You will be prompted for a file name via a standard Windows file save dialog; you can browse to the desired location (it defaults to the folder where you installed the Tool) and select a file name. The resulting Excel file will have twelve sheets corresponding to the two results tabs (human and ecological), the seven inputs tabs, two pathway/receptor selection tabs, and a reference list containing full citations for all references. **Figure 28** shows a sample export file. Access exports the file with all sheets selected; when you open it, you will need to select a single sheet before many menu options in Excel are available.

	A	B	C	D	E	F	G	H	I	J	K	L
1	Scenario	Climate	CAS	Chemical Name	Receptor	Pathway	Health Benchma	Value	C	Media_Conc_	Warning	
2	Crop	Avg	50328	Benzo(a)pyrene	Adult Farmer	Air	Cancer	1.42E-12	3.45E-12	mg/m3		
3	Crop	Avg	50328	Benzo(a)pyrene	Adult Farmer	Air	Noncancer	5.19E-06	1.04E-11	mg/m3		
4	Crop	Avg	50328	Benzo(a)pyrene	Adult Farmer	ExFruit	Cancer	9.56E-07	0.000368	mg/kg WW	BCF calculated	
5	Crop	Avg	50328	Benzo(a)pyrene	Adult Farmer	ExFruit	Noncancer	0.004849	0.000368	mg/kg WW	BCF calculated	
6	Crop	Avg	50328	Benzo(a)pyrene	Adult Farmer	ExVeg	Cancer	6.69E-07	0.000202	mg/kg WW	BCF calculated	
7	Crop	Avg	50328	Benzo(a)pyrene	Adult Farmer	ExVeg	Noncancer	0.00339	0.000202	mg/kg WW	BCF calculated	
8	Crop	Avg	50328	Benzo(a)pyrene	Adult Farmer	Fish	Cancer	1.09E-12	8.75E-08	mg/kg WW	BCF estimated	
9	Crop	Avg	50328	Benzo(a)pyrene	Adult Farmer	Fish	Noncancer	5.54E-09	8.75E-08	mg/kg WW	BCF estimated	
10	Crop	Avg	50328	Benzo(a)pyrene	Adult Farmer	GroundWate	Cancer	0	0	mg/L		
11	Crop	Avg	50328	Benzo(a)pyrene	Adult Farmer	GroundWate	Noncancer	0	0	mg/L		
12	Crop	Avg	50328	Benzo(a)pyrene	Adult Farmer	ProFruit	Cancer	1.09E-08	1.56E-06	mg/kg WW	BCF calculated	
13	Crop	Avg	50328	Benzo(a)pyrene	Adult Farmer	ProFruit	Noncancer	5.55E-05	1.56E-06	mg/kg WW	BCF calculated	
14	Crop	Avg	50328	Benzo(a)pyrene	Adult Farmer	ProVeg	Cancer	6.12E-09	2.97E-06	mg/kg WW	BCF calculated	
15	Crop	Avg	50328	Benzo(a)pyrene	Adult Farmer	ProVeg	Noncancer	3.1E-05	2.97E-06	mg/kg WW	BCF calculated	
16	Crop	Avg	50328	Benzo(a)pyrene	Adult Farmer	Root	Cancer	2.07E-06	0.001074	mg/kg WW	BCF calculated	

Human_Results | Eco_Results | Run_ScenarioInputs | Run_FateInp ...

Figure 28. Sample export file.

5.3   Save a Run

As noted earlier, any configuration changes you make are automatically saved in the underlying Biosolids Tool database (BST_v2022xxxx.mdb), including changes to selected scenarios, chemicals, pathways, and receptors and any changes you make to percent solids or chemical-specific inputs. The next time you run the Tool, those settings will be the starting point for any configuration changes you might then make. Thus, the most recent configuration and run results

are automatically saved. However, there may be instances in which you want to save a particular configuration and reload and revise it. That cannot be done directly, but it can be done indirectly if you prepare for doing so BEFORE you set up the configuration you want to save:

1. **Make a copy of BST_v2022xxxx.mdb** file and rename it to reflect the desired configuration (e.g., BST_arsenic_baseline.mdb)
2. **Open this new file** instead of the installed file and revise the settings to the desired configuration. Changes will be automatically saved in the renamed copy.

If you want to save a series of variations on a configuration, you can repeat the above process using either the original file each time or a copy you have already made as a starting point. For example, if you want to save three variants of a run for arsenic, reflecting preloaded, low, and high values for the various BCFs/BAFs, make an initial copy (e.g., BST_arsenic_baseline), set that up to run arsenic in the desired pathways with the preloaded chemical data, then make two additional copies of the BST_arsenic_baseline file (e.g., BST_arsenic_BCFsBAFs_low and BST_arsenic_BCFsBAFs_high), open these, and make only the changes to the BCFs/BAFs. You can then open each of these three files, run them, and export the results while maintaining a revisable version of each configuration.

> Note that the new file name can be anything, but copies **must** be located in the same folder as the installed Biosolids Tool to run. You can save the files and open them to revise the configuration in another location, but the model will not run from another directory.