ICFPA/NCASI Tools for Calculating Greenhouse Gas (GHG) Emissions from Pulp and Paper Manufacturing – with NCASI Data Entry Forms

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If you have questions or comments, contact:

Brad Upton
NCASI
PO Box 458
Corvallis, OR 97339, USA
e-mail: bupton@ncasi.org
phone: 541-752-8801
fax: 541-752-8806

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NCASI Tools for Calculating Greenhouse Gas (GHG) Emissions from Pulp and Paper Manufacturing – Enhanced Data Entry Forms

Introduction

The software described in this users' manual is an aid to developing emissions estimates using the methods in the report *Calculation tools for estimating greenhouse gas emissions from pulp and paper mills, Version 1.0* (available at www.ncasi.org). It is recommended that the report be reviewed prior to using this software to develop emissions estimates.

This version of the calculation tools requires use of Microsoft® Excel® 97 or a later version in order for the data entry forms to function. Because this version of the calculation tools may place demands on computer memory, it is recommended that the user close unnecessary applications before using the tools. In some situations, use of these tools on a computer with the Windows® NT operating system, or on a computer with limited RAM (memory) may be problematic.

This program has been developed by the International Council of Forest and Paper Associations with the assistance of the National Council for Air and Stream Improvement, Inc. (NCASI), a forest products industry environmental research organization.

These tools are intended to facilitate the calculation of direct CO_2, CH_4, and N_2O emissions from pulp and paper mills and ancillary operations. It also addresses indirect emissions attributable to the purchase and export of electricity and/or steam.

This document, and the software that it describes, are to be used in conjunction with two additional documents:

1) *Calculation tools for estimating greenhouse gas emissions from pulp and paper mills*, available at www.ncasi.org (hereinafter referred to as the Calculation Tools Report)

2) *Corporate GHG Accounting and Reporting: Corporate Inventory Module*, available at www.ghgprotocol.org

Most sections of this document include references to background information contained in the Calculation Tools Report.

This program includes significant amounts of material copied, with permission, from WRI and WBCSD calculation tools. Intellectual property rights of the WRI and WBCSD calculation tools belong to WRI and WBCSD.

If you have questions or comments, please contact Brad Upton, NCASI, PO Box 458, Corvallis, OR 97339, USA; e-mail: bupton@ncasi.org; phone: 541-752-8801; fax: 541-752-8806.

User Agreement

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Overview

This version of the calculation tools incorporates data entry forms which were designed to facilitate entry of data expressed in a variety of units, and to automate some of the steps required to estimate GHG emissions.

When the Excel file containing the calculation tools is opened, the user may be asked to enable or disable macros. The data entry forms incorporated into this version of the calculation tools will not function without macros enabled. Therefore, if asked, the user should enable macros in order to take advantage of the data entry forms.

After enabling macros, an introduction window will be displayed. The introduction provides basic information regarding the calculation tools and contact information for NCASI personnel involved in the development of the tools.

After the introduction window, a user agreement is displayed. After reading the user agreement, select the "Accept Conditions" button if the agreement is accepted. If not accepted, selecting the "Decline" button will terminate the program and close Excel.

After accepting the terms of the user agreement, the Operations in Inventory form will be displayed. This four page form provides a place to describe the operations boundaries of the emissions inventory. After completing the operational boundary section the main data entry forms will be displayed. Data can be entered into the forms in any order desired. Buttons on the data entry forms can be used to access specific form pages, which are numbered. The following data entry form pages are included in this version of the calculation tools:

1. **Stationary Combustion Sources** for entering data for combustion units such as boilers, turbines, IR dryers, etc.
2. **Transportation – Fuel based** for entering data associated with transportation sources for which fuel consumption data are available
3. **Transportation – Distance based** for entering data associated with transportation sources for which fuel consumption data are not available but for which distance traveled and fuel economy data are available
4. **Other Mobile Sources** for entering data associated with other mobile sources, such as harvesting equipment
5. **Landfills** for entering data associated with mill-owned landfills
6. **Anaerobic Wastewater Treatment** for entering data associated with mill-owned anaerobic wastewater treatment facilities
7. **Make-Up Carbonates** for entering data on consumption rates of makeup chemicals consumed in the pulp mill
8. **CO$_2$ Imports and Exports** for entering data associated with imports or exports of CO$_2$ (e.g., to precipitated calcium carbonate plants)
9. **Indirect – Energy Imports** for entering data related to imports of electricity and steam (or hot water)
10. **Indirect – Energy Exports** for entering data related to exports of electricity and steam (or hot water)
11. **Biomass – Wood fuel** for entering supporting information on wood-based biomass combustion
12. **Biomass – Pulping liquors** for entering supporting information on combustion of spent pulping liquors
13. **Finish** provides a series of commands related to saving and editing the data inputs

Once one of the above listed data entry forms has been selected (and is displayed on the screen) data, including source descriptions, fuel types consumed, specific fuels and quantities consumed, and units of measurement are selected or entered in drop down boxes or text boxes. The user is given the choice of using "default" emissions factors or entering fuel- or mill-specific "custom" emissions factors. Default emissions factors used for each source type can be reviewed in the source-specific worksheet of the underlying spreadsheet. The user is encouraged to use custom emissions factors based on mill-specific conditions when possible. Each sheet also incorporates an "Info/Help" button that, when selected, displays additional information related to data entry in the particular sheet from which the button was selected, and a reference to background information on the emissions calculations contained in the Calculation Tools Report. The

information displayed upon selecting the "Info/Help" buttons on the various sheets is very similar to the information contained in the remainder of this document.

The Transportation-Fuel based, Transportation-Distance based, Other Mobile Sources, Landfills, and Anaerobic Wastewater Treatment data forms provide the capability to identify the fraction of total emissions claimed as direct for each emission source included in the inventory. For example, if a transportation fleet is owned by another company but the emissions are to be included in the emissions inventory, zero should be entered as the fraction claimed as direct for this particular fleet (because the fleet is not owned by the company developing the emissions inventory). In this manner, the emissions estimate for this fleet will be characterized as indirect emissions. A value between zero and one must be entered for each emission source in these five data forms.

Most of the data entry sheets also have buttons which are used to enter the data typed or selected in the data entry form into the underlying calculation tools spreadsheet, or to view or edit data already entered into the spreadsheet. The "Enter Data" button enables a pop up window that displays the data as entered along with the data in measurement units converted to those required by the underlying spreadsheet. This pop up display provides options for either accepting or editing the entered data. The "View Source Table" button displays a pop up window containing the contents of the source category emissions calculation table, reflecting data already entered for this source category. The Source Table display also provides an option to edit data already written to the spreadsheet. The "View Summary Table" button enables a pop up window which displays the inventory summary table, and provides a means to access the inventory summary table of the underlying spreadsheet for entering descriptions related to specific greenhouse gases included in the inventory.

The data entry forms also include a "Close Data Entry Form" button. When this button is selected the source category page of the underlying spreadsheet corresponding to the last accessed data entry form will be displayed. This button may be useful for viewing the spreadsheet after data entry has been completed. The data entry forms may also be closed by clicking on the "X" at the top right corner of the form.

The completed spreadsheet contains the data entered in the forms, converted to SI units, and the completed GHG emissions inventory. The several pages within the worksheet can be viewed with the "Summary Table" worksheet containing a summary of the inventory. The "Supporting Info. on Biomass" worksheet contains information on emissions of climate neutral CO_2 from biomass combustion. The "Raw Data Log" worksheet contains the data entered into the data entry forms in the measurement units used during data entry. This sheet may be particularly useful for quality checking the data entered and for recalling the custom emissions factors used (if any). The "Energy Factors" worksheet contains several conversion factors and emissions factors used by the program and should not be modified.

Most of the worksheets of the calculation tools spreadsheet also include "Open Data Entry Form" command buttons that, when selected, re-open the forms for subsequent data entry. In this fashion, additional data can be entered. Furthermore, if data entry errors are identified when viewing any of the source-specific worksheets of the spreadsheet or when inspecting the raw data

log, these entries can be deleted, the data entry forms re-opened, and the corrected data entered (see the section on manual entry of "other" fuels and modifications to existing data entries).

Also available from the "13. Finish" data entry form is the "Clear Spreadsheet" button which clears any data in the underlying calculation tools spreadsheet and any raw data in the raw data log of the underlying spreadsheet. This button may be useful if the user wishes to start the data entry process over from a "clean slate," or if a file containing a previously completed emission inventory is to be used to begin a new inventory. The "Save Spreadsheet" button on the "13. Finish" form can be used to save the file. Selecting the "Save Spreadsheet" button activates the "save as" dialog box of Excel, and thus enables changing the file name or storage location if desired.

Data Entry

Operations in Inventory

Use this form to describe the operational boundaries of the greenhouse gas (GHG) inventory (Section 5 in the Calculation Tools Report contains additional background information). Enter text into each of the fields on the first page of this four page form, then select the "Next" button to proceed to the next page of the Operations in Inventory form. Entering data into the Operations in Inventory forms will overwrite any entries already made to the spreadsheet. Entries previously made can be modified from the spreadsheet at any time, or can be overwritten with new entries from the Operations in Inventory data entry forms. Select the operations that will be included in the inventory and select the "Next" button to proceed. Select the "Finish" button on the fourth page of the form to proceed to the main data entry forms.

After selecting the "Finish" button on the fourth page of the Operations in Inventory form the main data entry forms will be displayed. The buttons at the top of the main data entry form contain descriptions of the types of sources that can be entered on the each of the pages. The pages of data entry forms can be accessed in any order, and it is not necessary to enter data on all of the pages. For example, if transportation sources are not to be included within the operational boundaries of the inventory, the transportation sources pages can be left blank (ignored).

Stationary Combustion Sources page [Button 1]

Use this page to enter data associated with stationary combustion devices such as boilers, recovery furnaces, lime kilns and calciners, direct fired turbines, direct fired dryers, and any other stationary combustion sources that are fired with fossil fuel or biomass (Sections 8 and 9 in the Calculation Tools Report contains additional background information). Although carbon dioxide emissions from burning biomass (such as hogged wood fuel, bark, spent pulping liquors, WWTP residuals, etc.) are considered climate neutral and are not included in GHG inventories, methane and nitrous oxide emissions from biomass combustion are included in GHG inventories and can be calculated using the Stationary Combustion Sources page.

Enter the combustion source name and select the type of fuel being burned (e.g., liquid fossil fuel, biomass fuel, etc.) from the list of options in the drop down box within the Step 1 frame.

For combustion devices burning more than one type of fuel in the period of interest for the inventory (e.g., boilers burning both fuel oil and natural gas), data on each fuel must be entered separately. In this case, the combustion source name can include a description of the fuel for which data are being entered (for example, the source name could include "Boiler 1 natural gas").

In Step 2, select the specific fuel being burned and the measurement units of the fuel (e.g., million BTU HHV, US tons, etc.) in the drop down boxes within the frame. If the fuel of interest does not appear in the drop down box, then the data must be entered manually (see the section on manual entry of "other" fuels and modifications to existing data entries). Enter the quantity of fuel burned. For pulping liquors, mass units pertain to the quantities of liquor solids rather than total liquor weight. For wood-based fuels, mass units pertain to the quantities of dry solids in the fuel rather than the total mass of wet fuel.

Select whether you wish to use the default emissions factor or if you prefer to enter a custom emissions factor using the radio buttons within the Step 3 frame. If you choose to use a default factor, select whether to use a factor that considers all three GHGs, CO_2, CH_4, and N_2O (except the factors for biomass fuels, which only consider CH_4 and N_2O), or a factor that considers CO_2 only. If using a custom emissions factor, enter the numerical value of the factor then select the units associated with the emissions factor in the drop down box.

Review the data entries, then click the "Enter Data" button. A pop up window will display the data as entered along with the data in measurement units converted to those required by the underlying calculation tools spreadsheet. Review the data for errors, then either accept the data as entered (by selecting the "Accept Data" button) or elect to edit the data by selecting the "Edit Data" button. If the "Accept Data" button is selected the software will write the data to the spreadsheet and return to the data entry forms for additional data entry (data form text boxes will be empty). Alternatively, other sections of the data entry forms can then be accessed. If the "Edit Data" button is selected the data display window will close and the data entry form will be displayed, containing the data as originally entered by the user. From here the data can be edited, then the "Enter Data" button can be selected to repeat the data review and acceptance/edit choices.

Each source category data entry form also has buttons that can be used to review the emissions calculations for that source category or to view the emissions inventory summary table. Selecting the "View Source Table" button displays a pop up window with the contents of the source category emissions calculation table, as contained in the underlying spreadsheet. The Source Table display window contains two buttons, "Return to Data Form" and "Go To Source Table." The latter can be used to access the source table of the underlying spreadsheet (enables manual editing of data, etc.).

From the data entry form, select the "View Summary Table" button to display a pop up window with the inventory summary table, as contained in the underlying spreadsheet. The Summary Table display window contains two buttons, "Return to Data Form" and "Go To Summary Table." The latter can be used to access the inventory summary table of the underlying spreadsheet, which may be useful for entering descriptions related to specific greenhouse gases included in the inventory.

The data entry form also includes a "Close Data Entry Form" button. When this button is selected the source category page of the underlying spreadsheet corresponding to the last accessed data entry form will be displayed. This button may be useful for viewing the spreadsheet after data entry has been completed. The data entry forms may also be closed by clicking on the "X" at the top right corner of the form.

From the underlying spreadsheet view (either the source-specific tables or the summary table) the "Open Data Entry Form" button can be selected to re-activate the data entry forms and continue data entry.

Up to 25 fuel consumption data entries can be made using this data entry sheet. **Note that entering data is not the same as saving the file!** The file can be saved from the underlying spreadsheet, or by going to the "13. Finish" sheet and selecting the "Save Spreadsheet" button.

When finished entering data for stationary combustion sources, click on another sheet's button to exit the stationary combustion sources sheet. You can return to the stationary sources sheet to enter more data at any time.

Transportation – Fuel based page [Button 2]

Use this page to enter data associated with transportation sources with fuel consumption data (Section 13 in the Calculation Tools Report contains additional background information).

Enter the transportation source name within the Step 1 frame. Enter the fraction of total emissions claimed as direct for this particular entry. This must be a fraction between zero (corresponds to zero ownership of the emission source, with emissions considered to be indirect) and one (which would correspond to full ownership of the emission source, with emissions considered to be direct).

Select the type of fuel being burned (e.g., gasoline, natural gas, etc.) from the list of options in the drop down box within the Step 2 frame. Select the measurement units of the fuel (e.g., US gallons, liters, etc.) in the appropriate drop down box, then enter the quantity of fuel burned.

Select whether you wish to use the default emissions factor or if you prefer to enter a custom emissions factor using the radio buttons within the Step 3 frame. The default emissions factors for transportation sources addressed on this page only consider CO_2 (do not include emissions of the other GHGs CH_4, and N_2O). If using a custom emissions factor, enter the numerical value of the factor then select the units associated with the emissions factor in the drop down box.

Review the data entries, then click the "Enter Data" button. A pop up window will display the data as entered along with the data in measurement units converted to those required by the underlying calculation tools spreadsheet. Review the data for errors, then either accept the data as entered (by selecting the "Accept Data" button) or elect to edit the data by selecting the "Edit Data" button. If the "Accept Data" button is selected the software will write the data to the spreadsheet and return to the data entry forms for additional data entry (data form text boxes will be empty). Alternatively, other sections of the data entry forms can then be accessed. If the "Edit Data" button is selected the data display window will close and the data entry form will be

displayed, containing the data as originally entered by the user. From here the data can be edited, then the "Enter Data" button can be selected to repeat the data review and acceptance/edit choices.

Each source category data entry form also has buttons that can be used to review the emissions calculations for that source category or to view the emissions inventory summary table. Selecting the "View Source Table" button displays a pop up window with the contents of the source category emissions calculation table, as contained in the underlying spreadsheet. The Source Table display window contains two buttons, "Return to Data Form" and "Go To Source Table." The latter can be used to access the source table of the underlying spreadsheet (enables manual editing of data, etc.).

From the data entry form, select the "View Summary Table" button to display a pop up window with the inventory summary table, as contained in the underlying spreadsheet. The Summary Table display window contains two buttons, "Return to Data Form" and "Go To Summary Table." The latter can be used to access the inventory summary table of the underlying spreadsheet, which may be useful for entering descriptions related to specific greenhouse gases included in the inventory.

The data entry form also includes a "Close Data Entry Form" button. When this button is selected the source category page of the underlying spreadsheet corresponding to the last accessed data entry form will be displayed. This button may be useful for viewing the spreadsheet after data entry has been completed. The data entry forms may also be closed by clicking on the "X" at the top right corner of the form.

From the underlying spreadsheet view (either the source-specific tables or the summary table) the "Open Data Entry Form" button can be selected to re-activate the data entry forms and continue data entry.

Up to 25 fuel-based transportation data entries can be made using this data entry sheet. **Note that entering data is not the same as saving the file!** The file can be saved from the underlying spreadsheet, or by going to the "13. Finish" sheet and selecting the "Save Spreadsheet" button.

When finished entering data for fuel-based transportation sources, click on another sheet's button to exit this sheet. You can return to the fuel-based transportation sources sheet to enter more data at any time.

Transportation – Distance based page [Button 3]

Use this page to enter data associated with transportation sources with distance traveled and fuel economy data (Section 13 in the Calculation Tools Report contains additional background information).

Enter the transportation source name within the Step 1 frame. Enter the fraction of total emissions claimed as direct for this particular entry. This must be a fraction between zero (corresponds to zero ownership of the emission source, with emissions considered to be indirect)

and one (which would correspond to full ownership of the emission source, with emissions considered to be direct).

Select the vehicle type (e.g., hybrid auto 56 mpg, diesel locomotive, etc.) from the list of options in the drop down box. You can enter a vehicle type (type a new description) if you will use a custom emissions factor, however, you MUST select a vehicle type from the list of options if you will use a default emissions factor.

Select the measurement units of distance traveled (miles, kilometers, short ton miles, metric tonne kilometers) in the appropriate drop down box, then enter the distance traveled in the selected units within the Step 2 frame.

Select whether you wish to use the default emissions factor or if you prefer to enter a custom emissions factor using the radio buttons within the Step 3 frame. The default emissions factors for transportation sources addressed on this page only consider CO_2 (do not include emissions of the other GHGs CH_4, and N_2O). If using a custom emissions factor, enter the numerical value of the factor then select the units associated with the emissions factor in the drop down box. Alternatively, use the distance-based emissions factor calculator to calculate a custom emissions factor based on fuel economy by selecting the "calculator" button within the Step 3 frame.

Review the data entries, then click the "Enter Data" button. A pop up window will display the data as entered along with the data in measurement units converted to those required by the underlying calculation tools spreadsheet. Review the data for errors, then either accept the data as entered (by selecting the "Accept Data" button) or elect to edit the data by selecting the "Edit Data" button. If the "Accept Data" button is selected the software will write the data to the spreadsheet and return to the data entry forms for additional data entry (data form text boxes will be empty). Alternatively, other sections of the data entry forms can then be accessed. If the "Edit Data" button is selected the data display window will close and the data entry form will be displayed, containing the data as originally entered by the user. From here the data can be edited, then the "Enter Data" button can be selected to repeat the data review and acceptance/edit choices.

Each source category data entry form also has buttons that can be used to review the emissions calculations for that source category or to view the emissions inventory summary table. Selecting the "View Source Table" button displays a pop up window with the contents of the source category emissions calculation table, as contained in the underlying spreadsheet. The Source Table display window contains two buttons, "Return to Data Form" and "Go To Source Table." The latter can be used to access the source table of the underlying spreadsheet (enables manual editing of data, etc.).

From the data entry form, select the "View Summary Table" button to display a pop up window with the inventory summary table, as contained in the underlying spreadsheet. The Summary Table display window contains two buttons, "Return to Data Form" and "Go To Summary Table." The latter can be used to access the inventory summary table of the underlying spreadsheet, which may be useful for entering descriptions related to specific greenhouse gases included in the inventory.

The data entry form also includes a "Close Data Entry Form" button. When this button is selected the source category page of the underlying spreadsheet corresponding to the last accessed data entry form will be displayed. This button may be useful for viewing the spreadsheet after data entry has been completed. The data entry forms may also be closed by clicking on the "X" at the top right corner of the form.

From the underlying spreadsheet view (either the source-specific tables or the summary table) the "Open Data Entry Form" button can be selected to re-activate the data entry forms and continue data entry.

Up to 25 distance-based transportation data entries can be made using this data entry sheet. **Note that entering data is not the same as saving the file!** The file can be saved from the underlying spreadsheet, or by going to the "13. Finish" sheet and selecting the "Save Spreadsheet" button.

When finished entering data for distance-based transportation sources, click on another sheet's button to exit this sheet. You can return to the distance-based transportation sources sheet to enter more data at any time.

Optional Calculator for kg CO_2 / Distance Unit form

Use this page to calculate a distance-based emissions factor based on the fuel economy of the vehicle or fleet. The sheet can be called from the Transportation-Distance based page. To use the calculator, enter the fuel economy of the vehicle or fleet in units of miles per gallon (top left data box) or in liters per 100 kilometers (in the lower left data box). Select the "calculate" button to the right of the data entry box used, and calculated emissions factors based on gasoline and on diesel fuels will be displayed in the results frames. If you wish to accept the calculated emissions factor, select the "Accept / Close Window" button below the result that you wish to use. The result will be returned to the Transportation-Distance based page (in the appropriate emissions factor data entry box), and the calculator window will close. If you wish to close the calculator without accepting the calculated emissions factor, simply click on the "X" at the top left of the calculator window and the window will close, taking you back to the Transportation-Distance based page.

Emissions factors calculated by the optional calculator include only CO_2 (CH_4, and N_2O are not considered).

Other Mobile Sources page [Button 4]

Use this page to enter data associated with mobile, non-transportation sources, such as harvesting equipment and non-road vehicles (e.g., fork trucks) (Section 13 in the Calculation Tools Report contains additional background information).

Enter the mobile source name within the Step 1 frame. Enter the fraction of total emissions claimed as direct for this particular entry. This must be a fraction between zero (corresponds to zero ownership of the emission source, with emissions considered to be indirect) and one (which

would correspond to full ownership of the emission source, with emissions considered to be direct).

Select the type of fuel being burned (e.g., gasoline, natural gas, etc.) from the list of options in the drop down box within the Step 2 frame. Select the measurement units of the fuel (e.g., US gallons, liters, etc.) in the appropriate drop down box, then enter the quantity of fuel burned in the units selected.

Select whether you wish to use the default emissions factor or if you prefer to enter a custom emissions factor using the radio buttons within the Step 3 frame. If you choose to use a default factor, select whether to use a factor that considers all three GHGs, CO_2, CH_4, and N_2O, or a factor that considers CO_2 only. If using a custom emissions factor, enter the numerical value of the factor then select the units associated with the emissions factor in the drop down box.

Review the data entries, then click the "Enter Data" button. A pop up window will display the data as entered along with the data in measurement units converted to those required by the underlying calculation tools spreadsheet. Review the data for errors, then either accept the data as entered (by selecting the "Accept Data" button) or elect to edit the data by selecting the "Edit Data" button. If the "Accept Data" button is selected the software will write the data to the spreadsheet and return to the data entry forms for additional data entry (data form text boxes will be empty). Alternatively, other sections of the data entry forms can then be accessed. If the "Edit Data" button is selected the data display window will close and the data entry form will be displayed, containing the data as originally entered by the user. From here the data can be edited, then the "Enter Data" button can be selected to repeat the data review and acceptance/edit choices.

Each source category data entry form also has buttons that can be used to review the emissions calculations for that source category or to view the emissions inventory summary table. Selecting the "View Source Table" button displays a pop up window with the contents of the source category emissions calculation table, as contained in the underlying spreadsheet. The Source Table display window contains two buttons, "Return to Data Form" and "Go To Source Table." The latter can be used to access the source table of the underlying spreadsheet (enables manual editing of data, etc.).

From the data entry form, select the "View Summary Table" button to display a pop up window with the inventory summary table, as contained in the underlying spreadsheet. The Summary Table display window contains two buttons, "Return to Data Form" and "Go To Summary Table." The latter can be used to access the inventory summary table of the underlying spreadsheet, which may be useful for entering descriptions related to specific greenhouse gases included in the inventory.

The data entry form also includes a "Close Data Entry Form" button. When this button is selected the source category page of the underlying spreadsheet corresponding to the last accessed data entry form will be displayed. This button may be useful for viewing the spreadsheet after data entry has been completed. The data entry forms may also be closed by clicking on the "X" at the top right corner of the form.

From the underlying spreadsheet view (either the source-specific tables or the summary table) the "Open Data Entry Form" button can be selected to re-activate the data entry forms and continue data entry.

Up to 25 mobile non-transportation data entries can be made using this data entry sheet. **Note that entering data is not the same as saving the file!** The file can be saved from the underlying spreadsheet, or by going to the "13. Finish" sheet and selecting the "Save Spreadsheet" button.

When finished entering data for mobile non-transportation sources, click on another sheet's button to exit this sheet. You can return to the mobile non-transportation sources sheet to enter more data at any time.

Landfills page, General [Button 5]

Use this page to enter data associated with landfills (Section 14 in the Calculation Tools Report contains additional background information).

Select the method to be used for estimating greenhouse gases from the landfill using the radio buttons. Use only one of the following methods for each landfill. The three methods included in these calculation tools are:

Method 1 – Use method 1 to enter data associated with landfills with low permeability caps and effective gas recovery systems where measurements are made of the amounts of gas collected.

Method 2 – Use method 2 to enter data associated with landfills without low permeability caps and effective gas recovery systems, and where the amounts of waste deposited are reasonably constant from year-to-year and the landfill design has not been changed in ways that would substantially alter landfill gas releases.

Method 3 – Use method 3 to enter data associated with landfills without low permeability caps and effective gas recovery systems, and where the amounts of waste deposited or the character of the wastes or of the landfill may vary from year to year.

Landfills page, Method 1

Use this page to enter data associated with landfills with low permeability caps and effective gas recovery systems where measurements are made of the amounts of gas collected (Section 14.1 in the Calculation Tools Report contains additional background information).

To enter data, select the "Method 1" radio button.

Enter the landfill name or description and the type of waste deposited in the landfill. Enter the fraction of total emissions claimed as direct for this particular entry. This must be a fraction between zero (corresponds to zero ownership of the emission source, with emissions considered to be indirect) and one (which would correspond to full ownership of the emission source, with emissions considered to be direct). Enter the quantity of gas collected during the year of interest,

and select the units of measurement for the collected gas (e.g., cubic feet) using the drop down list. Enter values for the other landfill parameters.

Review the data entries, then click the "Enter Data" button. A pop up window will display the data as entered along with the data in measurement units converted to those required by the underlying calculation tools spreadsheet. Review the data for errors, then either accept the data as entered (by selecting the "Accept Data" button) or elect to edit the data by selecting the "Edit Data" button. If the "Accept Data" button is selected the software will write the data to the spreadsheet and return to the data entry forms for additional data entry (data form text boxes will be empty). Alternatively, other sections of the data entry forms can then be accessed. If the "Edit Data" button is selected the data display window will close and the data entry form will be displayed, containing the data as originally entered by the user. From here the data can be edited, then the "Enter Data" button can be selected to repeat the data review and acceptance/edit choices.

Each source category data entry form also has buttons that can be used to review the emissions calculations for that source category or to view the emissions inventory summary table. Selecting the "View Source Table" button displays a pop up window with the contents of the source category emissions calculation table, as contained in the underlying spreadsheet. The Source Table display window contains two buttons, "Return to Data Form" and "Go To Source Table." The latter can be used to access the source table of the underlying spreadsheet (enables manual editing of data, etc.).

From the data entry form, select the "View Summary Table" button to display a pop up window with the inventory summary table, as contained in the underlying spreadsheet. The Summary Table display window contains two buttons, "Return to Data Form" and "Go To Summary Table." The latter can be used to access the inventory summary table of the underlying spreadsheet, which may be useful for entering descriptions related to specific greenhouse gases included in the inventory.

The data entry form also includes a "Close Data Entry Form" button. When this button is selected the source category page of the underlying spreadsheet corresponding to the last accessed data entry form will be displayed. This button may be useful for viewing the spreadsheet after data entry has been completed. The data entry forms may also be closed by clicking on the "X" at the top right corner of the form.

From the underlying spreadsheet view (either the source-specific tables or the summary table) the "Open Data Entry Form" button can be selected to re-activate the data entry forms and continue data entry.

Up to five landfill entries can be made using this data entry sheet. **Note that entering data is not the same as saving the file!** The file can be saved from the underlying spreadsheet, or by going to the "13. Finish" sheet and selecting the "Save Spreadsheet" button.

When finished entering data for landfills with gas collection systems, click on another sheet's button to exit the landfills sheet, or select a different landfill method using the radio buttons at the top of the page. You can return to the method 1 landfill form to enter more data at any time.

Landfills page, Method 2

Use this page to enter data associated with landfills without low permeability caps and effective gas recovery systems, and where the amounts of waste deposited are reasonably constant from year to year and the landfill design has not been changed in ways that would substantially alter landfill gas releases (Section 14.2 in the Calculation Tools Report contains additional background information).

To enter data, select the "Method 2" radio button.

Enter the landfill name or description and the type of waste deposited in the landfill. Enter the fraction of total emissions claimed as direct for this particular entry. This must be a fraction between zero (corresponds to zero ownership of the emission source, with emissions considered to be indirect) and one (which would correspond to full ownership of the emission source, with emissions considered to be direct). Enter the annual deposition amount (assumed to be relatively constant from year to year), and select the measurement units for the deposition amount from the drop down list. Enter values for the other landfill parameters.

Review the data entries, then click the "Enter Data" button. A pop up window will display the data as entered along with the data in measurement units converted to those required by the underlying calculation tools spreadsheet. Review the data for errors, then either accept the data as entered (by selecting the "Accept Data" button) or elect to edit the data by selecting the "Edit Data" button. If the "Accept Data" button is selected the software will write the data to the spreadsheet and return to the data entry forms for additional data entry (data form text boxes will be empty). Alternatively, other sections of the data entry forms can then be accessed. If the "Edit Data" button is selected the data display window will close and the data entry form will be displayed, containing the data as originally entered by the user. From here the data can be edited, then the "Enter Data" button can be selected to repeat the data review and acceptance/edit choices.

Each source category data entry form also has buttons that can be used to review the emissions calculations for that source category or to view the emissions inventory summary table. Selecting the "View Source Table" button displays a pop up window with the contents of the source category emissions calculation table, as contained in the underlying spreadsheet. The Source Table display window contains two buttons, "Return to Data Form" and "Go To Source Table." The latter can be used to access the source table of the underlying spreadsheet (enables manual editing of data, etc.).

From the data entry form, select the "View Summary Table" button to display a pop up window with the inventory summary table, as contained in the underlying spreadsheet. The Summary Table display window contains two buttons, "Return to Data Form" and "Go To Summary Table." The latter can be used to access the inventory summary table of the underlying spreadsheet, which may be useful for entering descriptions related to specific greenhouse gases included in the inventory.

The data entry form also includes a "Close Data Entry Form" button. When this button is selected the source category page of the underlying spreadsheet corresponding to the last

accessed data entry form will be displayed. This button may be useful for viewing the spreadsheet after data entry has been completed. The data entry forms may also be closed by clicking on the "X" at the top right corner of the form.

From the underlying spreadsheet view (either the source-specific tables or the summary table) the "Open Data Entry Form" button can be selected to re-activate the data entry forms and continue data entry.

Up to five landfill entries can be made using this data entry sheet. **Note that entering data is not the same as saving the file!** The file can be saved from the underlying spreadsheet, or by going to the "13. Finish" sheet and selecting the "Save Spreadsheet" button.

When finished entering data for estimating landfill gas emissions via method 2, click on another sheet's button to exit the landfills sheet, or select a different landfill method using the radio buttons at the top of the page. You can return to the method 2 landfill form to enter more data at any time.

Landfills page, Method 3

Use this page to enter data associated with landfills without low permeability caps and effective gas recovery systems, and where the amounts of waste deposited or the character of the wastes or of the landfill may vary from year to year (Section 14.2 in the Calculation Tools Report contains additional background information).

To enter data, select the "Method 3" radio button.

Enter the landfill name or description and the type of waste deposited in the landfill. Enter the year in which waste was first deposited in the landfill, the last year in which waste was deposited in the landfill, and the year for which emissions are to be calculated. Enter the fraction of total emissions claimed as direct for this particular entry. This must be a fraction between zero (corresponds to zero ownership of the emission source, with emissions considered to be indirect) and one (which would correspond to full ownership of the emission source, with emissions considered to be direct). Review the information entered, and if correct select the "Proceed to data entry" button. If the information entered is not correct, select the "Reset landfill parameters" button and re-enter this information.

The program will display the year for which data are to be entered in the box labeled "Year of data for this entry." Enter the amount of waste deposited in the year displayed and select the measurement units for the deposition amount from the drop down list. If you wish to use the default values for the remaining landfill parameters, select the "Defaults" button. Otherwise, enter values for these other landfill parameters.

Review the data entries, then click the "Enter Data" button to save the entries for the displayed year in the data arrays of the program. **Note that this is not the same as saving the file!**

Once the "Enter Data" button has been selected, the "Year of data for this entry" display will be updated to the next year of the landfill's activity (as entered in the "General information on the

landfill" frame). Repeat the data entry steps until the last year of the landfill's activity has been entered, after which the word "Complete" will appear in the "Year of data for this entry" display. At this point the data will automatically be loaded to the spreadsheet. Select the "View Spreadsheet" button to view the entered data and the results of the calculations.

If the year for which emissions will be calculated is later than the last year in which waste was deposited, values must be entered in the last three data boxes (those requiring fractional entries) for the years between the last deposit and the year of emissions estimation.

Only one landfill can be considered using this method of estimating emissions. If you need to estimate emissions from more than one landfill using method 3, you will need to use a separate copy of these GHG calculation tools (using a "fresh" computer file) saved under a different file name to estimate emissions from each additional landfill.

When finished entering data for estimating landfill gas emissions via method 3, click on another sheet's button to exit the landfills sheet, or select a different landfill method using the radio buttons at the top of the page.

Anaerobic Wastewater Treatment page, General [Button 6]

Use this page to enter data associated with anaerobic wastewater treatment facilities (Section 15 in the Calculation Tools Report contains additional background information). This page is NOT TO BE USED FOR AEROBIC OR AERATED wastewater treatment systems.

To enter data, select the method to be used for estimating greenhouse gases from the anaerobic wastewater treatment system using the radio buttons. Use only one of the following methods for each anaerobic wastewater treatment system. The two methods included in these calculation tools are:

Method 1 – Use method 1 to enter data associated with anaerobic wastewater treatment systems with effective gas recovery systems where measurements are made of the amounts of gas collected. If the gas collection system is highly efficient and all collected gas is burned, the direct GHG emissions can be assumed to be zero.

Method 2 – Use method 2 to enter data associated with anaerobic wastewater treatment systems where gas is not collected or the collection efficiency is not known.

Anaerobic Wastewater Treatment page, Method 1

Use this page to enter data associated with anaerobic wastewater treatment systems with effective gas recovery systems where measurements are made of the amounts of gas collected (Section 15.1 in the Calculation Tools Report contains additional background information). If the gas collection system is highly efficient and all collected gas is burned, the direct GHG emissions can be assumed to be zero.

To enter data, select the "Method 1" radio button.

Enter the anaerobic wastewater treatment system name or description and the type of waste treated in the system (e.g., whole mill effluent, etc.). Enter the fraction of total emissions claimed as direct for this particular entry. This must be a fraction between zero (corresponds to zero ownership of the emission source, with emissions considered to be indirect) and one (which would correspond to full ownership of the emission source, with emissions considered to be direct).

Enter the quantity of gas collected during the year of interest, and select the units of measurement for the collected gas (e.g., cubic feet) using the drop down list. Enter values for the other anaerobic wastewater treatment system parameters.

Review the data entries, then click the "Enter Data" button. A pop up window will display the data as entered along with the data in measurement units converted to those required by the underlying calculation tools spreadsheet. Review the data for errors, then either accept the data as entered (by selecting the "Accept Data" button) or elect to edit the data by selecting the "Edit Data" button. If the "Accept Data" button is selected the software will write the data to the spreadsheet and return to the data entry forms for additional data entry (data form text boxes will be empty). Alternatively, other sections of the data entry forms can then be accessed. If the "Edit Data" button is selected the data display window will close and the data entry form will be displayed, containing the data as originally entered by the user. From here the data can be edited, then the "Enter Data" button can be selected to repeat the data review and acceptance/edit choices.

Each source category data entry form also has buttons that can be used to review the emissions calculations for that source category or to view the emissions inventory summary table. Selecting the "View Source Table" button displays a pop up window with the contents of the source category emissions calculation table, as contained in the underlying spreadsheet. The Source Table display window contains two buttons, "Return to Data Form" and "Go To Source Table." The latter can be used to access the source table of the underlying spreadsheet (enables manual editing of data, etc.).

From the data entry form, select the "View Summary Table" button to display a pop up window with the inventory summary table, as contained in the underlying spreadsheet. The Summary Table display window contains two buttons, "Return to Data Form" and "Go To Summary Table." The latter can be used to access the inventory summary table of the underlying spreadsheet, which may be useful for entering descriptions related to specific greenhouse gases included in the inventory.

The data entry form also includes a "Close Data Entry Form" button. When this button is selected the source category page of the underlying spreadsheet corresponding to the last accessed data entry form will be displayed. This button may be useful for viewing the spreadsheet after data entry has been completed. The data entry forms may also be closed by clicking on the "X" at the top right corner of the form.

From the underlying spreadsheet view (either the source-specific tables or the summary table) the "Open Data Entry Form" button can be selected to re-activate the data entry forms and continue data entry.

Up to five anaerobic wastewater treatment system entries can be made using this data entry sheet. **Note that entering data is not the same as saving the file!** The file can be saved from the underlying spreadsheet, or by going to the "13. Finish" sheet and selecting the "Save Spreadsheet" button.

When finished entering data for anaerobic wastewater treatment systems with gas collection systems, click on another sheet's button to exit the anaerobic wastewater treatment sheet, or select a different anaerobic wastewater treatment system method using the radio buttons at the top of the page. You can return to the method 1 form to enter more data at any time.

Anaerobic Wastewater Treatment page, Method 2

Use this page to enter data associated with anaerobic wastewater treatment systems where gas is not collected or the collection efficiency is not known (Section 15.2 in the Calculation Tools Report contains additional background information).

To enter data, select the "Method 2" radio button.

Enter the anaerobic wastewater treatment system name or description and the type of waste treated in the system (e.g., whole mill effluent, etc.). Enter the fraction of total emissions claimed as direct for this particular entry. This must be a fraction between zero (corresponds to zero ownership of the emission source, with emissions considered to be indirect) and one (which would correspond to full ownership of the emission source, with emissions considered to be direct).

Enter the amount of organic matter sent to the anaerobic wastewater treatment plant in the year of interest. The organic matter should be quantified by mass of BOD or mass of COD sent to the treatment plant in a year's time. Select the units of measurement for the organic matter (e.g., kg, lbs, US tons, metric tonnes) using the drop down list. Enter the methane emissions factor used to estimate the pounds of methane resulting from decomposition of a pound of organic matter (default values are 0.25 pounds methane per pound of COD or 0.6 pounds of methane per pound of BOD). Enter the amount of methane captured and burned (mass methane per year), and the units of this amount (e.g., kg, lbs, US tons, metric tonnes) using the drop down list.

Review the data entries, then click the "Enter Data" button. A pop up window will display the data as entered along with the data in measurement units converted to those required by the underlying calculation tools spreadsheet. Review the data for errors, then either accept the data as entered (by selecting the "Accept Data" button) or elect to edit the data by selecting the "Edit Data" button. If the "Accept Data" button is selected the software will write the data to the spreadsheet and return to the data entry forms for additional data entry (data form text boxes will be empty). Alternatively, other sections of the data entry forms can then be accessed. If the "Edit Data" button is selected the data display window will close and the data entry form will be displayed, containing the data as originally entered by the user. From here the data can be edited, then the "Enter Data" button can be selected to repeat the data review and acceptance/edit choices.

Each source category data entry form also has buttons that can be used to review the emissions calculations for that source category or to view the emissions inventory summary table. Selecting the "View Source Table" button displays a pop up window with the contents of the source category emissions calculation table, as contained in the underlying spreadsheet. The Source Table display window contains two buttons, "Return to Data Form" and "Go To Source Table." The latter can be used to access the source table of the underlying spreadsheet (enables manual editing of data, etc.).

From the data entry form, select the "View Summary Table" button to display a pop up window with the inventory summary table, as contained in the underlying spreadsheet. The Summary Table display window contains two buttons, "Return to Data Form" and "Go To Summary Table." The latter can be used to access the inventory summary table of the underlying spreadsheet, which may be useful for entering descriptions related to specific greenhouse gases included in the inventory.

The data entry form also includes a "Close Data Entry Form" button. When this button is selected the source category page of the underlying spreadsheet corresponding to the last accessed data entry form will be displayed. This button may be useful for viewing the spreadsheet after data entry has been completed. The data entry forms may also be closed by clicking on the "X" at the top right corner of the form.

From the underlying spreadsheet view (either the source-specific tables or the summary table) the "Open Data Entry Form" button can be selected to re-activate the data entry forms and continue data entry.

Up to five anaerobic wastewater treatment system entries can be made using this data entry sheet. **Note that entering data is not the same as saving the file!** The file can be saved from the underlying spreadsheet, or by going to the "13. Finish" sheet and selecting the "Save Spreadsheet" button.

When finished entering data for anaerobic wastewater treatment systems without gas collection systems, click on another sheet's button to exit the anaerobic wastewater treatment sheet, or select a different anaerobic wastewater treatment system method using the radio buttons at the top of the page. You can return to the method 2 form to enter more data at any time.

Make-Up Carbonates page [Button 7]

Use this page to enter data associated with consumption of makeup carbonates used in the kraft pulp mill (Section 10 in the Calculation Tools Report contains additional background information). Only a single entry can be made for each carbonate form per emission inventory. It is important to note that the calcium makeup is required because of losses from the causticizing area, most of which are in the form of calcium carbonate. This lost material is usually landfilled, thereby sequestering the carbon contained in the calcium carbonate. Because the default method in these calculation tools does not consider this loss of carbon from the system, the estimated CO_2 emissions from makeup calcium carbonate may be higher than actual emissions. Where these emissions are significant, companies may want to perform the more

detailed analyses required to correct the emissions estimates to account for the carbon that leaves the causticizing area in calcium carbonate.

Enter the total amount of sodium carbonate used in the year of interest, and select the associated units using the drop down box.

Enter the total amount of calcium carbonate used in the year of interest, and select the associated units using the drop down box.

Review the data entries, then click the "Enter Data" button. A pop up window will display the data as entered along with the data in measurement units converted to those required by the underlying calculation tools spreadsheet. Review the data for errors, then either accept the data as entered (by selecting the "Accept Data" button) or elect to edit the data by selecting the "Edit Data" button. If the "Accept Data" button is selected the software will write the data to the spreadsheet and return to the data entry forms for additional data entry (data form text boxes will be empty). Alternatively, other sections of the data entry forms can then be accessed. If the "Edit Data" button is selected the data display window will close and the data entry form will be displayed, containing the data as originally entered by the user. From here the data can be edited, then the "Enter Data" button can be selected to repeat the data review and acceptance/edit choices.

Each source category data entry form also has buttons that can be used to review the emissions calculations for that source category or to view the emissions inventory summary table. Selecting the "View Source Table" button displays a pop up window with the contents of the source category emissions calculation table, as contained in the underlying spreadsheet. The Source Table display window contains two buttons, "Return to Data Form" and "Go To Source Table." The latter can be used to access the source table of the underlying spreadsheet (enables manual editing of data, etc.).

From the data entry form, select the "View Summary Table" button to display a pop up window with the inventory summary table, as contained in the underlying spreadsheet. The Summary Table display window contains two buttons, "Return to Data Form" and "Go To Summary Table." The latter can be used to access the inventory summary table of the underlying spreadsheet, which may be useful for entering descriptions related to specific greenhouse gases included in the inventory.

The data entry form also includes a "Close Data Entry Form" button. When this button is selected the source category page of the underlying spreadsheet corresponding to the last accessed data entry form will be displayed. This button may be useful for viewing the spreadsheet after data entry has been completed. The data entry forms may also be closed by clicking on the "X" at the top right corner of the form.

From the underlying spreadsheet view (either the source-specific tables or the summary table) the "Open Data Entry Form" button can be selected to re-activate the data entry forms and continue data entry.

Only a single entry for sodium carbonate consumption and a single entry for calcium carbonate consumption can be made in an inventory. **Note that entering data is not the same as saving**

the file! The file can be saved from the underlying spreadsheet, or by going to the "13. Finish" sheet and selecting the "Save Spreadsheet" button.

When finished entering data for consumption of sodium carbonate and calcium carbonate, click on another sheet's button to exit this sheet.

CO₂ Imports and Exports page [Button 8]

Use this page to enter data associated with imports (e.g., for pH neutralization) and exports (e.g., to precipitated calcium carbonate (PCC) plants) of fossil fuel derived carbon dioxide (Section 9 in the Calculation Tools Report contains additional background information).

Enter the total amount of fossil CO_2 imports and select the associated units in the "CO_2 Imports" frame.

Enter the total amount of CO_2 generated by burning fossil fuel in the combustion unit supplying the PCC plant and select the associated units in the "CO_2 Exports" frame. Enter the fraction of the total emissions from this source that is sent to the PCC plant (must be a fraction between 0 and 1).

Review the data entries, then click the "Enter Data" button. A pop up window will display the data as entered along with the data in measurement units converted to those required by the underlying calculation tools spreadsheet. Review the data for errors, then either accept the data as entered (by selecting the "Accept Data" button) or elect to edit the data by selecting the "Edit Data" button. If the "Accept Data" button is selected the software will write the data to the spreadsheet and return to the data entry forms for additional data entry (data form text boxes will be empty). Alternatively, other sections of the data entry forms can then be accessed. If the "Edit Data" button is selected the data display window will close and the data entry form will be displayed, containing the data as originally entered by the user. From here the data can be edited, then the "Enter Data" button can be selected to repeat the data review and acceptance/edit choices.

Each source category data entry form also has buttons that can be used to review the emissions calculations for that source category or to view the emissions inventory summary table. Selecting the "View Source Table" button displays a pop up window with the contents of the source category emissions calculation table, as contained in the underlying spreadsheet. The Source Table display window contains two buttons, "Return to Data Form" and "Go To Source Table." The latter can be used to access the source table of the underlying spreadsheet (enables manual editing of data, etc.).

From the data entry form, select the "View Summary Table" button to display a pop up window with the inventory summary table, as contained in the underlying spreadsheet. The Summary Table display window contains two buttons, "Return to Data Form" and "Go To Summary Table." The latter can be used to access the inventory summary table of the underlying spreadsheet, which may be useful for entering descriptions related to specific greenhouse gases included in the inventory.

The data entry form also includes a "Close Data Entry Form" button. When this button is selected the source category page of the underlying spreadsheet corresponding to the last accessed data entry form will be displayed. This button may be useful for viewing the spreadsheet after data entry has been completed. The data entry forms may also be closed by clicking on the "X" at the top right corner of the form.

From the underlying spreadsheet view (either the source-specific tables or the summary table) the "Open Data Entry Form" button can be selected to re-activate the data entry forms and continue data entry.

Only a single entry for imports and a single entry for exports can be made in an inventory. **Note that entering data is not the same as saving the file!** The file can be saved from the underlying spreadsheet, or by going to the "13. Finish" sheet and selecting the "Save Spreadsheet" button.

When finished entering data for imports and exports of CO_2, click on another sheet's button to exit this sheet. You can return to this sheet at any time.

Indirect – Energy Imports page [Button 9]

Use this page to enter data associated with imports of energy, such as purchased electrical power, purchased steam, or purchased hot water (Section 12 in the Calculation Tools Report contains additional background information). DO NOT use this page to enter data associated with electrical power or steam generated by company-owned equipment.

Enter the energy stream description (e.g., purchased electricity, purchased steam, etc.) and select the type of energy using the radio buttons. If the energy stream is hot water, select the steam button (energy of hot water is calculated the same as that of steam). Enter the quantity of energy imported and select the measurement units (million BTU, MWh, or kWh) using the drop down box.

You will need to enter an emissions factor associated with the imported energy. You can enter a factor that you have obtained from the seller of the energy, or one available from various published sources, such as those discussed in the NCASI report *Calculation tools for estimating greenhouse gas emissions from pulp and paper mills*. Select the units associated with the emissions factor in the drop down box. Alternatively, you can select a state-specific or US average emissions factor for purchased electricity (not for steam or hot water) from those tabulated by the US Department of Energy (DOE) or the US Environmental Protection Agency (EPA) by selecting the "Lookup Factors" button. If you know that the imported energy (electricity, steam, or hot water) was generated in a combined heat and power (CHP) system (cogeneration system), you can select the "CHP Calculator" button to calculate an emissions factor based on information regarding the CHP system. Once you have entered an emissions factor and its units, provide a brief description of the method of arriving at the entered factor in the space provided.

Review the data entries, then click the "Enter Data" button. A pop up window will display the data as entered along with the data in measurement units converted to those required by the

underlying calculation tools spreadsheet. Review the data for errors, then either accept the data as entered (by selecting the "Accept Data" button) or elect to edit the data by selecting the "Edit Data" button. If the "Accept Data" button is selected the software will write the data to the spreadsheet and return to the data entry forms for additional data entry (data form text boxes will be empty). Alternatively, other sections of the data entry forms can then be accessed. If the "Edit Data" button is selected the data display window will close and the data entry form will be displayed, containing the data as originally entered by the user. From here the data can be edited, then the "Enter Data" button can be selected to repeat the data review and acceptance/edit choices.

Each source category data entry form also has buttons that can be used to review the emissions calculations for that source category or to view the emissions inventory summary table. Selecting the "View Source Table" button displays a pop up window with the contents of the source category emissions calculation table, as contained in the underlying spreadsheet. The Source Table display window contains two buttons, "Return to Data Form" and "Go To Source Table." The latter can be used to access the source table of the underlying spreadsheet (enables manual editing of data, etc.).

From the data entry form, select the "View Summary Table" button to display a pop up window with the inventory summary table, as contained in the underlying spreadsheet. The Summary Table display window contains two buttons, "Return to Data Form" and "Go To Summary Table." The latter can be used to access the inventory summary table of the underlying spreadsheet, which may be useful for entering descriptions related to specific greenhouse gases included in the inventory.

The data entry form also includes a "Close Data Entry Form" button. When this button is selected the source category page of the underlying spreadsheet corresponding to the last accessed data entry form will be displayed. This button may be useful for viewing the spreadsheet after data entry has been completed. The data entry forms may also be closed by clicking on the "X" at the top right corner of the form.

From the underlying spreadsheet view (either the source-specific tables or the summary table) the "Open Data Entry Form" button can be selected to re-activate the data entry forms and continue data entry.

Up to ten energy import data entries can be made using this data entry sheet. **Note that entering data is not the same as saving the file!** The file can be saved from the underlying spreadsheet, or by going to the "13. Finish" sheet and selecting the "Save Spreadsheet" button.

When finished entering data for energy imports, click on another sheet's button to exit this sheet. You can return to the energy imports sheet to enter more data at any time.

Emissions Factor Tables form

This page is called from the Indirect – Energy Imports page (Section 12 in the Calculation Tools Report contains additional background information). The energy imports page requires entry of an emissions factor associated with imported energy. One option for obtaining this emissions

factor, for purchased electricity only, is to select a state-specific or US average emissions factor for purchased electricity (not for steam or hot water) from those tabulated by the US Department of Energy (DOE) or the US Environmental Protection Agency (EPA) using the Emissions factor Tables page (accessed by selecting the "Lookup Factors" button from the Energy Imports page). Only one factor can be chosen from this page for each imported power stream.

The DOE factors are drawn from the instructions for DOE's Voluntary Reporting of Greenhouse Gases (1605b) program. The factors in the sheet were updated by DOE in April 2002. These emissions factors are based on emissions of the three GHGs carbon dioxide, methane, and nitrous oxide, and are summed based on the global warming potential of the gases and expressed in units of lb CO_2 equivalents per MWh of electrical power. The DOE periodically updates these emissions factors, and the most recent factors can be accessed on the internet at www.eia.doe.gov/oiaf/1605/e-factor.html.

The EPA factors are drawn from EPA's egrid database, and are based on 1998 data. These emissions factors are based on emissions of carbon dioxide only, and do not consider emissions of methane or nitrous oxide. The units of the EPA factors are lb CO_2 per MWh of electrical power. The egrid database, from which the EPA factors on the Emissions factor Tables page are drawn, contains emissions information in several levels of aggregation. Emission information for a particular generator, for a particular utility company, for a state (as provided in these tools), for geographic regions, or for the national average are included in the egrid database. The database can be downloaded from EPA's website at www.epa.gov/airmarkets/egrid/index.html.

To use the Emissions factor Tables page, select the state of interest (or US Average) from the drop down box within either the DOE Factors frame or the EPA Factors frame. Once the state of interest has been chosen, select the appropriate "Get Emissions factor" button to display the average purchased electricity emissions factor for that state. Once you have decided which emissions factor to use in the analysis, type in a short description of the factor (e.g., "DOE 1605b emissions factor for purchased power in the state of Delaware") in the space provided, select the radio button above the text space, then select the "Accept Value / Close Window" button to return the result to the Energy Imports page. If you decide not to use a factor from the Emissions factor Tables page, simply close the window by clicking on the "X" at the top right corner of the window, and return to the Energy Imports page.

CHP Calculator form

The CHP Calculator page is called from the Indirect – Energy Imports page or from the Indirect – Energy Exports page (Section 12 in the Calculation Tools Report contains additional background information). The CHP Calculator can be used to calculate an emissions factor associated with imported energy streams which were generated in a combined heat and power system (CHP, or cogeneration system) for use in the energy imports page, or to calculate total emissions associated with generating partially exported energy streams in a CHP system for use in the energy exports page.

Enter the total CHP system heat output and electrical power output, and select the units of each output entry (MWh, kWh, GJ, or million Btu), in the data entry and drop down boxes at the top of the page. Then, enter the CHP system total fuel consumption and total emissions and select

the units of each in the appropriate data entry and drop down boxes. Note that the total fuel input units are required to be entered as the lower heating value (LHV) of the fuels. The CHP system total fuel consumption and total emissions can be calculated by selecting the "Direct Emissions Calculator" button. This provides a means to calculate, rather than entering directly, total fuel consumption and total emissions by entering fuel quantities (in a variety of units) consumed by the CHP system.

The CHP calculator allocates emissions corresponding to fuel consumption among the heat and power outputs of the CHP system based on the efficiency method of allocating emissions (see the NCASI report, *Calculation tools for estimating greenhouse gas emissions from pulp and paper mills*, for more information on the efficiency method). The efficiency method requires knowledge of the ratio of efficiencies of heat production to power production. For example, if heat is produced at 80% efficiency and power is produced at 35% efficiency, the ratio equals 0.8/0.35 = 2.29. The ratio of efficiencies is constrained by the energy balance of the CHP system (a function of the heat and power outputs and the total fuel input). Selecting the "Calculate Ratio" button displays the minimum and maximum ratios of efficiencies allowed by the energy balance, determined by the heat and power output and fuel consumption data entered previously. Enter a ratio of efficiencies between the minimum and maximum values allowed in the space provided.

Press the "Calculate Emissions" button. The emissions calculation results will be displayed in the frame at the bottom of the page. Check the calculated efficiency of heat production and of power production to ensure that the calculated values are reasonable. If not, you may wish to select the "Reset Data Values" button, then modify the data entered in previous steps and repeat the calculations. Other displayed results include emissions factors for heat production and power production, and total emissions allocated to heat production and power production. If the results are acceptable, select the "Accept Calculation Results" button. The appropriate results will be transferred to the page from which the CHP calculator was called (i.e., total emissions associated with an energy stream if called from the Energy Exports page, or emissions factor associated with an energy stream if called from the Energy Imports page).

The CHP Calculator can then be closed using the "Close CHP Calculator" button.

Direct Emissions Calculator form

This page is used to calculate total direct emissions associated with operation of stationary combustion devices such as boilers, recovery furnaces, direct fired turbines, and any other stationary combustion sources that are fired with fossil fuel or biomass (Sections 8 and 9 in the Calculation Tools Report contains additional background information). The page can be called from the Energy Exports page or from the CHP calculator, and returns total emissions and associated units results to the page from which the calculator was called. Although carbon dioxide emissions from burning biomass (such as hogged wood fuel, bark, spent pulping liquors, WWTP residuals, etc.) are considered climate neutral and are not included in GHG inventories, methane and nitrous oxide emissions from biomass combustion are included in GHG inventories and can be calculated using the Direct Emissions Calculator.

Enter the combustion source name and select the type of fuel being burned (e.g., liquid fossil fuel, biomass fuels, etc.) from the list of options in the drop down box within the Step 1 frame. For combustion devices burning more than one type of fuel in the period of interest for the inventory (e.g., boilers burning both fuel oil and natural gas), data on each fuel must be entered separately. In this case, the combustion source name can include a description of the fuel for which data are being entered (for example, the source name could include "Boiler 1 natural gas").

In Step 2, select the specific fuel being burned and the measurement units of the fuel (e.g., million BTU HHV, US tons, etc.) in the drop down boxes within the frame. Then, enter the quantity of fuel burned. For pulping liquors, mass units pertain to the quantities of liquor solids rather than total liquor weight. For wood-based fuels, mass units pertain to the quantities of dry solids in the fuel rather than the total mass of wet fuel. If the fuel of interest does not appear in the drop down box of Step 2, this is an indication that the calculation tools do not contain a default emission factor nor energy content information for this fuel, and emissions associated with the fuel consumption cannot be calculated by the direct emissions calculator. In this situation, emissions associated with this particular fuel must be calculated manually.

Select whether you wish to use the default emissions factor or if you prefer to enter a custom emissions factor using the radio buttons within the Step 3 frame. If you choose to use a default factor, select whether to use a factor that considers all three GHGs, CO_2, CH_4, and N_2O (except the factors for biomass fuels, which only consider CH_4 and N_2O), or a factor that considers CO_2 only. If using a custom emissions factor, enter the numerical value of the factor then select the units associated with the emissions factor in the drop down box.

Review the data entries, then click the "Enter Data" button within the Step 4 frame to save your entries in the data arrays of the program. **Note that this is not the same as saving the file!** You can view the combustion units for which fuel consumption data have already been entered using the drop down box within the Step 4 frame.

Once the "Enter Data" button has been selected, the data entry boxes become blank and another combustion source (or another fuel burned in the combustion source) can be entered.

When finished entering data for the stationary combustion sources associated with the energy stream of interest, click on the "Sum" button within the Step 5 frame. The calculated total fuel input (in units of GJ LHV) and the total emissions associated with the fuels entered (in metric tons) will be displayed. Select the "Accept Values" button to accept these results and return them to the sheet from which the Direct Emissions Calculator was called (either the Energy Exports page or the CHP Calculator) and close the calculator. If you made a mistake or wish to modify the calculations rather than accept the results, DO NOT select the "Accept Values" button, but rather close the Direct Emissions Calculator. You will then need to select the "Direct Emissions Calculator" button again from the page from which it was originally called and follow the above procedures.

Indirect – Energy Exports page [Button 10]

Use this page to enter data associated with exports of energy, such as electrical power generated at the mill and sold to the grid, or steam or hot water sold to users outside of the company (Section 12 in the Calculation Tools Report contains additional background information).

Enter the energy stream description (e.g., electricity exported to the grid, sold steam or hot water, etc.) in the Step 1 frame and select the type of energy using the radio buttons. If the energy stream is hot water, select the steam button (energy of hot water is calculated the same as that of steam). Enter the quantity of energy exported, and select the measurement units (million BTU, MWh, or kWh) using the drop down box.

In the Step 2 frame, enter the TOTAL emissions associated with generating the energy from which exports are made and the units used to quantify the emissions (metric tonnes or US tons) using the units drop down box. The emissions information can be directly entered into the form, or it can be calculated based on the fuel(s) used in the combustion unit(s) associated with producing the energy by selecting the "Direct Emissions Calculator" button. If you know that the exported energy (electricity, steam, or hot water) was generated in a combined heat and power (CHP) system (cogeneration system), you can select the "CHP Calculator" button to calculate the total emissions associated with the energy stream from which exports were made based on information regarding the CHP system.

Once you have entered the total emissions (and units) associated with generating the energy from which exports were made, enter the quantity of the generated energy WHICH WAS EXPORTED in the Step 3 frame. Also enter the emissions units (metric tonnes or US tons) in the drop down box. This information will be used to assign a portion the total emissions associated with generating the energy to the exported energy. For exports of power onto the grid, you may also enter the carbon intensity (units of metric tons CO_2 equiv. per MWh of power) of the power on the utility grid into which the export occurred.

Review the data entries, then click the "Enter Data" button. A pop up window will display the data as entered along with the data in measurement units converted to those required by the underlying calculation tools spreadsheet. Review the data for errors, then either accept the data as entered (by selecting the "Accept Data" button) or elect to edit the data by selecting the "Edit Data" button. If the "Accept Data" button is selected the software will write the data to the spreadsheet and return to the data entry forms for additional data entry (data form text boxes will be empty). Alternatively, other sections of the data entry forms can then be accessed. If the "Edit Data" button is selected the data display window will close and the data entry form will be displayed, containing the data as originally entered by the user. From here the data can be edited, then the "Enter Data" button can be selected to repeat the data review and acceptance/edit choices.

Each source category data entry form also has buttons that can be used to review the emissions calculations for that source category or to view the emissions inventory summary table. Selecting the "View Source Table" button displays a pop up window with the contents of the source category emissions calculation table, as contained in the underlying spreadsheet. The Source Table display window contains two buttons, "Return to Data Form" and "Go To Source

Table." The latter can be used to access the source table of the underlying spreadsheet (enables manual editing of data, etc.).

From the data entry form, select the "View Summary Table" button to display a pop up window with the inventory summary table, as contained in the underlying spreadsheet. The Summary Table display window contains two buttons, "Return to Data Form" and "Go To Summary Table." The latter can be used to access the inventory summary table of the underlying spreadsheet, which may be useful for entering descriptions related to specific greenhouse gases included in the inventory.

The data entry form also includes a "Close Data Entry Form" button. When this button is selected the source category page of the underlying spreadsheet corresponding to the last accessed data entry form will be displayed. This button may be useful for viewing the spreadsheet after data entry has been completed. The data entry forms may also be closed by clicking on the "X" at the top right corner of the form.

From the underlying spreadsheet view (either the source-specific tables or the summary table) the "Open Data Entry Form" button can be selected to re-activate the data entry forms and continue data entry.

Up to nine energy export data entries can be made using this data entry sheet. **Note that entering data is not the same as saving the file!** The file can be saved from the underlying spreadsheet, or by going to the "13. Finish" sheet and selecting the "Save Spreadsheet" button.

When finished entering data for energy exports, click on another sheet's button to exit this sheet. You can return to the energy exports sheet to enter more data at any time.

Biomass – Wood Fuel page [Button 11]

Use this page to enter data associated with stationary combustion devices that burn wood-based fuel (Section 11 in the Calculation Tools Report contains additional background information). Although carbon dioxide emissions from burning biomass (such as hogged wood fuel, bark, spent pulping liquors, WWTP residuals, etc.) are considered climate neutral and are not included in GHG inventories, the data entered in this form will be used to compute climate neutral CO_2 emissions that will be reported as supporting information and will not be included in the emissions inventory results. This information on biomass emissions is being supplied to ensure that readers understand the entity's overall energy profile in terms of both greenhouse gas emissions and non-greenhouse gas emissions, and to provide awareness and understanding of how climate neutral biomass fuels are generated and used in the manufacture of pulp and paper. Note that this information is in conformance with the general greenhouse gas protocol designed by the World Resources Institute and the World Business Council for Sustainable Development.

Enter the combustion source name within the Step 1 frame.

In Step 2 enter the quantity of fuel burned and select the measurement units of the fuel (e.g., million BTU HHV, US tons, etc.) in the appropriate drop down box. Quantities of fuel

consumed should be expressed as amounts of dry solids in the fuel, rather than total amounts of wet fuel.

Select whether you wish to use the default emissions factor or if you prefer to enter a custom emissions factor using the radio buttons within the Step 3 frame. If using a custom emissions factor, enter the numerical value of the factor then select the units associated with the emissions factor in the drop down box.

In Step 4 you can enter the amount of climate neutral biomass-derived CO_2 that is exported rather than emitted. For example, if a portion of the emissions from the combustion source is routed to a precipitated calcium carbonate (PCC) plant, the amount of carbon in the exported CO_2 can be entered here. Note that the quantity entered should be mass of carbon rather than mass of carbon dioxide (for example, there are 12 pounds of carbon in 44 pounds of carbon dioxide). Only one number can be entered here per inventory.

Review the data entries, then click the "Enter Data" button. A pop up window will display the data as entered along with the data in measurement units converted to those required by the underlying calculation tools spreadsheet. Review the data for errors, then either accept the data as entered (by selecting the "Accept Data" button) or elect to edit the data by selecting the "Edit Data" button. If the "Accept Data" button is selected the software will write the data to the spreadsheet and return to the data entry forms for additional data entry (data form text boxes will be empty). Alternatively, other sections of the data entry forms can then be accessed. If the "Edit Data" button is selected the data display window will close and the data entry form will be displayed, containing the data as originally entered by the user. From here the data can be edited, then the "Enter Data" button can be selected to repeat the data review and acceptance/edit choices.

Each source category data entry form also has buttons that can be used to review the emissions calculations for that source category or to view the emissions inventory summary table. Selecting the "View Source Table" button displays a pop up window with the contents of the source category emissions calculation table, as contained in the underlying spreadsheet. The Source Table display window contains two buttons, "Return to Data Form" and "Go To Source Table." The latter can be used to access the source table of the underlying spreadsheet (enables manual editing of data, etc.).

From the data entry form, select the "View Summary Table" button to display a pop up window with the inventory summary table, as contained in the underlying spreadsheet. The Summary Table display window contains two buttons, "Return to Data Form" and "Go To Summary Table." The latter can be used to access the inventory summary table of the underlying spreadsheet, which may be useful for entering descriptions related to specific greenhouse gases included in the inventory.

The data entry form also includes a "Close Data Entry Form" button. When this button is selected the source category page of the underlying spreadsheet corresponding to the last accessed data entry form will be displayed. This button may be useful for viewing the spreadsheet after data entry has been completed. The data entry forms may also be closed by clicking on the "X" at the top right corner of the form.

From the underlying spreadsheet view (either the source-specific tables or the summary table) the "Open Data Entry Form" button can be selected to re-activate the data entry forms and continue data entry.

Up to 15 fuel consumption data entries can be made using this data entry sheet. **Note that entering data is not the same as saving the file!** The file can be saved from the underlying spreadsheet, or by going to the "13. Finish" sheet and selecting the "Save Spreadsheet" button.

When finished entering data for biomass – wood fuel sources, click on another sheet's button to exit this sheet. You can return to the biomass – wood fuel sheet to enter more data at any time.

Biomass – Pulping Liquors page [Button 12]

Use this page to enter data associated with stationary combustion devices that burn pulping liquors (e.g., recovery furnaces). Although carbon dioxide emissions from burning biomass (such as hogged wood fuel, bark, spent pulping liquors, WWTP residuals, etc.) are considered climate neutral and are not included in GHG inventories, the data entered in this form will be used to compute climate neutral CO_2 emissions that will be reported as supporting information and will not be included in the emissions inventory results. This information on biomass emissions is being supplied to ensure that readers understand the entity's overall energy profile in terms of both greenhouse gas emissions and non-greenhouse gas emissions, and to provide awareness and understanding of how climate neutral biomass fuels are generated and used in the manufacture of pulp and paper. Note that this information is in conformance with the general greenhouse gas protocol designed by the World Resources Institute and the World Business Council for Sustainable Development.

Note that because the default emissions factors for spent pulping liquors are based on the carbon content of the liquors (assuming a 1% correction for unoxidized carbon), the liquor emissions factor will include any carbon exiting a recovery furnace with smelt. Therefore, for kraft mills, the default liquor emissions factors estimate biomass carbon emissions from both the recovery furnace and the lime kiln.

Enter the combustion source description within the Step 1 frame. Select the type of pulping liquor (kraft, sulfite, or semi-chemical) and the wood furnish in the drop down boxes within the frame. For combustion devices burning more than one type of fuel in the period of interest for the inventory, data on each fuel must be entered separately. If the biomass fuel of interest does not appear in the drop down box (for example, if the biomass fuel is tall oil), the data must be entered manually (see the section on manual entry of "other" fuels and modifications to existing data entries).

In Step 2 enter the quantity of fuel burned and select the measurement units of the fuel (e.g., million BTU HHV, US tons, etc.) in the appropriate drop down box. For pulping liquors, mass units pertain to the quantities of liquor solids rather than total liquor weight.

Select whether you wish to use the default emissions factor or if you prefer to enter a custom emissions factor using the radio buttons within the Step 3 frame. If using a custom emissions

factor, enter the numerical value of the factor then select the units associated with the emissions factor in the drop down box.

In Step 4 you can enter the amount of climate neutral biomass-derived CO_2 that is exported rather than emitted. For example, if a portion of the emissions from the combustion source is routed to a precipitated calcium carbonate (PCC) plant, the amount of carbon in the exported CO_2 can be entered here. Note that the quantity entered should be mass of carbon rather than mass of carbon dioxide (for example, there are 12 pounds of carbon in 44 pounds of carbon dioxide). Only one number can be entered here per inventory.

Review the data entries, then click the "Enter Data" button. A pop up window will display the data as entered along with the data in measurement units converted to those required by the underlying calculation tools spreadsheet. Review the data for errors, then either accept the data as entered (by selecting the "Accept Data" button) or elect to edit the data by selecting the "Edit Data" button. If the "Accept Data" button is selected the software will write the data to the spreadsheet and return to the data entry forms for additional data entry (data form text boxes will be empty). Alternatively, other sections of the data entry forms can then be accessed. If the "Edit Data" button is selected the data display window will close and the data entry form will be displayed, containing the data as originally entered by the user. From here the data can be edited, then the "Enter Data" button can be selected to repeat the data review and acceptance/edit choices.

Each source category data entry form also has buttons that can be used to review the emissions calculations for that source category or to view the emissions inventory summary table. Selecting the "View Source Table" button displays a pop up window with the contents of the source category emissions calculation table, as contained in the underlying spreadsheet. The Source Table display window contains two buttons, "Return to Data Form" and "Go To Source Table." The latter can be used to access the source table of the underlying spreadsheet (enables manual editing of data, etc.).

From the data entry form, select the "View Summary Table" button to display a pop up window with the inventory summary table, as contained in the underlying spreadsheet. The Summary Table display window contains two buttons, "Return to Data Form" and "Go To Summary Table." The latter can be used to access the inventory summary table of the underlying spreadsheet, which may be useful for entering descriptions related to specific greenhouse gases included in the inventory.

The data entry form also includes a "Close Data Entry Form" button. When this button is selected the source category page of the underlying spreadsheet corresponding to the last accessed data entry form will be displayed. This button may be useful for viewing the spreadsheet after data entry has been completed. The data entry forms may also be closed by clicking on the "X" at the top right corner of the form.

From the underlying spreadsheet view (either the source-specific tables or the summary table) the "Open Data Entry Form" button can be selected to re-activate the data entry forms and continue data entry.

Up to 15 fuel consumption data entries can be made using this data entry sheet. **Note that entering data is not the same as saving the file!** The file can be saved from the underlying spreadsheet, or by going to the "13. Finish" sheet and selecting the "Save Spreadsheet" button.

When finished entering data for biomass – pulping liquors sources, click on another sheet's button to exit this sheet. You can return to the biomass – pulping liquors sheet to enter more data at any time.

Manual Entry of "Other" Fuels and Modifications to Existing Data Entries

There are two cases in which the user may wish to enter or change data directly in the underlying spreadsheet rather than by using the data entry forms: entering data on fuels not specifically addressed in the data entry forms; and making changes to data that have already been entered into the spreadsheet.

Fuels Not Specifically Addressed in the Data Entry Forms

In some situations, the user may wish to enter data on combustion of fuels which are not specifically addressed in the data forms (fuels that do not appear in the specific fuel type drop down boxes). Data on combustion of these fuels must be entered directly into the calculation tools spreadsheet, because there are no default emissions factors or energy conversion factors upon which to base the calculations performed by the data entry forms. To enter data directly into the calculation tools spreadsheet, close the data entry form and go to the appropriate page of the spreadsheet. Enter the data in the units specified in the spreadsheet. It is very important that the units of the fuel consumption correlate with the units of the emissions factor, and that the emissions factor units are expressed as kilograms CO_2 (or CO_2 equivalents) per unit of fuel. If these units are not used, the results returned by the calculation tools will be in error.

Making Changes to Data Already Entered

If data have already been entered to the spreadsheet and it is later determined that the data are in error, there are two methods for correcting the data entry errors. The simplest method is to close the data entry form and go to the appropriate page of the spreadsheet and delete the erroneous entries using the "delete" key on the keyboard. However, it is important not to delete any entries in the grey colored cells, which contain formulas used by the calculation tools. Only delete entries in the green, manila, or salmon colored cells. (If it is necessary to adjust the formulas, the grey, formula-containing cells are electronically protected using the password NCASI97333.) If the contents of any of the formula cells are deleted the software will no longer function correctly. If formula cell contents are deleted, it is recommended you delete the entire spreadsheet file and begin the inventory again. In this circumstance, it may be useful to print out the existing inventory results, especially the raw data log, for use in re-entering data for the new inventory.

Delete the data to be re-entered from the appropriate spreadsheet table(s) and delete the corresponding data in the raw data log worksheet. Once the contents of the cells containing the data entries to be modified have been deleted, select the "Open Data Entry Form" button and enter the correct data in the appropriate data entry form. The software will automatically enter

the data into the first available cells of the spreadsheet (and in the raw data log), and will avoid overwriting any existing data.

The other method of correcting erroneous data is to edit the data directly in the spreadsheet. In this case, do not delete all of the cell contents associated with the erroneous entry, but rather make changes to the data as required. If the data are edited in this manner, be sure to use the measurement units listed in the spreadsheet tables in order to avoid erroneous calculation results.

If the entire emissions inventory is to be deleted, select the "Clear Spreadsheet/Data Logger" button from the "13. Finish" data entry form. This will clear the data contents of each of the spreadsheet tables, including the summary table, and will also clear entries from the raw data log. Data for a new emissions inventory can then be entered.

Viewing and Printing Inventory Results

The data entry forms are used to enter data into the Calculation Tools spreadsheet; the spreadsheet is where the actual emissions calculations take place. The tables of the spreadsheet can be viewed as data is entered into the data entry forms by selecting the appropriate button from the forms, as discussed in previous sections of this document. Most sheets also includes a "Close Data Entry Form" button that, when selected, closes the data entry form and views the page within underlying spreadsheet to which data is written from the form. This button may be useful for viewing the spreadsheet after data entry has been completed. The spreadsheet can also be viewed from the "13. Finish" page of the data entry forms by selecting the "Close Data Entry Forms and Go To Spreadsheet Summary Page" button.

The various worksheets in the Calculation Tools spreadsheet contain the data entered (as converted by the data entry forms into the required units of the spreadsheet), emission calculation results (identified by source category), the emissions inventory summary, supporting information on biomass, and the raw data log which displays the data as it was entered into the data entry forms. There are several other worksheets in the spreadsheet which contain information such as energy content data for fuels and conversions factors. The "Energy Factors" worksheet contains information used by the calculations performed within the data entry forms, and should not be modified.

To view the results of the emissions inventory, go the spreadsheet and view the various source-specific worksheets, Summary Table worksheet, or the Supporting Info. on Biomass worksheet. Each of these worksheets can be printed using the Excel Print commands. The Raw Data Log spreadsheet can also be viewed or printed from the spreadsheet view.

Reviewing Data Entries

The "Raw Data Log" worksheet within the Calculation Tools spreadsheet contains all raw data as entered into the data entry forms, including units of measurement selected and custom emissions factors. This information can be useful in archiving the data entered, in quality checking the data entered, and in saving the custom emissions factors for use in subsequent emissions inventories.

The only data which are not written to the Raw Data Log worksheet are the individual entries into the CHP Calculator form, the Direct Emissions Calculator form, and the Optional Calculator for kg CO_2 / Distance Unit form (called from the Transportation – Distance based page). If the user wishes to archive the entries into these forms, the completed data entry forms can be printed out separately by holding down the "Alt" key while depressing the "Print Scrn" key on the computer keyboard. This will copy the image of the form to the computer clipboard. The image can then be pasted into a Word document and printed out.