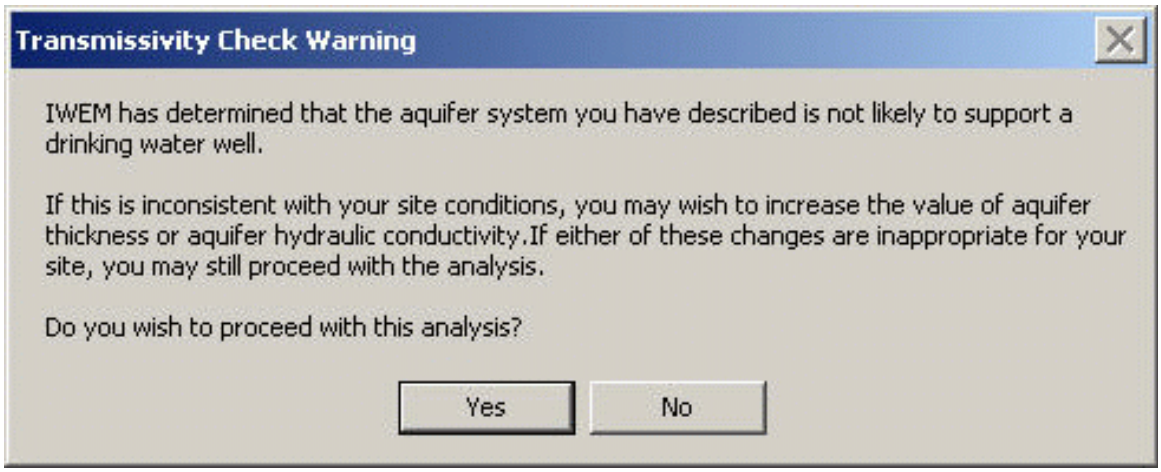
As part of the screening process, IWEM will check that the aquifer that will be modeled has a sufficiently high transmissivity to supply enough water to a domestic drinking water well. A low transmissivity value corresponds to a combination of a low hydraulic conductivity in the saturated zone and a small saturated thickness. If this situation is encountered, IWEM will display a warning message dialog box like the one shown below which asks if you want to continue. If you click |OK|, IWEM will continue with the input parameters you provided.



5.5.1.6 Tier 2 Input: Constituent List (20)

This is where you select the constituents that are present in the waste, and enter their leachate concentration. You can select constituents in several ways. You can:

- Search by Constituent Name or CAS Number, or
- Scroll through the list of IWEM constituents, using display and sort options.

If you performed a Tier 2 evaluation immediately after a Tier 1 evaluation, the waste constituents selected in Tier 1 are automatically transferred to Tier 2 and the Tier 1 leachate concentrations are also imported. If you are starting a Tier 2 evaluation and need to enter waste constituents, follow the steps described here.

The Constituent List (20) screen for Tier 2 is nearly identical to the Tier 1 Constituent List (7) screen, and the options and controls on this screen work exactly the same as the ones on the Screen 7. You can choose to include in your Tier 2 analysis any of the 206 organic constituents and 20 metal constituents included in the IWEM database

(see Appendix A). However, unlike Tier 1, in Tier 2 you can also add constituents to the IWEM list.

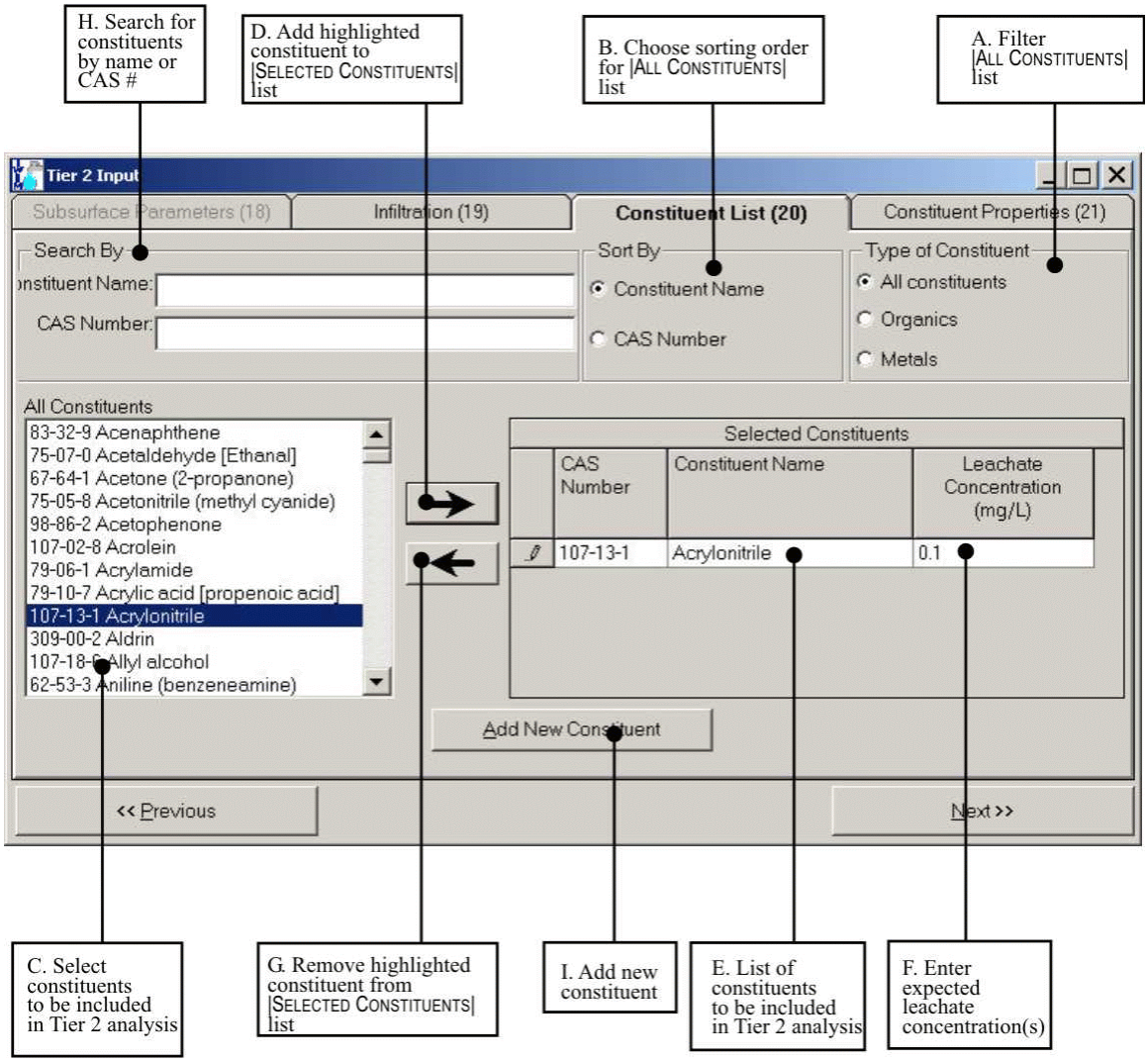


Figure 5.37 Tier 2 Input: Constituent List (20).

The features identified in Figure 5.37 are explained in more detail in the following paragraphs.

A. Filter |ALL CONSTITUENTS| ***List***

You can choose to display only organic constituents, only metals, or a combined list of all constituents by clicking one of the radio buttons under |TYPE OF CONSTITUENT|.

B. Choose Sorting Order for |ALL CONSTITUENTS| ***List***

You can determine whether the constituents are sorted by name or by CAS number by clicking one of the |SORT BY| radio buttons.

C. Select Constituents to be Included in Tier 2 Analysis

To move through the list of waste constituents:

1) Use the scroll bar at the right of the display window

2) Use the |ARROW| keys on the keyboard (once one constituent in the list is selected)

3) Type in the constituent name or CAS number in the |SEARCH BY| box

You can select constituents by using one of these methods:

- To add an individual constituent, select that constituent by clicking on its name.

- To add multiple constituents that are listed in contiguous order (that is, one after another without any non-selected constituents in the middle), click on the first waste constituent, press down the |SHIFT| key, and then click on the last waste constituent. All waste constituents listed between the first and last chosen constituents should now be highlighted.

- To add multiple constituents that are not in contiguous order, click on the first waste constituent, and then hold down the |CTRL| key while selecting additional constituents using the mouse.

Once your selection is complete, use the |ADD| button (described below) to transfer all the highlighted constituents to your list.

D. Add Highlighted Constituent(s) to |SELECTED CONSTITUENTS| List

Once the appropriate constituents are highlighted in the list (on the left of the screen), you can click the |ADD|  button in the center of the screen to transfer it to your list of leachate constituents (on the right side of the screen). Note that a waste constituent can also be added directly to your list by double-clicking on it in the list on the left.

E. List of Constituents to be Included in Tier 2 Analysis

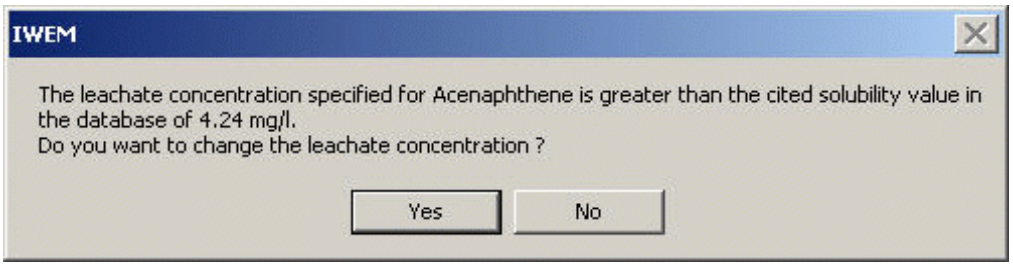
Once you have successfully added a constituent to your analysis, that constituent's name and CAS number will appear in the |SELECTED CONSTITUENTS| window on the right side of the screen.

If any of the selected waste constituents hydrolyze into toxic daughter products, the daughter products are automatically added to the Tier 2 evaluation. You can modify constituent properties and toxicity standards of the daughter product(s) in the upcoming screens.

F. Enter Expected Leachate Concentrations

For each waste constituent in the |SELECTED CONSTITUENTS| list, you must enter your expected leachate concentration in mg/L. This value cannot exceed 1,000 mg/L. Consult Chapter 2-Characterizing Waste in the ***Guide*** (U.S. EPA, 2002d) for analytical procedures that can be used to determine expected leachate concentrations for waste constituents. Because the expected leachate concentrations of daughter products are controlled by the leachate concentration of the parent constituent, the daughter product leachate concentrations are not IWEM inputs.

The IWEM software will display a warning message similar to the one shown below if you enter an expected leachate concentration that exceeds the solubility of that constituent, as cited in the IWEM database. If you accidentally entered the wrong value, click the |YES| button and correct the expected leachate concentration on the Leachate Concentration (8) screen. If you want to proceed with the evaluation using your entered value, click the |NO| button. In this case, a similar warning message about your input leachate concentration will be included in the printed report.



The Tier 2 Evaluation cannot be performed until the expected leachate concentration is entered for each selected waste constituent.

G. Remove Highlighted Constituent from |SELECTED CONSTITUENTS| ***List***

Analogous to the |ADD| button, you can click the |REMOVE| button to delete a highlighted constituent from the your list of selected constituents.

H. Search for Constituents by Name or CAS #

Type the name or the CAS number in the |SEARCH BY| window to select a particular constituent on the IWEM list. As soon as you have typed in enough information to identify the constituent, it will be highlighted in the constituent window on the left of the screen. You can then use the |ARROW| keys on the keyboard to move up or down in the list if the highlighted constituent is not exactly the one you intended to select.

I. Add New Constituent

To add a new waste constituent, click on the |ADD NEW CONSTITUENT| button at the bottom of the Constituent List. The message box shown below in Figure 5.38 will appear:

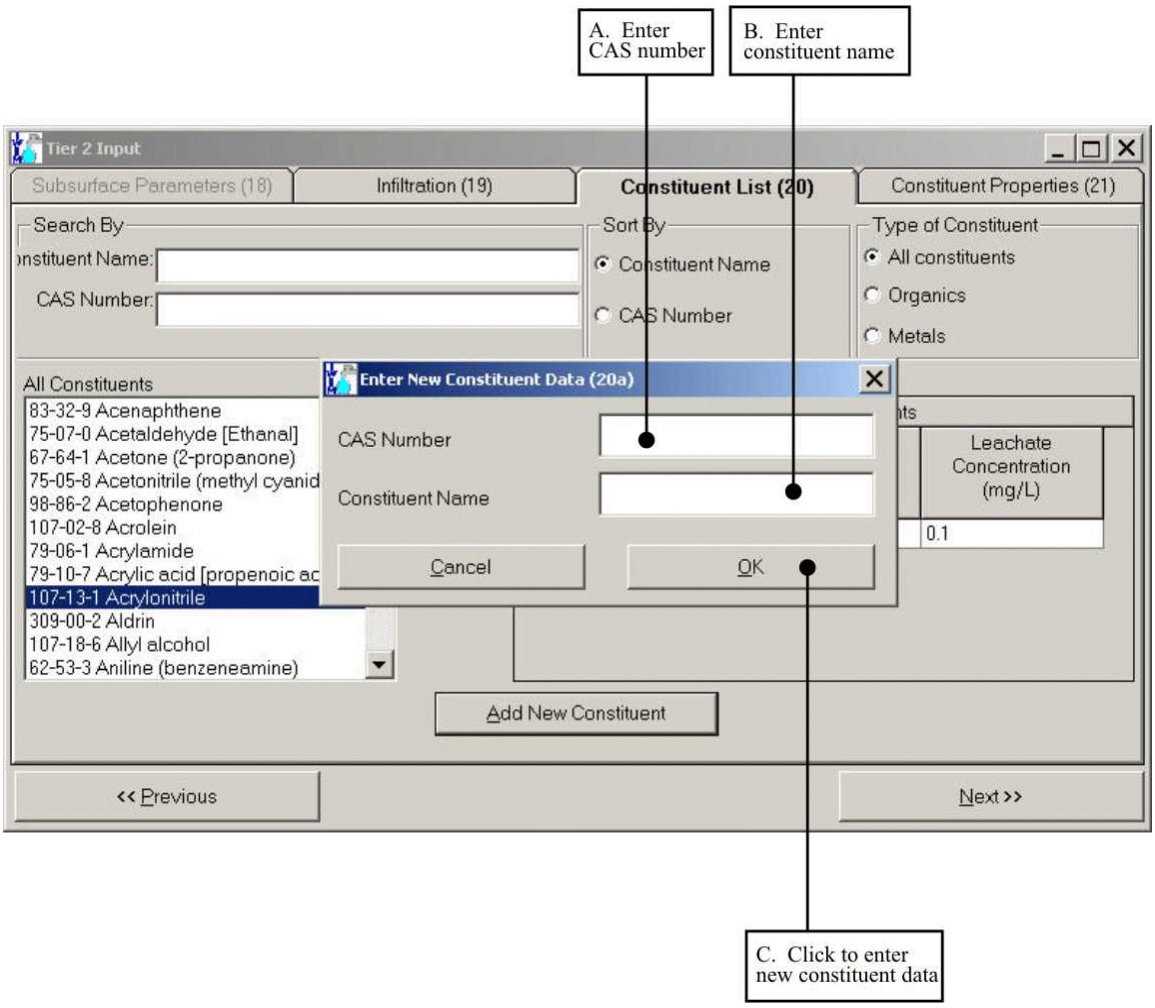


Figure 5.38 Tier 2 Input: Enter New Constituent Data (20a).

The features identified in Figure 5.38 are explained in more detail in the following paragraphs.

A. Enter CAS Number

The CAS number of a new constituent must be entered and it must be a number that is not already in use by one of the IWEM constituents. If a CAS number is not available or you do not know the number for a new constituent, any number can be used here, as long as it is a unique number between 50,000 and 999,999,999.

B. Enter Constituent Name

The constituent name must be entered and it must be a name that is not already in use by one of the constituents in the IWEM database.

C. Click to Enter New Constituent Data

After you click |OK|, a new entry in the database will be created for your new constituent, and screen 20b (Figure 5.39) will appear.

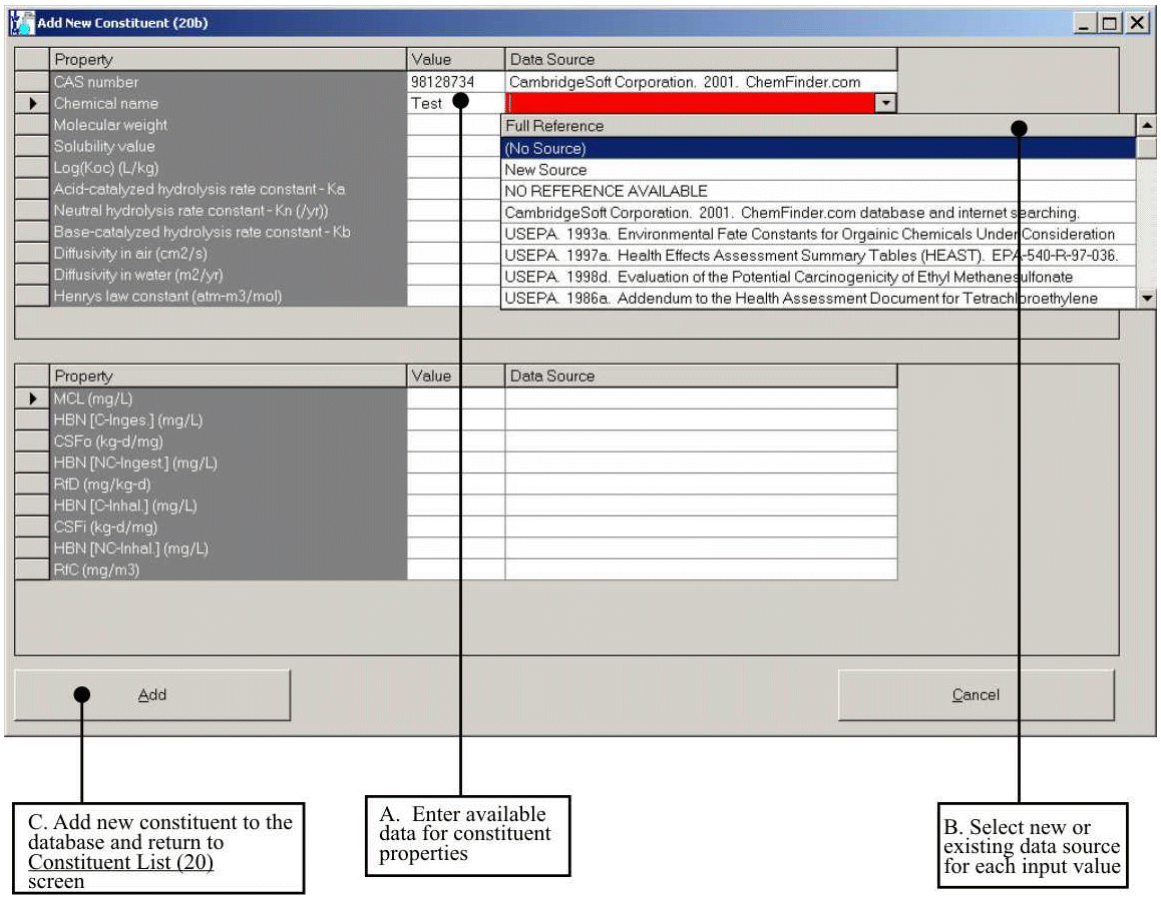


Figure 5.39 Tier 2 Input: New Constituent Data (20b).

The features identified in Figure 5.39 are explained in more detail in the following paragraphs.

A. Enter Available Data for Constituent Properties

You can provide the following constituent physical-chemical data as optional inputs. In addition, you can provide a "User-defined RGC" later on, in screen 22.

- Molecular weight
- Solubility
- Log K_{oc}
- Acid-catalyzed hydrolysis rate constant
- Neutral hydrolysis rate constant
- Base-catalyzed hydrolysis rate constant
- Diffusivity in air
- Diffusivity in water
- Henry's Law constant
- MCL (Maximum Contaminant Levels)
- HBN (Non-carcinogenic-Ingestion)
- HBN (Carcinogenic-Ingestion)
- HBN (Non-carcinogenic-Inhalation)
- HBN (Carcinogenic-Inhalation)

If you do not enter a value for the physical-chemical parameters, a default value of zero will be used for each of these parameters. However, for each constituent at least one non-zero RGC value must be entered (either an MCL, or an HBN). If you enter an HBN RGC, you must also enter its corresponding toxicity value (listed in the column next to each HBN). IWEM assumes a 30-year exposure duration for cancer HBNs and 7-year exposure duration for non-cancer HBNs.

B. Select Type of Data Source for Each Input Value

For each constituent property value that you enter, you must specify the source of the data. Clicking in the |DATA SOURCE| field after entering your data will display the drop-down list control  . Click on this control to reveal the drop-down list shown in Figure 5.39. You can select from the current list of references in the IWEM database, or you can choose |NEW SOURCE| to enter a bibliographic reference that is not included in the IWEM database (see Figure 5.40).

C. Add New Constituent to the Database and Return to the Constituent List (20) screen

After entering the available data and selecting or entering a reference for each value, click the ADD button to update the list of IWEM constituents. Once you have done this, a message box will appear asking if you want to include this newly added constituent in your Tier 2 analysis. Even if you decide not to use the new constituent in your current analysis, the new constituent will be permanently added to the IWEM database.

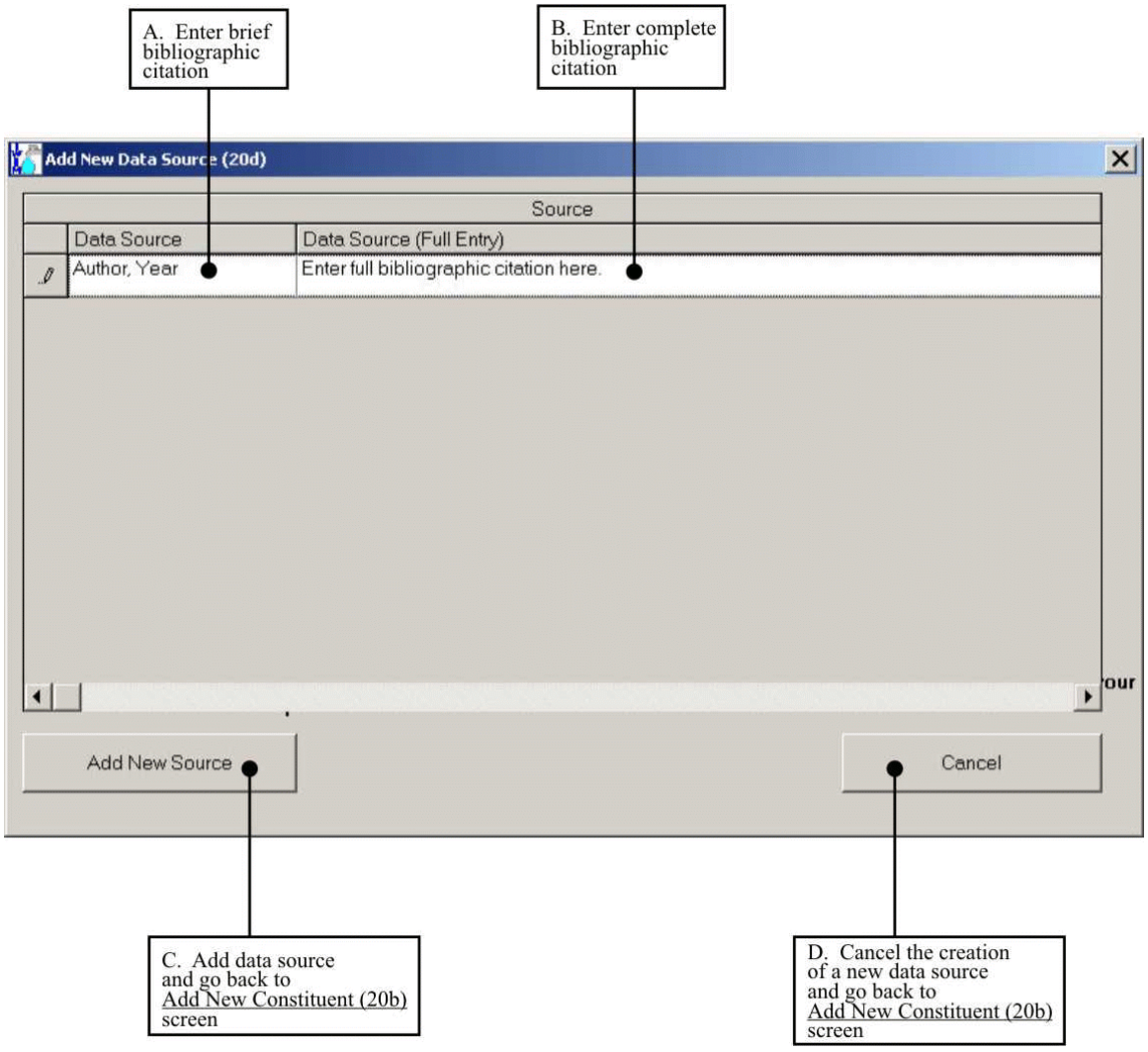


Figure 5.40 Tier 2 Input: Add New Data Source (20d).

The features identified in Figure 5.40 are explained in more detail in the following paragraphs.

A. Enter Brief Bibliographic Citation

If you choose │NEW SOURCE│ on dialog box 20b, the dialog box shown in Figure 5.40 will appear. Enter a brief bibliographic citation in this field, in the form of "Author, Year." IWEM uses this information to index all citations, and therefore, this entry must not duplicate an existing reference in the IWEM database.

B. Enter Complete Bibliographic Citation

Enter a complete bibliographic citation in this field. You can use the existing references in the IWEM database as a guide for formatting your newly added citation.

C. Add Data Source and Go Back to Add New Constituent (20b) screen

Click the │ADD NEW SOURCE│ button to enter this citation into the IWEM database and return to dialog box 20b.

D. Cancel and Go Back to Add New Constituent (20b) screen

Check the │CANCEL│ button if you do not wish to use the new bibliographic citation. This will return you to dialog box 20b.

5.5.1.7 Tier 2 Input: Constituent Properties (21)

On this screen, you can modify constituent sorption and degradation parameters. For each selected waste constituent, IWEM will display default values that are stored in its database. These values will be used in the Tier 2 analysis, unless you override them with user-supplied values. For all constituents, you can enter a value for the soil-water partition coefficient (k_d). For organic constituents, you can also enter an overall first-order degradation rate.