PM Calculator

User's Manual

Prepared for:

Emission Factor and Inventory Group (D205-01)
Emissions Monitoring and Analysis Division
Office of Air Quality Planning and Standards
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711

Prepared by:

E.H. Pechan & Associates, Inc.
3622 Lyckan Parkway, Suite 2002
Durham, NC 27707

September 2003

EPA Contract No. 68-D-02-063
Work Assignment No. 1-12

CONTENTS

LIST OF TABLES AND FIGURES

Tables

Figures

CHAPTER I
INTRODUCTION

The "Particulate Matter Calculator" (hereafter referred to as the Calculator) was designed to help States develop PM_{10} (particulate matter less than 10 microns in diameter) and $PM_{2.5}$ (particulate matter less than 2.5 microns in diameter) emission inventories. The Calculator uses information from AP-42[1] to calculate controlled filterable particulate emissions. It calculates controlled PM_{10} filterable emissions (PM10-FIL) and $PM_{2.5}$ filterable emissions (PM25-FIL) from uncontrolled PM_{10} filterable or PM filterable (PM-FIL) emissions for point sources with up to two control devices.

The Calculator requires the user to input several data parameters for a given calculation. These parameters consist of the Source Classification Code (SCC) for the point source, the primary and secondary particulate control device codes, and the uncontrolled PM-FIL or PM10-FIL emissions. The Calculator accepts input files containing the data parameters in several formats. These formats are fixed width text files, Excel 5.0 spreadsheet tables, Lotus wk3 spreadsheet tables, and dBASE IV database tables. After accepting the input files and performing the controlled emissions calculations, the results are saved to a user specified output file. The output file formats available in the Calculator are the same as the input formats. The program permits the user to specify a name, drive, and directory for each input and output file.

The Calculator works by first calculating the PM10-FIL and PM25-FIL particle distribution for the input SCC's uncontrolled emissions. It then determines the control efficiencies for the primary and secondary particulate device code. The Calculator then calculates the final controlled PM10-FIL and PM25-FIL emissions and overall PM10-FIL and PM25-FIL control efficiencies, which are sent to the output file. The detailed calculation is shown in Appendix A. The output file also contains emission factors from the Factor Information REtrieval (FIRE)[2] data system. These factors are not used to estimate controlled PM10-FIL and PM25-FIL emissions.

Chapter 2 of this manual explains how to install the Calculator onto your personal computer. Chapter 3 provides further instruction on using the Calculator.

CHAPTER II
GETTING STARTED

The Calculator software was developed in Access 97. Users with newer versions of Access (i.e., Access 2000 or Access XP) installed on their computers may experience difficulty installing or running the Calculator software depending on their Windows operating system. EPA expects to have future updates to the software in order to rectify this issue. The Calculator software can be downloaded from the EPA CHIEF web site at http://www.epa.gov/ttn/chief/software/pmcalc/index.html. Sample input files for the Calculator can also be found at this location.

The minimum system requirements to run the Calculator are as follows: a 386SX processor or higher, Windows 3.1 or later, a mouse or other pointing device, 6MB RAM, and an EGA or higher resolution video adapter. Installation of the Calculator requires 18 megabytes of total hard disk space.

To install the Calculator, download it from the CHIEF web site. To do this, select the link for the PM Calculator on the web site and, when prompted, choose to save the file to a location on your computer. The software setup files will be in compressed format in a single file called "pmcalc.zip". The setup files should be extracted from the compressed file using WinZip or a similar utility. The resulting files will occupy about 12 megabytes of disk space and should all be placed in a single temporary directory.

To begin the setup for the Calculator, double-click or run the file "Setup.exe" that you have extracted into the temporary directory with the other setup files. You will then be guided through the setup process. Once the Calculator is installed, it will occupy about 4 megabytes of disk space. You may delete all of the setup files and the temporary directory after installation. You will need additional disk space for the input and output files.

Once the Calculator is installed on your computer, you may start the program by selecting PM Calculator under Programs on your Windows start menu. An item entitled "Repair & Compact" will also be under the start menu for the PM Calculator. Access databases inherently increase in file size with usage and this item allows you to recover hard disk space from past sessions with the Calculator. It is recommended that you use this item after each session with the Calculator.

If you encounter problems setting up the calculator, or have other software related questions, contact the Info CHIEF Help Desk at (919)541-1000. For questions regarding PM calculations, contact Mr. William Kuykendal of the United States Environmental Protection Agency (EPA) at 919-541-5372, or by E-mail at kuykendal.bill@epa.gov.

CHAPTER III
PROCESSING DATA

When the Calculator is started, the welcome screen will be displayed, as shown below in Figure 1. You may click on this screen to go to the main screen to begin using the Calculator. If you do not click on it, it will be displayed for about 6 seconds and you will be automatically redirected to the Calculator's main screen.

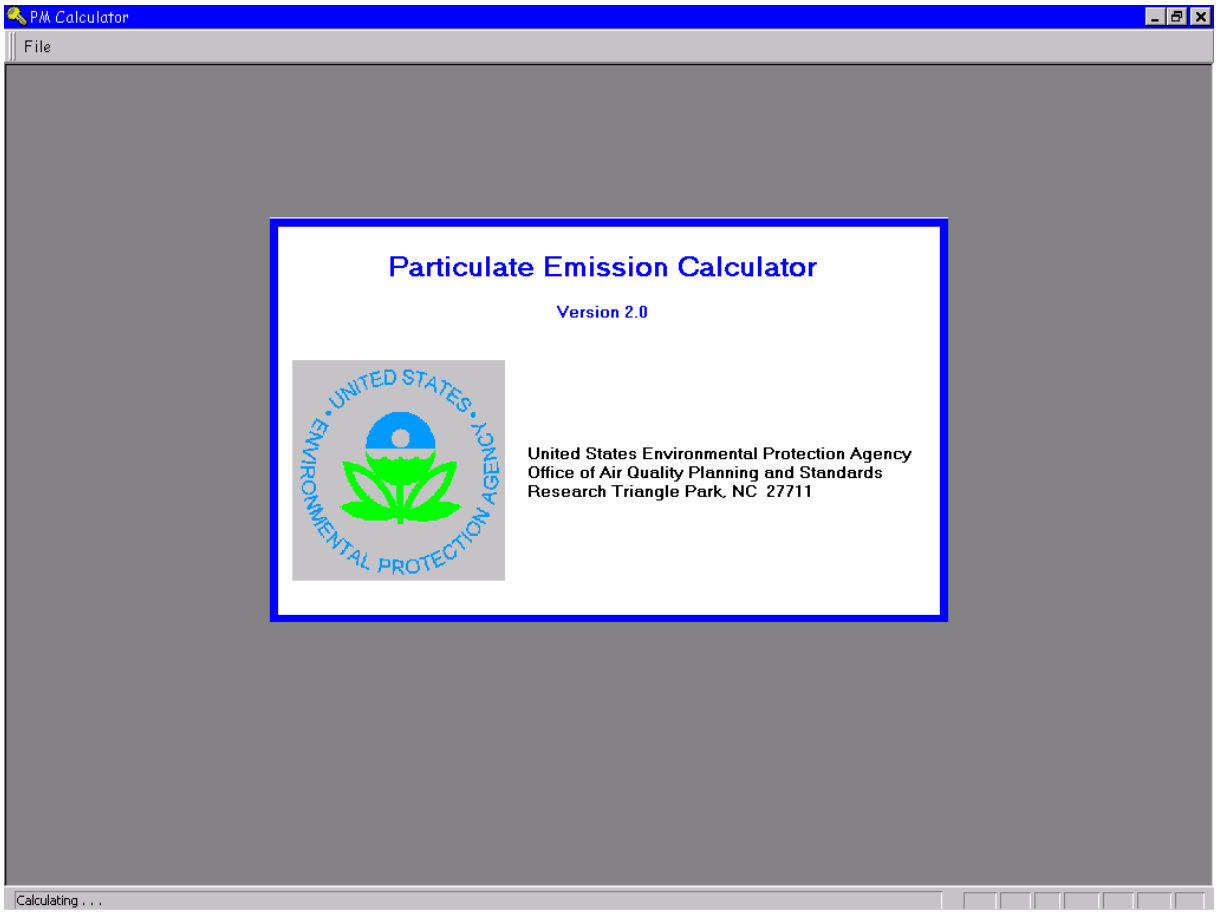

Figure 1. Welcome Screen

The main screen has several steps designed for the user to easily complete the input and output setup process in order to run the Calculator. Step 1, which is optional, enables the FIRE Emission Factor table to be updated. Step 2 allows the selection of the input file name and type. Step 3 allows the specification of the output file name and type. These steps are discussed in more detail in the sections that follow.

A. STEP 1: UPDATE FIRE

The screen to update the Calculator with emission factors from the Factor Information Retrieval (FIRE)[2] data system is displayed in Figure 2. As noted on this figure, the emission factors in the Calculator only need to be updated when the emission factors in FIRE are revised. EPA announces updates to the FIRE data system on the CHIEF web site at http://www.epa.gov/ttn/chief/. Emission factors are not used in the calculation of controlled emissions, but are placed in the Calculator output file, when available.

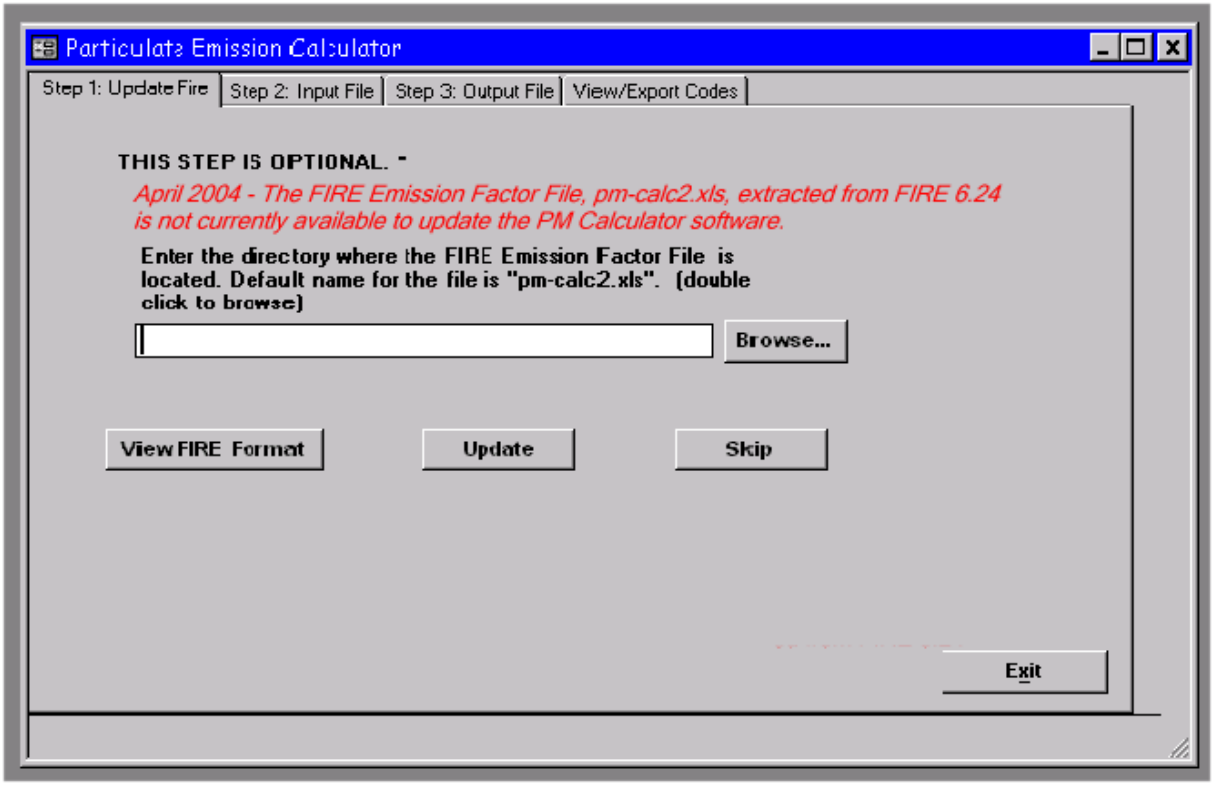

Figure 2. Update FIRE Screen

To update the emission factors, the user must provide an Excel file containing the updated FIRE emission factors. The structure for this file is shown below in Table 1 and can also be viewed through the Calculator screen interface by clicking the 'View FIRE Format' button. The default name for the FIRE emission factor file is "pm-calc2.xls". To complete the update, the user must provide the directory location for this file by using the 'Browse' button and then click the 'Update' button on the Update Fire screen. Further instructions for updating the Calculator with a new version of pm-calc2.xls will be provided on the CHIEF web site when revisions are announced.

April 2004 - The FIRE Emission Factor File, pm-calc2.xls, extracted from FIRE 6.24 is not currently available to update the PM Calculator software.

Table 1. Emission Factor File Format

Field Name	Type	Length	Description (all emissions are primary emissions)
Pollutant	Character	56	PM10, filterable/PM, condensable/PM10, total/PM25, total/PM25, filterable
SCC	Character	11	Source classification code
CTL_Code1	Character	3	Primary control device code, padded with “0”
CTL_Code2	Character	3	Secondary control device code, padded with “0”
Factor	character	22	Emission factor either discrete or formula
Poll_unit	character	10	Pollutant units
Measure	Character	35	Activity unit
Material	Character	40	Composition of activity
Action	Character	20	What is done to the material?
Standard	Logical	1	Is the EF in the same form as it is in AIRS?
UNIQID	Character	11	Unique ID value which contains FIRE version number
Factor Type	Character	9	Type of emission factor; either discrete or formula

B. STEP 2: INPUT FILE

The Calculator requires the user to input several data parameters for a given calculation. These parameters consist of the Source Classification Code (SCC) for the point source, the primary and secondary particulate control device codes, and the uncontrolled PM-FIL or PM10-FIL emissions.

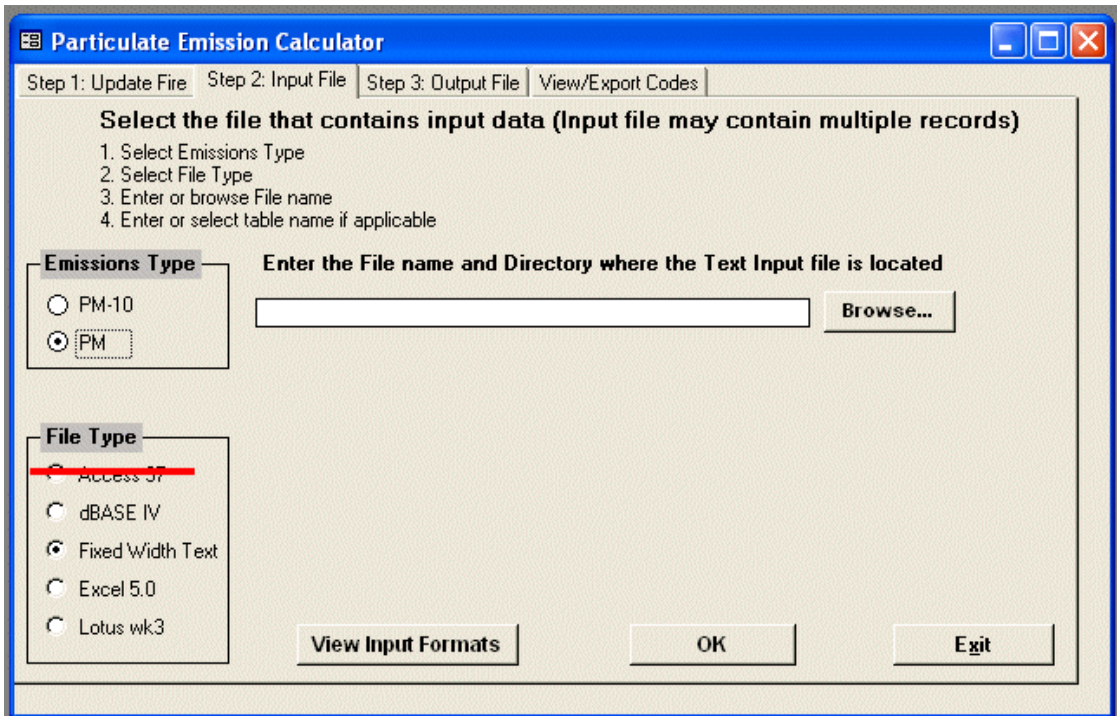

Figure 3. Input File Screen

Note: The MS Access file option will not work with version 2.0.2

Figure 3 above shows the input file screen. The user may click on the 'View Input Formats' button to see a screen that shows the necessary specifications for the various file formats that the Calculator will accept, as shown in Figure 4. The Calculator accepts input files as fixed width text files, Excel 5.0 spreadsheet tables, Lotus wk3 spreadsheet tables, or dBASE IV database tables. (Database and text files can be imported into MS Access, MS Excel and Lotus 1-2-3). Originally the Calculator was designed to accept MS Access 97 files as input. Unfortunately the Access 97 option is not available for Version 2.0.2 of the PM Calculator.

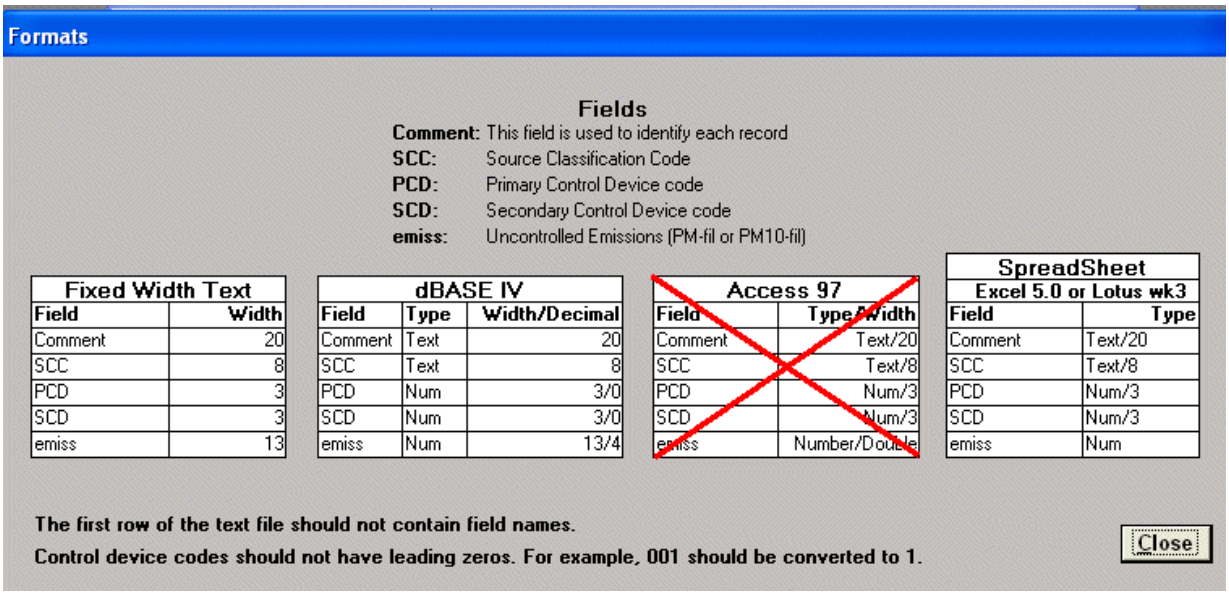

Figure 4. Input File Format Screen

Note: The MS Access file option will not work with version 2.0.2

A sample input file is presented in Appendix B. Sample input files are also available on the CHIEF web site at http://www.epa.gov/ttn/chief/software/pmcalc/. It is recommended that you create your input file by revising the data in one of the sample input files to ensure that the file follows the correct specifications and will be accepted by the Calculator.

To input your data file into the Calculator, select the PM-10 or PM button under 'Emissions Type' to identify the type of uncontrolled filterable emissions contained in your input file for which the Calculator will be calculating controlled emissions. Also select the appropriate button under 'File Type' to identify the format of your input file. Then use the 'Browse' button to specify the directory and filename of the input file. Once you have specified all the necessary information on the screen for your input file, click the 'OK' button to proceed.

C. STEP 3: OUTPUT FILE

After accepting the input file and performing the controlled emissions calculations, the Calculator's results are saved to a user specified output file. You will need to provide a few pieces of information before running the Calculator for it to create this output file. Figure 5 shows the output file screen. Use the text entry box or the 'Browse' button on the screen to specify a directory and a filename for the output file to be created by the Calculator. Select your file type preference for the output file. The output file may be created in any of the following formats: fixed width text files, Excel 5.0 spreadsheet tables, Lotus wk3 spreadsheet tables, and dBASE IV database tables. The fixed width text output file structures are shown in Appendix E. As in the case with the input file, Access 97is not an option for the output file for Version 2.0.2 of the PM Calculator.

When you have completed entering the output file information, click on the 'Process Data' button to start the Calculator. When the processing is complete, the results will be in the output file that you specified. The output will not be visible in the Calculator.

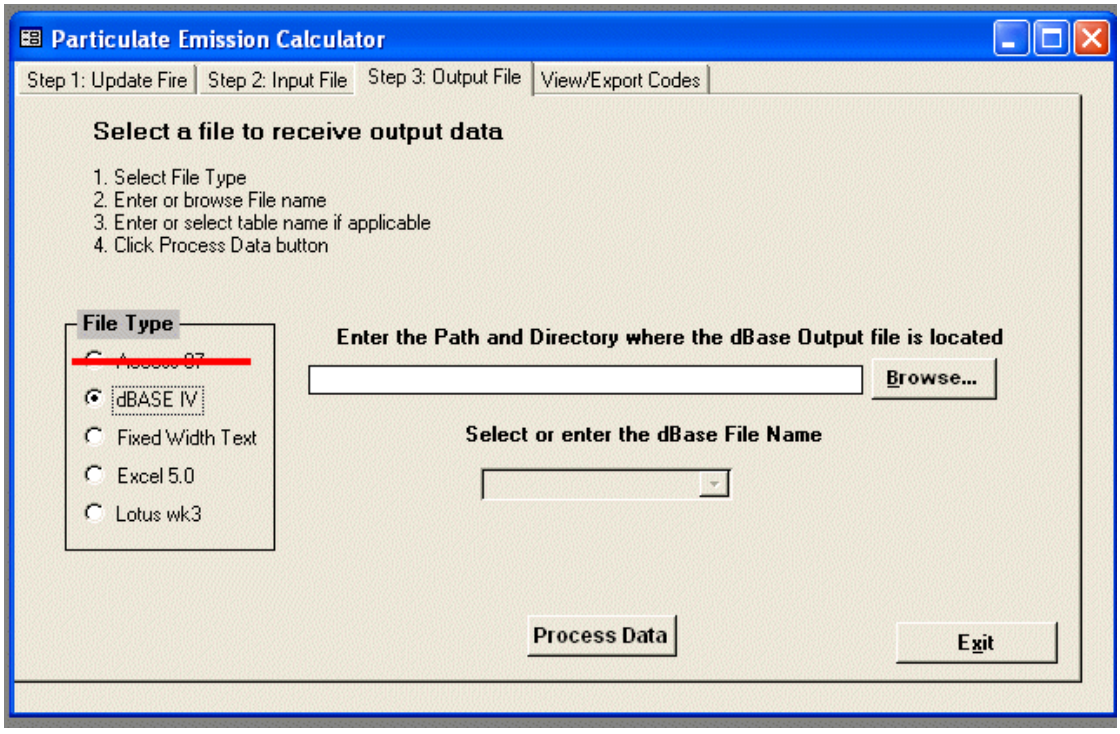

Figure 5. Output File Specification

Note: The MS Access file option will not work with version 2.0.2

D. RESOLVING ERRORS

If you encounter the error shown in Figure 6, either the path of the input file you have entered is invalid, the design structure of the input file is incorrect, or the file format of the input file can not be read by the Calculator. It is recommended that you create your input file by revising the data in one of the sample input files to ensure that the file follows the correct specifications and will be accepted by the Calculator.

Figure 7 presents summary statistics on errors in the input file and the possibility of improving the controlled emissions with FIRE emission factors. To correct these errors, continue to process your file and look for three entries in the "SCC ERR," "PCD ERR," and "SCD ERR" fields of the output file. If these records contain valid PM-FIL emissions, choose

Figure 6. File Cannot Be Processed

the most similar SCC or control device code from the list of valid codes for the Calculator. Use the Calculator's 'View/Export Codes' screen to obtain or view lists of codes that the Calculator uses (see "View/Export Lists of Valid SCC's and Control Codes" section of this document for more information). Once you have changed your input data, reprocess your input file through the Calculator.

If you do not change your input file and choose "Continue" on the screen shown in Figure 7, your data will be processed. The errors will be noted in the output file. Where the SCC is not found, the calculator will return the input file's uncontrolled emissions for cases, and control efficiencies of zero percent. Where the SCC is found, and the primary or secondary control code is not found, the SCC distribution is used to calculate the uncontrolled emissions and the controlled emissions are set equal to the uncontrolled emissions. The control efficiencies reported are zero percent in this case.

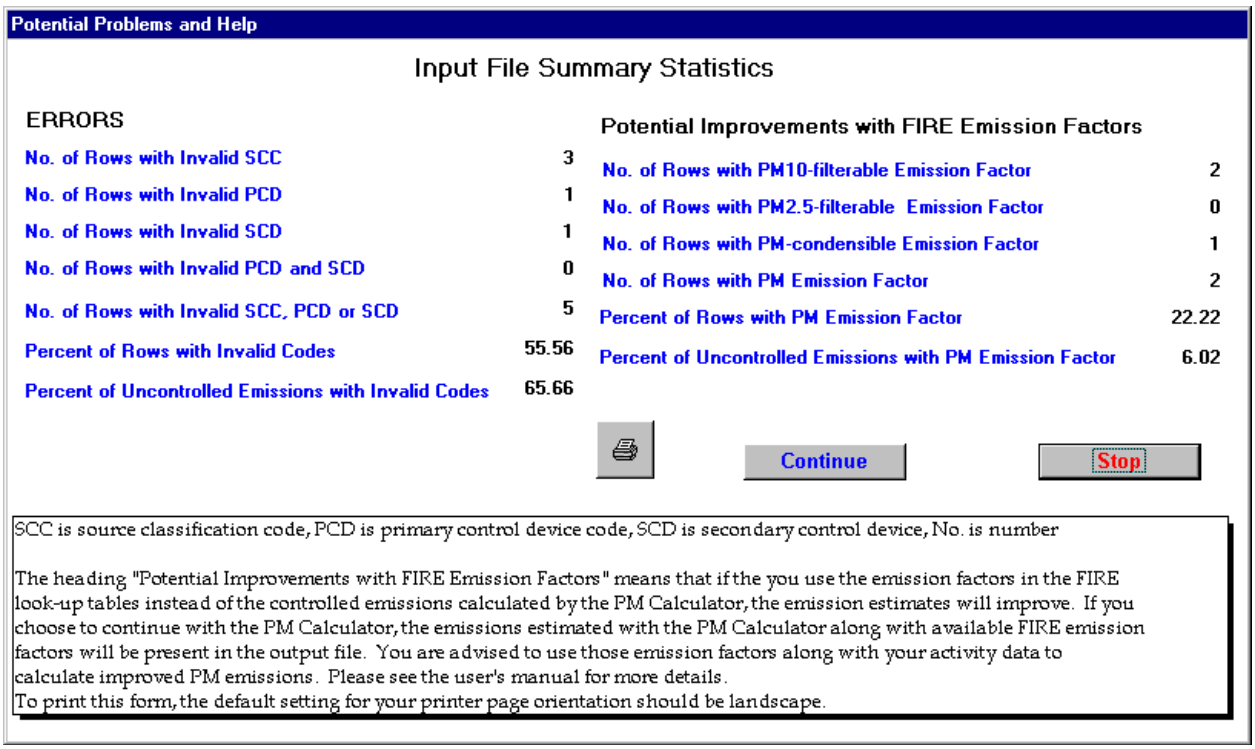

Figure 7. Input File Summary Statistics

E. FINAL OUTPUT

Table 2 shows the columns in the output file. An example calculation is shown in Appendix A. Output emissions are rounded to four decimal places, and output control efficiencies are rounded to two decimal places.

There are three calculation methodologies, indicated by the output fields “calccode 1” and “calccode 2”:

1. Specific information on particle size distribution and control efficiencies were available for the SCC and control you entered.

2. Specific information on the particle size distribution was available, but no specific information on the control was available. Generic control efficiencies were used.

3. No specific information was available. A generic distribution was used with generic control efficiencies.

“Calccode 1” displays the calculation code for the primary control. “Calccode 2” displays the calculation code for the secondary control.

Table 2. Output File Structure

Field No.	Field Name	Type (Width)	Description
1	Comment	Text (20)	Plant ID or other identifying information
2	SCC	Text (8)	Input SCC
3	PCD	Number	Input PCD
4	SCD	Number	Input SCD
5	PM Uncon[1]	Number	Uncontrolled PM-FIL emissions
6	PM10 Uncon	Number	Uncontrolled PM10-FIL emissions
7	PM25 Uncon	Number	Uncontrolled PM25-FIL emissions
8	PM10 Con	Number	Controlled PM10-FIL emissions
9	PM25 Con	Number	Controlled PM25-FIL emissions
10	PM10 CE	Number	PM10-FIL control efficiency (%)
11	PM25 CE	Number	PM25-FIL control efficiency (%)
12	SCC ERR[2]	Text (1)	SCC not found
13	PCD ERR[2]	Text (1)	Primary code not found
14	SCD ERR[2]	Text (1)	Secondary code not found
15	COM ERR	Text (1)	Control combination error
16	calccode 1	Text (7)	Calculation Code for Primary Device
17	calccode 2	Text (7)	Calculation Code for Secondary Device
18	PM25 Error	Text (3)	PM25-FIL emissions were greater than PM10-FIL
19	PM10fil	Text (80)	FIRE PM10-FIL emission factor or equation including pollutant unit, measure, and action; for example, 6E-1 lb/ton anthracite burned.
20	PMcon	Text (80)	FIRE PM condensable emission factor or equation including pollutant unit, measure, and action; for example, 6E-1 lb/ton anthracite burned
21	PM10tot	Text (80)	FIRE PM10 total emission factor or equation including pollutant unit, measure, and action; for example, 6E-1 lb/ton anthracite burned
22	PM25tot	Text (80)	FIRE PM25 total emission factor or equation including pollutant unit, measure, and action; for example, 6E-1 lb/ton anthracite burned
23	PM25fil	Text (80)	FIRE PM25-FIL emission factor or equation including pollutant unit, measure, and action; for example, 6E-1 lb/ton anthracite burned

[1] Output field only when input is PM-FIL uncontrolled emissions.
[2] A value of “2” does not mean that the EF is available for the given set of SCC, PDC, and SCD. It means FIRE has an EF for this process (SCC).

The “com err” field will display “?” for all records. In future revisions, this field could contain information about control combination errors.

The field “PM25 ERR” will indicate “yes” when controlled PM25-FIL emissions are calculated to be larger than PM10-FIL emissions. This occurs because of errors in AP-42. Data from AP-42 was not changed to account for these errors. When this error is “yes,” PM10-FIL controlled emissions have been set equal to controlled PM25-FIL emissions, and the PM10-FIL control efficiency has been re-estimated.

F. VIEW / EXPORT LISTS OF VALID SCC’S AND CONTROL CODES

An option on the main screen is “View/Export Codes.” Selecting this option will display the screen shown in Figure 8.

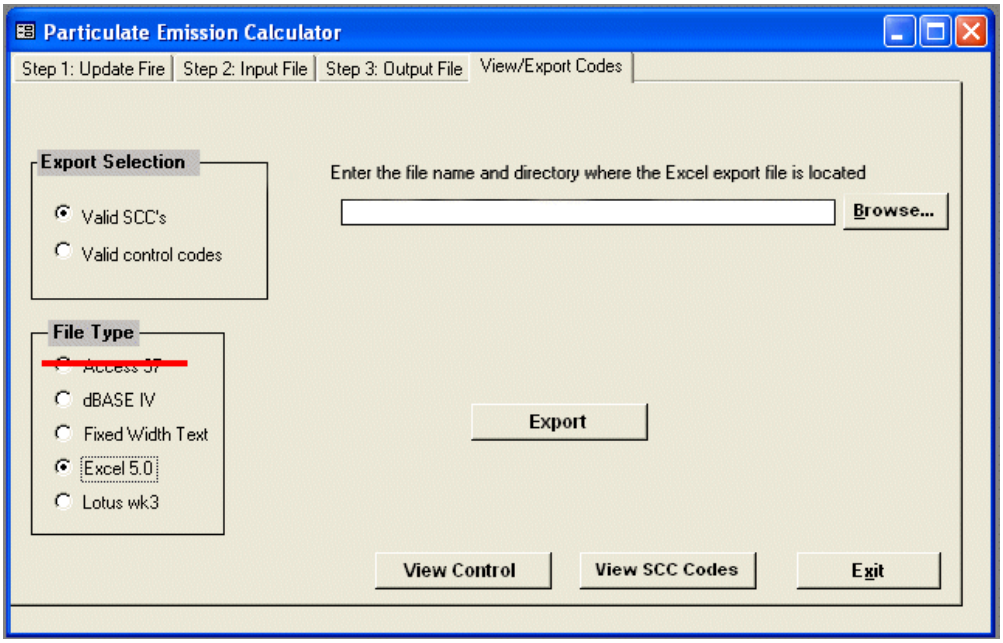

Figure 8. View Valid Control Codes and SCCs
Note: The MS Access file option will not work with version 2.0.2

The Calculator contains distributions for 2,359 SCC’s. This list was compiled from all SCC’s in the preliminary 1996 National Emission Trends database (November 1997) which had non-zero PM10-FIL emissions. The Calculator accepts all control codes found in Table B.2-3. “Typical Collection Efficiencies of Various Particulate Control Devices (%)” from Appenidx B.2 of AP-42[2], available on the CHIEF web site at http://www.epa.gov/ap42/index.html.

You may view each of these lists, and you may also export these lists to the following formats: dBASE IV, Excel 5.0, Lotus wk3, and fixed width text. Examples of the information in these files and the structures of the exported fixed width text files can be found in Appendix D.

APPENDIX A
METHOD USED TO CALCULATE PM EMISSIONS AND CONTROL EFFICIENCIES

Example 1

Given:

SCC = 10300101 External Combustion Boiler - Commercial/Institutional - Anthracite Coal: hand fired

PCD = 16 Fabric filter - high temperature

SCD = 10 Electrostatic precipitator - high efficiency

emissions = 25,000 tons PM-filterable (FIL)

Calculate controlled PM10-FIL and PM2.5-FIL emissions, and overall PM10-FIL and PM2.5-FIL control efficiencies.

Uncontrolled Particle Size Distribution (PSD) (fraction of PM-FIL)
PM10-FIL = 0.23, PM6-FIL = 0.17, PM2.5-FIL = 0.06

Control Device Efficiencies (%)

Primary Device	**pCE2.5**	**pCE6**	**pCE10**	**Source**
	99	99.41	99.43	AP-42
Secondary Device	**sCE2.5**	**sCE2.5-6**	**sCE6-10**	
	95	99	99.5	Generic

uncPM10 = $uncPM * psd10$

= $25{,}000 * .23$

= $5{,}750\,tons$

uncPM6 = $uncPM * psd6$

= $25{,}000 * .17$

= $4{,}250\,tons$

uncPM2.5 = $uncPM * psd2.5$

= $25{,}000 * .06$

= $1{,}500\,tons$

Calculate controlled emissions after passing through primary control device.

pconPM2.5 = $uncPM2.5 * (1 - \frac{pCE2.5}{100}$

= $1{,}500 * (1 - \frac{99}{100}$

= $15\,tons$

pconPM6 = $uncPM6 * (1 - \frac{pCE6}{100})$

= $4{,}250 * (1 - \frac{99.41}{100})$

= $25\,tons$

pconPM10 = $uncPM10 * (1 - \frac{pCE10}{100})$

= $5{,}750 * (1 - \frac{99.43}{100})$

= $33\,tons$

Calculate controlled emissions after passing through secondary control device.

conPM2.5 = $pconPM2.5 * (1 - \frac{sCE2.5}{100})$

= $15 * (1 - \frac{95}{100})$

= $0.75\,tons$

conPM6 = $((pconPM6 - pconPM2.5) * (1 - \frac{sCE6 - 2.5}{100})) + conPM2.5$

= $[(25 - 15) * (1 - \frac{99}{100})] + 0.75$

= $0.85\,tons$

conPM10 = $[(pconPM10 - pconPM6) * (1 - \frac{sCE6 - 10}{100})] + conPM6$

= $[(33 - 25) * (1 - \frac{99.5}{100})] + 0.85$

$= 0.89\,tons$

CEPM10 $= \left(\frac{(uncPM10 - conPM10)}{uncPM10}\right) * 100$

$= \left(\frac{(5750 - 0.89)}{5750}\right) * 100$

$= 99.98\%$

CEPM2.5 $= \left(\frac{(uncPM2.5 - conPM2.5)}{uncPM2.5}\right) * 100$

$= \left(\frac{(1500 - 0.75)}{1500}\right) * 100$

$= 99.95\%$

Example 2

Given:

SCC = 30300303 Industrial Processes - Primary Metal Production - By-product coke manufacturing - oven pushing

PCD = 10 Electrostatic precipitator - high efficiency

SCD = 3 Wet scrubber - low efficiency

emissions = 6,000 tons PM10-FIL

Uncontrolled PSD
PM10-FIL = 0.2174, PM6-FIL = 0.133, PM2.5-FIL = 0.087

Control Device Efficiencies (%)

Primary Device	**pCE2.5**	**pCE2.5-6**	**pCE6-10**	**Source**
	95	99	99.5	Generic
Secondary Device	**sCE2.5**	**sCE6**	**sCE10**	
	30	54.25	68	AP-42

uncPM10 = 6,000 tons

uncPM6 = $uncPM10 * \frac{psd6}{psd10}$

= $6{,}000 * \frac{.133}{.2174}$

= $3{,}671\,tons$

uncPM2.5 = $uncPM10 * \frac{psd2.5}{psd10}$

= $6{,}000 * \frac{.087}{.2174}$

= $2{,}401\,tons$

Calculate controlled emissions after passing through primary control device.

pconPM2.5 = $uncPM2.5 * (1 - \frac{pCE2.5}{100}$

= $2{,}401 * (1 - \frac{95}{100}$

= $120\,tons$

pconPM6 = $((uncPM6 - uncPM2.5) * (1 - pCE2.5 - 6)) + pconPM2.5$

= $((3671 - 2401) * (1 - \frac{99}{100})) + 120$

= $133\,tons$

pconPM10 = $((uncPM10 - uncPM6) * (1 - pCE6 - 10)) + pconPM6$

= $((6000 - 3671) * (1 - \frac{99.5}{100})) + 133$

= $145\,tons$

Calculate controlled emissions after passing through secondary control device.

conPM2.5 = $pconPM2.5 * (1 - \frac{sCE2.5}{100})$

= $120 * (1 - \frac{30}{100}$

= $84\,tons$

conPM6 = $pconPM6 * (1 - \frac{sCE6}{100})$

= $133 * (1 - \frac{54.25}{100})$

= $60.8\,tons$

conPM10 = $pconPM10 * (1 - \frac{sCE10}{100})$

= $145 * (1 - \frac{68}{100})$

= $46.4\,tons$

Since conPM10 < conPM2.5, conPM10 is set equal to conPM2.5; therefore, conPM10 = 84 tons.

CEPM10 = $(\frac{(uncPM10 - conPM10)}{uncPM10}) * 100$

= $(\frac{(6000 - 84)}{6000}) * 100$

= 98.6%

CEPM2.5 = $(\frac{(uncPM2.5 - conPM2.5)}{uncPM2.5}) * 100$

= $(\frac{(2401 - 84)}{2401}) * 100$

= 96.5%

where:

SCC	=	source classification code
pcd	=	primary control device
scd	=	secondary control device
PM10	=	particulate matter less than or equal to 10 microns
PM6	=	particulate matter less than or equal to 6 microns
PM2.5	=	particulate matter less than or equal to 2.5 microns
FIL	=	filterable emissions
psd	=	particle size distribution
pCE	=	primary control device control efficiency
sCE	=	secondary control device control efficiency
unc	=	uncontrolled emissions
pcon	=	controlled emissions after primary control
con	=	controlled emissions after primary and secondary control
2.5-6	=	emissions or control efficiencies greater than 2.5 microns but less than or equal to 6 microns
6-10	=	emissions or control efficiencies greater than 6 microns but less than or equal to 10 microns
CE	=	control efficiency

APPENDIX B
SAMPLE INPUT TABLE
FOR ALL FILE TYPES

COMMENT	SCC	PCD	SCD	EMISS
Example 1	10300101	16	10	23000.0000
Example 2	30700105	53	0	25000.0000
Example 3	50100515	1	0	3000.0000
Boiler 1	30300303	10	3	6000.0000
Plant XYZ	30300606	100	0	2000.0000
Plant ABC	10200204	16	128	5000.0000
ID #xxx	10100102	0	0	8000.0000
Plant XYZ	50100429	0	0	9000.0000
Example Plant	50100421	10	0	85000.0000

Note: For allowable input file formats, see figure 5. The emissions in the EMISS field must be uncontrolled PM-FIL or PM10-FIL emissions.

APPENDIX C
SAMPLE OUTPUT FILES

Sample Output File for PM10 Emissions

Comment	SCC	PCD	SCD	PM10uncon	PM25uncon	PM10con	PM25con	PM10CE	PM25CE	SCC ERR	PCD ERR	SCD ERR	COM ERR	calccode1	calccode2	PM25err	PM10fil	Pmcon	PM10tot	PM25tot	PM25fil
Example 1	10300101	16	10	23000	6000	3.55	3	99.98	99.95	1	1	1	?	1	2	no					
Example 2	30700105	53	0	25000	20969.29	2266.17	2096.92	90.94	90	1	1	1	?	2	2	no					
Example 3	50100515	1	0	3000	804.87	80.4	65.83	97.32	91.82	1	1	1	?	1	2	no					
Boiler 1	30300303	10	3	6000	2401.1	84.03	84.03	98.6	96.5	1	1	1	?	2	1	yes					
Plant XYZ	30300606	100	0	2000	1416.63	17.08	14.16	99.15	99	1	1	1	?	2	2	no	4.000E-1 Lb/Tons Material Produced	none	none	none	none
Plant ABC	10200204	16	128	5000	1742.5	3.53	2.44	99.93	99.86	1	1	1	?	1	2	no					
ID #xxx	10100102	0	0	8000	8000	8000	8000	0	0	2	1	1	?	scc err	scc err	no	4.800E0 Lb/Tons Anthracite Burned	8E-2*A Lb/Tons Anthracite Burned	none	none	none
Plant XYZ	50100429	0	0	9000	9000	9000	9000	0	0	3	1	1	?	scc err	scc err	no					
Example Plant	50100421	10	0	85000	85000	85000	85000	0	0	2	1	1	?	scc err	scc err	no					

*Note: For descriptions of the codes used for SCC ERR, PCD ERR, SCD ERR, COM ERR, calccode1, calccode2, and PM25err please see the table on page C-4.

Sample Output File for PM Emissions

Comment	SCC	PCD	SCD	PMuncon	PM10uncon	PM25uncon	PM10con	PM25con	PM10CE	PM25CE	SCC ERR	PCD ERR	SCD ERR	COM ERR	calccode1	calccode2	PM25err	PM10fil	Pmcon	PM10tot	PM25tot	PM25fil
Example 1	10300101	16	10	23000	5290	1380	0.81	0.69	99.98	99.95	1	1	1	?	1	2	no					
Example 2	30700105	53	0	25000	22142.5	18572.5	2007.15	1857.25	90.94	90	1	1	1	?	2	2	no					
Example 3	50100515	1	0	3000	246	66	6.59	5.39	97.32	91.82	1	1	1	?	1	2	no					
Boiler 1	30300303	10	3	6000	1304.4	522	18.27	18.27	98.6	96.5	1	1	1	?	2	1	yes					
Plant XYZ	30300606	100	0	2000	1714.2	1214.2	14.62	12.14	99.15	99	1	1	1	?	2	2	no	4.000E-1 Lb/ Tons Material Produced	none	none	none	none
Plant ABC	10200204	16	128	5000	1000	348.5	0.71	0.49	99.93	99.86	1	1	1	?	1	2	no					
ID #xxx	10100102	0	0	8000	8000	8000	8000	8000	0	0	2	1	1	?	scc err	scc err	no	4.800E0 Lb/ Tons Anthracite Burned	8E-2*A Lb/ Tons Anthracite Burned	none	none	none
Plant XYZ	50100429	0	0	9000	9000	9000	9000	9000	0	0	3	1	1	?	scc err	scc err	no					
E x a m p l e Plant	50100421	10	0	85000	85000	85000	85000	85000	0	0	2	1	1	?	scc err	scc err	no					

*Note: For descriptions of the codes used for SCC ERR, PCD ERR, SCD ERR, COM ERR, calccode1, calccode2, and PM25err please see the table on page C-4.

Description of Error Code Columns in Output Files

Column	Code Description
SCC ERR	1 - Means that the input SCC has a matching SCC in the PM Calculator's particle size distribution (PSD) table. 2 - Means that the input SCC has a matching SCC in FIRE. 3 - Means that the input SCC does not have a matching SCC in either the PM Calculator's PSD table or FIRE.
PCD ERR	1 - Means that the input Primary Control Device code has a matching code in the PM Calculator's control code list table. 3 - Means that the input Primary Control Device code does not have a matching code in the PM Calculator's control code list table.
SCD ERR	1 - Means that the input Secondary Control Device code has a matching code in the PM Calculator's control code list table. 3 - Means that the input Secondary Control Device code does not have a matching code in the PM Calculator's control code list table.
COM ERR	This column is a placeholder for future use and the value will always be "?".
CalcCode1	scc err - Means that the SCC was not in the PM Calculator's PSD table. Shown when the SCC ERR code is either 2 or 3. ctl err - Means that either the Primary or Secondary Control Device code does not have a matching code in the PM Calculator's control code list table. Shown when either the PCD ERR or the SCD ERR code is 3. 2 or 3 - Identifies the particle size distribution category when there are no SCC or control errors.
CalcCode2	scc err - Means that the SCC was not in the PM Calculator's PSD table. Shown when the SCC ERR code is either 2 or 3. ctl err - Means that either the Primary or Secondary Control Device code does not have a matching code in the PM Calculator's control code list table. Shown when either the PCD ERR or the SCD ERR code is 3. 2 or 3 - Identifies the particle size distribution category when there are no SCC or control errors.
PM25Err	Is "yes" if PM25 emissions are greater than PM10 emissions, otherwise is "no".

APPENDIX D
EXAMPLES OF SCC AND CONTROL CODE LISTS, AND FIXED WIDTH TEXT EXPORT STRUCTURES

Example of SCC List

SCC	SCC1	SCC2	SCC3	SCC4
10100101	External Combustion Boilers	Electric Generation	Anthracite Coal	Pulverized Coal
10100201	External Combustion Boilers	Electric Generation	Bituminous/Subbituminous Coal	Pulverized Coal: Wet Bottom (Bituminous Coal)
10100202	External Combustion Boilers	Electric Generation	Bituminous/Subbituminous Coal	Pulverized Coal: Dry Bottom (Bituminous Coal)
10100203	External Combustion Boilers	Electric Generation	Bituminous/Subbituminous Coal	Cyclone Furnace (Bituminous Coal)
10100204	External Combustion Boilers	Electric Generation	Bituminous/Subbituminous Coal	Spreader Stoker (Bituminous Coal)
10100205	External Combustion Boilers	Electric Generation	Bituminous/Subbituminous Coal	Traveling Grate (Overfeed) Stoker (Bituminous Coal
10100212	External Combustion Boilers	Electric Generation	Bituminous/Subbituminous Coal	Pulverized Coal: Dry Bottom (Tangential) (Bituminous

Example of Code List

Ctlcode	Description	CEPM10	CEPM6	CEPM25
0	None	0	0	0
1	Wet scrubber - hi-efficiency	99	95	90
2	Wet scrubber - med-efficiency	95	85	25
3	Wet scrubber - low-efficiency	90	80	20
4	Gravity collector - hi-efficiency	6	5	3.6

Fixed Width Text SCC List Structure

Field Name	Start	Width
SCC	**1**	**8**
SCC1	**9**	**50**
SCC2	**59**	**50**
SCC3	**109**	**50**
SCC4	**159**	**50**

Fixed Width Text Code List Structure

Field Name	Start	Width
Ctlcode	**1**	**3**
Description	**4**	**50**
CEPM10	**54**	**13**
CEPM6	**67**	**13**
CEPM25	**80**	**13**

APPENDIX E
FIXED WIDTH TEXT OUTPUT STRUCTURES

PM-10 Output Structure

Field Name	Start	Width
Comment	1	20
SCC	21	8
PCD	29	3
SCD	32	3
PM10 Uncon	35	13
PM25 Uncon	48	13
PM10 Con	61	13
PM25 Con	74	13
PM10 CE	87	7
PM25 CE	94	7
SCC ERR	101	1
PCD ERR	102	1
SCD ERR	103	1
COM ERR	104	1
calccode 1	105	7
calccode 2	112	7
PM25 Error	119	3
PM10fil	122	80
Pmcon	202	80
PM10tot	282	80
PM25tot	362	80
pm25fil	442	80

PM Output Structure

Field Name	Start	Width
Comment	1	20
SCC	21	8
PCD	29	3
SCD	32	3
PM Uncon	35	13
PM10 Uncon	48	13
PM25 Uncon	61	13
PM10 Con	74	13
PM25 Con	87	13
PM10 CE	100	7
PM25 CE	107	7
SCC ERR	114	1
PCD ERR	115	1
SCD ERR	116	1
COM ERR	117	1
calccode 1	118	7
calccode 2	125	7
PM25 Error	132	3
PM10fil	135	80
Pmcon	215	80
PM10tot	295	80
PM25tot	375	80
pm25fil	455	80

APPENDIX F
REFERENCES

1. Compilation of Air Pollutant Emission Factors, AP-42, fifth edition with supplements A, B, C, and D, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC.

2. Factor Information Retrieval (FIRE) System, FIRE 6.22 for Windows, located at http://www.epa.gov/ttn/chief/software/fire/index.html, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, October 1999.