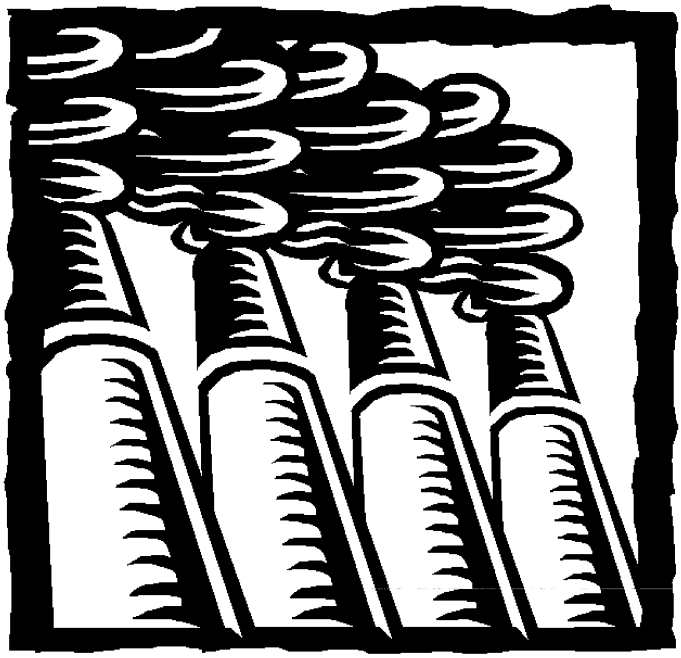

California Air Toxics Emission Factors

Database User's Manual
Version 1.2

Windows and Macintosh

DISCLAIMER

The statements and conclusions in this report are those of the contractor and not necessarily those of the California Air Resources Board. The mention of commercial products, their source, or their use in connection with material reported herein is not to be construed as actual or implied endorsement of such products.

ACKNOWLEDGEMENTS

The success of this program was due in part to the excellent cooperation from all of the districts which completed surveys and contributed source test reports. The authors would also like to thank the EPA and its contractors for assisting in the collection of source test reports. Guidance also was provided by California Air Resources Board Technical Support, Monitoring and Laboratory, and Research Divisions. This guidance helped in the development of a set of procedures which can be used to develop air toxics emission factors of known accuracy for a wide range of devices.

This report was submitted in fulfillment of Contract No. 92-338 "Development of Toxics Emission Factors from Source Test Data Collected Under the Air Toxics Hot Spots Program" by EER under the sponsorship of the California Air Resources Board.

ABSTRACT

The California Air Resources Board sponsored a program to develop air toxic emission factors from source test data collected under the Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB2588). Work for the project was divided into two phases. The purpose of Phase I was to collect all source tests prepared for AB2588, screen each test, conduct a detailed validation on selected tests, develop emission factor calculation procedures, and conduct a case study. Over 800 hundred source tests have been collected from a wide range of devices including asphalt dryers, boilers and heaters, reciprocating internal combustion engines, turbines, glass and metal furnaces, polystyrene reactors, and coating and plating operations. During Phase II, emission factors were calculated from a selection of 200 priority tests for trace metals including hexavalent chromium, PCDD/PCDF, PAH and other SVOC, benzene, toluene and other VOC, aldehydes, and HCl. A graphical user interface (GUI) was developed to display the emission factors. The GUI allows the user to sort, list, print, and export emission factors from any emission factor group or combination of emission factor groups. This report describes the contents and structure of the GUI, installation procedures, and guidance on using the GUI.

TABLE OF CONTENTS

LIST OF TABLES

1.0 Introduction

The California Air Resources Board (CARB) sponsored a program to develop air toxic emission factors from source test data collected under the Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB2588). Work for the project was divided into two phases. The purpose of Phase I was to collect all source tests prepared for AB2588, screen each test, conduct a detailed validation on selected tests, develop emission factor calculation procedures, and conduct a case study. Over 800 hundred source tests have been collected from a wide range of devices including:

- Asphalt dryers;
- Boilers, heaters and steam generators;
- Fluidized Bed Combustion;
- Reciprocating internal combustion engines;
- Turbines;
- Cement Kilns;
- Glass and metal furnaces;
- Polystyrene reactors; and
- Coating and plating operations.

During Phase II, emission factors were calculated from a selection of 200 priority tests for trace metals including hexavalent chromium, polychlorinated dibenzo-p-dioxin (PCDD), polychlorinated dibenzofuran (PCDF), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB) and other semi-volatile organic compounds (SVOC), benzene, toluene and other volatile organic compounds (VOC), aldehydes, and hydrogen chloride (HCl). The emission factor calculation procedures included categorizing each test by design and operating parameters. Statistics and engineering judgement were then applied to identify distinct groups of devices. One set of emission factors was developed for each distinct group of devices. These groups are identified in Table 1 by the major and sub group IDs.

It should be noted that not all emission factors in the GUI are unique. One set of emission factors has been developed for each major and sub group as noted above. Many of the groups contain results from several different source tests conducted on devices with different characteristics. These devices do not have identical designs, however, the statistical and engineering analyses indicated that the differences in each device did not impact emissions significantly. Therefore, the emission factors from all of the devices within each group were averaged together for each substance. This averaging resulted in a single emission factor per substance per group. When developing the GUI, the average results were applied to each distinct design from the set of sources that were averaged together. This was done to allow users to easily find data matching their specific device. This procedure also resulted in duplicate emission factors in the GUI. These duplicate emission factors are illustrated in Table 1 as the major/sub groups which apply to more than one line. For example, each emission factor from the group with a major group identification of "Boiler,Fuel Oil" and a sub group identification of "2" is repeated four times in the database.

Several quality ratings were assigned to each emission factor including the confidence interval, relative standard deviation, population rating, and source test method rating. The source test method rating and population rating are described below.

Source Test Method Rating

A Test was performed using a new or old CARB methodology and sufficient documentation was provided to validate the results.

B Test was performed using a new or old EPA methodology and sufficient documentation was provided to validate the results.

C Test was performed using a new or old CARB methodology and insufficient documentation was provided to validate the results.

D Test was performed using a new or old EPA methodology and insufficient documentation was provided to validate the results.

E An assumption was made in the emission factor calculation which could significantly affect the accuracy of the results. Methods which do not have validation check procedures also have been rated under this category.

It should be noted that the EPA methods are not considered inferior. However, the majority of the test methods were CARB's because they were mandated by the Hot Spots program. An EPA method could be used if there was no corresponding CARB test method or if the source asked for an equivalency determination. CARB and EPA test methods are different in many cases and can lead to different results. CARB test methods were rated higher than EPA's to provide consistent test result comparisons.

Population Rating

1- Source test data taken from many randomly chosen facilities in the industry population (5 or more sources).
2- Source test data taken from a reasonable number of facilities (3 to 4 sources).
3- Source test data taken from a small number of facilities, and there may be reason to suspect that the facilities do not represent a random sample of the industry (< 3 sources).

The emission factors developed under this program have been compiled into the California Air Toxics Emission Factors (CATEF) database so the CARB and facility owners/operators can quickly and reliably access these newly developed factors. CATEF uses a graphical-user-interface (GUI) to easily view, search, sort, export, and print this information. The following sections provide additional information on the database design and structure, system requirements, installation, and using the database.

2.0 Database Design and Structure

The user interface for CATEF was designed using Microsoft's FoxPro® Relational Database Management System for Windows™ Version 2.6a and Microsoft's FoxPro® Relational Database Management System for Apple® Macintosh® Version 2.6a. On the exterior, the database is a set of simple windows and dialog boxes which allow you to do the basic functions just mentioned. Besides a couple of keyboard commands, most operations are activated by clicking the desktop bus, or mouse. The database's interior structure is even simpler. CATEF contains one main database table with a current total of 33 fields and 2085 records. Two subordinate tables store the user's search and sort results and have the same structure as the main data table. It should be noted that the number of emission factors in the GUI may change in the future as additional emission factors are developed by subsequent research. If additional research is conducted, the emission factors would be provided in subsequent versions of the GUI.

Table 2 lists the main database file's field attributes, display, sort, search, report and export information, and definitions/descriptions. The field names provided in the second column, "Field Name (Structure)" appear as they are coded in the database structure. The "Field Type", "Width", and "Decimal" columns provide information on the storage requirements for each field. This information is useful when formatting exported data. The "Field Name (Display)" column provides the name of the fields as they appear on various GUI windows and reports. Fields included in each GUI function are marked in the "Main Display", "List Display", "Sort", "Search", "List Report", "Detail Report", and "Export" columns in Table 2. For example, the user can search for a set of emission factors using the contents of the System Type, Material Type, SCC, APC Device, Other Description, Substance Category, Substance, and ARB Rating fields. The "Field Value Listing/Definitions" column in Table 2 provides table references for selected fields. The referenced tables provide a complete listing of items contained in each field along with definitions for any acronyms. For example, as shown in Table 8, the values listed in the category field are Dioxin/Furan, Halogens, Metals, PAH, PCB, Particulate, SVOC, and VOC. Each acronym is spelled out and the number of emission factors for each field value are provided in the emission factors column.

3.0 System Requirements

System requirements for Windows™ and Macintosh™ based systems are described below.

3.1 Windows

The system requirements for installing the CATEF database for Windows on a personal computer are as follows:

- 80386sx processor (or higher)
- Mouse
- 6 MB RAM if virtual memory is set to none or 4 MB RAM if virtual memory is set to temporary or permanent
- Microsoft Windows version 3.0 or higher running in 386 enhanced mode
- VGA or higher resolution monitor recommended
- Minimum of 5 MB of available hard disk space, 8 MB recommended

3.2 Macintosh

To install the CATEF database for the MacOS™ a 68020 processor or better is required. Processor specific requirements include:

	Original 68020 ROM or higher processor	**PowerPC 601 or higher processor**
Random-access memory (RAM)	At least 4 MB free. 8 MB is recommended.	At least 8 MB free.
Operating system	System 7.0 or later.	System 7.1.2 or later.

Other system requirements are as follows:

- Color or grayscale monitor
- Minimum of 5 MB of available hard disk space, 8 MB recommended

4.0 Installation

Installation instructions for Windows and Macintosh based systems are provided below.

4.1 Windows

To install the CATEF database for Windows from a floppy disk drive to a single machine, follow these instructions. If you are installing from a drive other than A, adjust the instructions accordingly.

1. Start Microsoft Windows in 386 enhanced mode.

2. Insert the disk labeled "Disk 1" in drive A.

3. From the Windows Program Manager **File** menu, choose **Run.**

4. In the **Command Line** text box, type `A:\SETUP` and press Enter.

5. Follow the instructions on the screen.

The setup procedure allows you to specify the target directory and Program Manager group in which the database is installed. If you specify a Program Manager group that doesn't exist, the setup routine creates it. If you choose to make no changes, the routine places the database into the C:\CATEF directory and creates a Program Manager group titled "CATEF".

The setup routine installs a total of seven files onto your hard drive. Four files are associated with CATEF and the other three are FoxPro® resources. The CATEF.EXE file is the database executable. CATEF.DBF is a database file/table which stores search results. The TEMP.DBF file is the database file that stores the sort data. Both CATEF.DBF and TEMP.DBF are "temporary" files that are refreshed with new data every time you do a new search or sort. SMKSTACK.BMP is a graphic file that is included on the reports. The remaining files are FoxPro resource files that CATEF references when it needs to borrow a certain resource element. They are required to run CATEF and should not be deleted.

Note: The CATEF.DBF file is a table used by the database to store search results. It does not contain all of the emission factors. The master table holding all the emission factors is part of the executable code and is read-only.

Once CATEF for Windows is installed, double-click the CATEF application icon to start the database.

4.2 Macintosh

The CATEF database code is optimized to support both Mac system architectures: 68K machines and Power Macintosh™ machines. There are two sets of installation disks. One for 68K Macs and one for Power Macs. Since CATEF is not "fat" binary code, before installing the CATEF database, verify the installation disks are the appropriate ones for your machine. Disks for 68K Macs are labeled "(68K)", and disks for Power Macs are labeled "(PPC)".

To install the CATEF database for either Macintosh architecture from a floppy disk drive to a single machine, follow these instructions.

1. Insert the disk labeled "Disk 1" into the floppy drive. A window displaying the contents of Disk 1 will appear.

2. Double click the "Installer" icon to launch the set up application.

3. A dialog box appears requesting information. Enter your name and organization and click "OK".

4. Another dialog box appears asking for confirmation of the information just entered. If correct, click "OK". The next dialog box appears.

5. Click "Install" to continue installing CATEF. Click "Quit" to exit the installation process.

6. Select a target disk and folder. To put the CATEF database and support files in the same folder create a folder by clicking "New Folder".

Note: If a new folder is not created, the installer places the database files on the target disk independently. In order not to lose or accidentally delete a database file, creating a folder for CATEF is highly recommended.

7. Enter a name for the target folder and click "Create". The default name is CATEF 1.2.

8. After a target folder is created, click "Setup" in the Select Disk and Folder dialog box.

9. Follow the directions on the screen.

10. After the installation is complete, restart the computer.

The setup application installs a total of five files onto your hard drive. Three files are associated with CATEF and the other two are FoxPro® resources. The database executable for 68K Macs is named "CATEF (68K)". For Power Macs it is called "CATEF (PPC)". For a complete description of all installed files see the Windows installation instructions.

Once CATEF for the Macintosh is installed, double-click the CATEF (PPC) or (68K) application icon to start the database.

5.0 Using the Database

The CATEF database is a screen-driven application which provides data access via one main window and four sub-windows or dialogs. The main window titled "CATEF" is used to set search criteria and view search results. The Sort dialog sorts the search results. The Export dialog exports data according to a user-specified format. The Print dialog allows you to print the data in two report styles. The List window enables you to view the data in a tabular format. All three dialog boxes and the List window are controlled from the main CATEF window. It should also be noted that the windows function on the current selection. For example, if the user is working with a subset of ten records, only these records will be sorted, printed, exported, and listed.

5.1 Managing the CATEF Windows and Dialogs

Although there are several windows and dialogs as part of the CATEF database, only one window/dialog is active at a time. This can create some confusion if a window/dialog becomes hidden.

Example of how a window can become hidden

Let's say you conduct a search from the main CATEF window, and now you want to sort the results. You click the **Sort** button, but before you begin setting the sort order, you accidently click the mouse with the cursor outside of the sort dialog's borders. The sort dialog box becomes hidden, but it is still active. The dialog box jumped behind the main CATEF window and cannot be viewed. The main CATEF window, although it is in view, cannot be used because it is inactive. You can tell it is inactive because none of the elements (i.e., buttons, pop-up lists, etc.) work when clicked.

To re-establish the active window as the top window when it is hidden from view follow these steps:

1. Using the mouse, choose the **Window** menu. At the bottom of the menu all windows that are open are listed. The active window has a "√" to the left of its name.

2. Select the active window with the mouse and release. The active window returns to view.

5.2 Searching and Viewing Data Using the CATEF Window

Upon launching the CATEF database from the Windows Program Manager or Desktop, the application opens the main CATEF window. It is from this window that you will access all of the application's functions. The window is divided into three sections. At the top of the

window is the Search box which contains 8 pop-up lists, a search activation button labelled "Find", and a reset activation button labelled "Reset". To the right of the Search box is a column of four buttons. The **Sort**, **Export**, **Print**, and **List** buttons launch other screens which allow you to perform these functions. Below these two boxed areas is the Current Selection box which displays search results one record at a time.

Searching for Data — Option 1

1. Within the Search box, click on the down arrow to the right of the System Type pop-up list and hold. A pop-up list appears showing all of the system types that have emission factors in the database.

2. Select the system type you would like to find by dragging the mouse down the list until your selection is highlighted.

3. Release the mouse button. Your system type selection is now displayed in the pop-up list.

4. Repeat steps 1 through 3 to set other search parameters.

5. Once all your parameters are set, choose **Find** at the top of the Search box to run the search.

Searches can be conducted for any number of the eight parameters. All eight do not have to be set in order for the search to be valid. The default value for the pop-up lists is "Any". If you are searching data by only a couple of parameters and are not interested in a specific value of the remaining parameters leave the pop-list set to "Any". The search will return all the values of these unspecified parameters. For example, let's say you are interested in emission factors for all substance categories and substances emitted from internal combustion engines firing natural gas with an SCC of 20200202, and you are not particular about APC Devices, ARB rating, or other descriptions of the device. You select "Reciprocating ICE" from the System Type pop-up list, "Natural gas" from the Material Type pop-up list, and "20200202" from the SCC pop-up list. You leave the other lists set to "Any" since you want the search to return all substance categories and substances, APC Devices, other descriptions, and ARB ratings associated with the three parameters you set.

Using search Option 1 there is a possibility of finding no records which satisfy the users search criteria. For example, if the user selects "Reciprocating ICE" from the System Type pop-

up list and "Wood" from the Material Type pop-up no records will be found. Table 16 can be used to reduce the occurrence of searches which result in no records being found. This table lists the available data sets based on fields that describe device characteristics. This will allow the user to quickly find an available data set. It should be noted that a set of emission factors is provided in the GUI for each row of Table 16. However, as discussed in the Introduction, emission factor sets in rows not separated by lines are the same. For example, the emission factors for Boilers firing fuel oil No. 6 with an SCC of 10200401 are the same as emission factors for Boilers firing residual fuel oil with an SCC of 10200401.

If you are interested in a certain value of a particular parameter but you are not sure which one, then you can conduct a "staged" search. For instance, let's say you want to find emission factors for internal combustion engines firing natural gas with an unknown SCC. Doing such a search using Option 1 would not be effective since the SCC pop-up list still displays SCCs of all system types even after you have selected "Reciprocating ICE" from the System Type pop-up and "Natural gas" from the Material Type pop-up. To see only the SCCs classifying reciprocating internal combustion engines set the System Type and Material Type pop-ups and choose **Find.** This will re-dimension the SCC pop-up showing you only SCCs for internal combustion engines firing Natural gas. Using this new pop-up will make finding your unknown SCC much easier. This search method is described below.

Searching for Data — Option 2

1. Within the Search box, click on the down arrow to the right of the System Type pop-up list and hold. A pop-up list appears showing all of the system types that have emission factors in the database.

2. Select the system type you would like to find by dragging the mouse down the list until your selection is highlighted.

3. Release the mouse button. Your system type selection is now displayed in the pop-up list.

4. Choose **Find** at the top of the Search box to run the search. The database displays all records with the system type you designated in your search in the Current Selection box.

5. Repeat steps 1 through 4 for other parameters making sure you choose **Find** after each parameter is set.

Using this search option is recommended over Option 1 because it improves your search results. The possibility of finding zero records which satisfy your search criteria is less likely since as you search using Option 2 the pop-up lists dimension themselves showing you only the values that are available based on the previous parameters you set.

Important: To reset the database for a new search choose the **Reset** button. This loads all records back into the table so they will be available for a new search. If you are conducting a new search and all 2085 records are not loaded, you will find that not all parameters are in the pop-up lists. Use the record counter in the search panel and at the very bottom of the screen as your guide. This will tell you if you are searching the entire database or just a sub-set of it.

After you have set your search parameters and pushed the Find button, the database conducts the search and places the records in the Current Selection box. The Current Selection box displays the fields marked in "Main Display" column of Table 2. The Current Selection box at the bottom of the main CATEF window is your tool for viewing your search results one record at a time. At the top of the box is a button bar and a record counter. The button bar, with the buttons **Next**, **Prior**, **Top**, **Bottom**, and **Close**, allows you to move between records, and the record counter in the search panel and at the very bottom of the screen shows you how many records were found that satisfied your search criteria as well as which record you are currently viewing within this group of results.

Viewing Data One Record at a Time

1. To move to the next record in the current set of search results choose **Next** at the top of the Current Selection box. One click of the button moves you one record.

2. To move back to a previously viewed record choose **Prior**.

3. To go to the first record in the current set of search results choose **Top**.

4. To go to the last record choose **Bottom**.

5.3 Viewing Data Using the List Window

Unlike the Current Selection box, the list window allows you to examine multiple records more closely. In the window, each column is a field and each row is a record. At the top of each column is the field name.

Browsing Data in the List Window

1. To view multiple records of the current set of search results choose **List** from the button column in the top right corner of the main CATEF window. This actives a List window which shows the data in a tabular format.

2. To return to the main CATEF window press **Esc** on your keyboard or choose **Main** from the **Window** menu.

The List window is unique because you can split the window into two partitions and examine different parts of the data at the same time. To divide the window using the mouse, drag the splitter in the bottom left corner of the window to the right. Dragging to the right makes the left partition larger, and dragging to the left makes the left partition smaller. To close the partition drag the window splitter all the way to the left.

You can also reduce the width of the fields in the List window to fit more fields on the screen. Simply position the mouse on the dividing line between the fields at the top of the display. Then click the mouse button and move the mouse to reduce the size of the field. The List window can be enlarged by click the mouse button on the upper right hand corner of the window.

5.4 Sorting Data

The CATEF database includes a sort function so you can easily sort a search selection or the entire database. The **Sort** button on the main CATEF screen activates a sort dialog box. The sort dialog box contains eight fields which can be sorted in any order. The fields contained in the sort dialog are marked in the "Sort" column of Table 2. To conduct a sort of the search results, you place a number in the box corresponding to the field(s) to be sorted. The value of the number determines the sort order. For instance, if you wanted to sort by system type, SCC, and APC Device in this order, then you place a "1" in the System Type box, a "2" in the SCC box, and a "3" in the APC Device box. If you want to reverse the sort order of the same three parameters, you need to place a "1" in the APC Device box, a "2" in the SCC box, and a "3" in the System Type box. The user can sort by any number of parameters, between 1 and 9, according to any order. When setting sort order, the numbers have to be consecutive. Sorts ordered by non-consecutive numbers such as "1" and "3" will not be executed. Once the preferred sort order is set, the sort is activated by clicking the **OK** button at the bottom of the sort order dialog box. To exit the sort dialog without sorting data, choose the Cancel button. This will return you to the main CATEF window.

Sorting Your Search Results

1. To sort your results after conducting a search, click the **Sort** button on the button column in the top right corner of the main CATEF window. The sort dialog box appears.

2. To set the sort order using the mouse, drag the cursor into the sort order box of your first sort parameter.

3. Click the mouse once. This activates the box; the cursor changes to a blinking, vertical line.

4. Using the keyboard place a "1" in the box.

5. Set your remaining sort parameters by repeating Steps 2 through 4. Remember to use consecutive numbers when setting the order.

6. After your sort order is set, choose the **OK** button to activate the sort. CATEF conducts the sort and returns you to the main CATEF window.

5.5 Printing

The CATEF database provides printing of the data in two formats. The **Print** button on the main CATEF window activates a print dialog box. The print dialog box contains two choices for report formats. The format you want to print is selected by clicking the corresponding push button. The first report format presents a listing of all selected records (i.e., many records per page). The List report contains the fields marked in the "List Report" column of Table 2. The second format is a detailed reporting of a single record (i.e., one or two records per page). The Detail report contains the fields marked in the "Detail Report" column of Table 2.

Printing Reports

1. To print the current search selection, choose the **Print** button on the button column in the top right corner of the main CATEF window. The Print dialog box appears.

2. Choose **List** to print the list report. Or …

3. Choose **Detail** to print the detail report. CATEF prints the selected report and returns you to the main CATEF window.

4. Choose **Cancel** to return to the main CATEF window without printing a report.

5.6 Exporting Data to Other File Formats

The CATEF database allows you to export data in any one of 9 file formats. The formats CATEF supports are DIF, MOD, SYLK, WK1, WKS, WR1, WRK, XLS, and TXT. Each file type is discussed below:

DIF — In a DIF (Data Interchange Format) file, used by VisiCalc, each field from the CATEF table/.DBF becomes a vector (column) and each record becomes a tuple (row). The new file is given a .DIF extension.

MOD — To export to a file in Microsoft Multiplan version 4.01 MOD format use the MOD clause. The new file is given a .MOD extension.

SYLK — A SYLK file is a Symbolic Link interchange format in which each field from the CATEF table/.DBF becomes a column in the spreadsheet and each record becomes a row. The new file is given no extension.

WK1 — Select this export option to create a Lotus 1-2-3 spreadsheet. In a WK1 file, each field from the table/.DBF becomes a column in the new spreadsheet, and each record in the table/.DBF becomes a spreadsheet row. A .WKl extension is assigned to the file. This file type is to be used with Lotus 1-2-3 version 2.x.

WKS — This export option creates a Lotus 1-2-3 spreadsheet. Each field from the table/.DBF becomes a column in the new spreadsheet, and each record becomes a row. A .WKS extension is assigned to the file. This file type is to be used with Lotus 1-2-3 version 1-A.

WRK — A Lotus Symphony spreadsheet can be created from the CATEF table/.DBF with this export option. Each field from the table/.DBF becomes a column in the new spreadsheet, and each record in the table/.DBF becomes a row. A .WRK extension is given to the new file. This file type is to be used with Symphony version 1.10.

XLS — Select XLS to create a spreadsheet you can use in Microsoft Excel. Each field in the CATEF table/.DBF becomes a column in the spreadsheet, and each record becomes a row. An .XLS extension is assigned to the new file.

TXT — Select TXT to create an ASCII text file. Each record in the CATEF table/.DBF becomes a separate line in the text file. Fields in each record are separated by semicolons. An .TXT extension is assigned to the new file.

The **Export** button on the main CATEF window activates an export dialog box. The dialog box contains a set of radio buttons each denoting one of the file types discussed above. By selecting a radio button and then choosing **OK,** CATEF exports the data in the current selection to the specified file type. The file is always called "Output" and then the extension of the file type you selected. The file is found within the CATEF directory on your hard drive. You can only export one file type at a time.

Exporting Data

1. Click the **Export** button on the button column in the top right corner of the main CATEF window. The export dialog box appears.

2. Select a file type to export by clicking in one of the eight radio buttons. The button turns black if selected.

3. Choose **OK**. CATEF exports the data and places the file in the CATEF directory on your hard drive then returns you to the main CATEF window.

4. Choose **Cancel** to return to the main window without creating an export file.

To use the exported information in Quattro Pro Version 5 for Windows, first export from CATEF to Excel. The exported excel file can be imported directly into Quattro Pro. The resulting Quattro Pro file can be imported directly into Paradox for Windows.

5.7 Exiting CATEF

To exit CATEF, single-click the **Close** button on the main CATEF window. It should be noted for a Windows based computer trying to close by double clicking the left corner corner of either the CATEF screen or FoxPro does not close CATEF and results in the error message "Cannot Quit Fox Pro".

TABLE 1. EMISSION FACTOR GROUPS.

Major Group*	Sub Group	Material/Fuel	SCC	APC System	Other
Asphalt Blowing	1	Asphalt fumes	30601101	TO	Blow Cycle
Asphalt Blowing	2	Asphalt fumes	30601101	TO	No Blow Cycle
Asphalt Prod., Diesel	1	Diesel	30500211	C/FF	None
Asphalt Prod., Diesel	2	Diesel	30500205	FF	None
Asphalt Prod., Diesel	3	Diesel	30500205	WS	None
Asphalt Prod., Natural Ga	1	Natural gas	30500211	C/WS	None
Asphalt Prod., Natural Ga	1	Natural gas	30500211	C/FF	None
Asphalt Prod., Oil	1	Process oil 70	30500211	C/WS	None
Boiler, Distillate	1	Diesel	10200501	None	None
Boiler, Distillate	1	Diesel	10300501	None	None
Boiler, Fuel Oil	1	No. 6 fuel oil	10100401	None	None
Boiler, Fuel Oil	2	No. 6 fuel oil	10200401	None	None
Boiler, Fuel Oil	2	No. 6 fuel oil	10200403	None	None
Boiler, Fuel Oil	2	No. 6 fuel oil	10200402	None	None
Boiler, Fuel Oil	2	Residual fuel	10200401	None	None
Boiler, Landfill Gas	1	Landfill gas	10300811	None	None
Boiler, Natural Gas	1	Natural gas	10100601	None	None
Boiler, Wood	1	Wood	10100903	ESP/MC	None
Cement Kiln, Coal	1	Coal	30500606	FF	None
Cement Kiln, Coal/Coke	1	Coal/coke	30500606	FF	None
Coating, Green PE	1	15% chromium	40200110	BF	HVLP Spray Guns
Coating, Green PE	2	15% chromium	40200110	PA	HVLP Spray Guns
Coating, Green PE	3	15% chromium	40200110	WC	HVLP Spray Guns
Coating, Green PE	4	15% chromium	40200110	WT	HVLP Spray Guns
Coating, Green Primer	1	25-35% chromate	40200610	BF	HVLP Spray Guns
Coating, Green Primer	2	25-35% chromate	40200610	PA	HVLP Spray Guns
Coating, Green Primer	3	25-35% chromate	40200610	WC	Conventional Spray
Coating, Green Primer	4	25-35% chromate	40200610	WC	HVLP Spray Guns
Coating, Green Primer	5	25-35% chromate	40200610	WSN	Conventional Spray
Coating, Green Primer	6	25-35% chromate	40200610	WT	HVLP Spray Guns
Coating, Powder	1	75% Cr3C2, 20% NiCr, 5% C	40200101	None	Conventional Spray
Coating, Powder	2	87% Al2O3, 13% TiO2	40200101	None	Conventional Spray
Coating, Powder	3	70% Ni, 4% Cr	40202499	AF	Conventional Spray
Coating, Powder	4	49% Ni, 44% Cr	40202499	AF	Conventional Spray
Coating, Powder	5	4% Ni, 96% Al	40202499	AF	Conventional Spray
Coating, Powder	6	80% Ni, 20%Cr	40200101	None	Conventional Spray
Coating, Powder	7	100% chromium oxide	40200101	None	Conventional Spray
Coating, Yellow PE	1	30% lead chromate	40200110	BF	Conventional Spray
Coke Calcining	1	Natural gas	30601401	SD/FF	None
Drum Burning Furnace	1	None	30902501	AB	None
FBC, Biomass	1	Wood waste	10100903	AI/C/ESP	None
FBC, Biomass	2	Agricultural waste	10100903	AI/C/FF	None
FBC, Coal	1	Coal	10100217	LI/AI/C/FF	None
FBC, Coal	1	Coal	10100217	LI/AI/FF/ESP	None
FBC, Coke	1	Coke	10100801	LI/AI/C/FF	None
Furnace, Alloy Stock	1	Alloy stock	30300926	None	Electric Induction
Furnace, Aluminum	1	Aluminum	30400107	FF	Dross
Furnace, Aluminum	2	Aluminum	30400199	None	Melting Pot
Furnace, Aluminum	3	Aluminum	30400103	FF	Reverberatory

TABLE 1. EMISSION FACTOR GROUPS.

Major Group*	Sub Group	Material/Fuel	SCC	APC System	Other
Furnace, Aluminum	4	Aluminum	30400103	None	Reverberatory
Furnace, Brass/Bronze	1	Brass and bronze ingot	30400224	FF	Electric Induction
Furnace, Glass	1	Sand/limestone/soda	30501402	FF	None
Furnace, Glass	2	Sand/limestone/soda	30501402	None	None
Furnace, Glass	2	Sand/limestone/ash	30501403	None	None
Heater, Natural Gas	1	Natural gas	31000404	None	None
Heater, Natural/Ref. Gas	1	Natural gas/RFG	30600199	None	None
Heater, Oil	1	Pipeline oil	31000403	None	None
ICE, Diesel	1	Diesel	20200102	None	Oxygen < 13%
ICE, Diesel	2	Diesel	20300101	None	Oxygen < 13%
ICE, Diesel	3	Diesel	20100102	None	Oxygen > 13%
ICE, Diesel	4	Diesel	20200102	None	Oxygen > 13%
ICE, Field Gas	1	Field gas	20200202	None	Lean/4S/<650 Hp
ICE, Field Gas	2	Field gas	20200252	None	Lean/2S/<650 Hp
ICE, Field Gas	4	Field gas	20200254	None	Rich/4S/<650 Hp
ICE, Field Gas	5	Field gas	20200252	None	Lean/2S/>650 Hp
ICE, Landfill Gas	1	Landfill gas	20100802	None	None
ICE, Natural Gas	1	Natural gas	20200202	None	Lean/4S/<650 Hp
ICE, Natural Gas	2	Natural gas	20200254	None	Rich/4S/<650 Hp
ICE, Natural Gas	3	Natural gas	20200202	None	Lean/4S/>650 Hp
ICE, Natural Gas	4	Natural gas	20200252	None	Lean/2S/>650 Hp
Plating, Anodizing	1	Chromic acid	30901006	WS	Anodizing
Plating, Anodizing	2	Chromic acid	30901006	DM/WS/FF	Anodizing
Plating, Hard	1	Chromic acid	30901006	WS	Hard
Plating, Hard	1	Chromic acid	30901006	DM/PB	Hard
Plating, Hard	1	Chromic acid	30901006	DM	Hard
Plating, Hard	1	Chromic acid	30901006	DM/WS/PB	Hard
Plating, Hard	2	Chromic acid	30901006	DM/WS/FF	Hard
PM, Devolatizer	1	Styrene monomer	30101818	None	Devolatizer
PM, Extruder	1	Styrene monomer	30101818	ESP	Extruder
PM, Mix Tank	1	Styrene monomer	30101818	None	Mix Tank
PM, Reactor	1	Styrene monomer	30101818	None	Reactor
PM, Storage Silo	1	Styrene monomer	30101817	None	Storage Silo
Preheater Kiln, Coal	1	Coal	30501622	C/FF	None
SG, Crude Oil	1	Crude oil	31000413	SO2 Scrub	None
SG, Crude Oil	1	Crude oil	31000413	None	None
SG, Natural Gas	1	Natural gas	31000414	None	None
SG, Natural/CVR Gas	1	Natural gas/CVR gas	31000499	None	None
Turbine, Distillate	1	No. 2 distillate oil	20100101	None	None
Turbine, Distillate	1	Diesel	20100101	None	None
Turbine, Distillate	2	No. 2 distillate oil	20200103	None	None
Turbine, Field Gas	1	Field gas	20200203	None	None
Turbine, Landfill Gas	1	Landfill gas	20100801	None	None
Turbine, Nautral Gas	1	Natural gas	20200201	None	None
Turbine, Nautral Gas	2	Natural gas	20200203	None	None
Turbine, Nautral Gas	2	Natural gas	20200203	SCR	None
Turbine, Nautral Gas	2	Natural gas	20200203	COC/SCR	None

*A set of emission factors is provided in GUI for each row of data given above.
Emission factors in sets not separated by lines are the same.

#	Field Name (Structure)	Field Type	Width	Decimal	Field Name (Display)	Main Display	List Display	Sort	Search	List Report	Detail Report	Export	Field Value Listing/ Definiti	Description
1	Group	Character	30		Not Displayed							x		Emission major and sub group identification parameters as shown in Table 1
2	System	Character	26		System Type	x	x	x	x	x	x	x	Table 3	Primary system type such Boiler, Heater, Turbine, etc.
3	Material	Character	55		Material Type	x	x	x	x	x	x	x	Table 4	Primary material type such as Natural Gas, Coal, Green Primary, etc.
4	SCC	Character	15		SCC	x	x	x	x	x	x	x	Table 5	Source Classification Code
5	SCC_Des1	Character	30		SCC Description 1	x					x		Table 5	Source Classification Code Description 1
6	SCC_Des2	Character	30		SCC Description 2	x					x		Table 5	Source Classification Code Description 2
7	SCC_Des3	Character	35		SCC Description 3	x					x		Table 5	Source Classification Code Description 3
8	SCC_Des4	Character	50		SCC Description 4	x					x		Table 5	Source Classification Code Description 4
9	SIC	Character	15		SIC	x					x	x	Table 15	Standard Industrial Code
#	APCD_Type	Character	15		APC Device	x	x	x	x	x	x	x	Table 6	Air Pollution Control Device Type such as wet scrubber, fabric filter, etc.
#	Other_Des	Character	20		Other Description	x	x	x	x	x	x	x	Table 7	Other primary device description information such as conventional spray, electric
#	Category	Character	15		Substance Category	x	x	x	x	x	x	x	Table 8	The family or group of substance which each substance is classified under
#	Substance	Character	30		Substance	x	x	x	x	x	x	x	Table 9	Substance name such as Benzene, Arsenic, HCl, etc.
#	CAS	Character	15		CAS						x	x		Chemical abstract service number
#	Emit_ID	Character	5		Not Displayed									No information is provided for this field. May be used in future as additional substance
#	Mthd_Rating	Character	2		Method Rating	x					x	x	Table 10	Rating used to describe the class of source test method used and level of validation
#	Pop_Rating	Character	2		Population Rating	x					x	x	Table 11	Rating used to describe the representativeness of the
#	ARB_Rating	Character	5		ARB Rating	x	x	x	x	x	x	x	Table 12	ARB rating has the format xy-vn where x is the method rating, y is the population rating, and n is the order of magnitude difference between

#	Field Name (Structure)	Field Type	Width	Decimal	Field Name (Display)	Main Display	List Display	Sort	Search	List Report	Detail Report	Export	Field Value Listing/ Definiti	Description
#	EPA_Rating	Character	2		EPA Rating	x					x	x	Table 13	Rating used by EPA to describe the type of quantification method used and level of validation information provided and
#	Mean	Float	20	19	Not Displayed			x				x		Mean emission factor.
#	Median	Float	20	19	Not Displayed							x		Median emission factor.
#	Maximum	Float	20	19	Not Displayed							x		Maximum emission factor.
#	Minimu	Float	20	19	Not Displayed							x		Minimum emission factor.
#	EF_Unit	Character	20		Unit	x	x			x	x	x	Table 14	Emission factor unit.
#	Data_Pnts	Numeric	2		Number of Sources	x				x	x	x		Number of sources or source tests used to develop the mean
#	RSD	Float	20	2	RSD, %	x					x	x		Relative standard deviation which is the ratio of standard deviation to mean emission
#	Uncertnty	Float	20	2	Uncertainty, %	x					x	x		Uncertainty which is the ratio of the 95% confidence interval to the mean emission factor
#	Confd_Intl	Float	20	2	Not Displayed									No data provided. Internal use only
#	Det_Ratio	Float	20	2	Detection Ratio	x					x	x		Ratio of the sum of detected values to the sum of detected and non-detected values. A ratio of one indicates all of the data was detected. A ratio of
#	Mean_C	Character	10		Mean	x	x			x	x			Mean emission factor in scientific notation. For display
#	Median_C	Character	10		Median	x					x			Median emission factor in scientific notation. For display
#	Maximum_C	Character	10		Maximum	x				x	x			Maximum emission factor in scientific notation. For display
#	Minimum_C	Character	10		Minimum	x					x			Minimum emission factor in scientific notation. For display

TABLE 3. LISTING OF FIELD VALUES FOR
THE FIELD SYSTEM TYPE.

Field Value	Acronym Definition	Emission Factors
Asphalt Blowing		72
Asphalt Production		176
Boiler		464
Cement Kiln		115
Coating Operation		34
Coke Calcining		65
Drum Burning Furnace		32
Fluidized Bed		288
Glass Furnace		11
Heater		106
Metal Furnace		72
Plating Operating		14
Polystyrene		26
Preheater Kiln		58
Reciprocating ICE	Reciprocating Internal Combustion Engine	238
Steam Generator		107
Turbine		207

TABLE 4. LISTING OF FIELD VALUES FOR
THE FIELD MATERIAL TYPE.

Field Value	Acronym Definition	Emission Factors
Agricultural waste		57
Alloy stock		20
Aluminum		40
Asphalt fumes		72
Brass and bronze ingot		12
Chromic acid		14
Coal		271
Coal/coke		56
Coke		32
Crude oil		78
Diesel		235
Field gas		64
Green PE (15% chromium)	PE-Polyurethane	8
Green primer (25-35% chromate)		12
Landfill gas		83
Natural gas		348
Natural gas/CVR gas		25
Natural gas/RFG	RFG-Refinery Fuel Gas	24
No. 2 distillate oil		60
No. 6 fuel oil		235
None		32
Pipeline oil		58
Powder (100% chromium oxide)		2
Powder (4% Ni, 96% Al)	Ni-Nickel,Al-Aluminum	1
Powder (49% Ni, 44% Cr)	Ni-Nickel,Cr-Chromium	2
Powder (70% Ni, 4% Cr)	Ni-Nickel,Cr-Chromium	2
Powder (75% Cr3C2, 20% NiCr, 5% Cr)	Ni-Nickel,Cr-Chromium,C-Carbon	2
Powder (80% Ni, 20%Cr)	Ni-Nickel,Cr-Chromium	2
Powder (87% Al2O3, 13% TiO2)	l-Aluminum, O-Oxygen, Ti-Titaniu	1
Process oil 70		30
Residual fuel		68
Sand/limestone/ash		4
Sand/limestone/soda		7
Styrene monomer		26
Wood		55
Wood waste		45
Yellow PE (30% lead chromate)	PE-Polyurethane	2

TABLE 5. LISTING OF FIELD VALUES FOR THE FIELD SCC.

SCC	SCC Description 1	SCC Description 2	SCC Description 3	SCC Description 4	Emission Factors
10100217	External Combustion Boile	Electric Generation	Bituminous Coal	Atmospheric Fluidized Bed Combustion	154
10100401	External Combustion Boile	Electric Generation	Residual Oil	Grade 6 Oil: Normal Firing	31
10100601	External Combustion Boile	Electric Generation	Natural Gas	Boilers > 100 MBtu/Hr except Tangential	4
10100801	External Combustion Boile	Electric Generation	Coke	All Boiler Sizes	32
10100903	External Combustion Boile	Electric Generation	Wood/Bark Waste	Wood-Fired Boiler	157
10200401	External Combustion Boile	Industrial	Residual Oil	Grade 6 Oil	136
10200402	External Combustion Boile	Industrial	Residual Oil	10-100 MMBTU/hr	68
10200403	External Combustion Boile	Industrial	Residual Oil	<10 MMBTU/hr	68
10200501	External Combustion Boile	Industrial	Distillate Oil	Grades 1 and 2 Oil	27
10300501	External Combustion Boile	Commercial/Institutional	Distillate Oil	Grades 1 and 2 Oil	27
10300811	External Combustion Boile	Commercial/Institutional	Landfill Gas	All Boiler Types	48
20100101	Internal Combustion Engin	Electric Generation	Distillate Oil/Diesel	Turbine	36
20100102	Internal Combustion Engin	Electric Generation	Distillate Oil/Diesel	Reciprocating	17
20100801	Internal Combustion Engin	Electric Generation	Landfill Gas	Turbine	7
20100802	Internal Combustion Engin	Electric Generation	Landfill Gas	Reciprocating	28
20200102	Internal Combustion Engin	Industrial	Distillate Oil/Diesel	Reciprocating	51
20200103	Internal Combustion Engin	Industrial	Distillate Oil/Diesel	Turbine: Cogeneration	42
20200201	Internal Combustion Engin	Industrial	Natural Gas	Turbine	1
20200202	Internal Combustion Engin	Industrial	Natural Gas	Reciprocating	55
20200203	Internal Combustion Engin	Industrial	Natural Gas	Turbine: Cogeneration	121
20200252	Internal Combustion Engin	Industrial	Natural Gas	2-Cycle Lean Burn	31
20200254	Internal Combustion Engin	Industrial	Natural Gas	4-Cycle Rich Burn	33
20300101	Internal Combustion Engin	Commercial/Institutional	Distillate Oil/Diesel	Reciprocating	23
30101817	Miscellaneous Industries	Chemical Manufacturing	Plastics Production	Polystyrene: General	2
30101818	Miscellaneous Industries	Chemical Manufacturing	Plastics Production	Polystyrene: Reactor	24
30300926	Miscellaneous Industries	Primary Metal Production	Iron and Steel Production	Electric Induction Furnace	20
30400103	Miscellaneous Industries	Secondary Metal Producti	Secondary Aluminum Production	Smelting Furnace/Reverberatory	22
30400107	Miscellaneous Industries	Secondary Metal Producti	Secondary Aluminum Production	Hot Dross Processing	9
30400199	Miscellaneous Industries	Secondary Metal Producti	Secondary Aluminum Production	Other - Not Classified	9
30400224	Miscellaneous Industries	Secondary Metal Producti	Secondary Copper Production	Electric Induction:Charge with Bras	12
30500205	Miscellaneous Industries	Petroleum Industry	Asphaltic Concrete	Drum Dryer: Hot Asphalt Plants	42
30500211	Miscellaneous Industries	Petroleum Industry	Asphaltic Concrete	Rotary Dryer-Conventional Plant with Cyclone	134
30500606	Miscellaneous Industries	Mineral Products	Cement Manufacturing: Dry Proc	Kilns	115
30501402	Miscellaneous Industries	Mineral Products	Glass Manufacturing	Container Glass: Melting Furnace	7
30501403	Miscellaneous Industries	Mineral Products	Glass Manufacturing	Flat Glass: Melting Furnace	4
30501622	Miscellaneous Industries	Mineral Products	Lime Manufacturing	Calcining: Coal Fired Rotary Preheater Kiln	58
30600199	Miscellaneous Industries	Petroleum Industry	Petroleum Refining	Process Heaters: Natural/Process Gas-Fired	24
30601101	Miscellaneous Industries	Petroleum Industry	Petroleum Refining	Asphalt Blowing: General	72
30601401	Miscellaneous Industries	Petroleum Industry	Petroleum Refining	Petroleum Coke: Calciner	65
30901006	Miscellaneous Industries	Fabricated Metal Products	Electroplating Operations	Entire Process-Chrome	14
30902501	Miscellaneous Industries	Fabricated Metal Products	Drum Cleaning/Reclamation	Drum Burning Furnace	32
31000403	Miscellaneous Industries	Oil and Gas Production	Fuel Fired Equipment	Process Heaters:Crude Oil	58
31000404	Miscellaneous Industries	Oil and Gas Production	Fuel Fired Equipment	Process Heaters:Natural Gas	24
31000413	Miscellaneous Industries	Oil and Gas Production	Fuel Fired Equipment	Steam Generators:Crude Oil	78
31000414	Miscellaneous Industries	Oil and Gas Production	Fuel Fired Equipment	Steam Generators:Natural Gas	4
31000499	Miscellaneous Industries	Oil and Gas Production	Fuel Fired Equipment	Steam Generators: Natural/Process Gas	25
40200101	Organic Solvent Evaporati	Surface Coating Operation	Solvent-Base Paint	General	7
40200110	Organic Solvent Evaporati	Surface Coating Operation	Solvent-Base Paint	General	10
40200610	Organic Solvent Evaporati	Surface Coating Operation	Primer	General	12
40202499	Organic Solvent Evaporati	Surface Coating Operation	Large Aircraft	Other - Not Classified	5

TABLE 6. LISTING OF FIELD VALUES FOR
THE FIELD APCD TYPE.

Field Value	Acronym Definition	Emission Factors
AB	AB-Afterburner	32
AF	AF-Air Filter	5
AI/C/ESP	AI-Ammonia Injection,C-Cyclone,ESP-Electrostatic Precipitator	45
AI/C/FF	AI-Ammonia Injection,C-Cyclone,FF-Fabric Filter	57
BF	BF-Baffle Filter	6
C/FF	C-Cyclone,FF-Fabric Filter	125
C/WS	C-Cyclone,Wet Scrubber	67
COC/SCR	COC-Carbon Monoxide Oxidation Catalyst, SCR-Selective Catalytic Reduction	33
DM	DM-Demister	2
DM/PB	DM-Demister,PB-Polyballs	2
DM/WS/FF	DM-Demister,WS-Wet Scrubber,FF-Fiber Filter	4
DM/WS/PB	DM-Demister,WS-Wet Scrubber,PB-Polyballs	2
ESP	ESP-Electrostatic Precipitator	6
ESP/MC	ESP-Electrostatic Precipitator,MC-Multicyclone	55
FF	FF-Fabric Filter	178
LI/AI/C/FF	LI-Lime Injection,AI-Ammonia Injection,C-Cyclone,FF-Fabric Filter	109
LI/AI/FF/ESI	I-Lime Injection,AI-Ammonia Injection,FF-Fabric Filter,ESP-Electrostatic Precipitat	77
None	None-No Control Devices	1039
PA	PA-Paint Arestors	4
SCR	SCR-Selective Catalytic Reduction	33
SD/FF	SD-Spray Dryer,FF-Fabric Filter	65
SO2 Scrub	SO2-Scrub-SO2 Scrubber	39
TO	TO-Thermal Oxidizer	72
WC	WC-Water Curtain	6
WS	WS-Wet Scrubber	16
WSN	WSN-Water Spray Nozzle	2
WT	WT- Water Trough	4

TABLE 7. LISTING OF FIELD VALUES FOR
THE FIELD OTHER DESCRIPTION.

Field Value	Acronym Definition	Emission Factors
Anodizing		4
Blow Cycle		36
Conventional Spray		18
Devolatizer		6
Dross		9
Electric Induction		32
Extruder		6
HVLP Spray Guns	HVLP-High Volume Liquid Pressur	16
Hard		10
Lean/2S/<650 Hp	S-Strokes,Hp-Horse Power	6
Lean/2S/>650 Hp	S-Strokes,Hp-Horse Power	25
Lean/4S/<650 Hp	S-Strokes,Hp-Horse Power	30
Lean/4S/>650 Hp	S-Strokes,Hp-Horse Power	25
Melting Pot		9
Mix Tank		6
No Blow Cycle		36
None	None-No addition description	1657
Oxygen < 13%		46
Oxygen > 13%		45
Reactor		6
Reverberatory		22
Rich/4S/<650 Hp	S-Strokes,Hp-Horse Power	33
Storage Silo		2

TABLE 8. LISTING OF FIELD VALUES FOR THE FIELD CATEGORY.

Field Value	Acronym Definition	Emission Factors
Dioxin/Furan		332
Halogens		15
Metals		494
PAH	PAH-Polycyclic Aromatic Hydrocarbo	794
PCB	PCB-Polychlorinated Biphenyl	40
Particulate		2
SVOC	VOC-Semi-Volatile Organic Compour	71
VOC	VOC-Volatile Organic Compound	337

TABLE 9. LISTING OF FIELD VALUES FOR THE FIELD SUBSTANCE.

Substance	Comment	Emission Factors
1,3-Butadiene		11
2-Chloronaphthalene		12
2-Methylnaphthalene		13
Acenaphthene		48
Acenaphthylene		48
Acetaldehyde		29
Acrolein		22
Aluminum		1
Ammonia		2
Anthracene		48
Antimony		8
Arsenic		33
Barium		8
Benzaldehyde	Same as Benzoic aldehyde.	5
Benzene		56
Benzo(a)anthracene		48
Benzo(a)pyrene		48
Benzo(b)fluoranthene		45
Benzo(b+k)fluoranthene	Sum of b and k Benzo flouranthene.	15
Benzo(e)pyrene		17
Benzo(g,h,i)perylene		48
Benzo(k)fluoranthene		45
Beryllium		33
Cadmium		33
Carbon Tetrachloride		1
Chloroform		7
Chromium (Hex)	Same as Chromium (Hexavalent).	55
Chromium (Total)		57
Chrysene		48
Cobalt		4
Copper		33
Dibenz(a,h)anthracene		48
Dioxin/Furan:Total		2
Dioxin:4D 2378	Same as 2,3,7,8-Tetrachlorodibenzo-p-dioxin.	15
Dioxin:4D Other	Same as Tetrachlorodibenzo-p-dioxin other.	1
Dioxin:4D Total	Same as Tetrachlorodibenzo-p-dioxin total.	9
Dioxin:5D 12378	Same as 1,2,3,7,8-Pentachlorodibenzo-p-dioxin.	15
Dioxin:5D Other	Same as Pentachlorodibenzo-p-dioxin other.	1
Dioxin:5D Total	Same as Pentachlorodibenzo-p-dioxin total.	9
Dioxin:6D 123478	Same as 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin.	14
Dioxin:6D 123678	Same as 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin.	15
Dioxin:6D 123789	Same as 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin.	14
Dioxin:6D Other	Same as Hexachlorodibenzo-p-dioxin other.	1

TABLE 9. LISTING OF FIELD VALUES FOR THE FIELD SUBSTANCE.

Substance	Comment	Emission Factors
Dioxin:6D Total	Same as Hexachlorodibenzo-p-dioxin.	9
Dioxin:7D 1234678	Same as 1,2,3,4,7,8-Heptachlorodibenzo-p-dioxin.	15
Dioxin:7D Other	Same as Heptachlorodibenzo-p-dioxin other.	1
Dioxin:7D Total	Same as Heptachlorodibenzo-p-dioxin total.	9
Dioxin:8D	Same as Octachlorodibenzo-p-dioxin.	16
Ethylbenzene		23
Ethylene dibromide	Same as 1,2-Dibromoethane.	1
Ethylene dichloride	Same as 1,2-Dichloroethane.	1
Fluoranthene		48
Fluorene		48
Formaldehyde		57
Furan:4F 2378	Same as 2,3,7,8-Tetrachlorodibenzofuran.	15
Furan:4F Other	Same as Tetrachlorodibenzofuran other.	1
Furan:4F Total	Same as Tetrachlorodibenzofuran total.	9
Furan:5F 12378	Same as 1,2,3,7,8-Pentachlorodibenzofuran.	15
Furan:5F 23478	Same as 2,3,4,7,8-Pentachlorodibenzofuran.	14
Furan:5F Other	Same as Pentachlorodibenzofuran other.	1
Furan:5F Total	Same as Pentachlorodibenzofuran total.	9
Furan:6F 123478	Same as 1,2,3,4,7,8-Hexachlorodibenzofuran.	14
Furan:6F 123678	Same as 1,2,3,6,7,8-Hexachlorodibenzofuran.	15
Furan:6F 123789	Same as 1,2,3,7,8,9-Hexachlorodibenzofuran.	14
Furan:6F 234678	Same as 2,3,4,6,7,8-Hexachlorodibenzofuran.	14
Furan:6F Other	Same as Hexachlorodibenzofuran other.	1
Furan:6F Total	Same as Hexachlorodibenzofuran total.	9
Furan:7F 1234678	Same as 1,2,3,4,6,7,8-Heptachlorodibenzofuran.	15
Furan:7F 1234789	Same as 1,2,3,4,7,8,9-Heptachlorodibenzofuran.	14
Furan:7F Other	Same as Heptachlorodibenzofuran other.	1
Furan:7F Total	Same as Heptachlorodibenzofuran total.	9
Furan:8F	Same as Octachlorodibenzofuran.	16
HCl		12
Hexane		6
HF		3
Hydrogen Sulfide		10
Indeno(1,2,3-cd)pyrene		48
Iron		1
Lead		35
Manganese		33
Mercury		30
Methyl Chloroform	Same as 1,1,1-Trichloroethane.	4
Methylene Chloride	Same as Dichloromethane.	2
Molybdenum	Molybdenum trioxide is listed in A-I.	4
Naphthalene		48
Nickel		34

TABLE 9. LISTING OF FIELD VALUES FOR THE FIELD SUBSTANCE.

Substance	Comment	Emission Factors
Particulate	Total method 5 particulate catch.	2
PCB:Decachlorinated biphenyls		4
PCB:Dichlorinated biphenyls		4
PCB:Heptachlorinated biphenyls		4
PCB:Hexachlorinated biphenyls		4
PCB:Monochlorinated biphenyls		4
PCB:Nonachlorinated biphenyls		4
PCB:Octachlorinated biphenyls		4
PCB:Pentachlorinated biphenyls		4
PCB:Tetrachlorinated biphenyls		4
PCB:Trichlorinated biphenyls		4
Perchloroethylene	Same as Tetrachloroethene.	2
Perylene		13
Phenanthrene		48
Phenol		5
Phosphorus		11
Propylene		25
Propylene Oxide		3
Pyrene		48
Selenium		30
Silver		8
Strontium		1
Styrene		5
Thallium		8
Toluene		33
Trichloroethylene		1
Vanadium		4
Vinyl Chloride		4
Xylene (m,p)		15
Xylene (o)		15
Xylene (Total)		25
Zinc		30

TABLE 10. LISTING OF FIELD VALUES FOR THE FIELD METHOD RATING.

Field Value	Definition	Emission Factors
A	Test was performed using a new or old CARB methodology and sufficient documentation was provided to validate the results.	591
B	Test was performed using a new or old EPA methodology and sufficient documentation was provided to validate the results.	446
C	Test was performed using a new or old CARB methodology and insufficient documentation was provided to validate the results.	697
D	Test was performed using a new or old EPA methodology and insufficient documentation was provided to validate the results.	219
E	An assumption was made in the emission factor calculation which could significantly affect the accuracy of the results. Methods which do not have validation check procedures also have been rated under this category.	132

Note: The EPA methods are not considered inferior. However, the Hot Spots Program mandated that an EPA method could be used only if there was no corresponding CARB test method or if the source asked for an equivalency determination. CARB and EPA test methods are different in many cases and can lead to different results. CARB test methods were rated higher than the EPA's to provide consistent test result comparisons.

TABLE 11. LISTING OF FIELD VALUES FOR THE FIELD POPULATION RATING.

Field Value	Definition	Emission Factors
1	Source test data taken from many randomly chosen facilities in the industry population (5 or more sources).	336
2	Source test data taken from a reasonable number of facilities (3 to 4 sources).	205
3	Source test data taken from a small number of facilities, and there may be reason to suspect that the facilities do not represent a random sample of the industry (< 3 sources).	1544

TABLE 12. LISTING OF FIELD VALUES FOR THE FIELD ARB RATING.

Field Value	Definition	Emission Factors
A1-v0	ARB rating has the format xy-vn where x is the method rating, y is the population rating, and n is the order of magnitude difference between the minimum and maximum. If the emission factor was developed from a single run, n is set to "-".	3
A1-v1		5
A1-v3		4
A2-v1		11
A2-v2		1
A3-v-		8
A3-v0		351
A3-v1		193
A3-v2		15
B1-v1		32
B1-v2		126
B1-v3		41
B1-v4		23
B1-v5		28
B1-v6		2
B2-v0		1
B2-v1		29
B2-v2		39
B2-v3		17
B2-v4		8
B2-v5		2
B3-v0		29
B3-v1		33
B3-v2		31
B3-v3		5
C1-v0		8
C1-v1		4
C1-v2		8
C1-v3		28
C1-v4		6
C2-v0		4
C2-v1		44
C2-v2		24
C2-v3		3
C3-v-		76
C3-v0		318
C3-v1		140
C3-v2		29
C3-v3		5
D1-v1		4
D1-v2		10
D1-v3		4
D2-v0		4
D2-v1		12
D2-v2		2
D2-v3		4
D3-v-		29
D3-v0		65
D3-v1		50
D3-v2		28
D3-v3		7
E3-v-		6
E3-v0		77
E3-v1		45
E3-v2		3
E3-v3		1

TABLE 13. LISTING OF FIELD VALUES FOR THE FIELD EPA RATING*.

Field Value	Definition	Emission Factors
A	Developed from many random facilities using current source test methods and enough information available to validate the results.	88
B	Developed from reasonable number of facilities using current source test methods and enough information available to validate the results.	78
C	Developed from reasonable number of facilities using current source test methods.	84
D	Developed from small number of facilities using current source test methods.	1002
E	Developed from small number of facilities using old source test methods or order of magnitude methods.	542
N	No EPA rating available	291

*EPA overall ratings shown were assigned for this project and are not official EPA ratings.

TABLE 14. LISTING OF FIELD VALUES FOR THE FIELD UNIT.

Field Value	Definition	Emission
lbs/MMcf	Pounds per Million Cubic Fe	477
lbs/Mgal	Pounds per Thousand Gallon	662
lbs/drum	Pounds per Drum	32
lbs/gal paint	Pounds per Gallon Paint	22
lbs/lbs powder	Pounds per Pounds Powder	12
lbs/lbs productio	Pounds per Pounds Productio	26
lbs/ton	Pounds per Ton	343
lbs/ton coke	Pounds per Ton Coke	65
lbs/ton productio	Pounds per Ton Production	432
mg/amp-hr	Milligram per amp-hour	14

TABLE 15a. LISTING OF FIELD VALUES FOR THE FIELD SIC.

Field Value	Emission Factors
1311	434
1311/3761	27
1311/4911	42
1311/4911/4971	33
2021	68
2033/3275/4911	31
2911	161
2951	176
3087	26
3211/3231	4
3221	7
3241	173
3354	40
3411	68
3412	32
3471	4
3471/9721	2
3479	7
3492	12
3721	27
3728	22
4899/9721	23
4911	437
4911/4971	18
4953	48
4959	35
9721	128

ΓABLE 15b. APPLICABLE SIC DEFINITIONS.

SIC	Definition
1311	Crude Petroleum And Natural Gas
2021	Creamery Butter
2033	Canned Fruits And Vegetables
2911	Petroleum Refining
2951	Asphalt Paving Mixtures And Blocks
3087	Custom Compound Purchased Resins
3211	Flat Glass
3221	Glass Containers
3231	Products Of Purchased Glass
3241	Cement, Hydraulic
3275	Gypsum Products
3354	Aluminum Extruded Products
3411	Metal Cans
3412	Metal Barrels, Drums, And Pails
3469	Metal Stampings, Nec
3471	Plating And Polishing
3479	Metal Coating And Allied Services
3492	Fluid Power Valves & Hose Fittings
3721	Aircraft
3728	Aircraft Parts And Equipment, Nec
3761	Guided Missiles And Space Vehicles
4899	Communication Services, Nec
4911	Electric Services
4953	Refuse Systems
4959	Sanitary Services, Nec
4971	Irrigation Systems
9721	International Affairs

TABLE 16. LISTING OF DEVICES WITH EMISSION FACTORS IN GUI.

MAJOR/SUB GROUP	DEVICE SEARCH FIELD VALUES IN GUI				
IDENTIFICATION	System Type	Material Type	SCC	APCD Type	Other Description
Asphalt Blowing/1	Asphalt Blowing	Asphalt fumes	30601101	TO	Blow Cycle
Asphalt Blowing/2	Asphalt Blowing	Asphalt fumes	30601101	TO	No Blow Cycle
Asphalt Prod., Diesel/1	Asphalt Production	Diesel	30500211	C/FF	None
Asphalt Prod., Diesel/2	Asphalt Production	Diesel	30500205	FF	None
Asphalt Prod., Diesel/3	Asphalt Production	Diesel	30500205	WS	None
Asphalt Prod., Natural Gas/1	Asphalt Production	Natural gas	30500211	C/FF	None
	Asphalt Production	Natural gas	30500211	C/WS	None
Asphalt Prod., Oil/1	Asphalt Production	Process oil 70	30500211	C/WS	None
Boiler, Distillate/1	Boiler	Diesel	10200501	None	None
	Boiler	Diesel	10300501	None	None
Boiler, Fuel Oil/1	Boiler	No. 6 fuel oil	10100401	None	None
Boiler, Fuel Oil/2	Boiler	No. 6 fuel oil	10200401	None	None
	Boiler	No. 6 fuel oil	10200402	None	None
	Boiler	No. 6 fuel oil	10200403	None	None
	Boiler	Residual fuel	10200401	None	None
Boiler, Landfill Gas/1	Boiler	Landfill gas	10300811	None	None
Boiler, Natural Gas/1	Boiler	Natural gas	10100601	None	None
Boiler, Wood/1	Boiler	Wood	10100903	ESP/MC	None
Cement Kiln, Coal/1	Cement Kiln	Coal	30500606	FF	None
Cement Kiln, Coal/Coke/1	Cement Kiln	Coal/coke	30500606	FF	None
Coating, Green PE/1	Coating Operation	Green PE (15% chromium)	40200110	BF	HVLP Spray Guns
Coating, Green PE/2	Coating Operation	Green PE (15% chromium)	40200110	PA	HVLP Spray Guns
Coating, Green PE/3	Coating Operation	Green PE (15% chromium)	40200110	WC	HVLP Spray Guns
Coating, Green PE/4	Coating Operation	Green PE (15% chromium)	40200110	WT	HVLP Spray Guns
Coating, Green Primer/1	Coating Operation	Green primer (25-35% chromate)	40200610	BF	HVLP Spray Guns
Coating, Green Primer/2	Coating Operation	Green primer (25-35% chromate)	40200610	PA	HVLP Spray Guns
Coating, Green Primer/3	Coating Operation	Green primer (25-35% chromate)	40200610	WC	Conventional Spray
Coating, Green Primer/4	Coating Operation	Green primer (25-35% chromate)	40200610	WC	HVLP Spray Guns
Coating, Green Primer/5	Coating Operation	Green primer (25-35% chromate)	40200610	WSN	Conventional Spray
Coating, Green Primer/6	Coating Operation	Green primer (25-35% chromate)	40200610	WT	HVLP Spray Guns
Coating, Powder/1	Coating Operation	Powder (75% Cr3C2, 20% NiCr, 5% Cr)	40200101	None	Conventional Spray
Coating, Powder/2	Coating Operation	Powder (87% Al2O3, 13% TiO2)	40200101	None	Conventional Spray
Coating, Powder/3	Coating Operation	Powder (70% Ni, 4% Cr)	40202499	AF	Conventional Spray
Coating, Powder/4	Coating Operation	Powder (49% Ni, 44% Cr)	40202499	AF	Conventional Spray
Coating, Powder/5	Coating Operation	Powder (4% Ni, 96% Al)	40202499	AF	Conventional Spray
Coating, Powder/6	Coating Operation	Powder (80% Ni, 20%Cr)	40200101	None	Conventional Spray
Coating, Powder/7	Coating Operation	Powder (100% chromium oxide)	40200101	None	Conventional Spray
Coating, Yellow PE/1	Coating Operation	Yellow PE (30% lead chromate)	40200110	BF	Conventional Spray
Coke Calcining/1	Coke Calcining	Natural gas	30601401	SD/FF	None
Drum Burning Furnace/1	Drum Burning Furnace	None	30902501	AB	None
FBC, Biomass/1	Fluidized Bed Combustio	Wood waste	10100903	AI/C/ESP	None
FBC, Biomass/2	Fluidized Bed Combustio	Agricultural waste	10100903	AI/C/FF	None
FBC, Coal/1	Fluidized Bed Combustio	Coal	10100217	LI/AI/C/FF	None
	Fluidized Bed Combustio	Coal	10100217	LI/AI/FF/ESP	None
FBC, Coke/1	Fluidized Bed Combustio	Coke	10100801	LI/AI/C/FF	None
Furnace, Alloy Stock/1	Metal Furnace	Alloy stock	30300926	None	Electric Induction
Furnace, Aluminum/1	Metal Furnace	Aluminum	30400107	FF	Dross
Furnace, Aluminum/2	Metal Furnace	Aluminum	30400199	None	Melting Pot
Furnace, Aluminum/3	Metal Furnace	Aluminum	30400103	FF	Reverberatory
Furnace, Aluminum/4	Metal Furnace	Aluminum	30400103	None	Reverberatory
Furnace, Brass/Bronze/1	Metal Furnace	Brass and bronze ingot	30400224	FF	Electric Induction
Furnace, Glass/1	Glass Furnace	Sand/limestone/soda	30501402	FF	None
Furnace, Glass/2	Glass Furnace	Sand/limestone/ash	30501403	None	None
	Glass Furnace	Sand/limestone/soda	30501402	None	None
Heater, Natural Gas/1	Heater	Natural gas	31000404	None	None
Heater, Natural/Ref. Gas/1	Heater	Natural gas/RFG	30600199	None	None
Heater, Oil/1	Heater	Pipeline oil	31000403	None	None
ICE, Diesel/1	Reciprocating ICE	Diesel	20200102	None	Oxygen < 13%
ICE, Diesel/2	Reciprocating ICE	Diesel	20300101	None	Oxygen < 13%

TABLE 16. LISTING OF DEVICES WITH EMISSION FACTORS IN GUI.

MAJOR/SUB GROUP IDENTIFICATION	DEVICE SEARCH FIELD VALUES IN GUI				
	System Type	Material Type	SCC	APCD Type	Other Description
ICE, Diesel/3	Reciprocating ICE	Diesel	20100102	None	Oxygen > 13%
ICE, Diesel/4	Reciprocating ICE	Diesel	20200102	None	Oxygen > 13%
ICE, Field Gas/1	Reciprocating ICE	Field gas	20200202	None	Lean/4S/<650 Hp
ICE, Field Gas/2	Reciprocating ICE	Field gas	20200252	None	Lean/2S/<650 Hp
ICE, Field Gas/4	Reciprocating ICE	Field gas	20200254	None	Rich/4S/<650 Hp
ICE, Field Gas/5	Reciprocating ICE	Field gas	20200252	None	Lean/2S/>650 Hp
ICE, Landfill Gas/1	Reciprocating ICE	Landfill gas	20100802	None	None
ICE, Natural Gas/1	Reciprocating ICE	Natural gas	20200202	None	Lean/4S/<650 Hp
ICE, Natural Gas/2	Reciprocating ICE	Natural gas	20200254	None	Rich/4S/<650 Hp
ICE, Natural Gas/3	Reciprocating ICE	Natural gas	20200202	None	Lean/4S/>650 Hp
ICE, Natural Gas/4	Reciprocating ICE	Natural gas	20200252	None	Lean/2S/>650 Hp
PM, Devolatizer/1	Polystyrene Manufacturi	Styrene monomer	30101818	None	Devolatizer
PM, Extruder/1	Polystyrene Manufacturi	Styrene monomer	30101818	ESP	Extruder
PM, Mix Tank/1	Polystyrene Manufacturi	Styrene monomer	30101818	None	Mix Tank
PM, Reactor/1	Polystyrene Manufacturi	Styrene monomer	30101818	None	Reactor
PM, Storage Silo/1	Polystyrene Manufacturi	Styrene monomer	30101817	None	Storage Silo
Plating, Anodizing/1	Plating Operating	Chromic acid	30901006	WS	Anodizing
Plating, Anodizing/2	Plating Operating	Chromic acid	30901006	DM/WS/FF	Anodizing
Plating, Hard/1	Plating Operating	Chromic acid	30901006	DM	Hard
	Plating Operating	Chromic acid	30901006	DM/PB	Hard
	Plating Operating	Chromic acid	30901006	DM/WS/PB	Hard
	Plating Operating	Chromic acid	30901006	WS	Hard
Plating, Hard/2	Plating Operating	Chromic acid	30901006	DM/WS/FF	Hard
Preheater Kiln, Coal/1	Preheater Kiln	Coal	30501622	C/FF	None
SG, Crude Oil/1	Steam Generator	Crude oil	31000413	None	None
	Steam Generator	Crude oil	31000413	SO2 Scrub	None
SG, Natural Gas/1	Steam Generator	Natural gas	31000414	None	None
SG, Natural/CVR Gas/1	Steam Generator	Natural gas/CVR gas	31000499	None	None
Turbine, Distillate/1	Turbine	Diesel	20100101	None	None
	Turbine	No. 2 distillate oil	20100101	None	None
Turbine, Distillate/2	Turbine	No. 2 distillate oil	20200103	None	None
Turbine, Field Gas/1	Turbine	Field gas	20200203	None	None
Turbine, Landfill Gas/1	Turbine	Landfill gas	20100801	None	None
Turbine, Nautral Gas/1	Turbine	Natural gas	20200201	None	None
Turbine, Nautral Gas/2	Turbine	Natural gas	20200203	COC/SCR	None
	Turbine	Natural gas	20200203	None	None
	Turbine	Natural gas	20200203	SCR	None