Greener Cleanups: *EPA Spreadsheets for Environmental Footprint Analysis (SEFA) - August 2014*

U.S. Environmental Protection Agency (EPA), Office of Superfund Remediation and Technology Innovation (OSRTI)

Introduction to SEFA

Purpose: SEFA is a set of workbooks designed to assist EPA in conducting environmental footprint analyses for site cleanups, as described in EPA's Methodology for Understanding and Reducing a Project's Environmental Footprint (EPA 542-R-12-002). The Methodology is available at www.cluin.org/greenremediation/methodology. SEFA is intended for estimating footprints during key phases of a cleanup project, such as evaluation of alternative remedies, development of remedy designs, and optimization of remedies, but may also be applied to other phases. Although originally developed for EPA's internal use, EPA is making SEFA available to the public for the benefit of others wishing to estimate the environmental footprint of site cleanups. *The SEFA workbooks do not individually or collectively represent EPA guidance or requirements nor is their use required by EPA.*

Structure: SEFA is comprised of three interlinked excel workbooks (files) to be saved by users in a single directory. Each workbook contains multiple worksheets (tabs) as described in the sections below. The tabs in each workbook are categorized with the following color-coding:

Yellow: tab contains required or optional user data entry

Green: tab contains notes, instructions, or explanations

Blue: tab provides outputs

Gray: tab not set up for user data entry

Instructions: SEFA is equipped with full instructions and notes. These are located in designated tabs in each workbook. Also, abbreviated instructions and notes regarding certain key aspects of data entry are located throughout the other tabs in SEFA. SEFA has been developed to reflect the protocol in EPA's Methodology. For a full description of assumptions in SEFA, and the approach for conducting a footprint analysis, please refer to the Methodology (www.cluin.org/greenremediation/methodology).

"Main" Workbook: Starting and end points of analysis. No data entry by user, except for minimal (and optional) input on "General" and "Summary" tabs.

- ***Intro to SEFA*** : Purpose, structure, and logistics of using SEFA
- ***General*** : Site information and custom names for remedy components (data input by user to this tab is optional)
- ***Instructions*** : General instructions pertaining to linkage of the three workbooks and overall approach to SEFA input
- ***Summary*** : Overall results of analysis in tabular format (data input by user to this tab is optional)
- ***Totals by Scope and Component*** : Auto-filled column and pie charts that graphically organize results by remedy component and by scope for energy and air emissions footprints
- ***Energy & Air 1 - 6*** and ***All Energy & Air (7 worksheets)*** : Energy and air results imported automatically from the "Calculations" workbook

"Input" Workbook: Data entry by user for all remedy activities, including input for energy consumption, materials usage, waste generation, personnel transport, and operation of equipment. Tabs for user data entry are indicated below.

- ***General*** : Auto fills site, remedy, and component names from the "Main" workbook
- ***Input Instructions*** : Instructions for setting up data entry tabs in the "Input" workbook, and notes on features in the "Input" workbook that provide flexibility for the footprint analysis
- ***Detailed Notes and Explanations*** : Notes and explanations for each table in the "Input Template" tab
- ***Input Summary*** : Overall summary of input information is compiled automatically from the "Input" tabs and exported to the "Calculations" workbook
- ***Input Template*** : The majority of user data entry in SEFA occurs in this tab, including data entry for energy, materials, waste, transportation, and equipment. A blank template worksheet is provided. Multiple copies of the “Input Template” tab can be created by the user as needed. See the "Input" workbook for specific notes and instructions on setting up input tabs and entering data.
- ***Grid Electricity*** : Optional user input for fuel mix for local grid electricity
- ***User Defined Factors*** : Optional user input on footprint conversion factors for user-specified materials and activities
- ***Well Material Calculator*** : An optional tool for estimating the amount of materials required to construct a well of specified type, material, and size
- ***Lookup*** : Reference tables on typical rates of energy consumption and material conversion factors that are used in the "Input Template" tab

"Calculations" Workbook: Automatically applies footprint conversion factors for energy use and air emissions for individual remedy components, and summarizes results. No data entry by user, but supplemental calculations can be made by the user in some of the tabs.

- ***General*** : Auto fills site, remedy, and component names from the "Main" workbook
- ***Notes*** : Notes on the features in the "Calculations" workbook

Components 1 - 6 (6 worksheets) : Calculations made automatically for energy and air emissions based on results from the "Input" workbook, with useful subtotals at the bottom of each worksheet
All Components : Total energy use and air emissions (i.e., summation of values in the individual "Component" tabs), with useful subtotals at the bottom of the worksheet
Default Conversions : Built-in footprint conversion factors used to calculate energy and air emissions associated with common remediation materials and activities
Grid Electricity Conversions : Footprint conversion factors for grid electricity are calculated automatically based on fuel mix in the "Grid Electricity" tab in the "Input" workbook
Explanation of Grid Electricity : Explains how electricity conversion factors are developed and provides an example
Transfer 1 - 3 (3 worksheets) : Intermediate data exchange

Programming Details of SEFA:

Data Exchange **:** All (three) workbooks must be open simultaneously to enable automated data exchanges. SEFA will generally process inputs faster if running off a hard drive rather than a server.
Color Coding : The "General" tab of each workbook provides a legend for cell color coding used to distinguish functions such as manual input, imported/exported data, and automated calculations
Locks : Data cells with formulas (or data to be exported to other workbooks) are equipped with "hard locks"
Data Sources **:** Origination of values in cells with imported data (whether previously populated or calculated) can be identified by clicking on the cell of interest

SEFA Has Been Updated and Improved (August 2014)

SEFA was originally made available to the public in April 2012, with minor updates in January 2013. The August 2014 version of SEFA provides improvements for ease of use and flexibility of application. In addition, corrections and adjustments have been made that affect footprint results.

Improvements for Ease of Use and Flexibility of Application in SEFA - August 2014 Version:

The structure of SEFA has been updated to be more user friendly and to eliminate duplicate data entry. SEFA has also been updated to provide additional flexibility, allowing the user to more accurately estimate the environmental footprint of the cleanup. See the instructions and notes tabs in each workbook for information on how to make use of the new features in SEFA.

Removal of duplicate data entry : In the previous version of SEFA, information on materials use, waste generation, and water use were entered by the user in the "Input" workbook (previously named the "Energy" workbook) where it was compiled and transferred to the "Calculations" workbook for footprint calculations for energy and air emissions. The materials, waste, and water data was also entered separately in the "Main" workbook where it was used to tabulate total material use, waste generation, and water use. In the August 2014 version, the data entry has been consolidated so that the user enters this information only once, in the "Input" workbook.

Option to use multiple grid electricity fuel mixes : SEFA now allows the user the option of specifying a different fuel mix for grid electricity for each remedy component. This feature allows flexibility in the event that different areas at a cleanup site obtain grid electricity from different providers.
Additional flexibility in data entry : (a) The user may now “override” the default values for fuel usage rates for personnel, equipment, materials, and waste transport. (b) The user may now add specific user-defined waste management processes, and provide unique footprint conversion factors for those processes. (c) The user may now enter data on electricity usage based on a greater number of factors, including equipment horsepower rating, equipment kW rating, and total kWh usage.
Addition of Well Material Calculator : A new tab has been added to the "Input" workbook that calculates materials required for standard wells based on user specifications for type and size of wells, type of materials, and number of wells.

Changes to the "Summary" tab (in "Main" workbook): Three changes have been made to the "Summary" tab. (a) "Voluntary Purchase of RECs" is now categorized separately (as category E-3) and "On-site Grid Electricity Use" is added as category E-4. (b) The text in Rows 8 and 10 has been changed to say "% of (un)refined materials from recycled or reused material" instead of "% of (un)refined materials from recycled or waste material." (c) Totals for NOx, SOx, and PM are reported separately, in addition to the combined total. These three changes represent slight deviations from the structure for reporting metrics suggested in EPA's Methodology (www.cluin.org/greenremediation/methodology), but do not affect the numerical results of the SEFA worksheets.

Additional processing of results : The "Main" workbook in SEFA now contains post-processing charts and graphics, and the "Calculations" workbook now contains useful subtotals for specific items.
Notes and instructions have been added : SEFA now includes expanded notes and instructions designed to assist the new user in beginning a footprint analysis and to highlight advanced features for the experienced user. The notes and instructions also provide documentation on the structure of SEFA and the transfer of data among workbooks. Please see the “Instructions”, “Notes”, and “Explanations” tabs in the three workbooks.

Changes Affecting Footprint Results in SEFA - August 2014 Version:

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Several changes have been made to SEFA that affect the numerical results in the current (August 2014) version as compared to the previous (January 2013) version. These changes provide greater accuracy for the calculations in SEFA.

Changes to landfill gas combustion: Changes have been made to the greenhouse gas conversion factors for landfill gas combustion, for both flaring of on-site landfill gas and combustion of landfill gas for on-site energy use (Cells F36 and F12, respectively, in the "Components" tabs in the "Calculations" workbook), to account for the greenhouse gas emissions avoided by combustion of methane. Conversion factors for NOx, SOx, PM, and HAPs have been added for flaring of on-site landfill gas (Cells H36 - N36 in the "Components" tabs in the "Calculations" workbook). These changes will result in a significant decrease in greenhouse gas emissions calculated by SEFA, and a small increase in on-site NOx, SOx, PM, and HAPs emission calculated by SEFA, if combustion of landfill gas is included in the footprint analysis.

Change to transmission loss factor: In the previous version of SEFA, 10% grid electricity transmission losses were applied only to off-site electricity generation. SEFA now applies the 10% transmission losses to both the on-site use of grid electricity (Scope 1) and the associated off-site electricity generation (Scope 2). This is now consistent with EPA's Methodology (www.cluin.org/greenremediation/methodology). The update was made to the energy conversion factor for electricity transmission (located in Cell D172 in the “Component” tabs in the “Calculations” workbook) and will result in a small increase in the energy footprint from grid electricity use. Please see the “Explanation of Grid Electricity” tab in the “Calculations” workbook for more information on treatment of grid electricity in SEFA.

Change to conversion factor for Scope 2 electricity generation: The precision for the energy conversion factor for electricity generation has been changed from 6.9 to 6.929. The update was made in Column C of the "Grid Electricity Conversions" tab in the "Calculations" workbook and will result in a small (and possibly unnoticeable) increase in the energy footprint from grid electricity use.

Technical Assistance: EPA technical support in using SEFA is available only within the Agency. Individuals or organizations outside EPA who are interested in using SEFA for conducting footprint analyses may wish to obtain technical assistance from qualified environmental, engineering, or other suitable professionals. Selected examples of footprint analyses conducted using SEFA will be posted on EPA's Green Remediation Focus webpage at www.cluin.org/greenremediation/methodology. Any updates to SEFA will be posted at the same location. Suggestions for future enhancements to SEFA may be forwarded to Carlos Pachon, EPA/OSRTI (pachon.carlos@epa.gov).

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EPA United States Environmental Protection Agency

EPA is making SEFA available to the public as a means of disseminating useful information about environmental footprint analysis. The Agency is not responsible for adaptation of this workbook model by other organizations or associated analytical results.

Greener Cleanups: EPA Spreadsheets for Environmental Footprint Analysis - August 2014
Main Workbook

Site Name	***St. Ann Center - Milwaukee***
Remedy	***Alterative 2***
	Identify the site name and remedy name in the spaces above. These names will be populated on all of the worksheets for the project.

	Enter the path name (if not saved in same directory) and file name of the "Calculations" workbook for the project.
Path Name:	
Calculations File Name:	SEFA_StAnnAlt2_Calculations_(083114).xlsx

Component	**Remedy Component Names***
Component 1	NA
Component 2	Excavation
Component 3	Soil Sent Off-Site
Component 4	Backfill/Capping
Component 5	
Component 6	
	***Fill in unique names for Remedy Components (optional). These names will be populated on all of the worksheets for the project.**

The following color coding applies to cells in the worksheets in this workbook.

	Green cells indicate notes or instructions
	Yellow cells are for manual data input
	Blue cells are calculated cells that are protected
	Gray cells are not available and/or not applicable for data entry
	Orange cells are calculated metrics that are forwarded to the "Summary" tab

Overview

* This Tutorial models a hypothetical remedy and provides exercises for the purpose of demonstrating basic features in SEFA.
* The site is called "Green Hills" and the remedy is "Dig & Haul".
* The remedy includes site investigation, excavation of contaminated soil, transport of the soil off-site, backfilling the excavated areas, operation of a pump and treat system, and conducting groundwater monitoring.
* The Tutorial exercises will model the following: adding a new activity (regrading), changing the fuel mix for grid electricity, and adding a new remedy material. Additional exercises address include modeling carbon storage (from planting trees), alternative modes of transport, and alternative fuel usage.

Information entered for this Tutorial is hypothetical and should not be used as a basis for footprint analyses at real sites.

For questions or comments on this Tutorial, please contact:
Karen Scheuermann, EPA Region 9, scheuermann.karen@epa.gov

Instructions

1) Setting up the Workbooks

SEFA consists of the "Main", "Input", and "Calculations" workbooks (.xlsx files). All three files must be open at the same time while working in SEFA. This allows the workbooks to communicate and calculate footprints.
For simplest use, the three workbooks should all be saved in the same directory, in which case the "Path Name" can be left blank in the "General" tab of each workbook. Alternatively, if you would like to save the workbooks in different directories, you must fill in the "Path Name" on the "General" tab of each workbook using the following format:
DriveLetter :*FolderName* *FolderName* \ Be sure to include final backslash.
On the "General" tab of each workbook, you must enter the "File Name" of one of the other workbooks (as indicated in each workbook) using the following format: *WorkbookName* .*FileExtension*
The file extension is ".xlsx" for all three workbooks.
You may want to change the file names for the "Main", "Input", and "Calculations" workbooks to reflect the site, remedy, and date. For example, the new name for the "Main" workbook may be "main_SiteName_Nov2014.xlsx". If you change the names of the workbooks, you must update the file names on the "General" tabs in each workbook in order for the workbooks to exchange data. Note that the file names may be changed unintentionally when the files are copied or downloaded, and should be readjusted for proper functioning of the SEFA workbooks.

2) Setting up Site and Remedy Names

In the "General" tab in the "Main" workbook, you may replace default labels with site-specific labels for site name and remedy name. These will be automatically updated in all the workbooks. You may also provide a narrative overview of the site and remedy in the "General" tab in the "Main" workbook.

3) Setting up Remedy Components

On the "General" tab in the "Main" workbook, you have the option of customizing the names of the six "Remedy Components", and those customized names will automatically be updated in all the workbooks. If not customized, the default names <Component 1> to <Component 6> will be used by SEFA.
Customizing the Remedy Components allows you to reflect any delineation that will be relevant to the site and remedy. For example, the Remedy Components may be spatial in nature, representing different geographical areas of the cleanup site (e.g., North Quadrant, South Quadrant, West Quadrant). Or the Remedy Components may be functional in nature, representing different operations or activities at the site (e.g., Site Investigation, Excavation, Waste Hauling, Backfilling, Long-term Monitoring). As another example, the Remedy Components may be temporal in nature, representing different time segments for the remedy (e.g., Year 1, Year 2, Year 3).

4) Entering Data

"Input" Workbook : The majority of site and remedy data is entered in the "Input" tabs in the "Input" workbook. See the "Input Instructions" tab in the "Input" workbook for specifics on this data entry. Additional data may be entered in the "Input Summary, "Grid Electricity", "User Defined Factors", and "Well Material Calculator" tabs. See the instructions on each of those tabs for specifics on the functions provided in the tabs.
"Main" Workbook : In the "Summary" tab in the "Main" workbook (Row 35), you may provide a qualitative description of activities at the site related to Land & Ecosystems.
"Calculations" Workbook : No data entry is required by the user in the "Calculations" workbook. However, space is provided in the tabs of this workbook for user-specific calculations and subtotals.

5) Processing Data and Accessing Outputs

Processing Data : The SEFA worksheets automatically process the data entered by the user, apply footprint conversion factors, and compile the results. You have access to all worksheets where the data processing and compilation occurs. However, those portions of the worksheets are "protected" so that the data links and formulas cannot be altered.

Accessing Outputs : The final outputs of the SEFA worksheets are located in the "Main" workbook. The outputs are available in tabular format in the "Summary" tab, and in chart format in the "Totals by Scope and Component" tab. All output presentations are populated automatically.
Accessing Intermediate Results : The user has access to intermediate results throughout the SEFA workbooks. Intermediate results that may be of particular interest are located in the "Energy & Air" tabs in the "Main" workbook, the "Input Summary" tab in the "Input" workbook, and the "Component" tabs in the "Calculations" workbook.

6) Miscellaneous

General Formatting : Although you cannot alter cells in the worksheets that are used for processing data, some general formatting functions are available in all the worksheets. These include adjusting decimal places, adjusting width of columns or row, shading cells, etc. Most of the worksheets also contain blank spaces which are available for making notes or supporting calculations.

Naming, Adjusting, and Adding Tabs : You should not rename the original tabs in the SEFA workbooks, except for the “Input Template” tab in the "Input" workbook (as noted in the "Input Instructions" tab in the "Input" workbook). Renaming other tabs may disrupt the exchange of data among the workbooks. However, you may relocate tabs within each workbook. You may also add new tabs to the workbooks, for example to provide references and calculations in support of the data entry, or user-designed charts and tables for presenting the results.

St. Ann Center - Milwaukee - Alterative 2

Environmental Footprint Summary

Core Element	Metric		Unit of Measure	Footprint						
				NA	Excavation	Soil Sent Off-Site	Backfill/Capping			Total
Materials & Waste	M&W-1	Refined materials used on-site	Tons	0	0	0	0	0	0.0	0
	M&W-2	% of refined materials from recycled or reused material	%		0%					0%
	M&W-3	Unrefined materials used on-site	Tons	0	0	0	15,216	0	0.0	15,216
	M&W-4	% of unrefined materials from recycled or reused material	%				0%			0%
	M&W-5	On-site hazardous waste disposed of off-site	Tons	0	0	0	0	0	0.0	0
	M&W-6	On-site non-hazardous waste disposed of off-site	Tons	0	0	18,400	0	0	0.0	18,400
	M&W-7	% of total potential waste recycled or reused	%		100%	0%				0%
Water (used on-site)	W-1	Public water use	MG	0	0.01125	0.00000	0.00375	0	0	0.015
	W-2	Groundwater use	MG	0	0	0	0	0	0	0
	W-3	Surface water use	MG	0	0	0	0	0	0	0
	W-4	Reclaimed water use	MG	0	0	0	0	0	0	0
	W-5	Storm water use	MG	0	0	0	0	0	0	0
	W-6	Other water resource #1	MG	0	0	0	0	0	0	0
	W-7	Other water resource #2	MG	0	0	0	0	0	0	0
Energy	E-1	Total energy used (on-site and off-Site)	MMBtu	0	1,202	4,055	2,339	0	0	7,596
	E-2	Energy voluntarily derived from renewable resources								
	E-2A	On-site renewable energy generation or use + on-site biodiesel use + biodiesel and other renewable resource use for transportation	MMBtu	0	0	0	0	0	0	0
	E-2B	Voluntary purchase of renewable electricity	MWh	0	0	0	0	0	0	0
	E-3	Voluntary purchase of RECs	MWh	0	0	0	0	0	0	0
	E-4	On-site grid electricity use	MWh	0	0.0	0	0	0	0	0
Air	A-1	On-site NOx, SOx, and PM emissions	Pounds	0	1,064	0	523	0	0	1,587
	A-2	On-site HAP emissions	Pounds	0	0	0	0	0	0	0
	A-3	Total NOx, SOx, and PM emissions	Pounds	0	1,502	12,716	2,890	0	0	17,108
	A-3A	Total NOx emissions	Pounds	0	1,242	3,820	2,158	0	0	7,220
	A-3B	Total SOx emissions	Pounds	0	225	1,510	635	0	0	2,370
	A-3C	Total PM emissions	Pounds	0	35	7,386	96	0	0	7,517
	A-4	Total HAP emissions	Pounds	0	5	27	1	0	0	33
	A-5	Total greenhouse gas emissions	Tons CO2e*	0	95	319	170	0	0	584
Land & Ecosystems	Minimal disruptions to land and ecosystems.									

** Total greenhouse gases emissions (in CO2e) include consideration of CO2, CH4, and N2O (Nitrous oxide) emissions.*

"MMBtu" = millions of Btus

"MG" = millions of gallons

"CO2e" = carbon dioxide equivalents of global warming potential

"MWh" = megawatt hours (i.e., thousands of kilowatt-hours or millions of Watt-hours)

"Tons" = short tons (2,000 pounds)

The above metrics are consistent with EPA's Methodology for Understanding and Reducing a Project's Environmental Footprint (EPA 542-R-12-002), February 2012

Notes:

St. Ann Center - Milwaukee
Greener Cleanups: EPA Spreadsheets for Environmental Footprint Analysis - August 2014
Input Workbook
Alterative 2

	Enter the path name (if not saved in the same directory) and file name of the "Main" workbook for the project.
Path Name:	
Main File Name:	SEFA_StAnnAlt2_Main_(083114).xlsx

Component	Remedy Component Names
Component 1	*NA*
Component 2	*Excavation*
Component 3	*Soil Sent Off-Site*
Component 4	*Backfill/Capping*
Component 5	*0*
Component 6	*0*

Component names are autofilled from the "Main" workbook.

The following color coding applies to cells in the worksheets in this workbook.

	Green cells indicate notes or instructions
	Yellow cells are for manual data input
	Red cells are for manual data input from a drop-down list of selections and are protected
	Blue cells are calculated cells that are protected
	Gray cells are not available and/or not applicable for data entry

Input Instructions

1) Overview

The “Input” workbook is used for data entry of site and remedy information. The majority of this data is entered in the “Input” tabs. Additional information may be entered in the “Input Summary”, “Grid Electricity”, “User Defined Factors”, and “Well Material Calculator” tabs.

"Input" Tabs : The user enters information on transportation, materials, equipment, waste, and energy associated with the site and remedy on the "Input" tabs. The user may establish up to 14 "Input" tabs to reflect the site and remedy, and assigns each "Input" tab to one of the 6 Remedy Components. See the section “Adding and Aligning “Input” Tabs” below for information on setting up “Input” tabs, renaming the tabs, and assigning them to Remedy Components. See the “Detailed Notes and Explanations” tab for specifics on entering remedy data into the “Input” tabs.

"Input Summary" Tab : The column headings in the “Input Summary” tab (Row 6) must be updated by the user to reflect the tab names in the following situations: (a) if additional “Input” tabs are set up by the user (regardless of whether they are renamed); and (b) if “Input” tab names are customized or changed.

"Grid Electricity" Tab : If grid electricity is used at the site, the local fuel mix for the grid electricity should be added in this tab. See the instructions on the “Grid Electricity” tab for specifics on data entry for local fuel mix.

"User Defined Factors" Tab : If the remedy requires materials or off-site activities not provided in SEFA, you may add the materials or activities to SEFA. You should research and document the information, then enter it in the “User Defined Factors” tab. See the “User Defined Factors” tab for specifics on adding user defined factors.

"Well Material Calculator" Tab : Data entry is not required in this tab. The Well Material Calculator is provided as a convenience to the user. The Calculator uses a lookup table to calculate the amount of casing material, screen material, cement, and sand/gravel that would be required to build a well, based on specifications entered by the user. See the “Well Material Calculator” tab for specifics on the use of the Calculator.

2) Adding and Aligning "Input" Tabs

You may want to create additional “Input” tabs to help organize your data entry. When you create a new "Input" tab, you will typically want to align it with a Remedy Component. These steps are described below.

Creating Additional "Input" Tabs: To create a new “Input” tab, right-click the tab name of the "Input Template" tab, choose “move or copy”, check the box "create a copy" and then click "OK". You can leave the tab name alone after copying (such as “Input Template (2), Input Template (3)”, etc.), or you can rename each new “Input” tab by right-clicking on the tab, choosing “rename”, and typing the new name. If you rename an “Input” tab, you must also enter that new name on the “Input Summary” tab in the "Input" workbook, for the tab to be included in the footprint analysis. (See instructions below for the “Input Summary” tab for more information on this topic.)

Aligning the "Input" Tabs with the Remedy Components: Each “Input” tab can be considered a subcategory under one of the Remedy Components designated in the “General” tab of the “Main” workbook. In order for each “Input” tab to be included in the footprint analysis, the tab must be aligned with a Remedy Component. To align an “Input” tab, use the drop-down menu in Row 4 of the "Input" tab and choose the Remedy Component that the “Input” tab pertains to. You may select one of six Remedy Components or you may turn the selection "off" so that the tab is not aligned with a Remedy Component. The Remedy Component number will appear in Row 4 on the "Input Summary" tab. (If "off" is chosen, "0" will appear in Row 4.) An example of aligning “Input” tabs to the Remedy Components is illustrated in Item (7) below.

Additional Notes:

(a) You can create any number of “Input” tabs, but you may align a maximum of 14 “Input” tabs to the Remedy Components at any one time.

(b) You may group multiple “Input” tabs under the same Remedy Component.

(c) You may want to allow certain “Input” tabs to remain non-aligned with the Remedy Components in some cases. For example a non-aligned “Input” tab may be used for testing alternative designs or parameters for the remedy. The tab would be turned “off” when not included in the analysis, and would be re-aligned with a Remedy Component to be included in the analysis.

(d) You should reserve the unused (blank) “Input Template” tab, in the event that it becomes necessary to create additional “Input” tabs at a later time.

(e) You may delete an “Input” tab at any time by right-clicking on the tab and choosing “delete”. If an “Input” tab is deleted, you should also remove the name of that tab from the column headings in the “Input Summary” tab.

(f) You can reposition an “Input” tab by left-clicking on the tab and dragging it to the right or left. Multiple “Input” tabs can be grouped as part of the same Remedy Component in this manner, if that is desired.

(g) If you run out of space for entries in any of the tables in the "Input" tabs, you may create another "Input" tab to continue entries in the table.

3) Setting Up the "Input Summary" Tab

The “Input Summary” tab displays a summary of 14 “Input” tabs (in Columns E - R) and 6 Remedy Components (in Columns S - X). The grand total is displayed in Column Y.

If you create a new “Input” tab or rename an existing “Input” tab, you must add the new name to the column headings in Row 6 of the “Input Summary” tab. This allows the “Input Summary” tab to collect data from the various “Input” tabs. For example, if you rename the “Input Template” tab, so that it is now called “Site Investigation”, you must also rename the corresponding column heading in Row 6 of the “Input Summary” tab. In this example, Cell C6 would be renamed “Site Investigation”. Additional notes:

(a) The Remedy Component Numbers in Row 4 of the “Input Summary” tab are automatically populated, based on the selections made in Row 4 of the “Input” tabs.

(b) Other than renaming the column headings with “Input” tab names (if necessary), no other data entry is required in the “Input Summary” tab.

(c) You may add the "Input" tab names in any order in Row 6 of the "Input Summary" tab. They need not reflect the order of the tabs in the "Input" workbook.

(d) Be sure to reflect the exact tab name in Row 6 of the "Input Summary" tab, in order for it to be recognized by SEFA.

4) Data Entry in the "Input Template" Tab

The “Input Template” tab contains a variety of data entry tables for flexibility to accommodate a wide range of remedy activities and configurations. You can by-pass any of the data entry tables, and use only those tables that are relevant to the site and remedy at hand. (See EPA's Methodology [www.cluin.org/greenremediation/methodology] for a protocol for screening out inputs that would make minimal contributions to the footprint totals.) Much of the data entry in the “Input Template” tab is self-explanatory. However, please see the “Detailed Notes and Explanations” tab in the "Input" workbook for specifics on the data entry tables in the “Input Template” tab.

5) Using the "Grid Electricity" Tab

On the “Grid Electricity” tab, you can define the fuel mix (mix of energy resources that is used to generate grid electricity) for grid electricity used at your site. SEFA uses this fuel mix to calculate the footprint from generation of the grid electricity. By default, the fuel mix in the “Grid Electricity” tab is set to the U.S. national average from 2009. You are strongly encouraged to change this to a regional or local fuel mix that is more representative of the grid electricity used by the remedy. Specifying the fuel mix from the local provider will often be important for accuracy of the footprint calculations, as the fuel mix can vary substantially at the national, regional, and local levels.

You can set a single fuel mix for all Remedy Components, or you can specify individual fuel mixes for each of the 6 Remedy Components. This allows for flexibility in the event that different grid electricity providers are used for different activities or areas at the site. Please see the “Grid Electricity” tab for specifics on how to set the fuel mix for your site.

6) Using the "User Defined Factors" Tab

SEFA is equipped with default footprint conversion factors for a variety of materials and activities. The conversion factors are used to estimate the amount of energy required for, and the amount of NOx, SOx, PM, HAPs, and greenhouse gas emissions related to, the off-site production of materials or activities. Additional conversion factors are used for energy and air emissions related to the combustion of fuels. These default conversion factors can be viewed in the “Default Conversions” tab of the “Calculations” workbook and are applied automatically in the “Calculations” workbooks.

In the “User Defined Factors” tab, SEFA provides flexibility in establishing conversion factors for materials and activities that are unique to the remedy or site. Unique conversion factors can be established for the following:

(a) Combustion of fuels (both renewable and “conventional”) for transportation and on-site equipment

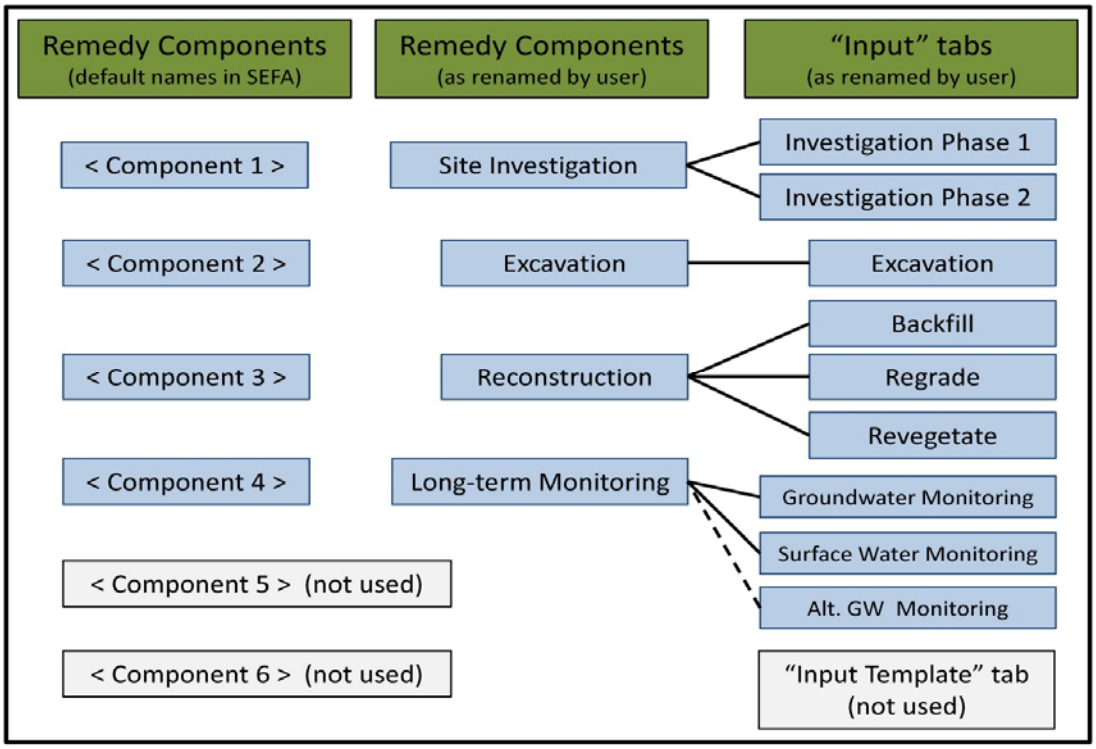
(b) Off-site manufacturing or processing of materials

(c) Off-site management and recycling of wastes

In establishing these unique conversion factors, you should research and document the data, and enter it into the “User Defined Factors” tab. Once entered, SEFA will automatically apply the conversion factors in the “Calculations” workbook. Please see the “User Defined Factors” tab for specifics on establishing unique conversion factors.

7) Example of Aligning "Input" Tabs to Remedy Components

The diagram below illustrates the alignment of “Input” tabs to Remedy Components for a hypothetical site and remedy. In this example, the user renames Remedy Components 1 - 4, according to the four main aspects of the remedy, but does not need Remedy Components 5 and 6. The user makes copies of the blank “Input Template” tab as needed, names them, and links them to the Remedy Components. The user keeps the original blank copy of the “Input Template” tab in reserve in the event that additional copies are needed. The notes below the diagram provide additional explanations for creating, naming, and aligning the “Input” tabs in this example.



Notes:

(a) The user is interested in distinguishing between Phases 1 and 2 during Site Investigation because the Phases will occur six months apart. Therefore, the user creates two copies of the “Input Template” tab, names the copies accordingly, and aligns them with the “Site Investigation” remedy component.

(b) The user views the excavation activities as a single discrete event, and so creates one copy of the “Input Template” tab, names it accordingly, and links it with the “Excavation” remedy component.

(c) The user would like to better understand the footprints for three aspects of Reconstruction to determine which aspects to focus on for footprint reduction measures. Therefore, the user creates three copies of the “Input Template” tab, names the copies accordingly, and aligns them with the “Reconstruction” remedy component.

(d) The user is interested in tracking two aspects of Long-term Monitoring separately, and so creates two copies of the “Input Template” tab, names the copies accordingly, and aligns them with the “Long-term Monitoring” remedy component.

(e) The user would like to test the environmental footprint from two groundwater monitoring regimes (which are equally effective for monitoring the site). Therefore, the user creates a copy of the “Input Template” tab for the alternative regime, and names it “Alt. GW Monitoring”. The user does not align this tab with the “Long-term Monitoring” remedy component, but keeps the tab turned “off”. When testing the alternative, the user will align the “Alt. GW Monitoring” with the “Long-term Monitoring” remedy component and will turn the original “Groundwater Monitoring” tab “off”.

Detailed Notes and Explanations for "Input Template" Tab

Table of Contents

1) Headings (Rows 1 & 2)

An identifier for the SEFA worksheets appears in Row 1. The site and remedy names appear automatically in Row 2, based on information entered in the "General" tab of the "Main" workbook. The name of the "Input" tab also appears automatically in Row 2, based on the name typed by the user on the tab at the bottom of the excel window. These headings are repeated at the top of subsequent pages of the "Input" tab.

2) Alignment with Remedy Components (Rows 4 & 5)

The drop-down menu in Cell E4 is used for alignment of the "Input" tab with a Remedy Component. Please see the "Input Instructions" tab in the "Input" workbook for instructions on aligning "Input" tabs.

3) Comment Space (Row 7)

Space is made available in Row 7 for narrative notes for General Scope, Examples of Items Eliminated through Screening Process, and Other Notes and References. In addition, spaces are left open in the following sections of the "Input Template" tab for notes, references, or supporting calculations:

(a) Selected cells between and among the tables in the main part of the worksheet

(b) All cells beginning in Column X and extending to the right

(c) All cells in Rows 160 - 192

(d) All cells in Rows 193 – 405 (Columns G - W) below the main worksheet

4) Personnel Transportation (Row 14)

Use this table to model personnel transportation to and from the site.

(a) Calculations for Fuel Used in Column K are based on the values or drop-down selections for Number of Roundtrips to Site, Roundtrip Distance to Site, Mode of Transportation, and Fuel Type in Columns C, D, E, and G, respectively. You must make entries or selections in all four columns (C, D, E, and G) in order for the Fuel Used to be calculated.

(b) You may select any combination for Mode of Transportation (Column E) and Fuel Type (Column G). However, SEFA provides Default Fuel Usage Rates (Column I) for only the most common combinations. For combinations for which SEFA does not provide a Default Fuel Usage Rate, the message "NO DATA" will appear in Column I.

(c) You may override the Default Fuel Usage Rate. If you have a specific Fuel Usage Rate for any transportation/fuel combination, you may enter it in Column J. This will override the default value in Column I. You may also use Column J to designate the Fuel Usage Rate when "NO DATA" appears in Column I.

(d) If “Airplane” is selected as Mode of Transportation in Column E, you should select “Diesel” as the Fuel Type in Column G. SEFA contains Default Fuel Usage Rates only for diesel when “Airplane” is selected, based on the assumption that diesel is similar to jet fuel.

(e) If “Electricity” is selected as Fuel Type in Column G, Fuel Used (Column K) will not be calculated, regardless of the Mode of Transportation in Column E. If the electricity supply for the transportation is provided on-site, you must enter it separately in the "On-Site Electricity Use" table (Row 43), in order for it to be included in the footprint analysis.

(f) The units for Total Distance (Column H) are dependent on the mode of transportation selected in the dropdown menu in Column E. The units are:

(i) For car or truck, the units are miles.

(ii) For airplane/bus/train, the units are passenger-miles.

(iii) If “Vehicle (other)” is selected in the dropdown menu, the units should be determined by the user.

(g) The units for Default Fuel Usage Rate (Column I) are dependent on the transportation/fuel combination and are noted below. When specifying the Fuel Usage Rate in Column J, the same units must be used. The units are based on gallons for diesel/biodiesel/gasoline and ccf for natural gas. Although some of the combinations are unlikely, the units would be:

(i) For car or truck, the units are miles/gallon or miles/ccf.

(ii) For airplane/bus/train, the units are passenger-miles/gallon or passenger-miles/ccf.

(iii) If “Vehicle (other)” is selected in the dropdown menu, the units should be determined by the user.

(h) When the Fuel Type (Column G) is biodiesel, B20, diesel, or gasoline, the units for Fuel Used (Column K) are gallons. When the Fuel Type is natural gas, the units for Fuel Used are hundreds of cubic feet (ccf). As noted above, when the Fuel Type is electricity, SEFA does not calculate Fuel Used.

(i) Open cells are provided in Rows 25 and 26 to allow additional flexibility for transportation/fuel combinations. When using these rows, you must still select the Fuel Type from the drop-down menu in Column G, in order for the fuel usage to be summed in the SEFA worksheets.

(j) If you are using a transportation fuel that is not provided in the drop-down menu in Column G, you may still include that fuel usage in the "Other Energy Use and Air Emissions” table beginning on Row 129 of the “Input Template” tab. Please see below for instructions on the use of that table.

5) On-Site Equipment Use and Transportation (Row 29)

Use this table to model on-site equipment that is powered by diesel, biodiesel, or gasoline, and to model the transport of that equipment to and from the site.

Equipment Use

(a) For equipment or processes powered by natural gas, use the “On-Site Natural Gas Use” table beginning in Cell L43. For equipment or processes powered by electricity, use the “On-Site Electricity Use” table beginning in Cell A43. If you are using equipment or processes powered by a fuel that is not provided in the drop-down menu in Column E, or in the “On-Site Natural Gas Use” or “On-Site Electricity Use” tables, you may still include that fuel usage in the "Other Energy Use and Air Emissions” table beginning on Row 129 of the “Input Template” tab. Please see below for instructions on the use of these tables.

(b) Calculations for Fuel Used for On-Site Equipment in Column H are based on the values or drop-down selections for Horsepower, Load Factor, Equipment Fuel Type, and Equipment Hours Operated in Columns C, D, E, and G, respectively. You must make entries or selections in all four columns (C, D, E, and G) in order for the Fuel Used for On-Site Equipment to be calculated.

(c) For Horsepower in Column C, you may enter the representative value noted in the dropdown menu (Column A), or a unique value, if known, for the equipment to be used on-site. The horsepower ratings noted in the dropdown menu in Column A are provided for convenience only, as generally representative values that can be used in the absence of more specific information. They are not recognized in the SEFA calculations unless entered in Column C.

(d) The Load Factor (Column D) for a piece of equipment is the ratio of the load that the motor actually draws when it is operating to the maximum load that it could draw. For example, for a motor of 100 HP that drives a constant 75 HP load whenever it is on, the load factor will be 75/100, or 75%. To represent a motor that is running fairly efficiently, it is recommended that a load factor of 75% be used absent other information.

Equipment Transportation

Fuel usage rates for equipment transportation are miles/gallon or miles/ccf. There is no drop-down menu for selecting mode of transport: the transport is set as heavy-duty truck. For selecting the Transport Fuel Type (Column L) and overriding the Default Fuel Usage Rate (Columns M and N), use the approach described above for Columns G, I, and J in the “Personnel Transportation” table.

Other

(a) The use of equipment on-site may be modelled independently from transport of the equipment to the site. For example, if a piece of equipment is used on-site, but transport of the equipment is not applicable (e.g., the equipment is permanently fixed to the site or transport is screened out as a minimal contributor), then fill in Columns A - G, but not Columns I - N. Conversely, if a piece of equipment is being transported to the site, but once on-site is powered by fuel other than diesel, biodiesel, or gasoline, then you would fill in Columns I - N, but not Columns A - G.

(b) Open cells are provided in Rows 39 and 40 to provide additional flexibility for equipment/fuel and transportation/fuel combinations. When using these rows, you must still select the Equipment Fuel Type and the Transport Fuel Type from the drop-down menus in Columns E and L, respectively, in order for the fuel usage to be summed in the SEFA worksheets.

(c) If you are using equipment or transportation fuel that is not provided in the drop-down menus in Columns E or L, you may still include that fuel usage in the "Other Energy Use and Air Emissions" table beginning on Row 129 of the "Input Template" tab. Please see below for instructions on the use of that table.

6) On-Site Electricity Use (Row 43)

Use this table to model electricity usage on-site, whether the electricity is supplied through the grid, or generated on-site from renewable resources.

(a) You may represent electricity demand in three ways: (1) based on the horsepower rating of equipment in Rows 45 - 48; (2) based on kW rating in Rows 49 - 52, and (3) based on total kWh used in Rows 53 - 56. Please note that all cells shaded yellow must be filled in for each type of data entry selected.

(b) The Load Factor (Column C) for a piece of electrical equipment is the ratio of the load that the motor actually draws when it is operating to the maximum load that it could draw. For example, for a motor of 100 HP that drives a constant 75 HP load whenever it is on, the load factor will be 75/100, or 75%. To represent a motor that is running fairly efficiently, it is recommended that a load factor of 75% be used absent other information.

(c) The Efficiency (Column D) for a piece of electrical equipment is a measure of how well the equipment performs relative to its designed capacity. The lower the efficiency, the more electricity is required by the equipment to complete the task. For efficiency, use either (1) the percent that gets you closest to the expected Electrical Rating or (2) a value of 75% to represent a motor that is running fairly efficiently.

(d) Enter electricity generated on-site from renewable resources in Cell G58. Enter only renewable electricity for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the on-site electricity generation). This renewable energy is subtracted from the total energy demand to the grid. Note that if the amount of renewable energy generated on-site is greater than that used on-site, the total Grid Electricity Used in Cell G59 is negative. This represents excess electricity that may be sold to other users or sent back into the grid.

7) On-Site Natural Gas Use (Row 43)

Use this table for combustion of natural gas on-site. For example, natural gas may be used for heating buildings or treatment processes.

(a) If power rating is known, use Rows 45 and 46.

(b) If heat load is known instead of power rating, use Rows 45 and 46, and enter power rating as 125% of heat load and choose 80% for efficiency.

(c) If Energy Required is known, use Row 47.

(d) If Natural Gas Used is known, use Row 48.

(e) The following conversion is used for calculating Natural Gas Used in Column R: 1 ccf = 103,000 Btu.

8) Landfill Gas Combusted On-Site for Energy Use (Row 53)

Use this table for combustion of landfill gas on-site. For example, the landfill gas usage may be in turbines for electricity production, or may be for heating in buildings or treatment processes. If the landfill gas is being flared, you should model this in the "Other Energy Use and Air Emissions" table on Row 129 of the "Input Template" tab.

(a) The greenhouse gas calculations in SEFA account for the avoidance of emissions of landfill methane, in addition to the emissions of CO2e as a result of the combustion process.

(b) SEFA does not account for non-methane gases emitted from the landfill. You can account for these in the "Other Energy Use and Air Emissions" table beginning on Row 129 of the "Input Template" tab.

(c) SEFA accounts for landfill gas combustion for beneficial purposes as "On-site renewable energy use or generation" in the "Summary" tab in the "Main" workbook. However, some entities do not support the claim of landfill gas as a renewable resource. In this case, you may want to use the "Other Energy Use and Air Emissions" table on Row 129 of the "Input Template" tab to adjust the totals for renewable energy in the "Summary" tab.

(d) When landfill gas is used for electricity production, you may decide to characterize the electricity production to be from a “renewable resource”. If you characterize the electricity as “renewable”, and you retain the renewable energy rights, you should enter the amount of electricity generated in Cell G58 of the “On-Site Electricity Use” table in the "Input Template" tab. You should also use the "Other Energy Use and Air Emissions” table on Row 129 of the “Input Template” tab to avoid double counting for the renewable energy.

9) Materials Use and Transportation (Row 65)

Use this table to model the types and amounts of materials used for the remedy and to model the transport of the materials to the site.

Materials Use

(a) Calculations for the energy and air emissions footprint from off-site manufacturing of materials are based on the values or drop-down selections for Material Type and Quantity in Columns A and D. (The footprint calculations are made automatically in the “Component” tabs in the “Calculations” workbook.) You must make entries or selections in both Columns A and D, and you must select “Yes” in the drop-down menu in Column H, in order for the footprint calculations to be made. Additional notes:

(i) There may be instances in which you do not want the energy and air emissions footprint calculations to be performed on the material, in which case you should choose “No” in Column H. For example, the material may be from a “Reused” source, with no energy or air emissions footprint accruing to the cleanup site.

(ii) If you do not find the material you are looking for in the drop-down menu in Column A, you may add a “User-defined Material” to the drop-down menu. For instructions, please see the “User Defined Factors” tab in the “Input” workbook.

(iii) If you are using a material that is in the drop-down menu in Column A, but you have documented unique footprint conversion factors for that material that are different from the default footprint conversion factors in SEFA, you may add the unique material to the drop-down menu, as a “User-defined Material”. For instructions, please see the “User Defined Factors” tab in the “Input” workbook.

(b) Summation of total tons of refined and unrefined materials, and calculation of % materials from recycled or reused sources, are based on values or drop-down selections made in Columns D, F, and G. (The total tons and %’s are presented in Rows 7 - 10 of the “Summary” tab of the “Main” workbook.) You must make entries or selections in all three Columns (D, F, and G) in order for the materials to be included in the totals tons and %’s. Additional notes:

(i) The distinction between refined and unrefined material (Column F) is described in EPA’s Footprint Methodology (www.cluin.org/greenremediation/methodology).

(ii) For background information on the selection in Column G between “Virgin”, “Recycled”, and “Reused” materials, see the discussion in Section 15 below.

(iii) The selections for “Recycled” and “Reused” materials in Column G are combined in the calculation for “% of (un)refined materials from recycled or reused material” in Rows 8 and 10 in the “Summary” table of the “Main” workbook. The distinction between “Recycled” and “Reused” is retained in the dropdown menu in Column G for the convenience of the user.

(iv) If a material is obtained partly from virgin sources and partly from reused or recycled sources, you may enter the appropriate portions of the material on two separate rows in the "Materials Use and Transportation" table, and identify one portion as “Virgin” and the other portion as “Reused” or “Recycled”. For example, if your site uses 100,000 lbs of cement composed of 8% reused material (with no footprint accruing to the site from the reused portion) you may enter the information in Columns A, D, F, G, and H as follows.

First row (virgin source):	cement, 92000 lbs, refined, virgin, yes
Second row (reused source):	cement, 8000 lbs, refined, reused, no

(c) For materials identified as “Reused” or “Recycled”, you will typically choose “No” in the drop-down menu in Column H to indicate that no energy or air emissions footprint accrues to the cleanup site from production of the material. If you would like to account for the footprint from a “Reused” or “Recycled” material, you may add it as a “User-defined Material” to the drop-down list in Column A. For instructions, please see the “User Defined Materials” tab in the “Input” workbook.

Materials Transportation

(a) Calculations for Fuel Used in Column Q are based on the values or drop-down selections for Default One-way Distance, Number of One-way Trips, Mode of Transportation, and Fuel Type in Columns I, K, L, and N, respectively. You must make entries or selections in three of the columns (K, L, and N) in order for the Fuel Used to be calculated. You may override the Default One-way Distance by entering a site-specific One-way Distance in Column J.

(b) You may select any combination for Mode of Transportation (Column L) and Fuel Type (Column N). However, SEFA provides Default Fuel Usage Rates (Column O) for only the most common combinations. For combinations for which SEFA does not provide a Default Fuel Usage Rate, the message “NO DATA” will appear in Column O.

(c) You may override the Default Fuel Usage Rate. If you have a specific Fuel Usage Rate for any transportation/fuel combination, you may enter it in Column P. This will override the default value in Column O. You may also use Column P to designate the Fuel Usage Rate when "NO DATA" appears in Column O. When overriding or designating the Fuel Usage Rate in Column P, you must use the same units as noted in the drop-down menu in Column L.

(d) If "Aircraft" is selected as Mode of Transportation in Column L, you should select "Diesel" as the Fuel Type in Column N. SEFA contains Default Fuel Usage Rates only for diesel when "Aircraft" is selected, based on the assumption that diesel is similar to jet fuel.

(e) The option for electricity is not provided in Column N for materials transport. If electricity is used for transport, and if the electricity supply is provided on-site, you must enter it separately in the "On-Site Electricity Use" table (Row 43), in order for it to be included in the footprint analysis.

(f) The units for Default Fuel Usage Rate in Column O depend on the Mode of Transportation selected in Column L. If "Truck (mpg)" is selected, the units are Miles per Gallon (mpg). If "Truck freight (gptm)" is selected, the units are Gallons per Ton-Mile (gptm). For all other selections (Aircraft, Barge, and Train), the units are also Gallons per Ton-Mile. For background information on the selection of "Truck (mpg)" vs "Truck freight (gptm)", see the discussion in Section 16 below.

(g) When "Truck (mpg)" has been selected in Column L, you may want to account for return empty trips. When Truck freight, Aircraft, Barge, or Train has been selected you generally should not model an empty return trip. (For background information on modelling empty return trips, see the discussion in Section 16 below.) In order to account for return empty trips, you may want to use one of the following options:

(i) Double the Number of Trips in Column K.

(ii) Enter the empty return trips in a separate Row, leaving Columns D, F, G, and H blank. (You may select the material from the drop-down menu in Column A, if desired.) Fill in Columns K, L, and N, and be sure that there is an entry in either Column I or J (or both). Use the override function in Column P if desired.

Other

(a) The use of materials on-site may be modelled independently from transport of the materials to the site. For example, if a material is used on-site, but transport of the material is not applicable (e.g., the material is transported with the same vehicle used for personnel transportation or transport is screened out as a minimal contributor), then fill in Columns A - H, but not Columns I - Q. Conversely, if a material is being transported to the site, but the material is not to be included in any aspect of the footprint (e.g., total tons, % recycled, energy and air emissions footprints), then fill in Columns I - Q, but not Columns A - H.

(b) Open cells are provided in Rows 83 and 84, to allow additional flexibility for transportation/fuel combinations. When using these rows, you must still select the Fuel Type from the drop-down menu in Column N, in order for the fuel usage to be summed in the SEFA worksheets.

(c) If you are using a transportation fuel that is not provided in the drop-down menu in Column N, you may still include that fuel usage in the "Other Energy Use and Air Emissions" table beginning on Row 129 of the "Input Template" tab. Please see below for instructions on the use of that table.

10) Waste Disposal and Transportation (Row 90)

Use this table to model types and amounts of wastes generated by the remedy and to model the transport of wastes from the site.

Waste Disposal

(a) Calculations for the energy and air emissions footprint from management of waste generated on-site are based on the values or drop-down selections for Waste Destination and Quantity in Columns A and D. (The footprint calculations are made automatically in the "Component" tabs in the "Calculations" workbook.) You must make entries or selections in both Columns A and D, in order for the footprint calculations to be made. Additional notes:

(i) SEFA assumes no energy or air emissions footprint from the "Recycled/Reused On-Site" and "Recycled/Reused Off-Site" selections in the drop-down menu in Column A. To include energy or air emissions footprints for recycled or reused waste in the footprint analysis, you may add a "User-defined" item to the drop-down menu. For instructions, please see the "User Defined Factors" tab in the "Input" workbook.

(ii) Aside from reused or recycled wastes, if you do not find the off-site waste management destination or process that you are looking for in the drop-down menu in Column A, you may add a "User-defined" item to the drop-down menu. For instructions, please see the "User Defined Factors" tab in the "Input" workbook.

(iii) If you are using a waste destination or process that is in the drop-down menu in Column A, but you have documented unique footprint conversion factors for that waste destination or process that are different from the default footprint conversion factors in SEFA, you may add the unique waste destination or process to the drop-down menu, as a "User-defined" item. For instructions, please see the "User Defined Factors" tab in the "Input" workbook.

(b) Summation of total tons of hazardous and non-hazardous wastes, and calculation of % of waste that is recycled or reused, are based values or drop-down selections made in Columns A and D. (The total tons and %'s are presented in Rows 11 - 13 of the "Summary" tab of the "Main" workbook.) You must make entries or selections in both Columns (A and D) in order for the materials to be included in the totals tons and %'s. Additional notes:

(i) The distinction between hazardous and non-hazardous waste (in the drop-down menu in Column A) may depend on state and local regulations for the location of the site and waste destination. You should make the selection in Column A that best fits the waste at hand.

(ii) For waste that is recycled/reused, no distinction is made in SEFA between hazardous and non-hazardous waste. This conforms with EPA's Footprint Methodology (www.cluin.org/greenremediation/methodology).

(c) Although wastewater sent to a POTW is not strictly speaking a "waste", that item has been included in the "Waste Disposal and Transportation" table (in the drop-down menu in Column A) for the user's convenience.

Waste Transportation

(a) Calculations for Fuel Used in Column N are based on the values or drop-down selections for Default One-way Distance, Number of One-way Trips, Mode of Transportation, and Fuel Type in Columns F, H, I, and K, respectively. You must make entries or selections in three of the columns (H, I, and K) in order for the Fuel Used to be calculated. You may override the Default One-way Distance by entering a site-specific One-way Distance in Column G.

(b) The use of Columns F - N in the "Waste Disposal and Transportation" table in Row 90 is parallel to the use of Columns I - Q in the "Materials Use and Transportation" table in Row 65. Please see Section 9 above for notes and descriptions for use of this table.

(c) The default footprint conversion factors in SEFA for processing wastewater at a POTW include the typical footprint from transport of the wastewater through municipal lines. Therefore, you should leave Columns F - N blank when modelling "POTW" as a waste destination.

11) Water Use (Row 108)

Use this table to model the types and quantity of water used on-site by the remedy.

(a) To model water used on-site, select the source of water from the drop-down menu in Column A, and enter the quantity of water in Column D. Space for narrative remarks is provided in Columns F, J, N, and S for the convenience of the user. Entering information in Columns F, J, N, and S is optional. Additional notes:

(i) The items selected in the drop-down menu in Column A are summed according to source, and totals for each source are reported in Rows 14 - 20 in the "Summary" tab of the "Main" workbook.

(ii) Narrative remarks in Columns F, J, N, and S are not forwarded to the "Summary" tab in the "Main" workbook.

(b) SEFA provides default footprint conversion factors for energy and air emissions only for "Public Water" in the drop-down menu in Column A. These footprint conversion factors include the typical footprint from transport of the public water through municipal lines.

(c) For all other selections in the drop-down menu (besides "Public Water"), SEFA assumes no energy or air emissions footprint. If there are any significant activities related to extracting, reclaiming, collecting, or diverting the other types of water, you may want to model those activities separately in other sections of the "Input Template" tab.

(d) No data entry options are provided in the "Water Use" table for transport of water from off-site suppliers. If water is transported to the site by truck or other vehicle, you may use the "Materials" table on Row 65 to model the transport, and use the notes section in Column R of that table to identify the entry.

(i) If "Truck (mpg)" is being used for transport of the water, leave Columns A - H of the "Materials" table blank, and enter the relevant transport information in Columns I - Q.

(ii) If transport based on gptm is being used for the water, leave Columns A and F - H of the "Materials" table blank. Enter the quantity of water (in tons) in Column D, and relevant transport information in Columns J, L, N, and P.

(e) If you do not find the water source you are looking for in the drop-down menu in Column A, you may choose "Other Water Resource" from the drop-down menu. SEFA will sum the water usage in the "Summary" tab in the "Main" workbook, but will not calculate and energy and air emissions footprint for the selection.

12) Off-Site Laboratory Analysis (Row 129)

Use this table to model the types and number of analyses conducted at off-site laboratories.

(a) Enter the type of analysis, the approximate cost per analysis, and the number of samples undergoing the analysis.

(b) Although the individual entries are summed for the total cost in Cell V146, this total cost is not reported in the results in SEFA. Instead the total cost is used as a surrogate for economic activity, which in turn is used to estimate the footprint from the laboratory analyses. This approach is documented in the "Default Conversions" tab in the "Calculations" workbook.

13) Other Energy Use and Air Emissions (Row 129)

Use this table to model energy use and air emissions from on-site activities and transportation that have not been covered in any of the other tables in the "Input Template" tab. The "Other Energy Use and Air Emissions" table provides flexibility to include in the footprint analysis unique situations at your cleanup site. In all cases, you must perform your own estimates or calculations for the quantities to be entered in Column F of this table.

(a) Rows 132 and 133: If the remedy at your site uses a conventional (i.e., non-renewable) energy source on-site that is not represented elsewhere in the "Input Template" tab, you may add it as "User-defined on-site conventional energy use" in Rows 132 or 133. For example, you may have a boiler on-site that runs on fuel oil. For instructions, please see the "User Defined Factors" tab in the "Input" workbook.

(b) Row 134: If the remedy at your site results in emissions of on-site hazardous air pollutants (HAPs) that are not represented elsewhere in the "Input Template" tab, you may add them as "On-site HAP process emissions" in Row 134. For example, the treatment system at your site may release fugitive VOC emissions. Enter the quantity of the emissions in lbs in Cell F134, and use the notes space in Cell G134 to describe the source and type of emissions.

(c) Row 135: If the remedy at your site results in greenhouse gas (GHG) emissions that are not represented elsewhere in the "Input Template" tab, you may add them as "On-site GHG emissions" in Row 135. For example, the landfill gas collection system at your site may not be 100% efficient, resulting in fugitive emissions of methane. Enter the quantity of the emissions in lbs CO2e in Cell F135, and use the notes space in Cell G135 to describe the source and type of emissions.

(d) Row 136: If the remedy at your site results in carbon or greenhouse gas storage, you may add this as "On-site carbon storage" in Row 136. For example, you may have planted trees as part of your remedy, resulting in uptake of CO2. Enter the quantity of the carbon storage provided by the trees in lbs CO2e in Cell F136, and use the notes space in Cell G136 to describe the source and type of carbon storage. The quantity in Cell F136 must be entered as a negative number to represent storage.

(e) Row 137: If you are flaring landfill gas at your site, you may add this as "GHG avoided by flaring on-site landfill methane" in Row 137. Enter the quantity of methane flared in ccf CH4 in Cell F137, and use the notes space in Cell G137 to describe the source and type of GHG storage. Recall that landfill gas is not 100% methane and adjust the amount entered in Cell F137 accordingly. Use Row 137 only for landfill gas that is combusted but not used for energy production. For landfill gas used in energy production, use the "Landfill Gas Combusted On-Site for Energy Use" table on Row 53 of the "Input Template" tab. Additional notes:

(i) The greenhouse gas calculations in SEFA account for the avoidance of emissions of landfill methane, in addition to the emissions of CO2e as a result of the combustion process.

(ii) SEFA does not account for non-methane gases emitted from the landfill. You can account for these emissions on other rows in the "Other Energy Use and Air Emissions" table.

(f) Rows 138, 139, and 140: If the remedy at your site results in NOx, SOx, or PM emissions or reductions that are not represented elsewhere in the "Input Template" tab, you may add these as "Other on-site NOx/SOx/PM emissions or reductions" in Rows 138, 139, and 140. For example, NOx emissions may occur as a result of fertilizer application during reseeding of disturbed soils. As another example, PM reductions may be achieved through particulate filters on diesel equipment used on-site. Enter the quantity of NOx/SOx/PM emissions or reductions in lbs in Cells F138, F139, and F140, and use the notes spaces in Cells G138, G139, and G140 to describe the items. The quantities must be entered as positive numbers to represent emissions and negative numbers to represent reductions.

(g) Rows 143 and 144: If the remedy at your site uses a conventional (i.e., non-renewable) energy source for transportation that is not represented elsewhere in the "Input Template" tab, you may add it as "User-defined conventional energy transportation" in Rows 143 or 144. For example, you may want to more accurately model the fuel used in rail transport of materials to your site, instead of using the default assumption of diesel fuel. For instructions, please see the "User Defined Factors" tab in the "Input" workbook.

14) Other Voluntary Renewable Energy Use (Row 149)

Use this table to model renewable energy use from on-site activities and transportation that have not been covered in any of the other tables in the "Input Template" tab. The "Other Voluntary Renewable Energy Use" table provides flexibility to include in the footprint analysis unique situations at your cleanup site. In all cases, you must perform your own estimates or calculations for the quantities to be entered in Column F.

(a) Rows 151 and 152: If the remedy at your site uses a renewable energy source on-site that is not represented elsewhere in the "Input Template" tab, you may add it as "User-defined on-site renewable energy use" in Rows 151 or 152. For example, you may have a boiler on-site that runs on biomass. For instructions, please see the "User Defined Factors" tab in the "Input" workbook.

(b) Rows 153 and 154: If the remedy at your site uses a renewable energy source for transportation that is not represented elsewhere in the "Input Template" tab, you may add it as "User-defined renewable energy transportation" in Rows 153 or 154. For example, you may use vehicles that run on ethanol. For instructions, please see the "User Defined Factors" tab in the "Input" workbook.

(c) Rows 155 and 156: Use this space to document voluntary purchases of renewable electricity or Renewable Energy Certificates (RECs). Enter the quantity of the renewable purchases in MWh in Cells F155 and F156. Also fill out the tables beginning in Cells M149 and M153 of the "Input Template" tab with specifics on the renewable purchases. Consistent with the protocol described in EPA's Methodology, SEFA does not include in the footprint analysis any emissions reductions (or "credits") that may be associated with the renewable purchases. However, the MWh amounts for the renewable purchases are included in the "Summary" table of the "Main" workbook. Please refer to EPA's Methodology (www.cluin.org/greenremediation/methodology) for a description of the difference between the two types of renewable purchases, and the reasoning behind the protocol.

15) Discussion for Selection of Virgin vs Recycled vs Reused Materials

For each material added in the "Materials Use and Transportation" table on Row 65, you should select the material source from three options ("Virgin", "Recycled", or "Reused") in the drop-down menu in Column G.

(a) The first option, "Virgin", describes a material that is being used for the first time, that has come directly from the manufacturer or supplier, and is made from raw materials, not recycled or repurposed sources. For this option, you must select "Yes" in Column H in order for the energy and air emissions footprint for the material to be calculated in SEFA.

(b) The second option, "Recycled", describes a material that is created from sources that are being used for a second time or more. A recycled material usually has a smaller footprint than a material from virgin sources. There are several approaches for representing a recycled material in SEFA.

(i) You may select "No" in Column H if the item is assumed to have an insignificant energy and air emissions footprint or if the footprint does not accrue to the site. In this case no energy and air emissions footprint will be calculated for the material.

(ii) You may select "Yes" in Column H if the item is assumed to have an energy and air emissions footprint similar to the footprint of the virgin material. In this case the energy and air emissions footprint will be calculated using the default conversion factors in SEFA for the virgin material.

(iii) You may create a "User-defined Material" in the drop-down list in Column A for a material that has footprint conversion factors different from the default factors in SEFA. (The default conversion factors in SEFA can be found on the "Default Conversions" tab in the "Calculations" workbook. Instructions for creating a "User-defined Material" can be found on the "User Defined Materials" tab in the "Input" workbook.) If you create a "User-defined Material" to represent a recycled material, you must select "Yes" in Column H in order for the energy and air emissions footprint for the material to be calculated using the user-defined conversion factors.

(c) The third option, "Reused", describes a material that is taken from another location and used essentially unchanged. Assuming that there is no energy or air emissions footprint associated with the "Reused" material, or that the footprint does not accrue to the site, you would select "No" in Column H. In this case no energy and air emissions footprint will be calculated for the material. If you find that the "Reused" material does have an energy and air emissions footprint, you may follow the approaches noted above for "Recycled" materials.

16) Discussion of Miles per Gallon (mpg) vs Gallons per Ton-Mile (gptm)

Options for materials and waste transportation in the "Input Template" tab include "Truck (mpg)" which represents truck transport based on Miles per Gallon (mpg) and "Truck freight (gptm)" which represents truck transport based on Gallons per Ton-Mile (gptm). The selection for mode of transportation is made in the drop-down menu in the "Materials" table in Row 65 (Column L) and in the "Waste" table in Row 90 (Column I). Rules of thumb are noted below for the two options for truck transport (mpg and gptm). However, each cleanup site and remedy is unique, and you should use the mode of transport that is most representative for the situation at hand.

Note that the other modes of transportation in the drop-down menu (airplane, barge, and train) are based on gptm. The discussion below regarding "Truck freight (gptm)" is also relevant to gptm transport by airplane, barge, and train.

(a) Truck (mpg): Miles per Gallon is a unit of measure best used to describe the efficiency of a vehicle hauling a single load to a single location, and is determined by how many miles a vehicle can travel on one gallon of fuel. Additional notes:

(i) For mpg, fuel use is calculated based on the one-way distance between the site and supplier (or site and waste destination), number of one-way trips, and type of fuel selected. These items are found in Column I or J, Column L, and Column N, respectively, in the "Materials" table and in Column F or G, Column I, and Column K, respectively, in the "Waste" table.

(ii) Typically, truck transport using mpg will most accurately represent short-haul scenarios. These scenarios may include dump trucks hauling clean fill from a nearby borrow site, or hauling waste to a nearby municipal waste landfill.

(iii) Truck transport using mpg often results in an empty return trip. If this is the case at your site, you should model the empty return trip. As an estimation, you may assume the same fuel usage rate (mpg) for the empty return trip, or if you know the fuel usage rate (mpg) is different, you may override it.

(b) Truck freight (gptm): Gallons per Ton-Mile is best used to describe the efficiency of hauling freight on a vehicle that may be carrying multiple loads to multiple locations, and is determined by how many gallons of fuel it takes to haul a ton of freight one mile. Additional notes:

(i) For gptm, fuel use is calculated based on the weight of material or waste being transported, one-way distance between the site and supplier, and type of fuel selected. These items are found in Column E, Column I or J, and Column N, respectively, in the "Materials" table and in Column E, Column F or G, and Column K, respectively, in the "Waste" table.

(ii) Typically truck transport using gptm will most accurately represent long-haul scenarios. These scenarios may include transporting steel or treatment chemicals from the manufacturing location to a local distribution yard or to the site.

(iii) The fuel usage rate for truck transport using gptm includes return trips of transport vehicles, based on average transport activities. Therefore, you should not model empty return trips for this type of transport.

17) Additional Flexibility for Combustion of Fuels

SEFA provides additional flexibility for modeling combustion of biodiesel, diesel, gasoline, and natural gas used for on-site equipment and for transportation.

(a) If you are using biodiesel, diesel, gasoline, or natural gas for transportation that has a footprint for combustion that is different from the default footprint in SEFA, you may establish user-defined conversion factors for combustion of that fuel. (See the "Default Conversions" tab in the "Calculations" workbook for the default conversion factors in SEFA.) Note that any user-defined factors established for a fuel type will apply to all forms of transportation using that fuel type (i.e., all types of transportation selected in the "Personnel", "On-site Equipment Use", "Materials Use", and "Waste Disposal" tables in the "Input Template" tab). For instructions on establishing user-defined factors for biodiesel, diesel, gasoline, or natural gas used in transportation, please see the "User Defined Factors" tab in the "Input" workbook.

(b) Similar to the notes above, if you are using biodiesel, diesel, gasoline, or natural gas for on-site equipment that has a footprint for combustion that is different from the default footprint in SEFA, you may establish user-defined conversion factors for combustion of that fuel. (See the "Default Conversions" tab in the "Calculations" workbook for the default conversion factors in SEFA.) Note that any user-defined factors established for a fuel type will apply to all forms of on-site equipment using that fuel type (i.e., all types of equipment selected in Column A in the "On-Site Equipment Use and Transportation" table in the "Input Template" tab). For instructions on establishing user-defined factors for biodiesel, diesel, gasoline, or natural gas used in on-site equipment, please see the "User Defined Factors" tab in the "Input" workbook.

Input Summary

Remedy Component Number →			2	3	4											Component Subtotals						Total
		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns E - R in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns S - X) or used in subsequent calculations)																				
Item		Site Investigation	Excavation	Soil Sent Off-Site	Backfill		Pump and Treat	Groundwater Monitoring	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	1	2	3	4	5	6	
On-Site																						
On-site Renewable Energy																						
Renewable electricity generated on-site	MWh		0	0	0											0	0	0	0	0	0	0
Landfill gas combusted on-site for energy use	ccf CH_4		0	0	0											0	0	0	0	0	0	0
On-site biodiesel use	gal		0	0	0											0	0	0	0	0	0	0
User-defined on-site renewable energy use #1	TBD		0	0	0											0	0	0	0	0	0	0
User-defined on-site renewable energy use #2	TBD		0	0	0											0	0	0	0	0	0	0
On-Site Conventional Energy																						
Grid electricity	MWh		0	0	0											0	0	0	0	0	0	0
On-site diesel use	Gal		5906.25	0	2925											0	5906.25	0	2925	0	0	8831.25
On-site gasoline use	Gal		68.04	0	0											0	68.04	0	0	0	0	68.04
On-site natural gas use	ccf		0	0	0											0	0	0	0	0	0	0
User-defined on-site conventional energy use #1	TBD		0	0	0											0	0	0	0	0	0	0
User-defined on-site conventional energy use #2	TBD		0	0	0											0	0	0	0	0	0	0
Other On-site Emissions																						
On-site HAP process emissions	Lbs		0	0	0											0	0	0	0	0	0	0
On-site GHG emissions	Lbs CO2e		0	0	0											0	0	0	0	0	0	0
On-site carbon storage	Lbs CO2e		0	0	0											0	0	0	0	0	0	0
GHG avoided by flaring on-site landfill methane	ccf CH4		0	0	0											0	0	0	0	0	0	0
Other on-site NOx emissions or reductions	Lbs		0	0	0											0	0	0	0	0	0	0
Other on-site SOx emissions or reductions	Lbs		0	0	0											0	0	0	0	0	0	0
Other on-site PM emissions or reductions	Lbs		0	0	0											0	0	0	0	0	0	0
Electricity Generation																						
Grid electricity	MWh		0	0	0											0	0	0	0	0	0	0
Voluntary purchase of renewable electricity	MWh		0	0	0											0	0	0	0	0	0	0
Voluntary purchase of RECs	MWh		0	0	0											0	0	0	0	0	0	0
Transportation Fuel Use Breakdown																						
Biodiesel use - Personnel Transport	gal		0	0	0											0	0	0	0	0	0	0
Biodiesel use - Equipment Transport	gal		0	0	0											0	0	0	0	0	0	0
Biodiesel use - Material Transport	gal		0	0	0											0	0	0	0	0	0	0
Biodiesel use - Waste Transport	gal		0	0	0											0	0	0	0	0	0	0
Diesel use - Personnel Transport	gal		0	0	0											0	0	0	0	0	0	0
Diesel use - Equipment Transport	gal		50.1	0	0											0	50.1	0	0	0	0	50.1
Diesel use - Material Transport	gal		3.3	0	6341.6											0	3.3	0	6341.6	0	0	6344.9
Diesel use - Waste Transport	gal		4.2	7053.4	0											0	4.2	7053.4	0	0	0	7057.6
Gasoline use - Personnel Transport	gal		358.5	0	119.5											0	358.5	0	119.5	0	0	478
Gasoline use - Equipment Transport	gal		0	0	0											0	0	0	0	0	0	0
Natural Gas use - Personnel Transport	ccf		0	0	0											0	0	0	0	0	0	0
Natural Gas use - Equipment Transport	ccf		0	0	0											0	0	0	0	0	0	0
Transportation																						
Conventional Energy																						
Transportation diesel use	gal		57.6	7053.4	6341.6											0	57.6	7053.4	6341.6	0	0	13452.6
Transportation gasoline use	gal		358.5	0	119.5											0	358.5	0	119.5	0	0	478
Transportation natural gas use	ccf		0	0	0											0	0	0	0	0	0	0
User-defined conventional energy transportation #1	TBD		0	0	0											0	0	0	0	0	0	0
User-defined conventional energy transportation #2	TBD		0	0	0											0	0	0	0	0	0	0
Renewable Energy																						
Transportation biodiesel use	gal		0	0	0											0	0	0	0	0	0	0
User-defined renewable energy transportation #1	TBD		0	0	0											0	0	0	0	0	0	0
User-defined renewable energy transportation #2	TBD		0	0	0											0	0	0	0	0	0	0

Input Summary

Remedy Component Number →			2	3	4											Component Subtotals						Total
		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns E - R in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns S - X) or used in subsequent calculations)																				
Item		Site Investigation	Excavation	Soil Sent Off-Site	Backfill		Pump and Treat	Groundwater Monitoring	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	1	2	3	4	5	6	
Off-Site																						
Construction Materials																						
Cement	dry-lbs		0	0	0											0	0	0	0	0	0	0
Concrete	lbs		0	0	0											0	0	0	0	0	0	0
Gravel/sand/clay	lbs		0	0	0											0	0	0	0	0	0	0
HDPE	lbs		450	0	0											0	450	0	0	0	0	450
Photovoltaic system (installed)	W		0	0	0											0	0	0	0	0	0	0
PVC	lbs		0	0	0											0	0	0	0	0	0	0
Stainless steel	lbs		0	0	0											0	0	0	0	0	0	0
Steel	lbs		0	0	0											0	0	0	0	0	0	0
Other refined construction materials	lbs		0	0	0											0	0	0	0	0	0	0
Other unrefined construction materials	lbs		0	0	0											0	0	0	0	0	0	0
Treatment Materials & Chemicals																						
Cheese whey	lbs		0	0	0											0	0	0	0	0	0	0
Emulsified vegetable oil	lbs		0	0	0											0	0	0	0	0	0	0
Molasses	lbs		0	0	0											0	0	0	0	0	0	0
Virgin GAC (coal based)	lbs		0	0	0											0	0	0	0	0	0	0
Other treatment chemicals & materials	lbs		0	0	0											0	0	0	0	0	0	0
Material Type																						
Total Virgin Refined Materials	tons		0.225	0	0											0	0.225	0	0	0	0	0.225
Total Recycled Refined Materials	tons		0	0	0											0	0	0	0	0	0	0
Total Reused Refined Materials	tons		0	0	0											0	0	0	0	0	0	0
Total Refined Material	tons		0.225	0	0											0	0.225	0	0	0	0	0.225
Total Virgin Unrefined Materials	tons		0	0	15216											0	0	0	15216	0	0	15216
Total Recycled Unrefined Materials	tons		0	0	0											0	0	0	0	0	0	0
Total Reused Unrefined Materials	tons		0	0	0											0	0	0	0	0	0	0
Total Unrefined Material	tons		0	0	15216											0	0	0	15216	0	0	15216
Fuel Processing																						
Biodiesel produced	gal		0	0	0											0	0	0	0	0	0	0
Diesel produced	gal		5963.85	7053.4	9266.6											0	5963.85	7053.4	9266.6	0	0	22283.85
Gasoline produced	gal		426.54	0	119.5											0	426.54	0	119.5	0	0	546.04
Natural gas produced	ccf		0	0	0											0	0	0	0	0	0	0
Water Use																						
Public Water Supply	gal x 1000		11.25	0	3.75											0	11.25	0	3.75	0	0	15
Extracted Groundwater	gal x 1000		0	0	0											0	0	0	0	0	0	0
Surface Water	gal x 1000		0	0	0											0	0	0	0	0	0	0
Reclaimed Water	gal x 1000		0	0	0											0	0	0	0	0	0	0
Collected/Diverted Storm Water	gal x 1000		0	0	0											0	0	0	0	0	0	0
Other Water Resource #1	gal x 1000		0	0	0											0	0	0	0	0	0	0
Other Water Resource #2	gal x 1000		0	0	0											0	0	0	0	0	0	0
Waste/Recycle Handling																						
Off-site waste water treatment (POTW)	gal x 1000		0	0	0											0	0	0	0	0	0	0
Off-site non-hazardous waste landfill	tons		0	18400	0											0	0	18400	0	0	0	18400
Off-site hazardous waste landfill	tons		0	0	0											0	0	0	0	0	0	0
Recycled/Reused On-Site	tons		2	0	0											0	2	0	0	0	0	2
Recycled/Reused Off-Site	tons		0	0	0											0	0	0	0	0	0	0
Solid Waste Totals																						
Total Non-Hazardous Waste	tons		0	18400	0											0	0	18400	0	0	0	18400
Total Hazardous Waste	tons		0	0	0											0	0	0	0	0	0	0
Total Recycled/Reused	tons		2	0	0											0	2	0	0	0	0	2
Total Waste (all types)	tons		2	18400	0											0	2	18400	0	0	0	18402
Lab Services																						
Off-site laboratory analysis	$		28804	0	1500											0	28804	0	1500	0	0	30304
Resource Extraction for Electricity																						
Coal extraction and processing	MWh															0	0	0	0	0	0	0
Natural gas extraction and processing	MWh															0	0	0	0	0	0	0
Nuclear fuel extraction and processing	MWh															0	0	0	0	0	0	0
Oil extraction and processing	MWh															0	0	0	0	0	0	0
Other fuel extraction and processing	MWh															0	0	0	0	0	0	0
Electricity Transmission																						
Transmission and distribution losses	MWh		0	0	0											0	0	0	0	0	0	0

Input Summary

Remedy Component Number →			2	3	4											Component Subtotals						Total
		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns E - R in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns S - X) or used in subsequent calculations)																				
Item		Site Investigation	Excavation	Soil Sent Off-Site	Backfill		Pump and Treat	Groundwater Monitoring	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	1	2	3	4	5	6	
Other																						
Lime	lb		0	0	0											0	0	0	0	0	0	0
Clean fill	tons		0	0	15216											0	0	0	15216	0	0	15216
Drain rock	tons		0	0	0											0	0	0	0	0	0	0
User-defined material #4	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #5	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #6	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #7	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #8	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #9	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #10	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #11	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #12	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #13	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #14	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #15	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #16	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #17	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #18	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #19	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #20	TBD		0	0	0											0	0	0	0	0	0	0
User-defined Waste Destinations																						
User-defined recycled/reused on-site #1	TBD		0	0	0											0	0	0	0	0	0	0
User-defined recycled/reused on-site #2	TBD		0	0	0											0	0	0	0	0	0	0
User-defined recycled/reused on-site #3	TBD		0	0	0											0	0	0	0	0	0	0
User-defined recycled/reused off-site #1	TBD		0	0	0											0	0	0	0	0	0	0
User-defined recycled/reused off-site #2	TBD		0	0	0											0	0	0	0	0	0	0
User-defined recycled/reused off-site #3	TBD		0	0	0											0	0	0	0	0	0	0
User-defined non-hazardous waste destination #1	TBD		0	0	0											0	0	0	0	0	0	0
User-defined non-hazardous waste destination #2	TBD		0	0	0											0	0	0	0	0	0	0
User-defined non-hazardous waste destination #3	TBD		0	0	0											0	0	0	0	0	0	0
Off-site hazardous waste incinerator	ton		0	0	0											0	0	0	0	0	0	0
User-defined hazardous waste destination #2	TBD		0	0	0											0	0	0	0	0	0	0
User-defined hazardous waste destination #3	TBD		0	0	0											0	0	0	0	0	0	0

Input Worksheet for Input Template

Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results)	**Component 1**	**NA**

General Scope

Example Items Eliminated through Screening Process

Other Notes and References

Personnel Transportation

Participant	Number of Roundtrips to Site	Roundtrip Distance to Site (miles)	Mode of Transportation*	Transport Fuel Type*	Total Distance Transported (miles)	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Personnel Transport**	Activity or Notes

**** See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.***

***** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.***

On-Site Equipment Use and Transportation

Equipment Type*	HP*	Load Factor (%)*	Equipment Fuel Type	Equipment Fuel Usage Rate (gal/hr)	Equipment Hours Operated	Fuel Used for On-site Equipment (gallons)	Number of Equipment Roundtrips to Site	Roundtrip Distance to Site (miles)	Total Distance Transported (miles)	Transport Fuel Type	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Equipment Transport**	Activity or Notes

**** HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.***

***** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.***

On-Site Electricity Use

Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
					Estimated Total Electricity Usage Based on Above	0	
					Renewable Electricity Generated On-Site*		
#REF!					Total Grid Electricity Used	0	

**** Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).***

On-Site Natural Gas Use

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (ccf)	Notes
					0	
				0		
		Totals	0	0	0	

Landfill Gas Combusted On-Site for Energy Use

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Landfill Gas Methane Used (ccf)	Notes
			0	
			0	
		Total	0	

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

Input Worksheet for Input Template

Remedy Component that this Input worksheet is part of:	Component 1	NA

Materials Use and Transportation

Material Type*	Unit	Quantity	Tons	Is the Material Refined or Unrefined?**	Material Source: Virgin, Recycled, or Reused?**	Calculate Item Footprint?**	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation***	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Materials Transport (gallons)	Notes and Description of Materials
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												

** Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.*

*** Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.*

**** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, and P.*

Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation**	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									

** No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.*

*** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, and M.*

Water Use

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

** Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections. Please see the "Detailed Notes and Explanations" tab for additional information.*

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

Remedy Component that this Input worksheet is part of:	Component 1	NA

Input Worksheet for Input Template

Other Energy Use and Air Emissions

Item		Units	Quantity	Notes
On-Site				
User-defined on-site conventional energy use #1	*User-Defined	TBD		
User-defined on-site conventional energy use #2	*User-Defined	TBD		
On-site HAP process emissions**		lbs		
On-site GHG emissions**		lbs CO2e		
On-site carbon storage**		lbs CO2e		
GHG avoided by flaring on-site landfill methane		ccf CH4		
Other on-site NOx emissions or reductions**		lbs		
Other on-site SOx emissions or reductions**		lbs		
Other on-site PM emissions or reductions**		lbs		
Transportation		**Units**	**Quantity**	**Notes**
User-defined conventional energy transportation #1	*User-Defined	TBD		
User-defined conventional energy transportation #2	*User-Defined	TBD		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Enter a positive number for emissions and a negative number for reductions, avoidances, or storage***
See the "Detailed Notes and Explanations" tab for use of this table

Other Voluntary Renewable Energy Use

Item		Units	Quantity	Notes
User-defined on-site renewable energy use #1	*User-Defined	TBD		
User-defined on-site renewable energy use #2	*User-Defined	TBD		
User-defined renewable energy transportation #1	*User-Defined	TBD		
User-defined renewable energy transportation #2	*User-Defined	TBD		
Voluntary purchase of renewable electricity**		MWh		
Voluntary purchase of RECs**		MWh		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Complete information on provider in the table to the right. No footprint reductions are associated with the voluntary purchases.***
See the "Detailed Notes and Explanations" tab for use of this table

Off-Site Laboratory Analysis

Parameter and Notes	Unit Cost ($)	Number of Samples	Total Cost
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
Totals		**0**	**0**

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	

Input Worksheet for NA

Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results)	**Component 1**	**NA**

General Scope

Example Items Eliminated through Screening Process

Other Notes and References

Personnel Transportation

Participant	Number of Roundtrips to Site	Roundtrip Distance to Site (miles)	Mode of Transportation*	Transport Fuel Type*	Total Distance Transported (miles)	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Personnel Transport**	Activity or Notes

** See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.*

*** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.*

On-Site Equipment Use and Transportation

Equipment Type*	HP*	Load Factor (%)*	Equipment Fuel Type	Equipment Fuel Usage Rate (gal/hr)	Equipment Hours Operated	Fuel Used for On-site Equipment (gallons)	Number of Equipment Roundtrips to Site	Roundtrip Distance to Site (miles)	Total Distance Transported (miles)	Transport Fuel Type	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Equipment Transport**	Activity or Notes

** HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.*

*** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.*

On-Site Electricity Use

Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
					Estimated Total Electricity Usage Based on Above	0	
					Renewable Electricity Generated On-Site*		
#REF!					Total Grid Electricity Used	0	

** Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).*

On-Site Natural Gas Use

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (ccf)	Notes
					0	
				0		
		Totals	0	0	0	

Landfill Gas Combusted On-Site for Energy Use

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Landfill Gas Methane Used (ccf)	Notes
			0	
			0	
		Total	0	

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

Input Worksheet for NA

Remedy Component that this Input worksheet is part of:	Component 1	NA

Materials Use and Transportation

Material Type*	Unit	Quantity	Tons	Is the Material Refined or Unrefined?**	Material Source: Virgin, Recycled, or Reused?**	Calculate Item Footprint?**	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation***	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Materials Transport (gallons)	Notes and Description of Materials
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												

** Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.*

*** Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.*

**** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, and P.*

Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation**	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
			0									Drill cuttings to landfill
			0									Empty return trip (drill cuttings)
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									

** No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.*

*** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, and M.*

Water Use

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

** Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections. Please see the "Detailed Notes and Explanations" tab for additional information.*

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

Remedy Component that this Input worksheet is part of:	Component 1	NA

Input Worksheet for NA

Other Energy Use and Air Emissions

Item		Units	Quantity	Notes
On-Site				
User-defined on-site conventional energy use #1	*User-Defined	TBD		
User-defined on-site conventional energy use #2	*User-Defined	TBD		
On-site HAP process emissions**		lbs		
On-site GHG emissions**		lbs CO2e		
On-site carbon storage**		lbs CO2e		
GHG avoided by flaring on-site landfill methane		ccf CH4		
Other on-site NOx emissions or reductions**		lbs		
Other on-site SOx emissions or reductions**		lbs		
Other on-site PM emissions or reductions**		lbs		
Transportation		**Units**	**Quantity**	**Notes**
User-defined conventional energy transportation #1	*User-Defined	TBD		
User-defined conventional energy transportation #2	*User-Defined	TBD		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Enter a positive number for emissions and a negative number for reductions, avoidances, or storage***
See the "Detailed Notes and Explanations" tab for use of this table

Other Voluntary Renewable Energy Use

Item		Units	Quantity	Notes
User-defined on-site renewable energy use #1	*User-Defined	TBD		
User-defined on-site renewable energy use #2	*User-Defined	TBD		
User-defined renewable energy transportation #1	*User-Defined	TBD		
User-defined renewable energy transportation #2	*User-Defined	TBD		
Voluntary purchase of renewable electricity**		MWh		
Voluntary purchase of RECs**		MWh		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Complete information on provider in the table to the right. No footprint reductions are associated with the voluntary purchases.***
See the "Detailed Notes and Explanations" tab for use of this table

Off-Site Laboratory Analysis

Parameter and Notes	Unit Cost ($)	Number of Samples	Total Cost
SVOCs	150	300	45,000
Metals	150	100	15,000
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
Totals		**400**	**60,000**

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	

Input Worksheet for Excavation

Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results)	**Component 2**	**Excavation**

General Scope

Remove vegetation and concrete paving.
Excavate approximately 11,500 cubic yards of contaminated soil over 45 days (equipment at 6 hours per day)
(Note that transport of soil to landfill is on separate tab.)

Example Items Eliminated through Screening Process

Not included in footprint analysis:
- potable water for equipment decontamination
- reagents, sampling containers, and other materials use for samplin g of wastes
- personnel protective equipment

Other Notes and References

Personnel Transportation

Participant	Number of Roundtrips to Site	Roundtrip Distance to Site (miles)	Mode of Transportation*	Transport Fuel Type*	Total Distance Transported (miles)	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Personnel Transport**	Activity or Notes
Excavator crew	90	50	Light-Duty Truck	Gasoline	4,500	17		265	
Project management	45	50	Car	Gasoline	2,250	24		94	

**** See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.***

***** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.***

On-Site Equipment Use and Transportation

Equipment Type*	HP*	Load Factor (%)*	Equipment Fuel Type	Equipment Fuel Usage Rate (gal/hr)	Equipment Hours Operated	Fuel Used for On-site Equipment (gallons)	Number of Equipment Roundtrips to Site	Roundtrip Distance to Site (miles)	Total Distance Transported (miles)	Transport Fuel Type	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Equipment Transport**	Activity or Notes
Excavator - large (250 HP)	250	75%	Diesel	9.375	270	2,531	1	100	100	Diesel	6		17	
Loader (200 HP)	200	75%	Diesel	7.5	270	2,025	1	100	100	Diesel	6		17	
Water truck (400 HP)	400	75%	Diesel	15	90	1,350	1	100	100	Diesel	6		17	
Generator - HP varies	12	75%	Gasoline	0.504	135	68.04	1	100	100					3 hours/day for pumps and other small equipment

**** HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.***

***** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.***

On-Site Electricity Use

Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
					Estimated Total Electricity Usage Based on Above	0	
					Renewable Electricity Generated On-Site*		
#REF!					Total Grid Electricity Used	0	

**** Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).***

On-Site Natural Gas Use

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (ccf)	Notes
					0	
				0		
		Totals	0	0	0	

Landfill Gas Combusted On-Site for Energy Use

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Landfill Gas Methane Used (ccf)	Notes
			0	
			0	
		Total	0	

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

Input Worksheet for Excavation

Remedy Component that this Input worksheet is part of: | **Component 2** | **Excavation**

Materials Use and Transportation

Material Type*	Unit	Quantity	Tons	Is the Material Refined or Unrefined?**	Material Source: Virgin, Recycled, or Reused?**	Calculate Item Footprint?**	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation***	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Materials Transport (gallons)	Notes and Description of Materials
HDPE	lb	450	0.225	Refined	Virgin	Yes	500	500	n/a	Truck freight (gptm)	Diesel	0.029		3	HDPE liner for stockpiling excavated soil (25 lbs/1000 sq ft), use 2 at a time, replaced every 5 days
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												

**** Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.***

***** Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.***

****** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, and P.***

Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation**	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
Off-site non-hazardous waste landfill	tons	0	0	25	35	0	Truck (mpg)	Diesel	6		0	Concrete paving sent to off-site municipal solid waste landfill
		0	0		35	0	Truck (mpg)	Diesel	6		0	Empty return trip (non-haz waste)
Recycled/reused on-site	tons	2	2	0	25	1	Truck (mpg)	Diesel	6		4.2	Vegetation removed before excavation and used on-site as mulch
Recycled/reused off-site	tons	0	0	50	25	0	Truck (mpg)	Diesel	6		0	Concrete paving removed before excavation and shipped off-site for reuse (truck transport is attributed to receiving location)
			0									
Recycled/reused on-site	tons	0	0	0	0	0						Soil moved for containment berm
			0									
			0									
			0									
			0									
			0									
			0									

**** No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.***

***** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, and M.***

Water Use

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
Public Water	gal x 1000	11.25	47	Public water supplied through municipal lines	High quality potable water	On-site dust control, 250 gal/day	Evaporation or infiltration into soil
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

**** Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections. Please see the "Detailed Notes and Explanations" tab for additional information.***

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

Input Worksheet for Excavation

Remedy Component that this Input worksheet is part of:	Component 2	Excavation

Other Energy Use and Air Emissions

Item		Units	Quantity	Notes
On-Site				
User-defined on-site conventional energy use #1	*User-Defined	TBD		
User-defined on-site conventional energy use #2	*User-Defined	TBD		
On-site HAP process emissions**		lbs		
On-site GHG emissions**		lbs CO2e		
On-site carbon storage**		lbs CO2e		
GHG avoided by flaring on-site landfill methane		ccf CH4		
Other on-site NOx emissions or reductions**		lbs		
Other on-site SOx emissions or reductions**		lbs		
Other on-site PM emissions or reductions**		lbs		
Transportation		**Units**	**Quantity**	**Notes**
User-defined conventional energy transportation #1	*User-Defined	TBD		
User-defined conventional energy transportation #2	*User-Defined	TBD		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Enter a positive number for emissions and a negative number for reductions, avoidances, or storage***
See the "Detailed Notes and Explanations" tab for use of this table

Other Voluntary Renewable Energy Use

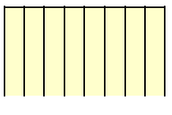
Item		Units	Quantity	Notes
User-defined on-site renewable energy use #1	*User-Defined	TBD		
User-defined on-site renewable energy use #2	*User-Defined	TBD		
User-defined renewable energy transportation #1	*User-Defined	TBD		
User-defined renewable energy transportation #2	*User-Defined	TBD		
Voluntary purchase of renewable electricity**		MWh		
Voluntary purchase of RECs**		MWh		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Complete information on provider in the table to the right. No footprint reductions are associated with the voluntary purchases.***
See the "Detailed Notes and Explanations" tab for use of this table

Off-Site Laboratory Analysis

Parameter and Notes	Unit Cost ($)	Number of Samples	Total Cost
Waste characterization	486	14	6,804
Confirmation samples	220	100	22,000
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
Totals		**114**	**28,804**

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	



Input Worksheet for Soil Sent Off-Site

Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results)	**Component 3**	**Soil Sent Off-Site**

General Scope

Transport approximately 11,500 cubic yards (18400 ton at 1.6 tons/yd)

Example Items Eliminated through Screening Process

Not included in footprint analysis:
- tarps or coverings for trucks
- potable water for equipment decontamination
- personnel protective equipment

Other Notes and References

Personnel Transportation

Participant	Number of Roundtrips to Site	Roundtrip Distance to Site (miles)	Mode of Transportation*	Transport Fuel Type*	Total Distance Transported (miles)	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Personnel Transport**	Activity or Notes

**** See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.***

***** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.***

On-Site Equipment Use and Transportation

Equipment Type*	HP*	Load Factor (%)*	Equipment Fuel Type	Equipment Fuel Usage Rate (gal/hr)	Equipment Hours Operated	Fuel Used for On-site Equipment (gallons)	Number of Equipment Roundtrips to Site	Roundtrip Distance to Site (miles)	Total Distance Transported (miles)	Transport Fuel Type	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Equipment Transport**	Activity or Notes

**** HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.***

***** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.***

On-Site Electricity Use

Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
					Estimated Total Electricity Usage Based on Above	0	
					Renewable Electricity Generated On-Site*		
#REF!					Total Grid Electricity Used	0	

**** Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).***

On-Site Natural Gas Use

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (ccf)	Notes
					0	
				0		
		Totals	0	0	0	

Landfill Gas Combusted On-Site for Energy Use

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Landfill Gas Methane Used (ccf)	Notes
			0	
			0	
		Total	0	

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

Input Worksheet for Soil Sent Off-Site

Remedy Component that this Input worksheet is part of:	Component 3	Soil Sent Off-Site

Materials Use and Transportation

Material Type*	Unit	Quantity	Tons	Is the Material Refined or Unrefined?**	Material Source: Virgin, Recycled, or Reused?**	Calculate Item Footprint?**	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation***	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Materials Transport (gallons)	Notes and Description of Materials
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												

**** Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.***

***** Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.***

****** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, and P.***

Excavated soil sent to off-site hazardous waste landfill

Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation**	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
Off-site hazardous waste landfill	tons	0	0	500	680	0	Truck (mpg)	Diesel	6		0	Excavated soil sent to off-site hazardous waste landfill
			0		680	0	Truck (mpg)	Diesel	6		0	Empty return trip (haz waste to landfill)
Off-site non-hazardous waste landfill	tons	18,400	18,400	25	23	920	Truck (mpg)	Diesel	6		3,527	Excavated soil sent to off-site non-hazardous waste landfill
			0		23	920	Truck (mpg)	Diesel	6		3,527	Empty return trip (non-haz waste to landfill)
Off-site hazardous waste incinerator	ton	0	0	500	2,000	0	Truck (mpg)	Diesel	6		0	Excavated soil sent to off-site hazardous waste incinerator
			0		2,000	0	Truck (mpg)	Diesel	6		0	Empty return trip (haz waste to incinerator)
			0									
			0									
			0									
			0									
			0									
			0									

**** No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.***

***** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, and M.***

Water Use

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

**** Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections. Please see the "Detailed Notes and Explanations" tab for additional information.***

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

Remedy Component that this Input worksheet is part of:	Component 3	Soil Sent Off-Site

Input Worksheet for Soil Sent Off-Site

Other Energy Use and Air Emissions

Item		Units	Quantity	Notes
On-Site				
User-defined on-site conventional energy use #1	*User-Defined	TBD		
User-defined on-site conventional energy use #2	*User-Defined	TBD		
On-site HAP process emissions**		lbs		
On-site GHG emissions**		lbs CO2e		
On-site carbon storage**		lbs CO2e		
GHG avoided by flaring on-site landfill methane		ccf CH4		
Other on-site NOx emissions or reductions**		lbs		
Other on-site SOx emissions or reductions**		lbs		
Other on-site PM emissions or reductions**		lbs		
Transportation		**Units**	**Quantity**	**Notes**
User-defined conventional energy transportation #1	*User-Defined	TBD		
User-defined conventional energy transportation #2	*User-Defined	TBD		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Enter a positive number for emissions and a negative number for reductions, avoidances, or storage***
See the "Detailed Notes and Explanations" tab for use of this table

Other Voluntary Renewable Energy Use

Item		Units	Quantity	Notes
User-defined on-site renewable energy use #1	*User-Defined	TBD		
User-defined on-site renewable energy use #2	*User-Defined	TBD		
User-defined renewable energy transportation #1	*User-Defined	TBD		
User-defined renewable energy transportation #2	*User-Defined	TBD		
Voluntary purchase of renewable electricity**		MWh		
Voluntary purchase of RECs**		MWh		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Complete information on provider in the table to the right. No footprint reductions are associated with the voluntary purchases.***
See the "Detailed Notes and Explanations" tab for use of this table

Off-Site Laboratory Analysis

Parameter and Notes	Unit Cost ($)	Number of Samples	Total Cost
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
Totals		**0**	**0**

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	

Input Worksheet for Backfill

Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results)	**Component 4**	**Backfill/Capping**

General Scope

Transport approximately 9510 yds/15216 tons of backfill material to site (15 days):
Backfill excavated areas.

Example Items Eliminated through Screening Process

Not included in footprint analysis:
- personnel protective equipment
- reagents, sampling containers, and other materials used fo sampling of clean fill

Other Notes and References

Personnel Transportation

Participant	Number of Roundtrips to Site	Roundtrip Distance to Site (miles)	Mode of Transportation*	Transport Fuel Type*	Total Distance Transported (miles)	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Personnel Transport**	Activity or Notes
Backfilling crew	30	50	Light-Duty Truck	Gasoline	1500	17		88	
Project management	15	50	Car	Gasoline	750	24		31	

**** See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.***

***** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.***

On-Site Equipment Use and Transportation

Equipment Type*	HP*	Load Factor (%)*	Equipment Fuel Type	Equipment Fuel Usage Rate (gal/hr)	Equipment Hours Operated	Fuel Used for On-site Equipment (gallons)	Number of Equipment Roundtrips to Site	Roundtrip Distance to Site (miles)	Total Distance Transported (miles)	Transport Fuel Type	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Equipment Transport**	Activity or Notes
Excavator - large (250 HP)	250	75%	Diesel	9.375	120	1125	0	0						No mobilization -- mobilized during excavation stage of project
							0	0						
Loader (200 HP)	200	75%	Diesel	7.5	120	900	0	0						No mobilization -- mobilized during excavation stage of project
Water truck (400 HP)	400	75%	Diesel	15	60	900	0	0						No mobilization -- mobilized during excavation stage of project
Dump truck (400 HP)	400	75%	Diesel	15	0	0	0	100		Diesel	6			Hauling clean fill from on-site stockpile
Dump truck (400 HP)	400	75%	Diesel	15	0	0	0	100		Diesel	6			Hauling clean fill from on-site stockpile

**** HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.***

***** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.***

On-Site Electricity Use

Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
					Estimated Total Electricity Usage Based on Above	0	
					Renewable Electricity Generated On-Site*		
#REF!					Total Grid Electricity Used	0	

**** Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).***

On-Site Natural Gas Use

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (ccf)	Notes
					0	
				0		
		Totals	0	0	0	

Landfill Gas Combusted On-Site for Energy Use

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Landfill Gas Methane Used (ccf)	Notes
			0	
			0	
		Total	0	

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

Input Worksheet for Backfill

Remedy Component that this Input worksheet is part of:	**Component 4**	**Backfill/Capping**

Materials Use and Transportation

Material Type*	Unit	Quantity	Tons	Is the Material Refined or Unrefined?**	Material Source: Virgin, Recycled, or Reused?**	Calculate Item Footprint?**	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation***	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Materials Transport (gallons)	Notes and Description of Materials
Clean fill	tons	15,216	15,216	Unrefined	Virgin	Yes	500	25	761	Truck (mpg)	Diesel	6		3171	Clean fill from off-site for backfilling
			0					25	761	Truck (mpg)	Diesel	6		3171	Empty return trip (clean fill from off-site)
Clean fill	tons	0	0	Unrefined	Reused	No	500	n/a	n/a						Contaminated fill material moved on-site for berm
			0												(on-site transport modeled in equipment table above)
Drain rock	tons	0	0	Unrefined	Virgin	Yes	500	50	0	Truck (mpg)	Diesel	6		0	Drain rock from off-site for backfilling
			0					50	0	Truck (mpg)	Diesel	6		0	Empty return trip (drain rock from off-site)
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												

**** Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.***

***** Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.***

****** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, and P.***

Clean fill from on-site for backfilling

Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation**	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									

**** No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.***

***** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, and M.***

Water Use

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
Public Water	gal x 1000	3.75	16	Public water supplied through municipal lines	High quality potable water	On-site dust control, 250 gal per day	Evaporation or infiltration into soil
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

**** Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections. Please see the "Detailed Notes and Explanations" tab for additional information.***

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

Remedy Component that this Input worksheet is part of:	**Component 4**	**Backfill/Capping**

Input Worksheet for Backfill

Other Energy Use and Air Emissions

Item		Units	Quantity	Notes
On-Site				
User-defined on-site conventional energy use #1	*User-Defined	TBD		
User-defined on-site conventional energy use #2	*User-Defined	TBD		
On-site HAP process emissions**		lbs		
On-site GHG emissions**		lbs CO2e		
On-site carbon storage**		lbs CO2e		
GHG avoided by flaring on-site landfill methane		ccf CH4		
Other on-site NOx emissions or reductions**		lbs		
Other on-site SOx emissions or reductions**		lbs		
Other on-site PM emissions or reductions**		lbs		
Transportation		**Units**	**Quantity**	**Notes**
User-defined conventional energy transportation #1	*User-Defined	TBD		
User-defined conventional energy transportation #2	*User-Defined	TBD		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Enter a positive number for emissions and a negative number for reductions, avoidances, or storage***
See the "Detailed Notes and Explanations" tab for use of this table

Other Voluntary Renewable Energy Use

Item		Units	Quantity	Notes
User-defined on-site renewable energy use #1	*User-Defined	TBD		
User-defined on-site renewable energy use #2	*User-Defined	TBD		
User-defined renewable energy transportation #1	*User-Defined	TBD		
User-defined renewable energy transportation #2	*User-Defined	TBD		
Voluntary purchase of renewable electricity**		MWh		
Voluntary purchase of RECs**		MWh		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Complete information on provider in the table to the right. No footprint reductions are associated with the voluntary purchases.***
See the "Detailed Notes and Explanations" tab for use of this table

Off-Site Laboratory Analysis

Parameter and Notes	Unit Cost ($)	Number of Samples	Total Cost
Clean fill sampling	150	10	1,500
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
Totals		**10**	**1,500**

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	

For use of this worksheet, please see instructions at the end of the worksheet

User Defined Activity, Material, or Service	Unit	Tons per Unit*	User Defined Conversion Factors — Parameters Used, Extracted, Emitted, or Generated: Energy (MMBtu/unit)	GHG (lbs CO2e/unit)	NOx (lbs/unit)	SOx (lbs/unit)	PM (lbs/unit)	HAPs (lbs/unit)	Ref.	Use this row only for:
User-defined emissions for biodiesel on-site equipment	gal									**User-defined emissions for biodiesel on-site equipment**
User-defined emissions for diesel on-site equipment	gal									**User-defined emissions for diesel on-site equipment**
User-defined emissions for gasoline on-site equipment	gal									**User-defined emissions for gasoline on-site equipment**
User-defined emissions for natural gas on-site equipment	ccf									**User-defined emissions for natural gas on-site equipment**
User-defined emissions for biodiesel transportation	gal									**User-defined emissions for biodiesel transportation**
User-defined emissions for diesel transportation	gal									**User-defined emissions for diesel transportation**
User-defined emissions for gasoline transportation	gal									**User-defined emissions for gasoline transportation**
User-defined emissions for natural gas transportation	ccf									**User-defined emissions for natural gas transportation**

Note: Entering user-defined emission conversion factors in Rows 7 - 14 will override default conversion factors for all emissions calculations of the same fuel/use throughout the SEFA workbooks.

Lime	lb	0.0005	0.028	3.96	0.0075	0.0106	0.0027	2.9E-04	1	**User-defined material #1**
Clean fill	tons	1	0.056	6.7	0.033	0.03	0.004	4.1E-07	2	**User-defined material #2**
Drain rock	tons	1	0.056	6.7	0.033	0.03	0.004	4.1E-07	3	**User-defined material #3**
User-defined material #4	TBD	TBD								**User-defined material #4**
User-defined material #5	TBD	TBD								**User-defined material #5**
User-defined material #6	TBD	TBD								**User-defined material #6**
User-defined material #7	TBD	TBD								**User-defined material #7**
User-defined material #8	TBD	TBD								**User-defined material #8**
User-defined material #9	TBD	TBD								**User-defined material #9**
User-defined material #10	TBD	TBD								**User-defined material #10**
User-defined material #11	TBD	TBD								**User-defined material #11**
User-defined material #12	TBD	TBD								**User-defined material #12**
User-defined material #13	TBD	TBD								**User-defined material #13**
User-defined material #14	TBD	TBD								**User-defined material #14**
User-defined material #15	TBD	TBD								**User-defined material #15**
User-defined material #16	TBD	TBD								**User-defined material #16**
User-defined material #17	TBD	TBD								**User-defined material #17**
User-defined material #18	TBD	TBD								**User-defined material #18**
User-defined material #19	TBD	TBD								**User-defined material #19**
User-defined material #20	TBD	TBD								**User-defined material #20**

Item or Service Used	Unit	Tons per Unit*	Energy (MMBtu/unit)	GHG (lbs CO2e/unit)	NOx (lbs/unit)	SOx (lbs/unit)	PM (lbs/unit)	HAPs (lbs/unit)	Ref.	Use this row only for:
User-defined recycled/reused on-site #1	TBD	TBD								User-defined recycled/reused on-site #1
User-defined recycled/reused on-site #2	TBD	TBD								User-defined recycled/reused on-site #2
User-defined recycled/reused on-site #3	TBD	TBD								User-defined recycled/reused on-site #3
User-defined recycled/reused off-site #1	TBD	TBD								User-defined recycled/reused off-site #1
User-defined recycled/reused off-site #2	TBD	TBD								User-defined recycled/reused off-site #2
User-defined recycled/reused off-site #3	TBD	TBD								User-defined recycled/reused off-site #3
User-defined non-hazardous waste destination #1	TBD	TBD								User-defined non-hazardous waste destination #1
User-defined non-hazardous waste destination #2	TBD	TBD								User-defined non-hazardous waste destination #2
User-defined non-hazardous waste destination #3	TBD	TBD								User-defined non-hazardous waste destination #3
Off-site hazardous waste incinerator	ton	1	15	8,000	100	60	10	2	4	User-defined hazardous waste destination #1
User-defined hazardous waste destination #2	TBD	TBD								User-defined hazardous waste destination #2
User-defined hazardous waste destination #3	TBD	TBD								User-defined hazardous waste destination #3

Item or Service Used	Unit	Tons per Unit*	Energy (MMBtu/unit)	GHG (lbs CO2e/unit)	NOx (lbs/unit)	SOx (lbs/unit)	PM (lbs/unit)	HAPs (lbs/unit)	Ref.	Use this row only for:
User-defined on-site conventional energy use #1	TBD									User-defined on-site conventional energy use #1
User-defined on-site conventional energy use #2	TBD									User-defined on-site conventional energy use #2
User-defined conventional energy transportation #1	TBD									User-defined conventional energy transportation #1
User-defined conventional energy transportation #2	TBD									User-defined conventional energy transportation #2
User-defined on-site renewable energy use #1	TBD									User-defined on-site renewable energy use #1
User-defined on-site renewable energy use #2	TBD									User-defined on-site renewable energy use #2
User-defined renewable energy transportation #1	TBD									User-defined renewable energy transportation #1
User-defined renewable energy transportation #2	TBD									User-defined renewable energy transportation #2

** "Tons per unit" refers to how many tons there are per unit of the material (e.g., 1 pound is 1/2000 of a ton or 0.0005 tons per unit)*

"MMBtu" = millions of Btus

Ref 1: Used conversion factors for lime double those for "other unrefined construction material" in the default conversion factors in the Calculations workbook.

Ref 2: Used same conversion factors for clean fill as those for "gravel/sand/clay" in the default conversion factors in the Calculations workbook (converted to tons).

Ref 3: Used same conversion factors for drain rock as those for "gravel/sand/clay" in the default conversion factors in the Calculations workbook (converted to tons).

Instructions for "User Defined Factors" tab

Overview of User Defined Factors

Use this worksheet for user-defined footprint conversion factors for materials and activities that are unique to your site, and are not already provided in the "Input Template" tab of the "Input" workbook. Unique conversion factors can be established for the following:

(a) Combustion of fuels (both conventional and renewable) for transportation and on-site equipment

(b) Manufacturing or processing of materials

(c) Management and recycling of wastes

(d) Use of conventional and renewable energy

In establishing these unique conversion factors, you must research and document the data, and enter it into the table above. Enter the item name in Column A, the units you would like to use for the item in Column B, the factor for converting the specified units to tons in Column C. Enter the footprint conversion factors in Columns

After you have entered an item and its conversion factors, you may select (or view) the item in the corresponding table on the "Input Template" tabs in the "Input" workbook. Once you enter the quantity of the item in an "Input Template" tab, SEFA will include the item in the footprint analysis, and will automatically apply the conversion factors in the "Calculations" workbook.

The conversion factors in Column D - N represent the amount of energy required for, and the amount of GHG, NOx, SOx, PM, and HAPs air emissions related to, the combustion of fuels, the off-site production of materials, the off-site management of waste, and the use of energy. Note that SEFA is equipped with default footprint conversion factors for a variety of materials and activities. These default conversion factors can be viewed in the "Default Conversions" tab of the "Calculations" workbook and are applied automatically in the "Calculations" workbook. You may want to view these default conversion factors before deciding whether to create a user-defined item with unique conversion factors.

How to Set Up User Defined Factors on This Worksheet

This section describes the general approach for setting up user defined factors. See the next four sections for specific examples for each type of user-defined factor.

(1) Column A: You are encouraged to enter descriptive names for the fuels, materials, waste processes, or energy usage in Column A. Once entered the new names will appear in the respective drop-down menus or data entry cell in the "Input" tab.

(2) Columns B and C: Entries in Columns B and C depend on the item being represented.

(a) For materials and wastes (Rows 16 - 49), you must enter the units for the item in Column B, and the conversion factor for tons in Column C.
Additional notes:

(i) Conversion to tons is necessary for summing of diverse materials or wastes (performed automatically in the SEFA workbooks) to arrive at the total materials usage or waste generation reported in the "Summary" tab in the "Main" workbook.

(ii) Conversion to tons is also necessary for calculations of fuel required for transport of materials or waste (performed automatically in the SEFA workbooks), when transport using units of "Gallons per Ton-Mile" is selected in the "Input Template" tab.

(b) For combustion of fuels (Rows 7 - 14), you must enter the units for the item in Column B, but you are not required to enter a conversion factor in Column C. The conversions for tons/gal and tons/ccf for these fuels are standard values set by default in SEFA.

(c) For energy (Rows 52 - 59), you must enter the units for the item in Column B, but you are not required to enter a conversion factor in Column C. The conversion for tons per unit is not needed in the SEFA calculations, because the items do not directly affect the amounts of materials or wastes, or the calculations of fuel used for transport.

(3) Column D: Entries in Column D depend on the item being represented.

(a) For materials, waste, and energy (Rows 16 - 59) enter in Column D the amount of energy (in Btus/unit), associated with the item.

(b) For combustion of fuels (Rows 7 - 14), you are not required to enter the amount of energy (in Btu/unit) in Column D. The energy content in Btu/gal and Btu/ccf for these fuels are standard values set by default in SEFA.

(4) Columns F - N: For all items (Rows 7 - 59), enter the footprint conversion factors for GHG, NOx, SOx, PM, and HAPs in Column F - N. These are footprint conversion factors that you have obtained through your own research. The conversion factors must be based on the units Column B.

(5) Column O: Provide a reference number in Column O. The full references for the footprint conversion factors can be added in the open space below the table.

(6) Columns P - T: The entries in these columns reiterate the original text in Column A, to document the purpose of each of the rows. (The original entry in Column A disappears once you enter a unique item in that Column.) Do not use any row in this table for a purpose other than that described in Columns P - T. For example, do not enter a fuel combustion item in Rows 16 - 35 (designated for materials manufacturing) or Rows 38 - 49 (designated for waste management).

Examples for Rows 16 - 35 (Manufacturing or processing of materials)

You may want to add to the footprint analysis a material not found in SEFA. You should first check the drop-down menu in Column A of the “Materials Use and Transportation” table on Row 65 of the “Input Template” tab in the “Input” workbook. If the material is not already in the drop-down menu, you may add the material name and its footprint conversion factors in Rows 16 - 35 in the "User Defined Factors" tab (above). You may also want to add a user-defined material to provide unique (more accurate) footprint conversion factors for a material already included in the drop-down menu.

(1) For example, aluminum is not found in the drop-down menu. If aluminum roofing is used on-site, you may want to add it to the drop-down menu. To do this, enter “Aluminum roofing” in Column A above. Column B might be “lbs” (of aluminum) and Column C would be “0.0005”, the conversion factor from lbs to tons. The footprint conversion factors in Columns D - N would represent the energy required, and the GHG, NOx, SOx, PM, and HAPs emissions to air, associated with the off-site manufacture of the aluminum roofing. The entry in Column D would be in units of MMBtu/lb (that is, MMBtu energy required per lb aluminum roofing manufactured), Column F would be in units of lbs CO2e/lb (that is, lbs CO2e emissions per lb aluminum roofing manufactured), Column H would be lbs NOx/lb, etc.

(2) As another example, instead of using “Other treatment chemicals & materials” from the drop-down menu, you may want to add to the drop-down menu a unique treatment chemical used at your site. To do this, you would enter the name of the treatment chemical in Column A above. Column B might be “gallons” (of treatment chemical) and Column C might be 0.004 tons per gallons (depending on the density of the treatment chemical). The footprint conversion factors in Columns D - N would represent the energy required, and the GHG, NOx, SOx, PM, and HAPs emissions to air, associated with the production of the treatment chemical. The entry in Column D would be in units of MMBtu/gallon (that is, MMBtu energy required per gallon treatment chemical produced), the entry in Column F would be in units of lbs CO2e/gallon (that is, lbs CO2e emissions per gallon treatment chemical produced), Column H would be lbs NOx/gallon, etc.

Once the user-defined material has been entered above, you may return to the “Materials Use and Transportation” table in the "Input Template" tab, select the newly added material from the drop-down menu in Column A, and enter the quantity of the material used at your site. All entries made in Rows 16 - 35 above are considered in SEFA as part of the off-site footprint.

Examples for Rows 37 - 49 (Management and recycling of wastes)

You may want to add to the footprint analysis a waste management or recycling process not found in SEFA. You should first check the drop-down menu in Column A of the “Waste Disposal and Transportation” table on Row 90 of the “Input Template” tab in the “Input” workbook. If the waste or recycling process is not already in the drop-down menu, you may add the process and its footprint conversion factors in Rows 37 - 49 in the "User Defined Factors" tab (above). You may also want to add a user-defined waste destination to provide unique (more accurate) footprint conversion factors for a waste destination or process already included in the drop-down

(1) For example, incineration is not found in the drop-down menu. If waste from your site is being sent to an off-site incinerator, you may want to add it to the drop-down menu. To do this, enter “Incinerator” in Column A above. Column B might be “tons” (of waste) and Column C would be “1”, the conversion factor from tons to tons. The footprint conversion factors in Columns D - N would represent the energy required, and the GHG, NOx, SOx, PM, and HAPs emissions to air, associated with the incinerating the waste. The entry in Column D would be in units of MMBtu/ton (that is, MMBtu energy required per ton of waste incinerated), Column F would be in units of lbs CO2e/ton (that is, lbs CO2e emissions per ton of waste incinerated), Column H would be lbs NOx/ton, etc.

(2) As another example, instead of using “Non-hazardous waste landfill” from the drop-down menu, you may want to add to the drop-down menu a local landfill that uses energy-saving processes and equipment. To do this, you would enter the name of the landfill in Column A above. Column B might be “tons” (of waste) and Column C would be “1”, the conversion factor from tons to tons. The footprint conversion factors in Columns D - N would represent the energy required, and the GHG, NOx, SOx, PM, and HAPs emissions to air, associated with the managing the waste at the landfill. The entry in Column D would be in units of MMBtu/ton (that is, MMBtu energy required per ton of waste managed), the entry in Column F would be in units of lbs CO2e/ton (that is, lbs CO2e emissions per ton of waste managed), Column H would be lbs NOx/ton, etc.

Once the user-defined waste destination has been entered above, you may return to the “Waste Disposal and Transportation” table in the "Input Template" tab, select the newly added waste destination or process from the drop-down menu in Column A, and enter the quantity of the waste sent to the waste disposal or recycling location. Entries made in Rows 38 - 40 above are considered in SEFA as part of the on-site footprint. Entries in Rows 41 - 49 are part of the off-site footprint.

Examples for Rows 52 - 59 (Use of conventional and renewable energy)

You may want to add to the footprint analysis an energy usage not found in SEFA. Inputs for energy usages are found in the tables in Rows 14 - 124 of the "Input Template" tab in the "Input" workbook. If an energy usage at your site is not available in these tables, you may add the name of the energy usage and its footprint conversion factors in Rows 52 - 59 above.

(1) For example, your site may burn fuel oil in a boiler (a conventional fuel used on-site). SEFA does not include this type of energy usage in Rows 14 - 124 of the "Input Template" tab. To model the energy usage of the boiler, use Row 47 or 48 in the table above. Enter the name of the activity in Column A, the units in Column B (for example, gallons of fuel oil), and the footprint conversion factors in Columns D - N. Once the fuel oil usage has been entered above, you may return to the “Input Template” tab, and find the new item represented in Row 132 or 133. Enter the quantity of fuel oil in Cell F132 of F133 of the “Input Template” tab. SEFA will automatically apply the new conversion factors to this item only.

(2) As another example, your site may use personnel transportation vehicles that run on bio-based ethanol (a renewable fuel used in transportation). SEFA does not include this type of energy usage in Rows 14 - 124 of the "Input Template" tab. To model the ethanol vehicles, use Row 53 or 54 in the table above. Enter the name of the activity in Column A, the units in Column B (for example, gallons of ethanol), and the footprint conversion factors in Columns D - N. Once the ethanol usage has been entered above, you may return to the “Input Template” tab, and find the new item represented in Row 153 or 154. Enter the quantity of ethanol in Cell F153 or F154 of the “Input Template” tab. SEFA will automatically apply the new conversion factors to this item only.

(3) In both the examples above, the footprint conversion factors in Columns D - N would represent the energy required, and the GHG, NOx, SOx, PM, and HAPs emissions to air, associated with the combustion of the fuel (either fuel oil or bio-based ethanol). The entry in Column D would be in units of MMBtu/gallon (that is, MMBtu energy per gallon of fuel oil or ethanol combusted), Column F would be in units of lbs CO2e/gallon (that is, lbs CO2e emissions per gallon of fuel oil or ethanol combusted), Column H would be lbs NOx/gallon, etc.

(4) Entries made in Rows 52, 53, 56, and 57 above are considered in SEFA a part of the on-site footprint. Entries made in Rows 54, 55, 58, and 59 above are considered in SEFA a part of the transportation footprint.

(5) SEFA does not provide for separate modelling of the production (e.g., resource extraction or processing of fuel oil or ethanol) of a unique energy source that may be added in Rows 52 - 59 above. Instead, SEFA will used default footprint conversion factors for the fuel type.

Examples for Rows 7 - 14 (Combustion of fuels for transportation and on-site equipment)

You may want to add to the footprint analysis unique conversion factors for combustion of fuels already found in SEFA (such as gasoline, diesel, or biodiesel). This may be of interest if the default conversion factors in SEFA do not accurately represent emissions from equipment or vehicles in use at your site. Default conversion factors are found in the "Default Conversions" tab in the "Calculations" workbook. To include in the analysis unique footprint conversion factors for combustion of fuels (either conventional or renewable) for transportation and on-site equipment, you may add the name of the fuel name and its footprint conversion factors in Rows 7 - 14

(1) For example, your site may use on-site diesel equipment with particulate filters. To model the emissions from this equipment, use Row 8 in the table above. Enter the name of the fuel combustion situation in Column A, the units in Column B (for example, gallons of diesel), and the footprint conversion factors in Columns F - N. Once you enter unique conversion factors for this situation in the table above, the factors will override the default conversion factors in SEFA, and SEFA will automatically apply the new factors to all on-site diesel combustion. In this example, the unique footprint conversion factors will be applied to all on-site diesel equipment that you enter into the “Input Template” tab.

(2) As another example, your site may use ultra-low sulfur diesel fuel for transport of materials and waste. To model the emissions from this transportation fuel, use Row 12 in the table above. Enter the name of the fuel combustion situation in Column A, the units in Column B (for example, gallons of diesel), and the footprint conversion factors in Columns F - N. Once you enter unique conversion factors for this situation in the table above, the factors will override the default conversion factors in SEFA, and SEFA will automatically apply the new factors to all transportation diesel usage. In this example, the unique footprint conversion factors will be applied to all diesel transportation (personnel, equipment, materials, and waste) that you enter into the “Input Template” tab.

(3) In both examples above, the footprint conversion factors in Columns F - N would represent the GHG, NOx, SOx, PM, and HAPs emissions to air, associated with the combustion of the fuel. The entry in Column F would be in units of lbs CO2e/gallon (that is, lbs CO2e emissions per gallon diesel combusted), Column H would be lbs NOx/gallon, etc. If natural gas is used, the units would be lbs CO2e/ccf, lbs NOx/ccf, etc.

(4) Entries made in Rows 7 - 10 above are considered in SEFA a part of the on-site footprint. Entries made in Rows 11 - 14 above are considered in SEFA a part of the transportation footprint.

(5) SEFA does not provide for separate modelling of the production (e.g., resource extraction or processing of ultra-low sulfur diesel) of the unique fuel that may be added in Rows 7 - 14 above. Instead, SEFA will used default footprint conversion factors for the fuel type.

Well Material Calculator - 1

Use this tool to calculate the amount of material required for a well of specified type, depth, and diameter. This page is a calculator only and not linked to the "Input" tabs. The user must manually enter the results from the "Materials Required" table below into the appropriate "Input" tab.

Notes on Well Material Calculations - 1:

Well Details - 1	
Type of Well	
Well Casing Material	
Total Depth of Well in Feet (from ground surface to bottom of well, including screen)	
Screen Length	
Well Casing Diameter in Inches	
Stick-up Height in Feet (if applicable)	
Number of Wells	

Materials Required - 1		
Casing Material		Pounds
Screen Material		Pounds
Grout for Annulus (Cement)		Pounds
Water for Annulus (to mix cement)		Gallons
Sand Pack Material (Gravel/Sand)		Pounds
Soil Cuttings for Disposal		Pounds
Grout to Abandon Well(s)		Pounds
Water for Grout to Abandon Well(s)		Gallons

Well Construction Material Factors

	Pounds per Foot of Well Length								
Well Diameter	**SCH 40 PVC Casing**	**SCH 80 PVC Casing**	**SCH 40 Steel Casing**	**SCH 80 Steel Casing**	**USER DEFINED Casing**	**Grout for Annulus**	**Grout to Abandon Well**	**Sand for Annulus**	**Drill Cuttings for Disposal**
2-inch	0.69	0.94	3.65	5.02		13	2	19	22
4-inch	2.03	2.82	10.79	14.98		19	6	29	39
6-inch	3.58	5.38	18.97	28.57		25	14	39	61
8-inch	5.39	8.18	28.55	43.39		32	25	48	87
10-inch	7.64	12.1	40.48	64.43		38	40	58	119
12-inch	10.1	16.7	53.52	88.63		45	57	68	155

Source: Most of the information in the above table is from EPA's "Methodology for Understanding and Reducing a Project's Environmental Footprint," February 2012. Additional material weight factors for Schedule 80 PVC, Schedule 40 Steel, and Schedule 80 Steel, are from "Groundwater and Wells, Second Edition", by Johnson Filtration Systems Inc., 1986.

Note on User Defined Casing: *The "User Defined Casing" feature can be used to calculate the amount of material required for a well constructed of a material or size (schedule) other than the four options provided. To use this feature, select "User Defined Casing" in the "Well Casing Material" drop-down menu in the "Well Details" table, then add the appropriate "pounds per foot of well length" factor to the "User Defined Casing" column of the "Well Construction Materials Factors" table, in the row that corresponds to the well diameter. You must find or develop the unique "pounds per foot of well length" factor for the specific material, schedule, and diameter of pipe. The Well Material Calculator will use this factor to calculate Casing Material required and total Screen Material required. Note that if you select a material for the well casing that is not already included in the library of materials in SEFA, you must also develop emissions factors for the material's production and add these values to the "User Defined Factors" tab. (See the "User Defined Factors" tab for specifics.)*

Notes on Calculations:
- Calculation for screened pipe assumes that the weight of screened pipe is equal to weight of casing.
- Calculations for Grout Material, Sand Pack Material, and Soil Cuttings for Disposal assume annulus around casing has a diameter that is 4 inches larger than the casing.
- Grout values are for weight of unmixed cement, assuming 6 gallons of water is mixed with 94 pounds of neat cement with a blended density of 15 pounds per gallon (generally typical of engineering specifications).
- Drill cutting volume does not include drilling mud for mud rotary drilling.

Well Material Calculator - 2

Use this tool to calculate the amount of material required for a well of specified type, depth, and diameter. This page is a calculator only and not linked to the "Input" tabs. The user must manually enter the results from the "Materials Required" table below into the appropriate "Input" tab.

Notes on Well Material Calculations - 2:

Well Details - 2	
Type of Well	
Well Casing Material	
Total Depth of Well in Feet (from ground surface to bottom of well, including screen)	
Screen Length	
Well Casing Diameter in Inches	
Stick-up Height in Feet (if applicable)	
Number of Wells	

Materials Required - 2		
Casing Material		Pounds
Screen Material		Pounds
Grout for Annulus (Cement)		Pounds
Water for Annulus (to mix cement)		Gallons
Sand Pack Material (Gravel/Sand)		Pounds
Soil Cuttings for Disposal		Pounds
Grout to Abandon Well(s)		Pounds
Water for Grout to Abandon Well(s)		Gallons

Well Construction Material Factors

	Pounds per Foot of Well Length								
Well Diameter	**SCH 40 PVC Casing**	**SCH 80 PVC Casing**	**SCH 40 Steel Casing**	**SCH 80 Steel Casing**	**USER DEFINED Casing**	**Grout for Annulus**	**Grout to Abandon Well**	**Sand for Annulus**	**Drill Cuttings for Disposal**
2-inch	0.69	0.94	3.65	5.02		13	2	19	22
4-inch	2.03	2.82	10.79	14.98		19	6	29	39
6-inch	3.58	5.38	18.97	28.57		25	14	39	61
8-inch	5.39	8.18	28.55	43.39		32	25	48	87
10-inch	7.64	12.1	40.48	64.43		38	40	58	119
12-inch	10.1	16.7	53.52	88.63		45	57	68	155

Source: Most of the information in the above table is from EPA's "Methodology for Understanding and Reducing a Project's Environmental Footprint," February 2012. Additional material weight factors for Schedule 80 PVC, Schedule 40 Steel, and Schedule 80 Steel, are from "Groundwater and Wells, Second Edition", by Johnson Filtration Systems Inc., 1986.

Note on User Defined Casing: *The "User Defined Casing" feature can be used to calculate the amount of material required for a well constructed of a material or size (schedule) other than the four options provided. To use this feature, select "User Defined Casing" in the "Well Casing Material" drop-down menu in the "Well Details" table, then add the appropriate "pounds per foot of well length" factor to the "User Defined Casing" column of the "Well Construction Materials Factors" table, in the row that corresponds to the well diameter. You must find or develop the unique "pounds per foot of well length" factor for the specific material, schedule, and diameter of pipe. The Well Material Calculator will use this factor to calculate Casing Material required and total Screen Material required. Note that if you select a material for the well casing that is not already included in the library of materials in SEFA, you must also develop emissions factors for the material's production and add these values to the "User Defined Factors" tab. (See the "User Defined Factors" tab for specifics.)*

Notes on Calculations:
- Calculation for screened pipe assumes that the weight of screened pipe is equal to weight of casing.
- Calculations for Grout Material, Sand Pack Material, and Soil Cuttings for Disposal assume annulus around casing has a diameter that is 4 inches larger than the casing.
- Grout values are for weight of unmixed cement, assuming 6 gallons of water is mixed with 94 pounds of neat cement with a blended density of 15 pounds per gallon (generally typical of engineering specifications).
- Drill cutting volume does not include drilling mud for mud rotary drilling.

Well Material Calculator - 3

Use this tool to calculate the amount of material required for a well of specified type, depth, and diameter. This page is a calculator only and not linked to the "Input" tabs. The user must manually enter the results from the "Materials Required" table below into the appropriate "Input" tab.

Notes on Well Material Calculations - 3:

Well Details - 3	
Type of Well	
Well Casing Material	
Total Depth of Well in Feet (from ground surface to bottom of well, including screen)	
Screen Length	
Well Casing Diameter in Inches	
Stick-up Height in Feet (if applicable)	
Number of Wells	

Materials Required - 3		
Casing Material		Pounds
Screen Material		Pounds
Grout for Annulus (Cement)		Pounds
Water for Annulus (to mix cement)		Gallons
Sand Pack Material (Gravel/Sand)		Pounds
Soil Cuttings for Disposal		Pounds
Grout to Abandon Well(s)		Pounds
Water for Grout to Abandon Well(s)		Gallons

Well Construction Material Factors

	Pounds per Foot of Well Length								
Well Diameter	**SCH 40 PVC Casing**	**SCH 80 PVC Casing**	**SCH 40 Steel Casing**	**SCH 80 Steel Casing**	**USER DEFINED Casing**	**Grout for Annulus**	**Grout to Abandon Well**	**Sand for Annulus**	**Drill Cuttings for Disposal**
2-inch	0.69	0.94	3.65	5.02		13	2	19	22
4-inch	2.03	2.82	10.79	14.98		19	6	29	39
6-inch	3.58	5.38	18.97	28.57		25	14	39	61
8-inch	5.39	8.18	28.55	43.39		32	25	48	87
10-inch	7.64	12.1	40.48	64.43		38	40	58	119
12-inch	10.1	16.7	53.52	88.63		45	57	68	155

Source: Most of the information in the above table is from EPA's "Methodology for Understanding and Reducing a Project's Environmental Footprint," February 2012. Additional material weight factors for Schedule 80 PVC, Schedule 40 Steel, and Schedule 80 Steel, are from "Groundwater and Wells, Second Edition", by Johnson Filtration Systems Inc., 1986.

Note on User Defined Casing: *The "User Defined Casing" feature can be used to calculate the amount of material required for a well constructed of a material or size (schedule) other than the four options provided. To use this feature, select "User Defined Casing" in the "Well Casing Material" drop-down menu in the "Well Details" table, then add the appropriate "pounds per foot of well length" factor to the "User Defined Casing" column of the "Well Construction Materials Factors" table, in the row that corresponds to the well diameter. You must find or develop the unique "pounds per foot of well length" factor for the specific material, schedule, and diameter of pipe. The Well Material Calculator will use this factor to calculate Casing Material required and total Screen Material required. Note that if you select a material for the well casing that is not already included in the library of materials in SEFA, you must also develop emissions factors for the material's production and add these values to the "User Defined Factors" tab. (See the "User Defined Factors" tab for specifics.)*

Notes on Calculations:
- Calculation for screened pipe assumes that the weight of screened pipe is equal to weight of casing.
- Calculations for Grout Material, Sand Pack Material, and Soil Cuttings for Disposal assume annulus around casing has a diameter that is 4 inches larger than the casing.
- Grout values are for weight of unmixed cement, assuming 6 gallons of water is mixed with 94 pounds of neat cement with a blended density of 15 pounds per gallon (generally typical of engineering specifications).
- Drill cutting volume does not include drilling mud for mud rotary drilling.

The "Lookup" worksheet is for reference only, and is not intended for user input.

The following tables are provided to convert transportation and equipment use into fuel use. References for gasoline and diesel use are generally from Climate Leaders documents and are consistent with the February 2012 EPA footprint methodology. Where fuel efficiencies are provided for biodiesel, B20, or natural gas, the following assumptions are made:

- diesel has a higher heating value of 0.139 MMBtu per gallon
- biodiesel has a higher heating value of 0.127 MMBtu per gallon
- natural gas has a higher heating value of 0.103 MMBtu per hundred cubic feet
- B20 is 20% biodiesel and 80% diesel
- fuel efficiencies scale approximately with higher heating value (e.g., biodiesel fuel efficiency in miles per gallon = 0.127/0.139 x diesel fuel efficiency).

Mode of Transport. For Personnel	B20 mpg or pmpg	Biodiesel mpg or pmpg	Diesel mpg or pmpg	Electricity mpkWh	Gasoline mpg	Natural Gas mpccf
Airplane	NO DATA	NO DATA	45	NO DATA	NO DATA	NO DATA
Bus	94	88	96	NO DATA	NO DATA	71
Car	28	26	28	NO DATA	24	21
Heavy-Duty Truck	5.9	5.5	6	NO DATA	8.5	4.4
Light-Duty Truck	20	18	20	NO DATA	17	15
Train	NO DATA	NO DATA	59	NO DATA	NO DATA	NO DATA
Vehicle (other)	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA

- Fuel usage for buses, airplanes, and trains are for passenger miles per gallon (pmpg)
- Airplane/jet fuel calculated as diesel for simplicity and due to similarities between kerosene and diesel
- Gasoline car and truck efficiencies and diesel car, truck, airplane, bus, and train efficiencies from converting average CO2 emissions in Climate Leaders from Commuting, Business Travel and Product Transport to diesel usage assuming Climate Leaders value of 22.3 lbs of CO2 per gallon of diesel.
- Gasoline mpg for heavy-duty truck is assumed to be 50% of a light-duty truck to represent a light-duty truck towing a trailer

Fuel Type for Equip. Use	Units	Units per HP-hr
B20	gal	0.051
Biodiesel	gal	0.055
Diesel	gal	0.05
Gasoline	gal	0.056

-Brake Specific Fuel Consumption (BSFC) values are consistent with 7,000 Btu/HP-hr (as used by EPA AP-42, Compilation of Air Pollutant Emission Factors, Chapter 3) and fuel higher heating values of 0.127 MMBtu for biodiesel, 0.139 MMBtu for diesel, 0.124 MMBtu for gasoline, and 0.103 MMBtu for natural gas (per February 2012 EPA footprint methodology).

Equipment Type and Representative Horsepower
Asphalt paver (150 HP)
Backhoe (100 HP)
Concrete paving machine (200 HP)
Dozer - large (200 HP)
Dozer - small (100 HP)
Drilling - direct push (60 HP)
Drilling - large rig (500 HP)
Drilling - medium rig (150 HP)
Dump truck (400 HP)
Excavator - large (250 HP)
Excavator - medium (175 HP)
Excavator/hoe - small (75 HP)
Generator - HP varies
Grader (175 HP)
Grout pump (20 HP)
Hydroseeder (20 HP)
Integrated tool carrier (100 HP)
Loader (200 HP)
Loader - small (75 HP)
Mobile laboratory (25 HP)
Mowers (5 HP)
Other - HP varies
Riding trencher (55 HP)
Roller (100 HP)
Rotary-screw air compressor - 250 cfm (60 HP)
Skid-steer - small (60 HP)
Telescopic handler (60 HP)
Tractor mower (25 HP)
Water truck (400 HP)

Equipment types are available with various engine sizes. Specific equipment sizes should be used when available. The above "representative sizes" are provided as general guides in the absence of other information

Lookup Table (continued)

Materials		Units	Conv. to tons	Default One-Way Distance from Source to Site (miles)
Cement		dry-lb	0.0005	500
Concrete		lb	0.0005	25
Gravel/sand/clay		lb	0.0005	25
HDPE		lb	0.0005	500
Photovoltaic system (installed)		W	0.000125	1000
PVC		lb	0.0005	500
Stainless steel		lb	0.0005	500
Steel		lb	0.0005	500
Other refined construction materials		lb	0.0005	500
Other unrefined construction materials		lb	0.0005	25
Cheese Whey		lb	0.0005	1000
Emulsified vegetable oil		lb	0.0005	1000
Molasses		lb	0.0005	1000
Virgin GAC (coal based)		lb	0.0005	500
Other Treatment Chemicals & Materials		lb	0.0005	500
Lime		lb	0.0005	500
Clean fill		tons	1	500
Drain rock		tons	1	500
User-defined material #4		TBD	TBD	500
User-defined material #5		TBD	TBD	500
User-defined material #6		TBD	TBD	500
User-defined material #7		TBD	TBD	500
User-defined material #8		TBD	TBD	500
User-defined material #9		TBD	TBD	500
User-defined material #10		TBD	TBD	500
User-defined material #11		TBD	TBD	500
User-defined material #12		TBD	TBD	500
User-defined material #13		TBD	TBD	500
User-defined material #14		TBD	TBD	500
User-defined material #15		TBD	TBD	500
User-defined material #16		TBD	TBD	500
User-defined material #17		TBD	TBD	500
User-defined material #18		TBD	TBD	500
User-defined material #19		TBD	TBD	500
User-defined material #20		TBD	TBD	500

Miles should be from manufacturer to the site

Mode of Transport. For Materials	B20 Usage Rate	Biodiesel Usage Rate	Diesel Usage Rate
Aircraft (gptm)	NO DATA	NO DATA	0.15
Barge (gptm)	0.0048	0.0051	0.0047
Train (gptm)	0.0025	0.0027	0.0025
Truck (mpg)	5.9	5.5	6
Truck freight (gptm)	0.0296	0.032	0.029

mpg = miles per gallon, gptm = gallons per ton-mile

- Airplane/jet fuel calculated as diesel for simplicity and due to similarities between kerosene and diesel

- Diesel fuel efficiencies are obtained by from converting average CO2 emissions reported in Climate Leaders: Commuting, Business Travel and Product Transport (EPA430-R-08-006) to diesel usage assuming Climate Leaders value of 22.3 lbs of CO2 per gallon of diesel.

** Default distance is one-way distance from site to disposal facility that can be used in absence of other*

Waste Facility	Units	Conv. to tons	Default Distance*
Off-site waste water treatment (POTW)	gal x 1000	4.17	50
Recycled/reused on-site	tons	1	0
Recycled/reused off-site	tons	1	50
Off-site non-hazardous waste landfill	tons	1	25
Off-site hazardous waste landfill	tons	1	500
User-defined recycled/reused on-site #1	TBD	TBD	0
User-defined recycled/reused on-site #2	TBD	TBD	0
User-defined recycled/reused on-site #3	TBD	TBD	0
User-defined recycled/reused off-site #1	TBD	TBD	50
User-defined recycled/reused off-site #2	TBD	TBD	50
User-defined recycled/reused off-site #3	TBD	TBD	50
User-defined non-hazardous waste destination #1	TBD	TBD	25
User-defined non-hazardous waste destination #2	TBD	TBD	25
User-defined non-hazardous waste destination #3	TBD	TBD	25
Off-site hazardous waste incinerator	ton	1	500
User-defined hazardous waste destination #2	TBD	TBD	500
User-defined hazardous waste destination #3	TBD	TBD	500

Water Source	Units	Conv. to tons
Public Water	gal x 1000	4.17
Extracted Groundwater	gal x 1000	4.17
Surface Water	gal x 1000	4.17
Reclaimed Water	gal x 1000	4.17
Collected/Diverted Storm Water	gal x 1000	4.17
Other Water Resource #1	gal x 1000	4.17
Other Water Resource #2	gal x 1000	4.17

Greener Cleanups: *EPA Spreadsheets for Environmental Footprint Analysis (SEFA) - August 2014*

U.S. Environmental Protection Agency (EPA), Office of Superfund Remediation and Technology Innovation (OSRTI)

Introduction to SEFA

Purpose: SEFA is a set of workbooks designed to assist EPA in conducting environmental footprint analyses for site cleanups, as described in EPA's Methodology for Understanding and Reducing a Project's Environmental Footprint (EPA 542-R-12-002). The Methodology is available at www.cluin.org/greenremediation/methodology. SEFA is intended for estimating footprints during key phases of a cleanup project, such as evaluation of alternative remedies, development of remedy designs, and optimization of remedies, but may also be applied to other phases. Although originally developed for EPA's internal use, EPA is making SEFA available to the public for the benefit of others wishing to estimate the environmental footprint of site cleanups. *The SEFA workbooks do not individually or collectively represent EPA guidance or requirements nor is their use required by EPA.*

Structure: SEFA is comprised of three interlinked excel workbooks (files) to be saved by users in a single directory. Each workbook contains multiple worksheets (tabs) as described in the sections below. The tabs in each workbook are categorized with the following color-coding:

Yellow: tab contains required or optional user data entry

Green: tab contains notes, instructions, or explanations

Blue: tab provides outputs

Gray: tab not set up for user data entry

Instructions: SEFA is equipped with full instructions and notes. These are located in designated tabs in each workbook. Also, abbreviated instructions and notes regarding certain key aspects of data entry are located throughout the other tabs in SEFA. SEFA has been developed to reflect the protocol in EPA's Methodology. For a full description of assumptions in SEFA, and the approach for conducting a footprint analysis, please refer to the Methodology (www.cluin.org/greenremediation/methodology).

"Main" Workbook: Starting and end points of analysis. No data entry by user, except for minimal (and optional) input on "General" and "Summary" tabs.

- ***Intro to SEFA*** : Purpose, structure, and logistics of using SEFA
- ***General*** : Site information and custom names for remedy components (data input by user to this tab is optional)
- ***Instructions*** : General instructions pertaining to linkage of the three workbooks and overall approach to SEFA input
- ***Summary*** : Overall results of analysis in tabular format (data input by user to this tab is optional)
- ***Totals by Scope and Component*** : Auto-filled column and pie charts that graphically organize results by remedy component and by scope for energy and air emissions footprints
- ***Energy & Air 1 - 6*** and ***All Energy & Air (7 worksheets)*** : Energy and air results imported automatically from the "Calculations" workbook

"Input" Workbook: Data entry by user for all remedy activities, including input for energy consumption, materials usage, waste generation, personnel transport, and operation of equipment. Tabs for user data entry are indicated below.

- ***General*** : Auto fills site, remedy, and component names from the "Main" workbook
- ***Input Instructions*** : Instructions for setting up data entry tabs in the "Input" workbook, and notes on features in the "Input" workbook that provide flexibility for the footprint analysis
- ***Detailed Notes and Explanations*** : Notes and explanations for each table in the "Input Template" tab
- ***Input Summary*** : Overall summary of input information is compiled automatically from the "Input" tabs and exported to the "Calculations" workbook
- ***Input Template*** : The majority of user data entry in SEFA occurs in this tab, including data entry for energy, materials, waste, transportation, and equipment. A blank template worksheet is provided. Multiple copies of the “Input Template” tab can be created by the user as needed. See the "Input" workbook for specific notes and instructions on setting up input tabs and entering data.
- ***Grid Electricity*** : Optional user input for fuel mix for local grid electricity
- ***User Defined Factors*** : Optional user input on footprint conversion factors for user-specified materials and activities
- ***Well Material Calculator*** : An optional tool for estimating the amount of materials required to construct a well of specified type, material, and size
- ***Lookup*** : Reference tables on typical rates of energy consumption and material conversion factors that are used in the "Input Template" tab

"Calculations" Workbook: Automatically applies footprint conversion factors for energy use and air emissions for individual remedy components, and summarizes results. No data entry by user, but supplemental calculations can be made by the user in some of the tabs.

- ***General*** : Auto fills site, remedy, and component names from the "Main" workbook
- ***Notes*** : Notes on the features in the "Calculations" workbook

Components 1 - 6 (6 worksheets) : Calculations made automatically for energy and air emissions based on results from the "Input" workbook, with useful subtotals at the bottom of each worksheet
All Components : Total energy use and air emissions (i.e., summation of values in the individual "Component" tabs), with useful subtotals at the bottom of the worksheet
Default Conversions : Built-in footprint conversion factors used to calculate energy and air emissions associated with common remediation materials and activities
Grid Electricity Conversions : Footprint conversion factors for grid electricity are calculated automatically based on fuel mix in the "Grid Electricity" tab in the "Input" workbook
Explanation of Grid Electricity : Explains how electricity conversion factors are developed and provides an example
Transfer 1 - 3 (3 worksheets) : Intermediate data exchange

Programming Details of SEFA:

Data Exchange **:** All (three) workbooks must be open simultaneously to enable automated data exchanges. SEFA will generally process inputs faster if running off a hard drive rather than a server.
Color Coding : The "General" tab of each workbook provides a legend for cell color coding used to distinguish functions such as manual input, imported/exported data, and automated calculations
Locks : Data cells with formulas (or data to be exported to other workbooks) are equipped with "hard locks"
Data Sources **:** Origination of values in cells with imported data (whether previously populated or calculated) can be identified by clicking on the cell of interest

SEFA Has Been Updated and Improved (August 2014)

SEFA was originally made available to the public in April 2012, with minor updates in January 2013. The August 2014 version of SEFA provides improvements for ease of use and flexibility of application. In addition, corrections and adjustments have been made that affect footprint results.

Improvements for Ease of Use and Flexibility of Application in SEFA - August 2014 Version:

The structure of SEFA has been updated to be more user friendly and to eliminate duplicate data entry. SEFA has also been updated to provide additional flexibility, allowing the user to more accurately estimate the environmental footprint of the cleanup. See the instructions and notes tabs in each workbook for information on how to make use of the new features in SEFA.

Removal of duplicate data entry : In the previous version of SEFA, information on materials use, waste generation, and water use were entered by the user in the "Input" workbook (previously named the "Energy" workbook) where it was compiled and transferred to the "Calculations" workbook for footprint calculations for energy and air emissions. The materials, waste, and water data was also entered separately in the "Main" workbook where it was used to tabulate total material use, waste generation, and water use. In the August 2014 version, the data entry has been consolidated so that the user enters this information only once, in the "Input" workbook.

Option to use multiple grid electricity fuel mixes : SEFA now allows the user the option of specifying a different fuel mix for grid electricity for each remedy component. This feature allows flexibility in the event that different areas at a cleanup site obtain grid electricity from different providers.
Additional flexibility in data entry : (a) The user may now “override” the default values for fuel usage rates for personnel, equipment, materials, and waste transport. (b) The user may now add specific user-defined waste management processes, and provide unique footprint conversion factors for those processes. (c) The user may now enter data on electricity usage based on a greater number of factors, including equipment horsepower rating, equipment kW rating, and total kWh usage.
Addition of Well Material Calculator : A new tab has been added to the "Input" workbook that calculates materials required for standard wells based on user specifications for type and size of wells, type of materials, and number of wells.

Changes to the "Summary" tab (in "Main" workbook): Three changes have been made to the "Summary" tab. (a) "Voluntary Purchase of RECs" is now categorized separately (as category E-3) and "On-site Grid Electricity Use" is added as category E-4. (b) The text in Rows 8 and 10 has been changed to say "% of (un)refined materials from recycled or reused material" instead of "% of (un)refined materials from recycled or waste material." (c) Totals for NOx, SOx, and PM are reported separately, in addition to the combined total. These three changes represent slight deviations from the structure for reporting metrics suggested in EPA's Methodology (www.cluin.org/greenremediation/methodology), but do not affect the numerical results of the SEFA worksheets.

Additional processing of results : The "Main" workbook in SEFA now contains post-processing charts and graphics, and the "Calculations" workbook now contains useful subtotals for specific items.
Notes and instructions have been added : SEFA now includes expanded notes and instructions designed to assist the new user in beginning a footprint analysis and to highlight advanced features for the experienced user. The notes and instructions also provide documentation on the structure of SEFA and the transfer of data among workbooks. Please see the “Instructions”, “Notes”, and “Explanations” tabs in the three workbooks.

Changes Affecting Footprint Results in SEFA - August 2014 Version:

-

Several changes have been made to SEFA that affect the numerical results in the current (August 2014) version as compared to the previous (January 2013) version. These changes provide greater accuracy for the calculations in SEFA.

Changes to landfill gas combustion: Changes have been made to the greenhouse gas conversion factors for landfill gas combustion, for both flaring of on-site landfill gas and combustion of landfill gas for on-site energy use (Cells F36 and F12, respectively, in the "Components" tabs in the "Calculations" workbook), to account for the greenhouse gas emissions avoided by combustion of methane. Conversion factors for NOx, SOx, PM, and HAPs have been added for flaring of on-site landfill gas (Cells H36 - N36 in the "Components" tabs in the "Calculations" workbook). These changes will result in a significant decrease in greenhouse gas emissions calculated by SEFA, and a small increase in on-site NOx, SOx, PM, and HAPs emission calculated by SEFA, if combustion of landfill gas is included in the footprint analysis.

Change to transmission loss factor: In the previous version of SEFA, 10% grid electricity transmission losses were applied only to off-site electricity generation. SEFA now applies the 10% transmission losses to both the on-site use of grid electricity (Scope 1) and the associated off-site electricity generation (Scope 2). This is now consistent with EPA's Methodology (www.cluin.org/greenremediation/methodology). The update was made to the energy conversion factor for electricity transmission (located in Cell D172 in the “Component” tabs in the “Calculations” workbook) and will result in a small increase in the energy footprint from grid electricity use. Please see the “Explanation of Grid Electricity” tab in the “Calculations” workbook for more information on treatment of grid electricity in SEFA.

Change to conversion factor for Scope 2 electricity generation: The precision for the energy conversion factor for electricity generation has been changed from 6.9 to 6.929. The update was made in Column C of the "Grid Electricity Conversions" tab in the "Calculations" workbook and will result in a small (and possibly unnoticeable) increase in the energy footprint from grid electricity use.

Technical Assistance: EPA technical support in using SEFA is available only within the Agency. Individuals or organizations outside EPA who are interested in using SEFA for conducting footprint analyses may wish to obtain technical assistance from qualified environmental, engineering, or other suitable professionals. Selected examples of footprint analyses conducted using SEFA will be posted on EPA's Green Remediation Focus webpage at www.cluin.org/greenremediation/methodology. Any updates to SEFA will be posted at the same location. Suggestions for future enhancements to SEFA may be forwarded to Carlos Pachon, EPA/OSRTI (pachon.carlos@epa.gov).

Development of SEFA was funded by EPA OSRTI under Contract No. EP-W-07-078 to Tetra Tech. Technical lead was provided by Karen Scheuermann of EPA Region 9 and appreciation is extended to Doug Sutton, Rob Greenwald, and Mike Pavarini for significant contributions in developing and updating the spreadsheets. For additional information on Green Remediation or EPA’s Footprint Methodology see cluin.org/greenremediation or contact Carlos Pachon at pachon.carlos@epa.gov.

EPA United States Environmental Protection Agency

EPA is making SEFA available to the public as a means of disseminating useful information about environmental footprint analysis. The Agency is not responsible for adaptation of this workbook model by other organizations or associated analytical results.

Greener Cleanups: EPA Spreadsheets for Environmental Footprint Analysis - August 2014
Main Workbook

Site Name	***St. Ann Center - Milwaukee***
Remedy	***Alternative 3***
	Identify the site name and remedy name in the spaces above. These names will be populated on all of the worksheets for the project.

	Enter the path name (if not saved in same directory) and file name of the "Calculations" workbook for the project.
Path Name:	
Calculations File Name:	SEFA_StAnnAlt3_Calculations_(083114).xlsx

Component	**Remedy Component Names***
Component 1	NA
Component 2	Excavation
Component 3	Soil Sent Off-Site
Component 4	Backfill/Capping
Component 5	
Component 6	
	***Fill in unique names for Remedy Components (optional). These names will be populated on all of the worksheets for the project.**

The following color coding applies to cells in the worksheets in this workbook.

	Green cells indicate notes or instructions
	Yellow cells are for manual data input
	Blue cells are calculated cells that are protected
	Gray cells are not available and/or not applicable for data entry
	Orange cells are calculated metrics that are forwarded to the "Summary" tab

Overview

* This Tutorial models a hypothetical remedy and provides exercises for the purpose of demonstrating basic features in SEFA.
* The site is called "Green Hills" and the remedy is "Dig & Haul".
* The remedy includes site investigation, excavation of contaminated soil, transport of the soil off-site, backfilling the excavated areas, operation of a pump and treat system, and conducting groundwater monitoring.
* The Tutorial exercises will model the following: adding a new activity (regrading), changing the fuel mix for grid electricity, and adding a new remedy material. Additional exercises address include modeling carbon storage (from planting trees), alternative modes of transport, and alternative fuel usage.

Information entered for this Tutorial is hypothetical and should not be used as a basis for footprint analyses at real sites.

For questions or comments on this Tutorial, please contact:
Karen Scheuermann, EPA Region 9, scheuermann.karen@epa.gov

Instructions

1) Setting up the Workbooks

SEFA consists of the "Main", "Input", and "Calculations" workbooks (.xlsx files). All three files must be open at the same time while working in SEFA. This allows the workbooks to communicate and calculate footprints.
For simplest use, the three workbooks should all be saved in the same directory, in which case the "Path Name" can be left blank in the "General" tab of each workbook. Alternatively, if you would like to save the workbooks in different directories, you must fill in the "Path Name" on the "General" tab of each workbook using the following format:
DriveLetter :*FolderName* *FolderName* \ Be sure to include final backslash.
On the "General" tab of each workbook, you must enter the "File Name" of one of the other workbooks (as indicated in each workbook) using the following format: *WorkbookName* .*FileExtension*
The file extension is ".xlsx" for all three workbooks.
You may want to change the file names for the "Main", "Input", and "Calculations" workbooks to reflect the site, remedy, and date. For example, the new name for the "Main" workbook may be "main_SiteName_Nov2014.xlsx". If you change the names of the workbooks, you must update the file names on the "General" tabs in each workbook in order for the workbooks to exchange data. Note that the file names may be changed unintentionally when the files are copied or downloaded, and should be readjusted for proper functioning of the SEFA workbooks.

2) Setting up Site and Remedy Names

In the "General" tab in the "Main" workbook, you may replace default labels with site-specific labels for site name and remedy name. These will be automatically updated in all the workbooks. You may also provide a narrative overview of the site and remedy in the "General" tab in the "Main" workbook.

3) Setting up Remedy Components

On the "General" tab in the "Main" workbook, you have the option of customizing the names of the six "Remedy Components", and those customized names will automatically be updated in all the workbooks. If not customized, the default names <Component 1> to <Component 6> will be used by SEFA.
Customizing the Remedy Components allows you to reflect any delineation that will be relevant to the site and remedy. For example, the Remedy Components may be spatial in nature, representing different geographical areas of the cleanup site (e.g., North Quadrant, South Quadrant, West Quadrant). Or the Remedy Components may be functional in nature, representing different operations or activities at the site (e.g., Site Investigation, Excavation, Waste Hauling, Backfilling, Long-term Monitoring). As another example, the Remedy Components may be temporal in nature, representing different time segments for the remedy (e.g., Year 1, Year 2, Year 3).

4) Entering Data

"Input" Workbook : The majority of site and remedy data is entered in the "Input" tabs in the "Input" workbook. See the "Input Instructions" tab in the "Input" workbook for specifics on this data entry. Additional data may be entered in the "Input Summary, "Grid Electricity", "User Defined Factors", and "Well Material Calculator" tabs. See the instructions on each of those tabs for specifics on the functions provided in the tabs.
"Main" Workbook : In the "Summary" tab in the "Main" workbook (Row 35), you may provide a qualitative description of activities at the site related to Land & Ecosystems.
"Calculations" Workbook : No data entry is required by the user in the "Calculations" workbook. However, space is provided in the tabs of this workbook for user-specific calculations and subtotals.

5) Processing Data and Accessing Outputs

Processing Data : The SEFA worksheets automatically process the data entered by the user, apply footprint conversion factors, and compile the results. You have access to all worksheets where the data processing and compilation occurs. However, those portions of the worksheets are "protected" so that the data links and formulas cannot be altered.

Accessing Outputs : The final outputs of the SEFA worksheets are located in the "Main" workbook. The outputs are available in tabular format in the "Summary" tab, and in chart format in the "Totals by Scope and Component" tab. All output presentations are populated automatically.
Accessing Intermediate Results : The user has access to intermediate results throughout the SEFA workbooks. Intermediate results that may be of particular interest are located in the "Energy & Air" tabs in the "Main" workbook, the "Input Summary" tab in the "Input" workbook, and the "Component" tabs in the "Calculations" workbook.

6) Miscellaneous

General Formatting : Although you cannot alter cells in the worksheets that are used for processing data, some general formatting functions are available in all the worksheets. These include adjusting decimal places, adjusting width of columns or row, shading cells, etc. Most of the worksheets also contain blank spaces which are available for making notes or supporting calculations.

Naming, Adjusting, and Adding Tabs : You should not rename the original tabs in the SEFA workbooks, except for the “Input Template” tab in the "Input" workbook (as noted in the "Input Instructions" tab in the "Input" workbook). Renaming other tabs may disrupt the exchange of data among the workbooks. However, you may relocate tabs within each workbook. You may also add new tabs to the workbooks, for example to provide references and calculations in support of the data entry, or user-designed charts and tables for presenting the results.

St. Ann Center - Milwaukee - Alternative 3

Environmental Footprint Summary

Core Element	Metric		Unit of Measure	Footprint						
				NA	Excavation	Soil Sent Off-Site	Backfill/Capping			Total
Materials & Waste	M&W-1	Refined materials used on-site	Tons	0	0	0	0	0	0.0	0
	M&W-2	% of refined materials from recycled or reused material	%		0%					0%
	M&W-3	Unrefined materials used on-site	Tons	0	0	0	9,056	0	0.0	9,056
	M&W-4	% of unrefined materials from recycled or reused material	%				35%			35%
	M&W-5	On-site hazardous waste disposed of off-site	Tons	0	0	0	0	0	0.0	0
	M&W-6	On-site non-hazardous waste disposed of off-site	Tons	0	0	6,080	0	0	0.0	6,080
	M&W-7	% of total potential waste recycled or reused	%		100%	0%				34%
Water (used on-site)	W-1	Public water use	MG	0	0.00375	0.00000	0.00125	0	0	0.005
	W-2	Groundwater use	MG	0	0	0	0	0	0	0
	W-3	Surface water use	MG	0	0	0	0	0	0	0
	W-4	Reclaimed water use	MG	0	0	0	0	0	0	0
	W-5	Storm water use	MG	0	0	0	0	0	0	0
	W-6	Other water resource #1	MG	0	0	0	0	0	0	0
	W-7	Other water resource #2	MG	0	0	0	0	0	0	0
Energy	E-1	Total energy used (on-site and off-Site)	MMBtu	0	531	1,340	882	0	0	2,753
	E-2	Energy voluntarily derived from renewable resources								
	E-2A	On-site renewable energy generation or use + on-site biodiesel use + biodiesel and other renewable resource use for transportation	MMBtu	0	0	0	0	0	0	0
	E-2B	Voluntary purchase of renewable electricity	MWh	0	0	0	0	0	0	0
	E-3	Voluntary purchase of RECs	MWh	0	0	0	0	0	0	0
	E-4	On-site grid electricity use	MWh	0	0.0	0	0	0	0	0
Air	A-1	On-site NOx, SOx, and PM emissions	Pounds	0	355	0	174	0	0	529
	A-2	On-site HAP emissions	Pounds	0	0	0	0	0	0	0
	A-3	Total NOx, SOx, and PM emissions	Pounds	0	677	4,202	1,090	0	0	5,968
	A-3A	Total NOx emissions	Pounds	0	513	1,262	808	0	0	2,583
	A-3B	Total SOx emissions	Pounds	0	145	499	245	0	0	889
	A-3C	Total PM emissions	Pounds	0	19	2,441	37	0	0	2,497
	A-4	Total HAP emissions	Pounds	0	4	9	1	0	0	13
	A-5	Total greenhouse gas emissions	Tons CO2e*	0	42	105	64	0	0	211
Land & Ecosystems	Minimal disruptions to land and ecosystems.									

** Total greenhouse gases emissions (in CO2e) include consideration of CO2, CH4, and N2O (Nitrous oxide) emissions.*

"MMBtu" = millions of Btus

"MG" = millions of gallons

"CO2e" = carbon dioxide equivalents of global warming potential

"MWh" = megawatt hours (i.e., thousands of kilowatt-hours or millions of Watt-hours)

"Tons" = short tons (2,000 pounds)

The above metrics are consistent with EPA's Methodology for Understanding and Reducing a Project's Environmental Footprint (EPA 542-R-12-002), February 2012

Notes:

St. Ann Center - Milwaukee
Greener Cleanups: EPA Spreadsheets for Environmental Footprint Analysis - August 2014
Input Workbook
Alternative 3

	Enter the path name (if not saved in the same directory) and file name of the "Main" workbook for the project.
Path Name:	
Main File Name:	SEFA_StAnnAlt3_Main_(083114).xlsx

Component	Remedy Component Names
Component 1	*NA*
Component 2	*Excavation*
Component 3	*Soil Sent Off-Site*
Component 4	*Backfill/Capping*
Component 5	*0*
Component 6	*0*

Component names are autofilled from the "Main" workbook.

The following color coding applies to cells in the worksheets in this workbook.

	Green cells indicate notes or instructions
	Yellow cells are for manual data input
	Red cells are for manual data input from a drop-down list of selections and are protected
	Blue cells are calculated cells that are protected
	Gray cells are not available and/or not applicable for data entry

Input Instructions

1) Overview

The “Input” workbook is used for data entry of site and remedy information. The majority of this data is entered in the “Input” tabs. Additional information may be entered in the “Input Summary”, “Grid Electricity”, “User Defined Factors”, and “Well Material Calculator” tabs.

"Input" Tabs : The user enters information on transportation, materials, equipment, waste, and energy associated with the site and remedy on the "Input" tabs. The user may establish up to 14 "Input" tabs to reflect the site and remedy, and assigns each "Input" tab to one of the 6 Remedy Components. See the section “Adding and Aligning “Input” Tabs” below for information on setting up “Input” tabs, renaming the tabs, and assigning them to Remedy Components. See the “Detailed Notes and Explanations” tab for specifics on entering remedy data into the “Input” tabs.

"Input Summary" Tab : The column headings in the “Input Summary” tab (Row 6) must be updated by the user to reflect the tab names in the following situations: (a) if additional “Input” tabs are set up by the user (regardless of whether they are renamed); and (b) if “Input” tab names are customized or changed.

"Grid Electricity" Tab : If grid electricity is used at the site, the local fuel mix for the grid electricity should be added in this tab. See the instructions on the “Grid Electricity” tab for specifics on data entry for local fuel mix.

"User Defined Factors" Tab : If the remedy requires materials or off-site activities not provided in SEFA, you may add the materials or activities to SEFA. You should research and document the information, then enter it in the “User Defined Factors” tab. See the “User Defined Factors” tab for specifics on adding user defined factors.

"Well Material Calculator" Tab : Data entry is not required in this tab. The Well Material Calculator is provided as a convenience to the user. The Calculator uses a lookup table to calculate the amount of casing material, screen material, cement, and sand/gravel that would be required to build a well, based on specifications entered by the user. See the “Well Material Calculator” tab for specifics on the use of the Calculator.

2) Adding and Aligning "Input" Tabs

You may want to create additional “Input” tabs to help organize your data entry. When you create a new "Input" tab, you will typically want to align it with a Remedy Component. These steps are described below.

Creating Additional "Input" Tabs: To create a new “Input” tab, right-click the tab name of the "Input Template" tab, choose “move or copy”, check the box "create a copy" and then click "OK". You can leave the tab name alone after copying (such as “Input Template (2), Input Template (3)”, etc.), or you can rename each new “Input” tab by right-clicking on the tab, choosing “rename”, and typing the new name. If you rename an “Input” tab, you must also enter that new name on the “Input Summary” tab in the "Input" workbook, for the tab to be included in the footprint analysis. (See instructions below for the “Input Summary” tab for more information on this topic.)

Aligning the "Input" Tabs with the Remedy Components: Each “Input” tab can be considered a subcategory under one of the Remedy Components designated in the “General” tab of the “Main” workbook. In order for each “Input” tab to be included in the footprint analysis, the tab must be aligned with a Remedy Component. To align an “Input” tab, use the drop-down menu in Row 4 of the "Input" tab and choose the Remedy Component that the “Input” tab pertains to. You may select one of six Remedy Components or you may turn the selection "off" so that the tab is not aligned with a Remedy Component. The Remedy Component number will appear in Row 4 on the "Input Summary" tab. (If "off" is chosen, "0" will appear in Row 4.) An example of aligning “Input” tabs to the Remedy Components is illustrated in Item (7) below.

Additional Notes:

(a) You can create any number of “Input” tabs, but you may align a maximum of 14 “Input” tabs to the Remedy Components at any one time.

(b) You may group multiple “Input” tabs under the same Remedy Component.

(c) You may want to allow certain “Input” tabs to remain non-aligned with the Remedy Components in some cases. For example a non-aligned “Input” tab may be used for testing alternative designs or parameters for the remedy. The tab would be turned “off” when not included in the analysis, and would be re-aligned with a Remedy Component to be included in the analysis.

(d) You should reserve the unused (blank) “Input Template” tab, in the event that it becomes necessary to create additional “Input” tabs at a later time.

(e) You may delete an “Input” tab at any time by right-clicking on the tab and choosing “delete”. If an “Input” tab is deleted, you should also remove the name of that tab from the column headings in the “Input Summary” tab.

(f) You can reposition an “Input” tab by left-clicking on the tab and dragging it to the right or left. Multiple “Input” tabs can be grouped as part of the same Remedy Component in this manner, if that is desired.

(g) If you run out of space for entries in any of the tables in the "Input" tabs, you may create another "Input" tab to continue entries in the table.

3) Setting Up the "Input Summary" Tab

The “Input Summary” tab displays a summary of 14 “Input” tabs (in Columns E - R) and 6 Remedy Components (in Columns S - X). The grand total is displayed in Column Y.

If you create a new “Input” tab or rename an existing “Input” tab, you must add the new name to the column headings in Row 6 of the “Input Summary” tab. This allows the “Input Summary” tab to collect data from the various “Input” tabs. For example, if you rename the “Input Template” tab, so that it is now called “Site Investigation”, you must also rename the corresponding column heading in Row 6 of the “Input Summary” tab. In this example, Cell C6 would be renamed “Site Investigation”. Additional notes:

(a) The Remedy Component Numbers in Row 4 of the “Input Summary” tab are automatically populated, based on the selections made in Row 4 of the “Input” tabs.

(b) Other than renaming the column headings with “Input” tab names (if necessary), no other data entry is required in the “Input Summary” tab.

(c) You may add the "Input" tab names in any order in Row 6 of the "Input Summary" tab. They need not reflect the order of the tabs in the "Input" workbook.

(d) Be sure to reflect the exact tab name in Row 6 of the "Input Summary" tab, in order for it to be recognized by SEFA.

4) Data Entry in the "Input Template" Tab

The “Input Template” tab contains a variety of data entry tables for flexibility to accommodate a wide range of remedy activities and configurations. You can by-pass any of the data entry tables, and use only those tables that are relevant to the site and remedy at hand. (See EPA's Methodology [www.cluin.org/greenremediation/methodology] for a protocol for screening out inputs that would make minimal contributions to the footprint totals.) Much of the data entry in the “Input Template” tab is self-explanatory. However, please see the “Detailed Notes and Explanations” tab in the "Input" workbook for specifics on the data entry tables in the “Input Template” tab.

5) Using the "Grid Electricity" Tab

On the “Grid Electricity” tab, you can define the fuel mix (mix of energy resources that is used to generate grid electricity) for grid electricity used at your site. SEFA uses this fuel mix to calculate the footprint from generation of the grid electricity. By default, the fuel mix in the “Grid Electricity” tab is set to the U.S. national average from 2009. You are strongly encouraged to change this to a regional or local fuel mix that is more representative of the grid electricity used by the remedy. Specifying the fuel mix from the local provider will often be important for accuracy of the footprint calculations, as the fuel mix can vary substantially at the national, regional, and local levels.

You can set a single fuel mix for all Remedy Components, or you can specify individual fuel mixes for each of the 6 Remedy Components. This allows for flexibility in the event that different grid electricity providers are used for different activities or areas at the site. Please see the “Grid Electricity” tab for specifics on how to set the fuel mix for your site.

6) Using the "User Defined Factors" Tab

SEFA is equipped with default footprint conversion factors for a variety of materials and activities. The conversion factors are used to estimate the amount of energy required for, and the amount of NOx, SOx, PM, HAPs, and greenhouse gas emissions related to, the off-site production of materials or activities. Additional conversion factors are used for energy and air emissions related to the combustion of fuels. These default conversion factors can be viewed in the “Default Conversions” tab of the “Calculations” workbook and are applied automatically in the “Calculations” workbooks.

In the “User Defined Factors” tab, SEFA provides flexibility in establishing conversion factors for materials and activities that are unique to the remedy or site. Unique conversion factors can be established for the following:

(a) Combustion of fuels (both renewable and “conventional”) for transportation and on-site equipment

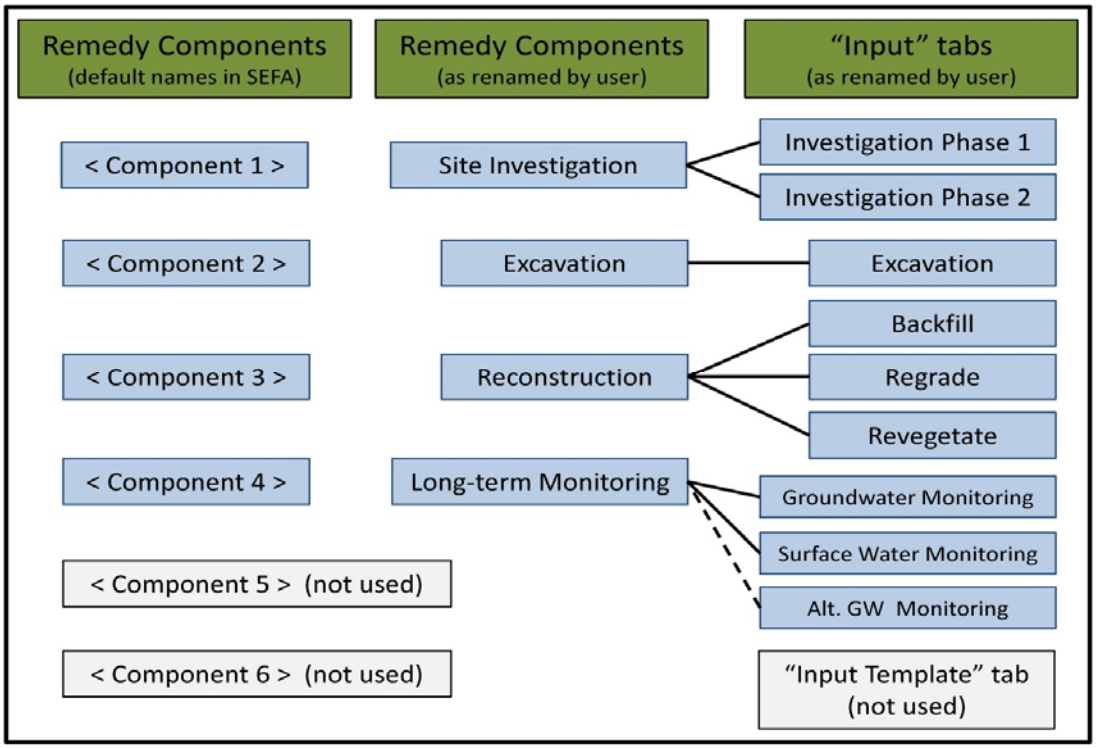
(b) Off-site manufacturing or processing of materials

(c) Off-site management and recycling of wastes

In establishing these unique conversion factors, you should research and document the data, and enter it into the “User Defined Factors” tab. Once entered, SEFA will automatically apply the conversion factors in the “Calculations” workbook. Please see the “User Defined Factors” tab for specifics on establishing unique conversion factors.

7) Example of Aligning "Input" Tabs to Remedy Components

The diagram below illustrates the alignment of “Input” tabs to Remedy Components for a hypothetical site and remedy. In this example, the user renames Remedy Components 1 - 4, according to the four main aspects of the remedy, but does not need Remedy Components 5 and 6. The user makes copies of the blank “Input Template” tab as needed, names them, and links them to the Remedy Components. The user keeps the original blank copy of the “Input Template” tab in reserve in the event that additional copies are needed. The notes below the diagram provide additional explanations for creating, naming, and aligning the “Input” tabs in this example.



Notes:

(a) The user is interested in distinguishing between Phases 1 and 2 during Site Investigation because the Phases will occur six months apart. Therefore, the user creates two copies of the “Input Template” tab, names the copies accordingly, and aligns them with the “Site Investigation” remedy component.

(b) The user views the excavation activities as a single discrete event, and so creates one copy of the “Input Template” tab, names it accordingly, and links it with the “Excavation” remedy component.

(c) The user would like to better understand the footprints for three aspects of Reconstruction to determine which aspects to focus on for footprint reduction measures. Therefore, the user creates three copies of the “Input Template” tab, names the copies accordingly, and aligns them with the “Reconstruction” remedy component.

(d) The user is interested in tracking two aspects of Long-term Monitoring separately, and so creates two copies of the “Input Template” tab, names the copies accordingly, and aligns them with the “Long-term Monitoring” remedy component.

(e) The user would like to test the environmental footprint from two groundwater monitoring regimes (which are equally effective for monitoring the site). Therefore, the user creates a copy of the “Input Template” tab for the alternative regime, and names it “Alt. GW Monitoring”. The user does not align this tab with the “Long-term Monitoring” remedy component, but keeps the tab turned “off”. When testing the alternative, the user will align the “Alt. GW Monitoring” with the “Long-term Monitoring” remedy component and will turn the original “Groundwater Monitoring” tab “off”.

Detailed Notes and Explanations for "Input Template" Tab

Table of Contents

1) Headings (Rows 1 & 2)

An identifier for the SEFA worksheets appears in Row 1. The site and remedy names appear automatically in Row 2, based on information entered in the "General" tab of the "Main" workbook. The name of the "Input" tab also appears automatically in Row 2, based on the name typed by the user on the tab at the bottom of the excel window. These headings are repeated at the top of subsequent pages of the "Input" tab.

2) Alignment with Remedy Components (Rows 4 & 5)

The drop-down menu in Cell E4 is used for alignment of the "Input" tab with a Remedy Component. Please see the "Input Instructions" tab in the "Input" workbook for instructions on aligning "Input" tabs.

3) Comment Space (Row 7)

Space is made available in Row 7 for narrative notes for General Scope, Examples of Items Eliminated through Screening Process, and Other Notes and References. In addition, spaces are left open in the following sections of the "Input Template" tab for notes, references, or supporting calculations:

(a) Selected cells between and among the tables in the main part of the worksheet

(b) All cells beginning in Column X and extending to the right

(c) All cells in Rows 160 - 192

(d) All cells in Rows 193 – 405 (Columns G - W) below the main worksheet

4) Personnel Transportation (Row 14)

Use this table to model personnel transportation to and from the site.

(a) Calculations for Fuel Used in Column K are based on the values or drop-down selections for Number of Roundtrips to Site, Roundtrip Distance to Site, Mode of Transportation, and Fuel Type in Columns C, D, E, and G, respectively. You must make entries or selections in all four columns (C, D, E, and G) in order for the Fuel Used to be calculated.

(b) You may select any combination for Mode of Transportation (Column E) and Fuel Type (Column G). However, SEFA provides Default Fuel Usage Rates (Column I) for only the most common combinations. For combinations for which SEFA does not provide a Default Fuel Usage Rate, the message "NO DATA" will appear in Column I.

(c) You may override the Default Fuel Usage Rate. If you have a specific Fuel Usage Rate for any transportation/fuel combination, you may enter it in Column J. This will override the default value in Column I. You may also use Column J to designate the Fuel Usage Rate when "NO DATA" appears in Column I.

(d) If “Airplane” is selected as Mode of Transportation in Column E, you should select “Diesel” as the Fuel Type in Column G. SEFA contains Default Fuel Usage Rates only for diesel when “Airplane” is selected, based on the assumption that diesel is similar to jet fuel.

(e) If “Electricity” is selected as Fuel Type in Column G, Fuel Used (Column K) will not be calculated, regardless of the Mode of Transportation in Column E. If the electricity supply for the transportation is provided on-site, you must enter it separately in the "On-Site Electricity Use" table (Row 43), in order for it to be included in the footprint analysis.

(f) The units for Total Distance (Column H) are dependent on the mode of transportation selected in the dropdown menu in Column E. The units are:

(i) For car or truck, the units are miles.

(ii) For airplane/bus/train, the units are passenger-miles.

(iii) If “Vehicle (other)” is selected in the dropdown menu, the units should be determined by the user.

(g) The units for Default Fuel Usage Rate (Column I) are dependent on the transportation/fuel combination and are noted below. When specifying the Fuel Usage Rate in Column J, the same units must be used. The units are based on gallons for diesel/biodiesel/gasoline and ccf for natural gas. Although some of the combinations are unlikely, the units would be:

(i) For car or truck, the units are miles/gallon or miles/ccf.

(ii) For airplane/bus/train, the units are passenger-miles/gallon or passenger-miles/ccf.

(iii) If “Vehicle (other)” is selected in the dropdown menu, the units should be determined by the user.

(h) When the Fuel Type (Column G) is biodiesel, B20, diesel, or gasoline, the units for Fuel Used (Column K) are gallons. When the Fuel Type is natural gas, the units for Fuel Used are hundreds of cubic feet (ccf). As noted above, when the Fuel Type is electricity, SEFA does not calculate Fuel Used.

(i) Open cells are provided in Rows 25 and 26 to allow additional flexibility for transportation/fuel combinations. When using these rows, you must still select the Fuel Type from the drop-down menu in Column G, in order for the fuel usage to be summed in the SEFA worksheets.

(j) If you are using a transportation fuel that is not provided in the drop-down menu in Column G, you may still include that fuel usage in the "Other Energy Use and Air Emissions” table beginning on Row 129 of the “Input Template” tab. Please see below for instructions on the use of that table.

5) On-Site Equipment Use and Transportation (Row 29)

Use this table to model on-site equipment that is powered by diesel, biodiesel, or gasoline, and to model the transport of that equipment to and from the site.

Equipment Use

(a) For equipment or processes powered by natural gas, use the “On-Site Natural Gas Use” table beginning in Cell L43. For equipment or processes powered by electricity, use the “On-Site Electricity Use” table beginning in Cell A43. If you are using equipment or processes powered by a fuel that is not provided in the drop-down menu in Column E, or in the “On-Site Natural Gas Use” or “On-Site Electricity Use” tables, you may still include that fuel usage in the "Other Energy Use and Air Emissions” table beginning on Row 129 of the “Input Template” tab. Please see below for instructions on the use of these tables.

(b) Calculations for Fuel Used for On-Site Equipment in Column H are based on the values or drop-down selections for Horsepower, Load Factor, Equipment Fuel Type, and Equipment Hours Operated in Columns C, D, E, and G, respectively. You must make entries or selections in all four columns (C, D, E, and G) in order for the Fuel Used for On-Site Equipment to be calculated.

(c) For Horsepower in Column C, you may enter the representative value noted in the dropdown menu (Column A), or a unique value, if known, for the equipment to be used on-site. The horsepower ratings noted in the dropdown menu in Column A are provided for convenience only, as generally representative values that can be used in the absence of more specific information. They are not recognized in the SEFA calculations unless entered in Column C.

(d) The Load Factor (Column D) for a piece of equipment is the ratio of the load that the motor actually draws when it is operating to the maximum load that it could draw. For example, for a motor of 100 HP that drives a constant 75 HP load whenever it is on, the load factor will be 75/100, or 75%. To represent a motor that is running fairly efficiently, it is recommended that a load factor of 75% be used absent other information.

Equipment Transportation

Fuel usage rates for equipment transportation are miles/gallon or miles/ccf. There is no drop-down menu for selecting mode of transport: the transport is set as heavy-duty truck. For selecting the Transport Fuel Type (Column L) and overriding the Default Fuel Usage Rate (Columns M and N), use the approach described above for Columns G, I, and J in the “Personnel Transportation” table.

Other

(a) The use of equipment on-site may be modelled independently from transport of the equipment to the site. For example, if a piece of equipment is used on-site, but transport of the equipment is not applicable (e.g., the equipment is permanently fixed to the site or transport is screened out as a minimal contributor), then fill in Columns A - G, but not Columns I - N. Conversely, if a piece of equipment is being transported to the site, but once on-site is powered by fuel other than diesel, biodiesel, or gasoline, then you would fill in Columns I - N, but not Columns A - G.

(b) Open cells are provided in Rows 39 and 40 to provide additional flexibility for equipment/fuel and transportation/fuel combinations. When using these rows, you must still select the Equipment Fuel Type and the Transport Fuel Type from the drop-down menus in Columns E and L, respectively, in order for the fuel usage to be summed in the SEFA worksheets.

(c) If you are using equipment or transportation fuel that is not provided in the drop-down menus in Columns E or L, you may still include that fuel usage in the "Other Energy Use and Air Emissions" table beginning on Row 129 of the "Input Template" tab. Please see below for instructions on the use of that table.

6) On-Site Electricity Use (Row 43)

Use this table to model electricity usage on-site, whether the electricity is supplied through the grid, or generated on-site from renewable resources.

(a) You may represent electricity demand in three ways: (1) based on the horsepower rating of equipment in Rows 45 - 48; (2) based on kW rating in Rows 49 - 52, and (3) based on total kWh used in Rows 53 - 56. Please note that all cells shaded yellow must be filled in for each type of data entry selected.

(b) The Load Factor (Column C) for a piece of electrical equipment is the ratio of the load that the motor actually draws when it is operating to the maximum load that it could draw. For example, for a motor of 100 HP that drives a constant 75 HP load whenever it is on, the load factor will be 75/100, or 75%. To represent a motor that is running fairly efficiently, it is recommended that a load factor of 75% be used absent other information.

(c) The Efficiency (Column D) for a piece of electrical equipment is a measure of how well the equipment performs relative to its designed capacity. The lower the efficiency, the more electricity is required by the equipment to complete the task. For efficiency, use either (1) the percent that gets you closest to the expected Electrical Rating or (2) a value of 75% to represent a motor that is running fairly efficiently.

(d) Enter electricity generated on-site from renewable resources in Cell G58. Enter only renewable electricity for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the on-site electricity generation). This renewable energy is subtracted from the total energy demand to the grid. Note that if the amount of renewable energy generated on-site is greater than that used on-site, the total Grid Electricity Used in Cell G59 is negative. This represents excess electricity that may be sold to other users or sent back into the grid.

7) On-Site Natural Gas Use (Row 43)

Use this table for combustion of natural gas on-site. For example, natural gas may be used for heating buildings or treatment processes.

(a) If power rating is known, use Rows 45 and 46.

(b) If heat load is known instead of power rating, use Rows 45 and 46, and enter power rating as 125% of heat load and choose 80% for efficiency.

(c) If Energy Required is known, use Row 47.

(d) If Natural Gas Used is known, use Row 48.

(e) The following conversion is used for calculating Natural Gas Used in Column R: 1 ccf = 103,000 Btu.

8) Landfill Gas Combusted On-Site for Energy Use (Row 53)

Use this table for combustion of landfill gas on-site. For example, the landfill gas usage may be in turbines for electricity production, or may be for heating in buildings or treatment processes. If the landfill gas is being flared, you should model this in the "Other Energy Use and Air Emissions" table on Row 129 of the "Input Template" tab.

(a) The greenhouse gas calculations in SEFA account for the avoidance of emissions of landfill methane, in addition to the emissions of CO2e as a result of the combustion process.

(b) SEFA does not account for non-methane gases emitted from the landfill. You can account for these in the "Other Energy Use and Air Emissions" table beginning on Row 129 of the "Input Template" tab.

(c) SEFA accounts for landfill gas combustion for beneficial purposes as "On-site renewable energy use or generation" in the "Summary" tab in the "Main" workbook. However, some entities do not support the claim of landfill gas as a renewable resource. In this case, you may want to use the "Other Energy Use and Air Emissions" table on Row 129 of the "Input Template" tab to adjust the totals for renewable energy in the "Summary" tab.

(d) When landfill gas is used for electricity production, you may decide to characterize the electricity production to be from a “renewable resource”. If you characterize the electricity as “renewable”, and you retain the renewable energy rights, you should enter the amount of electricity generated in Cell G58 of the “On-Site Electricity Use” table in the "Input Template" tab. You should also use the "Other Energy Use and Air Emissions” table on Row 129 of the “Input Template” tab to avoid double counting for the renewable energy.

9) Materials Use and Transportation (Row 65)

Use this table to model the types and amounts of materials used for the remedy and to model the transport of the materials to the site.

Materials Use

(a) Calculations for the energy and air emissions footprint from off-site manufacturing of materials are based on the values or drop-down selections for Material Type and Quantity in Columns A and D. (The footprint calculations are made automatically in the “Component” tabs in the “Calculations” workbook.) You must make entries or selections in both Columns A and D, and you must select “Yes” in the drop-down menu in Column H, in order for the footprint calculations to be made. Additional notes:

(i) There may be instances in which you do not want the energy and air emissions footprint calculations to be performed on the material, in which case you should choose “No” in Column H. For example, the material may be from a “Reused” source, with no energy or air emissions footprint accruing to the cleanup site.

(ii) If you do not find the material you are looking for in the drop-down menu in Column A, you may add a “User-defined Material” to the drop-down menu. For instructions, please see the “User Defined Factors” tab in the “Input” workbook.

(iii) If you are using a material that is in the drop-down menu in Column A, but you have documented unique footprint conversion factors for that material that are different from the default footprint conversion factors in SEFA, you may add the unique material to the drop-down menu, as a “User-defined Material”. For instructions, please see the “User Defined Factors” tab in the “Input” workbook.

(b) Summation of total tons of refined and unrefined materials, and calculation of % materials from recycled or reused sources, are based on values or drop-down selections made in Columns D, F, and G. (The total tons and %’s are presented in Rows 7 - 10 of the “Summary” tab of the “Main” workbook.) You must make entries or selections in all three Columns (D, F, and G) in order for the materials to be included in the totals tons and %’s. Additional notes:

(i) The distinction between refined and unrefined material (Column F) is described in EPA’s Footprint Methodology (www.cluin.org/greenremediation/methodology).

(ii) For background information on the selection in Column G between “Virgin”, “Recycled”, and “Reused” materials, see the discussion in Section 15 below.

(iii) The selections for “Recycled” and “Reused” materials in Column G are combined in the calculation for “% of (un)refined materials from recycled or reused material” in Rows 8 and 10 in the “Summary” table of the “Main” workbook. The distinction between “Recycled” and “Reused” is retained in the dropdown menu in Column G for the convenience of the user.

(iv) If a material is obtained partly from virgin sources and partly from reused or recycled sources, you may enter the appropriate portions of the material on two separate rows in the "Materials Use and Transportation" table, and identify one portion as “Virgin” and the other portion as “Reused” or “Recycled”. For example, if your site uses 100,000 lbs of cement composed of 8% reused material (with no footprint accruing to the site from the reused portion) you may enter the information in Columns A, D, F, G, and H as follows.

First row (virgin source):	cement, 92000 lbs, refined, virgin, yes
Second row (reused source):	cement, 8000 lbs, refined, reused, no

(c) For materials identified as “Reused” or “Recycled”, you will typically choose “No” in the drop-down menu in Column H to indicate that no energy or air emissions footprint accrues to the cleanup site from production of the material. If you would like to account for the footprint from a “Reused” or “Recycled” material, you may add it as a “User-defined Material” to the drop-down list in Column A. For instructions, please see the “User Defined Materials” tab in the “Input” workbook.

Materials Transportation

(a) Calculations for Fuel Used in Column Q are based on the values or drop-down selections for Default One-way Distance, Number of One-way Trips, Mode of Transportation, and Fuel Type in Columns I, K, L, and N, respectively. You must make entries or selections in three of the columns (K, L, and N) in order for the Fuel Used to be calculated. You may override the Default One-way Distance by entering a site-specific One-way Distance in Column J.

(b) You may select any combination for Mode of Transportation (Column L) and Fuel Type (Column N). However, SEFA provides Default Fuel Usage Rates (Column O) for only the most common combinations. For combinations for which SEFA does not provide a Default Fuel Usage Rate, the message “NO DATA” will appear in Column O.

(c) You may override the Default Fuel Usage Rate. If you have a specific Fuel Usage Rate for any transportation/fuel combination, you may enter it in Column P. This will override the default value in Column O. You may also use Column P to designate the Fuel Usage Rate when "NO DATA" appears in Column O. When overriding or designating the Fuel Usage Rate in Column P, you must use the same units as noted in the drop-down menu in Column L.

(d) If "Aircraft" is selected as Mode of Transportation in Column L, you should select "Diesel" as the Fuel Type in Column N. SEFA contains Default Fuel Usage Rates only for diesel when "Aircraft" is selected, based on the assumption that diesel is similar to jet fuel.

(e) The option for electricity is not provided in Column N for materials transport. If electricity is used for transport, and if the electricity supply is provided on-site, you must enter it separately in the "On-Site Electricity Use" table (Row 43), in order for it to be included in the footprint analysis.

(f) The units for Default Fuel Usage Rate in Column O depend on the Mode of Transportation selected in Column L. If "Truck (mpg)" is selected, the units are Miles per Gallon (mpg). If "Truck freight (gptm)" is selected, the units are Gallons per Ton-Mile (gptm). For all other selections (Aircraft, Barge, and Train), the units are also Gallons per Ton-Mile. For background information on the selection of "Truck (mpg)" vs "Truck freight (gptm)", see the discussion in Section 16 below.

(g) When "Truck (mpg)" has been selected in Column L, you may want to account for return empty trips. When Truck freight, Aircraft, Barge, or Train has been selected you generally should not model an empty return trip. (For background information on modelling empty return trips, see the discussion in Section 16 below.) In order to account for return empty trips, you may want to use one of the following options:

(i) Double the Number of Trips in Column K.

(ii) Enter the empty return trips in a separate Row, leaving Columns D, F, G, and H blank. (You may select the material from the drop-down menu in Column A, if desired.) Fill in Columns K, L, and N, and be sure that there is an entry in either Column I or J (or both). Use the override function in Column P if desired.

Other

(a) The use of materials on-site may be modelled independently from transport of the materials to the site. For example, if a material is used on-site, but transport of the material is not applicable (e.g., the material is transported with the same vehicle used for personnel transportation or transport is screened out as a minimal contributor), then fill in Columns A - H, but not Columns I - Q. Conversely, if a material is being transported to the site, but the material is not to be included in any aspect of the footprint (e.g., total tons, % recycled, energy and air emissions footprints), then fill in Columns I - Q, but not Columns A - H.

(b) Open cells are provided in Rows 83 and 84, to allow additional flexibility for transportation/fuel combinations. When using these rows, you must still select the Fuel Type from the drop-down menu in Column N, in order for the fuel usage to be summed in the SEFA worksheets.

(c) If you are using a transportation fuel that is not provided in the drop-down menu in Column N, you may still include that fuel usage in the "Other Energy Use and Air Emissions" table beginning on Row 129 of the "Input Template" tab. Please see below for instructions on the use of that table.

10) Waste Disposal and Transportation (Row 90)

Use this table to model types and amounts of wastes generated by the remedy and to model the transport of wastes from the site.

Waste Disposal

(a) Calculations for the energy and air emissions footprint from management of waste generated on-site are based on the values or drop-down selections for Waste Destination and Quantity in Columns A and D. (The footprint calculations are made automatically in the "Component" tabs in the "Calculations" workbook.) You must make entries or selections in both Columns A and D, in order for the footprint calculations to be made. Additional notes:

(i) SEFA assumes no energy or air emissions footprint from the "Recycled/Reused On-Site" and "Recycled/Reused Off-Site" selections in the drop-down menu in Column A. To include energy or air emissions footprints for recycled or reused waste in the footprint analysis, you may add a "User-defined" item to the drop-down menu. For instructions, please see the "User Defined Factors" tab in the "Input" workbook.

(ii) Aside from reused or recycled wastes, if you do not find the off-site waste management destination or process that you are looking for in the drop-down menu in Column A, you may add a "User-defined" item to the drop-down menu. For instructions, please see the "User Defined Factors" tab in the "Input" workbook.

(iii) If you are using a waste destination or process that is in the drop-down menu in Column A, but you have documented unique footprint conversion factors for that waste destination or process that are different from the default footprint conversion factors in SEFA, you may add the unique waste destination or process to the drop-down menu, as a "User-defined" item. For instructions, please see the "User Defined Factors" tab in the "Input" workbook.

(b) Summation of total tons of hazardous and non-hazardous wastes, and calculation of % of waste that is recycled or reused, are based values or drop-down selections made in Columns A and D. (The total tons and %'s are presented in Rows 11 - 13 of the "Summary" tab of the "Main" workbook.) You must make entries or selections in both Columns (A and D) in order for the materials to be included in the totals tons and %'s. Additional notes:

(i) The distinction between hazardous and non-hazardous waste (in the drop-down menu in Column A) may depend on state and local regulations for the location of the site and waste destination. You should make the selection in Column A that best fits the waste at hand.

(ii) For waste that is recycled/reused, no distinction is made in SEFA between hazardous and non-hazardous waste. This conforms with EPA's Footprint Methodology (www.cluin.org/greenremediation/methodology).

(c) Although wastewater sent to a POTW is not strictly speaking a "waste", that item has been included in the "Waste Disposal and Transportation" table (in the drop-down menu in Column A) for the user's convenience.

Waste Transportation

(a) Calculations for Fuel Used in Column N are based on the values or drop-down selections for Default One-way Distance, Number of One-way Trips, Mode of Transportation, and Fuel Type in Columns F, H, I, and K, respectively. You must make entries or selections in three of the columns (H, I, and K) in order for the Fuel Used to be calculated. You may override the Default One-way Distance by entering a site-specific One-way Distance in Column G.

(b) The use of Columns F - N in the "Waste Disposal and Transportation" table in Row 90 is parallel to the use of Columns I - Q in the "Materials Use and Transportation" table in Row 65. Please see Section 9 above for notes and descriptions for use of this table.

(c) The default footprint conversion factors in SEFA for processing wastewater at a POTW include the typical footprint from transport of the wastewater through municipal lines. Therefore, you should leave Columns F - N blank when modelling "POTW" as a waste destination.

11) Water Use (Row 108)

Use this table to model the types and quantity of water used on-site by the remedy.

(a) To model water used on-site, select the source of water from the drop-down menu in Column A, and enter the quantity of water in Column D. Space for narrative remarks is provided in Columns F, J, N, and S for the convenience of the user. Entering information in Columns F, J, N, and S is optional. Additional notes:

(i) The items selected in the drop-down menu in Column A are summed according to source, and totals for each source are reported in Rows 14 - 20 in the "Summary" tab of the "Main" workbook.

(ii) Narrative remarks in Columns F, J, N, and S are not forwarded to the "Summary" tab in the "Main" workbook.

(b) SEFA provides default footprint conversion factors for energy and air emissions only for "Public Water" in the drop-down menu in Column A. These footprint conversion factors include the typical footprint from transport of the public water through municipal lines.

(c) For all other selections in the drop-down menu (besides "Public Water"), SEFA assumes no energy or air emissions footprint. If there are any significant activities related to extracting, reclaiming, collecting, or diverting the other types of water, you may want to model those activities separately in other sections of the "Input Template" tab.

(d) No data entry options are provided in the "Water Use" table for transport of water from off-site suppliers. If water is transported to the site by truck or other vehicle, you may use the "Materials" table on Row 65 to model the transport, and use the notes section in Column R of that table to identify the entry.

(i) If "Truck (mpg)" is being used for transport of the water, leave Columns A - H of the "Materials" table blank, and enter the relevant transport information in Columns I - Q.

(ii) If transport based on gptm is being used for the water, leave Columns A and F - H of the "Materials" table blank. Enter the quantity of water (in tons) in Column D, and relevant transport information in Columns J, L, N, and P.

(e) If you do not find the water source you are looking for in the drop-down menu in Column A, you may choose "Other Water Resource" from the drop-down menu. SEFA will sum the water usage in the "Summary" tab in the "Main" workbook, but will not calculate and energy and air emissions footprint for the selection.

12) Off-Site Laboratory Analysis (Row 129)

Use this table to model the types and number of analyses conducted at off-site laboratories.

(a) Enter the type of analysis, the approximate cost per analysis, and the number of samples undergoing the analysis.

(b) Although the individual entries are summed for the total cost in Cell V146, this total cost is not reported in the results in SEFA. Instead the total cost is used as a surrogate for economic activity, which in turn is used to estimate the footprint from the laboratory analyses. This approach is documented in the "Default Conversions" tab in the "Calculations" workbook.

13) Other Energy Use and Air Emissions (Row 129)

Use this table to model energy use and air emissions from on-site activities and transportation that have not been covered in any of the other tables in the "Input Template" tab. The "Other Energy Use and Air Emissions" table provides flexibility to include in the footprint analysis unique situations at your cleanup site. In all cases, you must perform your own estimates or calculations for the quantities to be entered in Column F of this table.

(a) Rows 132 and 133: If the remedy at your site uses a conventional (i.e., non-renewable) energy source on-site that is not represented elsewhere in the "Input Template" tab, you may add it as "User-defined on-site conventional energy use" in Rows 132 or 133. For example, you may have a boiler on-site that runs on fuel oil. For instructions, please see the "User Defined Factors" tab in the "Input" workbook.

(b) Row 134: If the remedy at your site results in emissions of on-site hazardous air pollutants (HAPs) that are not represented elsewhere in the "Input Template" tab, you may add them as "On-site HAP process emissions" in Row 134. For example, the treatment system at your site may release fugitive VOC emissions. Enter the quantity of the emissions in lbs in Cell F134, and use the notes space in Cell G134 to describe the source and type of emissions.

(c) Row 135: If the remedy at your site results in greenhouse gas (GHG) emissions that are not represented elsewhere in the "Input Template" tab, you may add them as "On-site GHG emissions" in Row 135. For example, the landfill gas collection system at your site may not be 100% efficient, resulting in fugitive emissions of methane. Enter the quantity of the emissions in lbs CO2e in Cell F135, and use the notes space in Cell G135 to describe the source and type of emissions.

(d) Row 136: If the remedy at your site results in carbon or greenhouse gas storage, you may add this as "On-site carbon storage" in Row 136. For example, you may have planted trees as part of your remedy, resulting in uptake of CO2. Enter the quantity of the carbon storage provided by the trees in lbs CO2e in Cell F136, and use the notes space in Cell G136 to describe the source and type of carbon storage. The quantity in Cell F136 must be entered as a negative number to represent storage.

(e) Row 137: If you are flaring landfill gas at your site, you may add this as "GHG avoided by flaring on-site landfill methane" in Row 137. Enter the quantity of methane flared in ccf CH4 in Cell F137, and use the notes space in Cell G137 to describe the source and type of GHG storage. Recall that landfill gas is not 100% methane and adjust the amount entered in Cell F137 accordingly. Use Row 137 only for landfill gas that is combusted but not used for energy production. For landfill gas used in energy production, use the "Landfill Gas Combusted On-Site for Energy Use" table on Row 53 of the "Input Template" tab. Additional notes:

(i) The greenhouse gas calculations in SEFA account for the avoidance of emissions of landfill methane, in addition to the emissions of CO2e as a result of the combustion process.

(ii) SEFA does not account for non-methane gases emitted from the landfill. You can account for these emissions on other rows in the "Other Energy Use and Air Emissions" table.

(f) Rows 138, 139, and 140: If the remedy at your site results in NOx, SOx, or PM emissions or reductions that are not represented elsewhere in the "Input Template" tab, you may add these as "Other on-site NOx/SOx/PM emissions or reductions" in Rows 138, 139, and 140. For example, NOx emissions may occur as a result of fertilizer application during reseeding of disturbed soils. As another example, PM reductions may be achieved through particulate filters on diesel equipment used on-site. Enter the quantity of NOx/SOx/PM emissions or reductions in lbs in Cells F138, F139, and F140, and use the notes spaces in Cells G138, G139, and G140 to describe the items. The quantities must be entered as positive numbers to represent emissions and negative numbers to represent reductions.

(g) Rows 143 and 144: If the remedy at your site uses a conventional (i.e., non-renewable) energy source for transportation that is not represented elsewhere in the "Input Template" tab, you may add it as "User-defined conventional energy transportation" in Rows 143 or 144. For example, you may want to more accurately model the fuel used in rail transport of materials to your site, instead of using the default assumption of diesel fuel. For instructions, please see the "User Defined Factors" tab in the "Input" workbook.

14) Other Voluntary Renewable Energy Use (Row 149)

Use this table to model renewable energy use from on-site activities and transportation that have not been covered in any of the other tables in the "Input Template" tab. The "Other Voluntary Renewable Energy Use" table provides flexibility to include in the footprint analysis unique situations at your cleanup site. In all cases, you must perform your own estimates or calculations for the quantities to be entered in Column F.

(a) Rows 151 and 152: If the remedy at your site uses a renewable energy source on-site that is not represented elsewhere in the "Input Template" tab, you may add it as "User-defined on-site renewable energy use" in Rows 151 or 152. For example, you may have a boiler on-site that runs on biomass. For instructions, please see the "User Defined Factors" tab in the "Input" workbook.

(b) Rows 153 and 154: If the remedy at your site uses a renewable energy source for transportation that is not represented elsewhere in the "Input Template" tab, you may add it as "User-defined renewable energy transportation" in Rows 153 or 154. For example, you may use vehicles that run on ethanol. For instructions, please see the "User Defined Factors" tab in the "Input" workbook.

(c) Rows 155 and 156: Use this space to document voluntary purchases of renewable electricity or Renewable Energy Certificates (RECs). Enter the quantity of the renewable purchases in MWh in Cells F155 and F156. Also fill out the tables beginning in Cells M149 and M153 of the "Input Template" tab with specifics on the renewable purchases. Consistent with the protocol described in EPA's Methodology, SEFA does not include in the footprint analysis any emissions reductions (or "credits") that may be associated with the renewable purchases. However, the MWh amounts for the renewable purchases are included in the "Summary" table of the "Main" workbook. Please refer to EPA's Methodology (www.cluin.org/greenremediation/methodology) for a description of the difference between the two types of renewable purchases, and the reasoning behind the protocol.

15) Discussion for Selection of Virgin vs Recycled vs Reused Materials

For each material added in the "Materials Use and Transportation" table on Row 65, you should select the material source from three options ("Virgin", "Recycled", or "Reused") in the drop-down menu in Column G.

(a) The first option, "Virgin", describes a material that is being used for the first time, that has come directly from the manufacturer or supplier, and is made from raw materials, not recycled or repurposed sources. For this option, you must select "Yes" in Column H in order for the energy and air emissions footprint for the material to be calculated in SEFA.

(b) The second option, "Recycled", describes a material that is created from sources that are being used for a second time or more. A recycled material usually has a smaller footprint than a material from virgin sources. There are several approaches for representing a recycled material in SEFA.

(i) You may select "No" in Column H if the item is assumed to have an insignificant energy and air emissions footprint or if the footprint does not accrue to the site. In this case no energy and air emissions footprint will be calculated for the material.

(ii) You may select "Yes" in Column H if the item is assumed to have an energy and air emissions footprint similar to the footprint of the virgin material. In this case the energy and air emissions footprint will be calculated using the default conversion factors in SEFA for the virgin material.

(iii) You may create a "User-defined Material" in the drop-down list in Column A for a material that has footprint conversion factors different from the default factors in SEFA. (The default conversion factors in SEFA can be found on the "Default Conversions" tab in the "Calculations" workbook. Instructions for creating a "User-defined Material" can be found on the "User Defined Materials" tab in the "Input" workbook.) If you create a "User-defined Material" to represent a recycled material, you must select "Yes" in Column H in order for the energy and air emissions footprint for the material to be calculated using the user-defined conversion factors.

(c) The third option, "Reused", describes a material that is taken from another location and used essentially unchanged. Assuming that there is no energy or air emissions footprint associated with the "Reused" material, or that the footprint does not accrue to the site, you would select "No" in Column H. In this case no energy and air emissions footprint will be calculated for the material. If you find that the "Reused" material does have an energy and air emissions footprint, you may follow the approaches noted above for "Recycled" materials.

16) Discussion of Miles per Gallon (mpg) vs Gallons per Ton-Mile (gptm)

Options for materials and waste transportation in the "Input Template" tab include "Truck (mpg)" which represents truck transport based on Miles per Gallon (mpg) and "Truck freight (gptm)" which represents truck transport based on Gallons per Ton-Mile (gptm). The selection for mode of transportation is made in the drop-down menu in the "Materials" table in Row 65 (Column L) and in the "Waste" table in Row 90 (Column I). Rules of thumb are noted below for the two options for truck transport (mpg and gptm). However, each cleanup site and remedy is unique, and you should use the mode of transport that is most representative for the situation at hand.

Note that the other modes of transportation in the drop-down menu (airplane, barge, and train) are based on gptm. The discussion below regarding "Truck freight (gptm)" is also relevant to gptm transport by airplane, barge, and train.

(a) Truck (mpg): Miles per Gallon is a unit of measure best used to describe the efficiency of a vehicle hauling a single load to a single location, and is determined by how many miles a vehicle can travel on one gallon of fuel. Additional notes:

(i) For mpg, fuel use is calculated based on the one-way distance between the site and supplier (or site and waste destination), number of one-way trips, and type of fuel selected. These items are found in Column I or J, Column L, and Column N, respectively, in the "Materials" table and in Column F or G, Column I, and Column K, respectively, in the "Waste" table.

(ii) Typically, truck transport using mpg will most accurately represent short-haul scenarios. These scenarios may include dump trucks hauling clean fill from a nearby borrow site, or hauling waste to a nearby municipal waste landfill.

(iii) Truck transport using mpg often results in an empty return trip. If this is the case at your site, you should model the empty return trip. As an estimation, you may assume the same fuel usage rate (mpg) for the empty return trip, or if you know the fuel usage rate (mpg) is different, you may override it.

(b) Truck freight (gptm): Gallons per Ton-Mile is best used to describe the efficiency of hauling freight on a vehicle that may be carrying multiple loads to multiple locations, and is determined by how many gallons of fuel it takes to haul a ton of freight one mile. Additional notes:

(i) For gptm, fuel use is calculated based on the weight of material or waste being transported, one-way distance between the site and supplier, and type of fuel selected. These items are found in Column E, Column I or J, and Column N, respectively, in the "Materials" table and in Column E, Column F or G, and Column K, respectively, in the "Waste" table.

(ii) Typically truck transport using gptm will most accurately represent long-haul scenarios. These scenarios may include transporting steel or treatment chemicals from the manufacturing location to a local distribution yard or to the site.

(iii) The fuel usage rate for truck transport using gptm includes return trips of transport vehicles, based on average transport activities. Therefore, you should not model empty return trips for this type of transport.

17) Additional Flexibility for Combustion of Fuels

SEFA provides additional flexibility for modeling combustion of biodiesel, diesel, gasoline, and natural gas used for on-site equipment and for transportation.

(a) If you are using biodiesel, diesel, gasoline, or natural gas for transportation that has a footprint for combustion that is different from the default footprint in SEFA, you may establish user-defined conversion factors for combustion of that fuel. (See the "Default Conversions" tab in the "Calculations" workbook for the default conversion factors in SEFA.) Note that any user-defined factors established for a fuel type will apply to all forms of transportation using that fuel type (i.e., all types of transportation selected in the "Personnel", "On-site Equipment Use", "Materials Use", and "Waste Disposal" tables in the "Input Template" tab). For instructions on establishing user-defined factors for biodiesel, diesel, gasoline, or natural gas used in transportation, please see the "User Defined Factors" tab in the "Input" workbook.

(b) Similar to the notes above, if you are using biodiesel, diesel, gasoline, or natural gas for on-site equipment that has a footprint for combustion that is different from the default footprint in SEFA, you may establish user-defined conversion factors for combustion of that fuel. (See the "Default Conversions" tab in the "Calculations" workbook for the default conversion factors in SEFA.) Note that any user-defined factors established for a fuel type will apply to all forms of on-site equipment using that fuel type (i.e., all types of equipment selected in Column A in the "On-Site Equipment Use and Transportation" table in the "Input Template" tab). For instructions on establishing user-defined factors for biodiesel, diesel, gasoline, or natural gas used in on-site equipment, please see the "User Defined Factors" tab in the "Input" workbook.

Input Summary

Remedy Component Number →			2	3	4											Component Subtotals						Total
		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns E - R in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns S - X) or used in subsequent calculations)																				
Item		Site Investigation	Excavation	Soil Sent Off-Site	Backfill		Pump and Treat	Groundwater Monitoring	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	1	2	3	4	5	6	
On-Site																						
On-site Renewable Energy																						
Renewable electricity generated on-site	MWh		0	0	0											0	0	0	0	0	0	0
Landfill gas combusted on-site for energy use	ccf CH_4		0	0	0											0	0	0	0	0	0	0
On-site biodiesel use	gal		0	0	0											0	0	0	0	0	0	0
User-defined on-site renewable energy use #1	TBD		0	0	0											0	0	0	0	0	0	0
User-defined on-site renewable energy use #2	TBD		0	0	0											0	0	0	0	0	0	0
On-Site Conventional Energy																						
Grid electricity	MWh		0	0	0											0	0	0	0	0	0	0
On-site diesel use	Gal		1968.75	0	975											0	1968.75	0	975	0	0	2943.75
On-site gasoline use	Gal		22.68	0	0											0	22.68	0	0	0	0	22.68
On-site natural gas use	ccf		0	0	0											0	0	0	0	0	0	0
User-defined on-site conventional energy use #1	TBD		0	0	0											0	0	0	0	0	0	0
User-defined on-site conventional energy use #2	TBD		0	0	0											0	0	0	0	0	0	0
Other On-site Emissions																						
On-site HAP process emissions	Lbs		0	0	0											0	0	0	0	0	0	0
On-site GHG emissions	Lbs CO2e		0	0	0											0	0	0	0	0	0	0
On-site carbon storage	Lbs CO2e		0	0	0											0	0	0	0	0	0	0
GHG avoided by flaring on-site landfill methane	ccf CH4		0	0	0											0	0	0	0	0	0	0
Other on-site NOx emissions or reductions	Lbs		0	0	0											0	0	0	0	0	0	0
Other on-site SOx emissions or reductions	Lbs		0	0	0											0	0	0	0	0	0	0
Other on-site PM emissions or reductions	Lbs		0	0	0											0	0	0	0	0	0	0
Electricity Generation																						
Grid electricity	MWh		0	0	0											0	0	0	0	0	0	0
Voluntary purchase of renewable electricity	MWh		0	0	0											0	0	0	0	0	0	0
Voluntary purchase of RECs	MWh		0	0	0											0	0	0	0	0	0	0
Transportation Fuel Use Breakdown																						
Biodiesel use - Personnel Transport	gal		0	0	0											0	0	0	0	0	0	0
Biodiesel use - Equipment Transport	gal		0	0	0											0	0	0	0	0	0	0
Biodiesel use - Material Transport	gal		0	0	0											0	0	0	0	0	0	0
Biodiesel use - Waste Transport	gal		0	0	0											0	0	0	0	0	0	0
Diesel use - Personnel Transport	gal		0	0	0											0	0	0	0	0	0	0
Diesel use - Equipment Transport	gal		50.1	0	0											0	50.1	0	0	0	0	50.1
Diesel use - Material Transport	gal		1.1	0	2441.6											0	1.1	0	2441.6	0	0	2442.7
Diesel use - Waste Transport	gal		4.2	2330.6	0											0	4.2	2330.6	0	0	0	2334.8
Gasoline use - Personnel Transport	gal		119.5	0	39.8											0	119.5	0	39.8	0	0	159.3
Gasoline use - Equipment Transport	gal		0	0	0											0	0	0	0	0	0	0
Natural Gas use - Personnel Transport	ccf		0	0	0											0	0	0	0	0	0	0
Natural Gas use - Equipment Transport	ccf		0	0	0											0	0	0	0	0	0	0
Transportation																						
Conventional Energy																						
Transportation diesel use	gal		55.4	2330.6	2441.6											0	55.4	2330.6	2441.6	0	0	4827.6
Transportation gasoline use	gal		119.5	0	39.8											0	119.5	0	39.8	0	0	159.3
Transportation natural gas use	ccf		0	0	0											0	0	0	0	0	0	0
User-defined conventional energy transportation #1	TBD		0	0	0											0	0	0	0	0	0	0
User-defined conventional energy transportation #2	TBD		0	0	0											0	0	0	0	0	0	0
Renewable Energy																						
Transportation biodiesel use	gal		0	0	0											0	0	0	0	0	0	0
User-defined renewable energy transportation #1	TBD		0	0	0											0	0	0	0	0	0	0
User-defined renewable energy transportation #2	TBD		0	0	0											0	0	0	0	0	0	0

Input Summary

Remedy Component Number →			2	3	4																	
		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns E - R in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns S - X) or used in subsequent calculations)														Component Subtotals						
Item		Site Investigation	Excavation	Soil Sent Off-Site	Backfill		Pump and Treat	Groundwater Monitoring	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	1	2	3	4	5	6	Total
Off-Site																						
Construction Materials																						
Cement	dry-lbs		0	0	0											0	0	0	0	0	0	0
Concrete	lbs		0	0	0											0	0	0	0	0	0	0
Gravel/sand/clay	lbs		0	0	0											0	0	0	0	0	0	0
HDPE	lbs		150	0	0											0	150	0	0	0	0	150
Photovoltaic system (installed)	W		0	0	0											0	0	0	0	0	0	0
PVC	lbs		0	0	0											0	0	0	0	0	0	0
Stainless steel	lbs		0	0	0											0	0	0	0	0	0	0
Steel	lbs		0	0	0											0	0	0	0	0	0	0
Other refined construction materials	lbs		0	0	0											0	0	0	0	0	0	0
Other unrefined construction materials	lbs		0	0	0											0	0	0	0	0	0	0
Treatment Materials & Chemicals																						
Cheese whey	lbs		0	0	0											0	0	0	0	0	0	0
Emulsified vegetable oil	lbs		0	0	0											0	0	0	0	0	0	0
Molasses	lbs		0	0	0											0	0	0	0	0	0	0
Virgin GAC (coal based)	lbs		0	0	0											0	0	0	0	0	0	0
Other treatment chemicals & materials	lbs		0	0	0											0	0	0	0	0	0	0
Material Type																						
Total Virgin Refined Materials	tons		0.075	0	0											0	0.075	0	0	0	0	0.075
Total Recycled Refined Materials	tons		0	0	0											0	0	0	0	0	0	0
Total Reused Refined Materials	tons		0	0	0											0	0	0	0	0	0	0
Total Refined Material	tons		0.075	0	0											0	0.075	0	0	0	0	0.075
Total Virgin Unrefined Materials	tons		0	0	5856											0	0	0	5856	0	0	5856
Total Recycled Unrefined Materials	tons		0	0	0											0	0	0	0	0	0	0
Total Reused Unrefined Materials	tons		0	0	3200											0	0	0	3200	0	0	3200
Total Unrefined Material	tons		0	0	9056											0	0	0	9056	0	0	9056
Fuel Processing																						
Biodiesel produced	gal		0	0	0											0	0	0	0	0	0	0
Diesel produced	gal		2024.15	2330.6	3416.6											0	2024.15	2330.6	3416.6	0	0	7771.35
Gasoline produced	gal		142.18	0	39.8											0	142.18	0	39.8	0	0	181.98
Natural gas produced	ccf		0	0	0											0	0	0	0	0	0	0
Water Use																						
Public Water Supply	gal x 1000		3.75	0	1.25											0	3.75	0	1.25	0	0	5
Extracted Groundwater	gal x 1000		0	0	0											0	0	0	0	0	0	0
Surface Water	gal x 1000		0	0	0											0	0	0	0	0	0	0
Reclaimed Water	gal x 1000		0	0	0											0	0	0	0	0	0	0
Collected/Diverted Storm Water	gal x 1000		0	0	0											0	0	0	0	0	0	0
Other Water Resource #1	gal x 1000		0	0	0											0	0	0	0	0	0	0
Other Water Resource #2	gal x 1000		0	0	0											0	0	0	0	0	0	0
Waste/Recycle Handling																						
Off-site waste water treatment (POTW)	gal x 1000		0	0	0											0	0	0	0	0	0	0
Off-site non-hazardous waste landfill	tons		0	6080	0											0	0	6080	0	0	0	6080
Off-site hazardous waste landfill	tons		0	0	0											0	0	0	0	0	0	0
Recycled/Reused On-Site	tons		3202	0	0											0	3202	0	0	0	0	3202
Recycled/Reused Off-Site	tons		0	0	0											0	0	0	0	0	0	0
Solid Waste Totals																						
Total Non-Hazardous Waste	tons		0	6080	0											0	0	6080	0	0	0	6080
Total Hazardous Waste	tons		0	0	0											0	0	0	0	0	0	0
Total Recycled/Reused	tons		3202	0	0											0	3202	0	0	0	0	3202
Total Waste (all types)	tons		3202	6080	0											0	3202	6080	0	0	0	9282
Lab Services																						
Off-site laboratory analysis	$		28804	0	1500											0	28804	0	1500	0	0	30304
Resource Extraction for Electricity																						
Coal extraction and processing	MWh															0	0	0	0	0	0	0
Natural gas extraction and processing	MWh															0	0	0	0	0	0	0
Nuclear fuel extraction and processing	MWh															0	0	0	0	0	0	0
Oil extraction and processing	MWh															0	0	0	0	0	0	0
Other fuel extraction and processing	MWh															0	0	0	0	0	0	0
Electricity Transmission																						
Transmission and distribution losses	MWh		0	0	0											0	0	0	0	0	0	0

Input Summary

Remedy Component Number →			2	3	4											Component Subtotals						Total
Item		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns E - R in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns S - X) or used in subsequent calculations)														1	2	3	4	5	6	
		Site Investigation	Excavation	Soil Sent Off-Site	Backfill		Pump and Treat	Groundwater Monitoring	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED							
Other																						
Lime	lb		0	0	0											0	0	0	0	0	0	0
Clean fill	tons		0	0	5856											0	0	0	5856	0	0	5856
Drain rock	tons		0	0	0											0	0	0	0	0	0	0
User-defined material #4	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #5	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #6	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #7	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #8	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #9	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #10	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #11	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #12	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #13	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #14	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #15	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #16	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #17	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #18	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #19	TBD		0	0	0											0	0	0	0	0	0	0
User-defined material #20	TBD		0	0	0											0	0	0	0	0	0	0
User-defined Waste Destinations																						
User-defined recycled/reused on-site #1	TBD		0	0	0											0	0	0	0	0	0	0
User-defined recycled/reused on-site #2	TBD		0	0	0											0	0	0	0	0	0	0
User-defined recycled/reused on-site #3	TBD		0	0	0											0	0	0	0	0	0	0
User-defined recycled/reused off-site #1	TBD		0	0	0											0	0	0	0	0	0	0
User-defined recycled/reused off-site #2	TBD		0	0	0											0	0	0	0	0	0	0
User-defined recycled/reused off-site #3	TBD		0	0	0											0	0	0	0	0	0	0
User-defined non-hazardous waste destination #1	TBD		0	0	0											0	0	0	0	0	0	0
User-defined non-hazardous waste destination #2	TBD		0	0	0											0	0	0	0	0	0	0
User-defined non-hazardous waste destination #3	TBD		0	0	0											0	0	0	0	0	0	0
Off-site hazardous waste incinerator	ton		0	0	0											0	0	0	0	0	0	0
User-defined hazardous waste destination #2	TBD		0	0	0											0	0	0	0	0	0	0
User-defined hazardous waste destination #3	TBD		0	0	0											0	0	0	0	0	0	0

Input Worksheet for Input Template

Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results)	**Component 1**	**NA**

General Scope

Example Items Eliminated through Screening Process

Other Notes and References

Personnel Transportation

Participant	Number of Roundtrips to Site	Roundtrip Distance to Site (miles)	Mode of Transportation*	Transport Fuel Type*	Total Distance Transported (miles)	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Personnel Transport**	Activity or Notes

** See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.*

*** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.*

On-Site Equipment Use and Transportation

Equipment Type*	HP*	Load Factor (%)*	Equipment Fuel Type	Equipment Fuel Usage Rate (gal/hr)	Equipment Hours Operated	Fuel Used for On-site Equipment (gallons)	Number of Equipment Roundtrips to Site	Roundtrip Distance to Site (miles)	Total Distance Transported (miles)	Transport Fuel Type	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Equipment Transport**	Activity or Notes

** HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.*

*** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.*

On-Site Electricity Use

Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
					Estimated Total Electricity Usage Based on Above	0	
					Renewable Electricity Generated On-Site*		
#REF!					Total Grid Electricity Used	0	

** Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).*

On-Site Natural Gas Use

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (ccf)	Notes
					0	
				0		
		Totals	0	0	0	

Landfill Gas Combusted On-Site for Energy Use

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Landfill Gas Methane Used (ccf)	Notes
			0	
			0	
		Total	0	

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

Input Worksheet for Input Template

Remedy Component that this Input worksheet is part of:	Component 1	NA

Materials Use and Transportation

Material Type*	Unit	Quantity	Tons	Is the Material Refined or Unrefined?**	Material Source: Virgin, Recycled, or Reused?**	Calculate Item Footprint?**	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation***	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Materials Transport (gallons)	Notes and Description of Materials
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												

** Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.*

*** Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.*

**** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, and P.*

Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation**	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									

** No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.*

*** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, and M.*

Water Use

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

** Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections. Please see the "Detailed Notes and Explanations" tab for additional information.*

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

Remedy Component that this Input worksheet is part of:	Component 1	NA

Input Worksheet for Input Template

Other Energy Use and Air Emissions

Item		Units	Quantity	Notes
On-Site				
User-defined on-site conventional energy use #1	*User-Defined	TBD		
User-defined on-site conventional energy use #2	*User-Defined	TBD		
On-site HAP process emissions**		lbs		
On-site GHG emissions**		lbs CO2e		
On-site carbon storage**		lbs CO2e		
GHG avoided by flaring on-site landfill methane		ccf CH4		
Other on-site NOx emissions or reductions**		lbs		
Other on-site SOx emissions or reductions**		lbs		
Other on-site PM emissions or reductions**		lbs		
Transportation		**Units**	**Quantity**	**Notes**
User-defined conventional energy transportation #1	*User-Defined	TBD		
User-defined conventional energy transportation #2	*User-Defined	TBD		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Enter a positive number for emissions and a negative number for reductions, avoidances, or storage***
See the "Detailed Notes and Explanations" tab for use of this table

Other Voluntary Renewable Energy Use

Item		Units	Quantity	Notes
User-defined on-site renewable energy use #1	*User-Defined	TBD		
User-defined on-site renewable energy use #2	*User-Defined	TBD		
User-defined renewable energy transportation #1	*User-Defined	TBD		
User-defined renewable energy transportation #2	*User-Defined	TBD		
Voluntary purchase of renewable electricity**		MWh		
Voluntary purchase of RECs**		MWh		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Complete information on provider in the table to the right. No footprint reductions are associated with the voluntary purchases.***
See the "Detailed Notes and Explanations" tab for use of this table

Off-Site Laboratory Analysis

Parameter and Notes	Unit Cost ($)	Number of Samples	Total Cost
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
Totals		**0**	**0**

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	

Input Worksheet for NA

Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results)	**Component 1**	**NA**

General Scope

Example Items Eliminated through Screening Process

Other Notes and References

Personnel Transportation

Participant	Number of Roundtrips to Site	Roundtrip Distance to Site (miles)	Mode of Transportation*	Transport Fuel Type*	Total Distance Transported (miles)	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Personnel Transport**	Activity or Notes

** See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.*

*** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.*

On-Site Equipment Use and Transportation

Equipment Type*	HP*	Load Factor (%)*	Equipment Fuel Type	Equipment Fuel Usage Rate (gal/hr)	Equipment Hours Operated	Fuel Used for On-site Equipment (gallons)	Number of Equipment Roundtrips to Site	Roundtrip Distance to Site (miles)	Total Distance Transported (miles)	Transport Fuel Type	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Equipment Transport**	Activity or Notes

** HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.*

*** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.*

On-Site Electricity Use

Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
					Estimated Total Electricity Usage Based on Above	0	
					Renewable Electricity Generated On-Site*		
#REF!					Total Grid Electricity Used	0	

** Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).*

On-Site Natural Gas Use

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (ccf)	Notes
					0	
				0		
		Totals	0	0	0	

Landfill Gas Combusted On-Site for Energy Use

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Landfill Gas Methane Used (ccf)	Notes
			0	
			0	
		Total	0	

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

Input Worksheet for NA

Remedy Component that this Input worksheet is part of:	Component 1	NA

Materials Use and Transportation

Material Type*	Unit	Quantity	Tons	Is the Material Refined or Unrefined?**	Material Source: Virgin, Recycled, or Reused?**	Calculate Item Footprint?**	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation***	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Materials Transport (gallons)	Notes and Description of Materials
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												

** Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.*

*** Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.*

**** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, and P.*

Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation**	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
			0									Drill cuttings to landfill
			0									Empty return trip (drill cuttings)
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									

** No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.*

*** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, and M.*

Water Use

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

** Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections. Please see the "Detailed Notes and Explanations" tab for additional information.*

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

Remedy Component that this Input worksheet is part of:	Component 1	NA

Input Worksheet for NA

Other Energy Use and Air Emissions

Item		Units	Quantity	Notes
On-Site				
User-defined on-site conventional energy use #1	*User-Defined	TBD		
User-defined on-site conventional energy use #2	*User-Defined	TBD		
On-site HAP process emissions**		lbs		
On-site GHG emissions**		lbs CO2e		
On-site carbon storage**		lbs CO2e		
GHG avoided by flaring on-site landfill methane		ccf CH4		
Other on-site NOx emissions or reductions**		lbs		
Other on-site SOx emissions or reductions**		lbs		
Other on-site PM emissions or reductions**		lbs		
Transportation		**Units**	**Quantity**	**Notes**
User-defined conventional energy transportation #1	*User-Defined	TBD		
User-defined conventional energy transportation #2	*User-Defined	TBD		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Enter a positive number for emissions and a negative number for reductions, avoidances, or storage***
See the "Detailed Notes and Explanations" tab for use of this table

Other Voluntary Renewable Energy Use

Item		Units	Quantity	Notes
User-defined on-site renewable energy use #1	*User-Defined	TBD		
User-defined on-site renewable energy use #2	*User-Defined	TBD		
User-defined renewable energy transportation #1	*User-Defined	TBD		
User-defined renewable energy transportation #2	*User-Defined	TBD		
Voluntary purchase of renewable electricity**		MWh		
Voluntary purchase of RECs**		MWh		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Complete information on provider in the table to the right. No footprint reductions are associated with the voluntary purchases.***
See the "Detailed Notes and Explanations" tab for use of this table

Off-Site Laboratory Analysis

Parameter and Notes	Unit Cost ($)	Number of Samples	Total Cost
SVOCs	150	300	45,000
Metals	150	100	15,000
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
Totals		**400**	**60,000**

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	

Input Worksheet for Excavation

Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results)	**Component 2**	**Excavation**

General Scope

Remove vegetation and concrete paving.
Excavate approximately 3,800 cubic yards of contaminated soil over 15 days (equipment at 6 hours per day)
(Note that transport of soil to landfill is on separate tab.)

Example Items Eliminated through Screening Process

Not included in footprint analysis:
- potable water for equipment decontamination
- reagents, sampling containers, and other materials use for samplin g of wastes
- personnel protective equipment

Other Notes and References

Personnel Transportation

Participant	Number of Roundtrips to Site	Roundtrip Distance to Site (miles)	Mode of Transportation*	Transport Fuel Type*	Total Distance Transported (miles)	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Personnel Transport**	Activity or Notes
Excavator crew	30	50	Light-Duty Truck	Gasoline	1,500	17		88	
Project management	15	50	Car	Gasoline	750	24		31	

**** See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.***

***** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.***

On-Site Equipment Use and Transportation

Equipment Type*	HP*	Load Factor (%)*	Equipment Fuel Type	Equipment Fuel Usage Rate (gal/hr)	Equipment Hours Operated	Fuel Used for On-site Equipment (gallons)	Number of Equipment Roundtrips to Site	Roundtrip Distance to Site (miles)	Total Distance Transported (miles)	Transport Fuel Type	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Equipment Transport**	Activity or Notes
Excavator - large (250 HP)	250	75%	Diesel	9.375	90	844	1	100	100	Diesel	6		17	
Loader (200 HP)	200	75%	Diesel	7.5	90	675	1	100	100	Diesel	6		17	
Water truck (400 HP)	400	75%	Diesel	15	30	450	1	100	100	Diesel	6		17	
Generator - HP varies	12	75%	Gasoline	0.504	45	22.68	1	100	100					3 hours/day for pumps and other small equipment

**** HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.***

***** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.***

On-Site Electricity Use

Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
					Estimated Total Electricity Usage Based on Above	0	
					Renewable Electricity Generated On-Site*		
#REF!					Total Grid Electricity Used	0	

**** Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).***

On-Site Natural Gas Use

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (ccf)	Notes
					0	
				0		
			Totals	0	0	0

Landfill Gas Combusted On-Site for Energy Use

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Landfill Gas Methane Used (ccf)	Notes
			0	
			0	
		Total	0	

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

Input Worksheet for Excavation

Remedy Component that this Input worksheet is part of: | **Component 2** | **Excavation**

Materials Use and Transportation

Material Type*	Unit	Quantity	Tons	Is the Material Refined or Unrefined?**	Material Source: Virgin, Recycled, or Reused?**	Calculate Item Footprint?**	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation***	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Materials Transport (gallons)	Notes and Description of Materials
HDPE	lb	150	0.075	Refined	Virgin	Yes	500	500	n/a	Truck freight (gptm)	Diesel	0.029		1	HDPE liner for stockpiling excavated soil (25 lbs/1000 sq ft), use 2 at a time, replaced every 5 days
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												

**** Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.***

***** Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.***

****** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, and P.***

Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation**	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
Off-site non-hazardous waste landfill	tons	0	0	25	35	0	Truck (mpg)	Diesel	6		0	Concrete paving sent to off-site municipal solid waste landfill
		0	0		35	0	Truck (mpg)	Diesel	6		0	Empty return trip (non-haz waste)
Recycled/reused on-site	tons	2	2	0	25	1	Truck (mpg)	Diesel	6		4.2	Vegetation removed before excavation and used on-site as mulch
Recycled/reused off-site	tons	0	0	50	25	0	Truck (mpg)	Diesel	6		0	Concrete paving removed before excavation and shipped off-site for reuse (truck transport is attributed to
			0									receiving location)
Recycled/reused on-site	tons	3200	3200	0	0	0						Soil moved for containment berm
			0									
			0									
			0									
			0									
			0									
			0									

**** No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.***

***** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, and M.***

Water Use

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
Public Water	gal x 1000	3.75	16	Public water supplied through municipal lines	High quality potable water	On-site dust control, 250 gal/day	Evaporation or infiltration into soil
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

**** Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections. Please see the "Detailed Notes and Explanations" tab for additional information.***

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

Input Worksheet for Excavation

Remedy Component that this Input worksheet is part of:	Component 2	Excavation

Other Energy Use and Air Emissions

Item		Units	Quantity	Notes
On-Site				
User-defined on-site conventional energy use #1	*User-Defined	TBD		
User-defined on-site conventional energy use #2	*User-Defined	TBD		
On-site HAP process emissions**		lbs		
On-site GHG emissions**		lbs CO2e		
On-site carbon storage**		lbs CO2e		
GHG avoided by flaring on-site landfill methane		ccf CH4		
Other on-site NOx emissions or reductions**		lbs		
Other on-site SOx emissions or reductions**		lbs		
Other on-site PM emissions or reductions**		lbs		
Transportation		**Units**	**Quantity**	**Notes**
User-defined conventional energy transportation #1	*User-Defined	TBD		
User-defined conventional energy transportation #2	*User-Defined	TBD		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Enter a positive number for emissions and a negative number for reductions, avoidances, or storage***
See the "Detailed Notes and Explanations" tab for use of this table

Other Voluntary Renewable Energy Use

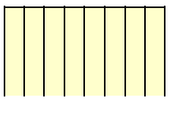
Item		Units	Quantity	Notes
User-defined on-site renewable energy use #1	*User-Defined	TBD		
User-defined on-site renewable energy use #2	*User-Defined	TBD		
User-defined renewable energy transportation #1	*User-Defined	TBD		
User-defined renewable energy transportation #2	*User-Defined	TBD		
Voluntary purchase of renewable electricity**		MWh		
Voluntary purchase of RECs**		MWh		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Complete information on provider in the table to the right. No footprint reductions are associated with the voluntary purchases.***
See the "Detailed Notes and Explanations" tab for use of this table

Off-Site Laboratory Analysis

Parameter and Notes	Unit Cost ($)	Number of Samples	Total Cost
Waste characterization	486	14	6,804
Confirmation samples	220	100	22,000
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
Totals		**114**	**28,804**

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	



Input Worksheet for Soil Sent Off-Site

Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results)	**Component 3**	**Soil Sent Off-Site**

General Scope

Transport approximately 3,800 cubic yards (6,080 tons at 1.6 tons/yd)

Example Items Eliminated through Screening Process

Not included in footprint analysis:
- tarps or coverings for trucks
- potable water for equipment decontamination
- personnel protective equipment

Other Notes and References

Personnel Transportation

Participant	Number of Roundtrips to Site	Roundtrip Distance to Site (miles)	Mode of Transportation*	Transport Fuel Type*	Total Distance Transported (miles)	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Personnel Transport**	Activity or Notes

**** See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.***

***** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.***

On-Site Equipment Use and Transportation

Equipment Type*	HP*	Load Factor (%)*	Equipment Fuel Type	Equipment Fuel Usage Rate (gal/hr)	Equipment Hours Operated	Fuel Used for On-site Equipment (gallons)	Number of Equipment Roundtrips to Site	Roundtrip Distance to Site (miles)	Total Distance Transported (miles)	Transport Fuel Type	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Equipment Transport**	Activity or Notes

**** HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.***

***** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.***

On-Site Electricity Use

Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
					Estimated Total Electricity Usage Based on Above	0	
					Renewable Electricity Generated On-Site*		
#REF!					Total Grid Electricity Used	0	

**** Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).***

On-Site Natural Gas Use

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (ccf)	Notes
					0	
				0		
		Totals	0	0	0	

Landfill Gas Combusted On-Site for Energy Use

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Landfill Gas Methane Used (ccf)	Notes
			0	
			0	
		Total	0	

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

Input Worksheet for Soil Sent Off-Site

Remedy Component that this Input worksheet is part of:	Component 3	Soil Sent Off-Site

Materials Use and Transportation

Material Type*	Unit	Quantity	Tons	Is the Material Refined or Unrefined?**	Material Source: Virgin, Recycled, or Reused?**	Calculate Item Footprint?**	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation***	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Materials Transport (gallons)	Notes and Description of Materials
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												

**** Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.***

***** Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.***

****** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, and P.***

Excavated soil sent to off-site hazardous waste landfill

Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation**	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
Off-site hazardous waste landfill	tons	0	0	500	680	0	Truck (mpg)	Diesel	6		0	Excavated soil sent to off-site hazardous waste landfill
			0		680	0	Truck (mpg)	Diesel	6		0	Empty return trip (haz waste to landfill)
Off-site non-hazardous waste landfill	tons	6,080	6,080	25	23	304	Truck (mpg)	Diesel	6		1,165	Excavated soil sent to off-site non-hazardous waste landfill
			0		23	304	Truck (mpg)	Diesel	6		1,165	Empty return trip (non-haz waste to landfill)
Off-site hazardous waste incinerator	ton	0	0	500	2,000	0	Truck (mpg)	Diesel	6		0	Excavated soil sent to off-site hazardous waste incinerator
			0		2,000	0	Truck (mpg)	Diesel	6		0	Empty return trip (haz waste to incinerator)
			0									
			0									
			0									
			0									
			0									
			0									

**** No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.***

***** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, and M.***

Water Use

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

**** Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections. Please see the "Detailed Notes and Explanations" tab for additional information.***

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

Remedy Component that this Input worksheet is part of:	Component 3	Soil Sent Off-Site

Input Worksheet for Soil Sent Off-Site

Other Energy Use and Air Emissions

Item		Units	Quantity	Notes
On-Site				
User-defined on-site conventional energy use #1	*User-Defined	TBD		
User-defined on-site conventional energy use #2	*User-Defined	TBD		
On-site HAP process emissions**		lbs		
On-site GHG emissions**		lbs CO2e		
On-site carbon storage**		lbs CO2e		
GHG avoided by flaring on-site landfill methane		ccf CH4		
Other on-site NOx emissions or reductions**		lbs		
Other on-site SOx emissions or reductions**		lbs		
Other on-site PM emissions or reductions**		lbs		
Transportation		**Units**	**Quantity**	**Notes**
User-defined conventional energy transportation #1	*User-Defined	TBD		
User-defined conventional energy transportation #2	*User-Defined	TBD		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Enter a positive number for emissions and a negative number for reductions, avoidances, or storage***
See the "Detailed Notes and Explanations" tab for use of this table

Other Voluntary Renewable Energy Use

Item		Units	Quantity	Notes
User-defined on-site renewable energy use #1	*User-Defined	TBD		
User-defined on-site renewable energy use #2	*User-Defined	TBD		
User-defined renewable energy transportation #1	*User-Defined	TBD		
User-defined renewable energy transportation #2	*User-Defined	TBD		
Voluntary purchase of renewable electricity**		MWh		
Voluntary purchase of RECs**		MWh		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Complete information on provider in the table to the right. No footprint reductions are associated with the voluntary purchases.***
See the "Detailed Notes and Explanations" tab for use of this table

Off-Site Laboratory Analysis

Parameter and Notes	Unit Cost ($)	Number of Samples	Total Cost
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
Totals		**0**	**0**

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	

Input Worksheet for Backfill

Please specify which Remedy Component this Input worksheet is part of: (Select "Off" to exclude this Input worksheet from calculations and results)	**Component 4**	**Backfill/Capping**

General Scope

Transport approximately 3,660 yds/5856 tons of backfill material to site (5 days):
- 5856 tons clean fill from off-site (transport from off-site by truck, with return trip empty)
- 3200 tons clean fill from on-site (transport by truck from stockpiled area on-site?)

Backfill excavated areas.

Example Items Eliminated through Screening Process

Not included in footprint analysis:
- personnel protective equipment
- reagents, sampling containers, and other materials used fo sampling of clean fill

Other Notes and References

Personnel Transportation

Participant	Number of Roundtrips to Site	Roundtrip Distance to Site (miles)	Mode of Transportation*	Transport Fuel Type*	Total Distance Transported (miles)	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Personnel Transport**	Activity or Notes
Backfilling crew	10	50	Light-Duty Truck	Gasoline	500	17		29	
Project management	5	50	Car	Gasoline	250	24		10	

**** See the "Detailed Notes and Explanations" tab for explanation of transport and fuel options.***

***** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.***

On-Site Equipment Use and Transportation

Equipment Type*	HP*	Load Factor (%)*	Equipment Fuel Type	Equipment Fuel Usage Rate (gal/hr)	Equipment Hours Operated	Fuel Used for On-site Equipment (gallons)	Number of Equipment Roundtrips to Site	Roundtrip Distance to Site (miles)	Total Distance Transported (miles)	Transport Fuel Type	Default Fuel Usage Rate**	Fuel Usage Rate Override**	Fuel Used for Equipment Transport**	Activity or Notes
Excavator - large (250 HP)	250	75%	Diesel	9.375	40	375	0	0						No mobilization -- mobilized during excavation stage of project
							0	0						
Loader (200 HP)	200	75%	Diesel	7.5	40	300	0	0						No mobilization -- mobilized during excavation stage of project
Water truck (400 HP)	400	75%	Diesel	15	20	300	0	0						No mobilization -- mobilized during excavation stage of project
Dump truck (400 HP)	400	75%	Diesel	15	0	0	0	100		Diesel	6			Hauling clean fill from on-site stockpile
Dump truck (400 HP)	400	75%	Diesel	15	0	0	0	100		Diesel	6			Hauling clean fill from on-site stockpile

**** HP and Load Factor must be entered by user in Columns C and D. Please see the "Detailed Notes and Explanations" tab for further explanation.***

***** for biodiesel, B20, diesel, and gasoline, units are gallons for Fuel Used and miles/gallon for Fuel Usage Rate; for natural gas, units are hundreds of cubic feet (ccf) for Fuel Used and ccf/gallon for Fuel Usage Rate.***

On-Site Electricity Use

Equipment Type	HP	Load Factor (%)	Efficiency (%)	Electrical Rating (kW)	Hours Used	Energy Used (kWh)	Notes
					Estimated Total Electricity Usage Based on Above	0	
					Renewable Electricity Generated On-Site*		
#REF!					Total Grid Electricity Used	0	

**** Electricity generated on-site from renewable resources, for which the facility retains the rights to the renewable energy (i.e., does not sell renewable energy certificates associated with the renewable energy generation).***

On-Site Natural Gas Use

Equipment Type	Power Rating (Btu/hr)	Efficiency (%)	Hours Used	Energy Required (Btu)	Natural Gas Used (ccf)	Notes
					0	
				0		
		Totals	0	0	0	

Landfill Gas Combusted On-Site for Energy Use

Equipment Type	Landfill Gas (ccf)	% Methane by volume	Landfill Gas Methane Used (ccf)	Notes
			0	
			0	
		Total	0	

Please see the "Detailed Notes and Explanations" tab for instructions on using the two tables above ("On-site Natural Gas Use" and "Landfill Gas Combusted On-Site for Energy Use"). In the two tables above, ccf = hundreds of cubic feet.

Input Worksheet for Backfill

Remedy Component that this Input worksheet is part of:	Component 4	Backfill/Capping

Materials Use and Transportation

Material Type*	Unit	Quantity	Tons	Is the Material Refined or Unrefined?**	Material Source: Virgin, Recycled, or Reused?**	Calculate Item Footprint?**	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation***	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Materials Transport (gallons)	Notes and Description of Materials
Clean fill	tons	5,856	5,856	Unrefined	Virgin	Yes	500	25	293	Truck (mpg)	Diesel	6		1221	Clean fill from off-site for backfilling
			0					25	293	Truck (mpg)	Diesel	6		1221	Empty return trip (clean fill from off-site)
Clean fill	tons	3,200	3,200	Unrefined	Reused	No	500	n/a	n/a						Contaminated fill material moved on-site for berm
			0												(on-site transport modeled in equipment table above)
Drain rock	tons	0	0	Unrefined	Virgin	Yes	500	50	0	Truck (mpg)	Diesel	6		0	Drain rock from off-site for backfilling
			0					50	0	Truck (mpg)	Diesel	6		0	Empty return trip (drain rock from off-site)
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												
			0												

**** Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined Materials" in the dropdown menu.***

***** Selections must be made in Columns F - H in order for the footprint calculations to be performed. Please see the "Detailed Notes and Explanations" tab for further information.***

****** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns L, N, and P.***

Clean fill from on-site for backfilling

Waste Disposal and Transportation

Waste Destination*	Unit	Quantity	Tons	Default One-way Distance to Site (miles)	One-way Distance to Site Override (miles)	Number of One-way Trips to Site	Mode of Transportation**	Transport Fuel Type	Default Fuel Usage Rate (gptm or mpg)	Fuel Usage Rate Override (gptm or mpg)	Fuel Used for Waste Transport (gallons)	Notes and Description of Waste
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									
			0									

**** No footprint is calculated for the Recycled/Reused On-Site and Off-Site selections. Please see the "Detailed Notes and Explanations" tab for instructions on specifying "User-Defined" selections in the dropdown menu.***

***** Please see the "Detailed Notes and Explanations" tab for instructions on selecting mode of transportation, accounting for empty return trips, and other aspects of data entry in Columns I, K, and M.***

Water Use

Source of Water Used*	Unit	Quantity	Tons	Source Location/Aquifer (optional)	Quality of Water Used (optional)	Water Uses (optional)	Fate of Used Water (optional)
Public Water	gal x 1000	1.25	5	Public water supplied through municipal lines	High quality potable water	On-site dust control, 250 gal per day	Evaporation or infiltration into soil
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				
			0				

**** Only the "Public Water" selection has an associated footprint. No footprint is calculated for the other water source selections. Please see the "Detailed Notes and Explanations" tab for additional information.***

Note: Information entered in Columns F - V (Source/Quality/Use/Fate) is not compiled or reported by SEFA.

Remedy Component that this Input worksheet is part of:	Component 4	Backfill/Capping

Input Worksheet for Backfill

Other Energy Use and Air Emissions

Item		Units	Quantity	Notes
On-Site				
User-defined on-site conventional energy use #1	*User-Defined	TBD		
User-defined on-site conventional energy use #2	*User-Defined	TBD		
On-site HAP process emissions**		lbs		
On-site GHG emissions**		lbs CO2e		
On-site carbon storage**		lbs CO2e		
GHG avoided by flaring on-site landfill methane		ccf CH4		
Other on-site NOx emissions or reductions**		lbs		
Other on-site SOx emissions or reductions**		lbs		
Other on-site PM emissions or reductions**		lbs		
Transportation		**Units**	**Quantity**	**Notes**
User-defined conventional energy transportation #1	*User-Defined	TBD		
User-defined conventional energy transportation #2	*User-Defined	TBD		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Enter a positive number for emissions and a negative number for reductions, avoidances, or storage***
See the "Detailed Notes and Explanations" tab for use of this table

Other Voluntary Renewable Energy Use

Item		Units	Quantity	Notes
User-defined on-site renewable energy use #1	*User-Defined	TBD		
User-defined on-site renewable energy use #2	*User-Defined	TBD		
User-defined renewable energy transportation #1	*User-Defined	TBD		
User-defined renewable energy transportation #2	*User-Defined	TBD		
Voluntary purchase of renewable electricity**		MWh		
Voluntary purchase of RECs**		MWh		

**** Enter units and conversion factors on "User Defined Factors" tab***
***** Complete information on provider in the table to the right. No footprint reductions are associated with the voluntary purchases.***
See the "Detailed Notes and Explanations" tab for use of this table

Off-Site Laboratory Analysis

Parameter and Notes	Unit Cost ($)	Number of Samples	Total Cost
Clean fill sampling	150	10	1,500
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
Totals		**10**	**1,500**

Description of purchased renewable electricity (green pricing product or green marketing product)	Provider:	
	Type of product:	
	Type of renewable energy source:	
	Date of renewable system installation:	
Description of purchased RECs	Provider:	
	Type of renewable energy source:	
	Date of renewable system installation:	
	Location of renewable system installation:	

For use of this worksheet, please see instructions at the end of the worksheet

User Defined Activity, Material, or Service	Unit	Tons per Unit*	User Defined Conversion Factors — Parameters Used, Extracted, Emitted, or Generated: Energy (MMBtu/unit)	GHG (lbs CO2e/unit)	NOx (lbs/unit)	SOx (lbs/unit)	PM (lbs/unit)	HAPs (lbs/unit)	Ref.	Use this row only for:
User-defined emissions for biodiesel on-site equipment	gal									**User-defined emissions for biodiesel on-site equipment**
User-defined emissions for diesel on-site equipment	gal									**User-defined emissions for diesel on-site equipment**
User-defined emissions for gasoline on-site equipment	gal									**User-defined emissions for gasoline on-site equipment**
User-defined emissions for natural gas on-site equipment	ccf									**User-defined emissions for natural gas on-site equipment**
User-defined emissions for biodiesel transportation	gal									**User-defined emissions for biodiesel transportation**
User-defined emissions for diesel transportation	gal									**User-defined emissions for diesel transportation**
User-defined emissions for gasoline transportation	gal									**User-defined emissions for gasoline transportation**
User-defined emissions for natural gas transportation	ccf									**User-defined emissions for natural gas transportation**

Note: Entering user-defined emission conversion factors in Rows 7 - 14 will override default conversion factors for all emissions calculations of the same fuel/use throughout the SEFA workbooks.

Lime	lb	0.0005	0.028	3.96	0.0075	0.0106	0.0027	2.9E-04	1	**User-defined material #1**
Clean fill	tons	1	0.056	6.7	0.033	0.03	0.004	4.1E-07	2	**User-defined material #2**
Drain rock	tons	1	0.056	6.7	0.033	0.03	0.004	4.1E-07	3	**User-defined material #3**
User-defined material #4	TBD	TBD								**User-defined material #4**
User-defined material #5	TBD	TBD								**User-defined material #5**
User-defined material #6	TBD	TBD								**User-defined material #6**
User-defined material #7	TBD	TBD								**User-defined material #7**
User-defined material #8	TBD	TBD								**User-defined material #8**
User-defined material #9	TBD	TBD								**User-defined material #9**
User-defined material #10	TBD	TBD								**User-defined material #10**
User-defined material #11	TBD	TBD								**User-defined material #11**
User-defined material #12	TBD	TBD								**User-defined material #12**
User-defined material #13	TBD	TBD								**User-defined material #13**
User-defined material #14	TBD	TBD								**User-defined material #14**
User-defined material #15	TBD	TBD								**User-defined material #15**
User-defined material #16	TBD	TBD								**User-defined material #16**
User-defined material #17	TBD	TBD								**User-defined material #17**
User-defined material #18	TBD	TBD								**User-defined material #18**
User-defined material #19	TBD	TBD								**User-defined material #19**
User-defined material #20	TBD	TBD								**User-defined material #20**

Item or Service Used	Unit	Tons per Unit*	Energy (MMBtu/unit)	GHG (lbs CO2e/unit)	NOx (lbs/unit)	SOx (lbs/unit)	PM (lbs/unit)	HAPs (lbs/unit)	Ref.	Use this row only for:
User-defined recycled/reused on-site #1	TBD	TBD								User-defined recycled/reused on-site #1
User-defined recycled/reused on-site #2	TBD	TBD								User-defined recycled/reused on-site #2
User-defined recycled/reused on-site #3	TBD	TBD								User-defined recycled/reused on-site #3
User-defined recycled/reused off-site #1	TBD	TBD								User-defined recycled/reused off-site #1
User-defined recycled/reused off-site #2	TBD	TBD								User-defined recycled/reused off-site #2
User-defined recycled/reused off-site #3	TBD	TBD								User-defined recycled/reused off-site #3
User-defined non-hazardous waste destination #1	TBD	TBD								User-defined non-hazardous waste destination #1
User-defined non-hazardous waste destination #2	TBD	TBD								User-defined non-hazardous waste destination #2
User-defined non-hazardous waste destination #3	TBD	TBD								User-defined non-hazardous waste destination #3
Off-site hazardous waste incinerator	ton	1	15	8,000	100	60	10	2	4	User-defined hazardous waste destination #1
User-defined hazardous waste destination #2	TBD	TBD								User-defined hazardous waste destination #2
User-defined hazardous waste destination #3	TBD	TBD								User-defined hazardous waste destination #3

Item or Service Used	Unit	Tons per Unit*	Energy (MMBtu/unit)	GHG (lbs CO2e/unit)	NOx (lbs/unit)	SOx (lbs/unit)	PM (lbs/unit)	HAPs (lbs/unit)	Ref.	Use this row only for:
User-defined on-site conventional energy use #1	TBD									User-defined on-site conventional energy use #1
User-defined on-site conventional energy use #2	TBD									User-defined on-site conventional energy use #2
User-defined conventional energy transportation #1	TBD									User-defined conventional energy transportation #1
User-defined conventional energy transportation #2	TBD									User-defined conventional energy transportation #2
User-defined on-site renewable energy use #1	TBD									User-defined on-site renewable energy use #1
User-defined on-site renewable energy use #2	TBD									User-defined on-site renewable energy use #2
User-defined renewable energy transportation #1	TBD									User-defined renewable energy transportation #1
User-defined renewable energy transportation #2	TBD									User-defined renewable energy transportation #2

** "Tons per unit" refers to how many tons there are per unit of the material (e.g., 1 pound is 1/2000 of a ton or 0.0005 tons per unit)*

"MMBtu" = millions of Btus

Ref 1: Used conversion factors for lime double those for "other unrefined construction material" in the default conversion factors in the Calculations workbook.

Ref 2: Used same conversion factors for clean fill as those for "gravel/sand/clay" in the default conversion factors in the Calculations workbook (converted to tons).

Ref 3: Used same conversion factors for drain rock as those for "gravel/sand/clay" in the default conversion factors in the Calculations workbook (converted to tons).

Instructions for "User Defined Factors" tab

Overview of User Defined Factors

Use this worksheet for user-defined footprint conversion factors for materials and activities that are unique to your site, and are not already provided in the "Input Template" tab of the "Input" workbook. Unique conversion factors can be established for the following:

(a) Combustion of fuels (both conventional and renewable) for transportation and on-site equipment

(b) Manufacturing or processing of materials

(c) Management and recycling of wastes

(d) Use of conventional and renewable energy

In establishing these unique conversion factors, you must research and document the data, and enter it into the table above. Enter the item name in Column A, the units you would like to use for the item in Column B, the factor for converting the specified units to tons in Column C. Enter the footprint conversion factors in Columns

After you have entered an item and its conversion factors, you may select (or view) the item in the corresponding table on the "Input Template" tabs in the "Input" workbook. Once you enter the quantity of the item in an "Input Template" tab, SEFA will include the item in the footprint analysis, and will automatically apply the conversion factors in the "Calculations" workbook.

The conversion factors in Column D - N represent the amount of energy required for, and the amount of GHG, NOx, SOx, PM, and HAPs air emissions related to, the combustion of fuels, the off-site production of materials, the off-site management of waste, and the use of energy. Note that SEFA is equipped with default footprint conversion factors for a variety of materials and activities. These default conversion factors can be viewed in the "Default Conversions" tab of the "Calculations" workbook and are applied automatically in the "Calculations" workbook. You may want to view these default conversion factors before deciding whether to create a user-defined item with unique conversion factors.

How to Set Up User Defined Factors on This Worksheet

This section describes the general approach for setting up user defined factors. See the next four sections for specific examples for each type of user-defined factor.

(1) Column A: You are encouraged to enter descriptive names for the fuels, materials, waste processes, or energy usage in Column A. Once entered the new names will appear in the respective drop-down menus or data entry cell in the "Input" tab.

(2) Columns B and C: Entries in Columns B and C depend on the item being represented.

(a) For materials and wastes (Rows 16 - 49), you must enter the units for the item in Column B, and the conversion factor for tons in Column C.
Additional notes:

(i) Conversion to tons is necessary for summing of diverse materials or wastes (performed automatically in the SEFA workbooks) to arrive at the total materials usage or waste generation reported in the "Summary" tab in the "Main" workbook.

(ii) Conversion to tons is also necessary for calculations of fuel required for transport of materials or waste (performed automatically in the SEFA workbooks), when transport using units of "Gallons per Ton-Mile" is selected in the "Input Template" tab.

(b) For combustion of fuels (Rows 7 - 14), you must enter the units for the item in Column B, but you are not required to enter a conversion factor in Column C. The conversions for tons/gal and tons/ccf for these fuels are standard values set by default in SEFA.

(c) For energy (Rows 52 - 59), you must enter the units for the item in Column B, but you are not required to enter a conversion factor in Column C. The conversion for tons per unit is not needed in the SEFA calculations, because the items do not directly affect the amounts of materials or wastes, or the calculations of fuel used for transport.

(3) Column D: Entries in Column D depend on the item being represented.

(a) For materials, waste, and energy (Rows 16 - 59) enter in Column D the amount of energy (in Btus/unit), associated with the item.

(b) For combustion of fuels (Rows 7 - 14), you are not required to enter the amount of energy (in Btu/unit) in Column D. The energy content in Btu/gal and Btu/ccf for these fuels are standard values set by default in SEFA.

(4) Columns F - N: For all items (Rows 7 - 59), enter the footprint conversion factors for GHG, NOx, SOx, PM, and HAPs in Column F - N. These are footprint conversion factors that you have obtained through your own research. The conversion factors must be based on the units Column B.

(5) Column O: Provide a reference number in Column O. The full references for the footprint conversion factors can be added in the open space below the table.

(6) Columns P - T: The entries in these columns reiterate the original text in Column A, to document the purpose of each of the rows. (The original entry in Column A disappears once you enter a unique item in that Column.) Do not use any row in this table for a purpose other than that described in Columns P - T. For example, do not enter a fuel combustion item in Rows 16 - 35 (designated for materials manufacturing) or Rows 38 - 49 (designated for waste management).

Examples for Rows 16 - 35 (Manufacturing or processing of materials)

You may want to add to the footprint analysis a material not found in SEFA. You should first check the drop-down menu in Column A of the “Materials Use and Transportation” table on Row 65 of the “Input Template” tab in the “Input” workbook. If the material is not already in the drop-down menu, you may add the material name and its footprint conversion factors in Rows 16 - 35 in the "User Defined Factors" tab (above). You may also want to add a user-defined material to provide unique (more accurate) footprint conversion factors for a material already included in the drop-down menu.

(1) For example, aluminum is not found in the drop-down menu. If aluminum roofing is used on-site, you may want to add it to the drop-down menu. To do this, enter “Aluminum roofing” in Column A above. Column B might be “lbs” (of aluminum) and Column C would be “0.0005”, the conversion factor from lbs to tons. The footprint conversion factors in Columns D - N would represent the energy required, and the GHG, NOx, SOx, PM, and HAPs emissions to air, associated with the off-site manufacture of the aluminum roofing. The entry in Column D would be in units of MMBtu/lb (that is, MMBtu energy required per lb aluminum roofing manufactured), Column F would be in units of lbs CO2e/lb (that is, lbs CO2e emissions per lb aluminum roofing manufactured), Column H would be lbs NOx/lb, etc.

(2) As another example, instead of using “Other treatment chemicals & materials” from the drop-down menu, you may want to add to the drop-down menu a unique treatment chemical used at your site. To do this, you would enter the name of the treatment chemical in Column A above. Column B might be “gallons” (of treatment chemical) and Column C might be 0.004 tons per gallons (depending on the density of the treatment chemical). The footprint conversion factors in Columns D - N would represent the energy required, and the GHG, NOx, SOx, PM, and HAPs emissions to air, associated with the production of the treatment chemical. The entry in Column D would be in units of MMBtu/gallon (that is, MMBtu energy required per gallon treatment chemical produced), the entry in Column F would be in units of lbs CO2e/gallon (that is, lbs CO2e emissions per gallon treatment chemical produced), Column H would be lbs NOx/gallon, etc.

Once the user-defined material has been entered above, you may return to the “Materials Use and Transportation” table in the "Input Template" tab, select the newly added material from the drop-down menu in Column A, and enter the quantity of the material used at your site. All entries made in Rows 16 - 35 above are considered in SEFA as part of the off-site footprint.

Examples for Rows 37 - 49 (Management and recycling of wastes)

You may want to add to the footprint analysis a waste management or recycling process not found in SEFA. You should first check the drop-down menu in Column A of the “Waste Disposal and Transportation” table on Row 90 of the “Input Template” tab in the “Input” workbook. If the waste or recycling process is not already in the drop-down menu, you may add the process and its footprint conversion factors in Rows 37 - 49 in the "User Defined Factors" tab (above). You may also want to add a user-defined waste destination to provide unique (more accurate) footprint conversion factors for a waste destination or process already included in the drop-down

(1) For example, incineration is not found in the drop-down menu. If waste from your site is being sent to an off-site incinerator, you may want to add it to the drop-down menu. To do this, enter “Incinerator” in Column A above. Column B might be “tons” (of waste) and Column C would be “1”, the conversion factor from tons to tons. The footprint conversion factors in Columns D - N would represent the energy required, and the GHG, NOx, SOx, PM, and HAPs emissions to air, associated with the incinerating the waste. The entry in Column D would be in units of MMBtu/ton (that is, MMBtu energy required per ton of waste incinerated), Column F would be in units of lbs CO2e/ton (that is, lbs CO2e emissions per ton of waste incinerated), Column H would be lbs NOx/ton, etc.

(2) As another example, instead of using “Non-hazardous waste landfill” from the drop-down menu, you may want to add to the drop-down menu a local landfill that uses energy-saving processes and equipment. To do this, you would enter the name of the landfill in Column A above. Column B might be “tons” (of waste) and Column C would be “1”, the conversion factor from tons to tons. The footprint conversion factors in Columns D - N would represent the energy required, and the GHG, NOx, SOx, PM, and HAPs emissions to air, associated with the managing the waste at the landfill. The entry in Column D would be in units of MMBtu/ton (that is, MMBtu energy required per ton of waste managed), the entry in Column F would be in units of lbs CO2e/ton (that is, lbs CO2e emissions per ton of waste managed), Column H would be lbs NOx/ton, etc.

Once the user-defined waste destination has been entered above, you may return to the “Waste Disposal and Transportation” table in the "Input Template" tab, select the newly added waste destination or process from the drop-down menu in Column A, and enter the quantity of the waste sent to the waste disposal or recycling location. Entries made in Rows 38 - 40 above are considered in SEFA as part of the on-site footprint. Entries in Rows 41 - 49 are part of the off-site footprint.

Examples for Rows 52 - 59 (Use of conventional and renewable energy)

You may want to add to the footprint analysis an energy usage not found in SEFA. Inputs for energy usages are found in the tables in Rows 14 - 124 of the "Input Template" tab in the "Input" workbook. If an energy usage at your site is not available in these tables, you may add the name of the energy usage and its footprint conversion factors in Rows 52 - 59 above.

(1) For example, your site may burn fuel oil in a boiler (a conventional fuel used on-site). SEFA does not include this type of energy usage in Rows 14 - 124 of the "Input Template" tab. To model the energy usage of the boiler, use Row 47 or 48 in the table above. Enter the name of the activity in Column A, the units in Column B (for example, gallons of fuel oil), and the footprint conversion factors in Columns D - N. Once the fuel oil usage has been entered above, you may return to the “Input Template” tab, and find the new item represented in Row 132 or 133. Enter the quantity of fuel oil in Cell F132 of F133 of the “Input Template” tab. SEFA will automatically apply the new conversion factors to this item only.

(2) As another example, your site may use personnel transportation vehicles that run on bio-based ethanol (a renewable fuel used in transportation). SEFA does not include this type of energy usage in Rows 14 - 124 of the "Input Template" tab. To model the ethanol vehicles, use Row 53 or 54 in the table above. Enter the name of the activity in Column A, the units in Column B (for example, gallons of ethanol), and the footprint conversion factors in Columns D - N. Once the ethanol usage has been entered above, you may return to the “Input Template” tab, and find the new item represented in Row 153 or 154. Enter the quantity of ethanol in Cell F153 or F154 of the “Input Template” tab. SEFA will automatically apply the new conversion factors to this item only.

(3) In both the examples above, the footprint conversion factors in Columns D - N would represent the energy required, and the GHG, NOx, SOx, PM, and HAPs emissions to air, associated with the combustion of the fuel (either fuel oil or bio-based ethanol). The entry in Column D would be in units of MMBtu/gallon (that is, MMBtu energy per gallon of fuel oil or ethanol combusted), Column F would be in units of lbs CO2e/gallon (that is, lbs CO2e emissions per gallon of fuel oil or ethanol combusted), Column H would be lbs NOx/gallon, etc.

(4) Entries made in Rows 52, 53, 56, and 57 above are considered in SEFA a part of the on-site footprint. Entries made in Rows 54, 55, 58, and 59 above are considered in SEFA a part of the transportation footprint.

(5) SEFA does not provide for separate modelling of the production (e.g., resource extraction or processing of fuel oil or ethanol) of a unique energy source that may be added in Rows 52 - 59 above. Instead, SEFA will used default footprint conversion factors for the fuel type.

Examples for Rows 7 - 14 (Combustion of fuels for transportation and on-site equipment)

You may want to add to the footprint analysis unique conversion factors for combustion of fuels already found in SEFA (such as gasoline, diesel, or biodiesel). This may be of interest if the default conversion factors in SEFA do not accurately represent emissions from equipment or vehicles in use at your site. Default conversion factors are found in the "Default Conversions" tab in the "Calculations" workbook. To include in the analysis unique footprint conversion factors for combustion of fuels (either conventional or renewable) for transportation and on-site equipment, you may add the name of the fuel name and its footprint conversion factors in Rows 7 - 14

(1) For example, your site may use on-site diesel equipment with particulate filters. To model the emissions from this equipment, use Row 8 in the table above. Enter the name of the fuel combustion situation in Column A, the units in Column B (for example, gallons of diesel), and the footprint conversion factors in Columns F - N. Once you enter unique conversion factors for this situation in the table above, the factors will override the default conversion factors in SEFA, and SEFA will automatically apply the new factors to all on-site diesel combustion. In this example, the unique footprint conversion factors will be applied to all on-site diesel equipment that you enter into the “Input Template” tab.

(2) As another example, your site may use ultra-low sulfur diesel fuel for transport of materials and waste. To model the emissions from this transportation fuel, use Row 12 in the table above. Enter the name of the fuel combustion situation in Column A, the units in Column B (for example, gallons of diesel), and the footprint conversion factors in Columns F - N. Once you enter unique conversion factors for this situation in the table above, the factors will override the default conversion factors in SEFA, and SEFA will automatically apply the new factors to all transportation diesel usage. In this example, the unique footprint conversion factors will be applied to all diesel transportation (personnel, equipment, materials, and waste) that you enter into the “Input Template” tab.

(3) In both examples above, the footprint conversion factors in Columns F - N would represent the GHG, NOx, SOx, PM, and HAPs emissions to air, associated with the combustion of the fuel. The entry in Column F would be in units of lbs CO2e/gallon (that is, lbs CO2e emissions per gallon diesel combusted), Column H would be lbs NOx/gallon, etc. If natural gas is used, the units would be lbs CO2e/ccf, lbs NOx/ccf, etc.

(4) Entries made in Rows 7 - 10 above are considered in SEFA a part of the on-site footprint. Entries made in Rows 11 - 14 above are considered in SEFA a part of the transportation footprint.

(5) SEFA does not provide for separate modelling of the production (e.g., resource extraction or processing of ultra-low sulfur diesel) of the unique fuel that may be added in Rows 7 - 14 above. Instead, SEFA will used default footprint conversion factors for the fuel type.

Well Material Calculator - 1

Use this tool to calculate the amount of material required for a well of specified type, depth, and diameter. This page is a calculator only and not linked to the "Input" tabs. The user must manually enter the results from the "Materials Required" table below into the appropriate "Input" tab.

Notes on Well Material Calculations - 1:

Well Details - 1	
Type of Well	
Well Casing Material	
Total Depth of Well in Feet (from ground surface to bottom of well, including screen)	
Screen Length	
Well Casing Diameter in Inches	
Stick-up Height in Feet (if applicable)	
Number of Wells	

Materials Required - 1		
Casing Material		Pounds
Screen Material		Pounds
Grout for Annulus (Cement)		Pounds
Water for Annulus (to mix cement)		Gallons
Sand Pack Material (Gravel/Sand)		Pounds
Soil Cuttings for Disposal		Pounds
Grout to Abandon Well(s)		Pounds
Water for Grout to Abandon Well(s)		Gallons

Well Construction Material Factors

	Pounds per Foot of Well Length								
Well Diameter	**SCH 40 PVC Casing**	**SCH 80 PVC Casing**	**SCH 40 Steel Casing**	**SCH 80 Steel Casing**	**USER DEFINED Casing**	**Grout for Annulus**	**Grout to Abandon Well**	**Sand for Annulus**	**Drill Cuttings for Disposal**
2-inch	0.69	0.94	3.65	5.02		13	2	19	22
4-inch	2.03	2.82	10.79	14.98		19	6	29	39
6-inch	3.58	5.38	18.97	28.57		25	14	39	61
8-inch	5.39	8.18	28.55	43.39		32	25	48	87
10-inch	7.64	12.1	40.48	64.43		38	40	58	119
12-inch	10.1	16.7	53.52	88.63		45	57	68	155

Source: Most of the information in the above table is from EPA's "Methodology for Understanding and Reducing a Project's Environmental Footprint," February 2012. Additional material weight factors for Schedule 80 PVC, Schedule 40 Steel, and Schedule 80 Steel, are from "Groundwater and Wells, Second Edition", by Johnson Filtration Systems Inc., 1986.

Note on User Defined Casing: *The "User Defined Casing" feature can be used to calculate the amount of material required for a well constructed of a material or size (schedule) other than the four options provided. To use this feature, select "User Defined Casing" in the "Well Casing Material" drop-down menu in the "Well Details" table, then add the appropriate "pounds per foot of well length" factor to the "User Defined Casing" column of the "Well Construction Materials Factors" table, in the row that corresponds to the well diameter. You must find or develop the unique "pounds per foot of well length" factor for the specific material, schedule, and diameter of pipe. The Well Material Calculator will use this factor to calculate Casing Material required and total Screen Material required. Note that if you select a material for the well casing that is not already included in the library of materials in SEFA, you must also develop emissions factors for the material's production and add these values to the "User Defined Factors" tab. (See the "User Defined Factors" tab for specifics.)*

Notes on Calculations:
- Calculation for screened pipe assumes that the weight of screened pipe is equal to weight of casing.
- Calculations for Grout Material, Sand Pack Material, and Soil Cuttings for Disposal assume annulus around casing has a diameter that is 4 inches larger than the casing.
- Grout values are for weight of unmixed cement, assuming 6 gallons of water is mixed with 94 pounds of neat cement with a blended density of 15 pounds per gallon (generally typical of engineering specifications).
- Drill cutting volume does not include drilling mud for mud rotary drilling.

Well Material Calculator - 2

Use this tool to calculate the amount of material required for a well of specified type, depth, and diameter. This page is a calculator only and not linked to the "Input" tabs. The user must manually enter the results from the "Materials Required" table below into the appropriate "Input" tab.

Notes on Well Material Calculations - 2:

Well Details - 2	
Type of Well	
Well Casing Material	
Total Depth of Well in Feet (from ground surface to bottom of well, including screen)	
Screen Length	
Well Casing Diameter in Inches	
Stick-up Height in Feet (if applicable)	
Number of Wells	

Materials Required - 2		
Casing Material		Pounds
Screen Material		Pounds
Grout for Annulus (Cement)		Pounds
Water for Annulus (to mix cement)		Gallons
Sand Pack Material (Gravel/Sand)		Pounds
Soil Cuttings for Disposal		Pounds
Grout to Abandon Well(s)		Pounds
Water for Grout to Abandon Well(s)		Gallons

Well Construction Material Factors

	Pounds per Foot of Well Length								
Well Diameter	**SCH 40 PVC Casing**	**SCH 80 PVC Casing**	**SCH 40 Steel Casing**	**SCH 80 Steel Casing**	**USER DEFINED Casing**	**Grout for Annulus**	**Grout to Abandon Well**	**Sand for Annulus**	**Drill Cuttings for Disposal**
2-inch	0.69	0.94	3.65	5.02		13	2	19	22
4-inch	2.03	2.82	10.79	14.98		19	6	29	39
6-inch	3.58	5.38	18.97	28.57		25	14	39	61
8-inch	5.39	8.18	28.55	43.39		32	25	48	87
10-inch	7.64	12.1	40.48	64.43		38	40	58	119
12-inch	10.1	16.7	53.52	88.63		45	57	68	155

Source: Most of the information in the above table is from EPA's "Methodology for Understanding and Reducing a Project's Environmental Footprint," February 2012. Additional material weight factors for Schedule 80 PVC, Schedule 40 Steel, and Schedule 80 Steel, are from "Groundwater and Wells, Second Edition", by Johnson Filtration Systems Inc., 1986.

Note on User Defined Casing: *The "User Defined Casing" feature can be used to calculate the amount of material required for a well constructed of a material or size (schedule) other than the four options provided. To use this feature, select "User Defined Casing" in the "Well Casing Material" drop-down menu in the "Well Details" table, then add the appropriate "pounds per foot of well length" factor to the "User Defined Casing" column of the "Well Construction Materials Factors" table, in the row that corresponds to the well diameter. You must find or develop the unique "pounds per foot of well length" factor for the specific material, schedule, and diameter of pipe. The Well Material Calculator will use this factor to calculate Casing Material required and total Screen Material required. Note that if you select a material for the well casing that is not already included in the library of materials in SEFA, you must also develop emissions factors for the material's production and add these values to the "User Defined Factors" tab. (See the "User Defined Factors" tab for specifics.)*

Notes on Calculations:
- Calculation for screened pipe assumes that the weight of screened pipe is equal to weight of casing.
- Calculations for Grout Material, Sand Pack Material, and Soil Cuttings for Disposal assume annulus around casing has a diameter that is 4 inches larger than the casing.
- Grout values are for weight of unmixed cement, assuming 6 gallons of water is mixed with 94 pounds of neat cement with a blended density of 15 pounds per gallon (generally typical of engineering specifications).
- Drill cutting volume does not include drilling mud for mud rotary drilling.

Well Material Calculator - 3

Use this tool to calculate the amount of material required for a well of specified type, depth, and diameter. This page is a calculator only and not linked to the "Input" tabs. The user must manually enter the results from the "Materials Required" table below into the appropriate "Input" tab.

Notes on Well Material Calculations - 3:

Well Details - 3	
Type of Well	
Well Casing Material	
Total Depth of Well in Feet (from ground surface to bottom of well, including screen)	
Screen Length	
Well Casing Diameter in Inches	
Stick-up Height in Feet (if applicable)	
Number of Wells	

Materials Required - 3		
Casing Material		Pounds
Screen Material		Pounds
Grout for Annulus (Cement)		Pounds
Water for Annulus (to mix cement)		Gallons
Sand Pack Material (Gravel/Sand)		Pounds
Soil Cuttings for Disposal		Pounds
Grout to Abandon Well(s)		Pounds
Water for Grout to Abandon Well(s)		Gallons

Well Construction Material Factors

	Pounds per Foot of Well Length								
Well Diameter	**SCH 40 PVC Casing**	**SCH 80 PVC Casing**	**SCH 40 Steel Casing**	**SCH 80 Steel Casing**	**USER DEFINED Casing**	**Grout for Annulus**	**Grout to Abandon Well**	**Sand for Annulus**	**Drill Cuttings for Disposal**
2-inch	0.69	0.94	3.65	5.02		13	2	19	22
4-inch	2.03	2.82	10.79	14.98		19	6	29	39
6-inch	3.58	5.38	18.97	28.57		25	14	39	61
8-inch	5.39	8.18	28.55	43.39		32	25	48	87
10-inch	7.64	12.1	40.48	64.43		38	40	58	119
12-inch	10.1	16.7	53.52	88.63		45	57	68	155

Source: Most of the information in the above table is from EPA's "Methodology for Understanding and Reducing a Project's Environmental Footprint," February 2012. Additional material weight factors for Schedule 80 PVC, Schedule 40 Steel, and Schedule 80 Steel, are from "Groundwater and Wells, Second Edition", by Johnson Filtration Systems Inc., 1986.

Note on User Defined Casing: *The "User Defined Casing" feature can be used to calculate the amount of material required for a well constructed of a material or size (schedule) other than the four options provided. To use this feature, select "User Defined Casing" in the "Well Casing Material" drop-down menu in the "Well Details" table, then add the appropriate "pounds per foot of well length" factor to the "User Defined Casing" column of the "Well Construction Materials Factors" table, in the row that corresponds to the well diameter. You must find or develop the unique "pounds per foot of well length" factor for the specific material, schedule, and diameter of pipe. The Well Material Calculator will use this factor to calculate Casing Material required and total Screen Material required. Note that if you select a material for the well casing that is not already included in the library of materials in SEFA, you must also develop emissions factors for the material's production and add these values to the "User Defined Factors" tab. (See the "User Defined Factors" tab for specifics.)*

Notes on Calculations:
- Calculation for screened pipe assumes that the weight of screened pipe is equal to weight of casing.
- Calculations for Grout Material, Sand Pack Material, and Soil Cuttings for Disposal assume annulus around casing has a diameter that is 4 inches larger than the casing.
- Grout values are for weight of unmixed cement, assuming 6 gallons of water is mixed with 94 pounds of neat cement with a blended density of 15 pounds per gallon (generally typical of engineering specifications).
- Drill cutting volume does not include drilling mud for mud rotary drilling.

The "Lookup" worksheet is for reference only, and is not intended for user input.

The following tables are provided to convert transportation and equipment use into fuel use. References for gasoline and diesel use are generally from Climate Leaders documents and are consistent with the February 2012 EPA footprint methodology. Where fuel efficiencies are provided for biodiesel, B20, or natural gas, the following assumptions are made:

- diesel has a higher heating value of 0.139 MMBtu per gallon
- biodiesel has a higher heating value of 0.127 MMBtu per gallon
- natural gas has a higher heating value of 0.103 MMBtu per hundred cubic feet
- B20 is 20% biodiesel and 80% diesel
- fuel efficiencies scale approximately with higher heating value (e.g., biodiesel fuel efficiency in miles per gallon = 0.127/0.139 x diesel fuel efficiency).

Mode of Transport. For Personnel	B20 mpg or pmpg	Biodiesel mpg or pmpg	Diesel mpg or pmpg	Electricity mpkWh	Gasoline mpg	Natural Gas mpccf
Airplane	NO DATA	NO DATA	45	NO DATA	NO DATA	NO DATA
Bus	94	88	96	NO DATA	NO DATA	71
Car	28	26	28	NO DATA	24	21
Heavy-Duty Truck	5.9	5.5	6	NO DATA	8.5	4.4
Light-Duty Truck	20	18	20	NO DATA	17	15
Train	NO DATA	NO DATA	59	NO DATA	NO DATA	NO DATA
Vehicle (other)	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA

- Fuel usage for buses, airplanes, and trains are for passenger miles per gallon (pmpg)
- Airplane/jet fuel calculated as diesel for simplicity and due to similarities between kerosene and diesel
- Gasoline car and truck efficiencies and diesel car, truck, airplane, bus, and train efficiencies from converting average CO2 emissions in Climate Leaders from Commuting, Business Travel and Product Transport to diesel usage assuming Climate Leaders value of 22.3 lbs of CO2 per gallon of diesel.
- Gasoline mpg for heavy-duty truck is assumed to be 50% of a light-duty truck to represent a light-duty truck towing a trailer

Fuel Type for Equip. Use	Units	Units per HP-hr
B20	gal	0.051
Biodiesel	gal	0.055
Diesel	gal	0.05
Gasoline	gal	0.056

-Brake Specific Fuel Consumption (BSFC) values are consistent with 7,000 Btu/HP-hr (as used by EPA AP-42, Compilation of Air Pollutant Emission Factors, Chapter 3) and fuel higher heating values of 0.127 MMBtu for biodiesel, 0.139 MMBtu for diesel, 0.124 MMBtu for gasoline, and 0.103 MMBtu for natural gas (per February 2012 EPA footprint methodology).

Equipment Type and Representative Horsepower
Asphalt paver (150 HP)
Backhoe (100 HP)
Concrete paving machine (200 HP)
Dozer - large (200 HP)
Dozer - small (100 HP)
Drilling - direct push (60 HP)
Drilling - large rig (500 HP)
Drilling - medium rig (150 HP)
Dump truck (400 HP)
Excavator - large (250 HP)
Excavator - medium (175 HP)
Excavator/hoe - small (75 HP)
Generator - HP varies
Grader (175 HP)
Grout pump (20 HP)
Hydroseeder (20 HP)
Integrated tool carrier (100 HP)
Loader (200 HP)
Loader - small (75 HP)
Mobile laboratory (25 HP)
Mowers (5 HP)
Other - HP varies
Riding trencher (55 HP)
Roller (100 HP)
Rotary-screw air compressor - 250 cfm (60 HP)
Skid-steer - small (60 HP)
Telescopic handler (60 HP)
Tractor mower (25 HP)
Water truck (400 HP)

Equipment types are available with various engine sizes. Specific equipment sizes should be used when available. The above "representative sizes" are provided as general guides in the absence of other information

Lookup Table (continued)

Materials		Units	Conv. to tons	Default One-Way Distance from Source to Site (miles)
Cement		dry-lb	0.0005	500
Concrete		lb	0.0005	25
Gravel/sand/clay		lb	0.0005	25
HDPE		lb	0.0005	500
Photovoltaic system (installed)		W	0.000125	1000
PVC		lb	0.0005	500
Stainless steel		lb	0.0005	500
Steel		lb	0.0005	500
Other refined construction materials		lb	0.0005	500
Other unrefined construction materials		lb	0.0005	25
Cheese Whey		lb	0.0005	1000
Emulsified vegetable oil		lb	0.0005	1000
Molasses		lb	0.0005	1000
Virgin GAC (coal based)		lb	0.0005	500
Other Treatment Chemicals & Materials		lb	0.0005	500
Lime		lb	0.0005	500
Clean fill		tons	1	500
Drain rock		tons	1	500
User-defined material #4		TBD	TBD	500
User-defined material #5		TBD	TBD	500
User-defined material #6		TBD	TBD	500
User-defined material #7		TBD	TBD	500
User-defined material #8		TBD	TBD	500
User-defined material #9		TBD	TBD	500
User-defined material #10		TBD	TBD	500
User-defined material #11		TBD	TBD	500
User-defined material #12		TBD	TBD	500
User-defined material #13		TBD	TBD	500
User-defined material #14		TBD	TBD	500
User-defined material #15		TBD	TBD	500
User-defined material #16		TBD	TBD	500
User-defined material #17		TBD	TBD	500
User-defined material #18		TBD	TBD	500
User-defined material #19		TBD	TBD	500
User-defined material #20		TBD	TBD	500

Miles should be from manufacturer to the site

Mode of Transport. For Materials	B20 Usage Rate	Biodiesel Usage Rate	Diesel Usage Rate
Aircraft (gptm)	NO DATA	NO DATA	0.15
Barge (gptm)	0.0048	0.0051	0.0047
Train (gptm)	0.0025	0.0027	0.0025
Truck (mpg)	5.9	5.5	6
Truck freight (gptm)	0.0296	0.032	0.029

mpg = miles per gallon, gptm = gallons per ton-mile

- Airplane/jet fuel calculated as diesel for simplicity and due to similarities between kerosene and diesel

- Diesel fuel efficiencies are obtained by from converting average CO2 emissions reported in Climate Leaders: Commuting, Business Travel and Product Transport (EPA430-R-08-006) to diesel usage assuming Climate Leaders value of 22.3 lbs of CO2 per gallon of diesel.

** Default distance is one-way distance from site to disposal facility that can be used in absence of other*

Waste Facility	Units	Conv. to tons	Default Distance*
Off-site waste water treatment (POTW)	gal x 1000	4.17	50
Recycled/reused on-site	tons	1	0
Recycled/reused off-site	tons	1	50
Off-site non-hazardous waste landfill	tons	1	25
Off-site hazardous waste landfill	tons	1	500
User-defined recycled/reused on-site #1	TBD	TBD	0
User-defined recycled/reused on-site #2	TBD	TBD	0
User-defined recycled/reused on-site #3	TBD	TBD	0
User-defined recycled/reused off-site #1	TBD	TBD	50
User-defined recycled/reused off-site #2	TBD	TBD	50
User-defined recycled/reused off-site #3	TBD	TBD	50
User-defined non-hazardous waste destination #1	TBD	TBD	25
User-defined non-hazardous waste destination #2	TBD	TBD	25
User-defined non-hazardous waste destination #3	TBD	TBD	25
Off-site hazardous waste incinerator	ton	1	500
User-defined hazardous waste destination #2	TBD	TBD	500
User-defined hazardous waste destination #3	TBD	TBD	500

Water Source	Units	Conv. to tons
Public Water	gal x 1000	4.17
Extracted Groundwater	gal x 1000	4.17
Surface Water	gal x 1000	4.17
Reclaimed Water	gal x 1000	4.17
Collected/Diverted Storm Water	gal x 1000	4.17
Other Water Resource #1	gal x 1000	4.17
Other Water Resource #2	gal x 1000	4.17