

EPA **IDEA Cost Estimating Model**
User's Guide

Illegal
Dumping
Economic
Assessment



Cost Estimating Model
Version 1.2

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CHAPTER 1 INTRODUCTION

Illegal dumping is a major problem in many urban and rural communities throughout the United States. For many communities, the financial and social impacts of illegal dumping activities are understood only in a general sense. It is widely accepted that illegal dumping affects public health and safety, decreases property values, discourages economic development, increases municipal operating costs, increases property taxes and service fees, and results in lost revenues. Furthermore, local governments and private property owners incur significant capital and operation and maintenance costs associated with the need to continuously clean up, haul, and dispose of illegally dumped wastes. For many municipalities, these costs are inadequately measured by current accounting practices. As a result, the true costs of illegal dumping activities have yet to be fully realized, and no effective means for cost recovery have been identified.

The Illegal Dumping Economic Assessment (IDEA) model was developed to provide community leaders with a tool for assessing and measuring the costs of illegal dumping activities. Use of the model can be a first step in quantifying such costs, thereby supporting cost management and policy-making decisions associated with illegal dumping prevention programs. Intended users of the IDEA model include state, tribal, and local government authorities; municipal departments; community groups; and civic organizations. The model is a tool for assembling baseline and ongoing cost data for prevention program measurement, cost recovery, and enforcement efforts and for calculating cleanup cost estimates. The information generated by the model can be used to publicize prevention program results, which are necessary to obtain continued support from high-level authorities as well as to maintain cooperation between municipal authorities and community groups.

As discussed in the U.S. Environmental Protection Agency's (EPA) *Illegal Dumping Prevention Guidebook* (<http://www.epa.gov/region5/dmpguide.htm>), an effective illegal dumping prevention approach requires integration of several strategies that complement one another, including site maintenance and controls, community outreach and involvement, targeted enforcement, and program measurement. Use of the IDEA model provides summary data not only for evaluating prevention program efforts but also for cost-benefit analyses, budget hearings, and grant program accountability.

The IDEA model is designed to be intuitive for ease of use. This user's guide presents the background information used to develop the IDEA model and provides general instructions and helpful tips for using the model to assess illegal dump site costs.

Specifically, Chapter 2 focuses on the scope of the model and its underlying structure, including:

- Suggested uses of the model
- Underlying assumptions
- Cost sources
- Parameters relevant to illegal dumping activities included in the model
- Parameters considered but not included in the model
- Model default values
- The illegal dump site cleanup process

Chapter 3 provides additional specific assumptions used in developing the model and general instructions, tips, and examples for using the IDEA model spreadsheet, including:

- Data to collect for model input
- How to input data into the model
- How to adjust default cost values included in the model or override them with actual cost values
- The flexibility of the model

Before continuing through this document, either upload the IDEA model on your computer to become familiar with it or review the worksheets, data collection form, and flowchart included in Appendices A through E of this document.

CHAPTER 2 SCOPE OF THE MODEL

The formulas of the IDEA model and its option buttons, macros, and other features are embedded in several worksheets of a Microsoft Excel spreadsheet. This format makes the model an easy-to-use cost analysis tool that is available in a popular software platform.

Intended users of the IDEA model include state, tribal, and local government authorities; municipal departments; community groups; and civic organizations. As indicated below, the model can be used to assess a variety of costs associated with illegal dumping activities in urban and rural areas.

You can use the IDEA model in a variety of ways.

<p>Estimate the costs of cleanup activities for</p> <ul style="list-style-type: none"> • An individual illegal dump site • A specific group of illegal dump sites • All the illegal dump sites in a given community 	<p>Assess indirect costs for</p> <ul style="list-style-type: none"> • Site surveillance activities • Property liabilities and impairment factors • Illegal dumping prevention activities
<p>Conduct cost analyses for</p> <ul style="list-style-type: none"> • Comparison of different cleanup methods, what-if scenarios, and varying productivity rates • Capital equipment investment decisions • Evaluation of the costs and benefits of illegal dumping prevention activities • Proposed site surveillance operations 	<p>Compile or accrue actual cleanup costs for</p> <ul style="list-style-type: none"> • Cleanup cost recovery actions • Enforcement efforts • Historical and trend analyses • Budget development, goal setting, and performance measurement

A summary of the costs can be printed out in a financial statement format (see Using the **Cost Summary** Worksheet in Chapter 3). This statement can be used to inform decision-makers or to give notice to responsible parties during cost recovery actions. In addition, the financial statement allows the model user to analyze costs and adjust them by conducting what-if analyses of specific parameters or variables.

Before making the IDEA model available to the public, its underlying assumptions, parameters, layout, and usability as well as the spreadsheet's formulas and calculations were tested using actual illegal dump site cleanup data gathered from several municipalities. The rest of this chapter discusses assumptions and cost sources used in the model, parameters included and not included in the model, the difference between using the model's default values and user-supplied values, and cleanup crew process rates.

ASSUMPTIONS AND COST SOURCES

Several key assumptions used throughout the model are discussed below. Additional assumptions are presented in specific sections of Chapter 3.

1. The model user has already assessed the illegal dump site or sites to be modeled and has collected the data for the **Model Input** worksheet. Furthermore, the user understands the concepts of the default values and process rates used in the model (see the last two sections of this chapter and Chapter 3 for more details).
2. The site cleanup process is simple and straightforward—that is, the site is ready for waste removal, and no demolition of structures, environmental investigations, or other significant site preparation activities are needed. Heavy equipment places waste directly into containers at a steady rate.
3. The default labor rate values include fringe benefits and overhead. Default equipment values include the costs of all supplies needed to operate the equipment.
4. Labor and equipment costs are based on an 8-hour workday. The model's default process rate includes the time required for one round-trip mobilization per day.
5. The distance of waste transport to a disposal facility is based on travel time, not mileage. The distance is either “near” (a 2-hour round trip) or “far” (a 4-hour round trip). This simplification is needed to address the wide variation in waste transport costs and fee schedules. A “near” distance assumes that the disposal facility is readily accessible.
6. After cleanup activities are completed, site restoration activities are limited to simple grading and barrier installation.
7. Household waste, regardless of its constituents, is considered to be a nonhazardous municipal solid waste.
8. Tires are not attached to metal wheel parts.

The cost values used in the IDEA model primarily come from 1999 R.S. Means cost estimating manuals, which are widely used and accepted. Obtaining most of the cost values from a single source such as R.S. Means helps to ensure that the costs in the model are comparable. Other sources of cost and conversion values used in the model include environmental and economic reports.

PARAMETERS INCLUDED

The model is based on two information parameters and nine cost parameters relevant to illegal dumping activities. These parameters correspond to the schedules in the **Model Input** worksheet, which provides the space for entering most data.

- Schedule A - Dump site features
- Schedule B - Waste type, quantity, and disposal methods
- Schedule C - Site cleanup costs
- Schedule D - Waste transport costs
- Schedule E - Waste disposal costs
- Schedule F - Site restoration and security costs
- Schedule G - Site surveillance costs
- Schedule H - Property liability assessment
- Schedule I - Program administrative costs
- Schedule J - Offsetting costs
- Schedule K - Adjustments to default cost values

PARAMETERS NOT INCLUDED

A variety of cost parameters associated with illegal dumping could not be included in the model because either limited cost data would be available to the model user or gathering the cost data would be too burdensome or complicated. Such parameters include short-term and long-term human health costs, pest control costs, and community self-worth values. Although these parameters are not specifically included in the model, the model has the space and flexibility for the user to manually enter additional cost items if the necessary data are available. The cost parameters not included in the model are briefly discussed below, including (1) a description of the parameter, (2) an explanation why the model does not account for the parameter, and (3) suggested actions the user can take regarding the parameter.

Lost Hauling and Disposal Revenues of Legitimate Businesses

Once an illegal dump site is cleaned up, the revenues initially lost by legitimate waste haulers and disposal facility operators will be realized. This revenue, however, would have to be discounted using an appropriate interest rate (the time value of money) based on the amount of time that the waste was not properly disposed of. This time period and the discount rate could not be easily incorporated into the

model. However, users are encouraged to explore the value of foregone revenues to better understand the economic impacts associated with this cost parameter.

Age of an Illegal Dump Site

Time plays a critical role in the accumulation of wastes at an illegal dump site. This consideration is important because an illegal dump site often serves as a magnet for additional dumping activities; therefore, costs may increase between the time when the model is used and the time when the site is actually cleaned up and secured. The model, however, does not consider the effects of time. Instead, the model provides for evaluation of costs at only one moment in time: the date of the cost assessment. Model users are encouraged to consider the effects of time and the potential for accumulation of additional wastes. Of particular concern is the time that passes between conducting the cost assessment and initiating removal of wastes and securing the dump site.

Migration of Waste

The effects of waste located in a body of water, absorbed into soil, or migrating away from a site is not considered in the IDEA model. The model assumes that waste is located in one easily accessible area. Users should understand the effects of migrating wastes on the cleanup crew's efficiency and the need for special equipment. Users can then either make the appropriate adjustments to the model's default values or use the additional line item spaces in the model to estimate additional labor and equipment costs associated with special circumstances.

Hazardous Waste

Hazardous waste at illegal dump sites poses greater health risks and cleanup and disposal costs than nonhazardous waste. In addition, hazardous waste is regulated under federal and state laws and involves a different cleanup and cost recovery process than nonhazardous solid wastes. These issues make it difficult to assess the costs of hazardous waste cleanup in a simplified model.

If hazardous or industrial liquid waste is encountered or suspected at an illegal dump site, the city or state environmental protection office should be immediately contacted. No unqualified person should attempt to determine the constituents of a hazardous liquid or waste, as this could have serious health consequences.

USING MODEL DEFAULT VALUES OR USER-SUPPLIED VALUES

Cost estimates can be calculated using the IDEA model's default values, user-entered actual values that override the default values, or a combination of default and actual values. Dump site cleanup costs can be quickly estimated by completing the two information parameters (Schedules A and B) and allowing the model's default values to calculate cleanup, transport, and disposal costs (Schedules C, D, and E). More

accurate cost estimates can be generated by collecting and entering actual cost data specific to a site or geographic location. In general, the more data that are gathered and entered in the model, the more accurate its output will be. For this reason, the model user is encouraged to (1) identify and measure wastes as accurately as possible; (2) gather specific information on local labor, equipment, and material costs; and (3) become familiar with the scope of local illegal dumping prevention and enforcement programs.

Techniques for overriding or adjusting the default values are discussed in detail in Chapter 3 under Schedule C. An example data collection form is provided in Appendix D.

CLEANUP CREW PROCESS RATE

The cleanup crew process rate is the most important variable in the site cleanup cost estimate. A process rate represents the amount of waste that can be cleaned up by a cleanup crew in 1 hour. The model uses an hourly process rate to determine the total length of time that equipment and labor will be employed to clean up the total amount of waste estimated to be present at a dump site.

The IDEA model assumes a straightforward cleanup process with no adverse conditions. Therefore, the default process rate should be considered an “ideal” process rate, the use of which tends to underestimate costs. All “real world” impediments to the actual cleanup process, such as restricted site access, would act to reduce the rate.

In reality, a process rate reflects the productivity of an entire cleanup crew, which depends on the size, quantity, and efficiency of the heavy equipment used and the types and total amount of waste to be removed.

The various process rates used in the model and ways to make adjustments to them are discussed in detail in Chapter 3 under Schedule C.

CHAPTER 3 USING THE MODEL

This chapter presents background information and general guidance for using the IDEA model. The chapter is divided into the following major sections: (1) hardware and software requirements, (2) getting started, (3) using the **Model Input** worksheet, (4) using the **Adjusting Default Values** worksheet, (5) using the **Cost Summary** worksheet, (6) using the **Tools** worksheet, and (7) the **Do Not Alter** worksheet.

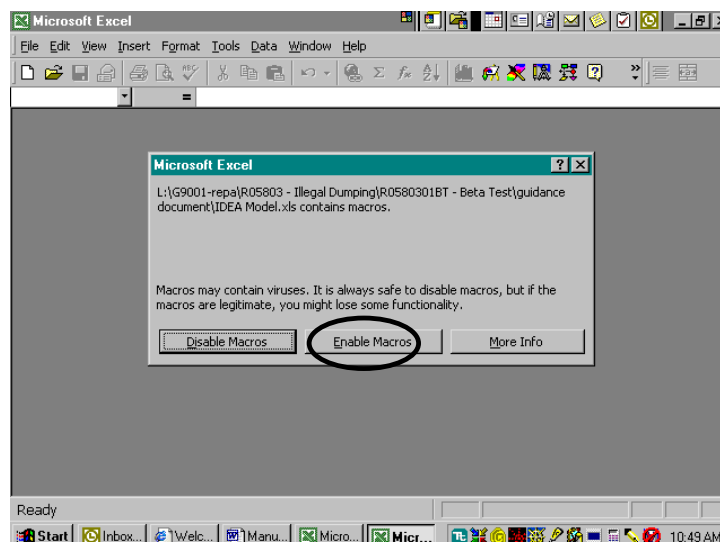
HARDWARE AND SOFTWARE REQUIREMENTS

To operate the IDEA model, you will need to have an IBM-compatible personal computer and Microsoft Excel for Windows 97, Version 5.0 or higher.


The model is in an electronic spreadsheet. You enter information (numbers, equations, or text) into yellow data entry cells. Using an equal (=) sign, you can do quick calculations directly in a data entry cell. For example, if you know that a lot size is 300 by 300 feet, you can quickly enter the square footage in a cell that requests such data. Simply type the following: = 300 * 300 (then press Enter)

GETTING STARTED

Open the Excel software on your computer. Then open the file titled IDEA Model. Before the model is completely operable, an option box will automatically pop up. At this point, you should press the “Enable Macros” button. The spreadsheet will now be open and available for use.

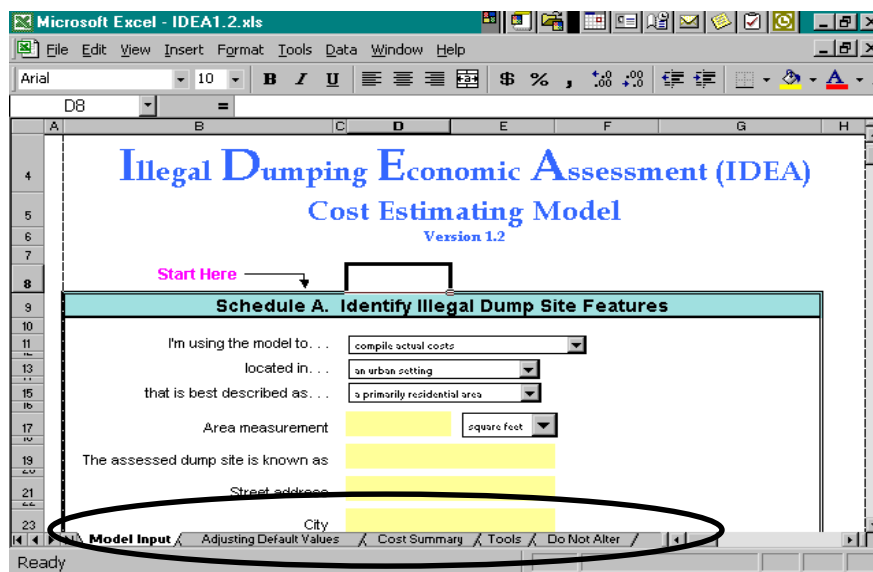


Immediately save this spreadsheet under a different name so that you always have an unchanged copy. Give the new copy a descriptive name, such as the name of the dump site or community you are going to evaluate. Each time you assess a new site, save the spreadsheet under a new file name to avoid overwriting or loss of data on the last site you assessed using the model.



Don't forget to **IMMEDIATELY** save your spreadsheet under a different name. Then frequently save your spreadsheet when entering data.

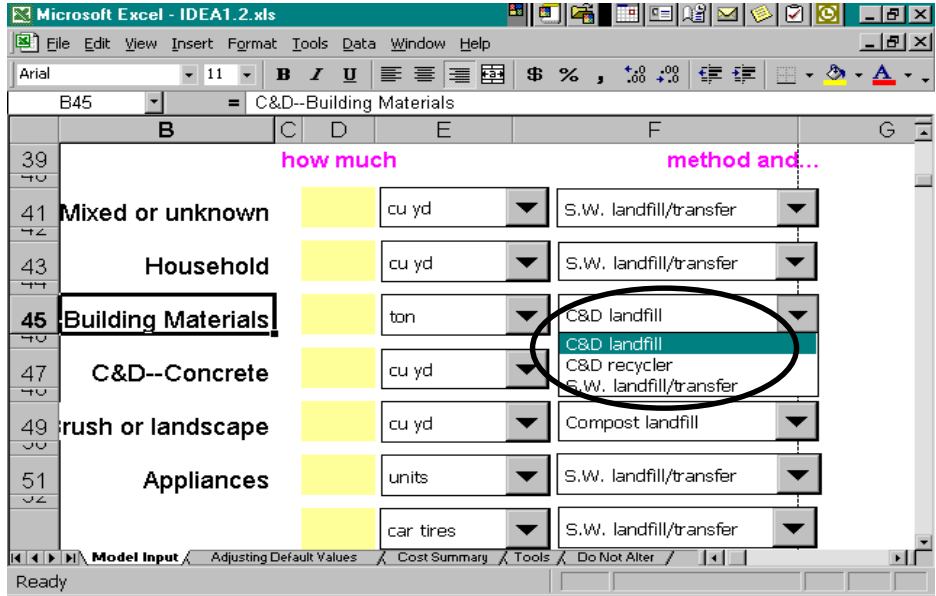
The spreadsheet has five tabs at the bottom titled **Model Input, Adjusting Default Values, Cost Summary, Tools, and Do Not Alter**. Clicking on a tab will open a worksheet in which data can be entered or reviewed. Each worksheet is discussed in detail below. Blank copies of the **Model Input, Adjusting Default Values, and Cost Summary** worksheets are provided in Appendices A through C, respectively.




USING THE MODEL INPUT WORKSHEET

The Model Input worksheet provides the space in which you will enter most of your data. This worksheet is divided into schedules that correspond to the model's parameters (see Chapter 2). The schedules consist of drop-down menus, data entry cells, and color-coded text to help you move through them as follows:

- **Drop-down menus** allow you to push a button to select one of several options, usually a variable, or to switch between the default and manual modes.



- **Data entry cells** are the only cells in which you can enter data and are colored yellow. All other cells are write-protected, so you don't have to worry about accidentally deleting default values or formulas.
- **Instructions** are provided in purple to help guide you through certain sections. Error messages and important information are provided in red text. Total and subtotal costs are highlighted in green cells.



The Model Input worksheet is designed to be intuitive for ease of use. All you need to do is look for the words “**Start Here**” at the top of Schedule A. Then follow the instructions and enter data as you work your way down through each schedule of the worksheet.

For easy reference, the tab(s) along the right margin of the page indicate the schedule(s) discussed on that page.

Schedule A. Identify Illegal Dump Site Features

Schedule A collects general information about the site or sites that you are about to evaluate. This schedule consists of drop-down menus and data entry cells. The general dump site feature information entered here is used in the **Cost Summary** worksheet as well as in several other schedules of the **Model Input** worksheet. If you are using the model's original default values, you must enter your dump site's zip code in Schedule A to automatically adjust the model's “national average” values to your geographic area.

Limitations

The first question in Schedule A asks how you intend to use the model. Your options are to use the model to (1) estimate costs of an individual site, (2) estimate costs of several sites, or (3) compile actual costs. Using the model to estimate costs or compile actual costs for an individual site is fairly straightforward. However, to assess multiple sites, you will need to complete some work outside of the spreadsheet. Your options include the following:

1. Run the model for each individual site and add up the costs (this option is best if you are evaluating only a few sites, or if you are compiling actual costs of several sites):
 - Input data, adjust default values if necessary, and run the model separately for each site
 - Print out the 1-page **Cost Summary** (or the 8-page **Model Input** worksheet) for each site
 - Check the results for double counting of costs among the sites
 - Add up each schedule's total by hand and then input the sums in a separate model for the group of sites

2. Run the model using aggregate waste volume (this option is best if you are assessing a large number of sites):
 - Add up the total waste volume (by type) estimated to be present at all the sites you are evaluating by hand (see note below regarding data collection at multiple sites)
 - Enter the aggregated information in Schedules A and B and review the other schedules for accuracy or additional data input
 - Make necessary adjustments to the process rates to account for smaller sites or multiple mobilizations in a single workday (see Schedule C, Table C-5) and run the model

Schedule B. Select Values for Waste Type, Quantity, and Disposal Method

Schedule B shows the standard waste types that the model assesses. Hazardous wastes are not assessed by the model but are included in this schedule as a precaution so users can be alerted to the actions to take if hazardous wastes are encountered.

This schedule consists of data entry cells for the waste volume and various drop-down menus for selecting the unit of measure, disposal method, and distance to the disposal facility. Purple text guides you through the data entry process.



It is assumed that you have estimated the volume of the waste during an inspection of the illegal dump site or group of sites. You should use a data collection form in the field to organize illegal dump site information.

An example data collection form is provided in Appendix D. However, you are encouraged to create your own data collection form based on the information in the Model Input worksheet flow chart in Appendix E in order to meet your particular needs.

The model allows you to enter the unit of measure that you used when estimating the waste quantity in the field. In Schedule C, the model converts the unit of measure entered to a standard or default unit that is used to calculate costs. Table B-1 shows the values used to convert standard waste types to an average unit.

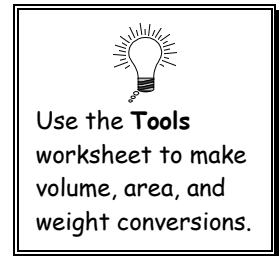
Table B-1. Standard Waste Types and Weight and Volume Conversions Used in Model

Standard Waste Types	Standard or Default Unit	Conversion to an Average Unit	Reference
Mixed or Unknown	cubic yards	700 pounds per cubic yard	1
Appliances	units	177 pounds per appliance	2
Tires	units	21 pounds per car tire, 70 pounds per truck tire, or 45.5 pounds for a variety of tires (the average for car and truck tires)	3
Brush or Landscape	cubic yards	300 pounds per cubic yard	4
Household	cubic yards	225 pounds per cubic yard	5
Construction and Demolition (C&D)—Building Materials	cubic yards	750 pounds per cubic yard	6
C&D—Concrete	cubic yards	2,000 pounds per cubic yard	7
Hazardous	not applicable	See Chapter 2 for a discussion of hazardous wastes.	not applicable

References:

1. CalRecovery, Inc. 1993. "Conversion Factor Study In-Vehicle and In-Place Waste Densities." Report No. 1310. Average of in-truck densities for commercial sector wastes.
2. EPA. 1997. "Measuring Recycling, A Guide for State and Local Governments." Office of Solid Waste and Emergency Response. EPA530-R-97-011. Average weight of a washing machine, clothes dryer, oven/range, refrigerator, and water heater tank.
3. EPA. 1997. Reported values, no averages.
4. EPA. 1997. Rounded average of a weight range for uncompacted grass clippings and leaves.
5. EPA. 1997. Middle of a weight range for uncompacted residential wastes.
6. CalRecovery, Inc. 1993. Average of midrange of in-truck densities for nonconcrete C&D wastes.
7. CalRecovery, Inc. 1993. Reported value, not an average.

C&D waste can vary widely in its weight depending on the specific material involved. The model allows for this variation by providing two C&D categories. C&D—Building Materials assumes that the waste is composed of roofing, siding, wood, or similar "lighter" materials. C&D—Concrete assumes that the waste is composed of concrete, brick, asphalt, metal, or similar "heavier" materials.



Some wastes that may be encountered at an illegal dump site are not included among the model's standard waste types. In general, however, you can include most nonstandard waste types with the Mixed or Unknown waste type. Or you can use your judgment and include a nonstandard waste type with a

standard waste type that has a similar weight (see Table B-1). Just be sure that the nonstandard waste type will be disposed of in the same way as the standard waste type you decided to include it with.

Schedule C. Estimate Site Cleanup Costs

All you need to do in order to quickly estimate site cleanup costs is enter the dump site's zip code in Schedule A and complete Schedule B. You can do this because Schedule C uses a standardized site cleanup method based on the waste type. The model standardizes the heavy equipment, containers, process rate, and labor needed to clean up a site and provides default values for the quantities, time rates, and costs of these items. Drop-down menus and purple text will guide you through Schedule C and its four parts.

Schedule C is divided into four parts. Part 1 allows you to enter a lump sum value for the site cleanup cost (for example, a contractor's estimate) and then go on to Schedule D. Part 2 estimates cleanup costs for the Mixed or Unknown, Household, C&D—Building Materials, C&D—Concrete, and Brush or Landscape waste types. These wastes are assumed to be cleaned up using the same method and at the same process rate. Part 3 estimates cleanup costs for Appliances, and Part 4 estimates cleanup costs for Tires. These wastes are addressed in separate parts because the model uses either different default labor, equipment, or process rate values to calculate cleanup costs for them.

The following sections discuss the default labor, process equipment, term equipment, per unit equipment and process rates used in the model; how to calculate and make changes to the default process rates; how to change default values; how to add just cost values on a line-by-line basis using the manual mode; and some of the limitations of Schedule C.

Default Labor

The model assumes that all cleanup crew members regardless of their duties will be at a site for the same amount of time. The total hours that labor will be needed at a site is a function of the default process rate and the type and volume of waste present. Labor wage rates include direct pay plus any required fringe benefits and overhead but not profit. The model's default labor types and hourly wage rates are summarized in Table C-1.

Table C-1. Default Labor Types and Hourly Wage Rates

Waste Type	Number of Personnel	Labor Type	Hourly Wage Rate
Mixed or Unknown, Household, C&D, and Brush or Landscape	1	Supervisor	\$23.45
	1	Front-end loader operator	\$27.20
	2	Dump truck driver	\$22.10
Appliances and Tires	1	Supervisor	\$23.45
	1	Front-end loader operator	\$27.20
	1	Other worker	\$21.45

Be sure to compare your actual cleanup crew labor makeup to the model's default labor types. If they are similar, you know that the cost estimate will be reasonable. If they are very different in terms of the numbers, types, costs, or efficiencies of personnel, make the necessary spreadsheet modifications using the methods described in the sections of this chapter titled **Changing Process Rates, Changing Default Values, and Manual Mode**.

Default Process Equipment

Process equipment consists of the heavy equipment that will be used to clean up an illegal dump site. The model assumes that all process equipment will be at a site for the same amount of time. The total time that equipment will be needed at a site is a function of the default process rate and the type and volume of waste present. The model's default process equipment types and hourly costs are summarized in Table C-2.

Table C-2. Default Process Equipment Types and Hourly Costs

Waste Type	Number of Equipment Units	Equipment Type	Hourly Cost
Mixed or Unknown, Household, C&D, and Brush or Landscape	1	Front-end loader	\$72.11
	2	20-cubic-yard dump truck	\$59.06
Appliances and Tires	1	Front-end loader	\$72.11

Be sure to compare your actual process equipment types to the model's default equipment types. If they are similar, you know that the cost estimate will be reasonable. If they are very different in terms of the numbers, types, costs, or efficiencies of equipment units, make the necessary spreadsheet modifications using the methods described in the sections of this chapter titled **Changing Process Rates, Changing Default Values, and Manual Mode**.

Term Equipment

Some equipment used during a cleanup will be available only on a daily, weekly, or monthly basis. Equipment that is priced based on the duration of its use is referred to as "term equipment" because it is

used for a specific term or period of time. The model allows you to manually enter the term (such as day, week, or month), the number of equipment units, the length of term (as a number), and the costs of several term equipment options.

Per-Unit Equipment

Per-unit equipment (such as roll-off boxes and other containers) is based on waste volume, or the number of units (such as tires or appliances) that will fit into it, rather than the duration of a cleanup. This equipment is assumed to be at a dump site until it is full at which point it is transported to a disposal facility and another empty unit immediately replaces it.

The default per-unit equipment consists of 40-cubic-yard roll-off containers that are used to accumulate Appliances and Tires. Each container is assumed to cost \$200 and to hold either 50 individual appliance units or 345 tires. The model calculates the number of containers needed based on this assumption. The labor and roll-off truck equipment costs relevant to the drop-off and pick-up of a container is assumed to be included in the waste transport costs of Schedule D.

Default Process Rates

As mentioned in Chapter 2, process rates are the most important variables in the site cleanup cost estimate. The model uses the process rate to determine the length of time that equipment and labor will be needed to clean up the total amount of waste at a dump site. The model converts the amount of waste indicated in Schedule B into a default unit. This value is then divided by the process rate to determine the value in the “Total Hours” column of Schedule C.

The default process rate is calculated based on the waste type and an assumed cleanup process. The Mixed or Unknown, Household, C&D—Building Materials, C&D—Concrete, and Brush or Landscape waste types are assumed to be cleaned up using the same process. Appliances and tires are cleaned up using different processes.

Regardless of the waste type, the default cleanup process is dependent on the type of heavy equipment used to remove wastes at a dump site. Each heavy equipment type is assumed to have a particular capacity that determines the amount of waste that it can handle in one “trip.” A single trip consists of using the equipment to reshape a waste pile, scoop up wastes, transport them to a disposal container, and then return to the waste pile. The model assumes that either a 20-cubic-yard dump truck or a roll-off truck leaves the site as soon as it is full and that an empty 20-cubic-yard dump truck or roll-off container is



The **process rate** is essentially the productivity of your cleanup crew. This productivity is a function of numerous variables, including heavy equipment bucket size, the number of mobilizations made during an 8-hour workday, and dump site logistics. Adjusting the process rate greatly affects the cost estimate, so understanding how this variable changes in the “real world” will allow you to generate better cost estimates.

immediately available at the site. A time per trip is assumed, which is then converted into an hourly rate. Finally, the number of units for each equipment type is assumed to determine the total hourly process rate for the waste type. Table C-3 summarizes how the default process rates were calculated.

Table C-3. Calculation of Default Process Rates by Waste Type

Waste Type	Equipment Type	Equipment Capacity	Time Per Trip	Total Hourly Rate	Number of Equipment Units	Total Process Rate
Mixed or Unknown, Household, C&D, and Brush or Landscape	4-cubic-yard, front-end loader	4 cubic yards	Not applicable	12 to 44 cubic yards per hour observed	1	28 cubic yards per hour
Appliances	4-cubic-yard, front-end loader	1 unit	Every 5 minutes assumed	12 units per hour assumed	1	12 units per hour
Tires	4-cubic-yard, front-end loader	46 tires minus 15% for bounce-out = 40 tires	Every 10 minutes assumed	240 tires per hour assumed	1	240 tires per hour

Figure C-1 illustrates the default labor, default process equipment, and default cleanup processes for the various standard waste types. The corresponding hourly process rates are also shown. Be sure to compare your actual cleanup crew's process rate to the model's default rates. If they are similar, you know that the cost estimate will be reasonable. If they are very different, make the necessary spreadsheet modifications using the methods described in the sections of this chapter titled **Changing Process Rates**, **Changing Default Values**, and **Manual Mode**.

Changing Process Rates

A process rate reflects the productivity of an entire cleanup crew, which depends primarily on the size, quantity, and efficiency of the heavy equipment used; the total volume of waste removed; and site logistics. You can obtain the information needed to calculate your actual response rate either from direct observation or from records (such as timesheets or waste disposal receipts) generated during cleanup operations.



Remember that changing process rates is an optional exercise that will improve cost estimates. All you need to do in order to quickly estimate site cleanup costs is to complete Schedules A and B. If you do not change process rates or default values, Schedule C uses standardized site cleanup values to develop cost estimates.

There are two ways to calculate the actual process rate of your cleanup crew:

1. **If each unit in the entire crew (including both labor and equipment units) worked the same number of hours**, use this formula:

$$\text{Process Rate} = \frac{WQ}{T_1}$$

Where

WQ = Total waste quantity

T₁ = Total hours of any one cleanup crew unit

Example C-1—Calculate Process Rate of Crew with Same Total Unit Hours

Example: Your cleanup crew consisted of three laborers and two pieces of heavy equipment. Based on timesheets, you determine that they each worked 8 hours at an illegal dump site. Based on waste disposal receipts, the crew removed 90 tons of waste. Because each labor and equipment unit was at the site for 8 hours, you would calculate the process rate to be (90/8), which equals 11.25 tons per hour.

2. **If individual crew units worked different numbers of hours**, use this formula:

$$\text{Process Rate} = \frac{\left(\frac{WQ}{L_1} + \dots + \frac{WQ}{L_n} \right)}{n} + \frac{\left(\frac{WQ}{E_1} + \dots + \frac{WQ}{E_n} \right)}{n}$$

2

Where

n = number of labor or equipment units

WQ = total waste quantity (in equivalent units)

L₁...L_n = labor hours of each individual labor unit employed

E₁...E_n = equipment hours of each individual equipment unit employed

Example C-2—Calculate Process Rate of Crew with Varying Total Unit Hours

Example: Your cleanup crew consisted of three laborers and two pieces of heavy equipment. Based on timesheets, you determine that one supervisor and one equipment operator worked at an illegal dump site for 8 hours and that one equipment operator worked at the site for 6 hours. Based on waste disposal receipts, the crew removed 90 tons of waste. To calculate the actual process rate, you would need to average the labor: (90/8 + 90/8 + 90/6) / 3, which equals 12.5 tons per hour. Next, you would average the equipment: (90/8 + 90/6) / 2, which equals 13.125 tons per hour. Finally, you would divide the two results by 2 to get the entire cleanup crew's actual process rate: (12.5 + 13.125) / 2, which equals 12.8 tons per hour.

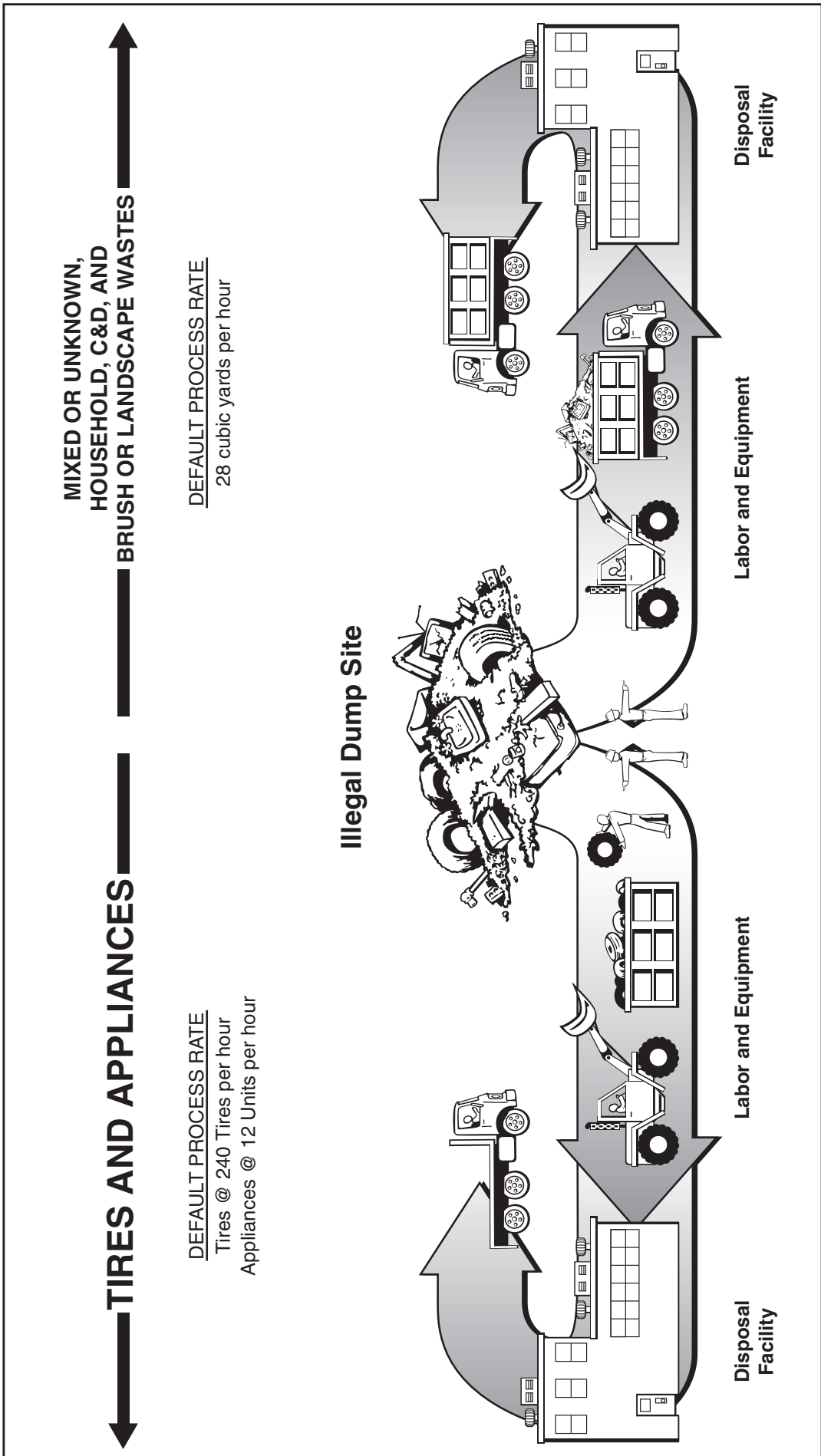


Figure C-1. □ Illustration of the Default Cleanup Crews, and Cleanup Processes and Process Rates for the Standard Waste Types.

If you take the time to measure cleanup crew efficiencies, you will be able to observe their overall productivity and gain a better understanding of the significance of this variable. In addition, you will be able to determine how site conditions and other factors affect productivity, which will allow you to generate better cost estimates.

Based on limited observations of the efficiencies of cleanup crews during model development, the process rate has been found to be affected by three specific variables:

- The bucket size and quantity of the heavy equipment used to load waste into containers
- The number of mobilizations required in an 8-hour workday
- Dump site logistics such as ease of site access, equipment maneuverability, and accessibility of wastes

Tables C-4 and C-5 offer general adjustment factors used to make changes in default process rates (or actual process rates) based on equipment bucket sizes and mobilization factors. However, because site logistics are highly variable from one site to the next, no general adjustment factor guidance is offered for the effects of site logistics on cleanup crew productivity.

Table C-4. Changes in Default Process Rates Based on Equipment Bucket Sizes

Standard Waste Type	Equipment Bucket Size in Cubic Yards	Process Rate
Mixed or Unknown, Household, C&D, and Brush or Landscape	4	28 cubic yards per hour
	3.5	24 cubic yards per hour
	3	21 cubic yards per hour
	2.5	17 cubic yards per hour
Appliances	4	12 units per hour
	3.5	10 units per hour
	3	9 units per hour
	2.5	7 units per hour
Tires	4	240 tires per hour
	3.5	210 tires per hour
	3	180 tires per hour
	2.5	150 tires per hour

Default process rates assume two ½-hour mobilizations for every 8-hour workday, which means that only one site is cleaned up each day. Therefore, the model's default process rates can be affected by

- Additional mobilizations
- A change in mobilization time
- A change in the length of a workday

The percentages presented in Table C-5 can be applied to your actual process rate as well as the model's default process rate.

Table C-5. Changes to Process Rate Based on Multiple Mobilizations

Number of Sites Cleaned Up per 8-Hour Workday	Lower the Process Rate by
1	13% *
2	19%
3	25%
4	31%
5	38%

Note: * For actual process rates only. Do not apply this to the default process rate because it already assumes one site cleanup per day.

This section offers general guidelines for adjusting default and actual process rates. Once you have a process rate that you want to use in place of the default process rate, you can make the necessary spreadsheet modifications using the methods described in the next two sections of this chapter titled **Changing Default Values** and **Manual Mode**.

Changing Default Values

You can generate more accurate cost estimates and conduct cost analyses by collecting and entering actual cost data specific to a site and location. In general, the more data you gather and enter in the model, the more accurate the output will be. For this reason, you are encouraged to (1) identify and measure wastes as accurately as possible; (2) gather specific information on local labor, equipment, and material costs; and (3) become familiar with the extent and characteristics of local illegal dumping prevention and enforcement programs.



In the Adjusting Default Values worksheet, enter the process rate and the labor, equipment, disposal, and other costs you have knowledge of, and then save the file. Now when you open the model, your actual values will be available.


Techniques for overriding or changing default values include the following:

- In Schedule A, localize the “national average” default cost values by entering the illegal dump site’s zip code.
- In the manual mode (see the next section), enter specific costs on a line-by-line basis.

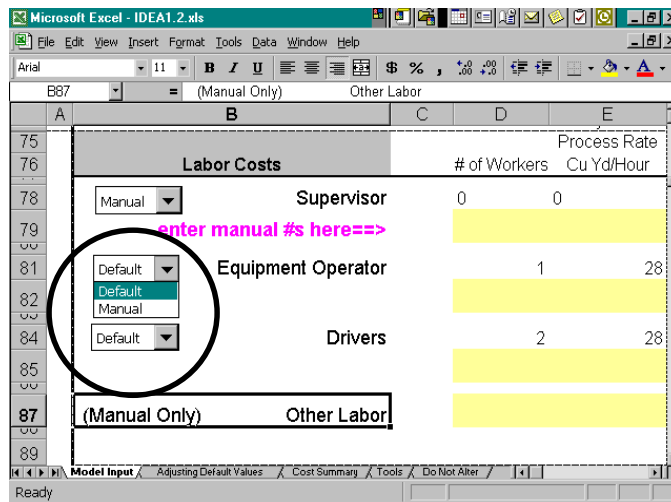
- In the **Adjusting Default Values** worksheet, enter your actual cost values for any or all of the process rate labor, equipment, material, or disposal site default values. This will change the default values used throughout the model, thereby customizing it to your specific circumstances (see the Using the **Adjusting Default Values** Worksheet section later in this chapter).
- For cost estimates generated after 1999, all values can be adjusted using price-inflator indices such as the consumer price index or producer price index (which are available from the U.S. Department of Labor or at various financial web sites). Enter the percentage change in the appropriate data entry cell in Schedule K.
- Use a combination of default and actual costs, depending on which costs are available to you.

Manual Mode

You can adjust cost values on a line-by-line basis using the manual mode. A drop-down menu allows you to select either the default or manual mode for calculating a particular line item value. In the drop-down menu, select Manual. The default value disappears, and an instruction line appears that says “enter manual #s here➡.” The arrow points to a yellow-shaded data entry cell.




If you want to zero out a particular default item, select **Manual** and then do not enter any data.



For line items that have a default or manual option, you can use either the default values or the manual values in the calculation but not a mixture of the two types. This prevents double counting and allows you to switch between the two modes in order to see differences, compare alternatives, and conduct what-if analyses.

Limitations

As a result of the model’s incorporation of a standardized cleanup method, all waste is assumed to be managed by the labor and equipment at a standardized process rate. Thus, the model does not allow for varying rates of processing or for percentages of a particular waste volume being processed at different rates. In reality, the process rate is affected by numerous site-specific and unpredictable variables.




You can use the model to see the differences associated with substituting labor for equipment in the cleanup phase. Use the model to help you decide whether to purchase or rent capital equipment (for example, if you have a large volume of waste and are considering purchasing or renting a particular piece of equipment—say a shredder for tires).

For manual entries, the model does not calculate the “length of term” values for term equipment. This is the case because the basis for the term can depend on more than one variable (such as the length of time needed for waste cleanup and the waste volume).

Schedule D. Estimate Waste Transport Costs

Waste transport typically involves a per load charge, may involve a per mile charge, and can involve other fees when the waste is handled by hauling and cartage companies. However, the model assumes that waste transport will incur labor costs and equipment charges based on the time required for a round trip from the illegal dump site to the disposal facility.



Schedules D and E are fully automated in the Default mode. As a result, you should check all values to see whether you agree with them. Use the **Manual Mode** or **Adjusting Default Values** worksheet to make any changes to transport and disposal costs to reflect local conditions.

The Hours Per Load charge depends on whether you selected the “Near” or “Far” button for the distance to the disposal facility in Schedule B. The “Near” category assumes a 2-hour round trip, and the “Far” category assumes a 4-hour round trip. The combined labor and equipment hourly rate is \$81.16. The total cost per load is presented in Table D-1.

Table D-1. Calculation of Default Waste Transport Costs

Disposal Facility Distance	Round-Trip Duration	Combined Labor and Equipment Total Cost
Near	2 hours	\$162.32
Far	4 hours	\$324.64

Schedule E. Estimate Disposal Costs

Disposal costs are based on either the total weight or total volume of the wastes being disposed of and the disposal method you selected in Schedule B. The model calculates disposal costs as indicated in Table E-1.

Table E-1. Default Disposal Facility Costs

Disposal Facility	Cost per Ton
Solid waste landfill or transfer station	\$37.00
Solid waste incinerator	\$40.00
C&D landfill	\$42.00
C&D recycler	\$28.00
Compost landfill	\$20.00
Metal recycler	\$22.00
Tire recycler	\$26.00
Tire incinerator	\$31.00

A column titled "Waste Total (in cu yds)" is provided for manual entries.



The model allows you to change the amount of waste present at an illegal dump site in order to see the impact on costs. To do this, when you have completed all the schedules, save your work and print out the Cost Summary. Then vary the amount of waste or select a different disposal facility and print out a new Cost Summary. **If you do not want to lose your original data**, do not save the new information unless you do so under a new file name.

Limitations

You cannot divide the amount of a single waste type among different disposal methods (for example, half the tires at a site go to a recycler and the other half to an incinerator).

If you do not expect to incur disposal costs for wastes that have been cleaned up, you can adjust the waste totals using the manual mode. To do this, look at the Waste Total amount calculated by the model and subtract the value of the materials not disposed of. Then enter the new Waste Total value and the disposal costs using the manual mode.

Schedule F. Estimate Site Restoration and Security Costs

After a site has been cleaned up, the model can estimate certain site restoration and security costs. However, the model does not automatically calculate such costs. Most of the variables needed to calculate these costs must be entered manually because the variables are highly site-specific. However, the model does provide a few default unit cost values, which are presented in Table F-1.

Table F-1. Calculation of Default Site Restoration and Security Costs

Activity	User Input Needed	Model Default Cost
Grading	square feet (area)	Costs of front-end loader labor (\$32.40) and equipment (\$46.65) operating at a rate of 3,000 square feet per hour
Fencing	linear feet number of gates	\$30 per linear foot of fencing \$250 per gate
Barrier installation (as an alternative to fencing)	linear feet	\$28 per linear foot
Sign installation	linear feet	1 sign for every 100 linear feet at \$48 per sign
Police surveillance (short-term)	hours	None

Grading of a site would be required after removal of wastes if uneven terrain or soil piles existed and you think it would be desirable to level the terrain in order to make the property more salable or less attractive as an illegal dump site. This activity is assumed to consist of using a front-end loader (assumed to be already on site) to level the site at a rate of 10 minutes per 300 square feet (or for rough grading, at a rate of 190 square yards per hour). Using the front-end loader default values, the model calculates the labor and equipment costs if a square-foot area is provided. You can also manually enter additional activities associated with site restoration such as seeding, demolition, or infrastructure improvement.

Fencing of a site would be required to completely limit access to the site. The fencing is assumed to consist of posts, 10-foot-tall cyclone fencing, and a number of 10-foot-wide gates selected by the user. The model calculates the labor and equipment costs if the linear feet of fencing needed to surround the site is provided.

As an alternative to fencing, solid barriers could be installed across site access points. These barriers are assumed to consist of concrete barricades typically used at highway construction sites. The model assumes that users will incur barrier purchase, transport, and installation costs, and the model calculates the costs if the linear feet to be covered is provided.

Signs are needed to indicate that no dumping is allowed at a site. If you have estimated costs for fencing or barriers, the model assumes installation of one sign per 100 linear feet covered. The model applies this

rate to the total linear feet value that you provided. The model calculates the costs of the labor and materials needed to install signs. To bypass the automatic assumption of one sign every 100 linear feet, you can manually input the total number of signs desired.

Limitations

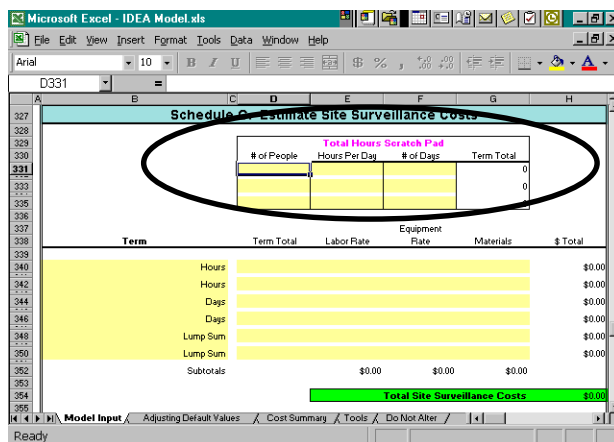
Default values do not reflect economies of scale that are likely to apply at larger sites. During an actual large-scale cleanup, the cost per unit tends to decrease as more units are purchased. The model, however, calculates the site restoration costs regardless of site size.

Schedule G. Estimate Site Surveillance Costs

Site surveillance costs are future direct costs that may be incurred. You should estimate these costs if police surveillance is desired to catch illegal dumpers at heavily used sites or if you want to quantify the value of community surveillance.

The model will calculate site surveillance costs if you provide the term, labor rate, equipment rate, and material costs applicable to this activity. Costs can be estimated depending on the term (the duration of the surveillance in either hourly, daily, or total terms). The model does not automatically calculate these costs and does not provide default cost values.

You can estimate the total number of hours (manhours) or the number of days using the **Total Hours Scratch Pad** imbedded in the model. Here you can enter the number of people to be used, the number of hours per day that they will work, and the number of days that they will work to calculate the hourly term total. You can also enter only the number of people and the hours to be worked per day to get a daily term total.



Once the term total is calculated, you can apply an appropriate loaded labor dollar rate and an equipment dollar rate in the hourly or daily term rows. Types of surveillance equipment used may include video and night vision cameras. Your equipment rate is a rental, lease, or operating expense rate. If equipment rates are available only on a daily or lump sum basis, enter these costs in the corresponding row.

Limitations

Schedule G is best used to estimate site surveillance costs for a single illegal dump site. If you wish to calculate such costs for a number of sites, you should enter the data in Schedule I.

Only two lines are provided for each term. Therefore, if you have a variety of dollar rates, you should use the model scratch pad to calculate the total number of hourly, daily, or lump sum terms one at a time.

Once you have several totals, add them together, enter the sum in the appropriate column of the lump sum row, and enter a 1 in the “Term Total” column.

Example G-1—Using the Site Surveillance Scratch Pad

Example: You might have four people monitoring a site, each with a different labor rate and a different term total. Calculate the “\$ Total” for each person individually, and jot down the value on a piece of paper. Then add up the “\$ Total” values, enter this lump sum value in the “Labor Rate” cell, and enter a 1 in the “Term Total” cell.

Schedule H. Assess Property Liabilities

One of the greatest impacts of illegal dumping is on the value of real estate, and estimating its effects on a property’s value is highly desirable. The real estate market, however, is extremely intricate and is affected by numerous economic, geographic, and aesthetic factors. Thus, it is difficult to simplify the estimation process and still produce significant results. Therefore, the model should be used to make comparative analyses in order to assess how an illegal dump site may affect property values as well as to tally any other identified liabilities.



Generating an estimate in Schedule H does not constitute fulfillment of general obligations to identify impairments, liens, or other liabilities associated with a particular property (known as due diligence). However, if you have conducted due diligence, enter your findings in this schedule, and type “Yes” in the appropriate data entry box.

Schedule H summarizes certain property and waste information entered earlier in the Model Input worksheet and allows you to compile comparable real estate values. Because of the real estate market’s intricacies, you should consult real estate professionals as you assess property value effects and draw conclusions.

Schedule I. Estimate Program Administrative Costs

Program administrative costs include the labor, equipment not covered in other schedules, and material costs incurred in an effort to combat illegal dumping. Typical program administrative costs include costs for salaried staff, dedicated equipment, office space, printed materials, and the time to run the model. The model allows you to provide lump sum values for up to seven individual costs.



The actual dollar values that you enter in Schedule I will depend on whether you are using the model to (1) estimate costs for an individual site, (2) estimate costs for several sites, or (3) compile actual costs. You will have made this determination in answering the first question in Schedule A.

Type in a name for the cost item being estimated. Enter a quantity value for the item. Then enter the cost value in the appropriate columns. The model provides sums broken down by labor, equipment, and material costs and also calculates the total dollar value for all costs.

Limitations

The specific values that you enter in Schedule I will depend on how you answered the first question in Schedule A. For example, if you are using the model to estimate costs for a single illegal dump site, you should enter prorated administrative costs or specific hourly administrative costs relevant to the site. Keep this in mind to avoid double counting of program administrative costs.

Schedule J. Estimate Offsetting Costs

Certain factors associated with illegal dump sites can offset their costs. These factors include (1) civil penalties collected, (2) public grants and private donations aimed at reducing illegal dumping, and (3) efforts of the community or volunteers. The model allows you to provide lump sum values for these factors. The model considers any value calculated in Schedule J to be a debit against the total costs estimated in the **Model Input** worksheet and will subtract this value from the total cost.

Civil Penalties: The dollar value of civil penalties can be entered if you know that the offending party has been identified and the fines have been paid. Community service hours can also be considered if the service performed involved litter removal or anti-illegal dumping activities.

Grants and Private Donations: Funds are available to support illegal dumping programs and can be from either public or private sources.

Community and Volunteer Efforts: Volunteers provide community service that is not always valued in dollar terms. The model allows you to consider the hours that volunteers provide as offsetting labor costs associated with site cleanup or as a lump sum offsetting administrative costs.



You can assess the economic impact of volunteer efforts in dollar terms based on costs avoided.

Schedule K. Adjustments to Default Cost Values

Default cost values reflect national averages of prices in 1999 dollars. As such, they are geographically neutral, and they are subject to inflation.

Default cost values will be automatically adjusted for your geographic location if you entered a zip code in Schedule A.

To adjust default cost values for inflation, look up the implicit price deflator figures (or other applicable inflation rates) published by the U.S. Department of Labor available on line at <http://stats.bls.gov:80/eag/eag.map.htm>. Enter the percent increase that you want to use in the available data entry cell and the corresponding year. The model will update all default values accordingly. You can also use this area of Schedule K to adjust default costs by a specific percentage in order to conduct a contingency analysis.

USING THE ADJUSTING DEFAULT VALUES WORKSHEET

The default cost values used in the IDEA model are considered to be national averages and should be adjusted to reflect local conditions whenever possible.

The **Adjusting Default Values** worksheet provides tables of all the default values used in the model categorized by process rates, labor costs, equipment costs, material costs, and disposal facility costs (see Appendix B). The tables allow you to enter your own values in the yellow data entry cells, and your values then replace the default values in the appropriate **Model Input** schedules and formulas. This process allows you to customize the model according to your local labor and equipment costs and process rates.



Once you have entered your actual costs in the **Adjusting Default Values** worksheet, save the file before entering specific illegal dump site information. Now when you use the IDEA model, you will have a customized model that better reflects local labor and equipment costs and process rates.

In addition, the model's default cost values can be changed if you enter a value in the Annual Inflation Rate cell in Schedule K. You would do so to update default values for the years beyond 1999. The price inflator feature applies only to the model's original default values and will not affect any actual values entered by you.

USING THE COST SUMMARY WORKSHEET

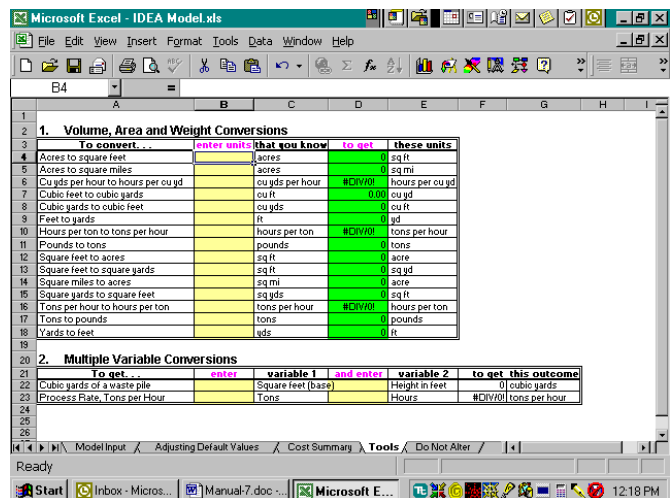
The **Cost Summary** worksheet is a financial statement of the costs entered in the Model Input worksheet, and no user input to this worksheet is necessary. When you have worked completely through the Model Input worksheet, press the Cost Summary tab to view and print the **Cost Summary** worksheet (see Appendix C).

The **Cost Summary** worksheet may display error messages if your **Model Input** worksheet has simple errors. For example, if you indicated that a lump sum is available for transport costs but you do not enter a lump sum in the correct data entry cell, an error message will describe the error and where to go in order to view or fix it.

USING THE TOOLS WORKSHEET

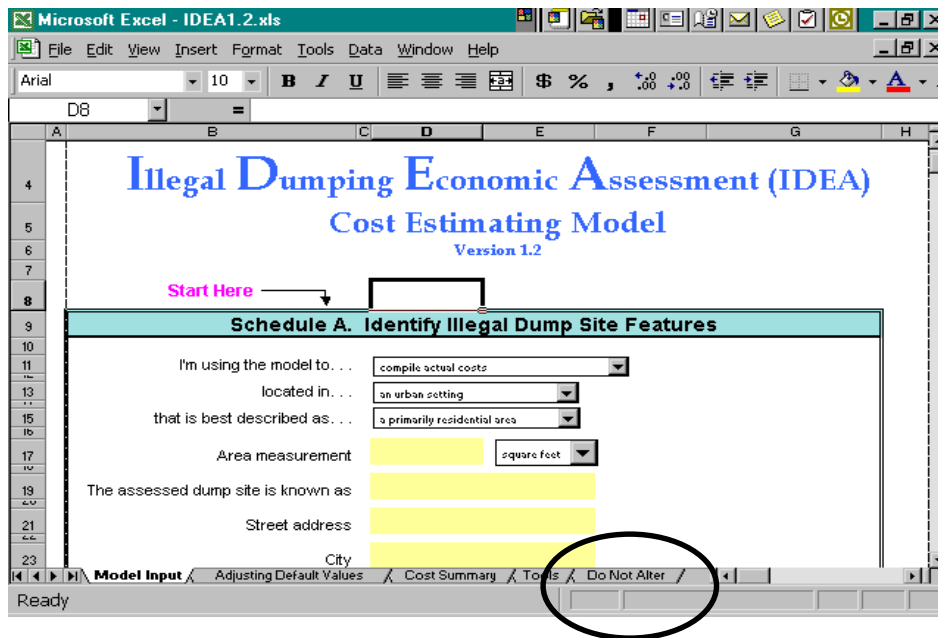
The **Tools** worksheet provides two conversion tables in a spreadsheet format. As with the **Model Input** worksheet, purple text guides you to enter the necessary values in yellow cells. The first **Tools** table allows you to convert area, volume, and weight measurements. The column headings are written in a conversational style to help guide you through the process.

The second **Tools** table allows you to make calculations for expressions with multiple variables, such as tons per hour. The column headings are written in a conversational style to help guide you through the process. Enter the variables that you know in the second and fourth columns to get the outcome described in the seventh column. All other columns contain unit titles.



THE DO NOT ALTER WORKSHEET

The **Do Not Alter** worksheet contains the inner workings of the model's other worksheets. The **Do Not Alter** worksheet is write-protected to prevent you from accidentally altering the model, and in general, you should ignore this worksheet.



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APPENDIX A
MODEL INPUT WORKSHEET
(Eight Pages)

Illegal Dumping Economic Assessment (IDEA) Cost Estimating Model

Version 1.2

Start Here →

Schedule A. Identify Illegal Dump Site Features	
I'm using the model to . . .	<input type="text" value="estimate costs of an individual site"/>
located in . . .	<input type="text" value="an urban setting"/>
that is best described as . . .	<input type="text" value="an abandoned/vacant lot"/>
Area measurement	<input type="text" value="square feet"/>
The assessed dump site is known as	<input type="text" value=""/>
Street address	<input type="text" value=""/>
City	<input type="text" value=""/>
County	<input type="text" value=""/>
State	<input type="text" value=""/>
Zip Code	<input type="text" value=""/>
Date Evaluated	<input type="text" value=""/>

Schedule B. Select Values for Waste Type, Quantity, and Disposal Methods				
	1.	2.	3.	4.
For each waste type:	Enter how much	Select unit	Select a disposal method and...	distance to the disposal facility
Mixed or unknown	<input type="text" value=""/>	cu yd <input type="text"/>	S.W. landfill/transfer <input type="text"/>	near <input type="text"/>
Household	<input type="text" value=""/>	cu yd <input type="text"/>	S.W. landfill/transfer <input type="text"/>	near <input type="text"/>
C&D--Building Materials	<input type="text" value=""/>	ton <input type="text"/>	C&D landfill <input type="text"/>	near <input type="text"/>
C&D--Concrete	<input type="text" value=""/>	cu yd <input type="text"/>	C&D landfill <input type="text"/>	near <input type="text"/>
Brush or landscape	<input type="text" value=""/>	cu yd <input type="text"/>	Compost landfill <input type="text"/>	near <input type="text"/>
Appliances	<input type="text" value=""/>	units <input type="text"/>	S.W. landfill/transfer <input type="text"/>	near <input type="text"/>
Tires	<input type="text" value=""/>	various tires <input type="text"/>	Tires recycler <input type="text"/>	near <input type="text"/>
Hazardous waste	<input type="text" value=""/>	drums <input type="text"/>		

Schedule C. Estimate Site Cleanup Costs

Schedule C, Part 1

(for lump sum)

1. Do you have a lump sum for the cleanup? ▼

Then go on to Part 2 of this Schedule

Schedule C, Part 2. Cleanup Costs for the Following Waste Types

Mixed or unknown	0.0	Waste not present
Household	0.0	Waste not present
C&D--Building Materials	0.0	Waste not present
C&D--Concrete	0.0	Waste not present
Brush or landscape	0.0	Waste not present
Total	0.0 cubic yards	

Labor Costs		# of Workers	Process Rate Cu Yd/Hour	Total Hours	\$ per hour	Total
Default ▼	Supervisor	1	28	0.0	\$23.45	\$0.00
				0.0		-
Default ▼	Equipment Operator	1	28	0.0	\$27.20	\$0.00
				0.0		-
Default ▼	Drivers	2	28	0.0	\$22.10	\$0.00
				0.0		-
(Manual Only)	Other Labor			0.0		-
Labor Subtotal						\$0.00

Process Equipment Costs		Quantity	Process Rate Cu Yd/Hour	Total Hours	\$ Per Hour	Total
Default ▼	Dump Truck	2	28	0.0	\$59.06	\$0.00
				0.0		-
Default ▼	Front-end Loader (4 cy)	1	28	0.0	\$72.11	\$0.00
				0.0		-
(Manual Only)	Compactor			0.0		\$0.00
(Manual Only)	Other Equipment			0.0		\$0.00

Term Equipment Costs		Term (Day, Wk, Mo)	# of Equipment Units	Length of Term	\$ Per Unit Per Term	Total
(Manual Only)	Compactor					\$0.00
(Manual Only)	Shredding Equipment					\$0.00
(Manual Only)	40-cu yd Container					\$0.00
(Manual Only)	Other Term Equipment					\$0.00
Equipment Subtotal						\$0.00

Schedule C, Part 3. Cleanup Costs by the Following Waste Type

Appliances	0	Waste not present
Total	0	

Labor Costs		# of Workers	Process Rate Units Per Hour	Total Hours	\$ per hour	Total
Default ▼	Supervisor	1	12	0.0	\$23.45	\$0.00
				0.0		-
Default ▼	Equipment Operator	1	12	0.0	\$27.20	\$0.00
				0.0		-
Default ▼	Other Worker	1	12	0.0	\$21.45	\$0.00
				0.0		-
(Manual Only)	Other Labor			0.0		\$0.00
Labor Subtotal						\$0.00

Process Equipment Costs		Quantity	Process Rate Units Per Hour	Total Hours	\$ Per Hour	Total
Default ▼	Front-end Loader (4 cy)	1	12	0.0	\$72.11	\$0.00
				0.0		-
(Manual Only)	Crusher or Grinder			0.0		\$0.00

Per Unit Equipment Costs		Units Per Container	Total Containers	Cost per Container	Total
Default ▼	40-cubic yard Container	50	0	\$200.00	\$0.00
			0		-
(Manual Only)	Other Container		0		\$0.00

Term Equipment Costs		Term (Day, Wk, Mo)	# of Equipment Units	Length of Term	\$ Per Unit Per Term	Total
(Manual Only)	Crusher or Grinder					\$0.00
(Manual Only)	Other Container					\$0.00
(Manual Only)	Other Term Equipment					\$0.00
Equipment Subtotal						\$0.00

Schedule C, Part 4. Cleanup Costs by the Following Waste Type

Tires	0 tires	Waste not present
Total	0 tires	

Labor Costs		# of Workers	Process Rate Units Per Hour	Total Hours	\$ per hour	Total
Default ▼	Supervisor	1	240	0.0	\$23.45	\$0.00
				0.0		-
Default ▼	Equipment Operator	1	240	0.0	\$27.20	\$0.00
				0.0		-
Default ▼	Other Worker	1	240	0.0	\$21.45	\$0.00
				0.0		-
(Manual Only)	Other Labor			0.0		\$0.00
Labor Subtotal						\$0.00

Process Equipment Costs		Quantity	Process Rate Units Per Hour	Total Hours	\$ Per Hour	Total
Default ▼	Front-end Loader (4 cy)	1	240	0.0	\$72.11	\$0.00
				0.0		-
(Manual Only)	Shredder			0.0		\$0.00

Per Unit Equipment Costs		Units Per Container	Total Containers	Cost per Container	Total
Default ▼	40-cubic yard Container	345	0	\$200.00	\$0.00
			0		-
(Manual Only)	Other Container		0		\$0.00

Term Equipment Costs		Term (Day, Wk, Mo)	# of Equipment Units	Length of Term	\$ Per Unit Per Term	Total
(Manual Only)	Shredder					\$0.00
(Manual Only)	Other Container					\$0.00
(Manual Only)	Other Term Equipment					\$0.00
Equipment Subtotal						\$0.00

Schedule D. Estimate Waste Transport Costs

(for lump sum)

Do you have a lump sum for waste transport costs?

no

Review this Schedule for accuracy.

Waste Type	# of Loads	Hours per Load	Hourly Labor	Hourly Equipment	Total
Default <input type="checkbox"/> Mixed or unknown	0	2.0	\$22.10	\$59.06	\$0.00
Default <input type="checkbox"/> Household	0	2.0	\$22.10	\$59.06	\$0.00
Default <input type="checkbox"/> C&D--Building Materials	0	2.0	\$22.10	\$59.06	\$0.00
Default <input type="checkbox"/> C&D--Concrete	0	2.0	\$22.10	\$59.06	\$0.00
Default <input type="checkbox"/> Brush or landscape	0	2.0	\$22.10	\$59.06	\$0.00
Default <input type="checkbox"/> Appliances	0	2.0	\$22.10	\$59.06	\$0.00
Default <input type="checkbox"/> Tires	0	2.0	\$22.10	\$59.06	\$0.00
Total Transport Costs					\$0.00

Schedule E. Estimate Disposal Costs

(for lump sum)

Do you have a lump sum for disposal costs?

no

Review this Schedule for accuracy.

Disposal Method	Waste Total (in cu yds)	Waste Total (in tons)	\$ Per Unit	Total
Default <input type="checkbox"/> Solid Waste Landfill		0.0	\$37.00	\$0
Default <input type="checkbox"/> Solid Waste Incinerator		0.0	\$40.00	\$0
Default <input type="checkbox"/> C&D Landfill		0.0	\$42.00	\$0
Default <input type="checkbox"/> C&D Recycler		0.0	\$28.00	\$0
Default <input type="checkbox"/> Compost Landfill		0.0	\$20.00	\$0
Default <input type="checkbox"/> Metals Recycler		0.0	\$22.00	\$0
Default <input type="checkbox"/> Tire Recycler		0.0	\$26.00	\$0
Default <input type="checkbox"/> Tire Incinerator		0.0	\$31.00	\$0
Total Disposal Costs				\$0

Schedule F. Estimate Site Restoration and Security Costs

Site Restoration		Area in Square Feet	Square Feet Per Hour	Equipment \$ Per Hour	Labor \$ Per Hour	Total
Default ▼	Grading		3,000	\$46.65	\$32.40	\$0.00
(Manual Only)	Reseeding					\$0.00
(Manual Only)	Infrastructure Improvements					\$0.00
Site Security		# of Gates	\$ per Gate	Barrier Linear Feet	\$ Per Linear Foot	Total
Default ▼	Fencing		\$250.00		\$30.00	\$0.00
Default ▼	Concrete Traffic Barrier				\$28.00	\$0.00
(Manual Only)	Other Barrier					\$0.00
Signs and Other Items		# Automatic	# Manual	\$ Per Unit	Total	
	Signs	0		\$ 48.00	\$0.00	
	Other Items (quantity and price)				\$0.00	
Total Site Restoration and Security Costs						\$0.00

Schedule G. Estimate Site Surveillance Costs

Term		Term Total	Labor Rate	Equipment Rate	Materials	\$ Total
	Hours					\$0.00
	Hours					\$0.00
	Days					\$0.00
	Days					\$0.00
	Lump Sum					\$0.00
	Lump Sum					\$0.00
	Subtotals		\$0.00	\$0.00	\$0.00	
Total Site Surveillance Costs						\$0.00

Schedule H. Assess Property Liabilities

Property Characterization	an urban setting				
	an abandoned/vacant lot				
Size	0 square feet				
Amount of Wastes Present	0 tons				
Estimated Cleanup and Disposal Costs	\$0.00				
Is the property tax delinquent?	no	<input type="button" value="v"/>			
Has due diligence been conducted?	<input type="text"/>				
Other Property Liability (in \$)	<input type="text"/>				
Other Property Liability (in \$)	<input type="text"/>				

Real Estate Comparable Values	Property in Square Feet	Lot Value \$ Per Sq Ft	Nearby Lot Value \$ Per Sq Ft	Net Difference* \$ Per Sq Ft	Total*
Use the two lines if you are comparing several properties					
Line 1	<input type="text"/>			\$0.00	\$0
Line 2	<input type="text"/>			\$0.00	\$0
*A negative number implies a depressed market value due to presence of dump.					
Total Property Liabilities					\$0

Schedule I. Estimate Program Administrative Costs

Cost Item	Quantity	Labor	Equipment	Materials	\$ Total
Type in a name for each cost item below					
Item 1	<input type="text"/>				\$0.00
Item 2	<input type="text"/>				\$0.00
Item 3	<input type="text"/>				\$0.00
Item 4	<input type="text"/>				\$0.00
Item 5	<input type="text"/>				\$0.00
Item 6	<input type="text"/>				\$0.00
Item 7	<input type="text"/>				\$0.00
		\$0.00	\$0.00	\$0.00	
Total Program Administrative Costs					\$0.00

Schedule J. Estimate Offsetting Costs

	Lump Sum \$ Value
Civil Fines Paid	<input type="text"/>
Grants or Donations	<input type="text"/>
Community/Volunteer Support	<input type="text"/>
Total Offsetting Costs	\$0.00

Schedule K. Adjustments to Default Cost Values	
	% Change
Default process rates (negative to slow down)	<input type="text"/>
Enter an annual inflation rate	<input type="text"/>
and enter the current year	<input type="text"/>
Geographic location affects default values	#N/A
Round costs in the Cost Summary to nearest...	\$100 <input type="text"/>

You're done with the estimate. Print out this Worksheet to check your entries. Go to the Cost Summary and print out the cost summary.

APPENDIX B

ADJUSTING DEFAULT VALUES WORKSHEET

(One Page)

To first adjust model's default values for inflation, go to Schedule K.
 If you want to replace default values with your own actual values, enter them in the yellow boxes.
 The IDEA Model will use those values in the Default mode.
 You can use a mix of default values and your own values.
 You will also be able to use the Manual mode to affect line item costs in the IDEA Model Schedules.

Process Rates	Model Default Values	Enter Your Default Values	Schedules That Values Apply To
Mixed, unknown, household, C&D, brush or landscape wastes (cu. yd./hr.)	28		Schedule C, Part 2, Labor and Equipment
Appliances (units/hr.)	12		Schedule C, Part 3, Labor and Equipment
Tires (units/hr.)	240		Schedule C, Part 4, Labor and Equipment
Grading (sq. ft/hr.)	3,000		Schedule F, Site Restoration

Labor (\$/Hr.)	Model Default Values*	Enter Your Default Values	Schedules That Values Apply To
Supervisor	\$ 23.45		Schedule C, Parts 2, 3 and 4
Front-End Loader Operator	\$ 27.20		Schedule C, Parts 2, 3 and 4
Dump Truck Driver	\$ 22.10		Schedule C, Parts 2, 3 and 4
Other Worker	\$ 21.45		Schedule C, Parts 3 and 4
Grader Operator	\$ 32.40		Schedule F, Site Restoration

Equipment	Model Default Values*	Enter Your Default Values	Schedules That Values Apply To
Dump Truck (\$/hr.)	\$ 59.06		Schedule C, Parts 2, 3 and 4
4-cu. yd. Front-End Loader (\$/hr.)	\$ 72.11		Schedule C, Parts 2, 3 and 4
Grader (\$/hr.)	\$ 46.65		Schedule F, Site Restoration
40-cu. yd. Dumpster (each)	\$ 200.00		Schedule C, Parts 2, 3 and 4, "Per Unit Equipment Costs"

Materials	Model Default Values*	Enter Your Default Values	Schedules That Values Apply To
Fence Gates (each)	\$ 250.00		Schedule F, Site Security
Fence (\$ per linear ft.)	\$ 30.00		Schedule F, Site Security
Traffic Barrier (\$ per LF)	\$ 28.00		Schedule F, Site Security
Signs (incl. Labor & Materials)	\$ 48.00		Schedule F, Signs and Other Items

Disposal Facilities (\$/ton)	Model Default Values*	Enter Your Default Values	Schedules That Values Apply To
Solid Waste Landfill/Transfer Sta.	\$ 37.00		Schedule E
Solid Waste Incinerator	\$ 40.00		Schedule E
C&D Landfill	\$ 42.00		Schedule E
C&D Recycler	\$ 28.00		Schedule E
Compost Landfill	\$ 20.00		Schedule E
Metals Recycler	\$ 22.00		Schedule E
Tire Recycler	\$ 26.00		Schedule E
Tire Incinerator	\$ 31.00		Schedule E

**In 1999 Dollars*

APPENDIX C
COST SUMMARY WORKSHEET
(One Page)

ILLEGAL DUMPING ECONOMIC ASSESSMENT (IDEA) MODEL

Cost Estimate of an Individual Site*

Unknown County

Date Printed 8/28/00
Date Evaluated 01/00/00

Illegal Dump Site Features

Unknown square feet of an abandoned/vacant lot in an urban setting.

Waste Quantities and Types

-	Mixed or unknown	0	Brush or landscape
-	Household	0	Appliances
-	C&D--Building Materials	0	Tires
-	C&D--Concrete		

Cleanup, Waste Transport, and Disposal Costs:

Cleanup Costs

Total Labor Costs	\$0	
Total Equipment Costs	\$0	
Subtotal		\$0

Waste Transport Costs \$0

Disposal Costs \$0

Total Cleanup, Transport, and Disposal Costs \$0

Post-Cleanup Costs:

Site Restoration and Security Costs \$0

Site Monitoring Costs

Labor	\$0	
Equipment	\$0	
Materials	\$0	
Subtotal		\$0

Total Post-Cleanup Costs \$0

Other Direct and Indirect Costs:

Net Property Liabilities¹ \$0

Program Administrative Costs

Labor	\$0	
Equipment	\$0	
Materials	\$0	
Subtotal		\$0

Total Other Direct and Indirect Costs \$0

Offsetting Costs²: \$0

Total Illegal Dumping Cost Estimate **\$0**

* Costs rounded to the nearest \$100

¹ These costs are highly variable; completion of this section does not constitute due diligence.

² This value from Schedule J is treated as a debit against total costs.

APPENDIX D

EXAMPLE DATA COLLECTION FORM

(One Page)

Data Collector _____

Date _____

Site Location _____

Property is accessible on (circle one) 1 2 3 4 sides

Property area _____ Percentage requiring grading and restoration _____%

Estimated number of tires _____ Estimated number of appliances _____

Estimated waste quantity (circle one) 1-5 5-40 40-240 >240 cy

Percentages of waste quantity

Mixed or unknown _____%

Household _____%

C&D – Building materials _____%

C&D – Concrete _____%

Brush or Landscape _____%

Site Location _____

Property is accessible on (circle one) 1 2 3 4 sides

Property area _____ Percentage requiring grading and restoration _____%

Estimated number of tires _____ Estimated number of appliances _____

Estimated waste quantity (circle one) 1-5 5-40 40-240 >240 cy

Percentages of waste quantity

Mixed or unknown _____%

Household _____%

C&D – Building materials _____%

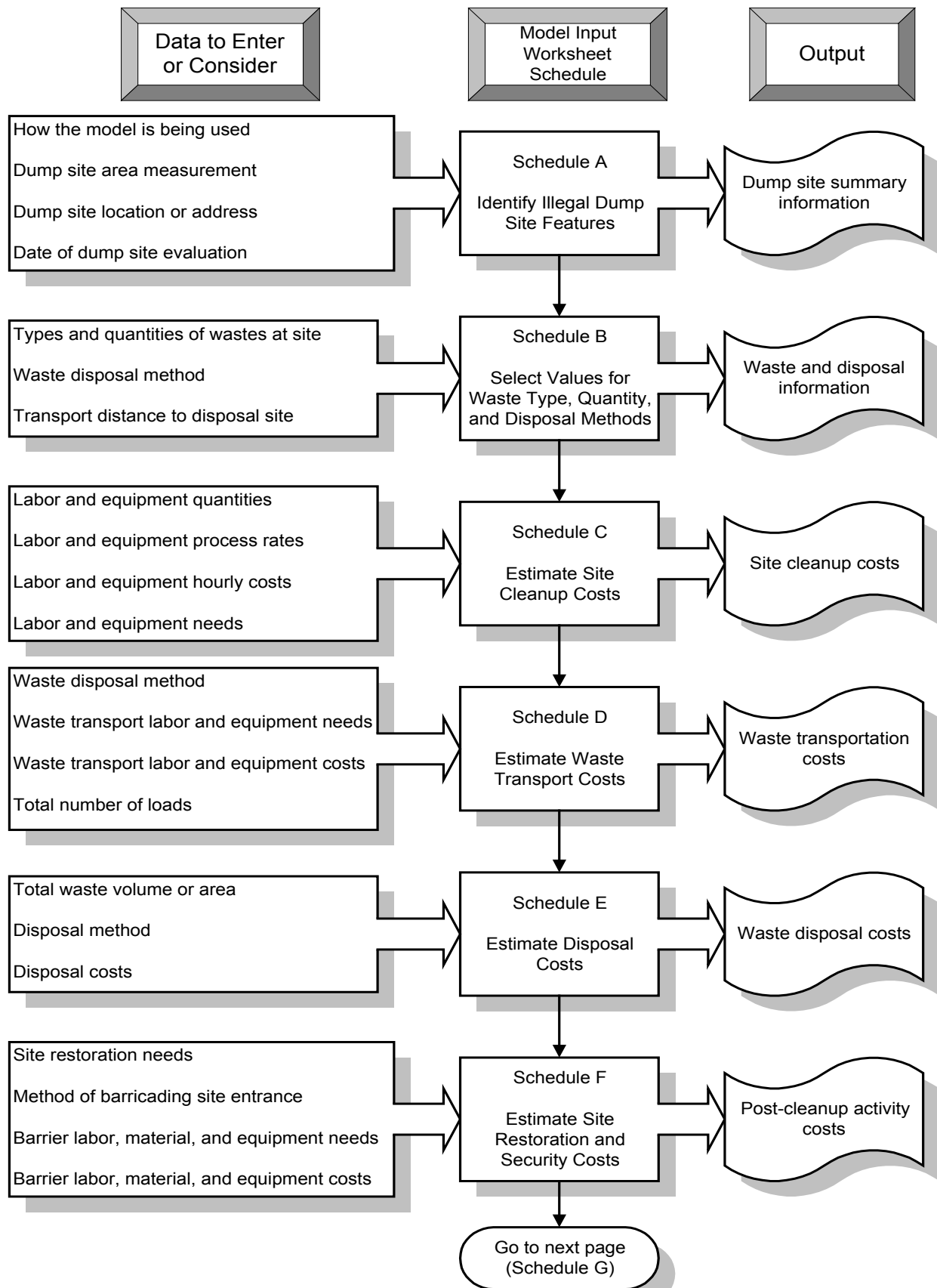
C&D – Concrete _____%

Brush or Landscape _____%

APPENDIX E

MODEL INPUT WORKSHEET FLOW CHART

(Two Pages)



Data to Enter
or Consider

Model Input
Worksheet
Schedule

Output

Continued from
Schedule F

Labor, equipment, and material needs for
conducting surveillance of dump site
Surveillance labor, equipment, and
material costs

Schedule G
Estimate Site
Surveillance Costs

Site surveillance costs

Dump site property liabilities
Dump site and nearby property values
Dump site characteristics
Local real estate market issues

Schedule H
Assess Property
Liabilities

Total property liability
costs

Labor, equipment, and materials
associated with local illegal dumping
prevention program administrative costs

Schedule I
Estimate Program
Administrative Costs

Program costs
attributable to dump
site(s) evaluated

Civil fines paid
Value of volunteer efforts
Grants or donations

Schedule J
Estimate Offsetting
Costs

Offsetting costs
attributable to dump
site(s) evaluated

Default cleanup process rates
Actual cleanup process rates
Default weight values for waste categories
Annual inflation rate since 1999

Schedule K
Adjustments to
Default Cost Values

Key default values
adjusted

Go on to
Cost Summary Worksheet