Iowa RBCA Tier 1 Software for Windows
User's Manual

Version 1.0

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1.0 Introduction

The Iowa RBCA Tier 1 software is a tool for helping you to perform Tier 1 evaluations. This manual provides an introduction to the software.

You should be familiar with the Tier 1 rules and Tier 1 guidance. The Tier 1 software is not intended to substitute for a thorough understanding of the Iowa RBCA Tier 1 process. The intent of this user's manual is to help you learn to use the software, but does not serve as a training manual for the Tier 1 process. If you are not familiar with Tier 1, it is possible to enter the wrong information. The program will act on the information given.

You are not required to use the Tier 1 software to perform a Tier 1 assessment. However, I believe the Tier 1 software will make doing a Tier 1 assessment easier for you. The software will help you determine what the required actions are for each receptor in a pathway, or what corrective action options are available for each receptor in a pathway. The software should also reduce your chances of making mistakes in a Tier 1 assessment.

The software is particularly useful in identifying whether you have passed a pathway, failed a pathway, and what actions are required or options are available for each pathway at Tier 1.

The primary tasks or functions of the Tier 1 software (some done by the user, some done by the software) are to:

- Input the maximum soil and groundwater concentrations for the site.
- Identify the receptors for the site, by answering a series of questions.
- Determine the required or optional actions available for each receptor in a pathway. The software does this for you, based on your site data and receptors.
- Select a corrective action, if one is required. The software identifies the possible options for corrective action, if they exist. It is up to the owner/operator and groundwater professional to choose from among the available options.
- Save the results. The data and results can be saved to a file for future reference. The data file can be sent to the IDNR on a floppy disk as part of the Tier 1 report.
- Print out the results. This includes 3 pages which can be included directly in the Tier l report, and additional print outs which will assist you in the Tier 1 process.

2.0 Hardware Requirements

The software is written in Visual Basic 4.0 for Windows. You do not need Visual Basic to run the software. To run the software requires a personal computer running Windows 3.1, Windows 95 or Windows NT. The minimum recommended processor is an Intel 486. The minimum recommended RAM is 8 MB. The program requires about 5 MB of hard disk space. A mouse or other pointing device is recommended, but not required. The user should be familiar with the basic operations of the Windows operating system they are using.

3.0 Installing the Program

The software is on three floppy disks, and includes an installation program to install the program from the floppy disks to your hard disk. The files on the floppy disks are compressed, and simply copying them from the floppy disks to your hard disk will not correctly install the program. You need to use the installation program.

Throughout this manual, click means to place the mouse cursor on the specified command and click once with the left mouse button. Double-click means to click the left mouse button twice, rapidly.

Prior to installing the software, please exit any programs you are running (i.e. File Manager, Email, Excel, etc.).

To install the program, insert the floppy disk labeled Disk 1/3 into your floppy drive. Run the setup program on the floppy disk by:

In Windows 3.1: click File at the top of Program Manager, then select Run from the drop-down menu. Type A:\SETUP in the text box beneath COMMAND LINE (or B:\SETUP, if your floppy drive is **B),** and then click OK. Windows will load the Tier 1 SETUP program from the floppy disk. Follow the instructions on the screen to install the program.

In Windows 95: click Start on the Task Bar at bottom the screen, then click Run. In the dialog box which appears, type A:\SETUP in the test box to the right of Open, then click on OK. The Iowa RBCA Tier 1 setup program will start, and guide you through installation of the program.

As part of installation the Setup program will install a Program Group and Tier 1 Icon (Windows 3**.**1) or a Program in Windows 95 (click Start, then select Programs, then select Tier 1).

If you use Windows 3.1 I recommend you exit all other programs before running the Tier 1 software. Windows 3.1 sometimes does a poor job of memory management, and you can run out of Graphical User Interface (GUI) memory even when you have plenty of free RAM.

4.0 Whom to Contact

If you have problems with, or questions about the software, contact:

LaDon Jones
375 Town Engineering
Iowa State University
Ames, Iowa 50011
(515)294-6848

The best way for me to find out about possible problems is for you, the user of the program, to let me know about any possible problems you encounter.

If you have questions regarding the interpretation of Tier 1 with regards to the software, contact the IDNR LUST staff or LaDon Jones.

5.0 Getting Started; A Tutorial

This manual is primarily in the form of a tutorial, which will take you through the features of the Tier 1 software, using example Tier 1 data. To get the maximum benefit from the tutorial I strongly recommend you start the Tier 1 software and follow along actively.

This manual assumes you are familiar with the basic features of your Windows operating system (starting programs, using the mouse, saving files, etc.). If you are not, you might wish to ask an experienced user for assistance.

Start the Tier 1 software by double-clicking on the Tier 1 Icon (or in Windows 95 by clicking Start on the Task Bar at the bottom, then clicking, and Tier 1).

When you start Tier 1 you will see a startup screen that is displayed temporarily as the program starts up, before coming to the Main form. An example of the Main form is shown as Figure 1. The Figures are to help you determine whether you are at the right location in the Tier 1 program, as we work through the tutorial. Figure 1 is shown using the style of Windows 95 or Windows NT 4.0. If you use Windows 3.1 the style will be different, but the same form titles and headings will be present.

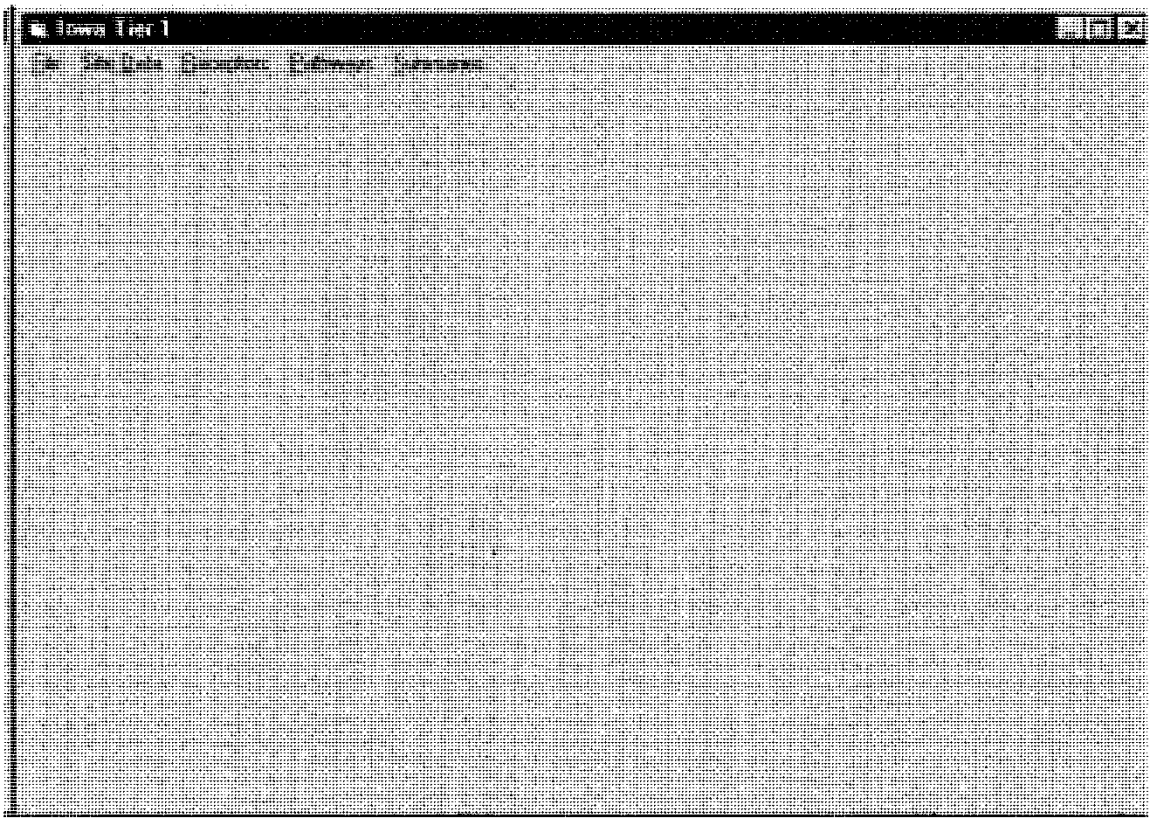

Figure 1. Main form for the Iowa RBCA Tier 1 Program

5.1 The Main Form

The Main form (Figure 1) provides the backdrop for the program. All features of the program are accessed from the Main form. The title of the Main form is Iowa Tier 1, and there are five (5) items on the Main form menu bar: File, Site Data, Receptors, Pathways and Summaries. A click on a menu bar item will lead to a form required for the Tier 1 evaluation.

I think you will find you generally work from left to right across the Main form, starting with Site Data, as you progress through a Tier 1 evaluation. If you get lost in the program you can always return to the Main Form by clicking OK, Done, Cancel, etc., until you arrive back at the Main form.

The Tier 1 software is an event driven program. The program is idle until you tell the program what you want to do, by clicking on buttons or menu items. You may click on any menu item at any time and the program will respond, although you may find that results are not available if the proper data has not previously been input. However, no harm will be done and you can always return to the Main form and select the appropriate menu item.

5.2 Site Data - Site Identification

We will work though an example, from start to finish.

Click Site Data from the Main form (place the mouse cursor on “Site Data” and click with the left mouse button). This will activate a drop-down menu which has two items; Site Identification and Analytical Data. Click on Site Identification (place the mouse cursor on Site Identification and click the left mouse button once).

You can also reach the items in the menu bar by pressing the Alt key, then using the arrow keys to highlight Site Data and pressing Enter. Hot Keys are activated with the Alt key. Note that the D is underlined in Site Data. Pressing and holding down the Alt key then pressing D will also activate the drop down menu for Site Data. Pressing the underlined letter in a drop-down menu will activate the item in the drop down menu.

The click on Site Identification will activate the Site Identification form, shown as Figure 2. Your form will not have the data in it.

Enter the requested information in the test boxes. You may select a text box by clicking on it with the left mouse button, or using the Tab key or arrow keys to move about. Enter any information you like, but I suggest you enter some information into each text box, so you will be able to see how it prints out later.

There are buttons to the lower right of the form called; Save Default, Clear and Load Default. These buttons act on the Certified Groundwater Professional information. The buttons allow you to save Certified Groundwater Professional information as the default, so you do not have to type the information in each time you do a new Tier 1 assessment or restart the program. To save the Certified Groundwater Professional information as the default, after you have entered the information click the Save Default button. If you click Load Default the default information will be placed in the Certified Groundwater Professional text boxes. The Clear button will clear the Certified Groundwater Professional information from the Site Identification form, but does not clear it as the default. To clear the stored default information, click Clear, then Save Default.

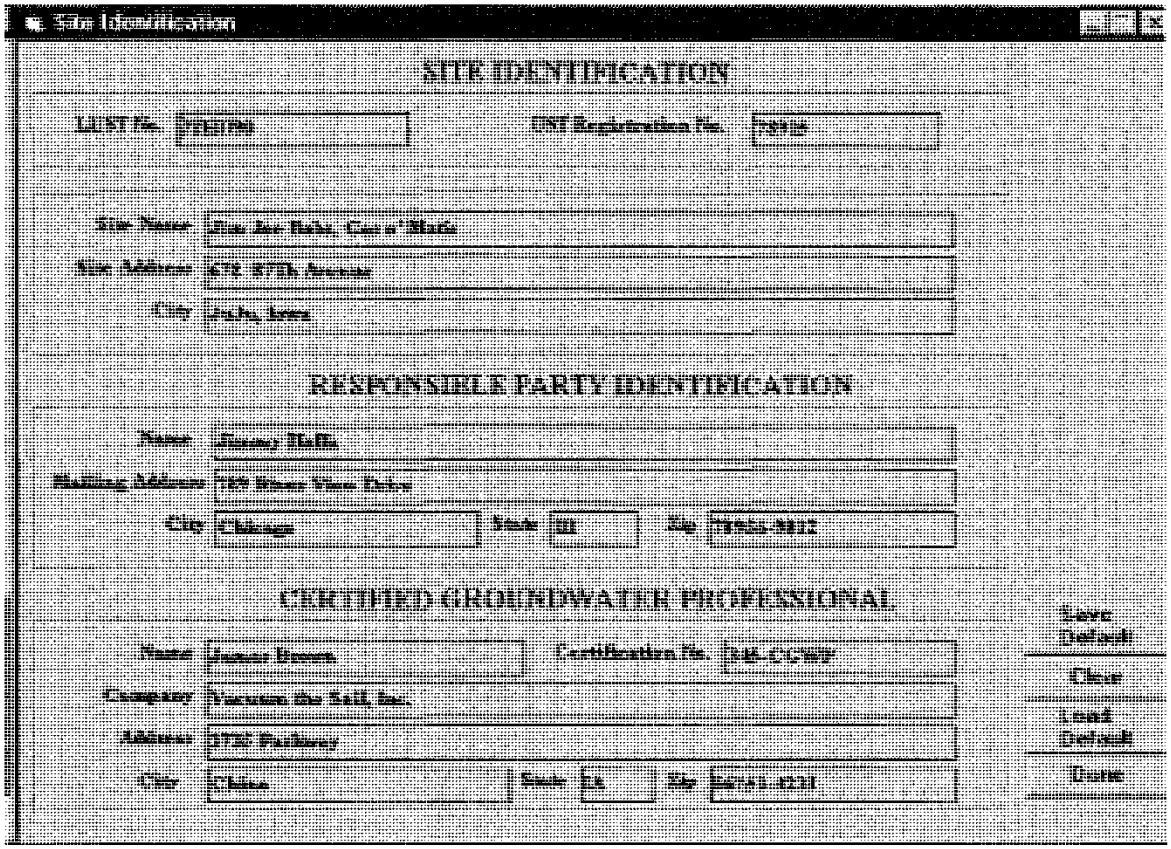

Figure 2. The Site Identification form.

After you have entered the necessary information in the Site Identification form, click Done (or use the Tab key until the Done button is selected, then press the Enter key), and you will return to the Main form.

5.3 Saving Your Data and Results

You may save your data and results to a file at any time, and you should save your data on a regular basis. If the software or operating system crashes you will be able to reload the data up to the point of your last Save. You should also save your data when you are done with a Tier 1 evaluation, to save any changes you have made since your last Save.

To save the data you have entered up to now click File on the Main form, then click Save on the drop down menu. This will bring up the Save As form, shown as Figure 3.

You will need to choose a file name for your Tier 1 assessment. The DNR requires you to use the LUST number as the file name for the data file(s) you submit as part of the Tier 1 report; with an extension of RBC (i.e. 7LT345.RBC). When you select Open under .File to open an existing file the Tier 1 program automatically looks for files with extensions of *.RBC. Using the recommended common extension of RBC for Tier 1 files will make it easier for you to find your Tier 1 data files.

After you have typed in a file name (for this example, as shown in Figure 3, I used exampl.rbc as the file name), click OK. The data you have entered up to this point will be saved in the file name chosen, and you are returned to the Main form.

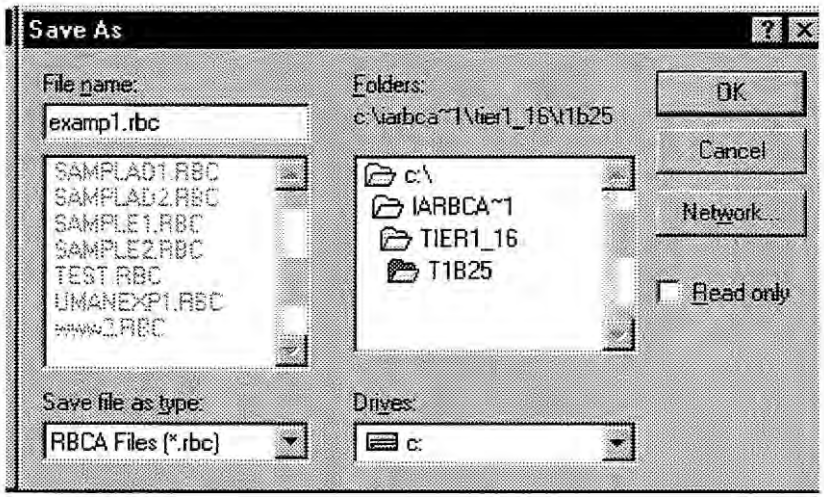

Figure 3. The Save As form.

The file name you have chosen for the data file (including the complete pathway) is now shown at the top of the Main form as the active file. From now on, as you continue working on the Tier 1 assessment, whenever you click File, then Save, the current data and results will automatically be saved to the existing active file shown at the top of the Main form.

If you wish to save data and results to a different file name, click File, then Save As, and choose a new file name. The new file will then become the active file.

Clicking New under File will clear all existing data from the program. Use New when you want to start a new Tier 1 assessment. Make sure you have saved your data for your current Tier 1 evaluation before clicking New. However, when you click New, if data has changed since your last save the program will warn you, and give you the option of Saving your data (before clearing the data for a new assessment), the option of Not saving your data before clearing the data for a new assessment, or the option of Canceling the New command, which will not clear the data and take you back to the Main form.

However, it is prudent for you to Save your existing data on your own, before clicking Open or New under the File menu.

You use Open under File to open a previously saved Tier 1assessment. Opening a Tier 1 data file will replace any existing information with the Tier 1 assessment data contained in the file. When you select Open the program will detect if you have make changes in any current data without saving it, and give you the opportunity to Save the current data, not Save the current data, or Cancel the Open command. As with the New command, it is prudent for you to Save your current data on your own, before clicking Open under the File menu.

5.3.1 Printing

As with Save, you can use the Print options at any time. If you have not completed the Tier 1 assessment certain results or data may not be available on the print out (you can print any page at any time, but if, for example, a pathway has not been evaluated, the print out will print the statement; The pathway has not been evaluated).

If you have entered example Site Identification information, we can demonstrate the Printing by printing the Tier 1 Cover Page. If you have not entered any example Site Identification information, click Site Data on the Main form, then Site Identification. Enter any information you like, but put some text into each text box on the Site Identification form. Click Done when you have finished inputting data to return to the Main form.

Click File on the Main form, then Print on the dropdown menu. This will activate the Print Selection form, shown as Figure 4. Click the check box to the left of the first item on the form; Tier 1 Cover Page. Then click Print at the bottom of the form to send a copy of the Tier 1 Cover Page to your Printer. This may take some time, depending on your printer and network. An example of the printout is shown as Figure 5.

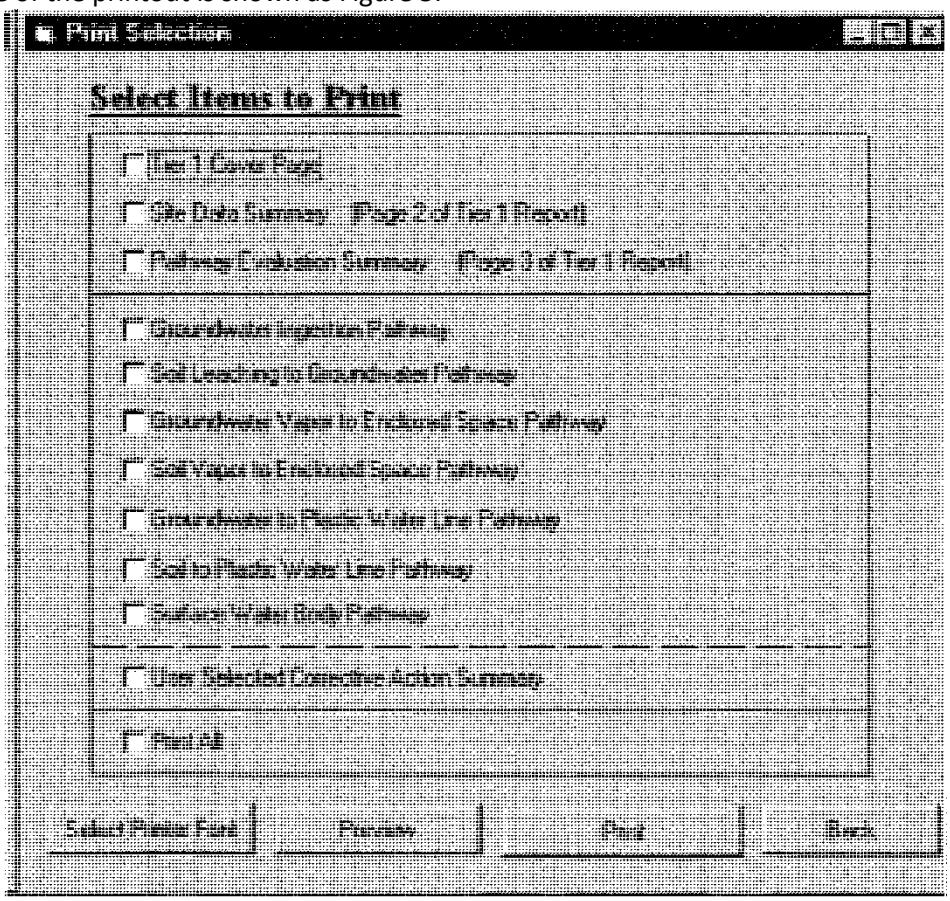

Figure 4. The Print Selection form.

The Tier 1 program does it printing through Windows to whatever printer is selected at the default printer. If you wish to send the print out to a particular printer, you need to set the default printer using Control Panel or Print Manager. The printouts from the Tier I program all use Portrait page orientation on 8 ½ x 11-inch paper.

IDNR

Tier 1 Report
Leaking Underground Storage Tank Site Assessment
for the Iowa Department of Natural Resources

SITE IDENTIFICATION

LUST No.	**7THU90**	**UST Registration No.**	**78915**

Site Name:	Jim Joe Bobs, Gas o' Matic
Site Address:	678 87th Avenuw
City:	JuJu, Iowa

RESPONSIBLE PARTY IDENTIFICATION

Name:	Jimmy Hoffa		
Street:	789 River View Drive		
City:	Chicago	State: Ill	Zip Code: 78956-9812

Submittal Date: _____ Recommend: ☐ Tier 2 ☐ Corrective Action ☐ No Action Required

STATEMENT OF CERTIFICATION

I, James Brown, Groundwater Professional Certification No. 345-CGWP, am familar with all applicable requirements of Iowa Code 455B.474 and all rules and procedures adopted thereunder including, but not limited to, Chapter 567-135 and the Department of Natural Reources Tier 1 guidance. Based on my knowledge of those documents and information I have prepared and reviewed regarding this site, UST Registration No. 78915, LUST No. 7THU90, I certify that this document is complete and accurate as provided in 567 IAC 135.9(11)"c" and meets the applicable requirements of the Tier 1 site assessment.

Print: Name/Address of Certified Groundwater Professional

James Brown
Vacuum the Soil, Inc.
3735 Parkway
Chino, IA 56751-4231

Signature: _____

Date: _____

I certify that I have reviewed this document, appendices and attachments for submittal to the Iowa Department of Natural Resources. To the best of my knowledge, the site history and scaled site plan are accurate.

Jimmy Hoffa
Print: Name of Responsible Party

Signature - Responsible Party

Official IDNR Use Only

Date Received:		Comment Letter Date:	
Reviewer:		Approved:	Y / N

Figure 5. The Tier 1 Cover page.

T1S-Ver. 1.0

Figure 5. The Tier 1 Cover page

You may also preview printouts on your screen. From the Print Selection form (click File on the Main form, then Print), again check the Tier 1 Cover Page item (it may already be checked, clicking on a check boxes toggles the check on and off), then click on Preview at the bottom of the Print Selection form. This will show the selected page on the screen, without sending it to the printer. From the Print Preview form you can view an approximation of how the page will print, and also send the page or pages to the printer, using the Print Current or Print Checked buttons.

If you check multiple boxes on the Print Selection form, then all the checked pages will be printed when you click Print at the button of the form. If you check Print All, then all the pages will be printed.

The same is true for Print Preview. You can preview any checked pages, when you click Preview. Use the Prev (Previous) and Back buttons in Preview to move from one page to another. Clicking Print Current on the Print Preview form will print the page showing on the screen. Clicking Print Checked will print all the checked pages.

When you are done, click Back until you return to the Main form.

5.4 The Analytical Data form

We will next go to the Analytical Data form. From the Main form, click Site Data, then click Analytical Data on the drop-down menu. This will activate the Analytical Data form, shown as Figure 6. Your Analytical Data form will not have the data shown in Figure 6.

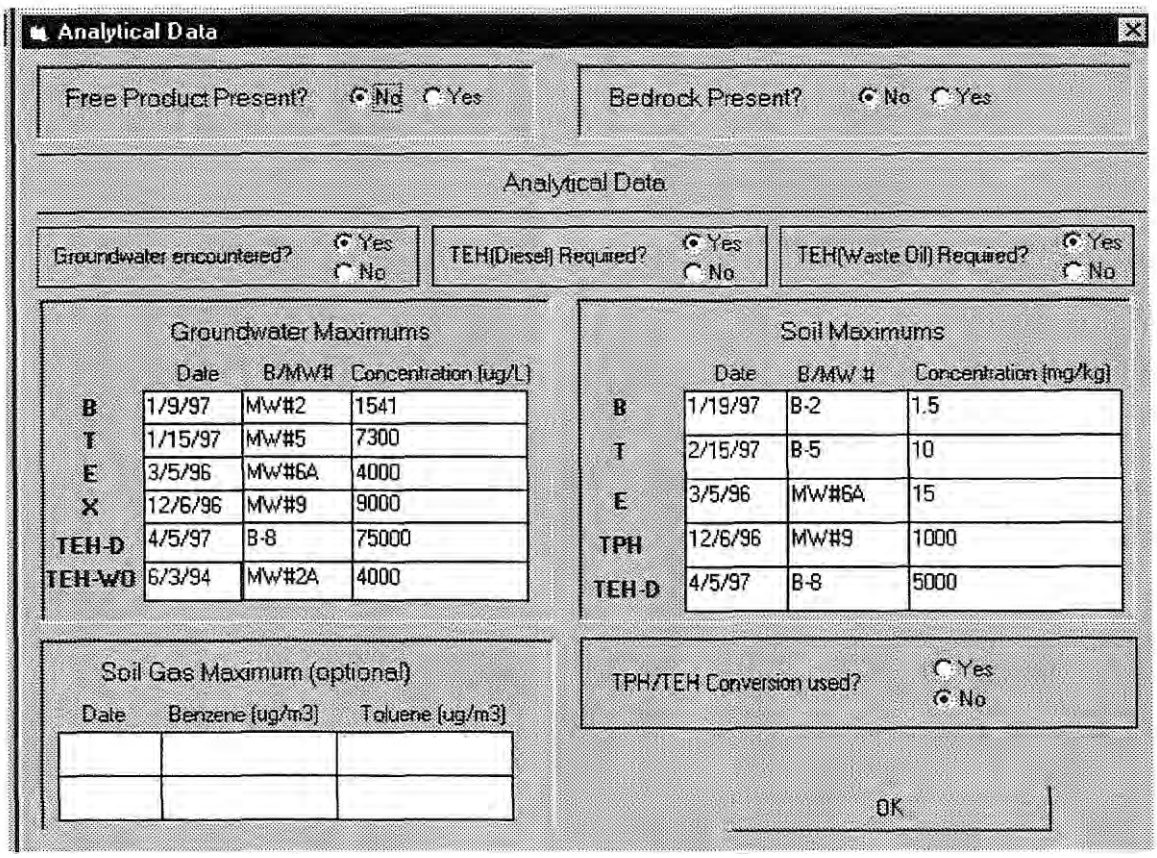

Figure 6. The Analytical Data form.

The Analytical Data form is where you input all the measured soil and groundwater concentrations for the Tier 1 assessment. Tier 1 assumes the point of exposure is the source, and the concentrations should be the maximum identified at the site for each chemical and media (soil and water). See the Tier 1 guidance for the criteria used to identify source concentrations.

There are a number of option buttons on the form, used to answer questions affecting Tier 1. The first two questions concern: is “Free Product Present?” or is “Bedrock Present?” To see what happens click the Yes button for each (click the word Yes, or the circle to the left of the word). If either is clicked Yes, you are reminded that you need to go to Tier 2, and the statement “Go to Tier 2” will be printed on the Site Data Summary page.

Even if you click Yes for either question, you may still do a Tier 1 assessment, and the software will function the same (pathway evaluations etc. will be based on the data input). The only effect of clicking Yes will be a Yes answer to these questions on the Site Data Summary page (page 2 of the Tier 1 report, which you can print out with the Tier 1 software) and a reminder to Go to Tier 2 will also be printed on the Site Data Summary page.

For now, click No for “Free Product Present?” and No for “Bedrock Present?”. The Yes and No buttons for each question are option buttons. Clicking Yes puts a dot next to the Yes and clears No, and vice versa. In place of using the mouse, you can also change the option by using the Tab key to move to the question, then press an arrow key.

Click Yes for the next three questions: “Groundwater encountered?”, “T.E.H(Diesel) Required?”, and “T.E.H(Waste Oil) Required?”. The groundwater encountered question relates to whether groundwater samples are not available due to the limitation on the required depth of drilling for Iowa RBCA. T.E.H.(Diesel) and T.E.H.(Waste Oil) refer to whether you are required to sample for these constituents. See the Tier 1 guidance for more information.

Next, you should input the example data shown in Figure 6.

Move to the Groundwater Maximums section (using the Mouse or Tab key) and type in the data shown in Figure 6. If you choose to enter different values under Date or B/MW#, this will not affect the example. However, entering different concentrations than those shown may mean your results are different than the results shown in later Figures. You can move to the next cell by clicking the cell with the left mouse button or by pressing the Tab key.

The boxes under Date and B/MW# are simple text boxes which allow you to type in any information you want. If you make a mistake, simply use the editing keys (arrows, delete, etc.) to correct the data.

If you click on a cell that already has data, initially the cell is highlighted in blue. When highlighted whatever you type will replace the existing data in the cell. If you want to edit the existing data, click the cell again or press an arrow key. The blue highlighting will be removed and you can edit the value in the cell. In edit mode press the Enter key, the Tab key, or click another cell with the mouse to accept the edited value and move to another cell.

The units for groundwater concentrations are µg/L (ppb). The concentration cells will only accept numbers and periods. The concentrations cannot be entered in scientific notation (i.e. not 3.2E+5), but must be entered as real numbers (i.e. 32000 or 32000.0). It is not necessary to use a period.

A mistake that can be made in entering concentrations is entering two periods (i.e. 15..41). Although the numbers will show up in any tables as they are entered, when the text is internally converted to a number for evaluating against the Tier 1 table any values after the second period will be truncated (i.e. 15.4.1, would convert to 15.4).

Click No for “TPH/TEH Conversion used?”. Type in the data shown in Figure 6 for Soil Maximums. The units for soil are mg/kg. The TPH value entered is not used in evaluating Tier 1, but would be used if “TPH/TEH Conversion used?” is clicked Yes. The TPH/TEH conversion is discussed in Section 6.4.

For now leave the Soil Gas Maximum data blank.

To review before we leave the Analytical Data form, you should have clicked No for “Free Product Present?”, “Bedrock Present?” and “TPH/TEH Conversion used?”. You should click Yes for “Groundwater encountered?”, “T.E.H(Diesel) Required?”, and “T.E.H(Waste Oil) Required?”. You should enter the groundwater maximums and soil maximums shown in Figure 6. Leave the soil gas maximum blank. If you have made any mistakes, please correct the data at this time.

Click OK to return to the Main form. You can return to the Analytical Data form at any time from the Main form by clicking Site Data, then Analytical Data on the dropdown menu.

You should save the data entered thus far. Click File on the Main form, then Save. If you have already saved the previous data to a file, the active file shown at the top of the Main form will automatically be updated. If you have not already saved the data to a file, the program will ask for a file name. If this is the case, choose a file name and click OK.

5.5 Identifying the Receptors

Having entered the Site Data the next step is to identify the receptors for the site. This is done using the Receptors item on the Main form. Click Receptors on the Main form. This will cause a drop down menu to appear with four items:

Groundwater Ingestion/Soil Leaching
Vapor to Enclosed Space
Plastic Water Line
Surface Water Body

The receptor questions have been organized by type. You identify all Tier 1 receptors by selecting each of the items under the Receptors menu item.

5.5.1 Groundwater Ingestion/Soil Leaching Receptors

We will start by identifying what receptors are present for the Groundwater Ingestion and Soil Leaching to Groundwater pathways. Click Receptors on the Main form, then click Groundwater Ingestion/Soil Leaching on the dropdown menu. This will bring up the Groundwater Ingestion Receptor form, shown as Figure 7.

There are three type of receptors for the groundwater ingestion/soil leaching pathways; drinking water wells, non-drinking water wells, and protected groundwater source. See the Tier 1 guidance for definitions of drinking water wells and non-drinking water wells.

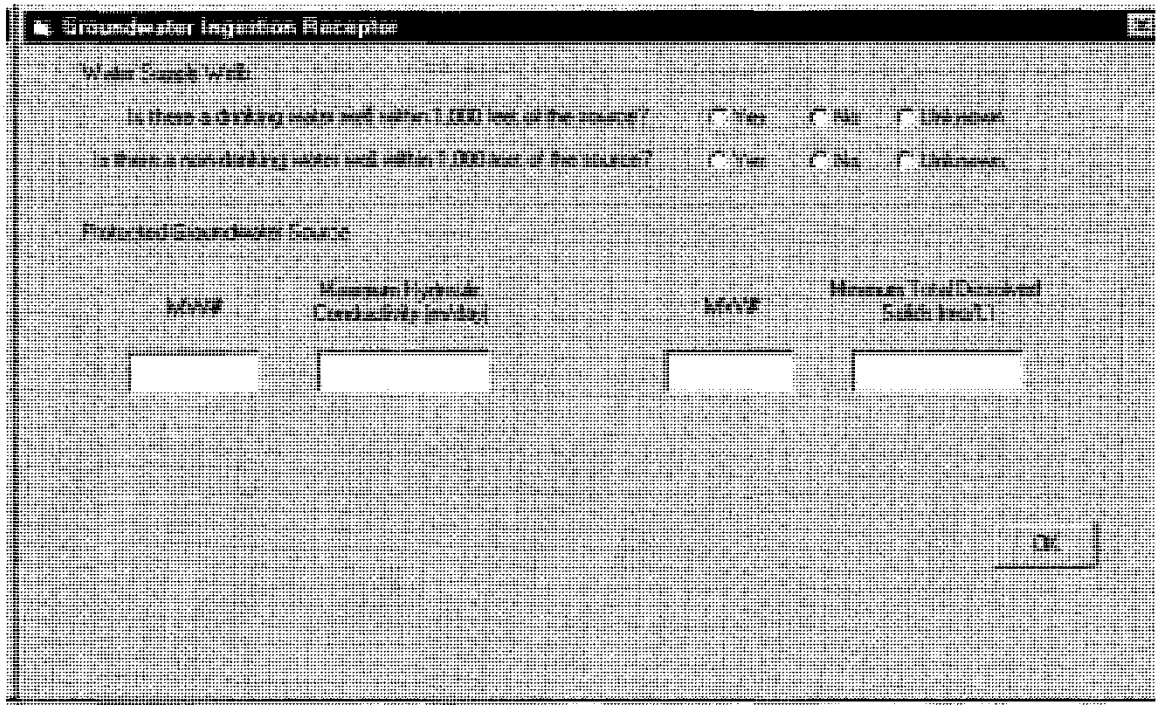

Figure 7. The Groundwater Ingestion Receptor form.

The first two questions on the form address whether there are drinking water wells or non-drinking water wells within

1,000 feet of the source.

If there is a drinking water well receptor within 1,000 feet of the source (i.e. is there a drinking water well receptor present according to the Tier 1 criteria), you should click Yes. If one is not present, you should click No.

For our example click No for “Is there a drinking water well within 1,000 feet of the source?”, and click Yes for “Is there a non-drinking water well within 1,000 feet of the source?”. The effect of clicking Unknown is covered in Section 6.6.

The Tier 1 software will determine if the first encountered groundwater is a protected groundwater source, based on the hydraulic conductivity and total dissolved solids information you enter.

For our example, assume the Maximum Hydraulic Conductivity found at the site is from a slug test in MW-4, and the hydraulic conductivity is 0.5 m/day. Assume the Minimum Total Dissolved Solids was found in a groundwater sample from MW-8 and was 2000 mg/L. Enter this information in the appropriate text boxes, as shown in Figure 8.

Generally, the maximum hydraulic conductivity and minimum total dissolved solids found at the site should be used. See the Tier 1 guidance for more details on the appropriate field measurements to use. If no total dissolved solids value is entered, the program will assume the total dissolved solids are 0 mg/L.

If the hydraulic conductivity is greater than or equal to 0.44 mid and the total dissolved solids are less than 2500 mg/L, the first encountered groundwater is defined as a protected groundwater source.

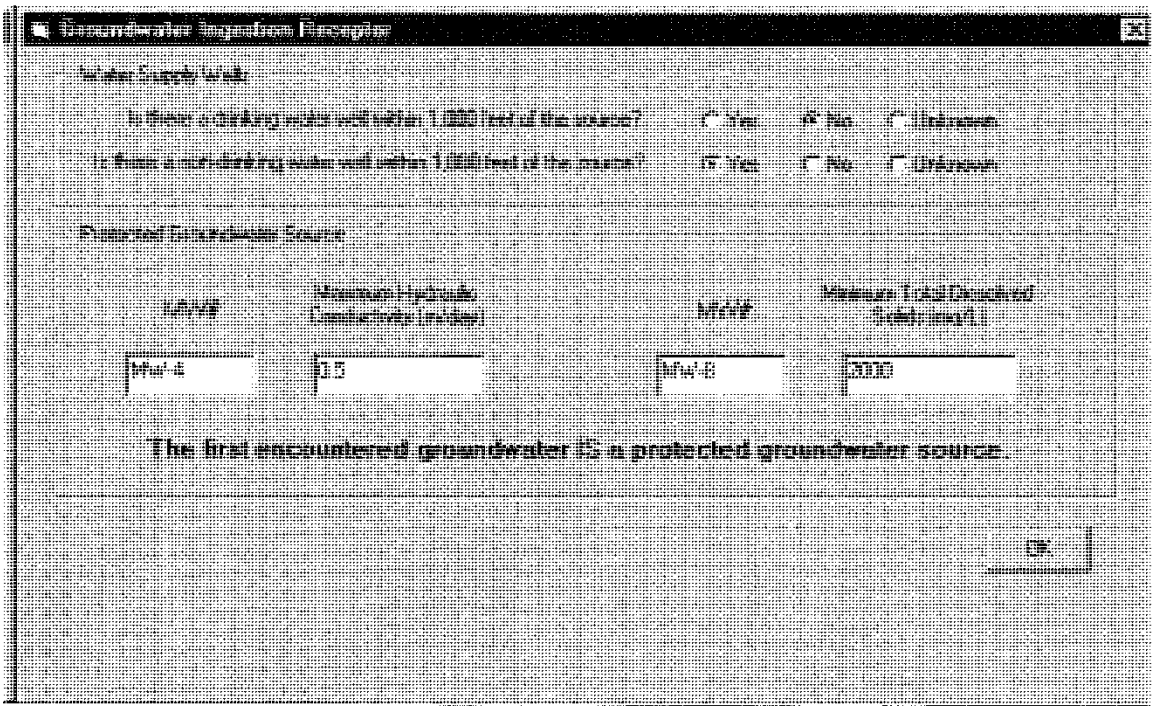

Figure 8. Example data for the Groundwater Ingestion Receptor form.

Having entered the data (Figure 8), click OK at the bottom right of the Groundwater Receptor form, and you will be taken back to the Main form.

At this point we have entered the site data and answered the receptor questions that relate to two pathways, Groundwater Ingestion and Soil Leaching. If you click Pathways on the Main form you will see the Groundwater Ingestion and Soil Leaching to Groundwater pathways are activated (black text) and the other pathways are not. You could at this point evaluate the Groundwater Ingestion and Soil Leaching to Groundwater pathways, since the site data, and receptor

information has been entered. The other pathways cannot be evaluated at this time because the receptor information has not been entered.

We will not evaluate the pathways at this time, but will instead enter all the receptor information first. If you clicked on any pathway by mistake, click on any option and click the Main button at the lower right of the form to return to the Main form.

5.5.2 The Vapor to Enclosed Space Receptor form

The next receptor we will consider concerns the vapor pathways at Tier 1; Soil Vapor to Enclosed Space and Groundwater Vapor to Enclosed Space. From the Main form click Receptors, then click Vapor to Enclosed Space on the drop-down menu. This will activate the Vapor to Enclosed Space form, shown as Figure 9.

A vapor survey is required at Tier 1 (see the Tier 1 guidance). If potentially explosive vapors have been identified during the vapor survey, you should answer Yes (click Yes). If potentially explosive vapors have not been identified during the explosive vapor survey, you should click No.

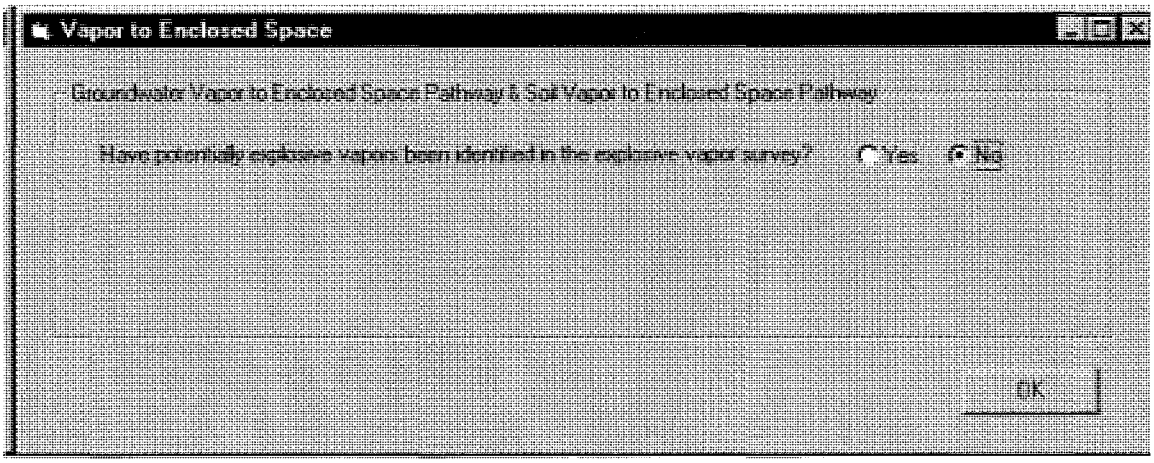

Figure 9. The Vapor to Enclosed Space receptor form.

If potentially explosive vapors are identified at Tier 1, a Tier 2 evaluation of the groundwater vapor and soil vapor to enclosed space pathways will be required, regardless of the maximum soil and groundwater concentrations found at Tier 1 (see the Tier 1 guidance).

For our example click No on the Vapor to Enclosed Space receptor form, as shown in Figure 9, then click OK to return to the Main form.

5.5.3 The Plastic Water Line Receptor

To identify plastic water line receptors at Tier 1, click Receptors on the Main form, then click Plastic Water Line on the drop-down menu. This will activate the Plastic Water Line Receptor form, shown as Figure 10.

Plastic water line receptors apply to the Groundwater to Plastic Water Line and Soil to Plastic Water Line pathways.

For our example input the responses shown in Figure 10. Click Yes in response to the question: “Is there an existing plastic water line within 200 feet of the soil or groundwater source?”. Type in 12 for the shallowest depth to groundwater at the site in feet.

Click OK to return to the Main form.

The responses used for this example will result in both actual and potential plastic water line receptors being present for the Groundwater to Plastic Water Line and Soil to Plastic Water Line pathways.

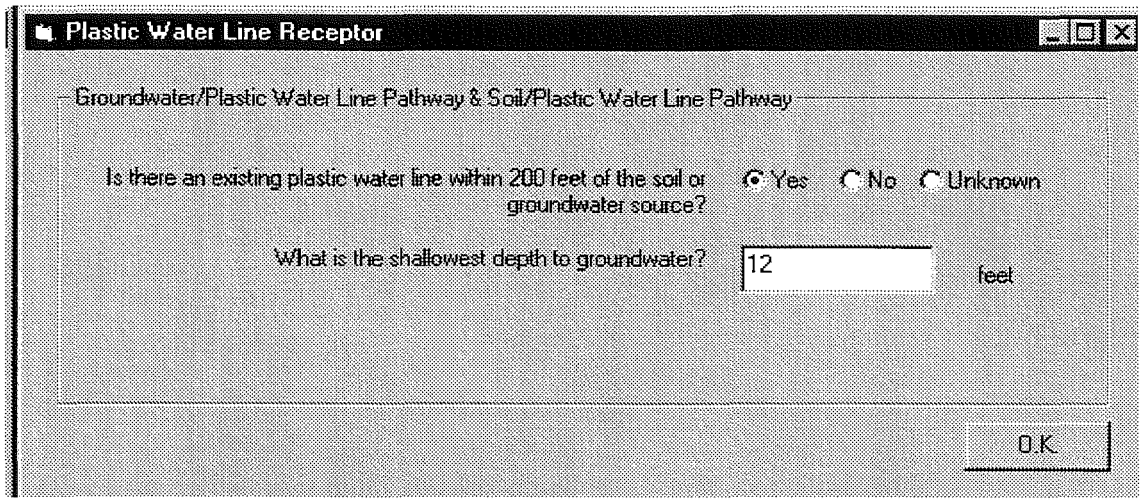

Figure 10. The Plastic Water Line Receptor form.

5.5.4 The Surface Water Body Receptor

The last receptor form addresses Surface Water Body receptors. From the Main form click Receptors, then Surface Water Body on the drop-down menu. This will activate the Surface Water Body Receptor form, shown as Figure 11.

The questions in the Surface Water Body Receptor form are used to determine;

- Is there a designated use surface water body within 200 feet of the groundwater source? The Tier 1 levels in the Tier 1 table for surface water only apply to designated use surface water bodies.

- Is there a petroleum sheen on the surface water or residue on the bank from the site? This is the visual inspection requirement. The result is determined by answering a series of questions about visual inspection.

For our example answer the questions as shown in Figure 11. Click Yes in response to the question “Is there a surface water body-designated use segment within 200 feet of the groundwater source?”. This will automatically select Yes for the next question “Is there a surface water body-general use segment within 200 feet of the groundwater source?”. This latter question pertains to the visual inspection requirement. For the purposes of visual inspection a designated use stream is also a general use stream.

If a designated use or general use surface water body is present within 200 feet of the source, this activates a series of questions on Visual Inspection. There are four questions in total, but whether the next question appears depends on your answer to the previous question under Visual Inspection.

For our example, click No to the first question under Visual Inspection, as shown in Figure 11. Click OK to return to the Main form. You should save your data at this point, by clicking File, then Save.

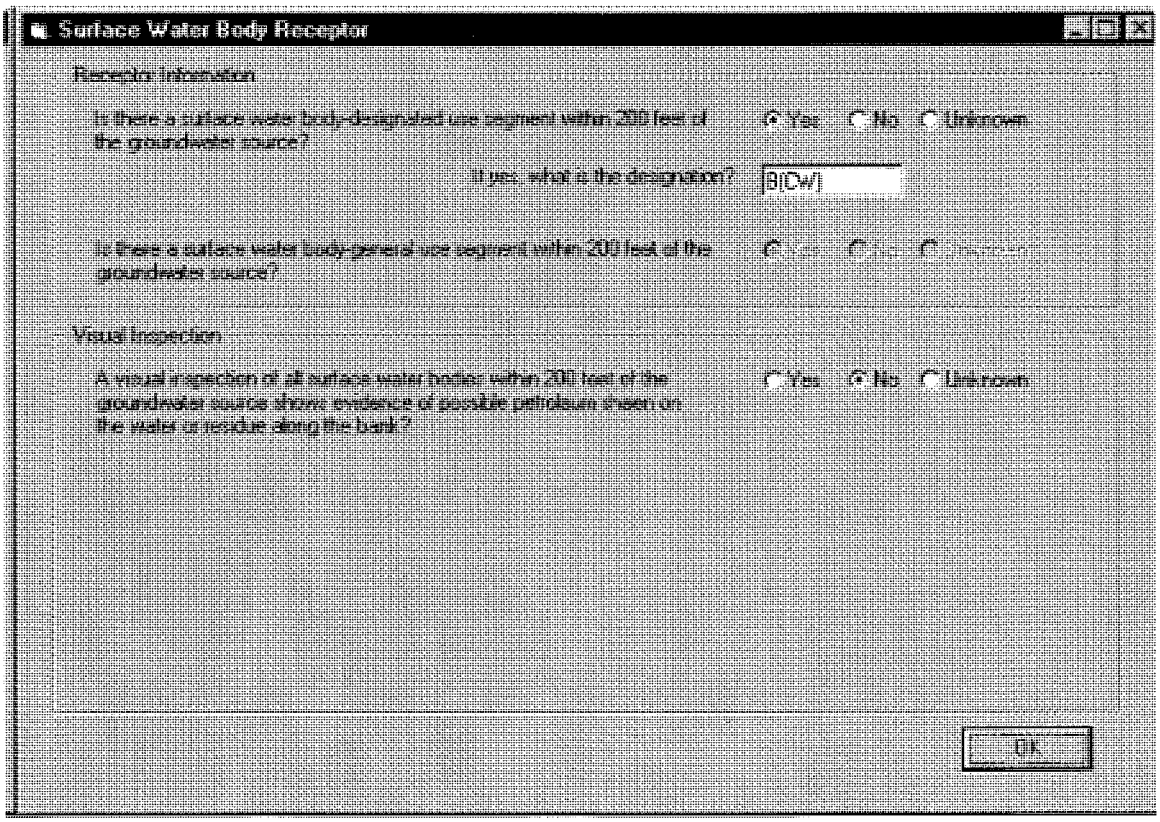

Figure 11. The Surface Water Body Receptor form.

Visual inspection is covered in detail in Section 6.8.

Now that you have entered the Site Data, and identified the Receptors, the information is available for page 2 of the Tier 1 report, the Site Data Summary. You may preview or print out the Site Data summary by clicking File, then Print. On the Print Selection form, click to check the second item; Site Data Summary (Page 2 of Tier 1 Report). Then click Preview or Print. Figure 12 is an example of the print out for our example problem.

***** IMPORTANT: READ ALL INSTRUCTIONS BEFORE COMPLETING *****

USE THE TIER 1 GUIDANCE DOCUMENT TO ASSIST IN COMPLETING THE TIER 1 REPORT FORM

CONFINE YOUR ANSWERS TO THE SPACE PROVIDED UNLESS OTHERWISE NOTED

SITE DATA SUMMARY

LUST# 7THU90

Free Product Present?	No	Continue with Tier 1
Bedrock Present?	No	

Analytical Data

Groundwater Maximums

	Date	B/MW #	Concentration (ug/L)
B	1/9/97	MW#2	1541
T	1/15/97	MW#5	7300
E	3/5/96	MW#6A	4000
X	12/6/96	MW#9	9000
TEH-D	4/5/97	B-8	75000
TEH-WO	6/3/94	MW#2A	4000

Soil Maximums

	Date	B/MW #	Concentration (mg/kg)
B	1/19/97	B-2	1.5
T	2/15/97	B-5	10
E	3/5/96	MW#6A	15
TPH	12//6/96	MW#9	1000
TEH-D	4/5/97	B-8	5000

Soil Gas Maximums (optional)

Date	Benzene (ug/m^3)	Toluene (ug/m^3)

Groundwater encountered?	Yes
TEH (Diesel) required?	Yes
TEH (Waste Oil) required?	Yes
TPH/TEH Conversion used?	No
All maximums < Tier 1 Table?	No

Receptors

Drinking water wells present within 1000 feet?	No	
Non-drinking water wells present within 1000 feet?	Yes	
Protected groundwater source?	Yes	
Maximum hydraulic conductivity (m/d)	MW# MW-4	K= 0.5
Minimum total dissolved solids (mg/L)	MW# MW-8	TDS= 2000
Explosive vapor levels (>10% LEL) identified within 500 ft?	No	
If yes, has the IDNR Emergency Response Section been notified?		
If yes, what is the report number?	Spill#	
Plastic water lines present within 200 feet?	Yes	
If yes, what is the shallowest depth to groundwater?	12 feet	< 20 feet? Yes
Surface water present within 200 feet?	Yes	
If yes, is the water body a designated use segment?	Yes	Designation: B(CW)
Is there a petroleum sheen on the surface water or residue on the bank from the site?	No	

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Figure 12. The Site Data Summary

5.6 Evaluating the Pathways

You have entered the Site Data and the Receptor data, and we are now ready to have the Tier 1 software evaluate the pathways.

There are seven Tier 1 pathways, and they are located under Pathways on the Main form. If you click Pathways on the Main form, you will see the seven pathways, plus an additional item, User Selected Corrective Action Summary.

5.6.1 The Groundwater Ingestion Pathway

From the Main form, click on Pathways, then click on "1. Groundwater Ingestion" in the dropdown menu. This will activate the Groundwater Ingestion Pathway form, shown as Figure 13.

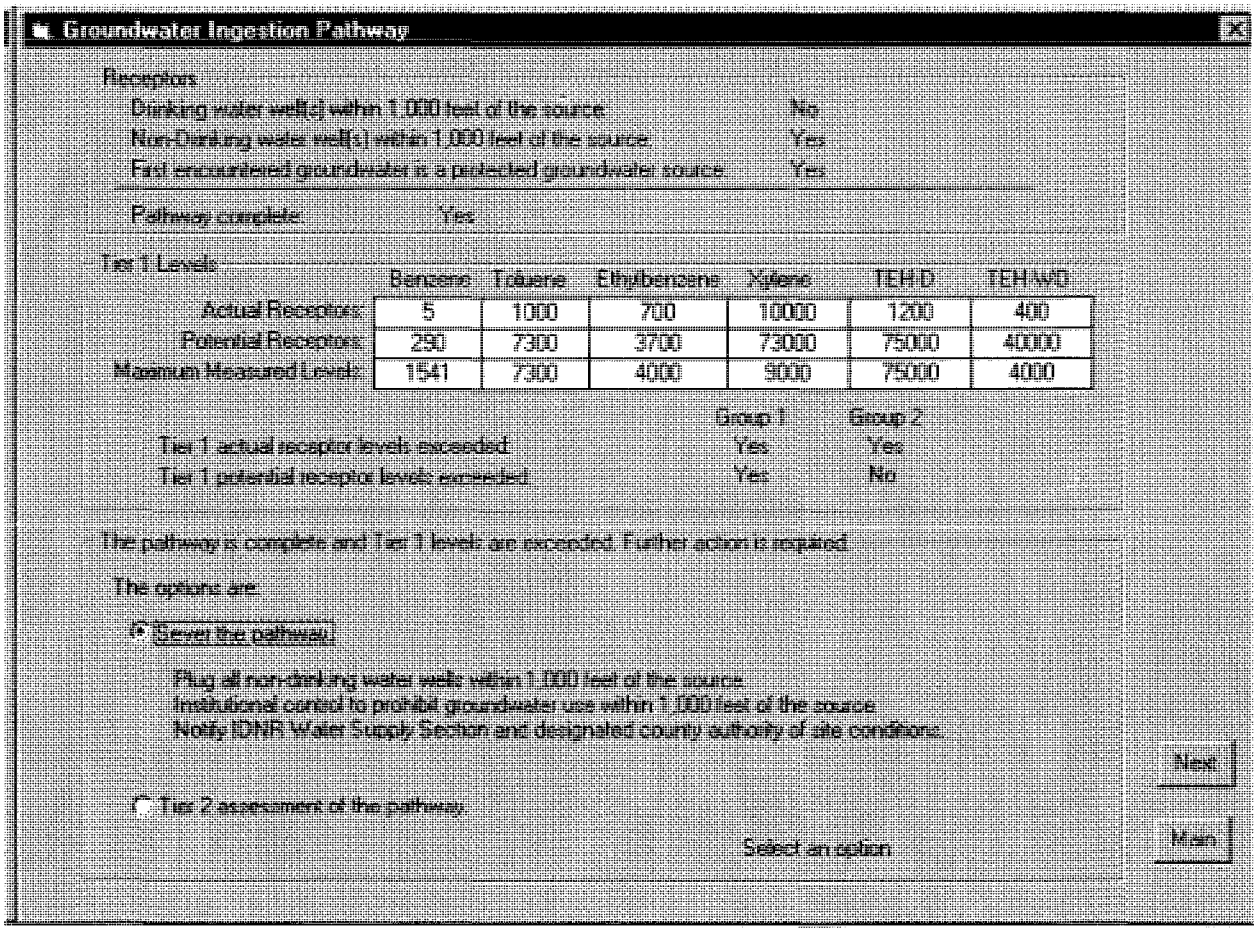

Figure 13. The Groundwater Ingestion Pathway form.

The pathways evaluations are where the major work done by the Tier 1 software takes place. Based on the soil and groundwater concentrations, and the receptors, the software determines what actions are required for the pathway, or what options are available.

Each pathway evaluation is generally divided into three sections; Receptors, Tier 1 Levels, and Required Actions or Options. You can see in Figure 13 that the first box of text summarizes the Receptors present for the pathway. This simply shows the receptors present based on the data and answers you provided in the Groundwater Ingestion/Soil Leaching receptor form. For our example there is no drinking water well receptor, but there is a non-Drinking water well receptor and a protected groundwater source receptor.

The next section, Tier 1 levels, shows the groundwater concentrations you have entered, and the Tier 1 levels for the receptors in the pathway. The Tier I levels shown for Actual Receptors apply to drinking water well only, and the Tier 1

levels for Potential receptors apply to non-drinking water wells and a protected groundwater source.

Also shown is whether or not the concentrations exceed the Tier 1 levels for the receptors, by Group. Group 1 are BTEX and Group 2 is TEH-Diesel and TEH-Waste Oil. The Yes or No answers are a simple comparison of the measured concentrations to the Tier 1 Table concentrations for the receptors. If measured concentrations exceed Tier 1 levels for any chemical in a Group, Yes is shown.

A Yes for exceeding a Tier 1 level does not mean you fail Tier 1 for a receptor. That depends on whether the receptor is present. For example, the Tier 1 levels are exceeded for actual receptors, but a drinking water well is not present.

The last portion, and most important information, are the required or optional actions are for the pathway; based on what receptors are present, and what Tier 1 levels are exceeded. The software determines the options shown, based on the rules for Iowa RBCA and the Tier 1 guidance, and should be the same options you would arrive at if you performed the Tier 1 evaluation by hand.

The required actions or options will vary for a site and pathway, depending on what receptors are present, the measured concentrations and Tier 1 levels for the pathway.

For our example there are two options; Sever the Pathway or a Tier 2 assessment of the pathway.

To sever a pathway you must deal with the receptors for which groundwater concentrations exceed Tier 1 target levels. For our example, there are two receptors type present, non-drinking water well(s) and a protected groundwater source, and Tier 1 levels are exceeded.

To sever the pathway you are required to plug the non-drinking water well(s), provide an institution control to prohibit use of the protected groundwater source within 1,000 of the source, and provide notification of site conditions to the DNR Water Supply section and designated county authority. The failure to sever the pathway for any of the receptors which fail Tier 1 would imply a Tier 2 assessment of the pathway is required.

The second option shown is to perform a Tier 2 assessment of the pathway.

The option chosen among those available for a pathway is at the discretion of the decision making parties for the site. This is likely to be a joint decision between the owner/operator, the groundwater professional and the party or parties providing funding for the work

In any case, you must choose one of the options before you leave the Groundwater Ingestion Pathway evaluation form, by clicking on the option button of your choice. You are not allowed to leave the form until you select an option. However, keep in mind that you can return to the pathway evaluation at any time and change the selected option.

For our example click on Sever the Pathway, as shown in Figure 13. Click the Main button on the form to return to the Main form (you can also click Next to move to the next pathway evaluation form, but click Main for now.

The Main form now shows a box with a card file icon, and a summary of the results for the Groundwater Ingestion pathway. This is simply to remind you of which pathways been evaluated, and provide a summary description of the results. As each pathway is evaluated a similar card icon and text will appear on the Main form. You can click on the card file icon to go to the pathway evaluation form for a pathway.

5.6.2 The Soil Leaching to Groundwater Pathway Evaluation

We will now look at the Soil Leaching to Groundwater Pathway. From the Main form, click Pathways, then click “2. Soil Leaching to Groundwater” from the dropdown menu. This will bring up the Soil Leaching to Groundwater Pathway evaluation form, shown as Figure 14.

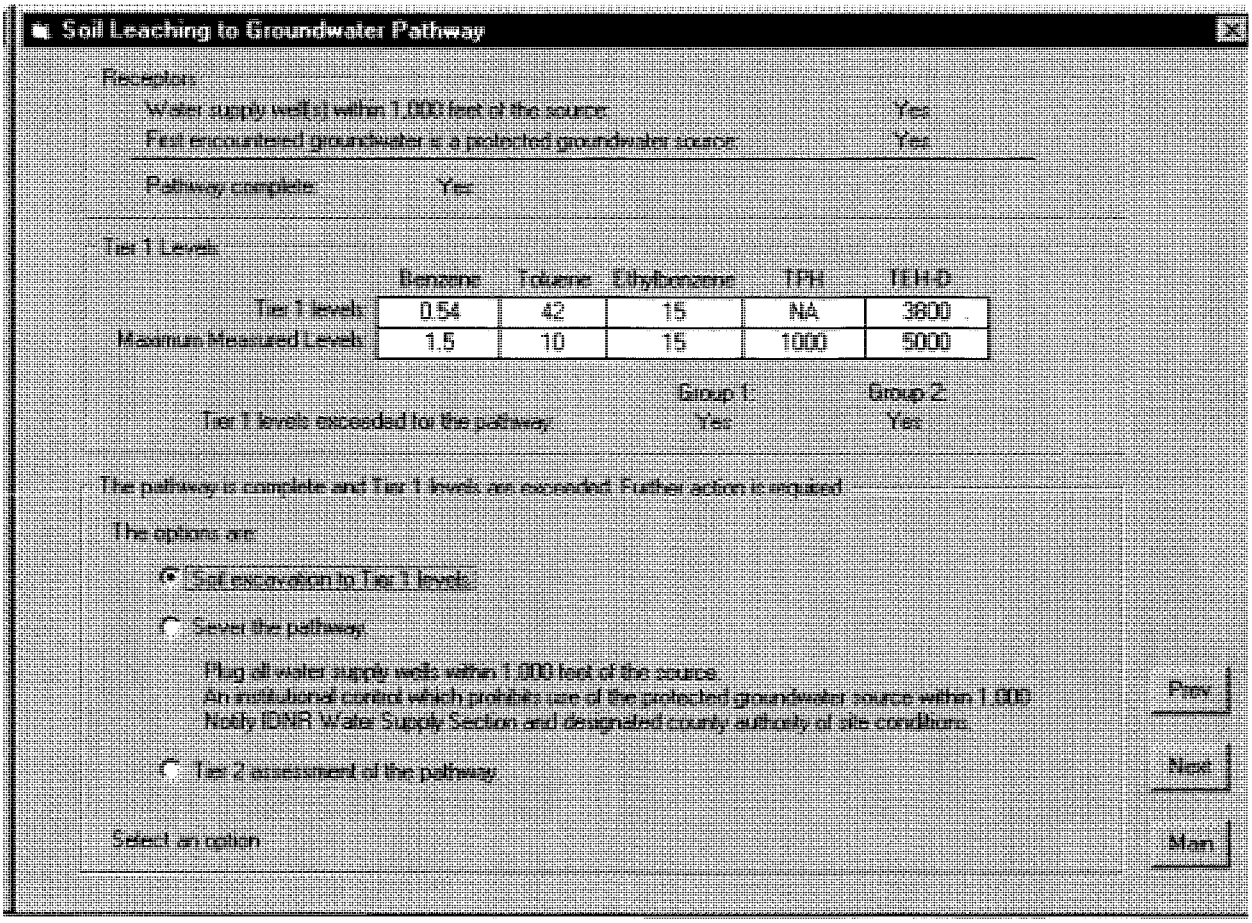

Figure 14. The Soil Leaching to Groundwater Pathway evaluation form.

Again, the form shows what receptors are present, whether measured concentrations exceed Tier 1 levels for the receptors, and what options are available for addressing the pathway at Tier 1. To see the effect of not selecting an option, click Main on the form prior to selecting an option. This will bring up a dialogue box that reminds you that you must select an option. Click OK on the dialogue box to take you back to the pathway evaluation form.

For our example click “Soil excavation to Tier 1 levels” as the selected option. This selection is apparently inconsistent with what we selected for Groundwater Ingestion. Groundwater Ingestion and Soil Leaching to Groundwater both have the same types of receptors, and severing the pathway for one would sever the pathway for the other, for our particular example problem. The Tier 1 program does not check for this type of inconsistency in your selection of corrective actions.

For the purposes of the example we will stick with “Soil excavation to Tier 1 levels” as the option. Click Main on the Soil Leaching to Groundwater pathway evaluation form to return to the Main form. There is now a card icon and summary text box on the main form for the Soil Leaching to Groundwater pathway.

5.6.3 The Groundwater Vapor to Enclosed Space Pathway

Let us now tum to the Groundwater Vapor to Enclosed Space Pathway evaluation. From the Main form, click on Pathways, then click on “3. Groundwater Vapor to Enclosed Space”. This will activate the Groundwater Vapor to Enclosed Space Pathway evaluation form, shown as Figure 15.

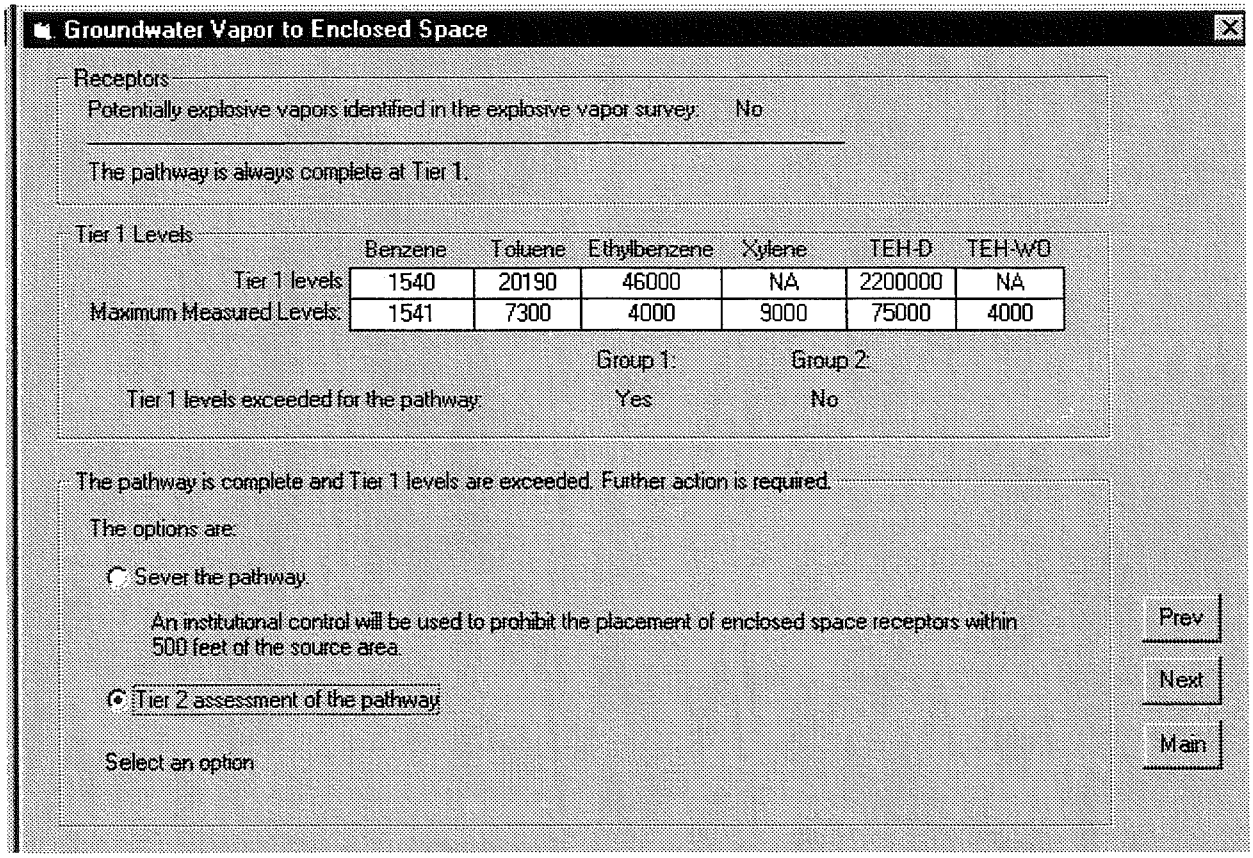

Figure 15. The Groundwater Vapor to Enclosed Space Pathway evaluation form.

The Tier 1 levels are exceeded for Group 1 chemicals, but not for Group 2 chemicals. This would imply the Group 2 chemicals may not need to be assessed at Tier 2 for this pathway, if a Tier 2 assessment is completed for the pathway (see the Tier 1 and Tier 2 guidance).

The Tier 1 level for TEH-WO (Waste Oil) is shown as NA (not applicable) for the pathway, in accordance with the Tier 1 Table.

For our example click “Tier 2 assessment of the pathway”, as shown in Figure 15, as the option, and then Main to return to the Main form.

5.6.4 The Soil Vapor to Enclosed Space Pathway

Moving along in order click Pathways on the Main form, then click on “4. Soil Vapor to Enclosed Space”. This will activate the Soil Vapor to Enclosed Space pathway evaluation, shown as Figure 16.

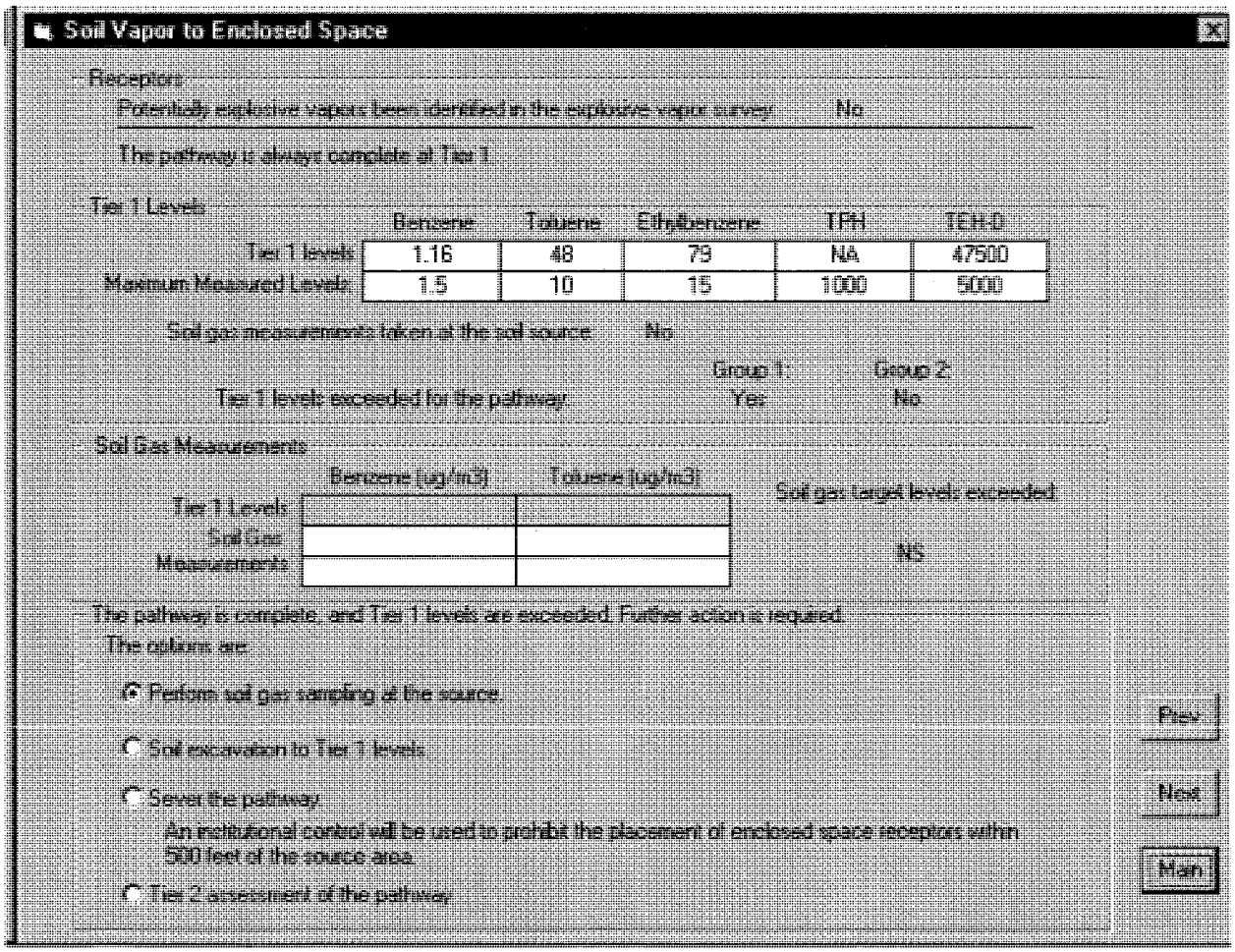

Figure 16. The Soil Vapor to Enclosed Space Pathway evaluation form.

The Tier 1 soil levels are exceeded for the Group 1 chemicals, but not for the Group 2 chemicals. Also note that "Soil gas target levels exceeded" shows NS for Not Sampled.

For our example we will elect to perform soil gas sampling at the source (the location(s) of the maximum soil concentrations). After performing soil gas sampling, the results should be input into the Analytical Data form, and the pathway reevaluated (load the saved Tier 1 data file for the site, input the soil gas results, and then return to the Soil Vapor to Enclosed Space pathway evaluation).

Click "Perform soil gas sampling at the source", as shown in Figure 16, then click the Main button to return to the Main form.

5.6.5 The Groundwater to Plastic Water Line Pathway

To evaluate the Groundwater to Plastic Water Line Pathway, on the Main form click Pathways, then "5. Groundwater to Plastic Water Line". This will activate the Groundwater to Plastic Water Line pathway evaluation form, shown as Figure 17.

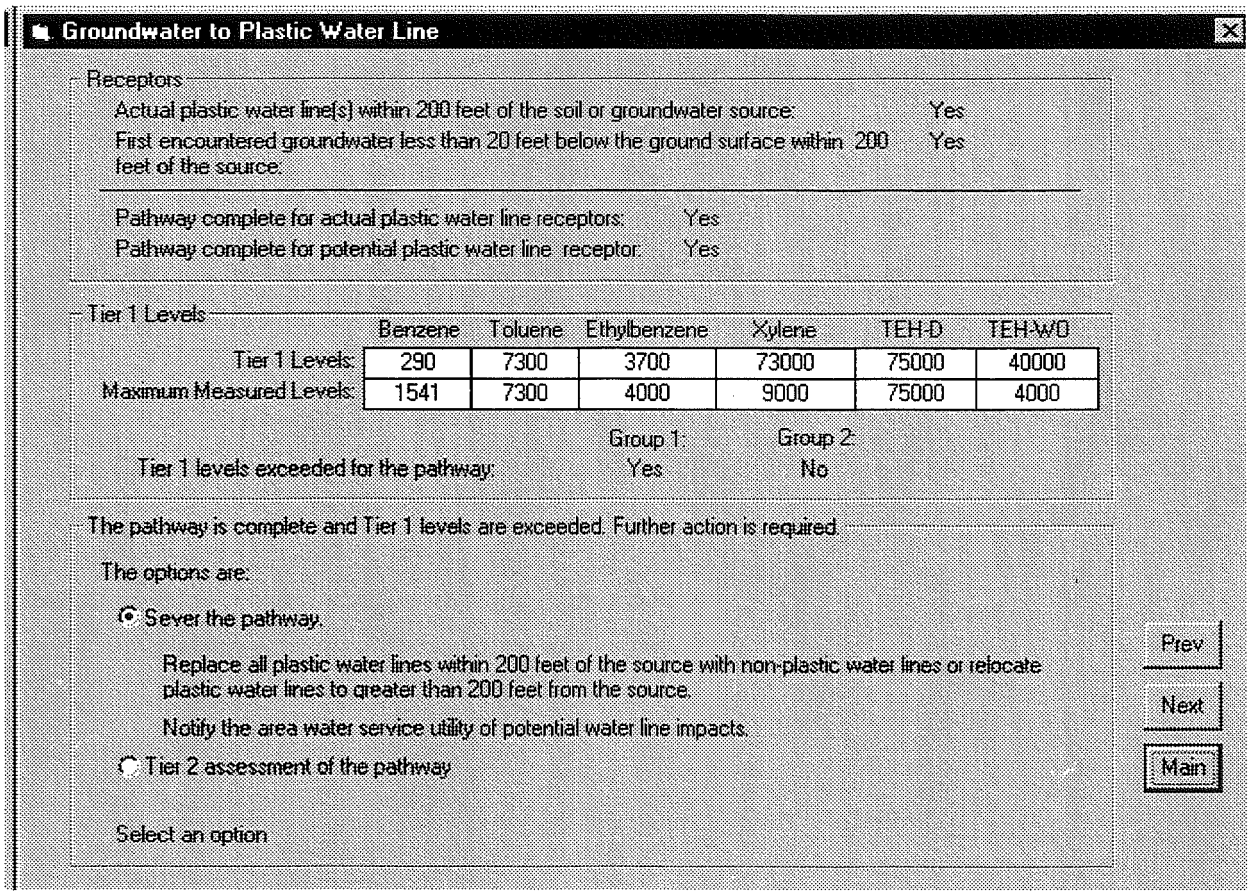

Figure 17. The Groundwater to Plastic Water Line pathway evaluation form.

For our example both potential plastic water line receptors (depth to groundwater is less than 20 feet) and actual plastic water line receptors are present (depth to groundwater is less than 20 feet and there are existing plastic water lines within 200 feet of the soil or groundwater source). Tier 1 levels are exceeded for the Group 1 chemicals, but not for the Group 2 chemicals.

For our example click on “Sever the Pathway”. The requirements to sever the pathway for the receptor are shown; Replace all plastic water lines within 200 feet of the source with non-plastic water lines or relocate plastic water lines to greater than 200 feet from the source. Notify the area water service utility of potential plastic water line impacts.

Click on the Main button to return to the Main form.

5.6.6 The Soil to Plastic Water Line Pathway

On the Main form click Pathways, then “6. Soil to Plastic Water Line” to activate the Soil to Plastic Water Line pathway evaluation form, shown as Figure 18. For our example, although potential and actual plastic water line receptors are present Tier 1 levels for the pathway are not exceeded, and no further action is required for the pathway.

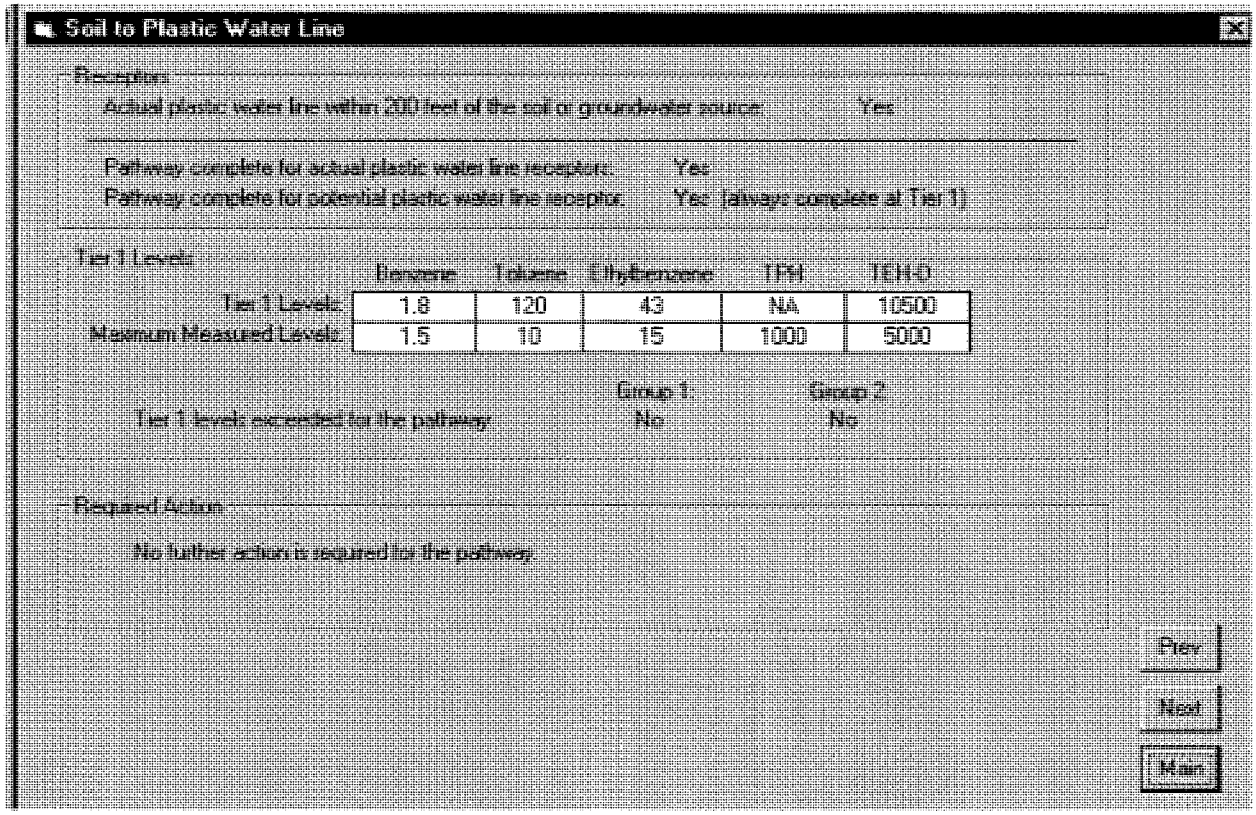

Figure 18. The Soil to Plastic Water Line pathway evaluation form.

Click the Main button to return to the Main form.

5.6.7 The Surface Water Body Pathway

Turning to the last pathway, click Pathways on the Main form, then click “7. Surface Water Body”. This will activate the Surface Water Body Pathway evaluation form, shown as Figure 19. For our example a designated use receptor is present and the Tier 1 levels are exceeded. The only possible course of action is a Tier 2 assessment of the pathway. Although shown as an option button, there is only one option and you cannot change the selection.

Click the Main button to return to the Main form.

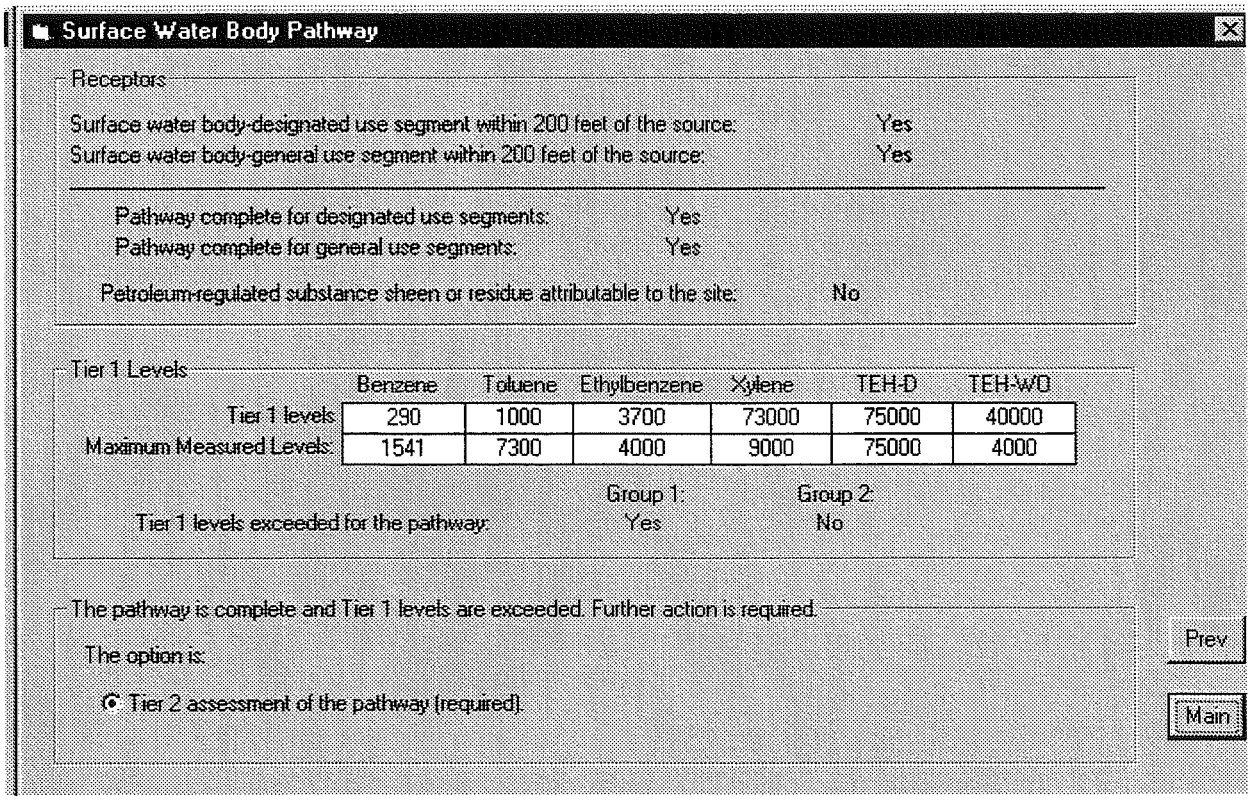

Figure 19. The Surface Water Body Pathway Evaluation form.

You should save the data and results of your Tier 1 evaluation thus far. Click File on the Main form, then Save. If you have already saved data to a file, or opened a previous file, the file shown at the top of the Main form will be automatically updated. If you wish to save the changes to a new file, click File, then Save As.

5.7 The User Selected Corrective Action form and Print Out.

At any time during a Tier 1 assessment, the User Selected Corrective Action form can be viewed. From the Main form, click Pathways, then click "User Selected Corrective Action Summary", at the bottom of the drop down menu. This activates the User Selected Corrective Action form, shown as Figure 20. This form provides a summary of whether each pathway passed or failed Tier 1, and what corrective actions, if any, are required or the corrective action option you selected for the pathway.

A more detailed summary is available as a print out. To see the print out, first click Back at the top of the User Selected Corrective Action form to return to the Main form. Click File, then Print to activate the Print Selection form. Click the User Selected Corrective Action Summary check box near the bottom of the form, then click Preview, or Print to print the page. Figure 21 is an example of the print out for our example problem. The printed version of the form provides more detail, by showing Pass or Fail for each chemical Group (or NA for Group 2). A Fail means a receptor was present and Tier 1 levels are exceeded. A Pass means receptors were not present or Tier 1 levels were not exceeded. After previewing and/or printing the User Selected Corrective Action page, return to the Main menu by clicking Back.

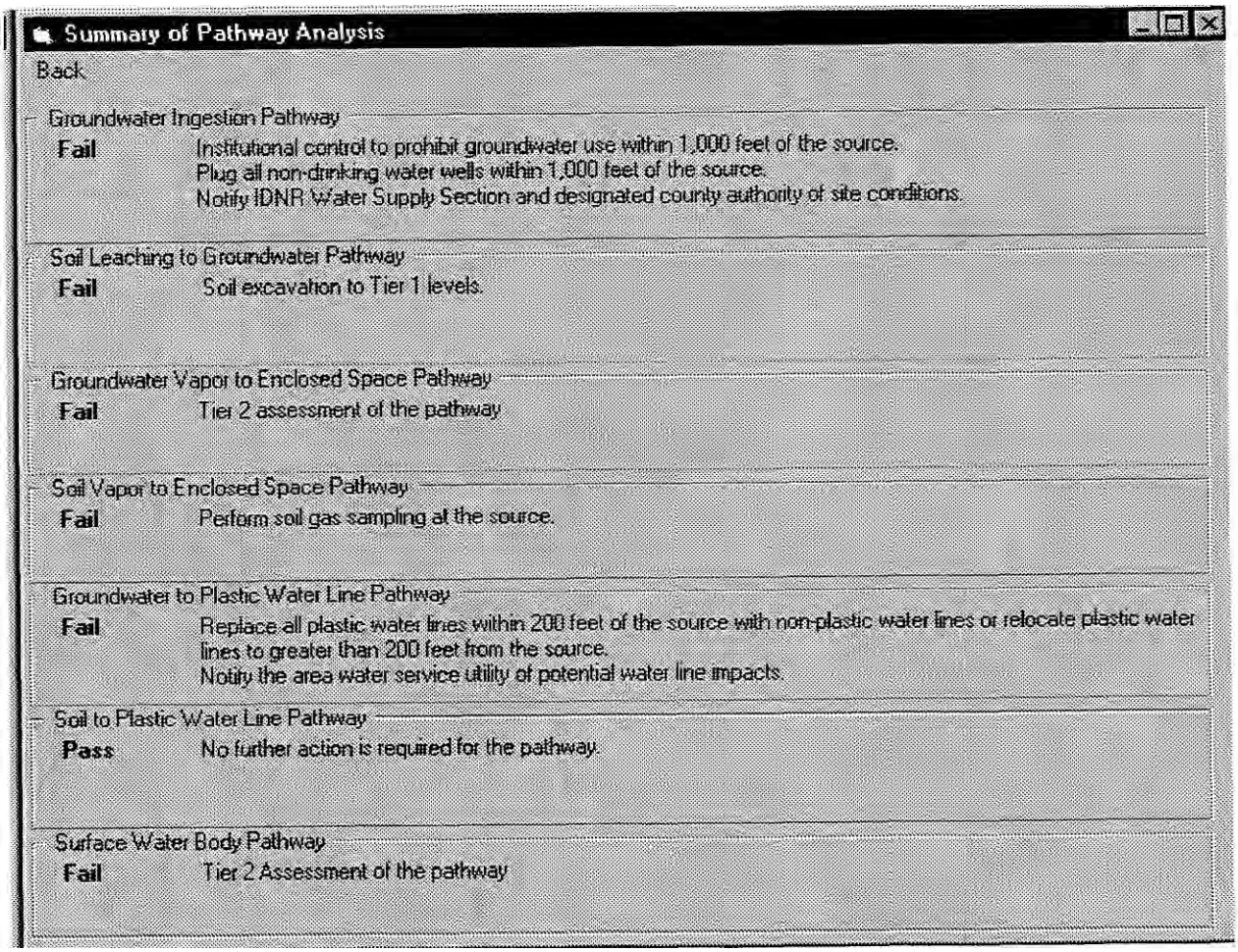

Figure 20. The User Selected Corrective Action form.

Iowa RBCA Tier 1: Action Summary LUST#: 7THU90

Pathway	Tier 1 Status Group 1	Tier 1 Status Group 2	Required or User Selected Corrective Actions
Groundwater Ingestion	Fail	Pass	Plug all non-drinking water wells within 1000 feet of the source. Institutional control to prohibit groundwater use within 1000 feet of the source. Notify IDNR Water Supply Section and designated county authority (protected groundwater source).
Soil Leaching to Groundwater	Fail	Fail	Conduct soil excavation to Tier 1 levels.
Groundwater Vapor To Enclosed Space	Fail	Pass	Tier 2 assessment of the pathway.
Soil Vapor To Enclosed Space	Fail	Pass	Perform soil gas sampling at the source.
Groundwater To Plastic Water Line	Fail	Pass	Replace all plastic water lines within 200 feet of the source with non-plastic water lines or relocate plastic water lines to greater than 200 feet from the source. Notify the area water service utility of potential water line impacts.
Soil To Plastic Water Line	Pass	Pass	No further action required.
Surface Water Body	Fail	Pass	Tier 2 Assessment of the Pathway.

Figure 21. The User Selected Corrective Action printout.

5.8 Print-Outs for the Pathway Evaluations

The Tier 1 program will print a page for each pathway evaluation. You are not required to send these pathway printouts to the DNR as part of the Tier 1 assessment report. However, I believe you will find the print outs a useful aid in completing your Tier 1 assessment and report.

To preview the pathway printouts, click File on the Main form, then Print. On the Print Selection form the pathway printouts for the seven pathways are shown in the second framed set of text, and all end with the word Pathway. To preview the results for each pathway check the boxes for the seven pathways (click each box), then click the Preview button at the bottom of the Print Selection form. You can use the Prev (Previous) and Next buttons at the top of the form to move back and forth between the checked forms. Clicking the Print Current button on the Print Preview form will print the page being viewed. Clicking the Print Checked button will print all the forms you checked before you came to the

print Preview form.

The printout for each pathway is a detailed summary of the results for each pathway. As an example, preview or printout the results page for the Groundwater Ingestion pathway. The Groundwater Ingestion pathway printout for our example is shown as Figure 22.

The printout for each pathway first shows the required actions or options for the pathway. If there are multiple options for a pathway, all the possible options are shown and the user selected corrective action is identified by a checked box. The Tier 1 levels and measured concentrations are shown, and whether or not Tier 1 levels are exceeded. Each type of receptor for the pathway is shown, and whether the receptor was identified by the user as being present.

Iowa RBCA Tier 1 Lust#: 7THU90

Groundwater Ingestion Pathway

Corrective Action Summary
User Selected Option is Checked
☒ Sever the Pathway
Plug all non-drinking water wells within 1000 feet of the source. Institutional control to prohibit groundwater use within 1000 feet of the source. Notify IDNR Water Supply Section and designated county authority (protected groundwater source).
☐ Tier 2 Assessment of the Pathway

Groundwater encountered:	Yes
TEH (Diesel) required:	Yes
TEH (Waste Oil) required:	Yes

Tier 1 Target Levels and Measured Concentrations (ug/L)						
Receptor	Benzene	Toluene	Ethylbenzene	Xylenes	TEH-D	TEH-WO
Drinking Water Well	5	1000	700	10000	1200	400
Non-drinking Water Well Protected Groundwater Source	290	7300	3700	73000	75000	40000
Maximum measured concentrations	1541	7300	4000	9000	75000	4000

Receptor Type	Receptor Present	Tier 1 Levels Exceeded	
		Group 1	Group 2
Drinking Water Well (within 1000ft)	No	Yes	Yes
Non-Drinking Water Well (within 1000ft)	Yes	Yes	No
Protected Groundwater Source	Yes	Yes	No

Maximum hydraulic conductivity (m/day)	MW# MW-4	K= 0.5
Minimum total dissolved solids (mg/L)	MW# MW-8	TDS= 2000

Figure 22. The Groundwater Ingestion Pathway printout.

5.9 The Pathway Evaluation Summary

One of the pages the software will print out that is required as part of a Tier 1 report is the Pathway Evaluation Summary; page 3 of the Tier 1 report. There are two components to the Pathway Evaluation Summary, for each pathway. Whether the pathway Passed or Failed for each chemical group, and what corrective actions have been completed for each pathway.

Click File on the Main form, then Print. Click on the third print out option “Pathway Evaluation Summary” (Page 3 of Tier 1 Report) and either Preview the page or Print it. A copy of the printed page is shown as Figure 23.

The Passed, Failed and NA results for each chemical group and each pathway are automatically generated by the software after you complete the evaluation for each pathway (under Pathways). How the software selects Passed, Failed or NA for the chemicals groups is discussed in Section 6.10.

PATHWAY EVALUATION SUMMARY **LUST#: 7THU90**

Pathway		Result			Corrective Action Selected		Go to Tier 2
		Chemical Group	1	2		Date Completed	
Groundwater Ingestion	actual	Passed	☒	☒	☐ Established institutional controls ☐ Plugged drinking water wells ☐ Plugged non-drinking water wells ☐ Notified IDNR Water Supply Section ☐ Notified designated county authority		
		Failed	☐	☐			
		NA		☐			
	potential	Passed	☐	☒			
		Failed	☒	☐			
		NA		☐			☐
Soil Leaching to Groundwater		Passed	☐	☐	☐ Established institutional controls ☐ Plugged drinking water wells ☐ Plugged non-drinking water wells ☐ Notified IDNR Water Supply Section ☐ Notified designated county authority ☐ Conducted soil excavation		
		Failed	☒	☒			
		NA		☐			☐
Groundwater Vapor to Enclosed Space		Passed	☐	☒	☐ Established institutional controls		
		Failed	☒	☐			
		NA		☐			☐
Soil Vapor to Enclosed Space		Passed	☐	☒	☐ Established institutional controls. ☐ Conducted soil excavation		
		Failed	☒	☐			
		NA		☐			☐
Groundwater to Plastic Water Line		Passed	☐	☒	☐ Relocated plastic water lines ☐ Replaced plastic water lines ☐ Notified utility company		
		Failed	☒	☐			
		NA		☐			☐
Soil to Plastic Water Line		Passed	☒	☒	☐ Relocated plastic water lines ☐ Replaced plastic water lines ☐ Notified utility company ☐ Conducted soil excavation		
		Failed	☐	☐			
		NA		☐			☐
Surface Water		Passed	☐	☒	*Tier 2 assessment of the pathway*		
		Failed	☒	☐			
		NA		☐			☒

Corrective Action Summary

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Figure 23. The Pathway Evaluation Summary printout.

We will now cover how to use the software to complete the Corrective Action Selected column of the Pathway Evaluation Summary (Figure 23) and how to input text into the Corrective Action Summary text box at the bottom of the page.

From the Main form click Summaries. The dropdown menu contains two items. Place the left mouse button over Pathway Evaluation (without clicking). This will bring up a submenu with three items. Move the mouse to the first item "1. GW Ingestion and Soil Leaching to GW". Click on the item. This will activate the Pathway Evaluation Summaries (GW Ingestion and Soil Leaching to GW) form, shown as Figure 24 (your form will not have checks or dates).

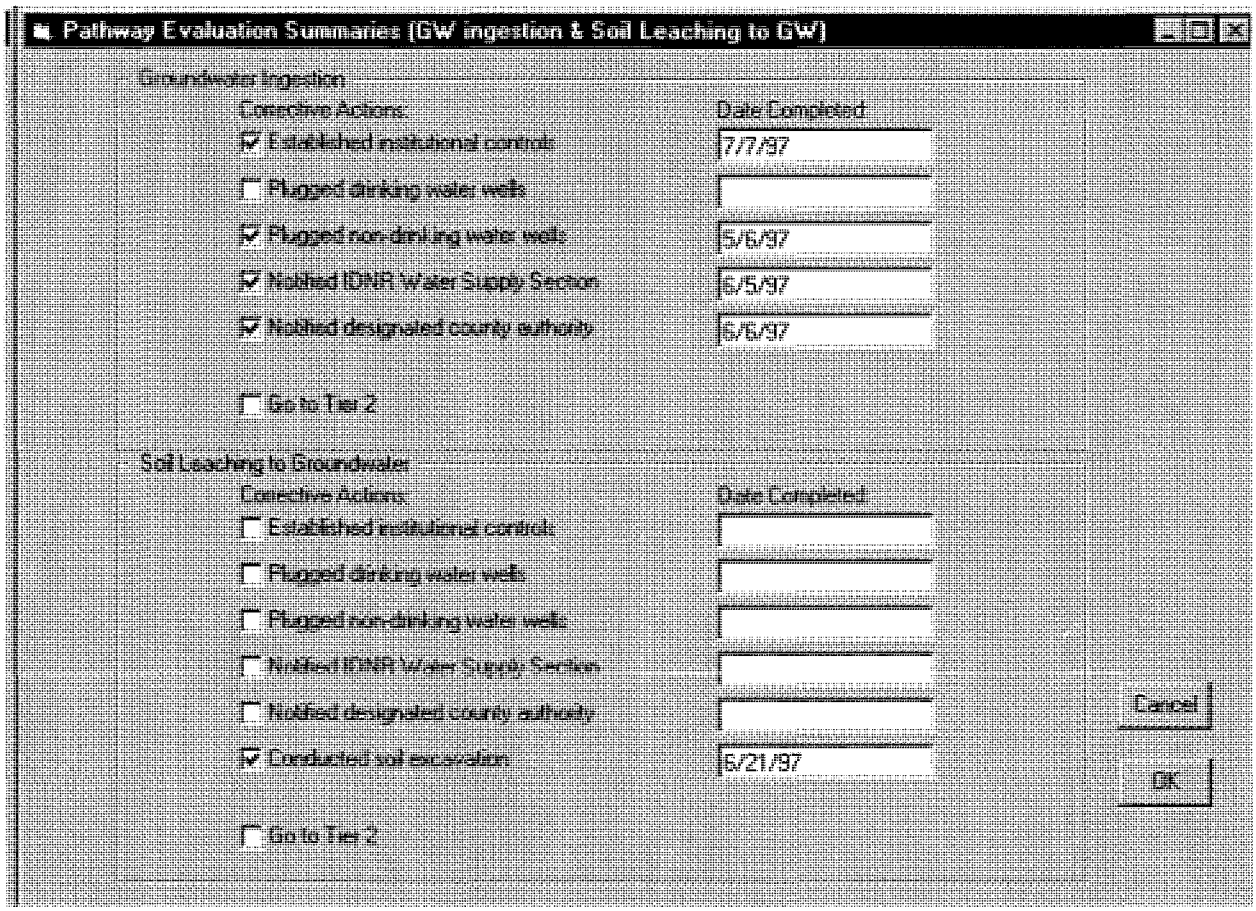

Figure 24. The Pathway Evaluation Summaries (GW ingestion and Soil Leaching to GW) form.

Whatever items you check for "Corrective Actions" on the summary forms and the dates you put in for "Date Completed" will be printed on the Pathway Evaluation Summary form (Figure 23). The summary forms simply list all the possible options for each pathway on the Pathway Evaluation Summary page (Figure 23), and whichever items you check for each pathway and the associated dates will be printed out verbatim.

It is up to you, the user, to check the correct Corrective Actions and put in the correct Date Completed for each checked Corrective Action.

This is one reason to print out the results for each pathway evaluation (Figure 22 is an example for the Groundwater Ingestion Pathway) and the User Selected Corrective Action Summary (Figure 21). The printout for each pathway shows the options for each pathway and the corrective action you have selected. The User Selected Corrective Action Summary shows the corrective action required or the option you selected for each pathway.

The results for our example problem are shown in Figure 21. Click on the Corrective Actions and enter the example dates shown in Figure 24. Click OK to return to the Main form.

From the Main form click Summaries, slide the mouse cursor to Pathway Evaluation, then slide the mouse cursor over

and click on “2. GW and Soil Vapor to Enclosed Spaces”. This will activate the “Pathway Evaluation Summaries (GW & Soil Vapor to Enclosed Spaces)” form, shown as Figure 25.

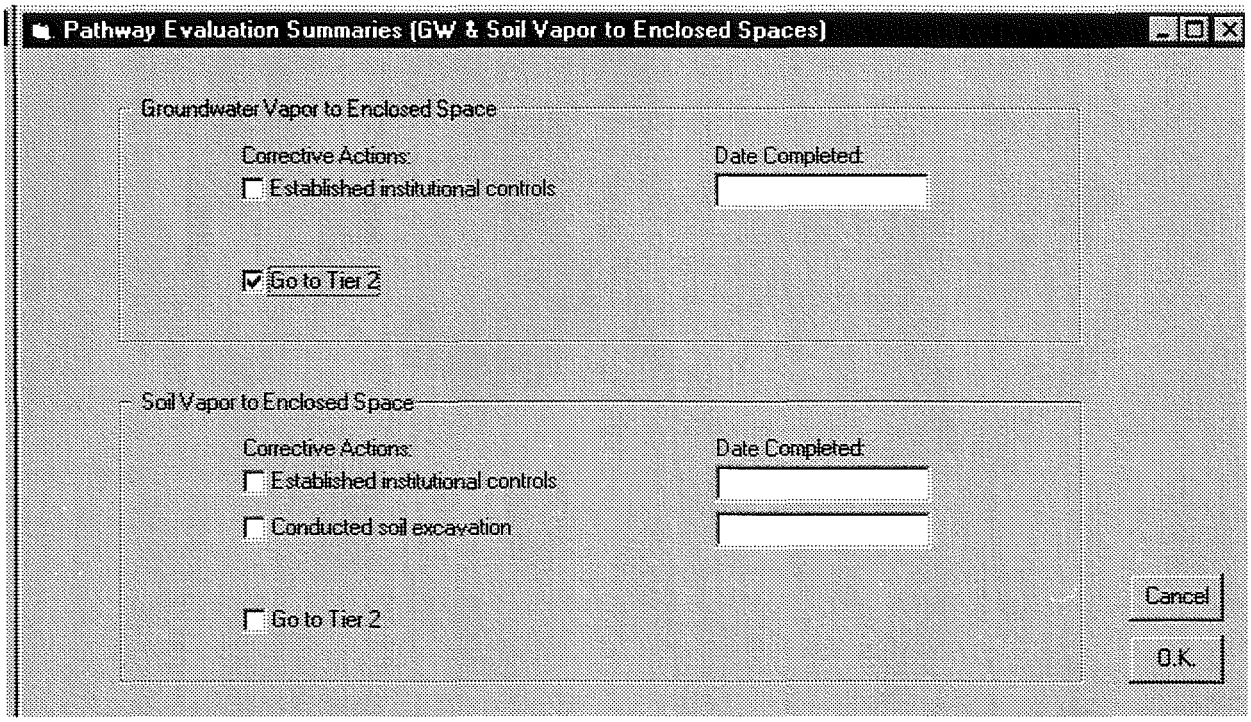

Figure 25. The Pathway Evaluation Summaries (GW & Soil Vapor to Enclosed Spaces) form.

For our example click on “Go to Tier 2” for Groundwater Vapor to Enclosed Space. For Soil Vapor to Enclosed Space there is no “Perform soil gas sampling at the source”. Soil gas sampling is not a final corrective action, but part of the evaluation. You would need to perform soil gas sampling at the source, then input the data in the Tier 1 program for the site and reevaluate the pathway later. Keep in mind, as long as you save your Tier 1 assessment to a file you can open the file at any later time to review the results, add additional data, change your selected corrective actions or update a pathway evaluation.

For now, we will leave the Soil Vapor to Enclosed Space summary blank, as shown in Figure 25. Click OK to return to the Main form.

To complete the Pathway Evaluation Summary for the last three pathways, from the Main form click Summaries, slide the mouse cursor to Pathway Evaluation, then slide the mouse cursor over and click on “3. GW and Soil to Plastic Water Line, Surface Water”. This will activate the “Pathway Evaluation Summaries (GW & Soil to Plastic Water Lines, Surface Water Body)” form, shown as Figure 26.

For our example fill out the form as shown in Figure 26. Note that the Soil to Plastic Water Line was no further action, so no information on Corrective Actions is required. Also, there are only two possibilities for the Surface Water pathway; no further action or go to Tier 2. After filling out the form click OK to return to the main form.

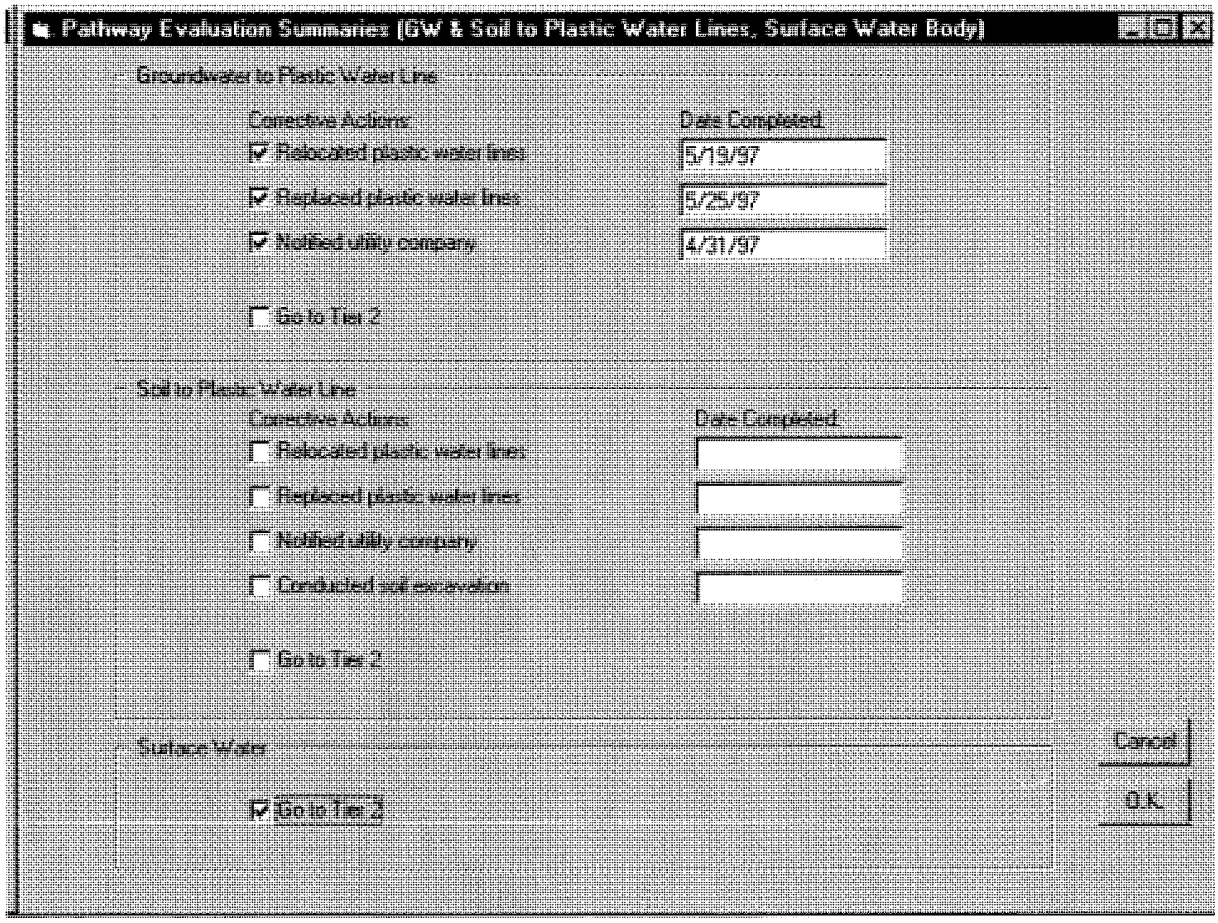

Figure 26. The Pathway Evaluation Summaries (GW & Soil to Plastic Water Line, Surface Water Body) form.

The final part of the Pathway Evaluation Summary (Figure 23) is a text box at the bottom of the page. The text box is a place for you to include any additional information or comments regarding your corrective actions (see the Tier 1 guidance for the information required for this section). You can input this information into the Tier 1 program and it will be printed out as part of the Pathway Evaluation Summary page.

From the Main form, click Summaries, then click on “Corrective Action Summary”. This will activate the Corrective Action Summary form, shown as Figure 27. Any information you type into this box will be printed out in the text box at the bottom of the Pathway Evaluation Summary page (Figure 23).

The example text typed into the text box in Figure 27 contains information on how the text will be printed out. The program will automatically justify paragraphs so they fit the width of the printout. For a paragraph then, just keep typing without hitting the Enter key. Pressing the Enter key will start new text at the beginning of a new line. If the text entered is too long to fit on the bottom of the Pathway Evaluation

Summary page when printed, a new page will automatically be generated, numbered as 3A, and the additional information will be printed on page 3A.

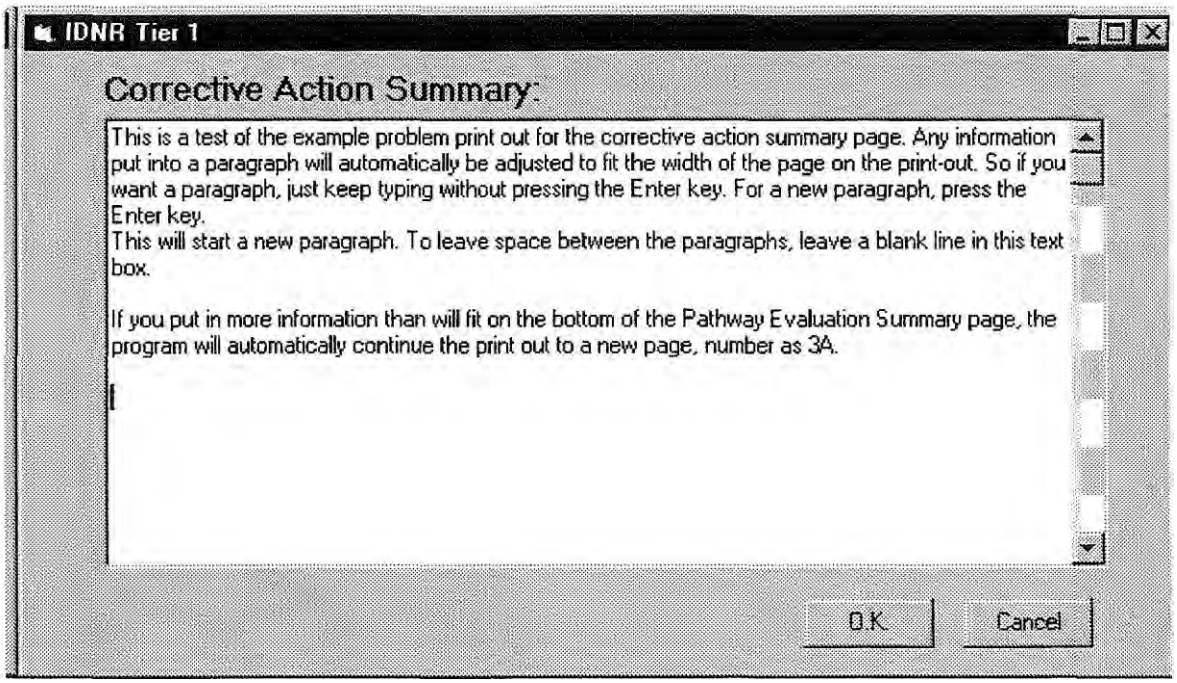

Figure 27. The Corrective Action Summary form.

For this example type in any information you would like to use as an example, then click the OK button to return to the Main menu.

As this point you should save your Tier 1 assessment. Click File on the Main form, then Save on the drop- down menu.

To see the effect of the information you have entered under Summaries on the Pathway Evaluation Summary page, click Print, and then click Pathway Evaluation Summary. Click the Preview button or Print button to preview or print the page. An example of the print out for the Pathway Evaluation Summary is shown as Figure 28.

You have now completed the tutorial for the Iowa Tier 1 RBCA software. In this example you have gone through the essential parts of the program.

If you are going on to the next section of the manual at this time, keep Tier 1 running with the current example. If you are not going on at this time make sure you save the example, and write down the name of the file. The example will continue to be used in the remainder of the user's manual. To exit the Tier 1 program click File on the Main menu, then Exit. If you have made changes in your data since your last Save the program will prompt you to save your data.

PATHWAY EVALUATION SUMMARY **LUST#: 7THU90**

Pathway		Result	Chemical Group 1	Chemical Group 2	Corrective Action Selected	Date Completed	Go to Tier 2
Groundwater Ingestion	actual	Passed	☒	☒	☒ Established institutional controls	7/7/97	
		Failed	☐	☐	☐ Plugged drinking water wells		
		NA		☐	☒ Plugged non-drinking water wells	5/6/97	
					☒ Notified IDNR Water Supply Section	6/5/97	
					☒ Notified designated county authority	6/6/97	
	potential	Passed	☐	☒			
		Failed	☒	☐			
		NA		☐			☐
Soil Leaching to Groundwater		Passed	☐	☐	☐ Established institutional controls		
					☐ Plugged drinking water wells		
		Failed	☒	☒	☐ Plugged non-drinking water wells		
		NA		☐	☐ Notified IDNR Water Supply Section		
					☐ Notified designated county authority		
					☒ Conducted soil excavation	6/21/97	☐
Groundwater Vapor to Enclosed Space		Passed	☐	☒	☐ Established institutional controls		
		Failed	☒	☐			
		NA		☐			☒
Soil Vapor to Enclosed Space		Passed	☐	☒	☐ Established institutional controls		
		Failed	☒	☐	☐ Conducted soil excavation		
		NA		☐			☐
Groundwater to Plastic Water Line		Passed	☐	☒	☒ Relocated plastic water lines	5/19/97	
		Failed	☒	☐	☒ Replaced plastic water lines	5/25/97	
		NA		☐	☒ Notified utility company	4/31/97	☐
Soil to Plastic Water Line		Passed	☒	☒	☐ Relocated plastic water lines		
		Failed	☐	☐	☐ Replaced plastic water lines		
		NA		☐	☐ Notified utility company		
					☐ Conducted soil excavation		☐
Surface Water		Passed	☐	☒	*Tier 2 assessment of the pathway*		
		Failed	☒	☐			
		NA		☐			☒

Corrective Action Summary

This is a test of the example problem print out for the corrective action summary page. Any information put into a paragraph will automatically be adjusted to fit the width of the page on the print-out. So if you want a paragraph, just keep typing without pressing the Enter key. For a new paragraph, press the Enter key.
This will start a new paragraph. To leave space between the paragraphs, leave a blank line in this text box.

If you put in more information than will fit on the bottom of the Pathway Evaluation Summary page, the program will automatically continue the print out to a new page, number as 3A.

T1S, Version 1.0

Figure 28. The completed Pathway Evaluation Summary printout.

6.0 Miscellaneous Information

The example in the tutorial has covered the use of the Tier 1 software for completing a Tier 1 assessment. This user's manual will not go through every possible option you may encounter when using the software, but in this section will cover some particular aspects of the program not covered or not covered in detail in the tutorial. I would again encourage you to use the software to actively perform the examples as we go through this section.

6.1 The Order of Putting in Information

The order in which you put in information for a Tier 1 assessment would normally be as we have done in the tutorial_ Site Data, Receptors, Pathways, Summaries. However, the Tier 1 program is event driven and you can put the information into the program in any order you like. You could do receptors first, in any order, then Analytical Data, etc. You can go back to a form at any time, to check what data you have entered or to modify the data. You can print any page on the Print Selection item list at any time.

However, although you can put in the information in any order, if the required information has not been input to do a pathway evaluation, the program will not allow you to click the pathway on the Pathways dropdown menu. If you print out the results for a pathway before it has been evaluated, the page will print and include the information available, but will note that the pathway has not been evaluated.

Feel free to experiment with the Tier 1 program to understand how it operates.

6.2 Modifying the Data

You can, at any time, return to the Analytical Data form or Receptor forms and change the data. In some cases this will mean the results for a Pathway evaluation will change. The Tier 1 program attempts to identify when a change in data affects a completed pathway evaluation, will warn that you need to redo the evaluations for some pathways, and will clear the results of the previous pathway evaluation from the Main form.

To be on the safe side, if you change Analytical Data or Receptor data I would recommend you should go through the Pathway evaluation for each pathway again (Pathways on the Main form).

For an example of the effect of modifying data, we will continue with the previous example problem. If you have exited the Tier 1 software, start the Tier 1 software and Open the saved file for the example problem.

Click Receptors, then Groundwater Ingestion/Soil Leaching. The information you previously input is shown (Figure 8). We will change the receptor data. Click No for "Is there a non-drinking water well within 1,000 feet of the source?". Now click OK.

This will bring up a dialogue box, shown as Figure 29, indicating the change in information may affect the Pathway evaluations for the pathways shown. Since non-drinking water wells are receptors for Groundwater Ingestion and Soil Leaching to Groundwater, the dialogue box indicates you should reevaluate those two pathways.

Clicking Yes on the dialogue box will accept the change in data, No will reset to the previous data, and Cancel will take you back to the receptor form. Click Yes on the dialogue box. Note that the summary results for the Groundwater Ingestion and Soil Leaching to Groundwater pathways have been cleared from body of the Main form, also indicating the pathways need to be reevaluated.

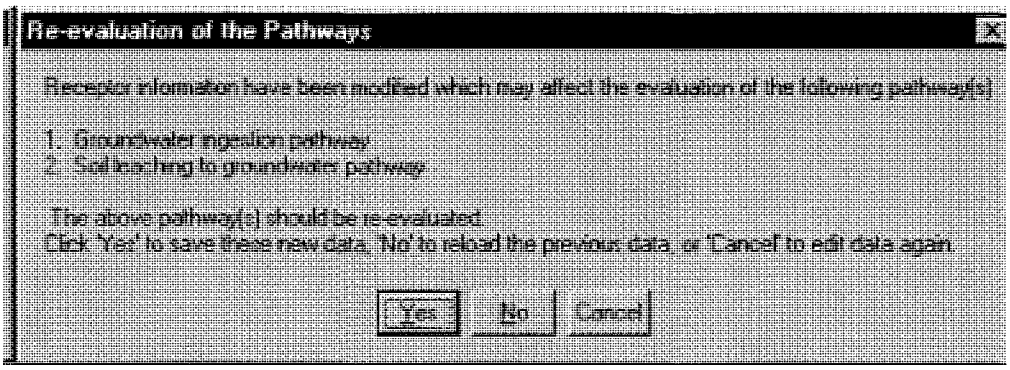

Figure 29. Reevaluation of the Pathway dialogue form.

Click on Pathways, then Groundwater Ingestion to activate the pathway evaluation form. The effect of the change in receptor is; under the Sever the Pathway option you are no longer required to plug non-drinking water wells, since they do not exist.

Click either of the options, then click Next to move to the next pathway, Soil Leaching (if you clicked Main, then simply click Pathways, followed by Soil Leaching to Groundwater, or click the card icon to the left of the Soil Leaching pathway on the body of the Main form).

Again the change in receptors affects the requirements for Severing the Pathway. Actual water supply wells are not present, and Severing the Pathway requires dealing with the protected groundwater source only. Click any of the options, then click Main to return to the main form.

To consider a different example return to the Receptor form for Groundwater Ingestion/Soil Leaching (click Receptors, then click Groundwater Ingestion/Soil Leaching). Replace the current hydraulic conductivity of 0.5 with 0.4 (click on the text box for the hydraulic conductivity, then type in the new value of 0.4). Now click OK. Click Yes on the dialogue box.

Now return to the evaluation of the Groundwater Ingestion pathway (click on Pathways, then Groundwater Ingestion). You will now find that no further action is required for the pathway, since there are no receptors. Click Next to move to the Soil Leaching pathway, and you will again find that no further action is required, due to the lack of receptors.

The program attempts to identify which pathway evaluations are affected by a change in data, and warns you to redo the evaluation. Again, to be on the safe side I would recommend you run through the pathway evaluations again when you make a change on the Analytical Data form or the Receptor forms.

As you might expect changes in Analytical Data can also affect previous pathway evaluations. To see this, return to the Analytical Data form (under Site Data), and change the Benzene concentration in soil to 1.16 mg/kg, then click OK Click Yes on the dialogue box to accept the new data. Return to the pathway evaluation for Soil Vapor to Enclosed Space (under Pathways). You will now find no further action is required. The Tier 1 levels for the pathway are not exceeded after the change in Benzene soil concentration (assuming you retained the example problem soil concentrations for the other soil components).

In some cases changes in Analytical Data will not affect the pathway evaluation. If a change in concentration does not change whether a Tier 1 level is exceeded or not, there will be no change in the pathway options. I would still recommend you go through the pathway evaluations (under Pathways) again, whenever you change the Analytical data or receptor information.

6.3 Group 2 Chemicals

For some sites Group 2 chemical concentrations may not be required. Return to the Analytical Data form under Site Data. If you check No for a Group 2 chemical being required (i.e. T.E.H.-Diesel), but a concentration for T.E.H. Diesel is entered, the Tier 1 program will warn you of the apparent contradiction, but then use whatever concentrations are

entered to evaluate the pathway. To see this, click No for T.E.H.- Diesel required, enter a groundwater concentration for TEH-D if one is not already present, and then click OK. Click OK on the dialogue box.

If T.E.H.-Diesel required is Yes, but you have entered no data for TEH-D the program will also point this out. To see this go to Analytical Data, click Yes for T.E.H.-Diesel required, then delete the T.E.H.-D data from the soil and groundwater maximums (make the concentrations blank, not 0). Now click OK. The program warns that you should provide T.E.H.-Diesel data. However, the program does not require you to put in T.E.H.-Diesel data if T.E.H.-Diesel required is Yes. If you leave the concentrations blank for T.E.H.-D when you have checked Yes for T.E.H.-Diesel required, the program will treat the blank concentrations as zero (0) in evaluating the pathways.

It is up to you to be consistent on Group 2 data. The program warns you of any apparent inconsistencies, but does not require you to correct them.

If both Group 2 chemicals are not required and clicked No, and no concentrations (blank) are entered for the Group 2 chemicals, then for Group 2 chemicals NA (not applicable) will be shown in the pathway evaluations and print-outs.

6.4 TPWTEH Conversion

If you do not have BTEX data for soil the program will do the default TPHITEH conversion for you. If you have actual BTEX measurements for soil, you should always use them in place of a TPH/TEH conversion.

To demonstrate the TPHITEH conversion go to the Analytical Data form (under Site Data). Click No for TPH/TEH conversion. Input TPH and TEH-D soil data if it does not already exist. Now click Yes for “TPH/TEH Conversion used?”. The program determines the largest concentration for each chemical using the default conversion factors (see the Tier 1 guidance) for TPH and TEH, and inserts the concentrations into BTE under Soil Maximums. If a TEH-D soil concentration is not entered, only the TPH soil concentration is used for the conversion.

The program will allow you to over-write any value generated by the TPH/TEH conversion for BTE. So if you are not using the TPH/TEH conversion make sure you have clicked No for TPH/TEH Conversion used.

6.5 Soil Gas Measurements

You have the option of taking soil gas measurements at Tier 1 for the Soil vapor to Enclosed Space pathway. If you take soil gas measurements you must sample on two different dates (see the Tier 1 guidance) for both Benzene and Toluene, regardless of whether Benzene or Toluene are the chemicals failing the Tier 1 soil concentrations for the pathway.

If you do not have soil gas measurements, leave the Soil Gas Maximum text boxes blank (do not use 0). The program recognizes blank as no data for soil gas.

If you have soil gas measurements enter the maximum soil gas concentrations found for Benzene and Toluene on the two sampling dates. If you enter soil gas measurements, but leave one or more of the four concentrations blank, the program will warn you that a data value is missing, and assume you fail soil gas (regardless of the values of the soil gas concentrations entered).

To demonstrate this go to Analytical Data (under Site Data), and enter three soil gas values (i.e. 100 each), but leave one blank, then click OK. A dialogue box will warn you that a data value is missing, and it will be assumed that soil gas fails the soil gas target levels (regardless of the concentrations entered).

If you enter all four soil gas concentration measurements, the program will use the soil gas concentration data evaluate the Soil Vapor to Enclosed Space pathway according to the soil gas target levels. The appropriate actions or options will appear when you click the Soil Vapor to Enclosed Space pathway evaluation (under Pathways). For example, if the two sets of soil gas measurements are less than or equal to the soil gas target levels (600000 µg/m3 for Benzene and 9250000 µg/m3 for Toluene), then no further action is required for the pathway, regardless of the soil concentrations.

The units for soil gas are µg/m3. For concentrations in air a ppm is not equal to a mg/L.

6.6 Using Unknown for Receptors

For a number of receptors you have the option of selecting Unknown. Under most conditions (the exception is discussed below) when you select Unknown for a receptor question or do not input data (i.e. hydraulic conductivity and total dissolved solids for protected groundwater source), the Tier I program will assume the receptor is present. The program will show Unknown for the receptor, but will evaluate the pathway as if the receptor is present.

The purpose of having an Unknown choice for the situation where the soil or groundwater concentrations do not exceed the Tier 1 levels for all the receptors in a pathway. If the soil or groundwater concentrations do not exceed the Tier 1 levels for the receptors in a pathway, then the pathway will be no further action even if the receptors are present. In such a situation selecting Unknown will have no effect on the required actions for a pathway.

Generally speaking you should not use Unknown unless you are sure Tier 1 levels are not exceeded for all receptors in a pathway. If you use Unknown incorrectly it will be evident, since when you evaluate the pathway (under Pathways) corrective action will be required for the receptor with an Unknown status if measured concentrations exceed the Tier 1 levels for the receptor.

6.7 Groundwater Data is Not Available

If you go to the Analytical Data form (under Site Data), you will see that one of the questions is “Groundwater encountered?”. For the vast majority of sites the correct answer to this question will be Yes.

The Groundwater encountered question exists to deal with the situation where groundwater concentrations are not available for the site, due to the limitation on depth of drilling that is part of Iowa RBCA (see the Tier 1 guidance for details). You should click No for the question “Groundwater encountered?” only if no groundwater concentrations are available for the site, and the reason for no groundwater samples being available was groundwater was not encountered, the limitation on depth of drilling was reached, and the limitation was invoked. If groundwater concentrations are available for the site you should use them for Tier 1, regardless of the depth at which they were obtained.

To see the effect of clicking No for “Groundwater encountered?”, go to the Analytical Data form (under Site Data) and click No for the question. The following dialogue box, Figure 30, appears to remind you of the conditions under which groundwater concentrations are not required. If you believe your reason for not having groundwater concentrations is valid, click Yes on the dialogue box to affirm your selection. If you selected that groundwater concentrations are not available by mistake, click No on the dialogue box.

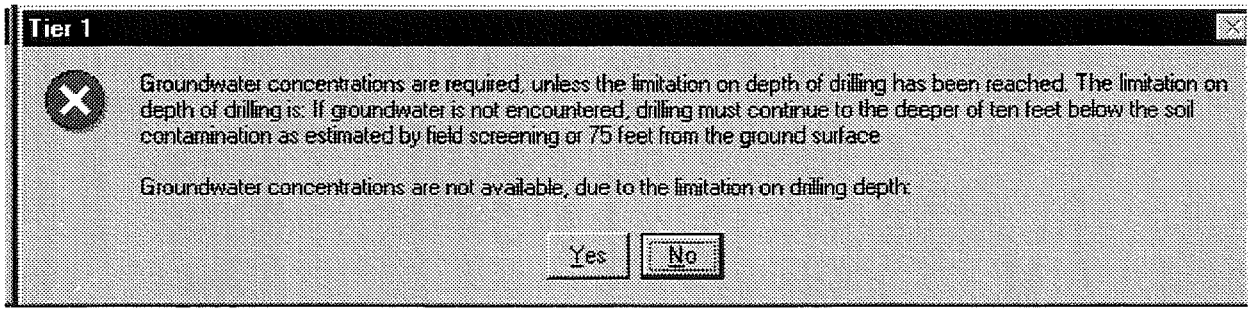

Figure 30. Dialogue box to confirm no groundwater concentrations are available, due to the limitation on depth of drilling.

Click Yes on the dialogue box to see the affect. All existing data for Groundwater Maximums on the Analytical Data form are erased, and NA is entered for all groundwater concentrations. The pathways involving groundwater will now be evaluated under the conditions of no groundwater concentrations available.

If there are no groundwater concentrations, this will also affect some of the receptor questions. For the Plastic Water Line pathways (under Receptors) you are required to enter a shallowest depth to groundwater. If you enter less than 75 feet the program warns you that this appears to be inconsistent with your selection that no groundwater concentration data is available. However, the program only provides a warning about the apparent inconsistency, and will use the entered depth to groundwater in the Groundwater to Plastic Water Line pathway evaluation and printout, unless you change it. Under the conditions of no groundwater data, a blank depth to groundwater or a depth greater than 75 feet will not be interpreted as inconsistent with no groundwater concentrations.

For the protected groundwater source (Groundwater Ingestion/Soil Leaching under Receptors), if you enter data for hydraulic conductivity and total dissolved solids the software will determine whether the first encountered groundwater is a protected groundwater source. For the case of no groundwater concentrations, the groundwater ingestion pathway will be no further action required, even if a protected groundwater source is present. For soil leaching to groundwater, action would be required for the protected groundwater source if soil concentrations exceed the Tier 1 levels for the pathway, regardless of whether there are groundwater concentrations or not. You do need to consider whether it is inconsistent to have data for evaluating a protected groundwater source, but assert that groundwater concentrations are not available.

If groundwater concentrations are not available, and no data is entered for hydraulic conductivity and total dissolved solids, the pathways are evaluated as if a protected groundwater source is not present. This is an exception to the usual approach for unknown receptors. If groundwater concentrations are available, and no data is entered for hydraulic conductivity and total dissolved solids, then the pathways are evaluated assuming a protected groundwater source receptor is present.

Also keep in mind that for the Soil Leaching to Groundwater pathway drinking water wells and non-drinking water wells are still possible receptors, even when groundwater concentrations are not available.

6.8 Visual Inspection for the Surface Water Body Pathway

If a designated use or general use surface water body is present within 200 feet of the source there is a visual inspection requirement. The purpose of the visual inspection requirement is to determine;

- Is there a petroleum sheen on the surface water body or residue on the bank from the site?

If the answer is Yes you fail the visual inspection requirement and a Tier 2 assessment of the pathway is required, regardless of whether a designated use surface water body is present and Tier 1 levels are exceeded. If the answer is No you pass the visual inspection requirement.

The answer to whether Visual Inspection is failed is determined from your answer to four questions. To demonstrate the pathway, go to Surface Water Body under Receptors. Click Yes for either of the questions about whether there is a designated use or general use surface water body within 200 feet of the source. This activates the questions on Visual Inspection. If you click No for the first Visual Inspection question “A visual inspection of all surface water bodies within 200 feet of the groundwater source shows evidence of possible petroleum sheen or residue along the bank?” then you have passed the visual inspection and no further questions appear.

If you click Yes for this question (try it), the next statement “In the opinion of the groundwater professional, the sheen or residue is associated with the underground storage tank site” appears. If you answer No to this statement, you pass visual inspection. However, you must provide justification in the Tier 1 report for a No response to the question (see the Tier 1guidance).

If you answer Yes to the statement about associated with the site (try it), the next statement appears “In the opinion of the groundwater professional, the sheen or residue is a petroleum regulated substance”. If you answer Yes, the site fails Visual Inspection and no further statements appear.

If you answer No to the statement (try it), you are required to obtain a laboratory measurement of the sheen or residue, and the final statement appears “The laboratory sample has shown the sheen or residue to be a petroleum regulated substance”. If you answer Yes you fail Visual Inspection. If you answer No you pass visual inspection.

6.9 Potentially Explosive Vapors Identified

The single receptor question for the vapor pathways (Vapor to Enclosed Space under Receptors) is “Have potentially explosive vapors been identified in the explosive vapor to survey?”. If you answer Yes to this question you are required to do a Tier 2 assessment, regardless of whether the soil and groundwater concentrations or soil gas measurements exceed the Tier 1 levels for the vapor pathways. You are also required to notify the owner/operator to notify the DNR Emergency Response Hotline, and if they have been notified to report the Spill number.

To demonstrate this, first go to the Analytical Data form (under Site Data) and click Yes for Groundwater Data available. Enter groundwater data that is less than the Tier 1 levels for the Groundwater Vapor to Enclosed Space pathway (i.e. 1540 or less), then click OK Now go the receptor form for Vapor to Enclosed Space (under Receptors) and click Yes for the explosive vapor question, then click OK Go to the Groundwater Vapor to Enclosed Space pathway evaluation (3. Groundwater Vapor to Enclosed Space under Pathways). You will see that you must notify the owner/operator to report the condition, and a Tier 2 assessment of the pathway is required, even though the groundwater concentrations do not exceed the Tier 1 target levels for the pathway. You will find the same is true for the Soil Vapor to Enclosed Space pathway.

6.10 Pass, Fail and NA on the Pathway Evaluation Summary

The software generates Pass, Fail or NA for the Group 1 and Group 2 chemicals in the Pathway Evaluation Summary print out (see Figure 28). In most cases the choice is obvious. If Tier 1 levels are not exceeded for the receptors in a pathway, or receptors are not present, a Pass results. If Tier 1 levels are exceeded for the receptors and the receptors are present, a Fail results. NA (Not Applicable) results for Group 2 if concentrations have not been input for the Group 2 chemicals and “TEH-Diesel required” and “TEH-Waste Oil required” are No on the Analytical Data form.

There are a few cases where the selection made is not obvious, and I will point them out.

Case 1. Groundwater Ingestion Pathway. If a drinking water well is not present, a protected groundwater source is present, and groundwater concentrations are between the Tier 1 levels for actual receptors and potential receptors, the Pathway Evaluation Summary will show Passed or NA for actual and potential receptors. However, in this case since a protected groundwater source is present you are required to notify the DNR Water Supply Section and designated county authority prior to no further action for the pathway. This requirement is indicated on the Groundwater Ingestion pathway evaluation form and printout and on the User Selected Corrective Action form and printout. I would encourage you to always print out the User Selected Corrective Action page, and the summary page for each pathway. They will always show what actions are required.

Case 2. Soil Vapor Pathway. If you take soil gas measurements and fail the soil gas target levels, Failed will be indicated for the Group 1 chemicals, regardless of the soil concentrations for the Group 1 chemicals. If you take soil gas measurements and pass the soil gas target levels, Passed (or NA) will be shown for Group 1 and Group 2 chemicals on the Pathway Evaluation Summary, regardless of the soil concentrations.

Case 3. Surface Water Pathway. If you fail the visual inspection Failed will be shown, regardless of whether you pass the Tier I levels for a designated use surface water body.

Again, I would encourage you to always preview and/or print out the results page for each pathway to determine what actions, if any, are required for each pathway.

6.11 Selecting a Font for Printing

Since we cannot be sure what fonts are available for printing for your computer and printer combination, the Tier 1 program allows you to choose from the fonts available for the default printer. To see the choices click Print under File, then click the Select Printer Font button at the bottom of the Print Selection form. This will activate the Select Printer Font form, shown as Figure 31. The drop-down list box shows the currently selected printer font. Clicking on the down arrow on the box will show a scrollable list of the available printer fonts. If the font is available the Tier 1 program chooses Arial by default, followed by Times New Roman. I recommend you use Arial or Times New Roman.

You can, however, experiment with other fonts. When you select a font the print preview will try to use the same screen font as the selected printer font, if one is available. If an equivalent screen font is not available Windows will use a substitute. The point is, for some fonts the printed results may not match the print preview. If your printed results exceed the margins, try a different font.

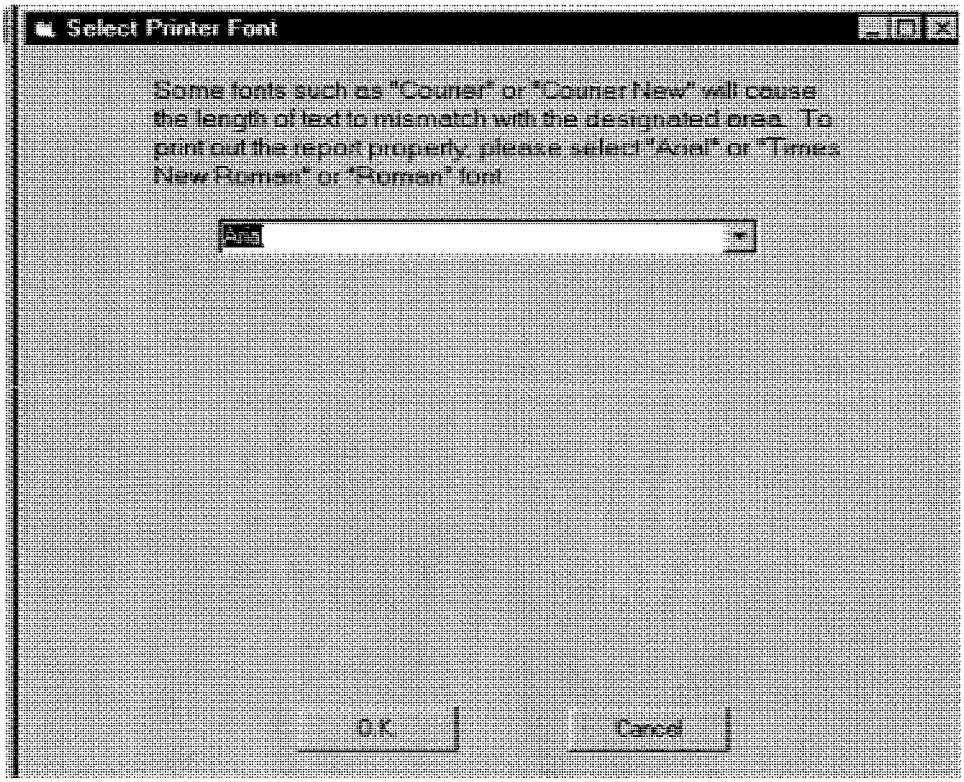

Figure 31. Select Printer Font form.

6.12 Errors on Attempting to Open Data Files

If you attempt to Open (under File) a file that is not a Tier 1 data file the program will inform you it is not a Tier 1 data file, and will not allow you to open the file. If this happens, click OK on the dialogue box.

If the program is attempting to open a file that it identifies as a Tier 1 data file, but finds apparent errors in the input format of the file, it will inform you that the file has the wrong format or is corrupted. If this occurs, click OK, then No for Saving the data. If you are sure the file is a Tier 1 data file you saved from the Tier 1 program, select New from the File menu, then try to Open the file again. If this does not work, exit the Tier 1 program, restart the Tier 1 program and then try to Open the file again. If this is not successful, please copy the file to a floppy disk and send it to:

LaDon Jones
375 Town Engineering
Iowa State University
Ames, Iowa 50011
(515)294-6848

with a cover letter describing the problem.

6.13 Running Tier 1 under Windows 3.1

As previously mentioned, Windows 3.1 is not particularly good at memory management. If you are using Windows 3.1 and having problems running the program, I recommend you exit all other programs before running the Tier 1 software. Also, check if printing is being handled through Print Manager (try printing both using and not using Print Manager to see which works best). Check that your default printer is set to the printer you want the output to go to before you start the Tier 1 program, and set the page orientation to portrait.

6.14 Version 2 of the Tier 1 software

Consideration is being given to developing a Version 2 of the Tier 1 software. If you have any suggestions about changes you would like to see in the software or additional features you would like to see in the software, please send any comments to LaDon Jones (letter, phone or email (LCJONES@IASTATE.EDU), or the DNR LUST staff.

The software was developed to help make your job easier, and you, the user doing Tier 1 assessments, are in the best position to provide feedback and suggestions.