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OPEN BURN/OPEN DETONATION DISPERSION MODEL (OBODM) USER'S GUIDE

Volume I. User's Instructions

by

Jay R. Bjorklund[a], James F. Bowers[b]
Gregory C. Dodd[a] and John M. White[b]

[a]H. E. Cramer Company, Inc.
Sandy, Utah 84091-0411

[b]Meteorology & Obscurants Division
West Desert Test Center

WEST DESERT TEST CENTER
U.S. ARMY DUGWAY PROVING GROUND
DUGWAY, UTAH 84022-5000

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Jay R. Bjorklund, James F. Bowers, Gregory C. Dodd
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13. ABSTRACT *(Maximum 200 words)*
The Open Burn/Open Detonation Dispersion Model (OBODM) is intended for use in evaluating the potential air quality impacts of the open-air burning and detonation (OB/OD) of obsolete munitions and solid propellants. OBODM uses cloud/plume rise, dispersion, and deposition algorithms taken from existing models for instantaneous and quasi-continuous sources to predict the downwind transport and dispersion of pollutants released by OB/OD operations. The model can be used to calculate peak concentration, time-mean concentration, dosage (time-integrated concentration), and particulate gravitational deposition for emissions from multiple OB/OD sources for either a single event or up to a year of sequential hourly source and meteorological inputs. The program is designed for use on IBM-compatible PCs using the MS-DOS (Version 2.1 or higher) operating system with keyboard and optional mouse control. It will also run under most WINDOWS environments. The OBODM computer program requires 505 kilobytes of conventional memory, a math coprocessor, and a minimum of 3 megabytes of hard disk storage. Volume I of this user's guide contains instructions for installing and running the model and example problems. Volume II discusses the model's mathematical algorithms and default meteorological inputs.

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TABLE OF CONTENTS

Page

List of Tables iii

Acknowledgements v

SECTION 1. INTRODUCTION

1.1 Model Overview 1

1.2 General Description of the OBODM Computer Program 1

1.3 Installation Instructions 2

1.4 How to use the OBODM User's Guide 5

SECTION 2. USER'S INSTRUCTIONS

2.1 Menu Input Data Format 7

2.2 Program Keyboard Command Keys 8

2.3 OBODM Menus 8

2.4 Error and Warning Messages 15

2.5 Setting Up a Simple Model Run (A Step-By-Step Procedure) . . . 15

2.6 Modifying a Prior OBODM Input File 23

2.7 Setting Up a Batch Run 24

SECTION 3. INPUT REFERENCE

3.1 Data File Access and Generation 29

3.2 Calculation Grid System Receptor Data 30

3.3 Meteorological Data 32

3.4 Source Data 35

3.5 Control and Print Options 38

3.6 Graphics 40

SECTION 4. DATA FILE FORMAT AND CONTENTS

PAGE

4.1 Free Field Format Input Data 45

4.2 Fixed Field Format Input Data 45

4.3 ISCST2 or ISCST3 Data File Format "UNFORM" 47

4.4 ISCST2 or ISCST3 Data File Formats "FREE", "ASCII" and "CARD". 48

4.5 Fixed Field Format Terrain Data 48

4.6 Free Field Format Digitized Map Data 49

4.7 Plot Output Data File 50

4.8 OBODM Fuel/Explosives Data Base File OBODFUEL.OBD 51

4.9 SIGMAPLOT File Format and Contents 106

4.10 Grid Coordinates and Elevation Data 108

SECTION 5. DEFAULT METEOROLOGICAL INPUTS 109

SECTION 6. APPENDICES

A OBODM Menus A-1

B Example OBODM Runs B-1

C References C-1

LIST OF TABLES

TABLE		PAGE
1	Keyboard Command Keys	9
2	Identification of OBODM Error Numbers	15
3	Contents of File OBODFUEL.OBD	47
4	Definitions of the Pasquill Stability Categories	53
5	Pasquill Stability Category as a Function of Net Radiation Index and Wind Speed	54
6	Net Radiation Index as a Function of Insolation Category	54
7	Net Radiation Index as a Function of Pasquill Stability Category and Wind Speed	54
8	Default Standard Deviations of the Wind Direction Angle in Degrees Measured Over 600 s at a Height of 10 m Above Open Terrain	55
9	Default Standard Deviations of the Wind Elevation Angle in Degrees at 10 m Above Open Terrain	55
10	Default Wind Speed Power Law Exponents Over Open Terrain	56
11	Default Vertical Potential Temperature Gradients in Degrees Kelvin Per Meter	56
12	Default Surface Mixing Layer Depths in Meters for Open Terrain	57

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SECTION 1. INTRODUCTION

1.1 MODEL OVERVIEW

The Open Burn/Open Detonation Dispersion Model (OBODM) is intended for use in evaluating the potential air quality impacts of the open-air burning and detonation (OB/OD) of obsolete munitions and solid propellants at Department of Defense and Department of Energy installations. To predict downwind air quality impacts of OB/OD operations, it is first necessary to determine the total quantities of pollutants released. OBODM can use either the theoretical emissions factors predicted by a products of combustion model (for example, Baroody, 1994) or empirical emissions factors such as those derived from measurements in the Dugway Proving Ground BangBox™. These emission factors define the quantities of pollutants released per unit mass of material burned or detonated for each major type of material. OBODM predicts the downwind transport and dispersion of these pollutants using cloud rise and dispersion model algorithms from existing dispersion models such as the Rocket Exhaust Effluent Dispersion Model (REEDM) (Bjorklund et al., 1982; Bjorklund, 1990a), Dugway Proving Ground's Real-Time Volume Source Dispersion Model (RTVSM) (Bjorklund, 1990b), and the U.S. Environmental Protection Agency's Industrial Source Complex (ISC) Dispersion Model (Bowers et al., 1979). A complete description of the dispersion and plume rise algorithms used in OBODM is found in Volume II of this two-volume user's manual.

OBODM can be used to calculate peak concentration, time-mean concentration, dosage (time-integrated concentration), and particulate gravitational deposition for emissions from multiple OB/OD sources. The model can consider instantaneous (detonation) or quasi-continuous (open burn) releases from point/volume and/or line sources. Other OBODM capabilities include combination of multiple source types and multiple emission times in a single run, rectangular (Cartesian) or polar coordinates with elevated ("flag pole") or surface-based receptors, standard or user-defined input data formats, user-specified engineering units, data input/solution save files, "brute force" computation mode with regulatory output tables (high, high second-high, etc.), tabular print output, and screen and hard-copy graphics output. All OBODM source and receptor locations are defined relative to a rectangular or a polar coordinate system in which north (0 degrees) is the positive Y-axis and east (90 degrees) is the positive X-axis. All vertical (z) coordinates are heights above ground level except when the OBODM complex terrain screening mode is used, in which case the z coordinates are terrain heights above mean sea level.

1.2 GENERAL DESCRIPTION OF THE OBODM COMPUTER PROGRAM

OBODM is written in the "C" and FORTRAN 77 computer languages. The program is designed for use on IBM-compatible personal computers (PCs) using the MS-DOS (Version 2.1 or higher) operating system with keyboard and optional mouse control. The OBODM program will also run under most WINDOWS environments. The OBODM computer program requires 505 kilobytes of conventional

memory, a math coprocessor, and a minimum of 3 megabytes of hard disk storage for program, data base, and data/solution save files. Hard diskspace required to run the OBODM program depends on the complexity of the data case and the quantity of meteorological data being processed. It can vary from 3 megabytes for a single OB/OD event to over 3 gigabytes when the maximum numbers of sources and receptors are used with a year of meteorological data under the Detailed processing mode. OBODM graphics requires an EGA or VGA graphics card and dot matrix printer, Laserjet printer (HP Laserjet 4, HP Ruggedwriter, IBM Proprinter/LG24 AGM, Epson FX/LQ, ALPS, OKIDATA, etc.), HP7475A bed plotter, or DEC Inkjet (Regis) printer for hard-copy output. For proper OBODM operation, your CONFIG.SYS file should specify at least 25 files and 25 buffers via FILES=25 and BUFFERS=25. Also, for hard-copy output your AUTOEXEC.BAT file should define the printer ports LPT1, LPT2, and LPT3 as well as define any communications ports (COM1 and COM2) coupled to graphics devices. For example, MODE LPT1:80,6 sets Printer 1 so that OBODM can produce hard-copy on Printer 1 (LPT1). Also, MODE COM1:96,N,8,1,,X sets asynchronous communications for controller 1 at 9600 baud rate, no parity, 8 data bits, 1 stop bit with XON/XOFF protocol for coupling to an HP7475A plotter.

1.3 INSTALLATION INSTRUCTIONS

1.3.1 Contents of Disk

The accompanying disk contains files INSTALL.BAT and OBODM013.EXE. FIle INSTALL.BAT is used to install the program and file OBODM013.EXE contains the compressed OBODM program, data base files, and example files.

1.3.2 Installation Procedures

To install the OBODM program under MS-DOS type:

A:\INSTALL A: [*destination*:]
or
B:\INSTALL B: [*destination*:]

where A: or B: is the source disk drive containing the OBODM disk and *destination* is the hard disk drive (C:, D:, etc.) where you want the OBODM directory (folder) to be located. For example:

A:\INSTALL A: C:

installs the OBODM program in directory (folder) C:\OBODM. The destination hard disk must contain at least 3 megabytes of free disk space. After installation, the destination directory should contain OBODM.EXE, OBODMENU.OBD, OBODMERR.OBD, OBODFUEL.OBD, EXAMPLE1.INP, EXAMPLE2.INP, EXAMPLE1.OUT, and EXAMPLE2.OUT. Alternately, from the WINDOWS 3.x program manager click File, click Run, and type the install sequence as shown above. Under Windows 95 click Start, click Run, and type the install sequence as shown above; then click OK. Files EXAMPLE1.OUT and EXAMPLE2.OUT contain the

output data for the two example cases. These files should be saved in an alternate directory and then compared with new ones generated by the OBODM program using EXAMPLE1.INP and EXAMPLE2.INP to insure the program is working correctly on your system.

The OBODM program is designed primarily for use under MS-DOS. However, OBODM will run under most WINDOWS environments if enough conventional memory (505 kilobytes) is available. Also, make sure the variables FILES and BUFFERS in your CONFIG.SYS file are both 25 or greater. To run under WINDOWS, you must first create an icon for OBODM.

Under Windows 95, right click the Start button and then click Explore. Double click the Programs folder in the Explorer window. Your current program folders will show in the right half of the window. If you wish to place the OBODM icon in one of the folders shown (such as Applications), double click the desired folder. Otherwise the icon will appear in your main programs group. Click File, New, and Shortcut and then type the path to the OBODM program for the Command Line (C:\OBODM\OBODM.EXE) and click Next. Type the name you desire (OBODM) and click Finish. Scroll down the right side of the Explorer window. The new OBODM shortcut should be the last shown. If you wish to change the icon, right click on the OBODM shortcut and then click Properties. In the Properties window, click Program, then go down and click Change Icon. You can select from the icons shown, or browse if you have other icon files such as PROGMAN.EXE, MORICONS.DLL, etc. OBODM can be executed in full screen mode or in a Windows 95 window. In the window mode, Windows 95 may reduce the window size after plotting; this does not happen in the full screen mode.

Under Windows 3.x, highlight the WINDOWS group from which you wish to execute OBODM (e.g., Applications), pull down the File menu under Program Manager, and click New. Next, click on Program Item and then click OK.

Under Description, type: OBODM
Under Command Line, type: C:\OBODM\OBODM.EXE
Under Working Directory, type: C:\OBODM

To select an icon, click on Change Icon and select an icon from PROGMAN.EXE or Browse for an icon. After you have selected an icon, click OK and then click OK under the Program Item Properties menu. The new icon should appear in the group you highlighted above. Double click on that group and then double click on the OBODM icon to run OBODM. If OBODM does not run, an error is displayed or the screen remains blank; either there is not enough free memory or there are problems between OBODM and WINDOWS. If one of these problems occurs, first free up a minimum of 505 kilobytes of memory. You can check the memory by using the MS-DOS MEM command piped through MORE (e.g., MEM /C | MORE). If memory is not the problem, you may have to create a .PIF file to run OBODM. Return to the Program Manager menu. Locate the PIF Editor, which is normally in the MAIN group. Double click on the PIF Editor icon. Pull the File menu down and click on New.

Under Program File Name, type: C:\OBODM\OBODM.EXE
For Window Title, type: OBODM
For Start-up Directory, type: C:\OBODM
Under Video Memory, highlight: Text
Under Memory Requirements, set: KB Required= 505, KB Desired=505
Under Display Usage, highlight: FullScreen
Under Execution, set: Exclusive
Under Close Window on Exit, set: on [X]

All other fields on this menu should be blank or zero. On the Advanced Options menu, set the following:

Under priorities, leave as defaulted; OBODM cannot run in the background.
Detect Idle Time can be left checked [X]
Under Display Options, check [X] the Text box

All other fields on this menu should be blank. When completed, save the OBODM.PIF file and return to the group containing the OBODM icon. Double click on OBODM to run the program. If OBODM still does not run properly, it is incompatible with your WINDOWS configuration and can only be run under MS-DOS. If this is the case, delete the OBODM.PIF file, remove the OBODM icon, and return to MS-DOS.

Setup options allow the user to choose a data editing convention and menu screen colors. OBODM data values may be entered using a left-hand editing or right-hand editing system. Under the left-hand editing system, all data fields are left justified, and editing is very similar to other character editors. Under the right-hand editing system, all data fields are right justified. Numeric values are easier to read in the right-hand system, but the editing takes some practice because inserts are to the right and there are several other differences from the left-hand system. The system used to edit data is selected under SETUP in the first OBODM (initial) menu. Also, you may change the colors of the menus via SETUP. If the colors are changed, go through several menus to see if you like the new color pattern. If not, go back to the first menu and try another combination of colors. Not all color combinations are allowed, but the program will display an error if a color is not allowed. All changes through SETUP are saved in the data-base file and will remain in effect each time OBODM is executed, but can be changed in any run.

1.4 HOW TO USE THE OBODM USER'S GUIDE

The OBODM user's guide consists of two volumes. Volume I contains the instructions for installing and running the model and example problems. Volume II discusses the model's mathematical algorithms and the meteorological data methods used in the model. These two volumes have been designed to meet the needs of both the novice and experienced dispersion modeler. This section briefly describes how the two different levels of OBODM users can best benefit from this manual.

1.4.1 Novice Users

Novice Users are those whose exposure to or experience with dispersion modeling has been limited. Some may be entirely new to dispersion modeling applications and unfamiliar with the necessary inputs required for proper execution of the model. These users should review all sections of Volume I and attempt to duplicate the results of the example problems in Appendix B. Section 2.5 provides a step-by-step procedure for setting up a simple model run using the first example in Appendix B. References to the various menu screens within Sections 2 and 3 can be understood easily by referring to Appendix A, which provides a copy of each OBODM menu screen. Section 3 gives a more detailed description of the OBODM inputs than is contained in Section 2.3. A review of Volume II, which describes the technical details of the model algorithms utilized in OBODM, will aid in understanding the purpose of the model's inputs. However, novice users may wish to review a more general discussion of Gaussian dispersion models (for example, Randerson, 1984 or Houghton, 1985) before studying Volume II.

1.4.2 Experienced Modelers

Experienced modelers are those who have a good understanding of Gaussian dispersion model concepts and have had considerable experience in Gaussian modeling in a variety of situations. They should already have a basic familiarity with Gaussian model source and meteorological input parameters. However, they still may wish to review Volume II to ensure that they understand exactly how these parameters are used in OBODM. Once they understand the algorithms and terminology used in OBODM, experienced users should have little difficulty in executing the model, obtaining any help needed by calling the help routines from within each screen (menu).

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SECTION 2. USER'S INSTRUCTIONS

2.1 MENU INPUT DATA FORMAT

OBODM is a menu-driven program which requires the user to move through various input menus and provide source, receptor, meteorological, and control inputs for the dispersion model algorithms. Help menus are provided to describe program operation, menu control, data control, data formats, and the abbreviation and conversion of engineering units. This section describes the data input format requirements for the OBODM menus.

OBODM data input values occupy a data field delineated by brackets [ ]. Data entries may not overlap the delineating brackets, but may flow over into multiple field data items such as titles and legends. Only one data value may be entered per numeric input field. Numeric values are free field and may be entered as whole numbers (100), decimal fractions (100.012), or in exponent form (1.00012E2), where E specifies the power of 10. Preceding and trailing blanks are ignored, but numeric values must not contain imbedded blanks. OBODM is not sensitive to case; upper- or lower-case letters may be used, but data file names should be entered as they are defined in the working directory. Blank data fields result in a default value, where the default is normally the first option shown in the menu. The letters C (or c) and X (or x) have special functions in most numeric fields: C directs the program to calculate a value for the respective field and X directs the program to delete the current value and replace it with a default, if one is available. Variables obtained via C are either calculated when the user leaves the menu or during execution of the dispersion model.

OBODM data values may be entered using a left-hand or right-hand editing system. Under the left-hand editing system, all data fields are left justified and editing is very similar to other character editors. The first keystroke in the data field automatically switches the editing from insert mode to typeover mode. Under the right-hand editing system, all data fields are right justified. Numeric values are easier to read in the right-hand system, but the editing takes some practice to get used to. The system used to edit data is selected under SETUP in the first (initial) OBODM menu. Also, you may change the colors of the menus via SETUP. If the colors are changed, go through several menus to see if you like the new color pattern. If not, go back to the first menu and try another combination of colors. Not all color combinations are allowed, but the program will display an error if a color is not allowed. All changes through SETUP are saved in the data-base file and will remain in effect each time OBODM is executed, but can be changed in any run.

Warnings or erroneous data are highlighted and have WAR or ERR appended to the end of the line containing the data field. The user must use the Enter key or Page-Down (PgDn) key to save entered data. The Enter key must be used to open data files. The use of any other key to exit a menu may cause loss of

data for the respective menu. If the Enter key is used to exit a menu and errors are detected, the program redisplays the menu and prompts the user to correct the data. A Page-Down, however, does not redisplay the menu in most cases, but goes on to the next menu. In any case, data must be error free in order to execute the dispersion model.

2.2 PROGRAM KEYBOARD COMMAND KEYS

Program keyboard commands are used to move the cursor between data fields and menus and to direct program flow. These commands are summarized in Table 1. Control of the cursor is also available through the left button of a mouse. Using a mouse, the cursor can be positioned on a data field and clicked once to enter data at that position or to direct the program to perform the indicated function. A double click in most cases is not necessary, but performs the same function as pressing the Enter key. Also, any of the functions shown at the top of the menu window can be activated via the Alt key, followed by the highlighted letter.

2.3 OBODM MENUS

This section briefly describes the OBODM program menus. The OBODM menus are discussed in greater detail in Section 3 below and shown in Appendix A. Progress from one menu to another is accomplished through the Enter, Page Down, and Page Up keys; the function keys; and/or via mouse control.

The first OBODM menu (01) asks you for the path name to the directory in which your OBODM data save files reside. You can save and retrieve data files in the current working directory and can also save and retrieve data files in an alternate directory named in this first menu. A blank field defaults to the current working directory. User data files residing in an alternate directory are identified in later menus by entering the file name preceded by an asterisk (*). After pressing Enter or Page Down while in this first menu, a message may appear on the screen indicating OBODM has found an old work file (OBODWORK.OBD) that was left on the directory after a program abort or power failure. The message will ask if you want to use this file to initialize the program. Answer N (no) or Y (yes) or click on option N or Y to set the option in the bracketed field and then click on the option in brackets. You can use this file to reinitialize OBODM with little or no loss of data.

Table 1. Keyboard Command Keys.

Key	Response
F1 (or Alt Q)	Terminates the OBODM program. Program operation is stopped and all files are closed.
F2 (or Alt M)	Returns control to the Main Menu shown on Page A-3 of Appendix A.
F3 (or Alt R)	Returns control to the base menu from any help menu.
F4 (or Alt H)	Displays program operation help menus.
F5	Displays units abbreviations and help menus for engineering units.
F6	Displays fuel/explosive default data help menus. The command requires file OBODFUEL.OBD to be present in the current working directory. Source emissions data may be set or defaulted from these help menus.
F7	Displays all OBODM input (.INP), output (.OUT) and solution files (.SOL) in the current working directory. The user can set or default file names from these help menus.
F8	Allows the user to skip any remaining graphics menus and go directly to plotting.
Right Tab	Tab right to the next data field. Right Tab will not work when at the last data field in a menu.
Left Tab	Tab left to the previous data field. Left Tab will not work when at the first data field in a menu.
Up Arrow	Move cursor up to a previous data field, either the field above or the left most in the line.
Down Arrow	Move cursor down to a next data field, either the field below or the right most in the line.
Right Arrow	Move the cursor one character to the right.
Left Arrow	Move the cursor one character to the left.
Ctrl Home	Move the cursor to the first data field in the menu.

Table 1. Keyboard Command Keys (Continued).

Key	Response
Ctrl End	Move the cursor to the last data field in the menu.
Home	Move the cursor to the first character in the data field.
End	Move the cursor to the last character in the data field.
Insert	Toggle to insert mode or toggle to overtype mode. Left justified editing inserts to the left of the current character and moves the remaining characters one position to the right. Right justified editing inserts to the right of the current character and moves the remaining characters one position to the left.
Delete	Deletes the current character. Left justified editing shifts all characters on the right of the current position one character to the left. Right justified editing shifts all characters on the left of the current position one character to the right. Also, right justified editing shifts the cursor one character position to the right.
Backspace	For left justified editing, the character to the left of the current cursor position is replaced by the current character, and the cursor and all characters on the right are shifted one position to the left. For right justified editing, the character to the left of the current cursor position is deleted and all characters on the left of the current cursor are shifted one position to the right. The cursor remains at the current position.
Ctrl K or Ctrl k	Clear the data field.
Enter (or Alt E)	Directs OBODM to save the menu data and exit the menu, branch to the specified data section, or open the specified data files. This key can be used interchangeably with the Page Down key. However, except for some graphics menus, the Page Down key does not cause OBODM to redisplay a menu when errors are detected. Also, Page Down does not open input (.INP), output (.OUT), or solution (.SOL) files. The Enter

Table 1. Keyboard Command Keys (Continued).

Key	Response
	key is used for most messages that appear on the screen and require a response from the user. If the message specifies an option or requires an input value, do not use Enter. For messages, use Enter only when OK is displayed or when directed to by the message.
Page Up (or Alt B)	Directs OBODM to go to the previous menu. Under some circumstances, OBODM will not save data correctly when a Page Up is entered after data menus are altered. To ensure that data are saved, use Enter or Page Down and then do two Page Ups.
Page Down (Alt N)	Directs OBODM to store the menu data and go to the next menu. Page Down does not open the data files displayed in Menu 2. Data errors do not prevent you from going to the next menu, except in graphics menus.
Escape	The escape key can be used as a substitute for F1, F2 or F3, depending on where you are in the program. Be careful with this key, as it may abort OBODM when you are in Menus (1), (2), or (3).
Ctrl C or Ctrl Break	These keys are used to interrupt the OBODM program when executing the dispersion model, generating reports, generating plots, or anytime you wish to regain control of the program. Under brute force runs when the program is processing large quantities of data and displaying data errors, this can be used to halt the program and return to correct problems. You can return to the Main Menu, abort the program, or continue with processing after the interrupt. Press the Ctrl C (or Ctrl Break) keys at the same time. There may be a delay between the time the keys are pressed and when the program actually halts, so wait for the program to halt.

The second menu (02) specifies the input-output data save files. Special data files, such as chronologically-ordered source emissions, chronologically-ordered meteorology, terrain data, map data, and plot files are specified in other program menus. If a data file name resides in the alternate directory specified in the first menu, precede the name with an asterisk (*). If no asterisk is used, the program assumes the data file resides in the current

working directory. Input data save files have a default extension name of .INP. The input data save file must have been generated in a previous run of the OBODM program. The output data save file may be the same name as the input file if you wish to update or modify the input file. The print output file default extension name is .OUT. All program input data, the results of the model calculations, and warning and error messages are written to the print output file. The solution file default extension name is .SOL. This file is used to save the dispersion calculation results required for graphics output or for future recovery (printing, scaling, or averaging) of the data case. This file can be both an input and output file. A plus symbol (+) prior to any file name forces the remaining file name fields to have the same name. An equal symbol (=) prior to the name under INPUT DATA SAVE FILE indicates a batch file that contains data file names for batch processing of multiple cases. Data file names can be defaulted using the F7 key. Pressing F7 will display a list of the OBODM data files in the current directory.

The user may use either Enter or Page Down to go to the MAIN MENU from the second menu. An Enter opens all data files and initializes data from the specified input file before going to the MAIN MENU. A Page Down goes directly to the MAIN MENU without opening any data files. If you are recovering from a previous abort or power failure, have reinitialized from an old OBODWORK.OBD file, and specify an input file here, an Enter will open this input file and write over the data read from the OBODWORK.OBD file. If, however, you use the Page Down key to go to the MAIN MENU, you can review which data sections are set (SET). Then, using Page Up from the MAIN MENU, you can return to the second menu and change or remove the input file as needed. Finally, using Enter from the second menu, you can open the data files and return to the MAIN MENU.

The OBODM MAIN MENU is the third menu. Program data input, execution, and graphics are controlled from this menu. Move the cursor to the desired section and press Enter, or click the mouse to go to the desired section, or type 1, 2, ... 9 followed by Enter to go to the desired data section. Before the dispersion model can be executed (EXECUTE), the column under HAVE DATA must show SET for the four data input sections. This column will display SET, ERR, NONE, or WARN for each data input section. If ERR is displayed for a section, the user must return to that section and correct the data error. If WARN is displayed, the program has detected questionable data and the user should review the data. The program will SET the EXECUTE and GRAPHICS sections under the HAVE DATA column after they have been executed. The EXECUTE section must show SET before any graphics can be generated. DISPLAY is used to display the print output file. When you leave the display menu, the program will ask if you wish to rewind the input file or leave it at the end of data. If the file is rewound, the data in the print file will be written over and lost. The REPRINT/SCALE section is used to reprint previously generated solution (.SOL) files. Also, this section can be used to scale previous solution files or calculate new averages or source combinations. The last section (FINISH) terminates the program, closing and cleaning up all data files and deleting the work file OBODWORK.OBD.

The next menus are used to enter the receptor locations (grid calculation points). Receptor locations can be entered in Cartesian (rectangular) or polar coordinates in user-selected engineering units. Depending on the coordinate system, the X coordinate is the east-west coordinate or the range, while the Y coordinate is the north-south coordinate or the azimuth bearing. Receptor locations are assumed to be relative to the rectangular origin (0,0) unless another origin is specified. For example, if the origin is defined as (X_0, Y_0), the actual receptor location used by OBODM for a receptor with rectangular coordinates $(\Delta X, \Delta Y)$ is $(X_0 + \Delta X, Y_0 + \Delta Y)$. Similarly, the actual receptor location used by OBODM for a receptor with polar coordinates (R,θ) is $(X_0 + R\sin\theta, Y_0 + R\cos\theta)$. You may direct OBODM to generate either a rectangular or polar grid from an initial value and spacing increment for each coordinate. The grid system orientation angle is subtracted from the wind direction (direction from which the wind is blowing) to determine the wind direction used in the dispersion calculations. This feature is designed to correct for the deviation of grid north from true north that occurs in some coordinate systems such as the Universal Traverse Mercator (UTM) system. The receptor height above ground level must be the same for all receptors in the regular grid, but can vary for the discrete receptors. When the complex terrain mode is specified, the base elevation of all receptors must be entered, where all elevations are relative to a single base elevation such as mean sea level (MSL). Also, the base elevations of all sources and the meteorological data measurement site must be entered. (The complex terrain option cannot be used when calculating concentration with gravitational deposition occurring or gravitational deposition for particu-lates with appreciable settling velocities.)

$$N_q \bullet (N_x \bullet N_y + N_d) \leq 10{,}000$$

Each OBODM run must satisfy the receptor grid size limitation where:

N_q = number of quantities (peak concentration, dosage, time-mean concentration, etc.) to be calculated in a single run

N_x = number of X coordinates for the regular receptor grid, ≤ 100

N_y = number of Y coordinates for the regular receptor grid, ≤ 100

N_d = number of discrete receptors, ≤ 100

The next group of menus is used to enter the meteorological data. OBODM can accept meteorological data for a single OB/OD event or chronologically-ordered hourly meteorological data. All meteorological data for a single case are entered in these menus. Also, the first hour of chronologically-ordered data must be set in these menus and the units must be the same as those to be

taken from the input hourly meteorological data file. If chronologically-ordered data are to be used, the user must specify which parameters are to be taken from these menus and which are to be taken from the hourly data input file. Chronologically-ordered data files can be in: (1) a user-specified format, either fixed or free field; or (2) an ISCST2, ISCST3, RAMMET or MPRM preprocessed format (EPA, 1995). Meteorological inputs used by the OBODM program should be specified by an experienced meteorologist familiar with Gaussian dispersion modeling. A slight error in any meteorological data element could lead to erroneous results without a warning from the program.

The next menus are used to enter the source data. Function key F6 can be used to initialize data in the first source data menu. You may specify the pollutant emissions factor by entering either the mass of pollutant released per unit mass of material burned or detonated, or the mass fraction of the material that is converted to the pollutant. The emissions factor is multiplied by the total mass of material burned or detonated to obtain the total pollutant emissions. The molecular weight is required for a gaseous pollutant if the desired output units are parts per million (or billion, etc.), and the density is required for particulates. If any source data vary with hourly input meteorological data, enter a Y in the last field of the first source data menu. The source parameters that vary by hour are identified in menus that follow. The hourly source data are then read from a user-specified data file which has a user-specified format. Not all source data menus will appear. Only those menus required for the specific source and emissions types will be displayed.

The next set of menus is used to specify OBODM program control information (i.e., which calculations will be performed and which output units will be used). The program may be able to calculate multiple parameters (dosage, peak concentration, etc.) in a single run, depending on the number of receptor points specified [see Equation (2-1)]. Solutions for multiple sources can be summed over all sources or select subgroups of sources. Multiple sources are indexed according to the order in which they are entered. The sources to be combined for output are identified using these source index numbers. Regulatory-type output tables (highest, second highest, etc. concentration, dosage etc.) are only produced when chronologically-ordered hourly meteorological inputs are used.

Help menus are displayed via the F4 or F6 function key. The F4 key displays program operation help menus, while the F6 key displays the fuel/explosives default data help menus. Much of the information in this section can also be found in these help menus.

The next menus are graphics menus. The user may cycle through the graphics menus, creating as many plots as desired. A hard copy is produced only for plots selected by the user. Hard copies can be sent directly to an output printer or communications port. Alternatively, a file can be generated for plotting at a future time. For print port output, your AUTOEXEC.BAT file must use the MS-DOS MODE command to set up LPT1, LPT2, and/or LPT3. For

example, MODE LPT1:132,6 sets Printer 1 to 132 characters per line and 6 lines per inch. Either 132 or 80 characters per line can be used. For asynchronous communications port output, your AUTOEXEC.BAT file must also use the MS-DOS MODE command to set up COM1 and/or COM2. For example, MODE COM1:96,N, 8,1,,X sets the mode of operation to 9600 baud, no parity, eight data bits, and one stop bit with XON/XOFF protocol. If you are using an HP7475A plotter coupled to a communications port, you must specify XON/XOFF protocol. Terrain and digitized map data files may be used for plot background, where the terrain data are plotted as contour heights and the map data identify sites, roads, etc.

2.4 ERROR AND WARNING MESSAGES

Error and warning messages are displayed on the current menu and/or written to the output print file (.OUT). If the MAIN MENU indicates an error or warning for any data section, but no message has appeared on the screen, the user may have to use DISPLAY to view the print output file for error or warning messages. Most warning and error messages produced by OBODM are self explanatory. However, numbered warning and error messages may not be. Table 2 identifies the OBODM error numbers. If a numbered message appears that is not listed in Table 2, you may have to contact your system personnel or the authors of the OBODM code to diagnose the problem.

2.5 SETTING UP A SIMPLE MODEL RUN (A STEP-BY-STEP PROCEDURE)

This section goes through a step-by-step example of setting up a simple problem in order to illustrate the most commonly used options of the OBODM program. This example problem will produce an output file identical to the output file listing for EXAMPLE1 in Appendix B. A more detailed description of each entry field is provided in Section 3 of this volume.

The problem to be modeled in this simple tutorial is the disposal by detonation of 500 lb (227 kg) of TNT. We wish to predict the peak concentration of carbon dioxide (CO_2) at the OB/OD installation's border, 10 km from the detonation site, for a 2 m/s wind speed measured at 10 m and the Pasquill C stability category. We will assume that the detonation site is in a rural setting with relatively flat terrain. The peak concentration at the border will be found by placing a single grid receptor directly downwind at 10 km.

Table 2. Identification of OBODM Error Numbers.

Error Number(s)	Error
6200, 6201, 6202 6203, 6204, 6419	The file type (binary versus ASCII) does not match the expected file type. Most likely an incorrect file name has been specified.
6205, 6206, 6207 6208	The edit descriptor used in the format specified for the data set does not match the actual data being read or written.
6311	The program attempted to read or write an illegal record in a direct access file. Either you have run out of disk space for an output file or an input file has been corrupted and cannot be used.
6405	An I/O operation was attempted on a file after an end-of-file.
6406, 6409, 6410 6411, 6421, 6500	The file may have been locked or have permissions set that would prevent the file from being accessed.
6413	The file is already assigned and cannot be reassigned in the manner specified.
6414	The named file is a directory or a read only file, or the file's sharing mode does not allow the specified operations.
6415	The file is being opened as a new file, but it already exists in the specified directory.
6417	Too many files have been opened. Change the FILES= command in the CONFIG.SYS file to at least FILES=25 and reboot the system.
6418	The program exceeded the limit on the number of open files. Close any unnecessary files and do not run background processes while OBODM is executing.
6420	A file has not been properly opened or specified and the program is asking for the correct file name of the unit being accessed.
6422	The program tried to move data to a file residing on a device that has insufficient storage space.

Table 2. Identification of OBODM Error Numbers (Continued).

Error Number(s)	Error
6501	The program tried to read more data than the file contains. The file has been corrupted, truncated, or is an incorrect file for the purpose specified.
6502	When the i*v form is used in free-field (list-directed) input, the i must be a positive integer.
6503	In free-field input of the form i*v, an extra repeat field was used.
6504	A numeric value was expected in a free-field input record.
6505	A character string was expected in a free-field input record or was not enclosed in single quotation marks.
6508	Too many bytes were read from the data file. Most likely an incorrect file name was specified for the application.
6980-6991	An error was found in a format specified for an input file. Check for balanced leading and trailing parentheses, incorrect edit specifiers, etc.
6100-6105	A math error has occurred causing an invalid result. Check all input data for erroneous values, especially for zero values that should not be zero.
6002	The copy of OBODM you have requires a coprocessor, but you do not have a coprocessor installed. You must install a coprocessor or obtain a copy of OBODM that emulates the coprocessor.

Step 1: Starting the Program.

The program is initiated by first going to the directory in which the executable file OBODM.EXE is located (e,g., C:\OBODM if the file is located in a subdirectory labeled OBODM). The program is started by typing

```
OBODM
```

Step 2: Specifying the Directory.

The first menu will request the DIRECTORY path name. In this example, we will use the current directory, which is the default if the entry field is left blank. To proceed, press Enter or Page Down.

Step 3: Naming Data Save Files.

Input and output data files can be named in the next screen. When the menu first appears, the cursor should be in the Input Data Save File (.INP) entry field. Press Tab to move the cursor to the Output Data Save File (.INP) entry field. Type

+EXAMPLE1

and press Enter, which will save the Print Output Save File (.OUT) and the Get/Save Solution for Graphics File (.SOL) under the same name with their proper extensions.

Step 4: Set the Grid System Receptor Data.

The next screen is the MAIN MENU. When the MAIN MENU first appears, the cursor should be at the CALCULATION GRID SYSTEM RECEPTOR DATA section. Press Enter, which will cause the menu entitled CALCULATION GRID SYSTEM RECEPTOR DATA to appear. Set the data entry fields as follows:

- Receptor grid system to rectangular - - - - - - - - - - [R]
- Receptor grid system length units to meters -- - - - - -[m]
- Receptor grid system height or elevation to meters - - - [m]
- Receptor grid (X,Y) origin coordinates both to zero -[0],[0]
- Add origin to source rectangular coordinates - - - - - - [ ]
- Height of grid system above flat terrain at ground level (zero or left blank) - - - - - - - - - - - - - - - - - - - [ ]
- Grid orientation angle at zero degrees [d] - - - - - -- - -[0]
- We will not generate a receptor grid system axis - - - - [N]
- Because there are no previous grid system receptor points, we will not delete current grid system receptor points - [N] or discrete receptor points - - - - - - - - - - - - - - [N]

Because all of the above entries are defaults, it is not necessary to go through each entry field. Instead, by pressing Enter, the defaults will be

set and the model will go to the next CALCULATION GRID SYSTEM RECEPTOR DATA menu.

The purpose of this example is to predict the peak CO_2 concentration at 10 km. If we assume a wind from the west, we can compute this concentration at (X = 10 km, Y = 0 km). Because we defined the units of our coordinate system as meters in the previous menu, enter the X coordinate of 10 km as 10,000 m [10000]. Press Enter to go to the next menu, set the Y coordinate to zero [0], and press Enter again. The DISCRETE RECEPTOR DATA menu is the next screen. Because we will not need any discrete receptors, press Enter or Page Down to have the model return to the MAIN MENU. The box by the Grid System should indicate [SET].

Step 5: Set the Meteorological Data.

By using either the arrow keys or mouse or pressing Tab, move the cursor to the METEOROLOGICAL DATA section and press Enter. The screen that appears allows us to specify that the meteorological data to be input will be a single observation [S] and that we will not specify minimum or maximum limits for meteorological parameters [N]. Press Enter and the menu for meteorological inputs will appear. For our desired meteorological inputs, the data entries are as follows:

- Wind speed at 10 meters in meters per second [m/s] - - -[2]

- Wind direction in degrees from north - - - - - - - - -[270]

- Set the Pasquill Stability Category for slightly unstable conditions -[C]

The wind direction of 270° is required so that the wind will blow directly towards our single receptor on the X axis. The rest of the entries in this menu can be left as they appear (their utility will be explained in Section 3). Press Enter to go to the next menu. The ground elevation at the meteorological (met.) measurement site in meters [m] should be zero [0] because nonzero elevations are used only in the complex terrain mode. The other entries should be either defaults (600 s is the default measurement time for the wind azimuth angle standard deviation and 50 percent is the default relative humidity) or set to [C] to direct the model to calculate the default based on the Pasquill stability category selected. Press Enter to go to the next METEOROLOGICAL DATA menu. Because we wish to use the default data entries in this menu, press Enter and OBODM should return to the MAIN MENU with the box by METEOROLOGICAL DATA indicating [SET].

Step 6: Set the Source Data.

The first step in entering source data is to define the material to be destroyed and the pollutant species of concern. We will make use of OBODM's data base to obtain the required characteristics for the material and species.

Using the arrow keys, mouse, or Tab key, position the cursor in the SOURCE DATA box and press Enter. The SOURCE POLLUTANT/SPECIES menu will be displayed. Press F6 to display a list of common fuels and explosives. The menu that appears will display the fuel/explosive type and the heat content and burn rate for each fuel/explosive. Using the arrow keys, mouse or Tab key, position the cursor on the line for TNT and press Enter. The next menu will display the various pollutant species of TNT. Position the cursor on the Carbon Dioxide species and press Enter. The screen will return to the SOURCE/POLLUTANT SPECIES menu with all of the necessary data fields set based on the Carbon Dioxide pollutant selected.

Press Enter to go to the SOURCE NUMBER menu. We will identify our single source in this example as Source 1. Enter [1] at the GET OR SPECIFY DATA field. Next press Enter and the GASES OR PARTICULATE SOURCE DATA menu will appear. Assign a name to identify the source such as [TNT only source]. Set the source type to volume [V] and the emission type to instantaneous [I]. The quantity of material to be detonated in units of pounds [lb] is [500]. The material heat content, which is the default for TNT in calories per g [ca/g], should already be set at [925]. The burn rate in grams per second [g/s] will be computed [C] by the model and because there is only a single meteorological observation, the hours in a day entries should be left blank.

To summarize, the entries should be as follows:

- Source type will be volume (point) - - - - - - - - - - - - - - - - - [V]
- Source emission type is instantaneous for detonation - - - - - - - [I]
- Total mass of material burned or released [lb] - - - - - - - - - - [500]
- Fuel material heat content [CA/g] - - - - - - - - - - - - - - - - [925]
- Fuel material burn rate [g/s] - - - - - - - - - - - - - - - - - - - [C]
- Hours in a day - all [ ]

Type Enter to save these data and go to the next menu.

Enter the source coordinates, release height, and initial source diameter as follows:

- The X and Y source coordinates are rectangular - - - - - - - - - - [R]
- The X and Y coordinates are both in meters [m] and the source will be at the grid origin (X = 0, Y = 0) - - - - - - - - - - - - - - [0],[0]
- The source base ground elevation Z is zero because we are not using complex terrain - [0]

- The effective release height [m] above ground level of the initial cloud (fireball) will be calculated by the model - - - - - - - - [C]

- The expected diameter [m] of the initial source will be calculated by the model - [C]

Note that, for a detonation at the surface, the centroid of the initial cloud (fireball) will be above the surface. Although the height and diameter of the initial cloud can be entered, we have directed the program to compute these parameters. The last data field on this menu asks if you want to review auxiliary source data. The auxiliary source data are only changed when very specific information is known about the source dispersion characteristics. Otherwise, this auxiliary menu should always use the shown default values.

Finally, press Enter and the SOURCE NUMBER menu will reappear with the number of sources [1] set under the SOURCE NUMBER header. Press Enter or Page Down to return to the MAIN MENU. SOURCE DATA in the MAIN MENU should now show SET.

Step 7: Set the Control/Options Data.

Press Tab or use the arrow keys or mouse to advance the cursor to the CONTROL/OPTIONS DATA and press Enter, which will advance OBODM to the CONTROL/PRINT OPTIONS menu. Enter the following inputs in their respective data fields:

- Heading - - - - - - - - - - - - - - [Example 1 - 500 lb TNT Detonation]

- Calculate dosage - [N]

- Calculate concentrations - [Y]

- Calculate time-averaged concentration - - - - - - - - - - - - - - - - [N]

- Concentration averaging time and units - - - - - [S] - - - - - - - [0]

- Calculate gravitational deposition - - - - - - - - - - - - - - - - - [N]

- Quasi-continuous integration time interval - - - - - - - - - - - - [C]

- Use final or distance-dependent cloud rise - - - - - - - - - - - - [F]

- Restrict calculations to a clearing index greater than - - [ ]

- Restrict calculations to daytime hours - - - - - - - - - - - - - - [N]

- Mass units - [ug]
- Length units - [m]
- Area units - [m]
- Volume units - [m]
- Time units - [s]

Note that, with the exception of entering the heading, all of the above inputs are defaults. Press Enter to go to the PRINT AND AUXILIARY OPTIONS menu. Set the print and auxiliary options as follows:

- Sum of sources should be printed - - - - - - - - - - - - - - - - - [S]
- The column width should be 80 characters - - - - - - - - - - - - - [80]
- Print maximum plume rise height and distance - - - - - - - - - - - [N]
- File name of output sigma plot file - - - - - - - - - - - - - [ ]
- Use plume rise Option A for instantaneous sources - - - - - - - [A]

Press Enter to return to the MAIN MENU. All of Data Sections 1 through 4 should have been [SET]. If so, the data entries are completed and the model is ready to run. If this is not the case, go to the section which is not [SET] and advance through the inputs for that section, as discussed above.

Once all of the data sections have been [SET] and OBODM is ready to run, press Tab or use the arrow keys or mouse to advance the cursor to the EXECUTE section and press Enter. Two messages will appear. The first message, in the middle of the screen, will be, "Please wait - Compiling reports." The second message, at the bottom of the screen, will be "Please wait - OBODM processing case #." When the messages disappear, the main menu will reappear and the EXECUTE section should have [SET] indicating that the model has completed its run. Press Tab or use the arrow keys or mouse to advance the cursor to the DISPLAY section to view the print file. Do not rewind the print file on leaving this menu. Then go to FINISH and press Enter to return to the C: prompt. Type

```
DIR EXAMPLE1
```

at the DOS C:\OBODM> prompt to see the files generated by the model. They should be as follows:

EXAMPLE1.INP
EXAMPLE1.OUT
EXAMPLE1.SOL

The file EXAMPLE1.OUT will list all of the inputs and the concentration solution for the single grid receptor point. Because this is a text file, an edit utility can be used to view the contents of this file or it can be printed. Compare the file with the output listing provided in Appendix B. The input listings should be the same and the concentration calculated at X=10000 and Y=0 should be 6.16226 $\mu g/m^3$ to at least five significant digits. If the solution for your model run does not agree with this value, compare your inputs with the Appendix B EXAMPLE1 listing. If your concentration solution agrees with the value listed, you have successfully completed your first OBODM run!

2.6 MODIFYING A PRIOR OBODM INPUT FILE

The modular structure used by OBODM makes it simple to modify prior model inputs. When the MAIN MENU appears on the screen, it is only necessary to make modifications within the specific sections that require change. Thus, when making a series of similar runs, it is not necessary to repeat the entire input process and re-enter parameters that do not change between runs. In this tutorial example we will: (1) modify the inputs for EXAMPLE1 to change from a single receptor point to multiple grid receptor points, and (2) calculate dosage. All other inputs will remain the same.

The program should be initiated (type OBODM) again from the directory in which the executable file is located. Because the EXAMPLE1 files are located in the same directory, press Enter in the first menu. Type EXAMPLE1 in the entry field for INPUT DATA SAVE FILE (.INP) in the second menu, and OBODM will recall all of the inputs from the EXAMPLE1 model run. Press Tab and the cursor should advance to OUTPUT DATA SAVE FILE (.INP). If a file name already exists in this entry field, delete the name using either the Delete key or pressing the Control and K keys simultaneously. Enter the plus symbol (+) followed by a new file name, EXAMPLE2 and press Enter. The file names in the remaining entry fields will change to the new file name and the model will advance to the MAIN MENU. The data for the first four sections should indicate [SET].

In order to change the grid system receptors, make sure the cursor is at that section and press Enter to go to the CALCULATION GRID SYSTEM RECEPTOR DATA menu. Then use the Tab, mouse, or arrow keys to advance the cursor to the entry field for "Delete current X,Y,Z grid system receptor points." Type [Y] and press Enter. The screen will advance to the X axis entry menu. Type the following east-west distances: 100, 500, 1000, 1500, 2000, 2500, 3000, 3500, 4000, 4500, and 5000. (Remember to press Tab to advance to the next entry field.) When these distances have been typed, press Enter to advance to the Y axis entry menu. Type the following north-south distances: -2000,

-1500, -1000, -500, 0, 500, 1000, 1500, and 2000. Press Enter twice to return to the MAIN MENU.

In order to direct OBODM to calculate dosage instead of concentration, use the Tab, mouse, or arrow key to advance the cursor to the CONTROL/OPTIONS DATA section and press Enter. Use the arrow key to move the cursor in the "Heading" data entry field under the number 1. Then press Insert (toggle to typeover) and 2 to modify the heading to EXAMPLE2. Use the Tab, mouse or the down arrow key to move to the "Calculate dosage" entry field and enter [Y]. Next, move to the "Calculate concentration" entry field and enter [N]. Press Enter to save these data. We will not change this last menu, so you may type Enter, or F2 or use the Page Down key or mouse to go back to the MAIN MENU. Advance the cursor down to the EXECUTE section and press Enter to execute this example. OBODM will now calculate dosage at the specified multiple receptor points. When the model run is completed, advance the cursor to DISPLAY to view the calculations or to the FINISH section and press Enter to return to the DOS C: prompt.

Examine the EXAMPLE2.OUT file either by editing or printing the file. Compare your output listing with the output listing for EXAMPLE2 provided in Appendix B. If the results for your model run do not agree with the example results, check the inputs for your run with those of the example run and correct any differences.

2.7 SETTING UP A BATCH RUN

A series of model calculations can be made in a single OBODM run by creating a series of unique input (.INP) files, placing the file names in a batch file, and executing the OBODM program. The series of input files can be created by using a text editor to modify an existing file and saving it under a different file name. However, using a text editor to modify an OBODM input file is difficult and can lead to erroneous results. A better method is to use the OBODM program to create all of the needed files. This is done by executing the OBODM program and moving to the OPTIONAL DATA FILES menu. Under INPUT DATA SAVE FILE (first data field) specify the file to get data from. If there is no input file, leave the first data field blank. Under OUTPUT DATA SAVE FILE (second data field) specify the first batch file to be created, and under PRINT OUTPUT SAVE FILE (third data field) specify a scratch (dummy) print file. Press Enter and go to the MAIN MENU. From the MAIN MENU go to the respective data sections and edit the input data. After the data are edited, return to the MAIN MENU and if all data sections in the MAIN MENU show SET, press Page Up to go back to the OPTIONAL DATA FILES menu. Type a new file name in the second data field under OUTPUT DATA SAVE FILE. Press Enter and go to the MAIN MENU to edit the data for this next batch file. Repeat cycling between the MAIN MENU and the OPTIONAL DATA FILES menu until all but the last batch file is created. When editing for the last batch file is completed, return to the MAIN MENU and move the cursor to FINISH (or type a 9) and press Enter to exit the program. All of the batch files should now be created. The following will illustrate this process.

In this tutorial batch run example, we want to change the wind speed and net radiation index (NRI) for several runs. In EXAMPLE1, the model run was for a 10-m wind speed set to 2 m/s and an NRI (net radiation index) of 2. We now want to make model calculations for the following combinations of wind speed and NRI:

Input File	Wind Speed (m/s)	NRI
EXAMPLE3	2	1
EXAMPLE4	2	0
EXAMPLE5	4	0
EXAMPLE6	6	0
EXAMPLE7	8	0

Start by running the OBODM program. Move to the OPTIONAL DATA FILES MENU and type EXAMPLE1 in the first field (INPUT DATA SAVE FILE), EXAMPLE3 in the OUTPUT DATA SAVE FILE field, and OBPRINT in the PRINT OUTPUT SAVE FILE field. Press Enter and go to the MAIN MENU. Move the cursor down to METEOROLOGICAL DATA and press Enter. In the following data menus change the net radiation index to 1, press Enter and return to the MAIN MENU by pressing F2 or Enter or Page Down until the MAIN MENU appears. Move the cursor to CONTROL/OPTIONS DATA and press Enter. In the heading change "Example 1 ..." to "Example 3 ...", press Enter and return to the MAIN MENU by pressing F2 or Enter or Page Down. If all data sections show the data are SET, press Page Up to return to the OPTIONAL DATA FILES MENU. When a new OUTPUT DATA SAVE FILE name is entered, the program will create file EXAMPLE3. In the OUTPUT DATA SAVE FILE field change EXAMPLE3 to EXAMPLE4 and press Enter to go edit the data for Example 4. Return to the MAIN MENU when done and press Page Up. Repeat this process for the new files EXAMPLE5, EXAMPLE6 and EXAMPLE7, changing only the wind speed and/or NRI to those values shown above and the appropriate heading title. After editing has been completed for EXAMPLE7 and still in the MAIN MENU, move the cursor to FINISH and exit the program. As a check to make sure all of the files have been created, run a directory listing by typing

```
DIR EXAMPLE*.INP
```

If you have example input files listed from 3 to 7 (approximately the same size as EXAMPLE1.INP), you are ready to create a batch run file that will list for each example case an input file name and desired output file names. (If all of the input files were not created, go back and edit and repeat the above for the missing files.)

The next step is to create the batch run file. Using a text editor, create a new file BATCHEXP.FIL. Once in the edit mode, type a 4-line list of the file names you would normally input in the OPTIONAL DATA FILES menu. In our batch run file example, the first case run will be EXAMPLE3 so that the first four lines will look like this:

```
EXAMPLE3                  (assumed file extension is .INP)

EXAMPLE3                  (assumed file extension is .OUT)
EXAMPLE3                  (assumed file extension is .SOL)
```

or could look like:

```
EXAMPLE3.INP

EXAMPLE3.OUT
EXAMPLE3.SOL
```

Note that the second line is blank. It is not necessary for the model program to create another save input file since no changes will be made to the original EXAMPLE3 input file. The next four lines should contain the file names for EXAMPLE4, followed by the remaining examples with the final batch run file listing looking like:

```
EXAMPLE3

EXAMPLE3
EXAMPLE3
EXAMPLE4

EXAMPLE4
EXAMPLE4
EXAMPLE5

EXAMPLE5
EXAMPLE5
EXAMPLE6

EXAMPLE6
EXAMPLE6
EXAMPLE7

EXAMPLE7
EXAMPLE7
```

Save the file under the initial BATCHEXP.FIL name and exit to the C:\OBODM> prompt.

You are now ready to make a batch run. However, first check to see if EXAMPLE3.OUT, EXAMPLE4.OUT,..., EXAMPLE7.OUT already exist. If they do and you run a batch run, the program will append all new calculations to the ends of the respective files. If they do exist and you want only new calculations in the print output files, delete the old copies before running OBODM in the batch mode. Run the OBODM program and press the Enter key to advance to the

OPTIONAL DATA FILES menu. The cursor should be at the INPUT DATA SAVE FILE (.INP) input field. Type

```
=BATCHEXP.FIL.
```

The equals (=) sign indicates that this is a batch file containing data file names for batch processing of multiple cases. Press Enter to start the batch run. You will see the file names for each example case displayed in the respective entry fields in the OPTIONAL DATA FILES menu as OBODM processes the five example cases. The program will also display a message at the bottom center of the screen to indicate that it is processing the run for the specified case number. After the batch run is completed, type

```
DIR EXAMPLE*.OUT
```

at the C:\OBODM> prompt to list all of the output files created for each case. Check the input listing within each output file, particularly for wind speed and/or NRI, to verify that the edited changes in the input files are correct. If the changes are correct, the model runs for those cases are valid. Also, check all batch output files (.OUT) for warnings or errors as these messages are not displayed, but only written to the output file under batch processing.

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SECTION 3. INPUT REFERENCE

The OBODM input menus briefly discussed in Section 2.5 are discussed in much greater detail in this section. Before reviewing this section, the user is encouraged to go through the step-by-step procedures outlined for a simple model run in Section 2.5 to become familiar with the primary OBODM inputs, how to move from menu to menu, and the basic structure of the program. Once the user has acquired this general familiarity with the OBODM program, this section can be used, as a reference source for answers to many of the questions that may arise when setting up an OBODM run. This section also provides the only discussion of OBODM's graphics capabilities.

3.1 DATA FILE ACCESS AND GENERATION

Data file access begins in the first menu where you specify the pathname to the directory on which the OBODM data files reside. For example, the OBODM.EXE, OBODMENU.OBD, OBODMERR.OBD, and OBODFUEL.OBD files must be in the OBODM directory that we created in Section 1.3.2. Data files can be saved in a subdirectory called SUBOBOD within the OBODM directory. In order to access this subdirectory, type the following in the entry field:

\OBODM\SUBOBOD\

If your data files are on another disk drive (e.g., D:) or on a floppy disk (e.g., A:), enter

D:*pathname*
or
A:

If the entry field is left blank, the model will default to the current drive and directory. The data editing mode and/or menu colors can be changed by typing [Y] in the SETUP field at the bottom of this menu. Setup options allow the user to choose a data editing convention and menu screen colors. OBODM data values may be entered using a left-hand editing or right-hand editing system. Under the left-hand editing system, all data fields are left justified and editing is very similar to other character editors. Under the right-hand editing system, all data fields are right justified. Numeric values are easier to read in the right-hand system, but the editing takes some practice, because inserts are to the right, plus several other differences from the left-hand system. Also, you may change the colors of the menus via SETUP. If the colors are changed, go through several menus to see if you like the new color pattern. If not, go back to the SETUP menu and try another combination of colors. Not all color combinations are allowed, but the program will display an error if a color is not allowed. All changes through SETUP are saved in the data-base file and will remain in effect each time OBODM is executed, but can be changed in any run.

The second menu allows the user to enter names for data save files for either: (1) retrieving INPUT DATA SAVE FILES (.INP); (2) saving input data to OUTPUT DATA SAVE FILES (.INP); (3) saving output listing and results to PRINT OUTPUT SAVE FILE (.OUT); and (4) retrieving and/or saving data for SOLUTION FOR GRAPHICS (.SOL). The input and output files are saved as ASCII files and can be viewed by a text editor or printed on a printer. However, do not attempt to change or modify the .INP files, unless you know exactly where specific data parameters reside in the .INP data file.

The Page Down, F2, and Enter (Return) keys all advance the program to the MAIN MENU, but only the Enter key opens any specified data files. The F2 and Page Down keys use any previously set data. If no files are specified in the entry fields, press Enter and the output listing from the model run will be saved to a default output data file labeled OBPRINT.OUT.

There are a few procedures that simplify data files access and generation. A plus (+) symbol prior to any file name forces all remaining file names to be labeled with the same name (with the appropriate extension name .INP, .OUT, or .SOL). If the user wants to get/store the data save files in the directory specified in the first menu, the file names should have an asterisk (*) symbol preceding the name. The program then replaces the * with the specified directory and gets/saves the files from/to that directory. If there is no *, the program gets/saves the data files from/to the current directory. If the user is using a batch file for batch processing of multiple cases, the equals (=) symbol should precede the batch name specified in the INPUT DATA SAVE FILE. The batch file should include four records (lines) for each batch case (see Section 2.7). The order of the files names for each batch case should be INPUT, OUTPUT, PRINT, and SOLUTION. Leave the record (line) blank if there is no filename.

3.2 CALCULATION GRID SYSTEM RECEPTOR DATA

This data section is entered from the MAIN MENU by typing 1 followed by pressing Enter or by moving the cursor to the CALCULATION GRID SYSTEM RECEPTOR DATA section and pressing Enter or clicking the left mouse button. This data section allows the user to define the receptor grid system. The grid system can be set up in rectangular (Cartesian) or polar coordinates. If rectangular coordinates are used, the X coordinate is the east-west distance from the origin and the Y axis is the north-south distance. If polar coordinates are used, the X coordinate is the radial distance from the origin and the Y coordinate is the azimuth bearing measured clockwise from (zero degrees) north. Length units of the grid system can be set in either metric or English units. The origin of the grid system can be set to any (X,Y) values. The rectangular or polar receptor coordinates are then defined with respect to this origin. The grid origin typically is set to (0,0).

The user may specify flat terrain with ground-level receptors, flat terrain with elevated (flag pole) receptors or complex terrain with ground-level receptors. The height of the flat terrain, flag pole grid system receptors is entered as a single value. If it is desired to have flag pole receptors at different heights above the flat terrain, discrete receptors must be used to allow entries for X, Y, and Z (height) at each receptor. If complex terrain is to be used, [C] should be entered as the height of the grid system. For complex terrain, both grid system receptors and discrete receptors must specify the elevation above mean sea level (MSL) of each receptor.

The orientation of the grid system north with respect to true north can be set in degrees or radians. This feature is useful, for example, to duplicate field test data where the grid axis has been aligned with a favorable wind direction or adjust for UTM coordinates. The orientation angle is positive when the positive Y axis points east of true north when viewed from the south. For example, suppose the user wants to orient a grid system along the climatological favored wind direction for southeast winds (i.e., winds blowing from the southeast towards the northwest). The user would orient his grid system for a downwind direction of 315° and enter -45 (deg) for the grid system orientation angle.

OBODM also has the capability of generating receptor points for the grid system and/or reading the receptor points and terrain elevation data from a data file. To do so, enter Y at the "Generate receptor grid system axes" field at the bottom of the first CALCULATION GRID SYSTEM RECEPTOR DATA menu. The next menu will allow the user to define the start and end points and receptor increments along both the X and Y axes. Alternately, the menu allows the user to specify a data file from which the (X,Y) axes and/or terrain elevation data are to be read (see Section 4.10). After entering this information, the next two menus will display the X and Y coordinates generated by the model.

A maximum of 100 X coordinates and 100 Y coordinates can be specified in either rectangular or polar coordinates. Also, a maximum of 100 discrete or unique points may be specified. The total number of points is given by NT = $N_x \cdot N_y + N_d$ where N_x and N_y are the number of X and Y grid coordinates and N_d is the number of discrete receptor points. Each computed quantity (concentration, time-mean concentration, dosage, etc.) requires NT storage locations for the solution. Because, the OBODM program has a maximum of 20,000 locations for all solutions, multiple program runs may be required for some problems.

If the user has recalled data from an input data file and/or wishes to change the coordinates of the current (X, Y, Z) grid system and/or discrete receptor points, the current receptor points can be deleted by entering [Y] in the "delete" field in the first receptor data menu. This entry will eliminate all receptor points and provide blank entry fields for the receptor data in following menus.

Enter all X grid system coordinates (or leave blank if none) in the X axis menu, all Y grid system coordinates (if any) in the Y axis menu, and all discrete (arbitrarily placed) coordinates in the DISCRETE RECEPTOR DATA menu. The Z column under DISCRETE RECEPTOR DATA may be left blank if there is no Z height. Complex terrain elevations for the (X,Y) grid system coordinates are entered or edited after the X axis and Y axis data menus.

3.3 METEOROLOGICAL DATA

This data section allows the user to enter the OBODM meteorological inputs. The model can be directed to use meteorological inputs for a single case or sequential hourly meteorological inputs by setting the first entry field on the first METEOROLOGICAL DATA menu to [S] or [H] for a single case or hourly data, respectively. The OBODM program will process a maximum of 8784 hours (1 year) of meteorological data when run in the Detailed processing mode or an unlimited number of hours (5 years, etc.) when run in the Summary processing mode (see Section 3.5). The program can start at any hour of the year. The user may change the limits of meteorological data parameters by typing [Y] in the last data field of this first menu. However, the user is cautioned that these limits are used to check for erroneous meteorological data and, if changed, may produce erroneous program results. Any changes to the meteorological data limits are <u>not supported</u> by the authors of the OBODM program.

The second METEOROLOGICAL DATA menu specifies wind data and information relating to stability categories. The wind speed is assumed to have been measured at 10 m above ground level. The direction from which the wind is blowing (in degrees measured clockwise from north, where north is 0 or 360° and south is 180°) is specified next. Thus, if the user wants X to be the downwind coordinate and Y to be the crosswind coordinate, the wind direction should be set to 270° for a maximum centerline type calculation. The user can either specify the Pasquill stability category or the net radiation index under Option A or specify ALL parameters under Option B. If the stability category is not input, the model will compute it from the net radiation index or the parameters entered under Option B. The program can then use the specified wind speed and stability to default all remaining meteorological data, if necessary. Also, if you intend to restrict dispersion calculations to daytime hours only, you must specify the longitude, latitude, and time-zone difference under Option B.

If you are using a chronologically-ordered meteorological data file, parameters in this menu and the following two menus <u>should</u> be set to the same value and <u>must</u> be set to the same units as the first hour of the data file. Parameters that are not read from the data file and not defaulted should be average values for the period of record. If you are using ISCST2, ISCST3, RAMMET, or MPRM preprocessed data, the alongwind, crosswind, and vertical standard deviations of the wind direction are defaulted according to the Pasquill stability category and wind speed. Also, except for the "CARD"

format, the wind speed power law coefficient and vertical gradient of potential temperature are defaulted (see Section 4.3 and 4.4).

An [X] or [C] in following menu data fields directs the model to Compute or reset the defaults in that data field. Some values will be defaulted while you are in the input phase and others will be defaulted during dispersion model execution. An X value in any field causes the menu to be redisplayed with the current default value.

In the following menu, the ground elevation of the meteorological measurement site is needed only if the complex terrain screening mode is being used. Some of the parameters in this menu and the following menu can be computed or set to defaults by entering [C] or [X] in the data entry field. The defaults are determined from the net radiation index and 10-m wind speed (see Section 3 of Volume II). The turbulence default values are representative of a 10-min averaging time. Thus, the measurement time of the standard deviation of the wind direction angle is normally set to 600 s. However, if the actual measurement time is not 600 s, it should be entered so that the model makes the correct time adjustments for the applicable turbulence parameters. The user also needs to enter the proper units. Press the F5 special function key to get a listing of the units abbreviations.

The air humidity in this menu is used to calculate the air density and also used to compute defaults for the vertical gradient of potential temperature. If the humidity is greater than 70 percent, the program assume a humid region. Otherwise, an arid region is assumed and values of the vertical gradient of potential temperature defaulted accordingly.

The next METEOROLOGICAL DATA menu allows the user to specify the change in wind speed and/or wind direction (shear) with height. OBODM normally is directed to compute wind-speed shear during dispersion model execution by using the default input [C]. The wind-direction shear normally is set equal to the default of [0] (zero). The ambient air temperature and pressure as well as the surface roughness length are specified in this menu. (The temperature and pressure must be specified before any default particle settling velocities in the SOURCE DATA menus can be computed.) Enter the surface roughness length only if known and only if default turbulence parameters (standard deviations) were used in the previous menu. The surface roughness length is used to adjust the turbulence parameters for the OB/OD site being modeled. If a single meteorological case is being modeled, the program will return to the MAIN MENU after this menu. Otherwise, additional information is required in following menus and the above entered data will remain constant unless overridden by the sequential hourly data.

If chronologically ordered data are to be processed, the user will be asked to provide the name of the file containing the hourly meteorological data in the next menu. The extension of the file name (e.g., .TXT, .DAT) must be specified with the filename. Also, if the file resides in an alternate directory specified in the first OBODM menu, the name here must be preceded by

an asterisk (*). The format of the hourly data file must also be selected from six format options. If Options A or B (user specified, free or fixed field) are selected, the user must specify in another menu which meteorological parameters are to be taken from the hourly input data file and in what order they are to be read. Those parameters not included in the sequential hourly inputs remain constant and are taken from the above menus. When sequential hourly inputs are used, a switch option must be set for calm winds that directs OBODM either to make no calculations (EPA preferred) for hours with calm winds or to set the wind speed to 1.0 m/s. Another switch option with sequential hourly inputs directs the model either to make no calculations for hours with missing meteorological data (EPA preferred) or to default to the previous hours value for missing data. However, if more than two consecutive hours are missing, the calculation results will be very suspect, depending on the site, time of day, time of year, and wind persistence. The user must also specify the method to use in computing short term ($\leq$24 hours) averages. The EPA Guideline on Air Quality Models suggests using a minimum of 75 percent of the total possible hours to compute the average. For example, if a 24-hour average is being computed and only 16 valid hours are available because of calm or missing hours, the program will use 18 hours to compute the average. The alternative to this option is to use the actual number of valid hours in the averaging period, which would be 16 in the above example.

If chronologically ordered meteorological inputs are used, the OBODM user will be requested to enter the year of the hourly meteorological data and, if ISCST2, ISCST3, RAMMETT, or MPRM preprocessed data are used, whether rural or urban mixing layer heights should be used. Calculations can be restricted to specific days by filling the entry fields for the designated month and days with either Y (for processing) or N (for exclusion from processing). If all data in the input data file are to be processed, enter [Y] at the appropriate entry field and the model will default all the days of the year to Y.

If you selected format Options A or B for sequential hourly inputs, OBODM menus will request that you specify the contents of the hourly meteorological data file. Enter [0] (zero) or leave the entry field blank if the meteorological parameter is not in the data record. Otherwise, enter [1], [2], [3], etc. if the parameter is the first, second, third, etc. value in the record (data line). The units are the same as those specified in earlier menus. Certain parameters can be defaulted using the current hour's wind speed and stability category. Indicate which parameters are to be defaulted by typing a C. Only those parameters shown with an asterisk (*) can be defaulted. If format Option B was selected, you will also be asked to specify the fixed format for each data record (line) of the hourly meteorological data file. OBODM requires that the user specify the format using FORTRAN EDIT CODES (for REAL type variables only), separating each edit code sequence with a comma (,). The menu shows two data fields for the format, but the two are actually treated as one data field. The HELP menus describe the various edit codes expected by the program for formatted data.

3.4 SOURCE DATA

The source data menu screens display the data entry fields for the required source inputs. The first of these menus allows the user to specify the fuel or explosive and the pollutant species of interest. Additional information, such as molecular weight or density, is required when the calculations are for a gaseous pollutant and the concentration units are parts per million or billion (ppm or ppb) or for particulates. For pollutants that decay with time, the user can enter the half-life of that pollutant/species. The user can define the source strength of the pollutant/species by entering either the ratio of the mass of pollutant to the mass of fuel or explosive burned or detonated, or the fraction of the total mass of the fuel or explosive that is released in the form of the pollutant/species. The last option on this menu is a switch that can be used to direct the model to read a data file containing hourly source data for the same hours as the hourly meteorological inputs file.

As an aid in using the first source data menu, the user can press the F6 special function key to obtain a listing of common fuels and explosives. The first of two help menus lists the fuel/explosive types and their respective heat contents and burn rates. Position the cursor on the desired fuel/explosive and press Enter. The next menu will list the pollutant/species for the selected fuel/explosive and its molecular weight, density, half-life, and emissions factor (ratio of the masses of the pollutant/species and fuel/explosive). If you position the cursor on the desired species and press Enter, pollutant/species characteristics will be transferred into the entry fields on the first source data menu.

If the pollutant/species is a particulate (and designated as such in the first source data menu), the model will bring up PARTICULATE DATA menus with queries for additional information related to particulates. The first of these menus asks the user to define the units for particulate diameter and settling velocity. If the user wants OBODM to generate the particle-size distribution, it is necessary to enter the number of particle-size categories (maximum is 50), mass-median diameter, and geometric standard deviation of the particle distribution. The user will also need to set the switch for automatic generation of the particle-size distribution. The final entry field on this menu sets the ratio of Lagrangian to Eulerian time scales. This parameter is used in the correction of turbulent intensities for crossing trajectory effects for heavy particles. The default value of [1] is normally used.

The next menu allows the user to review, modify, or enter the particle-size distribution. If automatic generation of the particle-size distribution was previously selected, this menu will display the computed distribution, which can be modified. If the option of automatically generating the particle-size distribution was not selected, the user must input the necessary data in the entry fields. The user can enter [X] to specify the use of model defaults and then press the F3 key to display the values here. Alternately, the user can enter [C] and OBODM will compute and use the default values at

execution time. The inputs displayed or entered for each particle-size category are the: (1) upper diameter boundary or average diameter, (2) lower diameter boundary, (3) mass fraction of the total particulate emissions in this category (the sum of this column should equal 1.0), (4) gravitational settling velocity, and (5) surface reflection coefficient. If values are not known for the settling velocity and reflection coefficient, the user can enter [C] to direct the model to compute these values based on particle size and density. The magnitude of the reflection coefficient ranges from zero to one. If values for the settling velocity are to be computed by the program, the user must first specify the temperature and pressure in the METEOROLOGICAL DATA menus.

The next menu allows the user to tag up to 50 individual sources with a source identification number. The user can then get or specify data for a specific source, copy source data from a specific source, or delete a specific source. The source number corresponds to the sequence number of the sources used. For example, if Source 3 is deleted from a set of 5 sources, Sources 4 and 5 become Sources 3 and 4 after the deletion. If both a copy and a deletion are specified for a source, the copy is done before the deletion. If a copy or deletion is specified, this menu is redisplayed after the copy and/or deletion. When a source number is entered in the "get or specify option", the model advances to the next menu for that specific source.

After a source number is entered and Page Down or Enter is pressed, the GASEOUS OR PARTICLE SOURCE DATA - SOURCE NUMBER ( ) menu will appear. The user can assign an identification name to the source that will be listed in the output file. The user must also select whether the source type is volume or line. Most sources are volume sources. OBODM represents a line source by a series of identical volume sources placed along the line. The user must also select whether the emission type is instantaneous or quasi-continuous. Generally, the emission type is dependent on the duration of the release. As a rule of thumb, any release longer than 15 s should be modeled as a quasi-continuous release and any release less than or equal to 15 s should be modeled as an instantaneous release. If a source is specified as quasi-continuous, but has a burn time less than 15 s, OBODM will redefine it as instantaneous. The model will also default certain parameters based on this time criterion.

The next set of input fields requires the user to enter the specific characteristics of the material to be burned or detonated and allows the option of specifying the hours in a day during which the source may be burned or detonated. The required characteristics of the material to be burned or detonated are the total mass, heat content, and burn rate. If the user selected one of the common fuels and explosives from the help menu, some of these inputs will already be listed. As discussed above, the burn duration determines the source type. Instantaneous sources last for up to 15 s and quasi-continuous sources last for up to 60 min. The user must enter the total mass of material and the burn rate for both instantaneous and quasi-continuous sources. All pollutant emissions are assumed constant over the duration of a

burn. If emissions are not constant over the duration of a burn, the source should be divided into multiple co-located sources of shorter duration. If the sources are to be burned or detonated during specific hours of the day, select those hours by entering [Y]. This option, which is used in combination with chronologically-ordered meteorological inputs, is useful for determining the diurnal air quality effects of OB/OD activities.

The next input menu deals with the location and dimensions of the source. The user must select the type of coordinates (either rectangular or polar) and then enter the location based on the coordinate system selected. If the complex terrain option is being used, the source base ground elevation above mean sea level must be entered. Otherwise that input is zero. The user must also enter the effective height above the ground of the burn or detonation. The effective release height above ground level for a burn generally can be approximated by the height of the top of the material to be burned. In the case of a surface-based detonation, the effective release height of the initial cloud (fireball) normally will be above the surface because of the explosive release. OBODM can be directed to compute [C] the effective release height and diameter of the initial cloud from a detonation (see Section 2.6 in Volume II). (The effective release height is assumed to be the radius of the initial cloud.) Alternately, the user may enter both the effective release height and initial diameter parameters. If the fuel/explosive heat content and burn rate are entered, OBODM will calculate the cloud or plume rise and add it to the effective release height. If the heat content is not entered or is set to zero, the program assumes a non-buoyant source and omits the cloud/plume rise calculations.

This menu also requires the physical dimensions and orientation of the material to be burned or detonated so that the model can estimate the initial standard deviations of the alongwind, crosswind, and vertical concentration distributions. The menu displayed will depend on whether the source is quasi-continuous, instantaneous, or a line source. An instantaneous source only requires the diameter of the resulting fire-ball. For this reason under ground detonations should be modeled as instantaneous line sources. A quasi-continuous burn requires the length of the long dimension, length of the short dimension, angle of orientation and the depth of the vertical dimension. A line source requires the coordinates X,Y and Z of the ends of the line, as well as, the width of the line and depth of the vertical dimension. However, the effective release height, width, and depth can be defaulted for ground-level instantanteous line sources.

The last query on the GASEOUS OR PARTICULATE DATA SOURCE NUMBER ( ), SOURCE ID ( ) menus lets the user specify or review auxiliary source data. Enter [Y] if you wish to do so. The next menu will then allow you to review or change the air entrainment coefficient, lateral and vertical rectilinear cloud expansion distances, lateral and vertical reference distances, and lateral and vertical cloud expansion coefficients. These values should only be changed by someone who fully understands these parameters and how they are used in the model.

If [Y] was entered in the first menu field for "source data vary with hourly met data," the next menu will ask the user to enter the source input filename containing the chronologically ordered hourly inputs. Source inputs read from this file will override any value(s) set in the previous source input menus. Also, source parameters that are not contained in the hourly inputs set must have been specified in the previous source data menus. All source data units must be consistent with those specified above. The source data input file cannot be the same as the input hourly meteorological data file. Sources that vary hourly are identified by their source number. There must be a source data record(s) for each of these sources for each hour in the meteorological data file. The user can press the F4 key for more information on the contents and format of this file. If the file data are free field, the menu that follows this one should be blank. Otherwise you must enter the FORTRAN EDIT codes that specify the format of the data. The two data fields shown in the format menu are treated as one data field.

3.5 CONTROL AND PRINT OPTIONS

The control and print option menus allow the user to designate the heading to be printed in the output file and designate what calculation(s) the model will make. The heading is used to identify the model run. OBODM can make different calculations (e.g., peak concentration, dosage, etc.) within a single run, but certain combinations of calculations cannot be made in the same run. For example, concentration and gravitational deposition should not be calculated in the same run unless concentration is to include the effects of depletion due to gravitational settling. The user may direct the model to use distance-dependent cloud/plume rise or to use the final (maximum, EPA preferred) rise at all downwind distances. OB/OD permit conditions can be simulated by restricting the calculations to hours when the clearing index exceeds a specified threshold and/or daytime hours (sunrise plus one hour to sunset minus one hour). (The clearing index is given by the product of the afternoon mixing height in feet and the mean wind speed through the mixing layer in knots, divided by 100. It is used as an air-stagnation index.) The user may also designate the units for the model output.

The next menu depends on whether a single meteorological case is being processed or sequential hourly data are being used. The menu allows the user to control the output and how it will be printed and saved for future reference. Options such as printing the sum of all sources or subgroups of sources are available. For sequential hourly data runs, there are two modes of processing provided: Summary and Detailed.

The Summary mode saves only final averages (maximum 50, highest, etc.) for specified source combinations and averaging times over as many years as are containing in the input meteorological data file. The saved solutions can be reprinted and/or rescaled at a latter date, but cannot be reaveraged or used to form new source combinations. This mode is used primarily when directory disk space is limited. Required disk space for the summary mode can

range from 3 to 30 megabytes, depending on the number of receptors, source combinations, and output options selected. To determine the additional bytes of empty disk space required for the solution (.SOL) file, multiply the number of receptors times the number of source combinations times the number of output tables times six.

The Detailed mode saves all calculations for each hour processed up to 8784 hours (one leap year) for each source entered. Averages and source combinations are formed after all hourly dispersion calculations are complete. Saved solutions can be reprinted or rescaled, and new averages can be calculated and new source combinations formed. However, the Detailed mode may be very demanding on directory disk space. Required disk space can range from 3 megabytes to 4.5 gigabytes, depending on the number of receptors, number of sources, and meteorological data used. The actual additional amount of empty disk space required for the solution (.SOL) file is difficult to predict because the program saves only non-zero results which depend greatly on the meteorological data and other program options used. To approximate the additional bytes of empty disk space required, multiply the number of receptors times the number of sources entered times the number of hours of meteorological data (≤ 8784) times the number of quantities (peak concentration, dosage, etc.) to be calculated times 2.5.

The results of OBODM calculations can be printed in 80 or 132 character width, but the program assumes 6 lines per inch for paper length and paging. For runs with chronologically ordered meteorological data, the user may request a table listing the highest and second-highest value at each receptor and/or the 50 highest receptors. Up to six concentration averaging times or deposition summation times can be calculated. There are also options to print the maximum plume rise, hourly meteorological data, and hourly source data. Finally, for instantaneous sources (i.e., release or emission times are less than or equal to 15 s), the user can select one of two options for the cloud rise equations. In Option A (default), the model computes the final rise for unstable/neutral conditions using the adiabatic rise equation with the distance to final the estimated as described in Appendix B of Volume II. In Option B, OBODM computes the final rise for unstable/neutral conditions by using the stable rise equation with a vertical potential temperature gradient of 3.344×10^{-4} K/m.

If a source grouping was specified by the user in the above menu, the next menu will ask the user to specify which sources are to form groups. A maximum of 10 source groups may be formed from a maximum of 20 source index numbers. Each source group must be separated by a blank data field. A positive source index number, in a source group directs the program to include that specific source. A negative source number directs the program to include that source, the source with the preceding positive number, and all sources with intermediate numbers in a group. For example, 2-6 defines a source group consisting of sources 2 through 6. If no previous positive value was entered that is less than the absolute value of the negative index, the program assumes one (first source).

3.6 GRAPHICS

Graphical displays and output can be generated after the OBODM model has executed a run or from previously generated solution (.SOL) data files. The first GRAPHICS menu allows the user to select a printer type to produce a hard copy of the plot or to send the plot data to a named output file. If your printer is not shown in the menu, choose a similar printer or use A) for Laserjets, B) for HP printers, or E) for most others. If the user would like the plot to include terrain contours and/or map reference points, the file names are entered here. The help menus define the format for the terrain and digitized map data specified here. Option L) allows the user to select a plot data output file for subsequent input to an alternate graphics program. The format and contents of this data file are shown in Section 4.7.

The first GRAPHICS menu also allows the user to designate the PC graphics board and the numbers of pixels in the horizontal and vertical screen dimensions, parameters that are normally set by the program. Only specify the PC graphics board and pixel resolution if the program does not automatically determine these settings. The plot display on the CRT screen will reveal whether the settings are correct or not. If you press the F8 key followed by Enter in this or any other graphics menu, the program will create a plot, defaulting all remaining information.

The second GRAPHICS menu continues with additional options for hard copy output. The user can designate the PC port output number for the plot, paper size, paper margins, color options, and whether the plot will be portrait or landscape oriented. The OBODM defaults in this menu are usually adequate. If a plot output file (OBP#####.PLT) is selected, it is usually best to copy this file to the printer using the DOS COPY command rather than printing the plot via the DOS PRINT command. The DOS PRINT command can sometimes misinterpret the plot data. The ##### in the plot file name is a 5 digit number set by the program. The full name is displayed on the screen and printed in the print output file.

The next menu asks the user to designate the quantity to be plotted. For each quantity (dosage, concentration, etc.), this menu will list a "yes" or "no" to indicate whether or not it was calculated. An option to plot the sum of sources or a source group combination is also available in this menu. If multiple sources were used in the model run and the source group combination option [G] is selected, the next menu will ask for the source identification (index) numbers of the sources to be combined in the plot or will ask for the source group to be plotted. These source index numbers were previously specified by the user in the source data entry section. A positive source identification number specifies that specific source. A negative identification number directs the program to include in the source group all sources from the preceding (lesser positive) number through the absolute value of the negative number. Enter sources for one source group only. Solutions can also be scaled via this menu. The equation used to scale solutions is

$$Q_n = Q_0 \bullet Cscale + Dscale \qquad (3\text{-}1)$$

where: Q_n is the new solution value
Q_o is the old solution value
Cscale (multiplier) is entered in this menu, and
Dscale (additive) is entered in this menu

For example, Cscale may be a conversion factor to another pollutant species and Dscale may be a background value in the same units as the solution.

The next menu asks the user to define the desired plot format from a list of options. Some of the options are either/or options [for example, [B] or [C] (contours of actual or log terrain heights) and [E] or [F] (isopleths of actual or log concentration values)]. The log option here should only be used to help smooth jagged or zigzag isopleth or contour lines. A better and more accurate means of smoothing jagged isopleth or contour lines is to add more grid system receptor points. The available plot options include concentration versus distance for the line of maximum concentration and maps of terrain height contours, concentration (dosage, deposition, etc.) isopleths, and special symbols at specified points. This menu also asks whether the calculation is for a single event or a time-period average if hourly meteorological inputs were used; the contents of the menu will depend on whether the Summary or Detailed processing mode was used. Options to plot the highest and second highest value for an N-hour average are provided. Further information is required for hourly met data in the last data field. If a calculation is requested for a designated N-hour average (Detailed mode only), the user needs to enter the start date/time (YYMMDDHH or YYJJJHH) or hour sequence number (1,2,3 . . ., 8784). Here, YYMMDDHH is year, month, day, and hour and YYJJJHH is year, Julian day, and hour. Type two or three (JJJ only) digits for each set of capital letters. If a seasonal or quarterly average is requested, the user should enter the season or quarter number (#). Seasonal numbers are: Winter = 1; Spring = 2; Summer = 3; and Fall = 4. If the highest or second highest values are selected to be plotted, the user must specify the averaging time (Detailed mode) or select from the averaging times shown (Summary mode) in this menu.

If special symbols are selected, the PLOT SPECIAL SYMBOLS menu will require for each symbol the (X,Y) coordinates, height, orientation, and symbol code as well as a rectangular or polar coordinate indicator. Code numbers for the possible symbols are defined in a short form at the bottom of the menu and are fully defined as follows:

1 - A box with a diagonal line from the center through the upper right corner.
2 - A box with the corners removed.
3 - A triangle with a vertical line from the center to the top.
4 - A plus sign.
5 - A capital X.

6 - A diamond with a vertical line from the center to the top.
7 - An up pointing arrow, unless changed by orientation.
8 - A capital X with a line connecting the upper ends of the X.
9 - A capital Z with a mid-horizontal line.
10 - A capital Y.
11 - A box with diagonal lines out from the corners.
12 - An asterisk.
13 - An hourglass.
14 - A circle with a vertical line from the center to the top.
15 - A flag on a pole.

The program will calculate default isopleth or contour levels, but allows the user to change the values in the CONTOUR/ISOPLETH LEVELS menu. The maximum and minimum values are listed as a guide. However, if the maximum or minimum values are selected as isopleths, they may not appear in the plot because there are too few (one) maximum value points or because the minimum value is zero. The isopleth or contour values should be listed in increasing order.

The PLOT AXES LABELS AND LEGEND menu gives the user the options of labeling the Y and X axes and providing a legend for the plot. The dollar sign ($) is used to indicate the end of a legend line. The program will try to place each line separately on the plot, depending on the length of the line and margin space available. The end of the legend is indicated by two consecutive dollar signs ($$). The program will try to fit the Y and X axis label on the single lines adjacent to the respective axis. The legend is placed below the X axis label in the remaining margin space. If not enough margin space is available, the program will squeeze lines together, reduce character size, or truncate labels or the legend. Therefore, multiple passes through a plot may be required to achieve labeling suitable for report purposes. If the user wishes to specify more details as to the plot dimensions, scales, margin size, isopleth/contour labeling, character size, etc., a Y should be entered in the bottom field in this menu. However, if this field is N and Enter is pressed, the program generates the specified plot, defaulting all detailed information.

The following six PLOT DETAILS menus allow the user to customize the plot. Options in the first of these menus include: (1) logarithmic or linear scaling, (2) indicate north, (3) include background map, (4) plot axes and label grid coordinates, (5) axes orientation, (6) curve smoothing, (7) legend line centering or left justification, and (8) tick marks or axis lines. The next menu allows designation of line types (solid, dashed, etc) for the various types of plots, and the next menu allows designation of the colors for the background, axes and labels, line of maximum values, contours, isopleths, and special symbols. The two following menus allow the user to select from several options for labeling grid coordinate positions and contour/isopleth values and for placing the contour/isopleth legends. If a legend placement outside the plot is selected, the margin must be large enough to accommodate the legend. Otherwise, the program will place it in the least obstructing

location it can find. The final PLOT DETAILS menu allows the user to reset the dimensions of the X,Y plot (paper dimensions), margins, axes scales, and size of the legend, label characters, and symbols. The user can also designate the maximum and minimum X and Y values. (If the scale is logarithmic, the user needs to use the maximum and minimum powers of 10.) The increment between the minor tick marks can be designated, or the program can compute it. Similarly, the number of decimal places for the coordinate numbers can be indicated or computed. Pressing Enter at the end of this menu starts the plot.

If a hard copy was selected, the program will pause at the end of the plot and ask if a hard copy is to be generated. A yes (Y) generates the hard copy, either directly to the printer, plotter, or data file. Do not press Enter after the Y or N to the hard copy question. A hard copy can take several minutes to generate. If you wish to stop the hard copy, press the Control and C (or Control and Break) keys at the same time and follow the prompts displayed on the screen. There may be a delay between the time you press the keys and when the program actually halts. When the hard copy is generated or no (N) is typed, the program will return to the GRAPHICS control menu for additional plotting or to terminate graphics. Graphics termination returns to the MAIN MENU.

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SECTION 4. DATA FILE FORMAT AND CONTENTS

4.1 FREE FIELD FORMAT INPUT DATA

Free field format is also referred to as list directed format. The user must specify via interactive screen menus which meteorological or source variables are to be read from the hourly data input file(s). Also, the user must specify the relative position in the input record of each input variable. There can be more values in the input record than variables being read, but not less. The program does not account for blocked input data records. Only numeric data values can appear in the input data record. Input data values must be separated by a comma or a blank. Leading blanks are ignored. Two or more consecutive commas indicate one or more skipped or non-existent values. Skipped values are counted when determining the relative position of a variable in the record. Multiple consecutive blanks are treated as one blank. If a blank precedes or follows a comma, it is ignored. Numeric data values may be entered as whole numbers (101), decimal fractions (101.012), or in exponent form (1.01012E2), but must not contain imbedded blanks. If data errors are detected (data out of range or erroneous characters), a message as to the nature of the error and where it occurred is written to the print output file.

4.2 FIXED FIELD FORMAT INPUT DATA

The user must specify via interactive screen menus which meteorological or source variables are to be read from the hourly data input file(s). Also, the user must specify the relative position in the input record of the value for each input variable and the format (FORTRAN edit codes) of the input data record. There can be more values in the input record than variables being read. Input data values must appear in the same field (data columns) in each input record. Leading and trailing blanks within an input field are ignored, but data must not contain imbedded blanks. Numeric data values may be entered as a whole number (101), decimal fraction (101.012) or in exponent form (1.01102E2), depending on the FORTRAN edit code specified for the data field. If data errors are detected (data out of range or erroneous characters), a message as to the nature of the error and where it occurred is written to the print output file.

The FORTRAN edit codes that can be used in the format specified for the input data records are shown below. Each code sequence must be separated from the next by a comma. The character ^ is used to indicate blanks in the data field.

F edit code:

Fw.d - Value is in whole number or decimal form, occupies a total of w columns, and the last d digits are the fraction. If the field contains a period (decimal point), it overrides the d value. If no period is used and there are fewer than d digits, zeros are appended to the left of the digits to form the fraction.

For example the following variable value results from reading the data record using the indicated format:

format	data record	variable value
F8.5	23456789	234.56789
F8.5	-1234.56	-1234.56
F8.5	^^1234E3	12.34
F8.5	1.2345E1	12.345
F8.0	^^^^1990	1990

E edit code:

Ew.d - Value is in exponent form, occupies a total of w columns, and the d digits are the fractional part.

For example the following variable value results from reading the data record using the indicated format:

format	data record	variable value
E9.3	734.432E3	734432.0
E12.4	^^1022.43E-6	1022.43E-6
E10.3	^^^^^5.234	5.234

G edit code:

Gw.d - Value is in either Fw.d or Ew.d format as shown above.

X edit code:

#X - Skip over the number of columns specified by #, where # > 0.

T edit code:

T# - Position the column pointer at the column specified by #, where # > 0.

TL edit code:

TL# - Move the column pointer # columns to the left, where # > 0.

TR edit code:

TR# - Move the column pointer # columns to the right, where # > 0.

P edit code:

#P - Multiply values read from the following fields by the power of ten specified by #. If the input field contains an exponent, the scale factor P is ignored. Turn off the scale factor by a following 0P.

BN edit code:

BN - Ignore all embedded or trailing blanks within a field (w columns). The effect is to remove the blanks and right justify the field.

BZ edit code:

BZ - Treat all embedded and trailing blanks within a field as zeros.

/ (slash) edit code:

/ - Indicate end of record. If the input data for a single hour occupies more than one input record, the slash can be used to divide the variable values into multiple records. Do not precede or follow the slash with a comma. The FORTRAN edit codes between the slashes are unique to that record, except for edit codes P, BN and BZ.

4.3 ISCST2 or ISCST3 DATA FILE FORMAT "UNFORM"

These data are binary (unformatted) record blocks using four bytes per binary word. Record one contains the surface station number, surface station year, upper air station number, and upper air year. Records two through the end of data each contain:

Parameter	Binary Word
Year	1
Month	2
Day	3
Stability class	4-27
Wind speed (m/s)	28-51
Air temperature (K)	52-75
Flow vector (deg) (dir. toward)	76-99
Randomized flow vector (deg)	100-123
Rural/Urban mixing height (m)	124-171

Each parameter from stability on down consists of 24 values except for mixing heights, which include both rural and urban (48) values. These data are produced by the EPA RAMMET or MPRM preprocessor programs.

4.4 ISCST2 or ISCST3 DATA FILE FORMATS "FREE", "ASCII" and "CARD"

These files contain hourly chronologically ordered ASCII data records, where the first record contains the surface station number, surface station year, upper air station number, and upper air year (separate values by a blank or single comma). The remaining data records contain:

Parameter	Format	Columns	
Year	I2	1-2	
Month (1-12)	I2	3-4	
Day (1-31)	I2	5-6	
Hour (0-23)	I2	7-8	
Flow vector (deg) (dir. toward)	F9.4	9-17	
Wind speed (m/s)	F9.4	18-26	
Air temperature (K)	F6.1	27-32	
Stability class (1-6)	I2	33-34	
Rural mixing height (m)	F7.1	35-41	
Urban mixing height (m)	F7.1	42-48	
Wind profile exponent	F8.4	49-56	("CARD" only)
Vert. pot. temp. grad. (K/m)	F8.4	57-64	("CARD" only)

Values in a free-field format ("FREE") are separated by a least one blank or single comma, but are not restricted to specific columns or length (format). These data are produced by the EPA RAMMET or MPRM preprocessor programs.

4.5 FIXED FIELD FORMAT TERRAIN DATA

Terrain data are used to plot contours of terrain. All values are right-justified in their respective field. These data are specified by file name in Menu 57. under the first GRAPHICS menu. The format is:

Record	Format	Columns	Contents
1	I4	1-4	Number of X coordinates (N_x) in the terrain data.
	I4	5-8	Number of Y coordinates (N_y) in the terrain data.
	A2	9-10	Abbreviation for X,Y units, default = ^m (meters).
	A2	11-12	Abbreviation for Z units, default = ^m.
2 - I	10F8.0	1-80	X coordinates (west to east) in 8 column fields, ten fields per input record image ($I = \{(N_x + 9)/10\} + 1$).

I+1 - J	10F8.0	1-80	Y coordinates (south to north) in 8 column fields, ten fields per input record image ($J = \{(N_y + 9)/10\} + I$).
J+1 - K	10F8.0	1-80	Z terrain height data in 8 column fields, ten fields per input record image. Enter N_x values for each Y coordinate 1 to NY. Start a new image for each Y coordinate ($K = \{(N_x + 9)/10\} \cdot N_y + J$).

The symbols { } mean integer part under contents above.

4.6 FREE FIELD FORMAT DIGITIZED MAP DATA

Map data are used to plot a background map and are specified via file name in the first GRAPHICS menu. The first record in the file must contain the distance units abbreviation in columns 53-54; the rest of the record can contain any information. All remaining records identify map features to plot. Map features to be plotted are specified by a data record containing a special code (1-5) and map label. If the code is positive, the label is plotted to the right of the first (X,Y) coordinates entered for the feature. If negative, the label is plotted to the left. This map code record is immediately followed by one or more records containing the (X,Y) coordinates of points defining the feature to be plotted. The special map codes are:

1 - Geographic boundary, such as a coastline, body of water, mountain range, etc. The accompanying label is not plotted, but must be present.
2 - Political boundary (city, county, government installation, etc.). This label is plotted.
3 - Roads or highways. The label is not plotted, but must be present.
4 - Special sites (buildings, data sites, etc.). This label is plotted.
5 - Airfield. This label is plotted.

The special code identifying the feature to be plotted is entered on the input record image, followed by a blank, followed by the label. A maximum of 20 characters are used from the label. The (X,Y) coordinate pairs defining the map feature are entered on the next record image(s) with up to 4 (X,Y) pairs (8 values) per input image. Values must be separated by a comma or a blank. For closed features, the first (X,Y) point must equal the last. For discontinuous features, use multiple code and (X,Y) pair record groups to define each continuous segment.

The following is an example of a digitized map data file in UTM coordinates (^ means blank):

```
^^^^^^^^^EXAMPLE^MAP^DATA^FOR^OBODM^^^^^^^^^^UNITS^=^m
1^DPG^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^EXAMPLE BOUNDARY
^^346800.0,4456300.0,353500.0,4456100.0,353300.0,4449800.0,346900.0,4449900.0,
^^346600.0,4433000.0,341000.0,4433100.0,325900.0,4416400.0,322500.0,4427900.0,
^^319300.0,4429200.0,315300.0,4433800.0,308200.0,4433900.0,307800.0,4419500.0,
^^268900.0,4419700.0,268900.0,4467800.0,318300.0,4467600.0,318500.0,4476300.0,

2^A5^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^EXAMPLE^AREA
^^353500.0,4449800.0,346900.0,4449800.0,346900.0,4456300.0,353500.0,4456300.0,
^^353500.0,4449800.0,

3^ROADS^A2^^^^^^^^^^^^^^^^^^^^^^^^^EXAMPLE^ROAD
^^346800.0,4456300.0,346800.0,4452500.0,346100.0,4452500.0,336800.0,4449400.0,
^^335800.0,4449400.0,332700.0,4449000.0,329600.0,4447200.0,332700.0,4449000.0,
^^331700.0,4449400.0,329600.0,4449400.0,

4^B3^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^EXAMPLE^SITE
^^310500.0,4457200.0,

5^RAF^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^EXAMPLE^AIR^STRIP
^^336500.0,4450000.0,333700.0,4453100.0,
```

4.7 PLOT OUTPUT DATA FILE

This output file is identified by file name in the first GRAPHICS menu under Option L. The file is intended for use with other programs or processes and is not further processed by OBODM. Multiple plots are stacked on this file in the order of generation. The format and contents are:

Record	Columns	Format	Contents
1	1-2	2A1	^S (blank followed by S for start).
	3-10	F8.4	Number of inches in horizontal X plot dimension.
	11-18	F8.4	Number of inches in vertical Y plot dimension.
	19-22	I4	Plot number.
2	1-50	50A1	Plot title.
N	1-2	2A1	^P (blank followed by P for plot point).
	3-10	F8.4	X coordinate to move pen to.
	11-18	F8.4	Y coordinate to move pen to.
	19-20	I2	Pen up/down: 2=down, 3=up, negative= new origin.

	21-22	I2	Color index - 1=black, 2=blue, 3=green, 4=cyan, 5=red, 6=magenta, 7=yellow, 8=dk-white, 9=gray, 10=lt-blue, 11=lt-green, 12=lt-cyan, 13=lt-red, 14=lt-magenta, 15=lt-yellow
M	1-99	9A1	^END PLOT (blank followed by END PLOT).

The values of N and M above depend on the plot generated.

4.8 OBODM FUEL/EXPLOSIVES DATA BASE FILE OBODFUEL.OBD

File OBODFUEL.OBD is distributed with the OBODM program and is used to provide default fuel/explosives data parameters. Table 3 shows the contents of this data file. The user may add data to this file as needed. Data are read in groups of records in a fixed-field format, where each record group defines a fuel or explosive with all associated pollutant species. The format and contents of each record group are:

Record	Format	Columns	Contents
N	A36	1-36	The name of the fuel or explosive
	F10.0	37-46	The heat content in calories per gram of material.
	F10.0	47-56	The burn rate of the material in grams per second.
	I4	57-60	The number of following pollutant species records (lines) for this material.
N+1	A36	1-36	The name of the pollutant species.
	F10.0	37-46	The molecular weight of the species in grams/gram-mole.
	F10.0	47-56	The density of the species in grams per cubic centimeter.
	F10.0	57-66	The half-life of the species in seconds.
	F10.0	67-76	The emission factor as a fraction.

Table 3. Contents of File OBODFUEL.OBD[a]

20mm HEI Cartridge	1000	1 104		
1,2,4-Trimethylbenzene	120.2	0.8758	0	8.24E-06
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	2.36E-05
1,3,5-Trimethylbenzene	120.2	0.8758	0	6.77E-06
1,3,5-Trinitrobenzene	213.1	1.4775	0	3.70E-07
1,3-Butadiene	54.1	0.6211	0	9.27E-06
1-Butene	56.1	0.5951	0	3.78E-05
1-Hexene	84.2	0.6731	0	6.14E-06
1-Pentene	70.1	0.6405	0	4.90E-06
2,2,4-Trimethylpentane	114.2	0.6917	0	1.32E-05
2,3-Dimethylbutane	86.2	0.6616	0	9.44E-07
2,3-Dimethylhexane	114.2	0.7121	0	3.78E-06
2,3-Dimethylpentane	100.2	0.6951	0	6.61E-06
2,4,4-Trimethyl-1-pentene	112.2	0.7150	0	1.89E-06
2,4-Dimethylhexane	114.2	0.6960	0	2.83E-06
2,4-Dimethylpentane	100.2	0.6727	0	1.28E-06
2,4-Dinitrotoluene	182.1	1.3208	0	2.41E-06
2,5-Dimethylhexane	114.2	0.6935	0	1.89E-06
2,6-Dinitrotoluene	182.1	1.2833	0	7.95E-08
2-Methyl-1-butene	70.1	0.6504	0	1.94E-06
2-Methyl-2-butene	70.1	0.6623	0	1.89E-06
2-Methylheptane	114.2	0.6980	0	3.78E-06
2-Methylhexane	100.2	0.6787	0	5.13E-06
2-Methylnapthalene	142.2	1.0058	0	1.65E-07
2-Methylpentane	86.2	0.6532	0	6.44E-06
2-Nitrodiphenylamine	214.2	0.0000	0	4.18E-07
2-Nitronapthalene	173.2	0.0000	0	2.71E-09
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	3.78E-06
3-Methyl-1-butene	70.1	0.6272	0	9.70E-07
3-Methylpentane	86.2	0.6645	0	3.54E-06
Acenaphthylene	152.2	0.8988	0	1.28E-07
Acetylene	26.0	0.6181	0	2.46E-04
Aluminum	27.0	2.7020	0	2.33E-03
Barium	137.3	3.5100	0	3.21E-04
Benzene	78.1	0.8787	0	3.72E-04
Benz{a}anthracene	238.1	1.0000	0	4.32E-09
Benzyl alcohol	108.2	1.0419	0	7.54E-08
Butylbenzyl phthalate	312.4	0.0000	0	1.64E-07
CO	28.0	0.0013	0	1.48E-01
CO2	44.0	0.0020	0	2.95E+00
Cadmium	112.4	8.6420	0	1.20E-03
Chromium	52.0	7.2000	0	4.92E-05
Copper	63.5	8.9200	0	3.69E-02
Cyclohexane	84.2	0.7781	0	9.66E-07
Cyclopentane	70.1	0.7500	0	1.00E-06
Di-n-butyl phthalate	278.4	1.0500	0	3.57E-05

[a] See text for explanation of file contents.

Table 3. Contents of File OBODFUEL.OBD (Continued)

Di-n-octyl phthalate	390.6	0.9780	0	9.50E-07
Dibenzofuran	168.2	1.0886	0	9.24E-08
Diethyl phthalate	182.1	1.3208	0	1.36E-07
Dimethyl phthalate	194.2	1.1940	0	1.36E-07
Diphenylamine	169.2	1.1600	0	1.45E-08
Ethane	30.1	0.5720	0	1.31E-04
Ethylbenzene	106.2	0.8670	0	6.45E-06
Ethylene	28.1	0.0013	0	4.01E-04
Fluorene	166.2	1.2030	0	1.34E-07
HMX	0.0	0.0000	0	1.21E-06
Lead	207.2	11.3437	0	1.79E-03
Methyl chloride	50.5	0.9159	0	1.75E-06
Methyl chloroform	133.4	1.3390	0	4.60E-06
Methylcyclohexane	98.2	0.0000	0	3.87E-06
Methylcyclopentane	0.0	0.0000	0	3.86E-06
Methylenechloride	84.9	1.3266	0	6.19E-04
n-Nitrosodiethylamine	102.1	0.0000	0	1.18E-07
n-Nitrosodiphenylamine	198.2	1.0000	0	4.48E-06
n-Methyl-n,2,4,6-tetranitroaniline	0.0	0.0000	0	2.20E-08
Naphthalene	128.2	1.0253	0	1.44E-07
Nickel	58.7	8.9000	0	2.69E-05
Non-methane Organic Compounds	0.0	0.0000	0	3.31E-03
Phenanthrene	178.2	0.9800	0	2.66E-07
Phenol	94.1	1.0576	0	1.06E-05
Propane	44.1	0.5005	0	1.85E-05
Propene	42.1	0.5193	0	7.06E-05
Pyrene	202.3	1.2710	0	4.29E-07
RDX	222.1	1.8200	0	1.60E-05
Styrene	104.2	0.9060	0	5.00E-06
Titanium	47.9	4.5000	0	6.80E-05
Toluene	92.2	0.8669	0	4.21E-05
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	2.32E-04
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	8.08E-04
Total Aromatics (e.g. styrene)	104.2	0.9060	0	2.95E-04
Total Non-methane Hydrocarbons	0.0	0.0000	0	1.64E-03
Total Unidentified Hydrocarbons	0.0	0.0000	0	3.03E-04
Vinylidene Chloride	96.9	1.2180	0	3.33E-06
Zinc	65.4	7.1400	0	2.34E-02
bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	1.12E-06
cis-2-Butene	56.1	0.6213	0	1.62E-06
cis-2-Pentene	70.1	0.6556	0	9.44E-07
i-Butane	58.1	0.0000	0	1.93E-06
i-Butene	56.1	0.0000	0	3.12E-05
i-Pentane	72.2	0.0000	0	1.70E-05
m- & p-Xylene	106.2	0.8627	0	2.55E-05
m-Ethyltoluene	135.2	0.9391	0	5.16E-06
n-Butane	58.1	0.6012	0	1.03E-05
n-Decane	142.3	0.7300	0	8.99E-06
n-Heptane	100.2	0.6840	0	7.39E-06

Table 3. Contents of File OBODFUEL.OBD (Continued)

n-Hexane	86.1	0.6548	0	4.83E-06
n-Nonane	128.3	0.7176	0	9.66E-07
n-Octane	114.2	0.7025	0	1.32E-05
n-Pentane	72.2	0.6262	0	1.86E-05
n-Propybenzene	120.2	0.8620	0	9.66E-07
o-Ethyltoluene	135.2	0.9391	0	4.19E-06
o-Xylene	106.2	0.8802	0	7.76E-06
p-Ethyltoluene	135.2	0.9391	0	2.27E-05
trans-2-Butene	125.0	1.1830	0	1.32E-05
trans-2-Pentene	84.2	0.6942	0	2.00E-06
40mm HEI Cartridge	1000	1	93	
1,2,4-Trimethylbenzene	120.2	0.8758	0	4.75E-06
1,3,5-Trimethylbenzene	120.2	0.8758	0	4.75E-06
1,3,5-Trinitrobenzene	213.1	1.4775	0	7.29E-08
1,3-Butadiene	54.1	0.6211	0	2.59E-06
1-Butene	56.1	0.5951	0	6.64E-04
1-Hexene	84.2	0.6731	0	1.84E-06
1-Pentene	70.1	0.6405	0	2.22E-06
2,2,4-Trimethylpentane	114.2	0.6917	0	1.10E-05
2,2-Dimethylbutane	86.2	0.6485	0	1.11E-06
2,3-Dimethylbutane	86.2	0.6616	0	5.56E-06
2,3-Dimethylhexane	114.2	0.7121	0	1.10E-06
2,3-Dimethylpentane	100.2	0.6951	0	6.67E-06
2,4,6-Trinitrotoluene	227.1	1.6540	1.35E+09	3.23E-05
2,4-Dimethylpentane	100.2	0.6727	0	4.45E-06
2,4-Dinitrotoluene	182.1	1.3208	0	2.08E-07
2,6-Dinitrotoluene	182.1	1.2833	0	2.51E-09
2-Methyl-1-butene	70.1	0.6504	0	2.22E-06
2-Methylhexane	100.2	0.6787	0	6.67E-06
2-Methylnapthalene	142.2	1.0058	0	1.63E-07
2-Methylpentane	86.2	0.6532	0	1.89E-05
2-Nitrodiphenylamine	214.2	0.0000	0	2.47E-08
2-Nitronapthalene	173.2	0.0000	0	1.54E-09
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	1.11E-06
3-Methylhexane	100.2	0.6860	0	2.67E-05
3-Methylpentane	86.2	0.6645	0	1.56E-05
Acenaphthylene	152.2	0.8988	0	8.37E-08
Acetylene	26.0	0.6181	0	5.64E-05
Aluminum	27.0	2.7020	0	2.15E-02
Barium	137.3	3.5100	0	2.13E-04
Benzene	78.1	0.8787	0	4.01E-05
Benz{a}anthracene	238.1	1.0000	0	1.23E-08
Butylbenzyl phthalate	312.4	0.0000	0	6.22E-07
CO	28.0	0.0013	0	2.84E-02
CO2	44.0	0.0020	0	1.19E+00
Cadmium	112.4	8.6420	0	4.26E-05
Carbon Tetrachloride	153.8	1.5940	0	6.09E-06
Chromium	52.0	7.2000	0	1.18E-04
Copper	63.5	8.9200	0	1.26E-02

Table 3. Contents of File OBODFUEL.OBD (Continued)

Cyclohexane	84.2	0.7781	0	1.00E-05
Cyclopentane	70.1	0.7500	0	2.22E-06
Cyclopentene	68.1	0.8000	0	1.11E-06
Di-n-butyl phthalate	278.4	1.0500	0	1.99E-06
Di-n-octyl phthalate	390.6	0.9780	0	1.52E-06
Dibenzofuran	168.2	1.0886	0	3.10E-08
Diethyl phthalate	182.1	1.3208	0	4.99E-07
Dimethyl phthalate	194.2	1.1940	0	4.08E-07
Diphenylamine	169.2	1.1600	0	7.73E-08
Ethane	30.1	0.5720	0	1.31E-04
Ethylbenzene	106.2	0.8670	0	4.19E-06
Ethylene	28.1	0.0013	0	1.09E-04
HMX	0.0	0.0000	0	1.12E-05
Lead	207.2	11.3437	0	1.28E-03
Methylcyclohexane	98.2	0.0000	0	3.34E-06
Methylcyclopentane	0.0	0.0000	0	1.22E-05
Methylenechloride	84.9	1.3266	0	1.17E-03
n-Nitrosodiphenylamine	198.2	1.0000	0	5.71E-08
Naphthalene	128.2	1.0253	0	1.67E-07
Nickel	58.7	8.9000	0	3.20E-05
Non-methane Organic Compounds	0.0	0.0000	0	7.01E-04
PM10	0.0	0.0000	0	6.25E-01
Phenanthrene	178.2	0.9800	0	2.56E-07
Propane	44.1	0.5005	0	5.14E-06
Propene	42.1	0.5193	0	2.14E-05
Pyrene	202.3	1.2710	0	1.06E-07
RDX	222.1	1.8200	0	4.98E-05
Styrene	104.2	0.9060	0	5.56E-05
Titanium	47.9	4.5000	0	1.02E-04
Toluene	92.2	0.8669	0	4.00E-05
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	2.20E-04
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	2.06E-04
Total Aromatics (e.g. styrene)	104.2	0.9060	0	1.37E-04
Total Non-methane Hydrocarbons	0.0	0.0000	0	8.69E-04
Total Unidentified Hydrocarbons	0.0	0.0000	0	2.67E-04
Zinc	65.4	7.1400	0	2.00E-03
bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	2.93E-06
cis-2-Butene	56.1	0.6213	0	8.90E-06
cis-2-Pentene	70.1	0.6556	0	1.11E-06
i-Butane	58.1	0.0000	0	2.19E-06
i-Butene	56.1	0.0000	0	1.18E-05
i-Pentane	72.2	0.0000	0	1.22E-05
m- & p-Xylene	106.2	0.8627	0	2.52E-05
n-Butane	58.1	0.6012	0	1.84E-05
n-Decane	142.3	0.7300	0	6.98E-06
n-Heptane	100.2	0.6840	0	7.39E-06
n-Hexane	86.1	0.6548	0	2.56E-05
n-Nonane	128.3	0.7176	0	2.57E-06
n-Octane	114.2	0.7025	0	4.77E-06

Table 3. Contents of File OBODFUEL.OBD (Continued)

n-Pentane	72.2	0.6262	0	1.78E-05
n-Propybenzene	120.2	0.8620	0	3.31E-06
o-Xylene	106.2	0.8802	0	4.19E-06
p-Ethyltoluene	135.2	0.9391	0	7.00E-06
trans-2-Butene	125.0	1.1830	0	2.58E-06
trans-2-Pentene	84.2	0.6942	0	6.67E-06
Amatol (50% TNT, 50% Ammn. Nitrate)	836	1	77	
1,2,4-Trimethylbenzene	120.2	0.8758	0	6.21E-07
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	4.97E-07
1,3,5-Trimethylbenzene	120.2	0.8758	0	7.44E-07
1-Butene	56.1	0.5951	0	1.87E-06
1-Hexene	84.2	0.6731	0	1.99E-06
1-Pentene	70.1	0.6405	0	1.24E-06
2,2,4-Trimethylpentane	114.2	0.6917	0	1.99E-06
2,3,4-Trimethylpentane	114.2	0.7191	0	6.22E-07
2,3-Dimethylbutane	86.2	0.6616	0	3.74E-07
2,3-Dimethylhexane	114.2	0.7121	0	3.73E-07
2,3-Dimethylpentane	100.2	0.6951	0	1.49E-06
2,4-Dimethylhexane	114.2	0.6960	0	9.96E-07
2,4-Dimethylpentane	100.2	0.6727	0	1.12E-06
2,4-Dinitrotoluene	182.1	1.3208	0	9.21E-06
2,5-Dimethylhexane	114.2	0.6935	0	1.12E-06
2-Methyl-1-butene	70.1	0.6504	0	3.74E-07
2-Methylheptane	114.2	0.6980	0	7.49E-07
2-Methylhexane	100.2	0.6787	0	7.45E-07
2-Methylpentane	86.2	0.6532	0	7.44E-07
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	7.49E-07
3-Methylpentane	86.2	0.6645	0	7.45E-07
Acetylene	26.0	0.6181	0	9.58E-05
Aluminum	27.0	2.7020	0	3.18E-04
Barium	137.3	3.5100	0	3.76E-04
Benzene	78.1	0.8787	0	2.27E-05
Benzyl alcohol	108.2	1.0419	0	3.61E-06
CO	28.0	0.0013	0	9.71E-03
CO2	44.0	0.0020	0	8.03E-01
Cadmium	112.4	8.6420	0	1.69E-06
Carbon Tetrachloride	153.8	1.5940	0	3.74E-07
Chromium	52.0	7.2000	0	1.58E-06
Copper	63.5	8.9200	0	8.56E-05
Di-n-octyl phthalate	390.6	0.0000	0	1.45E-06
Ethane	30.1	0.5720	0	5.95E-06
Ethylbenzene	106.2	0.8670	0	1.24E-06
Ethylene	62.0	0.9780	0	3.12E-05
Lead	207.2	11.3437	0	6.23E-04
Methane	16.0	0.5547	0	7.34E-05
Methylchloride	50.5	0.9159	0	7.47E-07
Methyl chloroform	133.4	1.3390	0	3.74E-07
Methylcyclohexane	98.2	0.0000	0	2.48E-06
Methylcyclopentane	0.0	0.0000	0	3.72E-07

Table 3. Contents of File OBODFUEL.OBD (Continued)

Methylenechloride	84.9	1.3266	0	1.50E-04
Nitrogen Oxide	30.0	0.0013	0	1.77E-02
Nitrogen Dioxide (peroxide)	46.0	1.4494	9360	5.93E-05
Nickel	58.7	8.9000	0	2.37E-06
Non-methane Organic Compounds	0.0	0.0000	0	5.76E-04
PM10	0.0	0.0000	0	1.86E-02
Phenol	94.1	1.0576	0	5.46E-06
Propane	44.1	0.5005	0	9.95E-07
Propene	42.1	0.5193	0	5.47E-06
Sulfur Dioxide	64.1	0.0029	0	2.60E-04
Tetrachloroethylene	165.8	1.6227	0	3.74E-07
Titanium	47.9	4.5000	0	3.50E-06
Toluene	92.2	0.8669	0	7.09E-06
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	1.58E-05
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	1.38E-04
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	4.27E-05
Total Non-methane Hydrocarbons	0.0	0.0000	0	4.51E-04
Total Unidentified Hydrocarbons	0.0	0.0000	0	2.54E-04
Zinc	65.4	7.1400	0	6.59E-05
bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	9.39E-06
i-Butane	58.1	0.0000	0	6.22E-07
i-Butene	56.1	0.0000	0	2.25E-06
i-Pentane	72.2	0.0000	0	1.50E-06
m- & p-Xylene	106.2	0.8627	0	4.85E-06
m-Ethyltoluene	135.2	0.9391	0	3.73E-07
n-Butane	58.1	0.6012	0	6.22E-07
n-Heptane	100.2	0.6840	0	7.47E-07
n-Hexane	86.1	0.6548	0	7.44E-07
n-Nonane	128.3	0.7176	0	3.74E-07
n-Octane	114.2	0.7025	0	3.73E-07
n-Propybenzene	120.2	0.8620	0	3.72E-07
o-Ethyltoluene	135.2	0.9391	0	3.72E-07
o-Xylene	106.2	0.8802	0	1.74E-06
p-Ethyltoluene	135.2	0.9391	0	9.30E-06
trans-2-Butene	125.0	1.1830	0	1.49E-06
Claymore Mine, M18A1	1000	1	100	
1,2,4-Trimethylbenzene	120.2	0.8758	0	4.16E-06
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	8.02E-06
1,3,5-Trimethylbenzene	120.2	0.8758	0	2.08E-06
1,3,5-Trinitrobenzene	213.1	1.4775	0	5.82E-08
1,3-Butadiene	54.1	0.6211	0	2.74E-06
1-Butene	56.1	0.5951	0	7.56E-06
1-Hexene	84.2	0.6731	0	2.41E-06
1-Pentene	70.1	0.6405	0	1.44E-06
2,2,4-Trimethylpentane	114.2	0.6917	0	3.43E-06
2,3,4-Trimethylpentane	114.2	0.7191	0	1.96E-06
2,3-Dimethylbutane	86.2	0.6616	0	4.87E-07
2,3-Dimethylpentane	100.2	0.6951	0	1.41E-06
2,4,6-Trinitrotoluene	227.1	1.6540	1.35E+09	5.54E-06

Table 3. Contents of File OBODFUEL.OBD (Continued)

2,4-Dimethylpentane	100.2	0.6727	0	4.87E-07
2,4-Dinitrotoluene	182.1	1.3208	0	4.30E-08
2-Methyl-1-butene	70.1	0.6504	0	4.89E-07
2-Methylheptane	114.2	0.6980	0	4.89E-07
2-Methylhexane	100.2	0.6787	0	3.69E-06
2-Methylpentane	86.2	0.6532	0	3.70E-06
3-Methylhexane	100.2	0.6860	0	1.95E-06
3-Methylpentane	86.2	0.6645	0	9.79E-07
Acenaphthylene	152.2	0.8988	0	3.02E-07
Acetophenone	120.2	1.0281	0	2.60E-07
Acetylene	26.0	0.6181	0	9.79E-04
Aluminum	27.0	2.7020	0	6.87E-03
Anthracene	178.2	1.2830	0	2.94E-07
Barium	137.3	3.5100	0	1.14E-04
Benzene	78.1	0.8787	0	8.08E-04
Benzo(a)anthracene	228.3	0.0000	0	1.32E-07
Benzo(a)pyrene	252.3	0.0000	0	7.16E-07
Benzo(b)fluoranthene	252.3	0.0000	0	5.96E-07
Benzo(k)fluoranthene	252.3	0.0000	0	4.76E-07
Benzyl alcohol	108.2	1.0419	0	1.07E-07
CO	28.0	0.0013	0	3.04E-02
CO2	44.0	0.0020	0	5.02E+00
Cadmium	112.4	8.6420	0	2.43E-04
Chromium	52.0	7.2000	0	3.81E-05
Chrysene	228.3	1.2740	0	2.27E-07
Copper	63.5	8.9200	0	5.22E-03
Cyclohexane	84.2	0.7781	0	1.28E-06
Cyclopentane	70.1	0.7500	0	9.79E-07
Cyclopentene	68.1	0.8000	0	4.87E-07
Di-n-butyl phthalate	278.4	1.0500	0	7.87E-05
Di-n-octyl phthalate	390.6	0.0000	0	5.08E-06
Dibenzofuran	168.2	1.0886	0	9.60E-08
Diethyl phthalate	182.1	1.3208	0	2.34E-07
Dimethyl phthalate	194.2	1.1940	0	1.79E-07
Diphenylamine	169.2	1.1600	0	2.28E-08
Ethane	30.1	0.5720	0	5.29E-06
Ethylbenzene	106.2	0.8670	0	3.79E-05
Ethylene	62.0	0.9780	0	2.37E-04
Fluoranthene	202.3	1.2520	0	1.14E-06
Fluorene	166.2	1.2030	0	2.17E-07
HMX	0.0	0.0000	0	7.50E-06
Lead	207.2	11.3437	0	5.27E-04
Methylchloride	50.5	0.9159	0	4.42E-06
Methyl chloroform	133.4	1.3390	0	2.32E-06
Methylcyclohexane	98.2	0.0000	0	5.31E-06
Methylcyclopentane	0.0	0.0000	0	1.56E-05
Methylenechloride	84.9	1.3266	0	1.12E-04
n-Nitrosodiphenylamine	198.2	1.0000	0	2.80E-08
Naphthalene	128.2	1.0253	0	2.96E-05

Table 3. Contents of File OBODFUEL.OBD (Continued)

Nickel	58.7	8.9000	0	1.91E-05
Non-methane Organic Compounds	0.0	0.0000	0	7.46E-03
PM10	0.0	0.0000	0	2.25E-01
Phenanthrene	178.2	0.9800	0	2.12E-06
Phenol	94.1	1.0576	0	2.11E-05
Propane	44.1	0.5005	0	3.55E-06
Propene	42.1	0.5193	0	2.44E-05
Pyrene	202.3	1.2710	0	2.04E-06
RDX	222.1	1.8200	0	9.87E-06
Styrene	104.2	0.9060	0	1.67E-03
Titanium	47.9	4.5000	0	3.05E-04
Toluene	92.2	0.8669	0	2.47E-04
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	7.12E-05
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	1.28E-03
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	3.04E-03
Total Non-methane Hydrocarbons	0.0	0.0000	0	4.88E-03
Total Unidentified Hydrocarbons	0.0	0.0000	0	4.91E-04
Vinyl Chloride	62.5	0.9106	0	1.09E-06
Zinc	65.4	7.1400	0	1.99E-03
bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	2.25E-06
cis-2-Butene	56.1	0.6213	0	1.28E-06
i-Butane	58.1	0.0000	0	9.79E-07
i-Butene	56.1	0.0000	0	3.69E-06
i-Pentane	72.2	0.0000	0	3.90E-06
m- & p-Xylene	106.2	0.8627	0	2.32E-04
m-Ethyltoluene	135.2	0.9391	0	5.61E-06
n-Butane	58.1	0.6012	0	1.78E-06
n-Decane	142.3	0.7300	0	1.01E-05
n-Heptane	100.2	0.6840	0	3.68E-06
n-Hexane	86.1	0.6548	0	1.30E-06
n-Nonane	128.3	0.7176	0	1.28E-06
n-Octane	114.2	0.7025	0	7.18E-06
n-Pentane	72.2	0.6262	0	9.10E-06
n-Propylbenzene	120.2	0.8620	0	5.13E-06
o-Ethyltoluene	135.2	0.9391	0	2.88E-06
o-Xylene	106.2	0.8802	0	4.50E-06
p-Ethyltoluene	135.2	0.9391	0	1.67E-05
trans-2-Butene	125.0	1.1830	0	1.83E-05
Composition B (56/38/6 RDX-TNT-WAX)	1319	1	74	
1,2,4-Trimethylbenzene	120.2	0.8758	0	9.79E-07
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	1.23E-06
1,3,5-Trimethylbenzene	120.2	0.8758	0	7.38E-07
1,3,5-Trinitrobenzene	213.1	1.4775	0	2.02E-05
1-Butene	56.1	0.5951	0	1.82E-06
1-Hexane	86.2	0.6603	0	1.60E-06
2,2,4-Trimethylpentane	114.2	0.6917	0	2.45E-06
2,3,4-Trimethylpentane	114.2	0.7191	0	1.10E-06
2,3-Dimethylbutane	86.2	0.6616	0	3.71E-07
2,3-Dimethylhexane	114.2	0.7121	0	3.64E-07

Table 3. Contents of File OBODFUEL.OBD (Continued)

2,3-Dimethylpentane	100.2	0.6951	0	9.86E-07
2,4-Dimethylhexane	114.2	0.6960	0	1.09E-06
2,4-Dimethylpentane	100.2	0.6727	0	6.15E-07
2,5-Dimethylhexane	114.2	0.6935	0	3.64E-07
2-Methylheptane	114.2	0.6980	0	3.71E-07
2-Methylhexane	100.2	0.6787	0	1.09E-06
2-Methylpentane	86.2	0.6532	0	3.71E-07
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	3.71E-07
3-Methylpentane	86.2	0.6645	0	4.91E-07
Acetylene	26.0	0.6181	0	1.41E-05
Aluminum	27.0	2.7020	0	2.55E-04
Barium	137.3	3.5100	0	2.47E-04
Benzene	78.1	0.8787	0	5.16E-06
Benzyl alcohol	108.2	1.0419	0	9.51E-06
Butylbenzyl phthalate	312.4	0.0000	0	7.59E-07
CO	28.0	0.0013	0	4.17E-03
CO2	44.0	0.0020	0	1.25E+00
Cadmium	112.4	8.6420	0	3.58E-06
Carbon Tetrachloride	153.8	1.5940	0	3.64E-07
Chromium	52.0	7.2000	0	1.74E-06
Copper	63.5	8.9200	0	3.53E-04
Di-n-butyl phthalate	278.4	1.0500	0	8.65E-07
Di-n-octyl phthalate	390.6	0.9780	0	2.68E-06
Ethane	30.1	0.5720	0	1.86E-06
Ethylbenzene	106.2	0.8670	0	1.96E-06
Ethylene	28.1	0.0013	0	1.35E-05
Lead	207.2	11.3437	0	5.57E-04
Methane	16.0	0.5547	0	2.23E-05
Methyl chloride	50.5	0.9159	0	7.38E-07
Methylcyclohexane	98.2	0.0000	0	2.34E-06
Methylcyclopentane	0.0	0.0000	0	3.64E-07
Methylenechloride	84.9	1.3266	0	2.83E-04
NO	30.0	0.0013	0	9.28E-03
NO2	46.0	1.4494	9360	1.92E-04
Non-methane Organic Compounds	0.0	0.0000	0	2.90E-04
PM10	0.0	0.0000	0	1.23E-02
Propane	44.1	0.5005	0	7.44E-07
Propene	42.1	0.5193	0	3.07E-06
SO2	64.1	0.0029	0	1.27E-04
Tetrachloroethylene	165.8	1.6227	0	1.80E-05
Titanium	47.9	4.5000	0	5.05E-05
Toluene	92.2	0.8669	0	6.01E-06
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7080	0	1.14E-05
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	3.36E-05
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	2.35E-05
Total Non-methane Hydrocarbons	0.0	0.0000	0	1.14E-04
Total Unidentified Hydrocarbons	0.0	0.0000	0	4.54E-05
Zinc	65.4	7.1400	0	7.38E-05
bis (2-Ethylhexyl)phthalate	390.5	0.9732	0	1.59E-06

Table 3. Contents of File OBODFUEL.OBD (Continued)

i-Butane	58.1	0.0000	0	3.72E-07
i-Butene	56.1	0.0000	0	9.79E-07
i-Pentane	72.2	0.0000	0	3.72E-07
m- & p-Xylene	106.2	0.8627	0	6.74E-06
m-Ethyltoluene	135.2	0.9391	0	3.71E-07
n-Decane	142.3	0.7300	0	3.64E-07
n-Heptane	100.2	0.6840	0	1.09E-06
n-Hexane	86.1	0.6548	0	7.41E-07
n-Nonane	128.3	0.7176	0	2.23E-06
n-Octane	114.2	0.7025	0	3.69E-07
n-Pentane	72.2	0.6262	0	3.72E-07
n-Propybenzene	120.2	0.8620	0	1.09E-06
o-Ethyltoluene	135.2	0.9391	0	1.10E-06
o-Xylene	106.2	0.8802	0	2.70E-06
p-Ethyltoluene	135.2	0.9391	0	9.81E-07
Diesel and Dunnage	1000	1	95	
1,2,4-Trimethylbenzene	120.2	0.8758	0	2.43E-04
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	5.09E-04
1,3,5-Trimethylbenzene	120.2	0.8758	0	5.57E-04
1,3-Butadiene	54.1	0.6211	0	1.34E-06
1-Butene	56.1	0.5951	0	4.69E-06
1-Hexene	84.2	0.6731	0	2.19E-06
1-Pentene	70.1	0.6405	0	1.72E-06
2,2,4-Trimethylpentane	114.2	0.6917	0	6.97E-06
2,3,4-Trimethylpentane	114.2	0.7191	0	1.38E-06
2,3-Dimethylbutane	86.2	0.6616	0	2.06E-06
2,3-Dimethylhexane	114.2	0.7121	0	5.40E-06
2,3-Dimethylpentane	100.2	0.6951	0	3.33E-06
2,4-Dimethylhexane	114.2	0.6960	0	6.42E-06
2,4-Dimethylpentane	100.2	0.6727	0	2.16E-06
2,5-Dimethylhexane	114.2	0.6935	0	1.11E-05
2-Methyl-1-butene	70.1	0.6504	0	1.05E-06
2-Methylheptane	114.2	0.6980	0	4.42E-05
2-Methylhexane	100.2	0.6787	0	1.38E-05
2-Methylnaphthalene	142.2	1.0058	0	2.18E-05
2-Methylpentane	86.2	0.6532	0	9.47E-06
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	5.90E-05
3-Methylhexane	100.2	0.6860	0	1.55E-05
3-Methylpentane	86.2	0.6645	0	5.08E-06
Acenaphthylene	152.2	0.8988	0	6.71E-06
Acetophenone	120.2	1.0281	0	1.74E-07
Acetylene	26.0	0.6181	0	9.52E-05
Aluminum	27.0	2.7020	0	7.13E-07
Anthracene	178.2	1.2830	0	1.02E-07
Barium	137.3	3.5100	0	1.61E-07
Benzene	78.1	0.8787	0	7.84E-05
Benzyl alcohol	108.2	1.0419	0	3.96E-05
Benzo(a)anthracene	228.3	0.0000	0	9.81E-07
Benzo(a)pyrene	252.3	0.0000	0	7.42E-07

Table 3. Contents of File OBODFUEL.OBD (Continued)

Benzo(b)fluoranthene	252.3	0.0000	0	7.84E-07
Benzo(ghi)perylene	276.3	0.0000	0	3.45E-07
Benzo(k)fluoranthene	252.3	0.0000	0	7.46E-07
Biphenyl	154.2	0.8660	0	6.45E-06
Butylbenzyl phthalate	312.4	0.0000	0	1.22E-07
CO	28.0	0.0013	0	2.98E-02
CO2	44.0	0.0020	0	1.63E+00
Chrysene	228.3	1.2740	0	9.33E-07
Cyclohexane	84.2	0.7781	0	2.67E-05
Cyclopentane	70.1	0.7500	0	1.53E-06
Di-n-butyl phthalate	278.4	1.0500	0	1.46E-07
Di-n-octyl phthalate	390.6	0.0000	0	9.19E-07
Dibenz(a,h)anthracene	278.3	1.2820	0	2.00E-07
Diethyl phthalate	182.1	1.3208	0	7.00E-08
Dimethyl phthalate	194.1	1.1900	0	1.88E-07
Ethane	30.1	0.5720	0	1.15E-05
Ethylbenzene	106.2	0.8670	0	5.49E-05
Ethylene	62.0	0.9780	0	7.43E-05
Fluoranthene	202.3	1.2520	0	7.85E-07
Indeno(1,2,3-cd)pyrene	276.3	0.0000	0	2.83E-07
Methane	16.0	0.5547	0	8.72E-05
Methylcyclohexane	98.2	0.0000	0	1.56E-04
Methylcyclopentane	0.0	0.0000	0	9.93E-06
Nitrogen Oxide	30.0	0.0013	0	7.99E-04
Nitrogen Dioxide (peroxide)	46.0	1.4494	9360	5.07E-05
Naphthalene	128.2	1.0253	0	8.38E-05
Non-methane Organic Compounds	0.0	0.0000	0	7.84E-03
OCDD	0.0	0.0000	0	1.03E-11
PM10	0.0	0.0000	0	5.44E-03
Perylene	252.3	1.3500	0	1.72E-07
Phenanthrene	178.2	0.9800	0	7.17E-06
Phenol	94.1	1.0576	0	1.56E-05
Propane	44.1	0.5005	0	2.22E-06
Propene	42.1	0.5193	0	1.30E-05
Pyrene	202.3	1.2710	0	7.06E-07
Sulfur Dioxide	64.1	0.0029	0	1.88E-04
Styrene	104.2	0.9060	0	4.99E-05
Toluene	92.2	0.8669	0	1.22E-04
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	3.50E-03
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	1.93E-04
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	2.29E-03
Total Non-methane Hydrocarbons	0.0	0.0000	0	1.20E-02
Total Unidentified Hydrocarbons	0.0	0.0000	0	6.04E-03
Zinc	65.4	7.1400	0	6.26E-05
i-Butane	58.1	0.0000	0	1.24E-06
i-Butene	56.1	0.0000	0	2.26E-06
i-Pentane	72.2	0.0000	0	1.08E-05
i-Propylbenzene	120.2	0.0000	0	1.03E-04
m- & p-Xylene	106.2	0.8627	0	4.52E-04

Table 3. Contents of File OBODFUEL.OBD (Continued)

m-Ethyltoluene	135.2	0.9391	0	1.28E-04
n-Butane	58.1	0.6012	0	4.60E-06
n-Decane	142.3	0.7300	0	1.97E-03
n-Heptane	100.2	0.6840	0	5.90E-05
n-Hexane	86.1	0.6548	0	1.60E-05
n-Nonane	128.3	0.7176	0	1.03E-03
n-Octane	114.2	0.7025	0	2.48E-04
n-Pentane	72.2	0.6262	0	9.05E-06
n-Propylbenzene	120.2	0.8620	0	8.16E-05
o-Xylene	106.2	0.8802	0	1.25E-04
p-Ethyltoluene	135.2	0.9391	0	1.53E-04
trans-2-Butene	125.0	1.1830	0	2.91E-06
trans-2-Pentene	84.2	0.6942	0	1.08E-06
Double Base (50% nitrocellulose)	1020	1	67	
1,2,4-Trimethylbenzene	120.2	0.8758	0	6.92E-08
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	1.38E-07
1-Butene	56.1	0.5951	0	1.73E-07
1-Hexene	84.2	0.6731	0	1.73E-07
1-Pentene	70.1	0.6405	0	1.73E-07
2,2,4-Trimethylpentane	114.2	0.6917	0	1.38E-07
2,3,4-Trimethylpentane	114.2	0.7191	0	3.46E-08
2,3-Dimethylbutane	86.2	0.6616	0	3.46E-08
2,4,4-Trimethyl-1-pentene	112.2	0.7150	0	1.04E-07
2,4-Dimethylhexane	114.2	0.6960	0	3.46E-08
2,4-Dimethylpentane	100.2	0.6727	0	3.46E-08
2-Methylhexane	100.2	0.6787	0	3.46E-08
2-Nitrophenol	139.1	1.4850	0	2.72E-07
3-Methyl-1-butene	70.1	0.6272	0	3.42E-08
3-Methylpentane	86.2	0.6645	0	3.42E-08
Acetylene	26.0	0.6181	0	2.77E-06
Benzene	78.1	0.8787	0	1.26E-06
Benzyl alcohol	108.2	1.0419	0	6.56E-06
CO	28.0	0.0013	0	1.82E-03
CO2	44.0	0.0020	0	7.80E-01
Carbon Tetrachloride	153.8	1.5940	0	3.46E-08
Chlorobenzene	112.6	1.1058	0	1.03E-07
Copper	63.5	8.9200	0	3.18E-04
Cyclopentane	70.1	0.7500	0	3.46E-08
Cyclopentene	68.1	0.8000	0	3.42E-08
Di-n-butyl phthalate	278.4	1.0500	0	1.23E-07
Dimethyl phthalate	194.1	1.1900	0	2.42E-07
Ethane	30.1	0.5720	0	2.42E-07
Ethyl chloride	64.5	0.8978	0	6.84E-08
Ethylbenzene	106.2	0.8670	0	4.79E-07
Ethylene	62.0	0.9780	0	1.85E-06
Lead	207.2	11.3437	0	5.75E-03
Methyl chloride	50.5	0.9159	0	1.04E-07
Methyl chloroform	133.4	1.3390	0	3.42E-08
Methylcyclohexane	98.2	0.0000	0	5.47E-07

Table 3. Contents of File OBODFUEL.OBD (Continued)

Methylenechloride	84.9	1.3266	0	1.97E-06
Nitrogen Oxide	30.0	0.0013	0	1.67E-03
Nitrogen Dioxide (peroxide)	46.0	1.4494	9360	1.04E-04
Non-methane Organic Compounds	0.0	0.0000	0	2.77E-05
PM10	0.0	0.0000	0	1.94E-02
Propane	44.1	0.5005	0	1.03E-07
Propene	42.1	0.5193	0	5.47E-07
Sulfur Dioxide	64.1	0.0029	0	2.59E-05
Titanium	47.9	4.5000	0	5.42E-08
Toluene	92.2	0.8669	0	6.92E-07
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7080	0	3.81E-07
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	6.46E-06
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	3.90E-06
Total Non-methane Hydrocarbons	0.0	0.0000	0	1.37E-05
Total Unidentified Hydrocarbons	0.0	0.0000	0	3.76E-06
Vinylidene Chloride	96.9	1.2180	0	3.42E-08
Zinc	65.4	7.1400	0	9.01E-06
bis (2-Ethylhexyl)phthalate	390.5	0.9732	0	9.14E-07
cis-2-Butene	56.1	0.6213	0	6.84E-08
cis-2-Pentene	70.1	0.6556	0	3.42E-08
i-Butane	58.1	0.0000	0	1.37E-07
i-Butene	56.1	0.0000	0	8.55E-07
m- & p-Xylene	106.2	0.8627	0	1.64E-06
m-Ethyltoluene	135.2	0.9391	0	3.46E-08
n-Butane	58.1	0.6012	0	1.37E-07
n-Decane	142.3	0.7300	0	6.84E-08
n-Propylbenzene	120.2	0.8620	0	6.92E-08
o-Ethyltoluene	135.2	0.9391	0	3.46E-08
o-Xylene	106.2	0.8802	0	5.47E-07
p-Ethyltoluene	135.2	0.9391	0	1.37E-07
trans-2-Butene	125.0	1.1830	0	1.71E-07
trans-2-Pentene	84.2	0.6942	0	3.42E-08
Explosive D (ammonium picrate)	800	1	7	
Benzene	78.1	0.8787	0	1.10E-04
CO	28.0	0.0013	0	5.30E-02
CO2	44.0	0.0020	0	9.90E-01
Methane	16.0	0.5547	0	2.40E-03
NO	30.0	0.0013	0	9.00E-04
NO2	46.0	1.4494	9360	1.10E-03
Total Non-methane Hydrocarbons	0.0	0.0000	0	2.00E-03
Flare, Cntermeas., Aircraft, M206	1000	1	90	
1,2,4-Trimethylbenzene	120.2	0.8758	0	1.45E-06
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	1.03E-06
1,3,5-Trimethylbenzene	120.2	0.8758	0	3.40E-07
1,3-Butadiene	54.1	0.6211	0	4.11E-06
1-Butene	56.1	0.5951	0	8.11E-06
1-Hexene	84.2	0.6731	0	5.97E-06
1-Pentene	70.1	0.6405	0	3.49E-06
2,2,4-Trimethylpentane	114.2	0.6917	0	2.48E-06

Table 3. Contents of File OBODFUEL.OBD (Continued)

2,3-Dimethylbutane	86.2	0.6616	0	6.81E-07
2,3-Dimethylpentane	100.2	0.6951	0	4.49E-07
2,4,6-Trinitrotoluene	227.1	1.6540	1.35E+09	8.38E-07
2,4-Dimethylhexane	114.2	0.6960	0	3.40E-07
2,4-Dimethylpentane	100.2	0.6727	0	3.42E-07
2,4-Dinitrotoluene	182.1	1.3208	0	1.74E-06
2,5-Dimethylhexane	114.2	0.6935	0	3.40E-07
2-Methyl-1-butene	70.1	0.6504	0	6.78E-07
2-Methyl-2-butene	70.1	0.6623	0	3.42E-07
2-Methylpentane	86.2	0.6532	0	6.81E-07
3-Methyl-1-butene	70.1	0.6272	0	3.42E-07
3-Methylhexane	100.2	0.6860	0	5.62E-07
3-Methylpentane	86.2	0.6645	0	3.40E-07
Acetylene	26.0	0.6181	0	2.85E-04
Allyl Chloride	76.5	0.9376	0	1.82E-05
Aluminum	27.0	2.7020	0	1.57E-02
Barium	137.3	3.5100	0	6.09E-04
Benzene	78.1	0.8787	0	4.49E-05
CO	28.0	0.0013	0	8.28E-03
CO2	44.0	0.0020	0	8.10E-01
Cadmium	112.4	8.6420	0	3.43E-05
Chromium	52.0	7.2000	0	1.57E-04
Copper	63.5	8.9200	0	4.57E-04
Cyclohexane	84.2	0.7781	0	3.32E-07
Cyclopentene	68.1	0.8000	0	7.89E-07
Di-n-butyl phthalate	278.4	1.0500	0	4.04E-05
Diethyl phthalate	182.1	1.3208	0	1.07E-06
Ethane	30.1	0.5720	0	1.02E-06
Ethyl chloride	64.5	0.8978	0	3.13E-06
Ethylbenzene	106.2	0.8670	0	2.36E-06
Ethylene	62.0	0.9780	0	1.16E-04
HMX	0.0	0.0000	0	9.00E-06
Lead	207.2	11.3437	0	5.08E-04
Methane	16.0	0.5547	0	1.58E-04
Methyl Chloride	50.5	0.9159	0	1.01E-06
Methylcyclohexane	98.2	0.0000	0	3.40E-07
Methylcyclopentane	0.0	0.0000	0	3.42E-07
Methylenechloride	84.9	1.3266	0	4.12E-04
Nitrogen Oxide	30.0	0.0013	0	5.32E-03
Nitrogen Dioxide (peroxide)	46.0	1.4494	9360	2.83E-03
Nickel	58.7	8.9000	0	2.18E-05
Nitroglycerin	227.1	1.5931	0	8.94E-07
Non-methane Organic Compounds	0.0	0.0000	0	1.02E-03
Pentaerythritol tetranitrate (PETN)	316.2	1.7730	0	1.56E-06
PM10	0.0	0.0000	0	5.54E-01
Propane	44.1	0.5005	0	2.04E-06
Propene	42.1	0.5193	0	2.24E-05
RDX	222.1	1.8200	0	5.95E-05
Sulfur Dioxide	64.1	0.0029	0	1.02E-03

Table 3. Contents of File OBODFUEL.OBD (Continued)

Styrene	104.2	0.9060	0	7.09E-06
Titanium	47.9	4.5000	0	1.27E-05
Toluene	92.2	0.8669	0	2.76E-05
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	1.19E-05
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	4.52E-04
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	8.60E-05
Total Non-methane Hydrocarbons	0.0	0.0000	0	6.10E-04
Total TCDF	0.0	0.0000	0	7.97E-11
Total Unidentified Hydrocarbons	0.0	0.0000	0	6.56E-05
Vinyl Chloride	62.5	0.9106	0	1.52E-06
Vinylidene Chloride	96.9	1.2180	0	1.15E-06
Zinc	65.4	7.1400	0	2.64E-04
bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	5.80E-07
cis-2-Butene	56.1	0.6213	0	1.01E-06
cis-2-Pentene	70.1	0.6556	0	3.40E-07
i-Butane	58.1	0.0000	0	6.64E-07
i-Butene	56.1	0.0000	0	2.48E-06
i-Pentane	72.2	0.0000	0	3.42E-07
i-Propylbenzene	120.2	0.0000	0	1.02E-06
m- & p-Xylene	106.2	0.8627	0	2.51E-06
m-Ethyltoluene	135.2	0.9391	0	3.40E-07
n-Butane	58.1	0.6012	0	5.65E-07
n-Decane	142.3	0.7300	0	3.38E-07
n-Heptane	100.2	0.6840	0	4.51E-07
n-Hexane	86.1	0.6548	0	6.76E-07
n-Nonane	128.3	0.7176	0	6.76E-07
n-Octane	114.2	0.7025	0	9.96E-07
n-Pentane	72.2	0.6262	0	6.83E-07
n-Propylbenzene	120.2	0.8620	0	1.02E-06
o-Ethyltoluene	135.2	0.9391	0	1.36E-06
o-Xylene	106.2	0.8802	0	1.28E-06
p-Ethyltoluene	135.2	0.9391	0	6.81E-06
trans-2-Butene	125.0	1.1830	0	2.81E-06
Fuze, Inertiam Tail, Bomb, FMU 54A/B	1000	1	97	
1,2,4-Trimethylbenzene	120.2	0.8758	0	1.75E-06
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	3.24E-06
1,3,5-Trimethylbenzene	120.2	0.8758	0	1.86E-06
1,3-Butadiene	54.1	0.6211	0	9.85E-06
1-Butene	56.1	0.5951	0	1.45E-05
1-Hexene	84.2	0.6731	0	9.55E-06
1-Pentene	70.1	0.6405	0	6.75E-06
2,2,4-Trimethylpentane	114.2	0.6917	0	4.64E-06
2,2-Dimethylbutane	86.2	0.6485	0	7.88E-07
2,3,4-Trimethylpentane	114.2	0.7191	0	4.05E-07
2,3-Dimethylbutane	86.2	0.6616	0	3.95E-07
2,3-Dimethylpentane	100.2	0.6951	0	7.91E-07
2,4,6-Trinitrotoluene	227.1	1.6540	1.35E+09	2.14E-06
2,4-Dimethylhexane	114.2	0.6960	0	8.11E-07
2,4-Dimethylpentane	100.2	0.6727	0	3.94E-07

Table 3. Contents of File OBODFUEL.OBD (Continued)

2-Methyl-1-butene	70.1	0.6504	0	1.59E-06
2-Methyl-2-butene	70.1	0.6623	0	7.91E-07
2-Methylpentane	86.2	0.6532	0	5.30E-07
3- and 4-Methylphenol(m- and p-Creso	108.1	1.0178	0	3.73E-07
3-Methyl-1-butene	70.1	0.6272	0	1.06E-06
3-Methylhexane	100.2	0.6860	0	3.94E-07
3-Methylpentane	86.2	0.6645	0	8.11E-07
Acetylene	26.0	0.6181	0	6.09E-04
Allyl Chloride	76.5	0.9376	0	2.85E-05
Aluminum	27.0	2.7020	0	1.71E-02
Barium	137.3	3.5100	0	1.44E-04
Benzene	78.1	0.8787	0	1.47E-04
Butylbenzyl phthalate	312.4	1.1210	0	4.76E-07
CO	28.0	0.0013	0	2.46E-02
CO2	44.0	0.0020	0	1.25E+00
Cadmium	112.4	8.6420	0	4.07E-04
Chromium	52.0	7.2000	0	5.22E-05
Copper	63.5	8.9200	0	1.32E-03
Cyclopentene	68.1	0.8000	0	1.72E-06
Di-n-butyl phthalate	278.4	1.0500	0	5.48E-05
Di-n-octyl phthalate	390.6	0.0000	0	5.69E-07
Diethyl phthalate	182.1	1.3208	0	1.32E-06
Ethane	30.1	0.5720	0	1.66E-05
Ethylbenzene	106.2	0.8670	0	3.55E-06
Ethylene	62.0	0.9780	0	2.59E-04
Fluoranthene	202.3	1.2520	0	6.44E-07
HMX	0.0	0.0000	0	1.28E-05
Lead	207.2	11.3437	0	6.77E-04
Methane	16.0	0.5547	0	4.14E-04
Methyl Bromide	94.9	1.6755	0	1.25E-05
Methyl Chloride	50.5	0.9159	0	4.19E-06
Methylcyclopentane	0.0	0.0000	0	3.95E-07
Methylenechloride	84.9	1.3266	0	1.04E-03
Nitrogen Oxide	30.0	0.0013	0	9.35E-03
Nitrogen Dioxide (peroxide)	46.0	1.4494	9360	3.37E-03
Naphthalene	128.2	1.0253	0	7.88E-06
Nickel	58.7	8.9000	0	6.82E-05
Nitroglycerin	227.1	1.5931	0	3.07E-06
Non-methane Organic Compounds	0.0	0.0000	0	1.82E-03
Pentaerythritol tetranitrate (PETN)	316.2	1.7730	0	1.28E-05
PM10	0.0	0.0000	0	4.44E-01
Phenanthrene	178.2	0.9800	0	5.79E-07
Phenol	94.1	1.0576	0	5.29E-05
Propane	44.1	0.5005	0	2.00E-06
Propene	42.1	0.5193	0	5.73E-06
Pyrene	202.3	1.2710	0	1.64E-06
RDX	222.1	1.8200	0	1.20E-04
Sulfur Dioxide	64.1	0.0029	0	5.44E-04
Styrene	104.2	0.9060	0	1.04E-05

Table 3. Contents of File OBODFUEL.OBD (Continued)

Titanium	47.9	4.5000	0	1.63E-05
Toluene	92.2	0.8669	0	4.20E-05
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	3.01E-05
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	9.86E-04
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	2.25E-04
Total Non-methane Hydrocarbons	0.0	0.0000	0	1.32E-03
Total Unidentified Hydrocarbons	0.0	0.0000	0	8.94E-05
Vinyl Chloride	62.5	0.9106	0	9.21E-07
Vinylidene Chloride	96.9	1.2180	0	1.38E-06
Zinc	65.4	7.1400	0	4.53E-04
bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	1.24E-06
cis-2-Butene	56.1	0.6213	0	1.33E-06
cis-2-Hexene	84.2	0.6869	0	3.95E-07
cis-2-Pentene	70.1	0.6556	0	1.19E-06
i-Butane	58.1	0.0000	0	3.95E-07
i-Butene	56.1	0.0000	0	6.37E-06
i-Pentane	72.2	0.0000	0	3.55E-06
i-Propylbenzene	120.2	0.0000	0	3.95E-07
m- & p-Xylene	106.2	0.8627	0	1.53E-05
m-Ethyltoluene	135.2	0.9391	0	5.33E-07
n-Butane	58.1	0.6012	0	3.94E-06
n-Heptane	100.2	0.6840	0	7.91E-07
n-Hexane	86.1	0.6548	0	7.91E-07
n-Nonane	128.3	0.7176	0	1.62E-06
n-Octane	114.2	0.7025	0	5.33E-07
n-Pentane	72.2	0.6262	0	7.91E-07
n-Propylbenzene	120.2	0.8620	0	1.22E-06
o-Ethyltoluene	135.2	0.9391	0	1.22E-06
o-Xylene	106.2	0.8802	0	3.10E-06
p-Ethyltoluene	135.2	0.9391	0	2.55E-06
trans-2-Butene	125.0	1.1830	0	1.04E-05
trans-2-Hexene	84.2	0.6784	0	7.91E-07
trans-2-Pentene	84.2	0.6942	0	1.20E-06
Fuze, Bomb, Tail, FMU 139A/B	1000	1	93	
1,2,4-Trimethylbenzene	120.2	0.8758	0	2.05E-06
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	2.43E-06
1,3,5-Trimethylbenzene	120.2	0.8758	0	9.73E-07
1,3-Butadiene	54.1	0.6211	0	4.35E-05
1-Butene	56.1	0.5951	0	1.58E-05
1-Hexene	84.2	0.6731	0	8.72E-06
1-Pentene	70.1	0.6405	0	6.14E-06
2,2,4-Trimethylpentane	114.2	0.6917	0	3.72E-06
2,2-Dimethylbutane	86.2	0.6485	0	9.73E-07
2,2-Dimethylpropane	72.2	0.6135	0	3.38E-06
2,3-Dimethylbutane	86.2	0.6616	0	4.86E-07
2,3-Dimethylpentane	100.2	0.6951	0	4.76E-07
2,4,6-Trinitrotoluene	227.1	1.6540	1.35E+09	5.77E-06
2-Methyl-1-butene	70.1	0.6504	0	9.69E-07
2-Methyl-2-butene	70.1	0.6623	0	1.62E-06

Table 3. Contents of File OBODFUEL.OBD (Continued)

2-Methylpentane	86.2	0.6532	0	4.86E-07
3-Methyl-1-butene	70.1	0.6272	0	8.08E-07
Acetophenone	120.2	1.0281	0	1.44E-06
Acetylene	26.0	0.6181	0	6.18E-04
Allyl Chloride	76.5	0.9376	0	3.02E-05
Aluminum	27.0	2.7020	0	3.52E-02
Antimony	121.8	6.6840	0	2.21E-04
Barium	137.3	3.5100	0	1.24E-04
Benzene	78.1	0.8787	0	1.17E-04
CO	28.0	0.0013	0	2.34E-02
CO2	44.0	0.0020	0	1.44E+00
Cadmium	112.4	8.6420	0	2.25E-03
Carbon Tetrachloride	153.8	1.5940	0	2.65E-06
Chromium	52.0	7.2000	0	1.39E-04
Copper	63.5	8.9200	0	7.23E-03
Cyclohexane	84.2	0.7781	0	4.86E-07
Cyclopentene	68.1	0.8000	0	8.08E-07
Di-n-butyl phthalate	278.4	1.0500	0	7.15E-07
Di-n-octyl phthalate	390.6	0.9780	0	2.68E-06
Diethyl phthalate	182.1	1.3208	0	1.52E-03
Dimethyl phthalate	194.1	1.1900	0	3.99E-07
Ethane	30.1	0.5720	0	9.18E-06
Ethylbenzene	106.2	0.8670	0	3.66E-06
Ethylene	62.0	0.9780	0	3.40E-04
HMX	0.0	0.0000	0	2.16E-05
Lead	207.2	11.3437	0	3.16E-03
Methane	16.0	0.5547	0	3.23E-04
Methyl Bromide	94.9	1.6755	0	8.75E-06
Methyl Chloride	50.5	0.9159	0	4.96E-06
Methyl Chloroform	133.4	1.3390	0	1.61E-05
Methylcyclopentane	0.0	0.0000	0	4.86E-07
Methylenechloride	84.9	1.3266	0	1.13E-04
Nitrogen Oxide	30.0	0.0013	0	9.90E-03
Nitrogen Dioxide (peroxide)	46.0	1.4494	9360	1.71E-02
Naphthalene	128.2	1.0253	0	1.44E-06
Nickel	58.7	8.9000	0	1.34E-04
Nitroglycerin	227.1	1.5931	0	2.53E-06
Non-methane Organic Compounds	0.0	0.0000	0	1.87E-03
Pentaerythritol tetranitrate (PETN)	316.2	1.7730	0	1.65E-05
PM10	0.0	0.0000	0	5.96E-01
Phenol	94.1	1.0576	0	1.60E-06
Propane	44.1	0.5005	0	3.88E-06
Propene	42.1	0.5193	0	5.91E-05
Pyrene	202.3	1.2710	0	1.21E-06
RDX	222.1	1.8200	0	3.40E-04
Sulfur Dioxide	64.1	0.0029	0	1.36E-03
Styrene	104.2	0.9060	0	2.95E-05
Titanium	47.9	4.5000	0	9.14E-05
Toluene	92.2	0.8669	0	2.34E-05

Table 3. Contents of File OBODFUEL.OBD (Continued)

Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	1.47E-05
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	1.09E-03
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	1.86E-04
Total Non-methane Hydrocarbons	0.0	0.0000	0	1.40E-03
Total Unidentified Hydrocarbons	0.0	0.0000	0	1.02E-04
Vinyl Chloride	62.5	0.9106	0	1.82E-06
Vinylidene Chloride	96.9	1.2180	0	4.46E-06
Zinc	65.4	7.1400	0	6.57E-03
bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	9.25E-06
cis-2-Butene	56.1	0.6213	0	1.13E-06
cis-2-Pentene	70.1	0.6556	0	6.46E-07
i-Butane	58.1	0.0000	0	2.26E-06
i-Butene	56.1	0.0000	0	5.33E-06
i-Pentane	72.2	0.0000	0	4.83E-07
m- & p-Xylene	106.2	0.8627	0	6.95E-06
m-Ethyltoluene	135.2	0.9391	0	9.73E-07
n-Butane	58.1	0.6012	0	2.42E-06
n-Decane	142.3	0.7300	0	1.13E-06
n-Heptane	100.2	0.6840	0	6.46E-07
n-Hexane	86.1	0.6548	0	6.46E-07
n-Nonane	128.3	0.7176	0	4.86E-07
n-Octane	114.2	0.7025	0	4.86E-07
n-Pentane	72.2	0.6262	0	9.69E-07
n-Propylbenzene	120.2	0.8620	0	9.69E-07
o-Ethyltoluene	135.2	0.9391	0	2.42E-06
o-Xylene	106.2	0.8802	0	1.81E-06
p-Ethyltoluene	135.2	0.9391	0	2.10E-06
trans-2-Butene	125.0	1.1830	0	1.28E-05
trans-2-Pentene	84.2	0.6942	0	1.94E-06
GGU-2/A Gas prss Prop. Act. Gen.	1000	1	97	
1,2,4-Trimethylbenzene	120.2	0.8758	0	1.01E-05
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	9.94E-07
1,3,5-Trimethylbenzene	120.2	0.8758	0	2.54E-06
1,3-Butadiene	54.1	0.6211	0	4.25E-05
1-Butene	56.1	0.5951	0	4.17E-05
1-Hexene	84.2	0.6731	0	1.17E-05
1-Pentene	70.1	0.6405	0	5.96E-06
2,2,4-Trimethylpentane	114.2	0.6917	0	2.77E-06
2,3,4-Trimethylpentane	114.2	0.7191	0	1.18E-06
2,3-Dimethylbutane	86.2	0.6616	0	5.89E-07
2,3-Dimethylhexane	114.2	0.7121	0	5.89E-07
2,3-Dimethylpentane	100.2	0.6951	0	7.91E-07
2,4,6-Trinitrotoluene	227.1	1.6540	1.35E+09	2.21E-06
2,4-Dimethylhexane	114.2	0.6960	0	5.89E-07
2-Methyl-1-butene	70.1	0.6504	0	1.77E-06
2-Methyl-2-butene	70.1	0.6623	0	7.74E-06
2-Methylpentane	86.2	0.6532	0	1.77E-06
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	1.18E-06
3-Methyl-1-butene	70.1	0.6272	0	7.97E-07

Table 3. Contents of File OBODFUEL.OBD (Continued)

3-Methylpentane	86.2	0.6645	0	1.21E-06
Acetylene	26.0	0.6181	0	6.36E-04
Allyl Chloride	76.5	0.9376	0	1.12E-04
Aluminum	27.0	2.7020	0	6.12E-03
Barium	137.3	3.5100	0	2.15E-04
Benzene	78.1	0.8787	0	1.30E-04
CO	28.0	0.0013	0	2.89E-02
CO2	44.0	0.0020	0	4.51E-01
Cadmium	112.4	8.6420	0	1.00E-04
Chlorobenzene	112.6	1.1058	0	7.27E-06
Chloroform	119.4	1.4832	0	2.56E-06
Chromium	52.0	7.2000	0	9.64E-05
Copper	63.5	8.9200	0	1.12E-03
Cyclopentene	68.1	0.8000	0	3.58E-06
Di-n-octyl phthalate	390.6	0.0000	0	1.21E-06
Diethyl phthalate	182.1	1.3208	0	1.56E-03
Dimethyl phthalate	194.1	1.1900	0	1.54E-06
Ethane	30.1	0.5720	0	3.03E-05
Ethyl chloride	64.5	0.8978	0	4.66E-06
Ethylbenzene	106.2	0.8670	0	2.32E-06
Ethylene	62.0	0.9780	0	6.14E-04
Fluoranthene	202.3	1.2520	0	6.27E-07
HMX	0.0	0.0000	0	9.28E-06
Lead	207.2	11.3437	0	9.57E-04
Methane	16.0	0.5547	0	1.11E-03
Methyl Chloride	50.5	0.9159	0	1.62E-05
Methylcyclopentane	0.0	0.0000	0	2.36E-06
Methylenechloride	84.9	1.3266	0	8.67E-04
Nitrogen Oxide	30.0	0.0013	0	1.59E-03
Nitrogen Dioxide (peroxide)	46.0	1.4494	9360	2.43E-03
Naphthalene	128.2	1.0253	0	1.16E-05
Nickel	58.7	8.9000	0	4.06E-05
Non-methane Organic Compounds	0.0	0.0000	0	2.66E-03
Pentaerythritol tetranitrate (PETN)	316.2	1.7730	0	4.90E-05
PM10	0.0	0.0000	0	9.28E-02
Phenanthrene	178.2	0.9800	0	1.06E-06
Propane	44.1	0.5005	0	7.74E-06
Propene	42.1	0.5193	0	7.15E-05
Pyrene	202.3	1.2710	0	2.14E-06
RDX	222.1	1.8200	0	1.40E-04
Sulfur Dioxide	64.1	0.0029	0	3.99E-04
Styrene	104.2	0.9060	0	8.33E-06
Tetrachloroethylene	165.8	1.6227	0	5.87E-06
Titanium	47.9	4.5000	0	6.79E-06
Toluene	92.2	0.8669	0	1.25E-05
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	4.31E-05
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	1.44E-03
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	1.55E-04
Total Non-methane Hydrocarbons	0.0	0.0000	0	1.78E-03

Table 3. Contents of File OBODFUEL.OBD (Continued)

Total Unidentified Hydrocarbons	0.0	0.0000	0	1.48E-04
Trichloroethylene	131.3	1.4642	0	1.11E-05
Vinyl Chloride	62.5	0.9106	0	4.35E-05
Vinylidene Chloride	96.9	1.2180	0	2.07E-06
Zinc	65.4	7.1400	0	5.64E-04
bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	2.43E-06
cis-2-Butene	56.1	0.6213	0	1.79E-06
cis-2-Hexene	84.2	0.6869	0	5.89E-07
cis-2-Pentene	70.1	0.6556	0	7.91E-07
i-Butane	58.1	0.0000	0	1.18E-06
i-Butene	56.1	0.0000	0	2.94E-06
i-Pentane	72.2	0.0000	0	5.89E-07
i-Propylbenzene	120.2	0.0000	0	1.18E-06
m- & p-Xylene	106.2	0.8627	0	7.66E-06
m-Ethyltoluene	135.2	0.9391	0	5.89E-07
n-Butane	58.1	0.6012	0	3.53E-06
n-Decane	142.3	0.7300	0	5.95E-07
n-Heptane	100.2	0.6840	0	7.97E-07
n-Hexane	86.1	0.6548	0	9.88E-07
n-Nonane	128.3	0.7176	0	5.89E-07
n-Octane	114.2	0.7025	0	1.21E-06
n-Pentane	72.2	0.6262	0	1.18E-06
n-Propylbenzene	120.2	0.8620	0	5.89E-07
o-Ethyltoluene	135.2	0.9391	0	6.07E-07
o-Xylene	106.2	0.8802	0	1.18E-06
p-Ethyltoluene	135.2	0.9391	0	5.07E-06
trans-2-Butene	125.0	1.1830	0	1.47E-05
trans-2-Hexene	84.2	0.6784	0	1.21E-06
trans-2-Pentene	84.2	0.6942	0	1.38E-06
Ground Illum. Signal,Red Star,M158	1000	1	92	
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	3.03E-06
1,3,5-Trimethylbenzene	120.2	0.8758	0	3.49E-07
1,3-Butadiene	54.1	0.6211	0	1.22E-05
1-Butene	56.1	0.5951	0	2.30E-05
1-Hexene	84.2	0.6731	0	1.74E-05
1-Pentene	70.1	0.6405	0	1.01E-05
2,2,4-Trimethylpentane	114.2	0.6917	0	6.41E-06
2,2-Dimethylbutane	86.2	0.6485	0	6.89E-07
2,3-Dimethylbutane	86.2	0.6616	0	3.52E-07
2,3-Dimethylpentane	100.2	0.6951	0	3.52E-07
2,4,4-Trimethyl-1-pentene	112.2	0.7150	0	3.51E-07
2,4,6-Trinitrotoluene	227.1	1.6540	1.35E+09	5.79E-07
2,4-Dimethylhexane	114.2	0.6960	0	6.89E-07
2,4-Dinitrotoluene	182.1	1.3208	0	7.78E-07
2-Methyl-1-butene	70.1	0.6504	0	9.33E-07
2-Methyl-2-butene	70.1	0.6623	0	4.66E-07
2-Methylheptane	114.2	0.6980	0	3.51E-07
2-Methylhexane	100.2	0.6787	0	6.89E-07
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	3.51E-07

Table 3. Contents of File OBODFUEL.OBD (Continued)

3-Methyl-1-butene	70.1	0.6272	0	3.49E-07
Acetylene	26.0	0.6181	0	2.66E-04
Allyl Chloride	76.5	0.9376	0	1.55E-05
Aluminum	27.0	2.7020	0	2.83E-03
Antimony	121.8	6.6840	0	2.43E-05
Barium	137.3	3.5100	0	5.47E-04
Benzene	78.1	0.8787	0	2.99E-05
CO	28.0	0.0013	0	1.21E-02
CO2	44.0	0.0020	0	5.13E-01
Cadmium	112.4	8.6420	0	1.11E-03
Chromium	52.0	7.2000	0	1.45E-04
Copper	63.5	8.9200	0	2.95E-04
Cyclopentene	68.1	0.8000	0	2.45E-06
Di-n-octyl phthalate	390.6	0.0000	0	8.25E-07
Diethyl phthalate	182.1	1.3208	0	7.66E-05
Dimethyl phthalate	194.1	1.1900	0	1.91E-08
Ethane	30.1	0.5720	0	2.43E-05
Ethylbenzene	106.2	0.8670	0	1.31E-06
Ethylene	62.0	0.9780	0	2.26E-04
Fluoranthene	202.3	1.2520	0	1.92E-07
HMX	0.0	0.0000	0	9.10E-06
Lead	207.2	11.3437	0	5.89E-04
Methane	16.0	0.5547	0	4.53E-04
Methyl Chloride	50.5	0.9159	0	1.29E-06
Methylcyclohexane	98.2	0.0000	0	3.51E-07
Methylcyclopentane	0.0	0.0000	0	1.05E-06
Methylenechloride	84.9	1.3266	0	1.00E-04
Nitrogen Oxide	30.0	0.0013	0	2.63E-03
Nitrogen Dioxide (peroxide)	46.0	1.4494	9360	1.52E-03
Nickel	58.7	8.9000	0	7.66E-05
Nitroglycerin	227.1	1.5931	0	2.66E-06
Non-methane Organic Compounds	0.0	0.0000	0	1.19E-03
OCDD	0.0	0.0000	0	3.09E-11
Pentaerythritol tetranitrate (PETN)	316.2	1.7730	0	8.36E-06
PM10	0.0	0.0000	0	8.23E-02
Phenanthrene	178.2	0.9800	0	2.35E-07
Phenol	94.1	1.0576	0	7.05E-07
Propane	44.1	0.5005	0	4.78E-06
Propene	42.1	0.5193	0	5.61E-05
Pyrene	202.3	1.2710	0	1.17E-06
RDX	222.1	1.8200	0	5.54E-05
Sulfur Dioxide	64.1	0.0029	0	1.10E-04
Styrene	104.2	0.9060	0	2.22E-06
Titanium	47.9	4.5000	0	1.09E-05
Toluene	92.2	0.8669	0	2.52E-05
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	2.74E-05
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	6.24E-04
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	6.25E-05
Total Non-methane Hydrocarbons	0.0	0.0000	0	7.69E-04

Table 3. Contents of File OBODFUEL.OBD (Continued)

Total TCDF	0.0	0.0000	0	4.94E-11
Total Unidentified Hydrocarbons	0.0	0.0000	0	5.57E-05
Vinyl Chloride	62.5	0.9106	0	1.06E-06
Zinc	65.4	7.1400	0	1.15E-04
bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	5.78E-07
cis-2-Butene	56.1	0.6213	0	1.05E-06
cis-2-Pentene	70.1	0.6556	0	3.52E-07
i-Butane	58.1	0.0000	0	1.52E-06
i-Butene	56.1	0.0000	0	4.48E-06
m- & p-Xylene	106.2	0.8627	0	2.70E-06
m-Ethyltoluene	135.2	0.9391	0	3.45E-07
n-Butane	58.1	0.6012	0	2.11E-06
n-Decane	142.3	0.7300	0	5.81E-07
n-Heptane	100.2	0.6840	0	9.30E-07
n-Hexane	86.1	0.6548	0	1.05E-06
n-Nonane	128.3	0.7176	0	9.30E-07
n-Octane	114.2	0.7025	0	1.05E-06
n-Pentane	72.2	0.6262	0	5.83E-07
n-Propylbenzene	120.2	0.8620	0	4.66E-07
o-Ethyltoluene	135.2	0.9391	0	6.89E-07
o-Xylene	106.2	0.8802	0	7.03E-07
p-Ethyltoluene	135.2	0.9391	0	1.52E-06
trans-2-Butene	125.0	1.1830	0	5.36E-06
trans-2-Pentene	84.2	0.6942	0	8.18E-07
HBX (48/31/17/4 RDX-TNT-Al-WAX)	1405	1	94	
1,2,4-Trimethylbenzene	120.2	0.8758	0	1.11E-06
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	1.11E-06
1,3,5-Trimethylbenzene	120.2	0.8758	0	3.71E-07
1,3,5-Trinitrobenzene	213.1	1.4775	0	1.49E-05
1,3-Butadiene	54.1	0.6211	0	1.38E-06
1-Butene	56.1	0.5951	0	6.28E-06
1-Hexene	84.2	0.6731	0	2.66E-06
1-Pentene	70.1	0.6405	0	1.53E-06
2,2,4-Trimethylpentane	114.2	0.6917	0	2.92E-06
2,3,4-Trimethylpentane	114.2	0.7191	0	7.31E-07
2,3-Dimethylbutane	86.2	0.6616	0	7.31E-07
2,3-Dimethylhexane	114.2	0.7121	0	7.51E-07
2,3-Dimethylpentane	100.2	0.6951	0	1.83E-06
2,4,4-Trimethyl-1-pentene	112.2	0.7150	0	3.71E-07
2,4-Dimethylhexane	114.2	0.6960	0	3.71E-07
2,4-Dimethylpentane	100.2	0.6727	0	1.10E-06
2,5-Dimethylhexane	114.2	0.6935	0	1.10E-06
2-Methyl-1-butene	70.1	0.6504	0	3.82E-07
2-Methyl-2-butene	70.1	0.6623	0	4.10E-07
2-Methyl-2-pentene	84.2	0.6863	0	4.10E-07
2-Methylheptane	114.2	0.6980	0	3.65E-07
2-Methylhexane	100.2	0.6787	0	9.02E-07
2-Methylpentane	86.2	0.6532	0	1.11E-06
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	3.65E-07

Table 3. Contents of File OBODFUEL.OBD (Continued)

3-Methyl-1-butene	70.1	0.6272	0	3.65E-07
3-Methylhexane	100.2	0.6860	0	2.56E-06
3-Methylpentane	86.2	0.6645	0	3.65E-07
Acetylene	26.0	0.6181	0	2.92E-05
Aluminum	27.0	2.7020	0	9.31E-03
Barium	137.3	3.5100	0	2.01E-04
Benzene	78.1	0.8787	0	7.16E-06
Benzyl alcohol	108.2	1.0419	0	3.96E-05
Butylbenzyl phthalate	312.4	0.0000	0	3.38E-06
CO	28.0	0.0013	0	5.18E-03
CO2	44.0	0.0020	0	1.14E+00
Cadmium	112.4	8.6420	0	3.16E-06
Carbon Tetrachloride	153.8	1.5940	0	4.10E-07
Chloroform	119.4	1.4832	0	3.82E-07
Chromium	52.0	7.2000	0	6.46E-06
Copper	63.5	8.9200	0	3.67E-03
Cyclopentane	70.1	0.7500	0	1.11E-06
Cyclopentene	68.1	0.8000	0	4.10E-07
Di-n-butyl phthalate	278.4	1.0500	0	5.17E-05
Di-n-octyl phthalate	390.6	0.0000	0	1.02E-05
Diethyl phthalate	182.1	1.3208	0	2.83E-06
Ethane	30.1	0.5720	0	1.64E-06
Ethylbenzene	106.2	0.8670	0	2.05E-06
Ethylene	62.0	0.9780	0	3.22E-05
Lead	207.2	11.3437	0	4.90E-05
Methane	16.0	0.5547	0	1.11E-05
Methylchloride	50.5	0.9159	0	6.29E-07
Methyl chloroform	133.4	1.3390	0	3.82E-07
Methylcyclohexane	98.2	0.0000	0	6.13E-06
Methylcyclopentane	0.0	0.0000	0	6.42E-07
Methylenechloride	84.9	1.3266	0	2.72E-04
Nitrogen Oxide	30.0	0.0013	0	9.85E-03
Nitrogen Dioxide (peroxide)	46.0	1.4494	9360	4.41E-05
Nickel	58.7	8.9000	0	1.15E-05
Non-methane Organic Compounds	0.0	0.0000	0	4.30E-04
PM10	0.0	0.0000	0	1.81E-01
Phenol	94.1	1.0576	0	1.18E-05
Propane	44.1	0.5005	0	8.71E-07
Propene	42.1	0.5193	0	9.35E-06
Sulfur Dioxide	64.1	0.0029	0	1.05E-03
Styrene	104.2	0.9060	0	1.85E-06
Titanium	47.9	4.5000	0	2.11E-05
Toluene	92.2	0.8669	0	3.34E-06
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	1.44E-05
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	9.35E-05
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	3.08E-05
Total Non-methane Hydrocarbons	0.0	0.0000	0	1.81E-04
Total Unidentified Hydrocarbons	0.0	0.0000	0	8.35E-05
Zinc	65.4	7.1400	0	5.16E-04

Table 3. Contents of File OBODFUEL.OBD (Continued)

bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	4.26E-05
cis-2-Butene	56.1	0.6213	0	2.19E-06
cis-2-Hexene	84.2	0.6869	0	3.71E-07
cis-2-Pentene	70.1	0.6556	0	4.10E-07
i-Butane	58.1	0.0000	0	7.31E-07
i-Butene	56.1	0.0000	0	3.52E-06
i-Propylbenzene	120.2	0.0000	0	7.31E-07
m- & p-Xylene	106.2	0.8627	0	7.86E-06
n-Butane	58.1	0.6012	0	5.04E-07
n-Decane	142.3	0.7300	0	3.65E-07
n-Heptane	100.2	0.6840	0	7.31E-07
n-Hexane	86.1	0.6548	0	7.31E-07
n-Octane	114.2	0.7025	0	1.10E-06
n-Pentane	72.2	0.6262	0	7.42E-07
n-Propylbenzene	120.2	0.8620	0	3.71E-07
o-Ethyltoluene	135.2	0.9391	0	3.71E-07
o-Xylene	106.2	0.8802	0	2.57E-06
p-Ethyltoluene	135.2	0.9391	0	7.42E-07
trans-2-Butene	125.0	1.1830	0	4.51E-06
trans-2-Hexene	84.2	0.6784	0	4.10E-07
trans-2-Pentene	84.2	0.6942	0	3.65E-07
Impluse Cartridge, ARD 446-1	1000	1	94	
1,2,4-Trimethylbenzene	120.2	0.8758	0	1.62E-06
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	7.47E-06
1,3,5-Trimethylbenzene	120.2	0.8758	0	7.38E-07
1,3-Butadiene	54.1	0.6211	0	1.14E-05
1-Hexene	84.2	0.6731	0	2.63E-05
1-Pentene	70.1	0.6405	0	1.29E-05
2,2,4-Trimethylpentane	114.2	0.6917	0	1.20E-05
2,3,4-Trimethylpentane	114.2	0.7191	0	2.18E-06
2,3-Dimethylbutane	86.2	0.6616	0	3.64E-07
2,3-Dimethylhexane	114.2	0.7121	0	7.27E-07
2,3-Dimethylpentane	100.2	0.6951	0	1.11E-06
2,4-Dimethylhexane	114.2	0.6960	0	2.62E-06
2,4-Dimethylpentane	100.2	0.6727	0	7.27E-07
2,4-Dinitrotoluene	182.1	1.3208	0	3.15E-07
2,5-Dimethylhexane	114.2	0.6935	0	7.47E-07
2-Methyl-1-butene	70.1	0.6504	0	9.88E-07
2-Methyl-2-butene	70.1	0.6623	0	7.51E-07
2-Methylheptane	114.2	0.6980	0	4.96E-07
2-Methylhexane	100.2	0.6787	0	3.76E-07
2-Methylpentane	86.2	0.6532	0	3.76E-07
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	3.47E-07
3-Methyl-1-butene	70.1	0.6272	0	4.96E-07
3-Methylhexane	100.2	0.6860	0	2.48E-06
3-Methylpentane	86.2	0.6645	0	1.09E-06
Acetophenone	120.2	1.0281	0	4.30E-07
Acetylene	26.0	0.6181	0	3.15E-04
Aluminum	27.0	2.7020	0	6.71E-03

Table 3. Contents of File OBODFUEL.OBD (Continued)

Antimony	121.8	6.6840	0	2.59E-04
Barium	137.3	3.5100	0	3.67E-04
Benzene	78.1	0.8787	0	9.77E-05
CO	28.0	0.0013	0	1.92E-02
CO2	44.0	0.0020	0	7.00E-01
Cadmium	112.4	8.6420	0	5.22E-06
Chromium	52.0	7.2000	0	6.82E-06
Copper	63.5	8.9200	0	5.64E-04
Cyclopentane	70.1	0.7500	0	4.46E-06
Di-n-butyl phthalate	278.4	1.0500	0	3.27E-05
Di-n-octyl phthalate	390.6	0.0000	0	6.38E-07
Diethyl phthalate	182.1	1.3208	0	1.82E-06
Ethane	30.1	0.5720	0	3.44E-05
Ethylbenzene	106.2	0.8670	0	1.39E-06
Ethylene	62.0	0.9780	0	4.87E-04
HMX	0.0	0.0000	0	1.67E-03
Lead	207.2	11.3437	0	1.31E-03
Methane	16.0	0.5547	0	5.28E-04
Methyl Chloride	50.5	0.9159	0	1.80E-06
Methyl Chloroform	133.4	1.3390	0	1.72E-06
Methylcyclopentane	0.0	0.0000	0	8.68E-07
Methylenechloride	84.9	1.3266	0	7.34E-05
n-Nitrosodiphenylamine	198.2	1.0000	0	1.06E-06
Nitrogen Oxide	30.0	0.0013	0	9.25E-03
Nitrogen Dioxide (peroxide)	46.0	1.4494	9360	2.52E-03
Nickel	58.7	8.9000	0	7.34E-06
Non-methane Organic Compounds	0.0	0.0000	0	2.17E-03
PM10	0.0	0.0000	0	1.21E-01
Phenol	94.1	1.0576	0	2.77E-06
Propane	44.1	0.5005	0	8.29E-06
Propene	42.1	0.5193	0	8.67E-05
Pyrene	202.3	1.2710	0	2.02E-06
RDX	222.1	1.8200	0	1.22E-03
Sulfur Dioxide	64.1	0.0029	0	3.48E-04
Styrene	104.2	0.9060	0	7.79E-06
Tetrachloroethylene	165.8	1.6227	0	5.24E-05
Titanium	47.9	4.5000	0	7.01E-06
Toluene	92.2	0.8669	0	2.41E-05
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	7.49E-05
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	9.92E-04
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	1.46E-04
Total Non-methane Hydrocarbons	0.0	0.0000	0	1.42E-03
Total Unidentified Hydrocarbons	0.0	0.0000	0	2.10E-04
Zinc	65.4	7.1400	0	2.39E-04
bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	2.09E-07
cis-2-Butene	56.1	0.6213	0	2.60E-06
cis-2-Hexene	84.2	0.6869	0	3.64E-07
cis-2-Pentene	70.1	0.6556	0	7.43E-07
i-Butane	58.1	0.0000	0	3.64E-06

Table 3. Contents of File OBODFUEL.OBD (Continued)

i-Butene	56.1	0.0000	0	3.23E-05
i-Pentane	72.2	0.0000	0	1.08E-05
m- & p-Xylene	106.2	0.8627	0	9.85E-06
m-Ethyltoluene	135.2	0.9391	0	7.39E-07
n-Butane	58.1	0.6012	0	3.21E-06
n-Decane	142.3	0.7300	0	3.21E-07
n-Heptane	100.2	0.6840	0	2.59E-06
n-Hexane	86.1	0.6548	0	2.23E-06
n-Nonane	128.3	0.7176	0	8.62E-07
n-Octane	114.2	0.7025	0	1.49E-06
n-Pentane	72.2	0.6262	0	1.60E-06
n-Propylbenzene	120.2	0.8620	0	7.47E-07
o-Ethyltoluene	135.2	0.9391	0	1.45E-06
o-Xylene	106.2	0.8802	0	2.83E-06
p-Ethyltoluene	135.2	0.9391	0	1.58E-06
trans-2-Butene	125.0	1.1830	0	1.21E-05
trans-2-Hexene	84.2	0.6784	0	3.64E-07
trans-2-Pentene	84.2	0.6942	0	8.67E-07
Impluse BBU-368 Cartridge	1000	1	96	
1,2,4-Trimethylbenzene	120.2	0.8758	0	3.07E-06
1,3,5-Trimethylbenzene	120.2	0.8758	0	5.42E-06
1,3-Butadiene	54.1	0.6211	0	1.56E-05
1-Butene	56.1	0.5951	0	1.43E-05
1-Hexene	84.2	0.6731	0	3.78E-05
1-Pentene	70.1	0.6405	0	2.03E-05
2,2,4-Trimethylpentane	114.2	0.6917	0	1.74E-05
2,2-Dimethylbutane	86.2	0.6485	0	1.10E-06
2,3,4-Trimethylpentane	114.2	0.7191	0	1.43E-06
2,3-Dimethylbutane	86.2	0.6616	0	1.10E-06
2,3-Dimethylpentane	100.2	0.6951	0	1.44E-06
2,4-Dimethylhexane	114.2	0.6960	0	2.18E-06
2,4-Dimethylpentane	100.2	0.6727	0	5.49E-07
2,5-Dimethylhexane	114.2	0.6935	0	1.06E-06
2-Methyl-1-butene	70.1	0.6504	0	1.27E-06
2-Methyl-2-butene	70.1	0.6623	0	1.10E-06
2-Methylheptane	114.2	0.6980	0	1.45E-06
2-Methylhexane	100.2	0.6787	0	5.32E-07
2-Methylpentane	86.2	0.6532	0	2.20E-06
3,3-Dimethylbenzidine	212.3	0.0000	0	8.12E-07
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	1.45E-06
3-Methyl-1-butene	70.1	0.6272	0	5.42E-07
3-Methylhexane	100.2	0.6860	0	1.97E-06
3-Methylpentane	86.2	0.6645	0	5.32E-07
Acetylene	26.0	0.6181	0	2.98E-04
Allyl Chloride	76.5	0.9376	0	1.83E-05
Aluminum	27.0	2.7020	0	2.29E-02
Barium	137.3	3.5100	0	1.08E-04
Benzene	78.1	0.8787	0	4.15E-05
CO	28.0	0.0013	0	1.68E-02

Table 3. Contents of File OBODFUEL.OBD (Continued)

CO2	44.0	0.0020	0	1.03E+00
Cadmium	112.4	8.6420	0	8.79E-06
Chromium	52.0	7.2000	0	4.84E-05
Copper	63.5	8.9200	0	3.32E-03
Cyclohexane	84.2	0.7781	0	1.10E-06
Cyclopentane	70.1	0.7500	0	5.42E-07
Cyclopentene	68.1	0.8000	0	5.45E-06
Di-n-butyl phthalate	278.4	1.0500	0	9.21E-05
Di-n-octyl phthalate	390.6	0.0000	0	8.54E-07
Diethyl phthalate	182.1	1.3208	0	7.82E-04
Ethane	30.1	0.5720	0	6.70E-06
Ethylbenzene	106.2	0.8670	0	4.69E-06
Ethylene	62.0	0.9780	0	5.31E-04
Fluoranthene	202.3	1.2520	0	4.93E-07
HMX	0.0	0.0000	0	2.80E-05
Lead	207.2	11.3437	0	1.29E-03
Methane	16.0	0.5547	0	2.30E-04
Methyl Chloride	50.5	0.9159	0	1.97E-06
Methylcyclohexane	98.2	0.0000	0	1.06E-06
Methylcyclopentane	0.0	0.0000	0	2.20E-06
Methylenechloride	84.9	1.3266	0	3.42E-04
n-Nitrosodiphenylamine	198.2	1.0000	0	3.75E-06
Nitrogen Oxide	30.0	0.0013	0	7.86E-03
Nitrogen Dioxide (peroxide)	46.0	1.4494	9360	2.91E-03
Nickel	58.7	8.9000	0	2.80E-04
Nitroglycerin	227.1	1.5931	0	2.71E-06
Non-methane Organic Compounds	0.0	0.0000	0	2.27E-03
Pentaerythritol tetranitrate (PETN)	316.2	1.7730	0	1.83E-03
PM10	0.0	0.0000	0	3.46E-01
Propane	44.1	0.5005	0	6.88E-06
Propene	42.1	0.5193	0	9.67E-05
Pyrene	202.3	1.2710	0	2.36E-06
Sulfur Dioxide	64.1	0.0029	0	7.85E-04
Styrene	104.2	0.9060	0	7.06E-06
Tetrachloroethylene	165.8	1.6227	0	6.29E-06
Titanium	47.9	4.5000	0	1.58E-05
Toluene	92.2	0.8669	0	1.78E-05
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	7.49E-05
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	1.06E-03
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	1.25E-04
Total Non-methane Hydrocarbons	0.0	0.0000	0	1.50E-03
Total Unidentified Hydrocarbons	0.0	0.0000	0	2.44E-04
Vinyl Chloride	62.5	0.9106	0	3.25E-06
Zinc	65.4	7.1400	0	3.41E-04
bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	2.25E-06
cis-2-Butene	56.1	0.6213	0	1.81E-06
cis-2-Hexene	84.2	0.6869	0	5.49E-07
cis-2-Pentene	70.1	0.6556	0	7.24E-07
i-Butene	56.1	0.0000	0	4.36E-05

Table 3. Contents of File OBODFUEL.OBD (Continued)

i-Pentane	72.2	0.0000	0	2.73E-06
i-Propylbenzene	120.2	0.0000	0	1.81E-06
m- & p-Xylene	106.2	0.8627	0	1.75E-05
m-Ethyltoluene	135.2	0.9391	0	1.99E-06
n-Butane	58.1	0.6012	0	9.38E-06
n-Decane	142.3	0.7300	0	8.32E-06
n-Heptane	100.2	0.6840	0	2.89E-06
n-Hexane	86.1	0.6548	0	3.43E-06
n-Nonane	128.3	0.7176	0	6.33E-06
n-Octane	114.2	0.7025	0	2.34E-06
n-Pentane	72.2	0.6262	0	2.35E-06
n-Propylbenzene	120.2	0.8620	0	2.53E-06
o-Ethyltoluene	135.2	0.9391	0	3.43E-06
o-Xylene	106.2	0.8802	0	7.76E-06
p-Ethyltoluene	135.2	0.9391	0	4.47E-06
trans-2-Hexene	84.2	0.6784	0	1.10E-06
trans-2-Pentene	84.2	0.6942	0	1.26E-06
Impulse Cartridge, MK107 MOD01	1000	1	89	
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	8.95E-07
1,3,5-Trimethylbenzene	120.2	0.8758	0	7.64E-07
1,3,5-Trinitrobenzene	213.1	1.4775	0	1.43E-06
1,3-Butadiene	54.1	0.6211	0	4.68E-06
1-Butene	56.1	0.5951	0	1.46E-05
1-Hexene	84.2	0.6731	0	1.04E-05
1-Pentene	70.1	0.6405	0	6.39E-06
2,2,4-Trimethylpentane	114.2	0.6917	0	3.96E-06
2,3,4-Trimethylpentane	114.2	0.7191	0	3.85E-07
2,4,6-Trinitrotoluene	227.1	1.6540	0	1.15E-05
2,4-Dimethylpentane	100.2	0.6727	0	7.67E-07
2,4-Dinitrotoluene	182.1	1.3208	0	2.35E-06
2-Methyl-1-butene	70.1	0.6504	0	5.11E-07
2-Methyl-2-butene	70.1	0.6623	0	5.11E-07
2-Methylpentane	86.2	0.6532	0	3.85E-07
3-Methyl-1-butene	70.1	0.6272	0	3.84E-07
3-Methylhexane	100.2	0.6860	0	3.84E-07
Acetophenone	120.2	1.0281	0	5.00E-07
Acetylene	26.0	0.6181	0	3.49E-04
Allyl Chloride	76.5	0.9376	0	7.39E-06
Aluminum	27.0	2.7020	0	1.49E-02
Barium	137.3	3.5100	0	5.63E-04
Benzene	78.1	0.8787	0	9.32E-05
CO	28.0	0.0013	0	2.06E-02
CO2	44.0	0.0020	0	1.24E+00
Cadmium	112.4	8.6420	0	2.08E-03
Chlorobenzene	112.6	1.1058	0	1.55E-06
Chromium	52.0	7.2000	0	4.87E-05
Copper	63.5	8.9200	0	2.78E-03
Cyclopentene	68.1	0.8000	0	1.41E-06
Di-n-butyl phthalate	278.4	1.0500	0	4.11E-05

Table 3. Contents of File OBODFUEL.OBD (Continued)

Di-n-octyl phthalate	390.6	0.0000	0	1.32E-06
Diethyl phthalate	182.1	1.3208	0	4.38E-04
Dimethyl phthalate	194.1	1.1900	0	4.15E-07
Ethane	30.1	0.5720	0	2.30E-06
Ethylbenzene	106.2	0.8670	0	1.46E-06
Ethylene	62.0	0.9780	0	2.62E-04
HMX	0.0	0.0000	0	3.34E-05
Lead	207.2	11.3437	0	7.12E-04
Methane	16.0	0.5547	0	1.55E-04
Methyl Chloride	50.5	0.9159	0	1.40E-06
Methylcyclohexane	98.2	0.0000	0	1.15E-06
Methylcyclopentane	0.0	0.0000	0	7.70E-07
Methylenechloride	84.9	1.3266	0	3.31E-04
Nitrogen Oxide	30.0	0.0013	0	2.15E-02
Nitrogen Dioxide (peroxide)	46.0	1.4494	9360	8.92E-04
Nickel	58.7	8.9000	0	2.51E-05
Nitroglycerin	227.1	1.5931	0	1.64E-05
Non-methane Organic Compounds	0.0	0.0000	0	1.46E-03
Pentaerythritol tetranitrate (PETN)	316.2	1.7730	0	7.41E-05
PM10	0.0	0.0000	0	3.66E-01
Phenol	94.1	1.0576	0	1.23E-06
Propane	44.1	0.5005	0	2.29E-06
Propene	42.1	0.5193	0	3.80E-05
Pyrene	202.3	1.2710	0	2.10E-06
RDX	222.1	1.8200	0	2.43E-04
Sulfur Dioxide	64.1	0.0029	0	3.75E-04
Styrene	104.2	0.9060	0	1.37E-05
Titanium	47.9	4.5000	0	2.91E-05
Toluene	92.2	0.8669	0	1.32E-05
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	1.01E-05
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	7.05E-04
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	1.29E-04
Total Non-methane Hydrocarbons	0.0	0.0000	0	9.40E-04
Total Unidentified Hydrocarbons	0.0	0.0000	0	9.60E-05
Vinyl Chloride	62.5	0.9106	0	3.46E-06
Vinylidene Chloride	96.9	1.2180	0	1.33E-06
Zinc	65.4	7.1400	0	2.75E-04
bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	9.36E-07
cis-2-Butene	56.1	0.6213	0	1.15E-06
cis-2-Pentene	70.1	0.6556	0	3.84E-07
i-Butane	58.1	0.0000	0	1.54E-06
i-Butene	56.1	0.0000	0	9.97E-06
i-Propylbenzene	120.2	0.0000	0	7.64E-07
m- & p-Xylene	106.2	0.8627	0	5.62E-06
m-Ethyltoluene	135.2	0.9391	0	1.15E-06
n-Butane	58.1	0.6012	0	1.15E-06
n-Decane	142.3	0.7300	0	3.84E-07
n-Heptane	100.2	0.6840	0	1.53E-06
n-Hexane	86.1	0.6548	0	7.67E-07

Table 3. Contents of File OBODFUEL.OBD (Continued)

n-Nonane	128.3	0.7176	0	1.15E-06
n-Octane	114.2	0.7025	0	6.40E-07
n-Pentane	72.2	0.6262	0	3.85E-07
n-Propylbenzene	120.2	0.8620	0	5.11E-07
o-Ethyltoluene	135.2	0.9391	0	7.67E-07
o-Xylene	106.2	0.8802	0	7.64E-07
p-Ethyltoluene	135.2	0.9391	0	1.65E-06
trans-2-Butene	125.0	1.1830	0	1.23E-05
trans-2-Pentene	84.2	0.6942	0	3.84E-07
M1 (85% Nitrocellulose)	1020	1.88E+05	11	
2,4-Dinitrotoluene	182.1	1.3208	0	1.20E-09
Benzene	78.1	0.8787	0	4.80E-06
Carbon Dioxide	44.0	0.0020	0	1.10E+00
Carbon Monoxide	28.0	0.0013	0	2.50E-04
Diphenylamine	169.2	1.1600	0	1.10E-10
Methane	16.0	0.5547	0	8.00E-03
Naphthtalene	128.2	1.0253	0	1.90E-08
Nitrogen Oxide	30.0	0.0013	0	1.20E-03
Nitrogen Dioxide (peroxide)	46.0	1.4494	9360	4.70E-04
Phenol	94.1	1.0576	0	3.43E-09
Total Non-methane Hydocarbons	0.0	0.0000	0	4.60E-04
M6 (87.7% Nitrocellulose)	1020	2.18E+05	13	
2,4-Dinitrotoluene	182.1	1.3208	0	1.00E-09
2,6-Dinitrotoluene	182.1	1.2833	0	1.00E-10
Benzene	78.1	0.8787	0	1.70E-06
Carbon Dioxide	44.0	0.0020	0	1.06E+00
Carbon Monoxide	28.0	0.0013	0	9.50E-05
Diphenylamine	169.2	1.1600	0	2.60E-10
Methane	16.0	0.5547	0	4.60E-05
Naphthalene	128.2	1.0253	0	7.50E-08
Nitrogen Oxide	30.0	0.0013	0	2.40E-03
Nitrogen Dioxide (peroxide)	46.0	1.4494	9360	5.20E-03
Phenol	94.1	1.0576	0	1.50E-09
Total Non-methane Hydrocarbons	0.0	0.0000	0	1.30E-05
n-Nitronaphthalene	198.2	1.0000	0	1.40E-10
Manufacturer's Waste (65% propell.)	1000	1.55E+04	112	
1,2,4-Trimethylbenzene	120.2	0.8758	0	3.90E-06
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	8.99E-06
1,3,5-Trimethylbenzene	120.2	0.8652	0	6.45E-06
1,3-Butadiene	54.1	0.6211	0	5.88E-06
1-Butene	56.1	0.5951	0	8.34E-06
1-Hexane	86.2	0.6603	0	4.82E-06
1-Pentene	70.1	0.6405	0	5.05E-06
1234678-HpCDF	0.0	0.0000	0	3.42E-08
123478-HxCDF	0.0	0.0000	0	2.13E-08
1234789-HpCDF	0.0	0.0000	0	7.89E-09
123678-HxCDF	0.0	0.0000	0	9.47E-09
12378-PeCDF	0.0	0.0000	0	7.89E-09
2,2,4-Trimethylpentane	114.2	0.6917	0	1.01E-05

Table 3. Contents of File OBODFUEL.OBD (Continued)

2,2-Dimethylbutane	86.2	0.6485	0	8.42E-06
2,3,4-Trimethylpentane	114.2	0.7191	0	4.44E-06
2,3-Dimethylbutane	86.2	0.6616	0	3.60E-06
2,3-Dimethylhexane	114.2	0.7121	0	6.10E-07
2,3-Dimethylpentane	100.2	0.6951	0	2.09E-06
2,4,4-Trimethyl-1-pentene	112.2	0.7150	0	1.06E-06
2,4-Dimethylhexane	114.2	0.6960	0	2.91E-06
2,4-Dimethylpentane	100.2	0.6727	0	1.93E-06
2,5-Dimethylhexane	114.2	0.6935	0	2.37E-06
2-Methyl-1-butene	70.1	0.6504	0	8.12E-07
2-Methyl-1-pentene	84.2	0.6799	0	1.30E-06
2-Methyl-2-butene	70.1	0.6623	0	6.61E-07
2-Methyl-2-pentene	84.2	0.6863	0	5.84E-07
2-Methylheptane	114.2	0.6980	0	2.16E-06
2-Methylhexane	100.2	0.6787	0	1.37E-06
2-Methylpentane	86.2	0.6532	0	3.84E-06
234578-HxCDF	0.0	0.0000	0	5.77E-09
23478-PeCDF	0.0	0.0000	0	1.88E-08
2378-TCDF	0.0	0.0000	0	5.52E-09
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	1.80E-06
3-Methylhexane	100.2	0.6860	0	4.92E-06
3-Methylpentane	86.2	0.6645	0	4.56E-06
Acenaphthylene	152.2	0.8988	0	1.60E-04
Aluminum	27.0	2.7020	0	5.36E-02
Acetylene	26.0	0.6181	0	1.55E-03
Barium	137.3	3.5100	0	8.63E-05
Benzene	78.1	0.8787	0	4.47E-04
Benzo(b)fluoranthene	252.3	0.0000	0	2.86E-05
Benzo(g,h,i)perylene	276.3	0.0000	0	2.86E-05
Benzo(k)fluoranthene	252.3	0.0000	0	3.65E-05
CO	28.0	0.0013	0	2.00E-02
CO2	44.0	0.0020	0	1.13E+00
Carbon Tetrachloride	153.8	1.5940	0	5.64E-06
Chlorobenzene	112.6	1.1058	0	9.30E-06
Chloroform	119.4	1.4832	0	2.31E-06
Chrysene	228.3	1.2740	0	3.38E-05
Cl2	70.9	3.2140	0	3.57E-04
Copper	63.5	8.9200	0	1.45E-05
Cyclohexane	84.2	0.7781	0	1.96E-06
Cyclopentene	68.1	0.8000	0	9.39E-07
Di-n-butyl phthalate	278.4	1.0500	0	5.95E-05
Di-n-octyl phthalate	390.6	0.0000	0	1.31E-04
Ethane	30.1	0.5720	0	9.51E-06
Ethylbenzene	106.2	0.8670	0	2.36E-06
Ethylene	62.0	0.9780	0	2.32E-04
Fluoranthene	202.3	1.2520	0	3.56E-04
HCL	36.5	1.1870	0	8.43E-02
Lead	207.2	11.3437	0	4.91E-04
Methane	16.0	0.5547	0	3.79E-04

Table 3. Contents of File OBODFUEL.OBD (Continued)

Methylchloride	50.5	0.9159	0	2.01E-05
Methylcyclohexane	98.2	0.0000	0	8.02E-06
Methylcyclopentane	0.0	0.0000	0	1.05E-06
Methylenechloride	84.9	1.3266	0	1.45E-05
Nitrogen Oxide	30.0	0.0013	0	1.01E-03
Nitrogen Dioxide (peroxide)	46.0	1.4494	9360	6.62E-06
Naphthalene	128.2	1.0253	0	7.87E-04
Non-methane Organic Compounds	0.0	0.0000	0	3.10E-03
OCDF	0.0	0.0000	0	3.95E-08
PM10	0.0	0.0000	0	1.91E+00
Phenanthrene	178.2	0.9800	0	1.95E-04
Phenol	94.1	1.0576	0	3.37E-05
Propane	44.1	0.5005	0	4.49E-06
Propene	42.1	0.5193	0	2.60E-05
Pyrene	202.3	1.2710	0	2.86E-04
Sulfur Dioxide	64.1	0.0029	0	8.59E-04
Styrene	104.2	0.9060	0	5.64E-06
Tetrachloroethylene	165.8	1.6227	0	1.72E-06
Titanium	47.9	4.5000	0	1.05E-05
Toluene	92.2	0.8669	0	2.76E-05
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7080	0	1.28E-04
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	1.86E-03
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	5.68E-04
Total Non-methane Hydrocarbons	0.0	0.0000	0	2.91E-03
Total Unidentified Hydrocarbons	0.0	0.0000	0	3.52E-04
Zinc	65.4	7.1400	0	5.71E-04
bis (2-Ethylhexyl)phthalate	390.5	0.9732	0	7.46E-06
cis-2-Butene	56.1	0.6213	0	8.38E-07
cis-2-Hexene	84.2	0.6869	0	7.65E-07
cis-2-Pentene	70.1	0.6556	0	5.59E-07
i-Butane	58.1	0.0000	0	1.35E-06
i-Butene	56.1	0.0000	0	5.81E-06
i-Pentane	72.2	0.0000	0	2.30E-05
i-Propylbenzene	120.2	0.0000	0	2.91E-06
m- & p-Xylene	106.2	0.8627	0	5.82E-05
m-Ethyltoluene	135.2	0.9391	0	2.59E-06
n-Butane	58.1	0.6012	0	9.28E-06
n-Decane	142.3	0.7300	0	1.43E-05
n-Heptane	100.2	0.6840	0	4.70E-06
n-Hexane	86.1	0.6548	0	3.66E-06
n-Nonane	128.3	0.7176	0	1.30E-05
n-Octane	114.2	0.7025	0	7.62E-06
n-Pentane	72.2	0.6262	0	4.25E-06
n-Propybenzene	120.2	0.8620	0	2.31E-06
o-Ethyltoluene	135.2	0.9391	0	2.34E-06
o-Xylene	106.2	0.8802	0	3.71E-06
p-Ethyltoluene	135.2	0.9391	0	5.00E-06
trans-2-Butene	125.0	1.1830	0	2.08E-05
trans-2-Hexene	84.2	0.6784	0	8.64E-07

Table 3. Contents of File OBODFUEL.OBD (Continued)

trans-2-Pentene	84.2	0.6942	0	1.53E-06
Propellant, M-3 (ambient conditions)	1000	1.55E+04	81	
1,2,4-Trimethylbenzene	120.2	0.8758	0	2.58E-07
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	5.37E-07
1,3,5-Trimethylbenzene	120.2	0.8652	0	4.18E-07
1,3-Butadiene	54.1	0.6211	0	8.87E-08
1-Hexene	84.2	0.6731	0	4.14E-07
1-Nitropyrene	247.3	0.0000	0	7.72E-10
1-Pentene	70.1	0.6405	0	2.76E-07
2,3-Dimethylbutane	86.2	0.6616	0	9.20E-08
2,3-Dimethylhexane	114.2	0.7121	0	1.19E-07
2,3-Dimethylpentane	100.2	0.6951	0	4.16E-07
2,4,6-Trinitrotoluene	227.1	1.6540	1.35E+09	9.32E-09
2,4-Dimethylhexane	114.2	0.6960	0	1.79E-07
2,4-Dimethylpentane	100.2	0.6727	0	1.79E-07
2,4-Dinitrotoluene	182.1	1.3208	0	6.24E-06
2,5-Dimethylhexane	114.2	0.6935	0	1.19E-07
2-Methylheptane	114.2	0.6980	0	1.19E-07
2-Methylhexane	100.2	0.6787	0	5.52E-07
2-Methylpentane	86.2	0.6532	0	1.74E-07
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	1.06E-07
3-Methylhexane	100.2	0.6860	0	2.34E-07
3-Methylpentane	86.2	0.6645	0	7.82E-07
4-Nitrophenol	139.1	1.2797	0	8.58E-07
Acetophenone	120.2	1.0281	0	1.38E-08
Acetylene	26.0	0.6181	0	1.86E-05
Aluminum	27.0	2.7020	0	1.52E-05
Benzene	78.1	0.8787	0	1.39E-05
Benzo(a)anthracene	228.3	0.0000	0	1.09E-08
Benzo(a)pyrene	252.3	0.0000	0	9.09E-09
Butylbenzyl phthalate	312.4	0.0000	0	2.74E-08
CO	28.0	0.0013	0	2.02E-02
CO2	44.0	0.0020	0	1.21E+00
Carbon Tetrachloride	153.8	1.5940	0	5.06E-07
Copper	63.5	8.9200	0	4.03E-06
Cyclohexane	84.2	0.7781	0	1.38E-07
Di-n-butyl phthalate	278.4	1.0500	0	1.07E-05
Di-n-octyl phthalate	390.6	0.0000	0	2.78E-08
Ethane	30.1	0.5720	0	1.24E-06
Ethylbenzene	106.2	0.8670	0	3.58E-07
Ethylene	62.0	0.9780	0	8.84E-06
Fluoranthene	202.3	1.2520	0	7.73E-08
Isoprene	68.1	0.6810	0	1.19E-07
Lead	207.2	11.3437	0	3.95E-06
Methylchloride	50.5	0.9159	0	2.17E-07
Methyl chloroform	133.4	1.3390	0	1.56E-08
Methylcyclohexane	98.2	0.0000	0	2.98E-07
Methylcyclopentane	0.0	0.0000	0	1.98E-06
Methylenechloride	84.9	1.3266	0	5.20E-05

Table 3. Contents of File OBODFUEL.OBD (Continued)

n-Nitrosodiphenylamine	198.2	1.0000	0	3.42E-08
Non-methane Organic Compounds	0.0	0.0000	0	1.97E-04
PM10	0.0	0.0000	0	8.77E-03
Phenanthrene	178.2	0.9800	0	3.78E-08
Phenol	94.1	1.0576	0	4.77E-07
Propane	44.1	0.5005	0	5.15E-07
Propene	42.1	0.5193	0	2.06E-06
Pyrene	202.3	1.2710	0	7.26E-08
RDX	222.1	1.8200	0	1.00E-08
Styrene	104.2	0.9060	0	1.75E-07
Toluene	92.2	0.8669	0	1.55E-06
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7080	0	1.91E-05
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	3.82E-05
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	1.73E-05
Total Non-methane Hydrocarbons	0.0	0.0000	0	9.87E-05
Total Unidentified Hydrocarbons	0.0	0.0000	0	2.41E-05
Vinylidene Chloride	96.9	1.2180	0	1.59E-07
bis (2-Ethylhexyl)phthalate	390.5	0.9732	0	1.24E-07
cis-2-Butene	56.1	0.6213	0	9.20E-08
i-Butene	56.1	0.0000	0	1.20E-06
m- & p-Xylene	106.2	0.8627	0	1.16E-06
m-Ethyltoluene	135.2	0.9391	0	1.41E-07
n-Butane	58.1	0.6012	0	1.84E-07
n-Decane	142.3	0.7300	0	8.74E-07
n-Heptane	100.2	0.6840	0	2.40E-07
n-Hexane	86.1	0.6548	0	1.37E-05
n-Nonane	128.3	0.7176	0	1.38E-07
n-Octane	114.2	0.7025	0	6.44E-07
n-Pentane	72.2	0.6262	0	1.52E-06
n-Propybenzene	120.2	0.8620	0	2.30E-07
o-Ethyltoluene	135.2	0.9391	0	5.37E-07
o-Xylene	106.2	0.8802	0	3.09E-07
p-Ethyltoluene	135.2	0.9391	0	2.16E-06
trans-2-Butene	125.0	1.1830	0	3.28E-07
Propellant, M-43 (USN)	1000	0	48	
1,2,4-Trimethylbenzene	120.2	0.8758	0	3.87E-07
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	4.53E-07
1,3,5-Trimethylbenzene	120.2	0.8652	0	9.07E-08
1,3-Butadiene	54.1	0.6211	0	9.07E-08
1-Butene	56.1	0.5951	0	2.72E-07
1-Pentene	70.1	0.6405	0	9.07E-08
2,4,4-Trimethyl-1-pentene	112.2	0.7150	0	9.07E-08
2-Methyl-1-butene	70.1	0.6504	0	9.07E-08
2-Methyl-2-butene	70.1	0.6623	0	9.07E-08
2-Methylheptane	114.2	0.6980	0	9.07E-08
2-Methylhexane	100.2	0.6787	0	1.81E-07
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	9.07E-08
3-Methyl-1-butene	70.1	0.6272	0	9.07E-08
Acetylene	26.0	0.6181	0	5.89E-06

Table 3. Contents of File OBODFUEL.OBD (Continued)

Benzene	78.1	0.8787	0	1.76E-06
CO	28.0	0.0013	0	1.40E-03
CO2	44.0	0.0020	0	7.73E-01
Cyclohexane	84.2	0.7781	0	9.07E-08
Cyclopentane	70.1	0.7500	0	9.07E-08
Ethane	30.1	0.5720	0	1.81E-07
Ethylbenzene	106.2	0.8670	0	3.42E-07
Ethylene	62.0	0.9780	0	4.81E-06
HCL	36.5	1.1870	0	9.97E-04
NO	30.0	0.0013	0	6.28E-03
NO2	46.0	1.4494	9360	4.69E-04
Non-methane Organic Compounds	0.0	0.0000	0	4.99E-05
PM10	0.0	0.0000	0	1.18E-03
Propene	42.1	0.5193	0	1.09E-06
SO2	64.1	0.0029	0	1.18E-04
Toluene	92.2	0.8669	0	5.44E-07
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7080	0	5.44E-07
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	1.33E-05
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	2.81E-06
Total Non-methane Hydrocarbons	0.0	0.0000	0	4.13E-05
Total Unidentified Hydrocarbons	0.0	0.0000	0	2.47E-05
cis-2-Butene	56.1	0.6213	0	9.07E-08
cis-2-Pentene	70.1	0.6556	0	9.07E-08
i-Butene	56.1	0.0000	0	5.44E-07
i-Pentane	72.2	0.0000	0	9.07E-08
m- & p-Xylene	106.2	0.8627	0	6.83E-07
n-Butane	58.1	0.6012	0	9.07E-08
n-Decane	142.3	0.7300	0	8.16E-07
n-Heptane	100.2	0.6840	0	9.07E-08
n-Hexane	86.1	0.6548	0	9.07E-08
n-Octane	114.2	0.7025	0	9.07E-08
o-Xylene	106.2	0.8802	0	9.07E-08
p-Ethyltoluene	135.2	0.9391	0	1.81E-07
trans-2-Butene	125.0	1.1830	0	1.81E-07
Propellant, M-9	1000	0	47	
1,3,5-Trimethylbenzene	120.2	0.8652	0	8.54E-08
1-Butene	56.1	0.5951	0	2.56E-07
1-Hexene	84.2	0.6731	0	2.13E-07
1-Nitropyrene	247.3	0.0000	0	6.22E-09
1-Pentene	70.1	0.6405	0	4.27E-08
2,3-Dimethylpentane	100.2	0.6951	0	5.98E-07
2-Methyl-1-butene	70.1	0.6504	0	4.27E-08
2-Nitrophenol	139.1	1.4850	0	1.76E-08
3-Methylhexane	100.2	0.6860	0	4.27E-07
4-Nitrophenol	139.1	1.2797	0	6.21E-07
Acetylene	26.0	0.6181	0	8.97E-06
Aluminum	27.0	2.7020	0	4.39E-06
Benzene	78.1	0.8787	0	3.24E-06
Benzo(a)pyrene	252.3	0.0000	0	3.78E-09

Table 3. Contents of File OBODFUEL.OBD (Continued)

CO	28.0	0.0013	0	2.71E-03
CO2	44.0	0.0020	0	9.37E-01
Cadmium	112.4	8.6420	0	6.01E-07
Carbon Tetrachloride	153.8	1.5940	0	2.32E-07
Copper	63.5	8.9200	0	6.46E-06
Cyclopentane	70.1	0.7500	0	4.27E-08
Dibenzofuran	168.2	1.0886	0	1.56E-08
Diethyl phthalate	182.1	1.3208	0	1.61E-05
Diphenylamine	169.2	1.1600	0	1.22E-09
Ethane	30.1	0.5720	0	5.55E-07
Ethylene	62.0	0.9780	0	6.49E-06
Lead	207.2	11.3437	0	1.01E-06
Methylchloride	50.5	0.9159	0	1.54E-07
n-Nitrosodiphenylamine	198.2	1.0000	0	1.58E-08
Non-methane Organic Compounds	0.0	0.0000	0	1.03E-04
PM10	0.0	0.0000	0	1.55E-02
Propene	42.1	0.5193	0	7.26E-07
RDX	222.1	1.8200	0	1.08E-09
Styrene	104.2	0.9060	0	4.70E-07
Titanium	47.9	4.5000	0	2.64E-07
Toluene	92.2	0.8669	0	1.39E-07
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	1.68E-05
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	5.38E-06
Total Non-methane Hydrocarbons	0.0	0.0000	0	1.51E-05
Vinylidene Chloride	96.9	1.2180	0	1.46E-07
bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	5.79E-08
i-Butene	56.1	0.0000	0	2.56E-07
i-Pentane	72.2	0.0000	0	9.07E-08
m-Ethyltoluene	135.2	0.9391	0	4.27E-08
n-Butane	58.1	0.6012	0	4.27E-08
n-Hexane	86.1	0.6548	0	1.71E-07
o-Ethyltoluene	135.2	0.9391	0	3.42E-07
p-Ethyltoluene	135.2	0.9391	0	3.97E-06
Propellant, M31A1E1	1000	0	65	
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	3.43E-07
1,3,5-Trimethylbenzene	120.2	0.8652	0	4.29E-08
1-Butene	56.1	0.5951	0	2.29E-07
1-Hexene	84.2	0.6731	0	1.07E-07
1-Pentene	70.1	0.6405	0	3.55E-08
2,2,4-Trimethylpentane	114.2	0.6917	0	1.29E-07
2,2-Dimethylbutane	86.2	0.6485	0	4.29E-08
2,3-Dimethylbutane	86.2	0.6616	0	3.55E-08
2,4,4-Trimethyl-1-pentene	112.2	0.7150	0	8.58E-08
2-Methylheptane	114.2	0.6980	0	3.44E-08
2-Methylhexane	100.2	0.6787	0	4.29E-08
2-Methylpentane	86.2	0.6532	0	6.89E-08
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	1.07E-07
3-Methyl-1-butene	70.1	0.6272	0	3.44E-08
3-Methylpentane	86.2	0.6645	0	3.77E-08

Table 3. Contents of File OBODFUEL.OBD (Continued)

Acetylene	26.0	0.6181	0	1.02E-06
Barium	137.3	3.5100	0	4.20E-07
Benzene	78.1	0.8787	0	9.98E-07
Benzyl alcohol	108.2	1.0419	0	1.91E-09
CO	28.0	0.0013	0	1.66E-04
CO2	44.0	0.0020	0	6.45E-01
Carbon Tetrachloride	153.8	1.5940	0	6.89E-08
Chromium	52.0	7.2000	0	3.97E-07
Copper	63.5	8.9200	0	6.31E-06
Cyclohexane	84.2	0.7781	0	3.55E-08
Cyclopentane	70.1	0.7500	0	4.29E-08
Di-n-butyl phthalate	278.4	1.0500	0	3.30E-07
Diethyl phthalate	182.1	1.3208	0	6.58E-08
Ethane	30.1	0.5720	0	6.38E-08
Ethyl chloride	64.5	0.8978	0	6.89E-08
Ethylbenzene	106.2	0.8670	0	4.44E-07
Ethylene	62.0	0.9780	0	9.78E-07
Methylchloride	50.5	0.9159	0	2.84E-07
Methyl chloroform	133.4	1.3390	0	3.44E-08
Methylcyclohexane	98.2	0.0000	0	3.30E-07
Methylenechloride	84.9	1.3266	0	7.46E-07
NO	30.0	0.0013	0	1.18E-03
NO2	46.0	1.4494	9360	9.67E-05
Non-methane Organic Compounds	0.0	0.0000	0	1.03E-07
PM10	0.0	0.0000	0	9.10E-01
Propane	44.1	0.5005	0	3.08E-07
SO2	64.1	0.0029	0	1.22E-03
Styrene	104.2	0.9060	0	2.57E-07
Toluene	92.2	0.8669	0	2.84E-07
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	2.33E-06
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	2.57E-06
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	5.43E-05
Total Non-methane Hydrocarbons	0.0	0.0000	0	9.88E-05
Total Unidentified Hydrocarbons	0.0	0.0000	0	1.92E-05
Vinylidene Chloride	96.9	1.2180	0	2.15E-07
Zinc	65.4	7.1400	0	4.14E-07
cis-2-Butene	56.1	0.6213	0	1.29E-07
i-Butane	58.1	0.0000	0	7.11E-08
i-Butene	56.1	0.0000	0	1.51E-07
m- & p-Xylene	106.2	0.8627	0	1.33E-06
m-Ethyltoluene	135.2	0.9391	0	8.58E-08
n-Butane	58.1	0.6012	0	3.44E-07
n-Decane	142.3	0.7300	0	3.55E-08
n-Nonane	128.3	0.7176	0	4.29E-08
n-Octane	114.2	0.7025	0	3.55E-08
n-Propybenzene	120.2	0.8620	0	1.72E-07
o-Ethyltoluene	135.2	0.9391	0	3.90E-07
o-Xylene	106.2	0.8802	0	3.44E-07
p-Ethyltoluene	135.2	0.9391	0	7.11E-08

Table 3. Contents of File OBODFUEL.OBD (Continued)

trans-2-Butene	125.0	1.1830	0	5.19E-08
Propellant, MK-23	1000	0	28	
1,3-Butadiene	54.1	0.6211	0	1.97E-07
1-Butene	56.1	0.5951	0	5.91E-07
2,4,4-Trimethyl-1-pentene	112.2	0.7150	0	1.97E-06
3-Methyl-1-butene	70.1	0.6272	0	9.84E-08
Acetylene	26.0	0.6181	0	5.51E-06
Benzene	78.1	0.8787	0	8.19E-07
CO	28.0	0.0013	0	2.70E-04
CO2	44.0	0.0020	0	5.37E-01
Carbon Tetrachloride	153.8	1.5940	0	1.08E-06
Chloroform	119.4	1.4832	0	4.20E-07
Ethyl chloride	64.5	0.8978	0	4.55E-07
Ethylene	62.0	0.9780	0	9.84E-07
HCL	36.5	1.1870	0	1.93E-03
Methylchloride	50.5	0.9159	0	7.14E-07
Methylenechloride	84.9	1.3266	0	5.95E-07
Non-methane Organic Compounds	0.0	0.0000	0	4.72E-05
PM10	0.0	0.0000	0	5.89E-02
Propane	44.1	0.5005	0	4.92E-07
Propene	42.1	0.5193	0	1.67E-06
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	1.13E-05
Total Unidentified Hydrocarbons	0.0	0.0000	0	2.85E-06
Vinyl Chloride	62.5	0.9106	0	1.54E-06
cis-2-Butene	56.1	0.6213	0	9.84E-08
i-Butene	56.1	0.0000	0	4.92E-07
m-Ethyltoluene	135.2	0.9391	0	2.95E-07
n-Propybenzene	120.2	0.8620	0	9.84E-08
o-Ethyltoluene	135.2	0.9391	0	2.95E-07
trans-2-Butene	125.0	1.1830	0	1.97E-07
Propellant, PBXN-110	1000	0	44	
1,2,4-Trimethylbenzene	120.2	0.8758	0	4.25E-07
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	1.10E-06
1,3,5-Trimethylbenzene	120.2	0.8758	0	2.99E-07
1,3-Butadiene	54.1	0.6211	0	4.98E-07
1-Butene	56.1	0.5951	0	5.97E-07
1-Pentene	70.1	0.6405	0	9.95E-08
2,4,4-Trimethyl-1-pentene	112.2	0.7150	0	1.99E-07
2,4-Dimethylhexane	114.2	0.6960	0	1.99E-07
2-Methyl-1-butene	70.1	0.6504	0	1.99E-07
3-Methyl-1-butene	70.1	0.6272	0	1.99E-07
Acetylene	26.0	0.6181	0	3.09E-06
Benzene	78.1	0.8787	0	4.88E-06
CO	28.0	0.0013	0	2.32E-02
CO2	44.0	0.0020	0	1.04E+00
Cyclopentene	68.1	0.8000	0	9.95E-08
Ethane	30.1	0.5720	0	9.95E-07
Ethylbenzene	106.2	0.8670	0	7.96E-07
Ethylene	62.0	0.9780	0	6.67E-06

Table 3. Contents of File OBODFUEL.OBD (Continued)

HCL	36.5	1.1870	0	1.79E-04
Methylchloride	50.5	0.9159	0	1.81E-07
NO	30.0	0.0013	0	2.62E-03
NO2	46.0	1.4494	9360	2.82E-04
Non-methane Organic Compounds	0.0	0.0000	0	1.07E-04
PM10	0.0	0.0000	0	4.87E-01
Propane	44.1	0.5005	0	2.99E-07
Propene	42.1	0.5193	0	2.99E-06
SO2	64.1	0.0029	0	3.47E-04
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	1.59E-05
Total Aromatics (e.g. styrene)	104.2	0.9060	0	7.07E-06
Total Non-methane Hydrocarbons	0.0	0.0000	0	5.11E-05
Total Unidentified Hydrocarbons	0.0	0.0000	0	4.41E-05
Vinyl Chloride	62.5	0.9106	0	2.23E-07
cis-2-Butene	56.1	0.6213	0	1.99E-07
i-Butene	56.1	0.0000	0	1.29E-06
m- & p-Xylene	106.2	0.8627	0	7.96E-07
m-Ethyltoluene	135.2	0.9391	0	1.99E-07
n-Butane	58.1	0.6012	0	9.95E-08
n-Decane	142.3	0.7300	0	1.29E-06
n-Nonane	128.3	0.7176	0	1.99E-07
n-Propybenzene	120.2	0.8620	0	9.95E-08
o-Ethyltoluene	135.2	0.9391	0	2.99E-07
o-Xylene	106.2	0.8802	0	3.75E-07
p-Ethyltoluene	135.2	0.9391	0	4.25E-07
trans-2-Butene	125.0	1.1830	0	3.98E-07
Propellant, Smokey Sam	1000	0	54	
1,2,4-Trimethylbenzene	120.2	0.8758	0	1.67E-06
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	5.10E-06
1,3,5-Trimethylbenzene	120.2	0.8758	0	1.67E-06
1,3-Butadiene	54.1	0.6211	0	1.18E-06
1-Butene	56.1	0.5951	0	1.18E-06
2,3,4-Trimethylpentane	114.2	0.7191	0	3.92E-07
2,3-Dimethylbutane	86.2	0.6616	0	3.92E-07
2,3-Dimethylpentane	100.2	0.6951	0	1.57E-06
2,4,4-Trimethyl-1-pentene	112.2	0.7150	0	3.92E-07
2,4-Dimethylpentane	100.2	0.6727	0	7.84E-07
2-Methylhexane	100.2	0.6787	0	1.18E-06
2-Methylpentane	86.2	0.6532	0	1.96E-06
3-Methylpentane	86.2	0.6645	0	7.84E-07
Acetylene	26.0	0.6181	0	8.31E-04
Benzene	78.1	0.8787	0	6.62E-05
CO	28.0	0.0013	0	7.17E-02
CO2	44.0	0.0020	0	4.23E-01
Cyclohexane	84.2	0.7781	0	1.18E-06
Ethylbenzene	106.2	0.8670	0	1.48E-06
Ethylene	62.0	0.9780	0	7.17E-05
HCL	36.5	1.1870	0	2.85E-02
Methylchloride	50.5	0.9159	0	5.69E-06

Table 3. Contents of File OBODFUEL.OBD (Continued)

Methylcyclohexane	98.2	0.0000	0	7.84E-07
Methylcyclopentane	0.0	0.0000	0	1.57E-06
Methylenechloride	84.9	1.3266	0	1.18E-06
NO	30.0	0.0013	0	1.09E-02
NO2	46.0	1.4494	9360	2.67E-04
Non-methane Organic Compounds	0.0	0.0000	0	1.16E-03
PM10	0.0	0.0000	0	2.58E-01
Propane	44.1	0.5005	0	1.57E-06
Propene	42.1	0.5193	0	2.74E-06
SO2	64.1	0.0029	0	1.49E-04
Toluene	92.2	0.8669	0	8.62E-06
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	2.27E-05
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	9.11E-04
Total Aromatics (e.g. styrene)	104.2	0.9060	0	1.03E-04
Total Non-methane Hydrocarbons	0.0	0.0000	0	1.11E-03
Total Unidentified Hydrocarbons	0.0	0.0000	0	7.49E-05
Vinyl Chloride	62.5	0.9106	0	8.78E-07
Vinylidene Chloride	96.9	1.2180	0	1.35E-06
i-Butene	56.1	0.0000	0	2.35E-06
i-Pentane	72.2	0.0000	0	7.84E-07
m- & p-Xylene	106.2	0.8627	0	1.18E-05
m-Ethyltoluene	135.2	0.9391	0	1.96E-06
n-Decane	142.3	0.7300	0	5.88E-06
n-Heptane	100.2	0.6840	0	1.96E-06
n-Hexane	86.1	0.6548	0	2.74E-06
n-Nonane	128.3	0.7176	0	1.18E-06
n-Octane	114.2	0.7025	0	1.18E-06
n-Pentane	72.2	0.6262	0	7.84E-07
n-Propybenzene	120.2	0.8620	0	7.84E-07
o-Xylene	106.2	0.8802	0	2.74E-06
p-Ethyltoluene	135.2	0.9391	0	7.06E-06
trans-2-Butene	125.0	1.1830	0	2.35E-06
Propellant, ammonium perchlorate,Al	925	1	83	
1,1-Dichloroethane	99.0	1.1757	0	6.63E-08
1,2-Dichloroethane	99.0	1.2351	0	6.32E-08
1,3,5-Trimethylbenzene	120.2	0.8758	0	1.33E-07
1,3-Butadiene	54.1	0.6211	0	6.63E-08
1-Butene	56.1	0.5951	0	9.28E-07
1-Hexene	84.2	0.6731	0	5.05E-07
1-Pentene	70.1	0.6405	0	3.98E-07
1234678-HpCDF	0.0	0.0000	0	3.71E-10
123478-HxCDF	0.0	0.0000	0	1.34E-10
2,2-Dimethylpropane	72.2	0.6135	0	2.53E-07
2-Methyl-1-butene	70.1	0.6504	0	3.16E-07
2-Methyl-2-butene	70.1	0.6623	0	1.26E-07
2-Methylheptane	114.2	0.6980	0	1.26E-07
2-Methylhexane	100.2	0.6787	0	1.26E-07
234678-HXCDF	0.0	0.0000	0	8.42E-11
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	1.26E-07

Table 3. Contents of File OBODFUEL.OBD (Continued)

3-Methyl-1-butene	70.1	0.6272	0	1.33E-07
3-Methylhexane	100.2	0.6860	0	7.95E-07
Acetylene	26.0	0.6181	0	6.38E-06
Aluminum	27.0	2.7020	0	1.15E-02
Barium	137.3	3.5100	0	1.34E-05
Benzene	78.1	0.8787	0	2.65E-07
Benzyl alcohol	108.2	1.0419	0	2.24E-06
Benzyl chloride	126.6	1.1002	0	5.30E-07
CO	28.0	0.0013	0	2.10E-03
CO2	44.0	0.0020	0	3.17E-01
Carbon Tetrachloride	153.8	1.5940	0	1.72E-06
Chlorobenzene	112.6	1.1058	0	3.79E-07
Chloroform	119.4	1.4832	0	1.19E-06
Chromium	52.0	7.2000	0	9.13E-06
Cyclohexane	84.2	0.7781	0	6.63E-08
Cyclopentane	70.1	0.7500	0	1.26E-07
Cyclopentene	68.1	0.8000	0	4.42E-07
Ethane	30.1	0.5720	0	3.84E-06
Ethyl chloride	64.5	0.8978	0	1.33E-06
Ethylbenzene	106.2	0.8670	0	5.05E-07
Ethylene	28.1	0.0013	0	2.92E-06
HCL	36.5	1.1870	0	2.10E-01
Lead	207.2	11.3437	0	4.23E-05
Methane	16.0	0.5547	0	1.77E-05
Methyl Chloride	50.5	0.9159	0	4.42E-07
Methyl chloroform	133.4	1.3390	0	1.99E-07
Methylcyclohexane	98.2	0.0000	0	1.19E-06
Methylcyclopentane	0.0	0.0000	0	6.32E-08
Methylenechloride	84.9	1.3266	0	1.71E-06
NO	30.0	0.0013	0	2.16E-03
NO2	46.0	1.4494	9360	2.06E-04
Non-methane Organic Compounds	0.0	0.0000	0	1.04E-04
PM10	0.0	0.0000	0	4.31E-01
Propane	44.1	0.5005	0	1.46E-06
Propene	42.1	0.5193	0	3.28E-06
SO2	64.1	0.0029	0	5.77E-05
Styrene	104.2	0.9060	0	3.98E-07
Tetrachloroethylene	165.8	1.6227	0	1.58E-06
Titanium	47.9	4.5000	0	9.94E-07
Toluene	92.2	0.8669	0	8.84E-07
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	3.22E-06
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	2.91E-05
Total Aromatics (e.g. styrene)	104.2	0.9060	0	3.03E-06
Total HpCDF	0.0	0.0000	0	6.24E-10
Total HxCDF	0.0	0.0000	0	5.39E-10
Total Non-methane Hydrocarbons	0.0	0.0000	0	5.90E-05
Total PeCDF	0.0	0.0000	0	5.39E-10
Total TCDF	0.0	0.0000	0	3.54E-10
Total Unidentified Hydrocarbons	0.0	0.0000	0	2.58E-05

Table 3. Contents of File OBODFUEL.OBD (Continued)

Vinyl Chloride	62.5	0.9106	0	1.89E-07
Vinylidene Chloride	96.9	1.2180	0	1.26E-07
Zinc	65.4	7.1400	0	6.19E-05
bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	5.45E-06
cis-2-Butene	56.1	0.6213	0	3.79E-07
cis-2-Pentene	70.1	0.6556	0	1.33E-07
i-Butane	58.1	0.0000	0	3.79E-07
i-Butene	56.1	0.0000	0	1.05E-05
m- & p-Xylene	106.2	0.8627	0	8.21E-07
n-Butane	58.1	0.6012	0	5.30E-07
n-Decane	142.3	0.7300	0	3.98E-07
n-Nonane	128.3	0.7176	0	6.63E-08
n-Pentane	72.2	0.6262	0	1.89E-07
o-Ethyltoluene	135.2	0.9391	0	1.26E-07
o-Xylene	106.2	0.8802	0	6.32E-07
p-Ethyltoluene	135.2	0.9391	0	1.26E-07
trans-2-Butene	125.0	1.1830	0	6.32E-07
trans-2-Pentene	84.2	0.6942	0	1.26E-07
Propellant, ammonium perc.,non-Al	925	1	92	
1,1-Dichloroethane	99.0	1.1757	0	3.49E-08
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	3.80E-07
1,2-Dichloroethane	99.0	1.2351	0	3.45E-08
1,3,5-Trimethylbenzene	120.2	0.8758	0	3.49E-08
1,3-Butadiene	54.1	0.6211	0	6.90E-08
1-Butene	56.1	0.5951	0	1.17E-06
1-Hexene	84.2	0.6731	0	3.11E-07
1-Pentene	70.1	0.6405	0	4.49E-07
1234678-HpCDD	0.0	0.0000	0	1.49E-12
1234678-HpCDF	0.0	0.0000	0	3.13E-11
2,2-Dimethylbutane	86.2	0.6485	0	1.40E-07
2,3-Dimethylhexane	114.2	0.7121	0	1.40E-07
2,3-Dimethylpentane	100.2	0.6951	0	2.09E-07
2,4-Dichlorophenol	163.0	0.0000	0	3.57E-06
2-Chlorophenol	128.6	1.2634	0	7.46E-06
2-Methyl-1-butene	70.1	0.6504	0	2.07E-07
2-Methyl-2-butene	70.1	0.6623	0	3.49E-08
2-Methylheptane	114.2	0.6980	0	2.79E-07
2-Nitrophenol	139.1	1.4850	0	5.04E-06
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	3.49E-08
3-Methyl-1-butene	70.1	0.6272	0	1.38E-07
3-Methylhexane	100.2	0.6860	0	1.24E-06
4-Nitrophenol	139.1	1.2797	0	1.69E-06
Acetylene	26.0	0.6181	0	4.29E-06
Aluminum	27.0	2.7020	0	8.98E-06
Antimony	121.8	6.6840	0	1.17E-06
Barium	137.3	3.5100	0	2.67E-07
Benzene	78.1	0.8787	0	7.33E-07
Benzyl alcohol	108.2	1.0419	0	1.48E-06
Benzyl chloride	126.6	1.1002	0	4.88E-07

Table 3. Contents of File OBODFUEL.OBD (Continued)

CO	28.0	0.0013	0	1.47E-04
CO2	44.0	0.0020	0	4.21E-01
Carbon Tetrachloride	153.8	1.5940	0	2.16E-06
Chlorobenzene	112.6	1.1058	0	3.49E-08
Chloroform	119.4	1.4832	0	1.08E-06
Chromium	52.0	7.2000	0	8.54E-06
Copper	63.5	8.9200	0	9.61E-05
Cyclohexane	84.2	0.7781	0	1.05E-07
Di-n-butyl phthalate	278.4	1.0500	0	3.57E-08
Di-n-octyl phthalate	390.6	0.9780	0	1.37E-07
Dimethyl phthalate	194.2	1.1940	0	9.72E-08
Ethane	30.1	0.5720	0	1.55E-06
Ethyl chloride	64.5	0.8978	0	7.33E-07
Ethylbenzene	106.2	0.8670	0	6.98E-08
Ethylene	28.1	0.0013	0	2.93E-06
HCL	36.5	1.1870	0	4.30E-01
Lead	207.2	11.3437	0	3.74E-06
Methane	16.0	0.5547	0	5.93E-06
Methyl Chloride	50.5	0.9159	0	1.15E-06
Methyl chloroform	133.4	1.3390	0	3.45E-08
Methylcyclohexane	98.2	0.0000	0	3.84E-07
Methylcyclopentane	0.0	0.0000	0	3.49E-08
Methylenechloride	84.9	1.3266	0	5.76E-06
NO	30.0	0.0013	0	4.14E-03
NO2	46.0	1.4494	9360	4.25E-03
Naphthalene	128.2	1.0253	0	2.62E-07
Nickel	58.7	8.9000	0	2.28E-05
Non-methane Organic Compounds	0.0	0.0000	0	6.42E-05
OCDF	0.0	0.0000	0	2.99E-11
PM10	0.0	0.0000	0	1.82E-02
Propane	44.1	0.5005	0	9.32E-07
Propene	42.1	0.5193	0	2.66E-06
SO2	64.1	0.0029	0	1.10E-04
Tetrachloroethylene	165.8	1.6227	0	5.06E-06
Titanium	47.9	4.5000	0	3.40E-07
Toluene	92.2	0.8669	0	1.43E-06
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	4.40E-06
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	1.24E-05
Total Aromatics (e.g. styrene)	104.2	0.9060	0	3.21E-06
Total HpCDF	0.0	0.0000	0	4.55E-11
Total HxCDF	0.0	0.0000	0	2.53E-11
Total Non-methane Hydrocarbons	0.0	0.0000	0	4.68E-05
Total PeCDF	0.0	0.0000	0	1.64E-11
Total TCDF	0.0	0.0000	0	7.47E-12
Total Unidentified Hydrocarbons	0.0	0.0000	0	3.01E-05
Vinyl Chloride	62.5	0.9106	0	2.09E-07
Vinylidene Chloride	96.9	1.2180	0	3.45E-08
Zinc	65.4	7.1400	0	1.17E-06
cis-2-Butene	56.1	0.6213	0	1.04E-07

Table 3. Contents of File OBODFUEL.OBD (Continued)

cis-2-Pentene	70.1	0.6556	0	1.40E-07
i-Butane	58.1	0.0000	0	1.04E-07
i-Butene	56.1	0.0000	0	7.94E-07
i-Pentane	72.2	0.0000	0	1.40E-07
i-Propylbenzene	120.2	0.0000	0	5.58E-07
m- & p-Xylene	106.2	0.8627	0	6.98E-08
n-Butane	58.1	0.6012	0	4.14E-07
n-Decane	142.3	0.7300	0	6.90E-08
n-Nonane	128.3	0.7176	0	9.07E-07
n-Pentane	72.2	0.6262	0	6.98E-08
o-Ethyltoluene	135.2	0.9391	0	3.49E-08
o-Xylene	106.2	0.8802	0	3.49E-08
trans-2-Butene	125.0	1.1830	0	1.05E-07
RDX (cyclotrimethylenetrinitramine)	1480	1	7	
Benzene	78.1	0.8787	0	6.90E-05
CO	28.0	0.0013	0	3.10E-02
CO2	44.0	0.0020	0	5.70E-01
Methane	16.0	0.5547	0	2.00E-04
NO	30.0	0.0013	0	9.00E-04
NO2	46.0	1.4494	9360	6.00E-04
Total Non-methane Hydrocarbons	0.0	0.0000	0	1.30E-03
Triple Base (M30-28% Nitrocellulose	1000	1.20E+05	5	
CO	28.0	0.0013	0	2.50E-05
CO2	44.0	0.0020	0	6.60E-01
NO	30.0	0.0013	0	5.20E-03
NO2	46.0	1.4494	9360	2.10E-03
Total Non-methane Hydrocarbons	0.0	0.0000	0	1.50E-05
Signal,Illum,Arcrft,Rd Str,AN-M43A2	1000	1	85	
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	2.44E-06
1,3-Butadiene	54.1	0.6211	0	2.65E-06
1-Butene	56.1	0.5951	0	1.17E-05
1-Hexene	84.2	0.6731	0	9.49E-06
1-Pentene	70.1	0.6405	0	5.93E-06
1234678-HpCDD	0.0	0.0000	0	3.92e-10
2,2,4-Trimethylpentane	114.2	0.6917	0	3.70E-06
2,3-Dimethylbutane	86.2	0.6616	0	3.49E-07
2,3-Dimethylpentane	100.2	0.6951	0	6.98E-07
2,4,6-Trinitrotoluene	227.1	1.6540	0	4.61E-06
2-Methyl-1-butene	70.1	0.6504	0	4.63E-07
2-Methyl-2-butene	70.1	0.6623	0	1.16E-06
2-Methylpentane	86.2	0.6532	0	6.98E-07
3-Methyl-1-butene	70.1	0.6272	0	3.47E-07
3-Methylhexane	100.2	0.6860	0	1.40E-06
Acetylene	26.0	0.6181	0	3.06E-04
Allyl Chloride	76.5	0.9376	0	1.78E-05
Aluminum	27.0	2.7020	0	1.99E-02
Antimony	121.8	6.6840	0	2.61E-05
Barium	137.3	3.5100	0	4.82E-04
Benzene	78.1	0.8787	0	3.38E-05

Table 3. Contents of File OBODFUEL.OBD (Continued)

CO	28.0	0.0013	0	2.16E-02
CO2	44.0	0.0020	0	1.06E+00
Cadmium	112.4	8.6420	0	8.83E-05
Chromium	52.0	7.2000	0	5.67E-05
Copper	63.5	8.9200	0	8.54E-04
Cyclopentene	68.1	0.8000	0	1.27E-06
Di-n-octyl phthalate	390.6	0.9780	0	4.31E-07
Diethyl phthalate	182.1	1.3208	0	9.74E-08
Ethane	30.1	0.5720	0	9.02E-06
Ethylbenzene	106.2	0.8670	0	4.63E-07
Ethylene	62.0	0.9780	0	2.15E-04
HMX	0.0	0.0000	0	1.29E-05
Hexachlorobenzene	284.8	0.0000	0	3.16E-06
Lead	207.2	11.3437	0	6.60E-04
Methane	16.0	0.5547	0	2.90E-04
Methyl Chloride	50.5	0.9159	0	1.65E-06
Methylcyclopentane	0.0	0.0000	0	3.49E-07
Methylenechloride	84.9	1.3266	0	8.14E-06
Nitrogen Oxide	30.0	0.0013	0	1.28E-02
Nitrogen Dioxide (peroxide)	46.0	1.4494	9360	1.10E-03
Nickel	58.7	8.9000	0	2.82E-05
Non-methane Organic Compounds	0.0	0.0000	0	9.89E-04
OCDD	0.0	0.0000	0	1.77E-09
Pentaerythritol tetranitrate (PETN)	316.2	1.7730	0	1.19E-05
PM10	0.0	0.0000	0	4.52E-01
Propane	44.1	0.5005	0	2.55E-06
Propene	42.1	0.5193	0	3.51E-05
RDX	222.1	1.8200	0	1.91E-04
Sulfur Dioxide	64.1	0.0029	0	1.28E-02
Styrene	104.2	0.9060	0	4.52E-06
Titanium	47.9	4.5000	0	3.89E-05
Toluene	92.2	0.8669	0	2.95E-05
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	1.46E-05
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	5.96E-04
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	7.21E-05
Total HpCDD	0.0	0.0000	0	6.13E-10
Total HpCDF	0.0	0.0000	0	1.58E-10
Total HxCDF	0.0	0.0000	0	1.24E-10
Total Non-methane Hydrocarbons	0.0	0.0000	0	7.44E-04
Total PeCDF	0.0	0.0000	0	1.48E-10
Total TCDF	0.0	0.0000	0	9.44E-11
Total Unidentified Hydrocarbons	0.0	0.0000	0	6.09E-05
Vinyl Chloride	62.5	0.9106	0	2.31E-06
Zinc	65.4	7.1400	0	7.23E-04
bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	1.37E-06
cis-2-Butene	56.1	0.6213	0	6.93E-07
cis-2-Pentene	70.1	0.6556	0	3.47E-07
i-Butane	58.1	0.0000	0	3.49E-07
i-Butene	56.1	0.0000	0	3.45E-06

Table 3. Contents of File OBODFUEL.OBD (Continued)

i-Pentane	72.2	0.0000	0	3.47E-07
m- & p-Xylene	106.2	0.8627	0	2.55E-06
n-Butane	58.1	0.6012	0	2.20E-06
n-Decane	142.3	0.7300	0	6.98E-07
n-Heptane	100.2	0.6840	0	5.80E-07
n-Hexane	86.1	0.6548	0	8.10E-07
n-Nonane	128.3	0.7176	0	1.04E-06
n-Octane	114.2	0.7025	0	3.49E-07
n-Pentane	72.2	0.6262	0	5.78E-07
n-Propylbenzene	120.2	0.8620	0	3.49E-07
o-Ethyltoluene	135.2	0.9391	0	6.94E-07
o-Xylene	106.2	0.8802	0	1.24E-06
p-Ethyltoluene	135.2	0.9391	0	1.47E-06
trans-2-Butene	125.0	1.1830	0	7.75E-06
trans-2-Pentene	84.2	0.6942	0	4.63E-07
T45E7 Adapter Booster	1000	1	107	
1,2,4-Trimethylbenzene	120.2	0.8758	0	2.53E-06
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	6.85E-06
1,3,5-Trimethylbenzene	120.2	0.8758	0	4.29E-06
1,3,5-Trinitrobenzene	213.1	1.4775	0	4.21E-09
1,3-Butadiene	54.1	0.6211	0	3.41E-05
1-Butene	56.1	0.5951	0	5.41E-05
1-Hexene	84.2	0.6731	0	2.81E-05
1-Pentene	70.1	0.6405	0	1.94E-05
2,2,4-Trimethylpentane	114.2	0.6917	0	1.59E-05
2,2-Dimethylbutane	86.2	0.6485	0	5.75E-07
2,3,4-Trimethylpentane	114.2	0.7191	0	4.12E-06
2,3-Dimethylbutane	86.2	0.6616	0	1.73E-06
2,3-Dimethylpentane	100.2	0.6951	0	2.94E-06
2,4,4-Trimethyl-1-pentene	112.2	0.7150	0	1.15E-06
2,4,6-Trinitrotoluene	227.1	1.6540	1.35E+09	3.39E-06
2,4-Dimethylhexane	114.2	0.6960	0	2.88E-06
2,4-Dimethylpentane	100.2	0.6727	0	5.92E-07
2,4-Dinitrotoluene	182.1	1.3208	0	1.28E-08
2,5-Dimethylhexane	114.2	0.6935	0	1.15E-06
2-Methyl-1-butene	70.1	0.6504	0	4.30E-06
2-Methyl-2-butene	70.1	0.6623	0	1.75E-06
2-Methylheptane	114.2	0.6980	0	2.30E-06
2-Methylhexane	100.2	0.6787	0	3.47E-06
2-Methylpentane	86.2	0.6532	0	5.62E-06
2-Nitrodiphenylamine	214.2	0.0000	0	9.22E-09
2-Nitronapthalene	173.2	0.0000	0	1.78E-09
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	2.30E-06
3-Methyl-1-butene	70.1	0.6272	0	3.12E-06
3-Methylpentane	86.2	0.6645	0	4.26E-06
Acenaphthylene	152.2	0.8988	0	5.89E-07
Acetophenone	120.2	1.0281	0	1.43E-07
Acetylene	26.0	0.6181	0	5.18E-04
Aluminum	27.0	2.7020	0	9.48E-03

Table 3. Contents of File OBODFUEL.OBD (Continued)

Anthracene	178.2	1.2830	0	1.26E-07
Barium	137.3	3.5100	0	9.77E-04
Benzene	78.1	0.8787	0	1.26E-04
Benz{a}anthracene	238.1	1.0000	0	2.93E-08
Benzo{a}pyrene	252.3	1.0000	0	1.31E-08
Benzyl alcohol	108.2	1.0419	0	1.78E-07
CO	28.0	0.0013	0	2.93E-02
CO2	44.0	0.0020	0	4.81E+00
Cadmium	112.4	8.6420	0	5.77E-03
Carbon Tetrachloride	153.8	1.5940	0	3.24E-06
Chromium	52.0	7.2000	0	9.43E-05
Chrysene	228.3	1.2740	0	3.72E-08
Copper	63.5	8.9200	0	3.13E-03
Cyclohexane	84.2	0.7781	0	2.33E-06
Cyclopentane	70.1	0.7500	0	5.89E-07
Cyclopentene	68.1	0.8000	0	3.71E-06
Dibenzofuran	168.2	1.0886	0	1.71E-07
Diethyl phthalate	182.1	1.3208	0	3.24E-07
Dimethyl phthalate	194.2	1.1940	0	2.67E-07
Diphenylamine	169.2	1.1600	0	1.41E-08
Ethane	30.1	0.5720	0	2.54E-05
Ethylbenzene	106.2	0.8670	0	9.17E-06
Ethylene	28.1	0.0013	0	5.69E-04
Fluoranthene	202.3	1.2520	0	3.34E-07
Fluorene	166.2	1.2030	0	3.49E-07
HMX	0.0	0.0000	0	1.29E-04
Lead	207.2	11.3437	0	7.73E-04
Methyl chloride	50.5	0.9159	0	2.15E-06
Methylcyclohexane	98.2	0.0000	0	2.92E-06
Methylcyclopentane	0.0	0.0000	0	2.91E-06
Methylenechloride	84.9	1.3266	0	5.01E-04
n-Nitrosodiphenylamine	198.2	1.0000	0	3.98E-08
N-methyl-N,2,4,6-tetranitroaniline	0.0	0.0000	0	2.65E-07
Naphthalene	128.2	1.0253	0	1.68E-07
Nickel	58.7	8.9000	0	4.00E-05
Non-methane Organic Compounds	0.0	0.0000	0	2.34E-03
PM10	0.0	0.0000	0	2.62E-01
Phenanthrene	178.2	0.9800	0	1.06E-06
Phenol	94.1	1.0576	0	1.30E-07
Propane	44.1	0.5005	0	1.06E-05
Propene	42.1	0.5193	0	1.61E-04
Pyrene	202.3	1.2710	0	4.62E-07
RDX	222.1	1.8200	0	2.36E-04
Styrene	104.2	0.9060	0	1.15E-04
Titanium	47.9	4.5000	0	2.67E-04
Toluene	92.2	0.8669	0	5.19E-05
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	8.68E-05
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	1.43E-03
Total Aromatics (e.g. styrene)	104.2	0.9060	0	3.60E-04

Table 3. Contents of File OBODFUEL.OBD (Continued)

Total Non-methane Hydrocarbons	0.0	0.0000	0	1.91E-03
Total Unidentified Hydrocarbons	0.0	0.0000	0	3.10E-04
Vinylidene Chloride	96.9	1.2180	0	2.04E-06
Zinc	65.4	7.1400	0	3.24E-03
bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	2.36E-06
cis-2-Butene	56.1	0.6213	0	4.29E-06
cis-2-Pentene	70.1	0.6556	0	2.73E-06
i-Butane	58.1	0.0000	0	2.30E-06
i-Butene	56.1	0.0000	0	3.14E-05
i-Pentane	72.2	0.0000	0	6.17E-06
m- & p-Xylene	106.2	0.8627	0	2.41E-05
m-Ethyltoluene	135.2	0.9391	0	2.53E-06
n-Butane	58.1	0.6012	0	9.11E-06
n-Decane	142.3	0.7300	0	1.18E-06
n-Heptane	100.2	0.6840	0	3.31E-06
n-Hexane	86.1	0.6548	0	5.82E-06
n-Nonane	128.3	0.7176	0	1.36E-06
n-Octane	114.2	0.7025	0	2.37E-06
n-Pentane	72.2	0.6262	0	5.03E-06
n-Propybenzene	120.2	0.8620	0	2.34E-06
o-Ethyltoluene	135.2	0.9391	0	2.74E-06
o-Xylene	106.2	0.8802	0	4.45E-06
p-Ethyltoluene	135.2	0.9391	0	1.09E-05
trans-2-Butene	125.0	1.1830	0	1.98E-05
trans-2-Pentene	84.2	0.6942	0	4.10E-06
TNT (2,4,6-Trinitrotoluene)	925	1	100	
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	5.75E-06
1,3,5-Trimethylbenzene	120.2	0.8758	0	1.77E-05
1,3,5-Trinitrobenzene	213.1	1.4775	0	2.28E-05
1,3-Butadiene	54.1	0.6211	0	2.66E-06
1-Butene	56.1	0.5951	0	1.89E-06
1-Hexane	86.2	0.6603	0	2.21E-06
1-Nitropyrene	247.3	0.0000	0	1.81E-09
1-Pentene	70.1	0.6405	0	1.41E-06
2,2,4-Trimethylpentane	114.2	0.6917	0	2.87E-06
2,2-Dimethylbutane	86.2	0.6485	0	8.42E-06
2,3,4-Trimethylpentane	114.2	0.7191	0	3.35E-06
2,3-Dimethylbutane	86.2	0.6616	0	9.58E-07
2,3-Dimethylhexane	114.2	0.7121	0	1.92E-06
2,3-Dimethylpentane	100.2	0.6951	0	1.11E-06
2,4,4-Trimethyl-1-pentene	112.2	0.7150	0	4.79E-07
2,4,6-Trinitrotoluene	227.1	1.6540	1.35E+09	3.48E-05
2,4-Dimethylpentane	100.2	0.6727	0	4.61E-07
2,4-Dinitrotoluene	182.1	1.3208	0	7.55E-06
2-Methyl-1-butene	70.1	0.6504	0	4.73E-07
2-Methyl-2-butene	70.1	0.6623	0	4.79E-07
2-Methylheptane	114.2	0.6980	0	7.86E-07
2-Methylhexane	100.2	0.6787	0	1.84E-06
2-Methylnapthalene	142.2	1.0058	0	7.85E-07

Table 3. Contents of File OBODFUEL.OBD (Continued)

2-Methylpentane	86.2	0.6532	0	1.38E-06
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	9.40E-07
3-Methyl-1-butene	70.1	0.6272	0	4.61E-07
3-Methylpentane	86.2	0.6645	0	9.22E-07
Acetophenone	120.2	1.0281	0	1.77E-07
Acetylene	26.0	0.6181	0	1.73E-05
Aluminum	27.0	2.7020	0	1.97E-03
Barium	137.3	3.5100	0	7.28E-04
Benzene	78.1	0.8787	0	1.02E-05
Benz{a}anthracene	238.1	1.0000	0	7.18E-07
Benzo{a}pyrene	252.3	1.0000	0	4.64E-07
Benzo(b)fluoranthene	252.3	0.0000	0	8.28E-07
Benzo(k)fluoranthene	252.3	0.0000	0	6.07E-07
Benzyl alcohol	108.2	1.0419	0	1.41E-07
Butylbenzyl phthalate	312.4	0.0000	0	2.08E-07
CO	28.0	0.0013	0	1.04E-02
CO2	44.0	0.0020	0	1.47E+00
Cadmium	112.4	8.6420	0	3.99E-05
Chromium	52.0	7.2000	0	2.31E-05
Copper	63.5	8.9200	0	9.79E-04
Cyclohexane	84.2	0.7781	0	2.31E-06
Cyclopentane	70.1	0.7500	0	4.61E-07
Cyclopentene	68.1	0.8000	0	4.61E-07
Di-n-butyl phthalate	278.4	1.0500	0	5.12E-07
Di-n-octyl phthalate	390.6	0.9780	0	8.70E-07
Dibenzofuran	168.2	1.0886	0	6.86E-08
Diethyl phthalate	182.1	1.3208	0	1.91E-07
Dimethyl phthalate	194.2	1.1940	0	8.81E-08
Diphenylamine	169.2	1.1600	0	1.76E-08
Ethane	30.1	0.5720	0	7.40E-07
Ethylbenzene	106.2	0.8670	0	4.79E-07
Ethylene	28.1	0.0013	0	2.24E-05
Fluoranthene	202.3	1.2520	0	5.30E-07
HMX	0.0	0.0000	0	2.36E-06
Lead	207.2	11.3437	0	5.99E-04
Methane	16.0	0.5547	0	1.85E-05
Methylcyclohexane	98.2	0.0000	0	9.22E-06
Methylcyclopentane	0.0	0.0000	0	9.22E-07
Methylenechloride	84.9	1.3266	0	1.84E-04
n-Nitrosodiphenylamine	198.2	1.0000	0	8.70E-07
NO	30.0	0.0013	0	9.20E-03
NO2	46.0	1.4494	9360	6.59E-05
Naphthalene	128.2	1.0253	0	1.58E-06
Nickel	58.7	8.9000	0	2.91E-05
Non-methane Organic Compounds	0.0	0.0000	0	4.89E-04
PM10	0.0	0.0000	0	9.26E-02
Phenanthrene	178.2	0.9800	0	6.07E-07
Phenol	94.1	1.0576	0	1.52E-06
Propane	44.1	0.5005	0	3.70E-07

Table 3. Contents of File OBODFUEL.OBD (Continued)

Propene	42.1	0.5193	0	7.24E-06
Pyrene	202.3	1.2710	0	5.32E-06
RDX	222.1	1.8200	0	9.59E-06
SO2	64.1	0.0029	0	1.41E-04
Styrene	104.2	0.9060	0	1.48E-06
Titanium	47.9	4.5000	0	5.51E-05
Toluene	92.2	0.8669	0	6.46E-06
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030	0	3.33E-06
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	6.03E-05
Total Aromatics (e.g. styrene)	104.2	0.9060	0	1.71E-05
Total Non-methane Hydrocarbons	0.0	0.0000	0	3.96E-05
Zinc	65.4	7.1400	0	3.90E-04
bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	1.05E-06
cis-2-Butene	56.1	0.6213	0	9.34E-07
cis-2-Pentene	70.1	0.6556	0	4.61E-07
i-Butane	58.1	0.0000	0	4.61E-07
i-Pentane	72.2	0.0000	0	1.38E-06
m- & p-Xylene	106.2	0.8627	0	3.48E-06
m-Ethyltoluene	135.2	0.9391	0	4.79E-07
n-Heptane	100.2	0.6840	0	1.44E-06
n-Hexane	86.1	0.6548	0	1.38E-06
n-Octane	114.2	0.7025	0	2.87E-06
n-Pentane	72.2	0.6262	0	4.79E-06
n-Propybenzene	120.2	0.8620	0	3.70E-07
0-Xylene	106.2	0.8802	0	1.92E-06
p-Ethyltoluene	135.2	0.9391	0	1.92E-06
trans-2-Butene	125.0	1.1830	0	9.46E-07
trans-2-Pentene	84.2	0.6942	0	4.61E-07
Tritonal (79% TNT, 21% Aluminum)	1290	1	75	
1,2,4-Trimethylbenzene	120.2	0.8758	0	3.71E-07
1,2,4-Trimethylbenzene & sec-Butylbe	120.2	0.8758	0	3.69E-07
1,3-Butadiene	54.1	0.6211	0	1.45E-06
1-Butene	56.1	0.5951	0	2.54E-06
1-Hexane	86.2	0.6603	0	2.09E-06
1-Pentene	70.1	0.6405	0	1.47E-06
2,2,4-Trimethylpentane	114.2	0.6917	0	2.23E-06
2,3-Dimethylbutane	86.2	0.6616	0	3.63E-07
2,3-Dimethylhexane	114.2	0.7121	0	1.09E-06
2,3-Dimethylpentane	100.2	0.6951	0	3.63E-07
2,4-Dimethylhexane	114.2	0.6960	0	3.72E-07
2,4-Dinitrotoluene	182.1	1.3208	0	1.05E-04
2-Methylheptane	114.2	0.6980	0	4.90E-07
2-Methylhexane	100.2	0.6787	0	1.12E-06
2-Methylpentane	86.2	0.6532	0	1.09E-06
3-Ethylhexane, 3-Methylheptane	114.2	0.7136	0	3.63E-07
3-Methylhexane	100.2	0.6860	0	2.90E-06
Acetylene	26.0	0.6181	0	1.23E-04
Aluminum	27.0	2.7020	0	2.59E-02
Anthracene	178.2	1.2830	0	6.16E-06

Table 3. Contents of File OBODFUEL.OBD (Continued)

Barium	137.3	3.5100	0	5.30E-04
Benzene	78.1	0.8787	0	6.17E-06
Benzyl alcohol	108.2	1.0419	0	7.14E-05
CO	28.0	0.0013	0	4.68E-03
CO2	44.0	0.0020	0	7.00E-01
Carbon Tetrachloride	153.8	1.5940	0	3.71E-07
Chloroform	119.4	1.4832	0	3.63E-07
Copper	63.5	8.9200	0	1.81E-04
Cyclopentane	70.1	0.7500	0	3.69E-07
Cyclopentene	68.1	0.8000	0	7.26E-07
Di-n-butyl phthalate	278.4	1.0500	0	2.18E-04
Di-n-octyl phthalate	390.6	0.0000	0	7.79E-06
Ethane	30.1	0.5720	0	3.63E-07
Ethylbenzene	106.2	0.8670	0	2.45E-06
Ethylene	62.0	0.9780	0	2.15E-05
Lead	207.2	11.3437	0	1.69E-03
Methylchloride	50.5	0.9159	0	7.44E-07
Methylcyclohexane	98.2	0.0000	0	6.98E-06
Methylcyclopentane	0.0	0.0000	0	7.44E-07
Methylenechloride	84.9	1.3266	0	1.78E-05
Nitrogen Oxide	30.0	0.0013	0	8.19E-03
Nitrogen Dioxide (peroxide)	46.0	1.4494	9360	1.54E-04
Nickel	58.7	8.9000	0	4.31E-06
Non-methane Organic Compounds	0.0	0.0000	0	2.63E-04
PM10	0.0	0.0000	0	3.69E-01
Propane	44.1	0.5005	0	7.42E-07
Propene	42.1	0.5193	0	3.18E-06
Sulfur Dioxide	64.1	0.0029	0	1.58E-04
Styrene	104.2	0.9060	0	3.72E-07
Tetrachloroethylene	165.8	1.6227	0	2.70E-06
Titanium	47.9	4.5000	0	1.49E-05
Toluene	92.2	0.8669	0	2.94E-06
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7080	0	1.63E-05
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	1.57E-04
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	2.66E-05
Total Non-methane Hydrocarbons	0.0	0.0000	0	2.76E-04
Total Unidentified Hydrocarbons	0.0	0.0000	0	8.97E-05
Zinc	65.4	7.1400	0	2.07E-04
cis-2-Butene	56.1	0.6213	0	3.63E-07
i-Butane	58.1	0.0000	0	7.44E-07
i-Butene	56.1	0.0000	0	1.36E-06
i-Propylbenzene	120.2	0.0000	0	1.09E-06
m- & p-Xylene	106.2	0.8627	0	9.21E-06
m-Ethyltoluene	135.2	0.9391	0	2.59E-06
n-Butane	58.1	0.6012	0	1.86E-06
n-Decane	142.3	0.7300	0	3.71E-07
n-Nonane	128.3	0.7176	0	3.35E-06
n-Octane	114.2	0.7025	0	3.72E-07
n-Pentane	72.2	0.6262	0	7.26E-07

Table 3. Contents of File OBODFUEL.OBD (Continued)

n-Propybenzene	120.2	0.8620	0	3.71E-07
o-Xylene	106.2	0.8802	0	3.56E-06
p-Ethyltoluene	135.2	0.9391	0	4.32E-06
trans-2-Butene	125.0	1.1830	0	1.85E-06
trans-2-Hexene	84.2	0.6784	0	2.98E-06
trans-2-Pentene	84.2	0.6942	0	3.72E-07
Tritonal with 2.5% Calcium Stearate	1290	1	57	
1,3-Butadiene	54.1	0.6211	0	1.84E-06
1-Butene	56.1	0.5951	0	5.52E-06
1-Hexene	84.2	0.6731	0	2.94E-06
1-Pentene	70.1	0.6405	0	1.46E-06
2,2,4-Trimethylpentane	114.2	0.6917	0	7.36E-07
2,2-Dimethylbutane	86.2	0.6485	0	3.68E-07
2,4,4-Trimethyl-1-pentene	112.2	0.7150	0	3.68E-07
2,5-Dimethylhexane	114.2	0.6935	0	3.68E-07
2-Methyl-1-butene	70.1	0.6504	0	3.68E-07
2-Methyl-2-butene	70.1	0.6623	0	7.29E-07
Acetylene	26.0	0.6181	0	2.10E-05
Aluminum	27.0	2.7020	0	1.77E-02
Barium	137.3	3.5100	0	7.78E-04
Benzene	78.1	0.8787	0	5.52E-06
Benzyl alcohol	108.2	1.0419	0	5.92E-06
CO	28.0	0.0013	0	3.99E-03
CO2	44.0	0.0020	0	1.42E+00
Cadmium	112.4	8.6420	0	6.00E-06
Chlorobenzene	112.6	1.1058	0	1.10E-06
Chromium	52.0	7.2000	0	8.72E-06
Copper	63.5	8.9200	0	5.84E-04
Cyclopentene	68.1	0.8000	0	3.64E-07
Di-n-octyl phthalate	390.6	0.0000	0	4.90E-06
Ethane	30.1	0.5720	0	7.36E-07
Ethylbenzene	106.2	0.8670	0	2.94E-06
Ethylene	62.0	0.9780	0	3.16E-05
Lead	207.2	11.3437	0	1.52E-03
Methylchloride	50.5	0.9159	0	3.68E-07
Methylcyclohexane	98.2	0.0000	0	4.37E-06
Methylenechloride	84.9	1.3266	0	3.11E-04
Nitrogen Oxide	30.0	0.0013	0	6.65E-03
Nitrogen Dioxide (peroxide)	46.0	1.4494	9360	5.93E-05
Non-methane Organic Compounds	0.0	0.0000	0	2.43E-04
PM10	0.0	0.0000	0	2.98E-01
Propane	44.1	0.5005	0	3.64E-07
Propene	42.1	0.5193	0	8.09E-06
Sulfur Dioxide	64.1	0.0029	0	1.76E-04
Tetrachloroethylene	165.8	1.6227	0	3.68E-07
Titanium	47.9	4.5000	0	3.44E-05
Toluene	92.2	0.8669	0	3.31E-06
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780	0	1.57E-04
Total Aromatics (e.g. Styrene)	104.2	0.9060	0	1.42E-05

Table 3. Contents of File OBODFUEL.OBD* (Continued)

Total Non-methane Hydrocarbons	0.0	0.0000	0	5.14E-05
Total Unidentified Hydrocarbons	0.0	0.0000	0	3.64E-06
Zinc	65.4	7.1400	0	5.44E-04
bis(2-Ethylhexyl)phthalate	390.5	0.9732	0	5.30E-06
cis-2-Butene	56.1	0.6213	0	7.36E-07
i-Butane	58.1	0.0000	0	7.29E-07
i-Butene	56.1	0.0000	0	2.57E-06
i-Propylbenzene	120.2	0.0000	0	7.29E-07
m- & p-Xylene	106.2	0.8627	0	8.02E-06
n-Butane	58.1	0.6012	0	3.64E-07
n-Decane	142.3	0.7300	0	3.64E-07
o-Xylene	106.2	0.8802	0	3.68E-06
p-Ethyltoluene	135.2	0.9391	0	7.29E-07
trans-2-Butene	125.0	1.1830	0	2.94E-06
trans-2-Pentene	84.2	0.6942	0	3.64E-07

[a] See text for explanation of file contents.

4.9 SIGMAPLOT FILE FORMAT AND CONTENTS

The Sigmaplot output file is available to facilitate plotting OBODM solutions using the SigmaPlot™ software or other graphics software. The format and contents of this file will depend on OBODM output options specified. Each calculation option (peak concentration, dosage, hourly average, highest, etc.) selected will produce the following record groups. Each record group is written sequentially to the file.

Record	Format	Columns	Contents
1			Blank
2	50A1	1-50	Main title
3	4I1	38-41	Number of X grid system coordinates
4	4I1	38-41	Number of Y grid system coordinates
5	A11	17-27	'Rectangular' or 'Polar'
6	F12.2	11-22	X origin of grid system
	F12.2	34-45	Y origin of grid system
7	F7.2	32-38	Grid system orientation angle
8			Blank
9	I4	20-23	Number of sources (N_s)
10			Blank
11		4-9	'Source'
		20	'X'
		42	'Y'
12		4-9	'Number'
		15-24	'Coordinate'
		38-47	'Coordinate'
13		4-9	'------'
		15-24	'----------'
		38-47	'----------'
14	I3	6-8	Source number
	F11.2	14-24	Source X coordinate
	A10	26-35	Source X coordinate units
	F11.2	37-47	Source Y coordinate
	A10	49-58	Source Y coordinate units
.			
.			
.			
$14+N_s$			Blank
$15+N_s$	80A1	1-80	Main heading
$16+N_s$	80A1	1-80	Hour label, if applicable
$17+N_s$	80A1	1-80	Source group label, if applicable
$18+N_s$	80A1	1-80	Calculation height, if applicable

The solution data follow and depend on the output options selected. The following record group is written only if N_x (number of X coordinates) and N_y (number of Y coordinates) are both greater than one. The first X,Y pair written are for X index 1, Y index 1. The second pair written are for X index 2, Y index 1. All solutions for the X coordinates are written before incrementing the Y index.

Record	Format	Columns	Contents
$19+N_s$			Blank
$20+N_s$		10	'X'
		23	'Y'
$21+N_s$		5-14	'Coordinate'
		18-27	'Coordinate'
		30-79	Dispersion quantity label
$22+N_s$		3-15	X units
		17-29	Y units
$23+N_s$		5-59	'---- ... ----'
$24+N_s$	F11.2	4-14	X coordinate
	F11.2	17-27	Y coordinate
	F16.6	23-38	Calculated dispersion at X,Y
.			
.			
.			
$23+N_s+N_x \cdot N_y$	F11.2	4-14	X coordinate
	F11.2	17-27	Y coordinate
	F16.6	23-38	Calculated dispersion at X,Y

If only one Y or X coordinate is being used, the program assumes maximum centerline calculations and writes the following record group rather than the previous shown.

$19+N_s$			Blank
$20+N_s$		6-13	'Distance'
$21+N_s$	5A2	4-13	Distance units
	33A2	17-82	Dispersion quantity label
$22+N_s$		4-58	'---- ... ----'
$23+N_s$	F11.2	4-14	X or Y coordinate (multiple valued)
	F16.6	21-36	Calculated dispersion
.			
.			
.			
$22+N_s+$	F11.2	4-14	X or Y coordinate
$\mathrm{Max}(N_x,N_y)$	F16.6	21-36	Calculated dispersion

4.10 GRID COORDINATES AND ELEVATION DATA

OBODM optionally allows the user to have the program generate the grid receptors to be used in calculations. Alternately, the program allows the input of these data from a disk file. The data can be either free field or formatted. The X axis, Y axis, and Elevation data are all optional and their presence in the data file is indicated in the GENERATE CALCULATION GRID SYSTEM RECEPTOR DATA menu. Also, whether they are free field or formatted is indicated in the menu.

Record	Format/Columns	Contents
1	free field, separated by a comma or blank	Number of X coordinates (N_x) in the terrain data. Number of Y coordinates (N_y) in the terrain data.
2-I	user defined	Optional X coordinates (west to east)
1+1-J	user defined	
J+1-K	user defined	Optional Y coordinates (south to north) Option Z terrain elevation data for COMPLEX terrain. The order of these data is specified by the user. Either all elevations for the X coordinates are read in successive record groups, one group for each Y coordinate, or all elevations for the Y coordinates are read in successive record groups, one group for each X.

(I, J, & K depend on the contents of the data file)

SECTION 5. DEFAULT METEOROLOGICAL INPUTS

The minimum OBODM meteorological inputs consist of the wind speed and wind direction at 10 m above the surface, air temperature, and either the Pasquill stability category or the Net Radiation Index (NRI). With this minimum information, the program will provide default values for all other meteorological inputs, although the user is encouraged to use measured or site-specific climatological values wherever available. This section summarizes the OBODM default meteorological inputs. A more detailed discussion of these default values is provided in Section 3 of Volume II.

The Pasquill stability categories divide the atmospheric stability of the surface mixing layer into the six discrete classes summarized in Table 4. Although a variety of methods have been used to estimate the Pasquill stability categories, the most common procedure (Turner, 1964) relates them to the 10-m wind speed and NRI, as shown in Table 5. The NRI is in turn a function of the solar altitude and cloud cover, as shown in Table 6. (Note that Tables 5 and 6 use the units from the original Turner methodology rather than SI units.) OBODM assigns its default meteorological inputs based on the combination of the 10-m wind speed and NRI. If the Pasquill stability category rather than the NRI (or the information needed to compute the NRI) is entered, OBODM uses Table 7 to estimate the NRI.

Table 4. Definitions of the Pasquill Stability Categories.

Pasquill Stability Category	Definition
A	Very Unstable
B	Unstable
C	Slightly Unstable
D	Neutral
E	Stable
F	Very Stable

Table 5. Pasquill Stability Category as a Function of Net Radiation Index and Wind Speed.

Net Radiation Index	10-m Wind Speed (kt) 0-1	>1-3	>3-5	>5-6	>6-7	>7-9	>9-10	>10-11	>11
4	A	A	A	B	B	B	C	C	C
3	A	B	B	B	B	C	C	C	D
2	B	B	C	C	C	C	D	D	D
1	C	C	D	D	D	D	D	D	D
0	D	D	D	D	D	D	D	D	D
-1	F	F	E	E	D	D	D	D	D
-2	F	F	F	F	E	E	E	D	D

Table 6. Net Radiation Index as a Function of Insolation Category.

Insolation Category (|=Solar altitude in degrees)	Net Radiation Index
Strong (60 < |)	4
Moderate (35 < | ≤ 60)	3
Slight (15 < | ≤ 35)	2
Weak (| ≤ 15)	1
Overcast < 7000 ft (day or night)	0
Cloud cover > 4/10 (night)	-1
Cloud cover ≤ 4/10 (night)	-2

Table 7. Net Radiation Index as a Function of Pasquill Stability Category and Wind Speed.

Pasquill Stability Category	10-m Wind Speed (kt)								
	0-1	>1-3	>3-5	>5-6	>6-7	>7-9	>9-10	>10-11	>11
A	4	4	4	4	4	4	4	4	4
B	2	3	3	3	3	4	4	4	4
C	1	1	2	2	2	3	4	4	4
D	0	0	1	1	0	0	0	0	0
E	-2	-2	-1	-1	0	0	0	0	0
F	-2	-2	-2	-2	-1	-1	-1	0	0

In addition to the wind speed and wind direction at 10 m, the OBODM meteorological inputs consist of the standard deviations of the wind direction and elevation angles in radians (equivalent to the lateral and vertical turbulence intensities), longitudinal turbulence intensity, wind-profile exponent, vertical potential temperature gradient, and depth of the surface mixing layer. The default values for the standard deviations of the wind direction and elevation angles in degrees are listed in Tables 8 and 9, respectively. The OBODM default longitudinal turbulence intensities are 1.33 times the wind direction standard deviations in Table 8. (If the user enters the standard deviation of the wind direction, but not the longitudinal turbulence intensity, OBODM sets the longitudinal turbulence intensity equal to 1.33 times the user-specified wind direction standard deviation.) The OBODM default wind power-law exponents are listed in Table 10. The default vertical potential temperature gradients and mixing depths are given in Tables 11 and 12, respectively.

Table 8. Default Standard Deviations of the Wind Direction Angle in Degrees Measured Over 600 s at a Height of 10 m Above Open Terrain (Dumbauld and Bowers 1983).

10-m Wind Speed (m/s)	Net Radiation Index 4	3	2	1	0	-1,-2
0 - 1	26.0	22.0	21.0	15.0	11.0	4.0
>1 - 3	22.0	20.0	16.0	11.0	10.0	4.0
>3 - 5	19.0	16.0	13.0	11.0	9.0	7.0
>5 - 7	15.0	13.0	12.0	9.0	8.0	6.7
>7	13.0	12.0	10.0	8.0	7.0	6.7

Table 9. Default Standard Deviations of the Wind Elevation Angle in Degrees at 10 m Above Open Terrain (Dumbauld and Bowers, 1983).

10-m Wind Speed (m/s)	Net Radiation Index 4	3	2	1	0	-1,-2
0 - 1	8.7	8.7	7.0	5.0	4.0	3.0
>1 - 3	7.0	7.0	6.0	4.0	3.5	3.0
>3 - 5	7.0	6.0	5.5	5.3	5.0	5.0
>5 - 7	6.0	5.3	5.0	4.8	4.8	4.7
>7	5.3	5.0	4.5	4.5	4.5	4.5

Table 10. Default Wind Speed Power Law Exponents Over Open Terrain (Dumbauld and Bowers, 1983).

10-m Wind Speed (m/s)	Net Radiation Index 4	3	2	1	0	-1,-2
0 - 1	0.10	0.10	0.20	0.20	0.25	0.40
>1 - 3	0.10	0.10	0.20	0.20	0.25	0.30
>3 - 5	0.10	0.10	0.15	0.15	0.20	0.25
>5 - 7	0.10	0.10	0.10	0.10	0.10	0.20
>7	0.10	0.10	0.10	0.10	0.10	0.10

Table 11. Default Vertical Potential Temperature Gradients in Degrees Kelvin Per Meter (Bjorklund and Bowers, 1982).

10-m Wind Speed (m/s)	Pasquill Stability Category A	B	C	D	E	F
	Relative Humidity >70%					
0 - 1	0.000	0.000	0.000	0.015	0.030	0.035
>1 - 3	0.000	0.000	0.000	0.010	0.020	0.025
>3 - 5	0.000	0.000	0.000	0.005	0.015	0.015
>5 - 7	0.000	0.000	0.000	0.003	0.010	0.010
>7	0.000	0.000	0.000	0.003	0.003	0.003
	Relative Humidity ≤ 70%					
0 - 1	0.000	0.000	0.000	0.030	0.030	0.040
>1 - 3	0.000	0.000	0.000	0.020	0.020	0.030
>3 - 5	0.000	0.000	0.000	0.010	0.010	0.020
>5 - 7	0.000	0.000	0.000	0.005	0.005	0.010
>7	0.000	0.000	0.000	0.000	0.000	0.005

Table 12. Default Surface Mixing Layer Depths in Meters for Open Terrain (from Dumbauld and Bowers, 1983).

10-m Wind Speed (m/s)	Net Radiation Index					
	4	3	2	1	0	-1,-2
0 - 1	2500	2000	1000	500	100	30
>1 - 3	2200	1800	1200	600	200	100
>3 - 5	1800	1500	1200	600	300	200
>5 - 7	1500	1200	1000	600	300	200
>7	1200	1000	700	500	300	200

SECTION 6. APPENDICES

APPENDIX A. OBODM MENUS

```
01                          OBODM (Version 01.3)
                 OPEN BURN/OPEN DETONATION DISPERSION MODEL

                          by H. E. CRAMER CO., INC.
             PO Box 411, Sandy, Utah 84091-0411, (801) 561-4964
                                  and
                     Meteorology & Obscurants Division
      West Desert Test Center, Dugway, Utah 84022-5000, (435) 831-5101


   {Specify the PATHNAME to the directory on which the OBODM data files }
   {reside (Example: \OBODM\SUBOBOD\).  Precede the PATHNAME by the disk}
   {drive if applicable (Example: C:\OBODM\SUBOBOD\). All blanks default}
   {to the current drive and directory.                                 }

      DIRECTORY pathname -- [                                    ]

   {If OBODM data save file names are preceded by an asterisk (*) symbol,}
   {the above directory path name replaces the * and the files reside on }
   {the specified directory.  Data save file names not preceded by an *  }
   {reside on the current directory.                                     }

      SETUP (change edit mode, colors) (N/Y) ----------------- [N]

 {F4 for help, PgDn or Enter for next menu}
```

```
02                          OBODM (Version 01.3)
                            OPTIONAL DATA FILES

                       {F7 Displays OBOD data files}

      INPUT DATA SAVE FILE (.INP)           OUTPUT DATA SAVE FILE (.INP)

 GET DATA FROM-[                      ] SAVE DATA TO-[                      ]

     PRINT OUTPUT SAVE FILE (.OUT)       GET/SAVE SOLUTION FOR GRAPHICS (.SOL)
                                          (scratch/temporary if not specified)
 SAVE DATA TO -[                      ] SAVE DATA TO-[                      ]


  {A plus (+) symbol prior to any file name forces all remaining file  }
  {names to be the same name (with different extension name .INP, .OUT }
  {or .SOL).  An equals (=) symbol prior to the name specified for     }
  {INPUT DATA SAVE FILE indicates a batch file that contains data file }
  {names for batch processing of multiple cases.  Include four records }
  {(lines) for each batch case.  Order the names INPUT, OUTPUT, PRINT  }
  {and SOLUTION.  Leave record (line) blank if no file name.           }


 { Enter to get data from/initialize files}
```

```
03                          OBODM (Version 01.3)
                                 MAIN MENU
  {Position cursor at DATA SECTION or EXECUTE or GRAPHICS and press Enter}

                 DATA SECTION                            DATA

     1)  CALCULATION GRID SYSTEM RECEPTOR DATA  [  ]  {      }

     2)  METEOROLOGICAL DATA  ----------------  [  ]  {      }

     3)  SOURCE DATA  ------------------------  [  ]  {      }

     4)  CONTROL/OPTIONS DATA  ---------------  [  ]  {      }

     5)  EXECUTE  ----------------------------  [  ]  {      }

     6)  GRAPHICS  ---------------------------  [  ]  {      }

     7)  DISPLAY  print file -----------------  [  ]

     8)  REPRINT/SCALE  old solution file ----  [  ]

     9)  FINISH (end program)  ---------------  [  ]

  {PgDn for data sections not SET}
```

```
04                          OBODM (Version 01.3)
                   CALCULATION GRID SYSTEM RECEPTOR DATA

                     {F5 displays units abbreviations}

  Receptor grid system is Rectangular or Polar (R/P) ------------------- = [R]
  Receptor grid system length units (m,km,ft,yd,mi,etc.) -------------- = [m ]
  Receptor grid system height or elevation units (m,km,ft,yd,mi,etc.) - = [m ]
  Receptor grid X,Y origin ------------------- = [            ],[            ]
  (Note: Origin is added to rectangular receptor points.)

  Add origin to source rectangular coordinates (N/Y) --------------------- [ ]
  Height of grid system above flat terrain.  If COMPLEX terrain is used
  (elevations Z > 0), type C for Complex -------------------- = [            ]

  Grid system orientation angle {units (d,r)= [d]} ---------- = [            ]
  (Note: Orientation angle is positive when positive Y axis points
   east of north when viewed from the south.)

  Generate receptor grid system axes (Y/N) ------------------------------- [N]

  Delete current X,Y,Z grid system receptor points (N/Y) ----------------- [N]
  Delete current discrete receptor points (N/Y) -------------------------- [N]

  {PgUp or F2 for main menu, PgDn for next menu}
```

```
05                          OBODM (Version 01.3)
            GENERATE/READ CALCULATION GRID SYSTEM RECEPTOR DATA
                  {Use F5 to display units abbreviations}

 Generate X axis (  m)
   Start - [            ], Increment - [            ], End - [            ]
 Generate Y axis (  m)
   Start - [            ], Increment - [            ], End - [            ]

 Read X, Y axes and/or Z terrain elevations from a data file.
   File name ------------------------------------- [                      ]
    {The first record in the file contains the number of X coords. (Nx)  }
    {and number of Y coords. (Ny) separated by a blank or comma, the next}
    {record group are X coords., then Y coords., and last Z elevations.  }
   X format- [                                                            ]
   Y format- [                                                            ]
   Z format- [                                                            ]
    {Type a single asterisk (*) for free field (list directed) format.}
    {Leave field blank if respective X,Y,Z data are not in data file. }
   Order of Z data (A/B) ---------------------------------------------- [A]
    A) Elevs. for each X coord. (1-Nx) are read from record groups, one
       group for each Y coord. (1-Ny). Each Y starts a new record group.
    B) Elevs. for each Y coord. (1-Ny) are read from record groups, one
       group for each X coord. (1-Nx). Each X starts a new record group.
 {PgDn or Enter for next menu}
```

```
06                          OBODM (Version 01.3)
                   CALCULATION GRID SYSTEM RECEPTOR DATA

              {X or Ctrl k in data field deletes data value}

X axis(  m)=[          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],

 {PgDn or Enter for next menu}
```

```
07                          OBODM (Version 01.3)
                   CALCULATION GRID SYSTEM RECEPTOR DATA

              {X or Ctrl k in data field deletes data value}

Y axis(  m)=[          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],
            [          ],[          ],[          ],[          ],[          ],

 {PgDn or Enter for next menu}
```

```
08                          OBODM (Version 01.3)
                   CALCULATION GRID SYSTEM ELEVATION DATA

              {X or Ctrl k in data field deletes data value}

                                        X axis( m)
            [          ] [          ] [          ] [          ] [          ]
Y axis(  m) ------------------------------------------------------------------
                              Z terrain elevation at X,Y (  )
[         ]-[          ],[          ],[          ],[          ],[          ],
[         ]-[          ],[          ],[          ],[          ],[          ],
[         ]-[          ],[          ],[          ],[          ],[          ],
[         ]-[          ],[          ],[          ],[          ],[          ],
[         ]-[          ],[          ],[          ],[          ],[          ],
[         ]-[          ],[          ],[          ],[          ],[          ],
[         ]-[          ],[          ],[          ],[          ],[          ],
[         ]-[          ],[          ],[          ],[          ],[          ],
[         ]-[          ],[          ],[          ],[          ],[          ],
[         ]-[          ],[          ],[          ],[          ],[          ],
[         ]-[          ],[          ],[          ],[          ],[          ],
[         ]-[          ],[          ],[          ],[          ],[          ],
[         ]-[          ],[          ],[          ],[          ],[          ],
[         ]-[          ],[          ],[          ],[          ],[          ],

 {PgDn or Enter for next menu}
```

```
09                          OBODM (Version 01.3)
                           DISCRETE RECEPTOR DATA

                {X or Ctrl k in data field deletes data value}

    X( m)       Y(  m)         Z( m)         X( m)       Y(  m)         Z( m)
------------ ------------ ------------ ------------ ------------ ------------
[          ],[          ],[          ],[          ],[          ],[          ]
[          ],[          ],[          ],[          ],[          ],[          ]
[          ],[          ],[          ],[          ],[          ],[          ]
[          ],[          ],[          ],[          ],[          ],[          ]
[          ],[          ],[          ],[          ],[          ],[          ]
[          ],[          ],[          ],[          ],[          ],[          ]
[          ],[          ],[          ],[          ],[          ],[          ]
[          ],[          ],[          ],[          ],[          ],[          ]
[          ],[          ],[          ],[          ],[          ],[          ]
[          ],[          ],[          ],[          ],[          ],[          ]
[          ],[          ],[          ],[          ],[          ],[          ]
[          ],[          ],[          ],[          ],[          ],[          ]
[          ],[          ],[          ],[          ],[          ],[          ]
[          ],[          ],[          ],[          ],[          ],[          ]
[          ],[          ],[          ],[          ],[          ],[          ]

 {PgDn or Enter for next menu}
```

```
10                          OBODM (Version 01.3)
                          SOURCE POLLUTANT/SPECIES
     {F6 displays common fuels and explosives with the respective    }
     {quantity of pollutant/species per quantity of fuel or explosive}

 FUEL OR EXPLOSIVE LABEL ----------- = [                                    ]
 POLLUTANT/SPECIES LABEL ----------- = [                                    ]
 POLLUTANT/SPECIES IS GASEOUS OR PARTICULATE (G/P) ---------------------- [G]
 Pollutant/species molecular weight (grams/gram-mole) ------- =[            ]
    (Required for print output units of PPM or PPB)
 Pollutant/Species density {units (g/cm**3,etc.)=[        ]}- =[            ]
    (Required for PARTICLES)
 Poll/species half-life (0=infinite) {units (s,mn,h)=[  ]} -- =[            ]

                          {SPECIFY EITHER}
 Ratio of mass of pollutant/species {units(g,kg,lb,etc.)=[  ]}=[            ]
 per mass of fuel or explosive burned {units=(g,kg,etc.)=[  ]}=[            ]
                                {OR}
 Fraction of exhaust cloud constituting pollutant/species --- =[            ]

 Some source data vary with hourly input met. data (N/Y) ----------------[N]


 {PgUp or F2 for main menu}
```

```
11                          OBODM (Version 01.3)
                              PARTICULATE DATA

                     {F5 displays units abbreviations}

  Particle diameter units (um,mm,cm,etc.) ---------------------------- = [um]
  Particle settling velocity units (m/s,mi/h,kts,etc.) ------------ = [  m/s]

         {The following three parameters are for the automatic}
         {generation of the particle size distribution only.  }

  Number of particle size categories in distribution (max=50) -------- = [  ]
  Mass-median diameter of particle distribution ------------ = [            ]
  Geometric standard deviation of particle distribution(>1)- = [            ]

  Automatically generate the particle size distribution (N/Y) ----------- [N]

  Ratio of Lagrangian to Eulerian time scales (used in correction of
  turbulent intensities for crossing trajectory effects of heavy
  particles) (>=0) ---------------------------------------- = [           1]



 {PgDn or Enter for next menu}
```

```
12                          OBODM (Version 01.3)
                              PARTICULATE DATA


 CATEGORY /UPPER BOUND /LOWER BOUND /    MASS    /  SETTLING  / REFLECTION /
  NUMBER  /OR AVERAGE  /IF NOT AVG  /  FRACTION  /  VELOCITY  /COEFFICIENT /
          /  DIAMETER  /  DIAMETER  / (fraction  /   (  m/s)  / (unitless) /
          /    (um)    /    (um)    /  of total) / C=computed / C=computed /
 ---------/------------/------------/------------/------------/------------/
           [          ] [          ] [          ] [          ] [          ]
           [          ] [          ] [          ] [          ] [          ]
           [          ] [          ] [          ] [          ] [          ]
           [          ] [          ] [          ] [          ] [          ]
           [          ] [          ] [          ] [          ] [          ]
           [          ] [          ] [          ] [          ] [          ]
           [          ] [          ] [          ] [          ] [          ]
           [          ] [          ] [          ] [          ] [          ]
           [          ] [          ] [          ] [          ] [          ]
           [          ] [          ] [          ] [          ] [          ]

                  {X defaults value, then F3 displays values here}
                  {C defaults values at execution time           }


 {PgDn or Enter for next menu}
```

```
13                          OBODM (Version 01.3)
                               SOURCE NUMBER

                          {Number of sources =[  ]}


 GET OR SPECIFY DATA FOR SOURCE NUMBER (01 to 50) ---------------------- [  ]

 COPY SOURCE DATA FROM SOURCE NUMBER ----------------------------------- [  ]

 DELETE SOURCE NUMBER -------------------------------------------------- [  ]


  {The source number indicates the sequence number of sources used.  If  }
  {source number 3 of 5 sources is deleted, sources 4 and 5 become 3 and }
  {4.  If both a copy and a delete number are specified, the copy is done}
  {prior to the delete.  If a copy or delete number is specified, this   }
  {menu is redisplayed after the copy and/or delete.  Use Enter to copy  }
  {and/or delete.                                                        }


 {PgDn or Enter to copy, delete, specify source}
```

```
14                          OBODM (Version 01.3)
                      GASEOUS OR PARTICULATE SOURCE DATA
                               SOURCE NUMBER (  )
                      {F5 displays units abbreviations}

 SOURCE IDENTIFICATION NAME ---------- [                                  ]

 Source type (Volume(point),Line) ---------------------------------------- [V]
 Source emission type (Instantaneous,Quasi-continuous) ------------------ [I]

 Total mass of material burned or released
      {units (g,kg,lb,etc.)=[ g]} ------------------------- = [          1.0]
 Fuel material heat content {units(CA/g,J/lb,etc.)=[ CA/g]}= [             ]
 Fuel material burn rate (quasi-continuous sources only)
      {units (g/s,lb/s,etc.)=[  g/s]} -------------------- = [             ]

 Hours in a day during which this source can be burned or detonated, starting
 with hour 00__ and ending with hour 23__.  Enter Yes or No (blank is default
 Yes)                                  hour - 00 01 02 03 04 05 06 07 08 09
                                              [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]
                                              10 11 12 13 14 15 16 17 18 19
                                              [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]
                                              20 21 22 23
                                              [ ][ ][ ][ ]
 {PgDn or Enter for next menu}
```

```
15                          OBODM (Version 01.3)
                      GASEOUS OR PARTICULATE SOURCE DATA
   SOURCE NUMBER (  ), SOURCE ID (                                    )
                      {F5 displays units abbreviations}

                        {X,Y is center of source}

 X,Y source coordinates are Rectangular/Polar ------------------------- = [R]

 X coordinate or range {units (m,km,etc.=[ m]} ------------- = [            ]
 Y coordinate or bearing (X units or degrees if polar) ----- = [            ]
 Z source base ground elevation (X units)(complex terrain) - = [            ]
 Release height above ground (C=default=1/2 depth)
                            {units(m,km,etc.=[ m]} ----------- = [         ]

 Length of long dimension of initial source material (C=default=10.0)
                                  {units (m,km,etc.=[ m]} ---- = [         ]
 Length of short dimension of initial source material (C=default=10.0)
                           (same as long dimension units) ---- = [         ]
 Angle of long dimension from zero degrees north (degrees) ---- = [         ]
 Depth or vertical dimension of initial source material (C=default=10.0)
                                  {units (m,km,etc.=[ m]} ---- = [         ]

 Do you wish to specify or review auxiliary source data (N/Y) ----------- [N]
 {PgDn or Enter for next menu}
```

```
16                          OBODM (Version 01.3)
                      GASEOUS OR PARTICULATE SOURCE DATA
   SOURCE NUMBER (  ), SOURCE ID (                                    )
                      {F5 displays units abbreviations}

                       {X,Y is center of source}

 X,Y source coordinates are Rectangular/Polar ------------------------- = [R]
 X coordinate or range {units (m,km,etc.)=[ m]} ------------ = [            ]
 Y coordinate or bearing (X units or degrees if polar) ----- = [            ]
 Z source base ground elevation (X units)(complex terrain) - = [            ]
 Effective height of release above ground (C=default=1/2 diameter)
                                         {units(m,km,etc.)=[ m]}=[         ]

 Diameter of initial source material immediately after detonation
    (type C for default) {units (m,km,etc.)=[ m]} ------------- = [         ]

 Do you wish to specify or review auxiliary source data (N/Y) ----------- [N]



 {PgDn or Enter for next menu}
```

```
17                          OBODM (Version 01.3)
                      GASEOUS OR PARTICULATE SOURCE DATA
    SOURCE NUMBER (  ), SOURCE ID (                                    )
                      {F5 displays units abbreviations}

                  {X,Y is mid point of end of line source}
              (C=default, I=instantaneous Q=quasi-continuous)
 X,Y source coordinates are Rectangular/Polar ------------------------- = [R]
 Start of Line Source
  X coordinate or range {units (m,km,etc.)=[ m]} ----------- = [            ]
  Y coordinate or bearing (X units or degrees if polar) ---- = [            ]
  Z source base elevation (X units)(complex terrain) ----------- = [        ]
  Release ht. above grnd.(C=1/2 depth I or 0.0 Q) {units=[ m]} - = [        ]
 End of Line Source
  X coordinate or range (X units) -------------------------- = [            ]
  Y coordinate or bearing (Y units) ------------------------- = [            ]
  Z base elevation (Z units) (complex terrain) ----------------- = [        ]
  Release height above ground (C=start ht.) (height units) ----- = [        ]
 Width and Depth
  Width of line source (C=depth I or 10.0 Q) {(m,km,etc.)=[ m]}  = [        ]
  Depth or vertical dimension of initial source material (C=compute I or
  10.0 Q)             {units (m,km,etc.)=[ m]} ----------------- = [        ]

 Do you wish to specify or review auxiliary source data (N/Y) ----------- [N]
 {PgDn or Enter for next menu}
```

```
18                          OBODM (Version 01.3)
                      GASEOUS OR PARTICULATE SOURCE DATA
    SOURCE NUMBER (  ), SOURCE ID (                                    )
                      {F5 displays units abbreviations}

 Air entrainment coeff. (default = .64 for OD, .60 for OB) --- = [          ]

 Lateral rectilinear cloud expansion distance {units=[  ]} --- = [          ]
 Vertical rectilinear cloud expansion distance {units=[  ]} -- = [          ]

 Lateral reference distance {units=[  ]} --------------------- = [          ]
 Vertical reference distance {units=[  ]} -------------------- = [          ]

 Lateral cloud expansion coefficient (default= 1 for OD, .9 for OB) = [     ]
 Vertical cloud expansion coefficient (default= 1 for both OB & OD) = [     ]

 {PgDn or Enter for next menu}
```

```
19                          OBODM (Version 01.3)
                          SOURCE POLLUTANT/SPECIES

   {Note: Source data read from an hourly chronologically-ordered data set }
   {      override any value(s) set in the above source input data menus.  }
   {      Also, parameters that are not read from the hourly data set must }
   {      be specified in the above source data menus.  All source data    }
   {      units must be specified.  The source input data file cannot be   }
   {      the same as the hourly meteorological input data file.  Sources  }
   {      that vary hourly are identified by their source numbers.  There  }
   {      must be a source data record(s) for each of these sources for    }
   {      each hour in the meteorological data file.  Use F4 for more      }
   {      information on the contents and format of this file.             }

 Source input data file name ----------------------- [                     ]



 {PgDn or Enter for next menu}
```

```
20                          OBODM (Version 01.3)
                          SOURCE POLLUTANT/SPECIES
 {Specify 0 (zero) or blank, if source parameter is not in data record.  }
 {Otherwise specify if the value for the parameter is 1st, 2nd, 3rd, etc.}
 {value in the record by a 1, 2, 3, etc.                                 }

 Source Number (required) ---------------------------------------------- [  ]

 Total mass of material burned or detonated (     ) -------------------- [  ]
 Fuel heat content of source material (     ) -------------------------- [  ]
 Fuel burn rate (     ) --------------------------------------------- [  ]



 {PgDn or Enter for next menu}
```

```
21                          OBODM (Version 01.3)
                          SOURCE POLLUTANT/SPECIES

 {If the source data are free field format, ignore this menu, but make sure}
 {the format area below is all blanks.  If the source data are fixed field }
 {format, you must enter the format of each data field in the input record.}


 {Use FORTRAN edit codes: Fw.d; Ew.d; Gw.d; #X; T#; TL#; TR#; #P; BN; or BZ}
 {Where: w is field width or number of columns occupied by the value.      }
 {       d is the number of digits following the decimal point.            }
 {       # is the number of columns or power of 10 for code P.             }
 {Separate each edit code sequence with a comma.  See help menus.          }

                                     FORMAT
 12345678901234567890123456789012345678901234567890123456789012345678901234 5
 ------------------------------------------------------------------------------
[                                                                              ]
[                                                                              ]



 {PgDn or Enter for next menu}
```

```
22                          OBODM (Version 01.3)
                            METEOROLOGICAL DATA


  Specify whether meteorological input data are for a Single event or
  are Hourly observations in chronological order (S/H) ------------------ [S]

  {Note: For hourly chronologically-ordered meteorological data (H):   }
  {      Values specified in the following menus should be the same as }
  {      those found in the first hour of the data set.  Parameters    }
  {      not read from the data set and not defaulted must be set here,}
  {      and should be set to average values.  All data units must be  }
  {      specified and must be the same as the input data set.         }

  Specify minimum and maximum limits for meteorological data (N/Y) ------ [N]



 {PgDn or Enter for next menu}
```

```
23                          OBODM (Version 01.3)
                         METEOROLOGICAL DATA LIMITS
                      {F5 displays units abbreviations}

  { WARNING: If any value in this menu is changed, program results may be }
  { invalid and cannot be supported by the authors of the OBODM program.  }
 Parameter         Minimum  Maximum       Parameter         Minimum  Maximum
------------------------------------ ----------------------------------------
 **** Hour limits                     Air pressure (mb) ----[       ][       ]
 are restricted to:                   Vertical gradient of
 either 0000 - 2300                   pot. temp. (K/m) -----[       ][       ]
 or     0100 - 2400                   Mixing layer depth (m)[       ][       ]
 Hour ----------- [       ][       ] Wind speed shear (m/s)[       ][       ]
 Wind speed (m/s) [       ][       ] Wind direction (d/m)
 Wind direction(d)[       ][       ] shear ----------------[       ][       ]
 Wind speed power                     Air temp. (C) --------[       ][       ]
 law exponent --- [       ][       ] Air humidity (%) -----[       ][       ]
 Lateral turbulent                    Turb. meas. time (s) -[       ][       ]
 intensity (d) -- [       ][       ] Clearing index -------[       ][       ]
 Vertical turbulent                   Roughness length (cm)-[       ][       ]
 intensity (d) -- [       ][       ]
 Alongwind turbulent
 intensity (d) -- [       ][       ]

 {PgDn or Enter for next menu}
```

```
24                          OBODM (Version 01.3)
                            METEOROLOGICAL DATA

                      {F5 displays units abbreviations}

 Wind speed at 10 meters {units (m/s,kts,etc.)=[     ]} -------- = [        ]
 Wind direction (degrees from, clockwise from north) ----------- = [        ]

 {For default meteorological data, specify the stability category or net}
 {radiation index under A) or specify all parameters under B), otherwise}
 {go to the next page. (X or C defaults the data field)                 }

 A) Pasquill stability category (A,B,C,D,E,F) or
    Net radiation index (4,3,2,1,0,-1,-2) ---------------------------- = [  ]

 B) Date/time:  4 digit year = [    ]     Month --- = [  ]     Day --- = [  ]
                    Julian day --- = [   ]    Hour (std/dst) [   ] - = [    ]
    Site location/clouds:
    West longitude (deg) * --------------------------------- = [            ]
    North latitude (deg) * --------------------------------- = [            ]
    Time zone diff. (GMT - site (std. hrs)) * ----------------------- = [   ]
    Cloud cover (8ths of celestial dome) ------------------------------ = [ ]
    Cloud ceiling {units (m,km,ft,etc.)= [  ]} ---------------- = [         ]
  *(longitude, latitude, zone are required for calcs. restricted to daytime)
 {PgDn or Enter for next menu}
```

```
25                          OBODM (Version 01.3)
                            METEOROLOGICAL DATA

                      {F5 displays units abbreviations}

 Ground elev. at met. measurement site {units(m,km,etc.=[  ])}= [           ]

 Wind speed power law coefficient (unitless) ---------------- = [           ]

 Measure time of std. dev. wind dir. angle {units (s,mn)=[  ]}= [           ]
 Standard deviation of wind direction angle {units (d,r)= [ ]}= [           ]
 Standard deviation of wind elevation angle {units (d,r)= [ ]}= [           ]
 Longitudinal turbulence intensity {units (d,r)= [ ]} ------- = [           ]

 Mixing layer depth {units (m,km,ft,etc.)= [  ]} ------------ = [           ]

 Air humidity {units = percent} ----------------------------- = [           ]
 Vert. gradient of pot. temp. {units (C/m,K/m,etc.)= [     ]} = [           ]
  {Default values for the vert. gradient of pot. temp. depend on }
  {humidity.  If humidity > 70%, assume a humid region, otherwise}
  {assume an arid region.                                        }


 {PgDn or Enter for next menu}
```

```
26                          OBODM (Version 01.3)
                            METEOROLOGICAL DATA

                      {F5 displays units abbreviations}


 Wind speed shear (C = computed) {units (m/s,kts,etc.)=[     ]}=[           ]
 Wind direction shear {units (d/m,d/km,d/ft,etc.)= [     ]} - = [           ]

 Ambient air temperature {units (C,K,etc.)= [  ]} ----------- = [           ]
 Surface roughness length {units (cm,mm,etc.)= [  ]} -------- = [           ]
 Air pressure {units (mb,P,inhg,mmhg)= [    ]} -------------- = [           ]


 {PgDn or Enter for next menu}
```

```
27                          OBODM (Version 01.3)
                         HOURLY METEOROLOGICAL DATA

 Name of hourly meteorological data file ----------- [                      ]
 Format of hourly data file (A/B/C/D/E/F) ------------------------------- [ ]
   A) {USER SPECIFIED} {ASCII, free field, unblocked hourly records       }
   B)   "       "      {ASCII, fixed field, unblocked hourly records      }
   C) {ISCST3    *   } {Preprocessed RAMMET or MPRM unformatted 24 hour   }
                       {blocked binary records (ISCST3 "UNFORM" format)   }
   D)    "       "     {ISCST3 "FREE" field format hourly unblocked ASCII }
                       {records                                           }
   E)    "       "     {ISCST3 "CARD" format fixed field hourly unblocked }
                       {ASCII records                                     }
   F)    "       "     {ISCST3 "ASCII" format fixed field hourly unblocked}
                       {records                                           }
   * means first record is surface and upper air station numbers and years.

 Calm hours are Not calculated or calms are Set to 1.0 mps (N/S) -------- [N]
 Missing met. data hours Not calculated or met. data Defaulted (N/D) ---- [N]
 If short term averages have less than 75% valid (non-calm, non-missing)
 hours, either 75% (EPA guideline) of the possible hours rounded up to the
 nearest integer or the actual count can be used to calculate the average.
 Use 75% Minimum or Actual count (M/A) ---------------------------------- [M]

 {PgDn or Enter for next menu}
```

```
28                          OBODM (Version 01.3)
                         HOURLY METEOROLOGICAL DATA
  Specify year of meteorological data (required, four digits) -------- [    ]
  Use Rural or Urban mixing layer depths (ISCST3 data only) (R/U) ------- [ ]

  If all days in the input data set are to be processed, enter Y here. -- [ ]
  Otherwise fill the fields below with a Y to include the day or a N or
  blank to exclude the day from processing.

 ------------------------------------------------------------------------------
 MONTH           DAY OF MONTH          MONTH           DAY OF MONTH
       123456789012345678901234567890 1       123456789012345678901234567890 1
 ------------------------------------------------------------------------------
 {JAN}[                                ]{FEB}[                               ]
 {MAR}[                                ]{APR}[                                ]
 {MAY}[                                ]{JUN}[                                ]
 {JUL}[                                ]{AUG}[                                 ]
 {SEP}[                               ] {OCT}[                                 ]
 {NOV}[                               ] {DEC}[                                 ]
 ------------------------------------------------------------------------------



 {PgDn or Enter for next menu}
```

```
29                          OBODM (Version 01.3)
              USER SPECIFIED HOURLY METEOROLOGICAL DATA CONTENTS
 {Specify 0 (zero), blank or C, if meteorological parameter is not in data  }
 {record. Otherwise specify if the value for the parameter is 1st, 2nd, 3rd,}
 {etc. value in the record by a 1, 2, 3, etc.  Zero or blank holds the      }
 {initial value constant.  C specifies default from stability category or   }
 {net radiation index and wind speed.  Only those parameters marked with an }
 {* below can be defaulted.                                                 }

      Year ------------------------------------------------------ [  ]
      Month ----------------------------------------------------- [  ]
      Day ------------------------------------------------------ [  ]
      Hour -(limits are set to [    ]-[    ] standard time)----- [  ]
      Julian day ------------------------------------------------ [  ]
      Wind speed (     ) ----------------------------------------- [  ]
      Wind speed power law coefficient * ------------------------ [  ]
      Wind direction (deg) --------------------------------------- [  ]
      Lateral turbulence intensity (lateral std. dev.) ( ) * --- [  ]
      Vertical turbulence intensity (vertical std. dev.) ( ) * - [  ]
      Alongwind turbulence intensity (alongwind std. dev.) ( ) * [  ]
      Air temperature (  ) --------------------------------------- [  ]


 {PgDn or Enter for next menu}
```

```
30                          OBODM (Version 01.3)
              USER SPECIFIED HOURLY METEOROLOGICAL DATA CONTENTS
 {Specify 0 (zero), blank or C, if meteorological parameter is not in data  }
 {record. Otherwise specify if the value for the parameter is 1st, 2nd, 3rd,}
 {etc. value in the record by a 1, 2, 3, etc.  Zero or blank holds the      }
 {initial value constant.  C specifies default from stability category or   }
 {net radiation index and wind speed.  Only those parameters marked with an }
 {* below can be defaulted.                                                 }

      Pressure (    ) ------------------------------------------ [  ]
      Vert. pot. temp. grad. (     ) * -------------------------- [  ]
      Mixing layer depth (  ) * ---------------------------------- [  ]
      Wind speed shear (     ) * ------------------------------- [  ]
      Wind direction shear (    ) ------------------------------- [  ]
      Pasquill stability category (unitless) * ----------------- [  ]
      Net radiation index (unitless) * ------------------------- [  ]
      Measurement time for lateral turbulence intensity (  ) --- [  ]
      Roughness length (  ) -------------------------------------- [  ]
      Air Humidity (%) ------------------------------------------ [  ]
      Clearing Index {Hm(ft)*Spd(kts)/100} ---------------------- [  ]
      Cloud cover (8ths of the Celestial dome) ----------------- [  ]
      Cloud ceiling (  ) ----------------------------------------- [  ]


 {PgDn or Enter for next menu}
```

```
31                          OBODM (Version 01.3)
              USER SPECIFIED HOURLY METEOROLOGICAL DATA FORMAT

  {Specify the fixed format for each data record (line) of the data file}

 {Use FORTRAN edit codes: Fw.d; Ew.d; Gw.d; #X; T#; TL#; TR#; #P; BN; or BZ}
 {Where: w is field width or number of columns occupied by the value.      }
 {       d is the number of digits following the decimal point.            }
 {       # is the number of columns or power of 10 for code P.             }
 {Separate each edit code sequence with a comma.                           }

                                 FORMAT
 12345678901234567890123456789012345678901234567890123456789012345678901234 5
 ------------------------------------------------------------------------------
[                                                                              ]
[                                                                              ]



 {PgDn or Enter for next menu}
```

```
32                          OBODM (Version 01.3)
                           CONTROL/PRINT OPTIONS
                      {F5 displays units abbreviations}

       Heading --- [                                                 ]

       Calculate dosage (N/Y) ------------------------------------- [N]
       Calculate concentration (N/Y) ------------------------------ [Y]
       Calculate time-average concentration (N/Y) ----------------- [N]
       Concentration averaging time {units (s,mn,h)= [ s]} = [        ]
       Calculate gravitational deposition (N/Y) ------------------- [N]

       Quasi-cont. (dosage) integration time interval(s) - = [       C]
       Use Final or Distance dependent cloud rise (F/D) (Complex
         terrain requires Final) ----------------------------------[F]
       Restrict calcs. to a clearing index greater than ------ [      ]
       Restrict calcs. to daytime hours {SR+1h to SS-1h} (N/Y)
        (requires longitude, latitude and time zone difference)---- [ ]
       Mass units (g,kg,mg,ug,lb,oz,tn,pa) -------------------- =  [ug]
       Length units (m,km,ft,yd,mi,etc.) ---------------------- =  [ m]
       Area units (square - m,km,ft,yd,mi,etc. or ac,he) ------ =  [ m]
       Volume units (cubic - m,km,etc. or li,ppm,ppb) --------- = [  m]
       Time units (s,mn,h) ------------------------------------ =  [ s]

 {PgDn or Enter for next menu}
```

```
33                          OBODM (Version 01.3)
                       PRINT AND AUXILIARY OPTIONS

 Print sum of sources only (S) or print subgroups of sources (G) (S/G) -- [S]
 Page column width (80/132) ------------------------------------------- [ 80]
 Print maximum plume rise height and distance (N/Y) --------------------- [N]
 File name of output Sigmaplot file ---------------- [                     ]

 Plume rise option for instantaneous sources (duration <= 15 s) (A/B) --  [A]
  (A) EITHER use stable rise for stable thermal stratification and
      adiabatic rise for unstable/neutral stratification.  Final rise
      for stable stratification is limited to the minimum of the two.
  (B) OR use stable rise for all thermal stratifications, where the vert.
      gradient of potential temp. is limited to >= 3.344E-4 (K/m).

 {PgDn or Enter for next menu}
```

```
34                          OBODM (Version 01.3)
                       PRINT AND AUXILIARY OPTIONS

 Use Detailed or Summary mode to save calculations (D/S) ---------------- [D]
 Print sum of sources only (S) or print subgroups of sources (G) (S/G) -- [S]
 Page column width (80/132) ------------------------------------------- [ 80]
 Print maximum plume rise height and distance (N/Y) --------------------- [N]
 File name of output Sigmaplot file ---------------- [                     ]
 Print table of highest and second highest values at each receptor (N/Y)- [N]
 Print table of maximum 50 values over all receptors (N/Y) -------------- [N]
 Number of hours N in each average, where:  N = [  ],[  ],[  ],[  ],[  ],[  ]
 Print table for each N hour period (avg. con.,etc. or total dep.) (N/Y)- [N]
 Print table of Seasonal or Quarterly average con. or total dep. (N/S/Q)- [N]
 Print table of Annual average con. or total dep. (N/A) ----------------- [N]
 Print hourly input meteorological data (N/Y) --------------------------- [N]
 Print hourly input source data (N/Y) ----------------------------------- [N]

 Plume rise option for instantaneous sources (duration <= 15 s) (A/B) --  [A]
  (A) EITHER use stable rise for stable thermal stratification and
      adiabatic rise for unstable/neutral stratification.  Final rise
      for stable stratification is limited to the minimum of the two.
  (B) OR use stable rise for all thermal stratifications, where the vert.
      gradient of potential temp. is limited to >= 3.344E-4 (K/m).

 {PgDn or Enter for next menu}
```

35 OBODM (Version 01.3)
PRINT SOURCE GROUPS

```
 {Enter source index numbers of sources you wish combined for output.  }
 {A pos. source index number includes one source.  A neg. index includes}
 {all sources from the previous pos. index up through the absolute value}
 {of the neg. index.  A negative index not preceded by a lesser pos.    }
 {index assumes one as the preceding index.  Separate each different    }
 {group by a blank field.  A maximum of 50 different groups may be      }
 {specified with a maximum of 100 source index numbers for all groups.  }
Source indices =[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
 {PgDn or Enter for next menu}
```

---

36 OBODM (Version 01.3)
PROGRAM CONTROL
{F3 returns to current menu}

Program options and parameter data required by the OBODM program are specified in various screen menus. The menus are organized as to the type of data required in the menu, such as source data or meteorological data. Access to the various menus is controlled through a main menu, where this main menu shows the various types of data required and whether or not data are present (SET/NONE/WARN/ERR). If SET or WARN is displayed for each data type in the main menu, the OBODM model may be executed. However, if NONE or ERR is displayed for any data type, the OBODM model may not be executed and the user must transfer to the respective data type menus to set or correct the data. Also, if WARN or ERR is displayed, a message concerning the warning or error has been written to the print output file. You must execute the OBODM model or specify a previously generated solution/graphics file prior to executing graphics. Input data for the different data types may be specified via optional input data files. These optional input data files were generated in a previous run of the OBODM program as output data save files. When the OBODM program is executed, a work file OBODWORK.OBD is created. This work file can also be used to initialize OBODM input data if the file exits in the user's directory.

{F2 for main menu, PgDn for next page}

37 OBODM (Version 01.3)

KEYBOARD CONTROL

KEY	ACTION	KEY	ACTION
Left Arrow	- Move cursor left.	F1	- Exit OBODM.
Right Arrow	- Move cursor right.	F2	- Return to main menu.
Up Arrow	- Move cursor up.	F3	- Return to current menu (from F4,F5,F6,F7).
Down Arrow	- Move cursor down.		
Right TAB	- Move to next data field.	F4	- Display program operation help menus.
Left TAB	- Move to prev. data field.		
DELete	- Delete current character.	F5	- Displays units abbrev.
INSert	- Insert after current char.	F6	- Displays fuel/explosive default data values.
Ctrl k or K	- Clear current data field.		
Page Up	- Go back to prev. menu.	F7	- Display OBOD files names.
Page Down	- Go to next menu. Data errors do not stop progress.	F8	- Skip remaining plot input data menus and go plot.
Enter/Return	- Same as Page Down, except data errors do not allow next page. Open files.	Ctrl C	- Interrupt program.
		ESC	- Same as F1, F2 or F3, depending on current menu.
Backspace	- Delete character to left of cursor.		
Home	- Go to first char of data field.		
End	- Go to last char of data field.		
Ctrl Home	- Go to first data field in menu.		
Ctrl End	- Go to last data field in menu.		

{PgUp for prev page, PgDn for next page}

---

38 OBODM (Version 01.3)

DATA FORMAT

{F3 returns to current menu}

A) INTERACTIVE DATA SCREEN MENUS -

Data values for both numeric and alphanumeric data are entered between the start and end brackets [] for the respective parameter. Values cannot overwrite the start bracket or the end bracket. Options for the parameter value are shown in parentheses (). If a value already appears within the start and end brackets, it is the default value. Numeric data may be entered as whole numbers 101, as decimal fractions 101.012 or in exponent form 1.01012E2. Leading or trailing blanks are allowed for both numeric and alphanumeric values, but numeric values must not contain imbedded blanks. Either upper or lower case letters can be used. Abbreviations for units must be strictly followed. In order to save entered data you must exit a menu via the PgDn or ENTER keys. Otherwise any entered data are lost. If the program detects data errors, the screen menu will be re-displayed if PgDn was typed. If ENTER was typed, PgDn is assumed, but if errors are detected, the menu is not redisplayed. However, when you return to the main menu, the data section will be flagged with ERR.

{PgUp for prev page, PgDn for next page}

39 OBODM (Version 01.3)
DATA FORMAT
{F3 returns to current menu}

B) FREE FIELD FORMAT INPUT HOURLY METEOROLOGICAL AND/OR SOURCE DATA -

The user specifies via interactive screen menu which meteorological or source variables are to be read from the input hourly data file(s). Also, the user specifies the relative position in the input record of the value for each input variable. There can be more values in the input record than variables being read. Only numeric data values can appear in the input data record. Input data values must be separated by a comma or a blank. Leading blanks are ignored. Two or more consecutive commas indicate one or more skipped or non-existent values. Multiple consecutive blanks are treated as one blank. Variables that have skipped over values due to multiple consecutive commas retain their previous value. If a blank precedes or follows a comma, the blank(s) is ignored. Numeric data values may be entered as whole numbers (101), decimal fractions (101.012) or in exponent form (1.01012E2), but must not contain imbedded blanks. If data errors are detected (data out of range or erroneous characters), a message is written to the print output file as to the nature of the error and where it occurred.

{PgUp for prev page, PgDn for next page}

---

40 OBODM (Version 01.3)
DATA FORMAT
{F3 returns to current menu}

C) FIXED FIELD FORMAT INPUT HOURLY METEOROLOGICAL AND/OR SOURCE DATA -

The user specifies via interactive screen menu which meteorological or source variables are to be read from the input hourly data file(s). Also, the user specifies the relative position in the input record of the value for each input variable and the format (FORTRAN edit codes) of the input data record. There can be more values in the input record than variables being read. Input data values must appear in the same field (data columns) in each input record. Leading and trailing blanks within an input field are ignored, but data must not contain imbedded blanks. Numeric data values may be entered as a whole number (101), decimal fraction (101.012) or in exponent form (1.01102E2), depending on the FORTRAN edit code specified for the data field. If data errors are detected (data out of range or erroneous characters), a message is written to the print output file as to the nature of the error and where it occurred.

{PgUp for prev page, PgDn for next page}

C) FIXED FIELD FORMAT INPUT HOURLY METEOROLOGICAL AND/OR SOURCE DATA (CONTINUED) -

The FORTRAN edit codes that can be used in the format specified for the input data records are shown below. Each code must be separated from the next by a COMMA.

Fw.d - Value is in whole number or decimal form and occupies a total of w columns with d digits as the fractional part. If the field contains a period (decimal point) it overrides the d value. If no period is used and there are fewer than d digits, zeros are appended to the left of the digits to form the fraction.

format	data record	variable value
F8.5	23456789	234.56789
F8.5	-1234.56	-1234.56
F8.5	1234E3	12.34

{PgUp for prev page, PgDn for next page}

C) FIXED FIELD FORMAT INPUT HOURLY METEOROLOGICAL AND/OR SOURCE DATA (CONTINUED) -

Fw.d - Continued.

format	data record	variable value
F8.5	1.2345E1	12.345
F8.0	1990	1990

Ew.d - Value is in exponent form and occupies a total of w columns with d digits as the fractional part.

format	data record	variable value
E9.3	734.432E3	734432.0
E12.4	1022.43E-6	1022.43E-6
E10.3	5.234	5.234

{PgUp for prev page, PgDn for next page}

C) FIXED FIELD FORMAT INPUT HOURLY METEOROLOGICAL AND/OR SOURCE DATA (CONTINUED) -

Gw.d - Value is either Fw.d or Ew.d format as shown above.

#X - Skip over the number of columns specified by #, # > 0.

T# - Position the column pointer at the column specified by #, # > 0.

TL# - Move the column pointer # columns to the left, # > 0.

TR# - Move the column pointer # columns to the right, # > 0.

#P - Multiply values read from the following fields by the power of ten specified by #. If the input field contains an exponent the scale factor P is ignored. Turn off the scale factor by a following 0P.

{PgUp for prev page, PgDn for next page}

C) FIXED FIELD FORMAT INPUT HOURLY METEOROLOGICAL AND/OR SOURCE DATA (CONTINUED) -

BN - Ignore all embedded or trailing blanks within a field (w columns). The effect is to remove the blanks and right justify the field.

BZ - Treat all embedded and trailing blanks within a field as zeros.

/ - Indicate end of record. If the input data for a single hour occupies more than one input record, the slash can be used to divide the variable values into multiple records. Do not precede or follow the slash with a comma. The FORTRAN edit codes between the slashes are unique to that record, except for edit codes P, BN and BZ.

{PgUp - prev page, F2 - main menu, PgDn - next page}

D) ISCST data file format "UNFORM"
These data are binary (unformatted) record blocks using four bytes per binary word. Record one contains: the surface station no.; surface year; upper air station no.; and upper air year. Records two through the end of data contain-

Parameter	Binary Word
Year	1
Month	2
Day	3
Stability class	4-27
Wind speed (m/s)	28-51
Air temperature (K)	52-75
Flow vector (deg) (dir. toward)	76-99
Randomized flow vector (deg)	100-123
Rural,Urban mixing height (m)	124-171

Each parameter from stability on down consists of 24 values, except mixing heights include both rural, urban (48) values.

{PgUp for prev page, PgDn for next page}

D) ISCST (continued) data file formats "FREE", "ASCII" and "CARD"
These files contain hourly ASCII records, where the first record contains:
the surface station no.; surface year; upper air station no.; upper air year (separate values by a blank).

Parameter	Format	Columns	(values in a "FREE" format are separate by at least one blank)
Year	I2	1-2	
Month (1-12)	I2	3-4	
Day (1-31)	I2	5-6	
Hour (0-23)	I2	7-8	
Flow vector (deg) (dir. toward)	F9.4	9-17	
Wind speed (m/s)	F9.4	18-26	
Air temp. (K)	F6.1	27-32	
Stability class (1-6)	I2	33-34	
Rural mixing height (m)	F7.1	35-41	
Urban mixing height (m)	F7.1	42-48	
Wind profile exponent	F8.4	49-56	("CARD" only)
Vert. pot. temp. grad. (K/m)	F8.4	57-64	("CARD" only)

{PgUp for prev page, PgDn for next page}

E) FIXED FIELD FORMAT TERRAIN DATA -

Terrain data used to plot contours of terrain. Values are right-justified in their respective field. This data file can also be used to input complex terrain in the receptor data section. The format is:

record	columns	contents
1	1-4	Number of X coordinates (NX) in the terrain data.
	5-8	Number of Y coordinates (NY) in the terrain data.
	9-10	Abbreviation for X,Y units, default = meters.
	11-12	Abbreviation for Z units, default = meters.
2 - I	1-80	X coordinates (west to east) in 8 column fields, ten fields per input record image (I = {(NX + 9)/10} + 1).
I+1 - J	1-80	Y coordinates (south to north) in 8 column fields, ten fields per input record image (J = {(NY + 9)/10} + I).
J+1 - K	1-80	Z terrain height data in 8 column fields, ten fields per input record image. Enter NX values for each Y coordinate 1 to NY. Start a new image for each Y coordinate (K = {(NX + 9)/10} * NY + J).

{} - means integer part

{PgUp for prev page, PgDn for next page}

F) FREE FIELD FORMAT DIGITIZED MAP DATA -

Map data are used to plot a background map. The first record in the file must contain the distance units abbreviation in columns 53 & 54; the rest of the record can contain any information. All remaining records identify map features to plot. Map features to be plotted are specified by a data record containing a special code (1-5) and map label. If the code is positive, the label is plotted to the right of the first X,Y coordinate entered for the feature. If negative, the label is plotted to the left. This map code record is immediately followed by one or more records containing the X,Y coordinates of points defining the feature to be plotted. The special map codes are:

1 - Geographic boundary, such as a coastline, body of water, mountain range, etc. The accompanying label is not plotted, but must be present.
2 - Political boundary, such as a city, county, government installation, etc. This label is plotted.
3 - Roads or highways. The label is not plotted, but must be present.
4 - Special sites, such as buildings, data sites, etc. This label is plotted.
5 - Air-field. This label is plotted.

{PgUp for prev page, PgDn for next page}

F) FREE FIELD FORMAT DIGITIZED MAP DATA (CONTINUED) -

The special code identifying the feature to be plotted is entered on the input record image, followed by a blank, followed by the label. A maximum of 20 characters are used from the label. The X,Y coordinate pairs defining the map feature are entered on the next record image(s) with up to 4 X,Y pairs (8 values) per input image. Values must be separated by a comma or a blank. For closed features, the first X,Y point must equal the last. For discontinuous features, use multiple code and X,Y pair record groups to define each continuous segment.

G) PLOT OUTPUT DATA FILE -

This file is intended for use with other programs or processes and is not further processed by OBODM. Multiple plots are stacked on this file in the order of generation. The format and contents are shown on the next page.

{PgUp for prev page, PgDn for next page}

G) PLOT OUTPUT DATA FILE (CONTINUED) - (^ means blank character)

record	columns	format	contents
1	1-2	2a1	^S (blank followed by S for start).
	3-10	f8.4	Number of inches in horizontal X plot dimension.
	11-18	f8.4	Number of inches in vertical Y plot dimension.
	19-22	i4	Plot number.
2	1-50	50a1	Plot title.
N	1-2	2a1	^P (blank followed by P for plot point).
	3-10	f8.4	X coordinate to move pen to.
	11-18	f8.4	Y coordinate to move pen to.
	19-20	i2	Pen up/down, 2=down, 3=up, neg.=new origin.
	21-22	i2	Color index - 1=black, 2=blue, 3=green, 4=cyan, 5=red, 6=magenta, 7=yellow, 8=dk-white, 9=gray, 10=lt-blue, 11=lt-green, 12=lt-cyan, 13=lt-red, 14=lt-magenta, 15=lt-yellow.
M	1-9	9a1	^END PLOT (blank followed by END PLOT).

{PgUp for prev page, PgDn for next page}

51

OBODM (Version 01.3)
QUANTITIES CALCULATED
{Use F3 to return to current menu}

Peak-Concentration - Maximum instantaneous quantity of pollutant/species material in mass per unit volume of air.

Dosage - Time-integrated concentration of pollutant/species material in mass-time per unit volume of air.

Time-Average Concentration - Concentration averaged over a user specified time interval (<= 3600 sec) in mass per unit volume of air.

Gravitational Deposition - Ground level total accumulation of material in mass per unit area due to the gravitational settling of pollutant/species material. If dosage, con. or other quantity is calculated along with grav. deposition, then the other quantities are depleted due to the gravitational settling of particles.

The mode used to save hourly or N-hour average dispersion calculations is set via the print and auxiliary options menu. The detailed mode (D) saves each calculated hour for each source on disk to be retrieved for printing or plotting desired averages and source combinations. A maximum of 1 year of data (8784 hours) is allowed. The summary (S) mode saves only final averages on disk. These include: seasonal (quarterly), annual, maximum-50, highest and second highest averages. Source grouping must be specified in the print and auxiliary options menu. Up to 6 averaging times can be specified for each source group. An unlimited number of hours is allowed under the summary mode.

{pgUp for prev page, PgDn for next page}

52

OBODM (Version 01.3)
UNITS ABBREVIATIONS
{F3 returns to current menu}

length: {m}=meters, {km}=kilometers, {ft}=feet, {yd}=yards, {mi}=miles, {cm}=centimeters, {mm}=millimeters, {um}=micrometers, {in}=inches.

mass: {g}=gram, {kg}=kilogram, {lb}=pound, {oz}=ounce, {tn}=ton, {mg}=milligram, {ug}=microgram, {pa}=particles.

time: {s}=second, {mn}=minute, {h}=hour, {std}=standard time, {dst}=daylight savings time.

heat: {ca}=calorie, {kc}=kilocalorie, {btu}=British thermal unit, {J}=joule, {e}=erg.

temperature: {C}=Celsius, {K}=Kelvin, {F}=Fahrenheit, {Ra}=Rankine.

direction: {d}=degrees, {r}=radian.

velocity: {kts}=knots or {m/s},{ft/s},{mi/h},etc.=length/time.

pressure: {mb}=millibars, {P}=Pascals, {inhg}=inches Hg, {mmhg}=millimeters Hg.

area: square length or {ac}=acre, {he}=hectare.

volume: cubic length or {li}=liter, {ppm}=parts per million, {ppb}=parts per billion, {ppt}=parts per trillion.

{PgUp or F2 for main menu, PgDn for next page}

53 OBODM (Version 01.3)
UNITS EQUIVALENTS
{F3 returns to current menu}

```
      length: km = 1000 m, m = 3.280833 ft, yd = 3 ft, mi = 5280 ft,
              mi = 1.609347 km
        mass: kg = 1000 g, lb = 453.5923 g, oz = 28.3495 g, tn = 2000 lb,
              tn = 907.1846 kg
        time: h = 60 mn, h = 3600 s
        heat: kc = 1000 ca, ca = 4.18605 J, btu = 251.996 ca, e = 1.0E7 J
 temperature: K = C+273.15, Ra = (9/5) K, C = (5/9)(F-32)
   direction: r = (pi/180) d
        area: ac = 43560 ft**2 = 4046.856 m**2 = 0.404687 he,
              he = 10000 m**2 = 107638.7 ft**2 = 2.47104 ac
      volume: li = 10 cm**3, ppm = 1000 ppb, ppt = 1.0E-3 ppb,
              ppb = (con*22.4*1013.25*temp)/(273.15*press*molwt)
              where: temp = deg K, press = mb, molwt = g/g-mole and
                     con = concentration in g/m**2
```

{PgUp for prev page, PgDn for next page}

---

54 OBODM (Version 01.3)
FUELS AND EXPLOSIVES
{F3 returns to current menu}
{place cursor on fuel/explosive, press ENTER for pollutant/species display}

FUEL/EXPLOSIVE		HEAT CONTENT (ca/g)	BURN RATE (g/s)
20mm HEI Cartridge	[ ]	{1000.0 }	{1.0 }
40mm HEI Cartridge	[ ]	{1000.0 }	{1.0 }
Amatol (50% TNT, 50% Ammn. Nitrate)	[ ]	{836.0 }	{1.0 }
Claymore Mine, M18A1	[ ]	{1000.0 }	{1.0 }
Composition B (56/38/6 RDX-TNT-WAX)	[ ]	{1319.0 }	{1.0 }
Diesel and Dunnage	[ ]	{1000.0 }	{1.0 }
Double Base (50% nitrocellulose)	[ ]	{1020.0 }	{1.0 }
Explosive D (ammonium picrate)	[ ]	{800.0 }	{1.0 }
Flare, Cntermeas., Aircraft, M206	[ ]	{1000.0 }	{1.0 }
Fuze, Inertiam Tail, Bomb, FMU 54A/B	[ ]	{1000.0 }	{1.0 }
Fuze, Bomb, Tail, FMU 139A/B	[ ]	{1000.0 }	{1.0 }
GGU-2/A Gas prss Prop. Act. Gen.	[ ]	{1000.0 }	{1.0 }

{PgUp for prev menu, PgDn for next menu} {Entr - to select}

```
55                          OBODM (Version 01.3)

                            POLLUTANT/SPECIES
  {Position cursor on desired species and press ENTER for default values}

 1,2,4-Trimethylbenzene              [ ]-Mol. wt. (g/mol) = {120.2          }
     Density (g/cm**3) = {0.8758         }, Half-life (h) = {Infinite       }
     Species emission factor (mass species/mass fuel) --- = {8.24E-06       }
 1,2,4-Trimethylbenzene & sec-Butylbe[ ]-Mol. wt. (g/mol) = {120.2          }
     Density (g/cm**3) = {0.8758         }, Half-life (h) = {Infinite       }
     Species emission factor (mass species/mass fuel) --- = {2.36E-05       }
 1,3,5-Trimethylbenzene              [ ]-Mol. wt. (g/mol) = {120.2          }
     Density (g/cm**3) = {0.8758         }, Half-life (h) = {Infinite       }
     Species emission factor (mass species/mass fuel) --- = {6.77E-06       }
 1,3,5-Trinitrobenzeneoxide)         [ ]-Mol. wt. (g/mol) = {213.1          }
     Density (g/cm**3) = {1.4775         }, Half-life (h) = {9360.0         }
     Species emission factor (mass species/mass fuel) --- = {3.70E-07       }
 1,3-Butadiene                       [ ]-Mol. wt. (g/mol) = {54.1           }
     Density (g/cm**3) = {0.6211         }, Half-life (h) = {Infinite       }
     Species emission factor (mass species/mass fuel) --- = {9.27E-06       }
 1-Butene                            [ ]-Mol. wt. (g/mol) = {56.1           }
     Density (g/cm**3) = {0.5951         }, Half-life (h) = {Infinite       }
     Species emission factor (mass species/mass fuel) --- = {3.78E-05       }

 {PgUp for prev menu, PgDn for next menu}                  {Entr - to select}
```

```
56                          OBODM (Version 01.3)
                   CURRENT DATA FILES ON DEFAULT DIRECTORY

 {Under INPUT DATA FILES type G to get data from the file, type S to save }
 {data to the file or type B for both get and save.  Under PRINT OUTPUT   }
 {and SOLUTION DATA FILES G,S or B will select the file.  First type G,S, }
 {or B for the respective files.  Second type or click Entr to select the }
 {files.  Last type F3 or click Rtrn to move file names to data file menu.}

    INPUT DATA FILES        PRINT OUTPUT FILES       SOLUTION DATA FILES
------------------------- ------------------------- -------------------------
          EXAMPLE1.INP[ ]           EXAMPLE1.OUT[ ]           EXAMPLE1.SOL[ ]
          EXAMPLE2.INP[ ]           EXAMPLE2.OUT[ ]           EXAMPLE2.SOL[ ]
                      [ ]                       [ ]                       [ ]
                      [ ]                       [ ]                       [ ]
                      [ ]                       [ ]                       [ ]
                      [ ]                       [ ]                       [ ]
                      [ ]                       [ ]                       [ ]
                      [ ]                       [ ]                       [ ]
                      [ ]                       [ ]                       [ ]
                      [ ]                       [ ]                       [ ]
                      [ ]                       [ ]                       [ ]
                      [ ]                       [ ]                       [ ]

 {PgUp for prev menu, PgDn for next menu}   {When files are set - Rtrn or F3}
```

```
57                          OBODM (Version 01.3)
                                  GRAPHICS

 Produce hard copy on (A/B/C...) ---------------------------------------- [ ]
   A) HP Laserjet xx                      B) HP RuggedWriter (HP mode)
   C) IBM Proprinter                      D) Epson FX
   E) Epson LQ                            F) Alps P2400C
   G) IBM XL24 AGM                        H) OKIDATA
   I) Canon BJ200e                        J) HP7475A Hewlett Packard plotter.
   K) DEC Inkjet
   L) Plot data output file name (X,Y data) -------- [                      ]



 Terrain input data file name ---------------------- [                      ]

 Digitized map input data file name ---------------- [                      ]

 Type of PC graphics board (normally set by prog.) (CGA,EGA,VGA) -------- [ ]
 Number of pixels in horizontal screen axis (normally set by prog) -- [     ]
 Number of pixels in vertical screen axis (normally set by prog) ---- [     ]



 {PgDn or Enter for next menu}
```

```
58                          OBODM (Version 01.3)
                                  GRAPHICS

 Printer number (A/B/C/D/E/F) ------------------------------------------ [A]
    A) Print Port 1 (LPT1)  B) Print Port 2 (LPT2)  C) Print Port 3 (LPT3)
    D) File (OBP#####.PLT)  E) COM Port 1           F) COM Port 2
    COM or Print Port number if not given above, also set A or E above
    to indicate whether an LPT port (A) or COM port (E) ---------------- [  ]
 Paper size
    width (horizontal inches) (plotting width is 0.5 inches less) --- [     ]
    length (vertical inches) (plotting length is 1.5 inches less) --- [     ]

 Additional paper margins in inches (added to CRT margins) (default = 0)
    Left ------------------------------------------------------------ [       ]
    Right ----------------------------------------------------------- [       ]

    Bottom ---------------------------------------------------------- [       ]
    Top ------------------------------------------------------------- [       ]

 Color (N/Y) ------------------------------------------------------------[N]
 Plot orientation (A/B) -------------------------------------------------[A]
    A) X is horizontal, Y is vertical (portrait).
    B) X is vertical, Y is horizonal (landscape).

 {PgDn or Enter for next menu}
```

```
59                          OBODM (Version 01.3)
                                  GRAPHICS

 Select quantity to be plotted (A/B/C/D/E/F) ---------------------------- [ ]

          Quantity                Calculated
   ------------------------------  ----------
   A - Dosage                        {   }
   B - Concentration                 {   }
   C - Time-average concentration    {   }
   D - Gravitational deposition      {   }
   E - None, terminate graphics


 Plot Sum of sources or a source Group combination (S/G) ---------------- [ ]

 Scale/adjustment factor - Cscale * xxxxx + Dscale.  All concentration,
 dosage, etc. calculations xxxxx are multiplied by Cscale and then added
 to Dscale.  For example, Cscale may be a percent conversion to another
 pollutant species, Dscale may be background.  Make sure Dscale is in
 the same units as specified in the initial run.
 Cscale ------------------------------------------------------- [            ]
 Dscale ------------------------------------------------------- [            ]

{PgDn or Enter for next menu}
```

```
60                          OBODM (Version 01.3)
                             PLOT SOURCE GROUP
  {Enter source index numbers of sources you wish combined for output.  }
  {A positive source index number includes one source.  A negative index}
  {includes all sources from the previous positive index up through the }
  {absolute value of the negative index.  A negative index not preceded }
  {by a lesser positive index assumes one as the preceding index.  Only }
  {one source group may be entered.                                     }

 Source indices =[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                 [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                 [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                 [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                 [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                 [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                 [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                 [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                 [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                 [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                 [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                 [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                 [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                 [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
                 [   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ],[   ]
 {PgDn or Enter for next menu}
```

```
61                          OBODM (Version 01.3)
                                  GRAPHICS

 Plot contents (A and/or B) ---------------------------------------- [A],[ ]
  A) Distance versus    quantity
  B) Special symbols at specified points.




 For hourly meteorological data only -
   Plot which calculation {A/B/C/D/E/F} ---------------------------------- [ ]
   A) Plot single N-hour event.         B) Plot seasonal average or total.
   C) Plot quarterly average or total.  D) Plot annual average or total.
   E) Plot highest for N-hour average.  F) Plot second highest values for
                                           N-hour average.
   For A), E) or F), enter number of hours in average (N-hour). -------- [  ]

   For A), enter the start date time (YYMMDDHH or YYJJJHH) or sequential
     hour number (1,2,3,...,8784). -OR-
   For B) or C), seasonal or quarterly, enter the season or quarter
     number (1,2,3,4). ------------------------------------------- [        ]

 {PgDn or Enter for next menu}
```

```
62                          OBODM (Version 01.3)
                                  GRAPHICS
 Plot contents {A/(BorC)/D/(EorF)/G} -(max of 5 options)- [E],[ ],[ ],[ ],[ ]
  A) Line of maximum terrain.
  B) Contours of actual terrain heights.
  C) Contours of log of terrain heights.
  D) Line of maximum    quantity
  E) Isopleths using actual values of    quantity
  F) Isopleths using log of values of    quantity
  G) Special symbols at specified points.

 For hourly meteorological data only -
   Plot which calculation {A/B/C/D/E/F} ---------------------------------- [ ]
   A) Plot single N-hour event.         B) Plot seasonal average or total.
   C) Plot quarterly average or total.  D) Plot annual average or total.
   E) Plot highest for N-hour average.  F) Plot second highest values for
                                           N-hour average.
   For A), E) or F), enter number of hours in average (N-hour). -------- [  ]

   For A), enter the start date time (YYMMDDHH or YYJJJHH) or sequential
     hour number (1,2,3,...,8784). -OR-
   For B) or C), seasonal or quarterly, enter the season or quarter
     number (1,2,3,4). ------------------------------------------- [        ]

 {PgDn or Enter for next menu}
```

63 OBODM (Version 01.3)
PLOT SPECIAL SYMBOLS

symbol number	X (m) coordinate	Y (m) coordinate	symbol ht. (in)	symbol angle	symbol code #	Rect./Polar coord.(R/P)
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

{symbol code: 1=box (+ line cntr to top rt crnr), 2=box (box 1 + crnrs rmvd)}
{3=triangle (+ line cntr to top cntr), 4=+, 5=X, 6=diamond (+ line cntr to }
{top cntr), 7=up arrow, 8=X (+ line cnectg upr ends), 9=Z (+mid-horiz line),}
{10=Y, 11=box (+ diag lines out frm crnrs), 12=*, 13=hourglass, 14=circle }
{+ mid-vert line), 15=flag (+ pole) }

{PgDn or Enter for next menu}

---

64 OBODM (Version 01.3)
CONTOUR/ISOPLETH LEVELS

{Max. value = , Min. value = *quantity* }

[ ],[	],[	],[	],[	]
[ ],[	],[	],[	],[	]
[ ],[	],[	],[	],[	]
[ ],[	],[	],[	],[	]

{PgDn or Enter for next menu}

```
65                          OBODM (Version 01.3)
                        PLOT AXES LABELS AND LEGEND

 Y axis label- [                                                        ]

 X axis label- [                                                        ]

                 {indicate end of legend line by $ and end of legend by $$}

 Legend label- [                                                        ]
               [                                                        ]
               [                                                        ]
               [                                                        ]
               [                                                        ]
               [                                                        ]

 Do you wish to specify plot dimensions, scale, etc.? (N/Y) ------------- [N]



 {PgDn or Enter for details menu (Y) or plot (N)}
```

```
66                          OBODM (Version 01.3)
                                PLOT DETAILS
 Log/linear axes          - A) LINEAR X,Y          B) LOG X, LINEAR Y ----- [ ]
                            C) LINEAR X, LOG Y     D) LOG X,Y
 Indicate north           - A) DO NOT INDICATE NORTH ---------------------- [ ]
                            B) USE ARROW WITH N AT BASE
 Plot background map      - A) NO BACKGROUND MAP PLOTTED ------------------ [ ]
                            B) PLOT BACKGROUND MAP IN BLACK/WHITE
                            C) PLOT BACKGROUND MAP IN COLOR
 Axes, coordinates        - A) PLOT AXES AND LABEL GRID COORDINATES ------- [ ]
                            B) ONLY LABEL GRID COORDINATES
                            C) NEITHER AXES OR GRID COORDINATE LABELS
 Horizontal, vertical     - A) X,Y ARE HORIZONTAL,VERTICAL AXES ----------- [ ]
 axes orientation           B) X,Y ARE VERTICAL,HORIZONTAL AXES
 Smooth or point to       - A) SMOOTH CURVES ------------------------------ [ ]
 point curves               B) JOIN POINTS WITH STRAIGHT LINES
 Left justify or center   - A) CENTER ALL LINES --------------------------- [ ]
 each legend line           B) CENTER ACCORDING TO LONGEST LINE AND LEFT
                               JUSTIFY OTHER LINES
 Tick marks or axis to    - A) PLOT MINOR AND MAJOR TIC-------------------- [ ]
 axis lines                 B) PLOT MINOR TICK MARKS AND JOIN OPPOSITE AXES
                               AT MAJOR TICKS WITH SOLID LINE

 {PgDn or Enter for next menu, F8 starts plot}
```

```
67                          OBODM (Version 01.3)
                                PLOT DETAILS


                             LINE TYPE OPTION

   quantity    as a function of distance curve ------------------------- [ ]

 Line of maximum TERRAIN curve ---------------------------------------- [ ]
 Line of maximum    quantity    curve ----------------------------------- [ ]

 TERRAIN contour levels ------------- [ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ]
                                      [ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ]
     quantity   isopleth levels ----- [ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ]
                                      [ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ]

    {A) SOLID, B) DASHED, C) DOTTED, D) DASH-DOT, E) DASH-2 DOTS,      }
    {F) DASH-3 DOTS, G) DASH-4 DOTS, H) DASH-5 DOTS ... P) DASH-13 DOTS}




 {PgDn or Enter for next menu, F8 starts plot}
```

```
68                          OBODM (Version 01.3)
                                PLOT DETAILS
                               COLOR OPTIONS
 Plot background ------------------------------------------------------- [ ]
 Plot axes and labels -------------------------------------------------- [ ]
     quantity   as a function of distance curve ------------------------- [ ]
 Line of maximum TERRAIN curve ---------------------------------------- [ ]
 Line of maximum     quantity   curve ----------------------------------- [ ]

 TERRAIN contour levels ------------- [ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ]
                                      [ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ]
     quantity   isopleth levels ----- [ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ]
                                      [ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ]

 Special symbols -------------------- [ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ]
                                      [ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ]
                                      [ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ]
                                      [ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ]
                                      [ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ],[ ]

       A=black, B=blue, C=green, D=cyan, E=red, F=magenta, G=yellow,
       H=dk-white, I=gray, J=lt-blue, K=lt-green, L=lt-cyan, M=lt-red,
       N=lt-magenta, O=lt-yellow, P=lt-white.

 {PgDn or Enter for next menu, F8 starts plot}
```

```
69                          OBODM (Version 01.3)
                                PLOT DETAILS
 Plot grid coordinate positions ---------------------------------------- [ ]
    A) Grid coordinate positions are indicated only on axes
    B) Internal grid coordinate positions are indicated by a PLUS symbol
 Label     quantity   isopleth lines ------------------------------------ [ ]
    A) Label each isopleth with actual numeric value
    B) Label each isopleth with the indices A,B,C, etc.
    C) Label each isopleth with the indices 1,2,3, etc.
    D) Do not label isopleths
 Legend of indices for    quantity    isopleth levels ------------------- [ ]
    A) Plot legend showing isopleth values of indices
    B) Do not plot legend of indices
 Placement of legend of indices for    quantity    isopleth levels ------ [ ]
    A) Upper right corner inside of plot axes
    B) Upper left corner inside of plot axes
    C) Lower left corner inside of plot axes
    D) Lower right corner inside of plot axes
    E) Top right margin         Warning: for E,F,G & H the legend may
    F) Top left margin                   be relocated or eliminated if
    G) Bottom left margin                the margin is not big enough.
    H) Bottom right margin
    Note: Options A through H require room to place the legend.

 {PgDn or Enter for next menu, F8 starts plot}
```

```
70                          OBODM (Version 01.3)
                                PLOT DETAILS

 Label terrain contour lines ------------------------------------------- [ ]
    A) Label each contour with actual numeric value
    B) Label each contour with the indices A,B,C, etc.
    C) Label each contour with the indices 1,2,3, etc.
    D) Do not label contours
 Legend of indices for terrain contour levels -------------------------- [ ]
    A) Plot legend showing contour values of indices
    B) Do not plot legend of indices
 Placement of legend of indices for terrain contour levels ------------- [ ]
    A) Upper right corner inside of plot axes
    B) Upper left corner inside of plot axes
    C) Lower left corner inside of plot axes
    D) Lower right corner inside of plot axes
    E) Top right margin
    F) Top left margin
    G) Bottom left margin
    H) Bottom right margin
    Note: Options A through H require room to place the legend.


 {PgDn or Enter for next menu, F8 starts plot}
```

```
71                          OBODM (Version 01.3)
                                PLOT DETAILS


 Total X and Y plot dimensions (inches) --- X=[            ],Y=[            ]
 Margins (inches) --------------------- X left  =[       ], X right=[       ]
                                        Y bottom=[       ], Y top  =[       ]
 Axes MIN/MAX (X,Y units) ------- MIN. X=[            ],MIN. Y=[            ]
 (if log, use min/max power of 10)MAX. X=[            ],MAX. Y=[            ]
 Axes scale (inches/ X,Y units) ---------- X=[            ], Y=[            ]
 Height of axis label and legend characters (inches) ----------- = [        ]
 Height of axis coordinate numbers (inches) --------------------- = [        ]
 Height of special symbols (inches) ---------------------------- = [        ]
 Increment between minor tick marks (X,Y units) X=[          ],Y=[          ]
 Number of digits to right of decimal for coordinate numbers -- X=[  ],Y=[  ]

 {PgDn or Enter starts plot}
```

```
72                          OBODM (Version 01.3)
                 OPEN BURN/OPEN DETONATION DISPERSION MODEL

                                   SETUP

  Use Left or Right justification for editing data fields (L/R) --------- [L]

  Text background color (A/B/C...H) ------------------------------------- [B]
  Data field background color (A/B/C...H) ------------------------------  [H]
  Text foreground color (A/B/C...H) ------------------------------------- [E]

      A - black       B - blue        C - green       D - cyan
      E - red         F - magenta     G - yellow      H - white

  Data field foreground color (A/B/C...O) ------------------------------  [O]

      A - black       B - blue        C - green       D- cyan
      E - red         F - magenta     G - yellow      H - white
      I - grey        J - lt. blue    K - lt. green   L - lt. cyan
      M - light red   N - lt. magenta O - lt. yellow


{F4 for help, PgDn or Enter for next menu}
```

```
73                          OBODM (Version 01.3)
                        PRINT AND AUXILIARY OPTIONS

 Print sum of sources only (S) or print subgroups of sources (G) (S/G) -- [ ]
 Page column width (80/132) ------------------------------------------- [ 80]

 Heading --------------- [                                                ]

 Scale/adjustment factor - Ascale * xxxxx + Bscale.  All concentration,
 dosage, etc. calculations xxxxx are multiplied by Ascale and then added
 to Bscale.  For example, Ascale may be a percent conversion to another
 pollutant species, Bscale may be background.  Make sure Bscale is in
 the same units as specified in the initial run.
 Ascale ------------------------------------------------------ [            ]
 Bscale ------------------------------------------------------ [            ]

 {PgDn or Enter for next menu}
```

```
74                          OBODM (Version 01.3)
                        PRINT AND AUXILIARY OPTIONS

 Print sum of sources only (S) or print subgroups of sources (G) (S/G) -- [ ]
 Page column width (80/132) ------------------------------------------- [ 80]
 Print table of highest and second highest at each receptor (N/Y) ------- [ ]
 Print table of maximum 50 receptors (N/Y) ------------------------------ [ ]
 Number of hours N in each average, where:  N = [  ],[  ],[  ],[  ],[  ],[  ]
 Print table for each N hour averaging period (con, dep, etc.) (N/Y) -----[ ]
 Print table of Seasonal or Quarterly average con. or total dep. (N/S/Q)- [ ]
 Print table of Annual average con. or total dep. (N/A) ----------------- [ ]

 Heading --------------- [                                                ]

 Scale/adjustment factor - Ascale * xxxxx + Bscale.  All concentration,
 dosage, etc. calculations xxxxx are multiplied by Ascale and then added
 to Bscale.  For example, Ascale may be a percent conversion to another
 pollutant species, Bscale may be background.  Make sure Bscale is in
 the same units as specified in the initial run.
 Ascale ------------------------------------------------------ [            ]
 Bscale ------------------------------------------------------ [            ]

 {PgDn or Enter for next menu}
```

```
75                          OBODM (Version 01.3)
                                  GRAPHICS

 Plot contents (A and/or B) ---------------------------------------- [A],[ ]
  A) Distance versus    quantity
  B) Special symbols at specified points.




 For hourly meteorological data only -
   Plot which calculation {B/C/D/E/F} ------------------------------------ [ ]
   B) Plot seasonal average or total.   C) Plot quarterly average or total.
   D) Plot annual average or total.     E) Plot highest for N-hour average.
   F) Plot second highest values for
      N-hour average.

   For E) or F), enter number of hours in average (  /  /  /  /  /  )
     (select from N-hour options shown). ------------------------------- [  ]

   For B) or C), seasonal or quarterly, enter the season or quarter
     number (1,2,3,4). ------------------------------------------- [        ]

 {PgDn or Enter for next menu}
```

```
76                          OBODM (Version 01.3)
                                  GRAPHICS
 Plot contents {A/(BorC)/D/(EorF)/G} -(max of 5 options)- [E],[ ],[ ],[ ],[ ]
  A) Line of maximum terrain.
  B) Contours of actual terrain heights.
  C) Contours of log of terrain heights.
  D) Line of maximum    quantity
  E) Isopleths using actual values of    quantity
  F) Isopleths using log of values of    quantity
  G) Special symbols at specified points.

 For hourly meteorological data only -
   Plot which calculation {B/C/D/E/F} ------------------------------------ [ ]
   B) Plot seasonal average or total.   C) Plot quarterly average or total.
   D) Plot annual average or total.     E) Plot highest for N-hour average.
   F) Plot second highest values for
      N-hour average.

   For E) or F), enter number of hours in average (  /  /  /  /  /  )
     (select from N-hour options shown). ------------------------------- [  ]

   For B) or C), seasonal or quarterly, enter the season or quarter
     number (1,2,3,4). ------------------------------------------- [        ]

 {PgDn or Enter for next menu}
```

```
77                          OBODM (Version 01.3)
                             PLOT SOURCE GROUP
 Enter the number of the source group to plot  or  N to display the next
 set of groups  or  P to display the previous set of groups  or a negative
 number to specify the first group to be redisplayed below ------------ [   ]

 Group
 Option                     Sources Within Group
 ---------------------------------------------------------------------
  01) - (  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  )
      - (  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  )
      - (  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  )
  02) - (  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  )
      - (  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  )
      - (  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  )
  03) - (  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  )
      - (  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  )
      - (  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  )
  04) - (  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  )
      - (  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  )
      - (  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  )
  05) - (  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  )
      - (  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  )
      - (  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  ,  )
 {PgDn or Enter for next menu}
```

```
78                          OBODM (Version 01.3)
                       PRINT AND AUXILIARY OPTIONS

 Page column width (80/132) ------------------------------------------ [ 80]
 Print table of highest and second highest at each receptor (N/Y) ------- [ ]
 Print table of maximum 50 receptors (N/Y) ----------------------------- [ ]
 Number of hours N in each average, select from - (  /  /  /  /  /  )
   ------------------------------------------- [  ],[  ],[  ],[  ],[  ],[  ]
 Print table of Seasonal or Quarterly average con. or total dep. (N/S/Q)- [ ]
 Print table of Annual average con. or total dep. (N/A) ---------------- [ ]

 Heading --------------- [                                                ]

 Scale/adjustment factor - Ascale * xxxxx + Bscale.  All concentration,
 dosage, etc. calculations xxxxx are multiplied by Ascale and then added
 to Bscale.  For example, Ascale may be a percent conversion to another
 pollutant species, Bscale may be background.  Make sure Bscale is in
 the same units as specified in the initial run.
 Ascale ------------------------------------------------------ [            ]
 Bscale ------------------------------------------------------ [            ]



 {PgDn or Enter for next menu}
```

APPENDIX B. EXAMPLE OBODM RUNS

Table 1

- Program Input Data -

- Program Models Selected -

- Concentration
- Using final cloud rise ht. for all calc. distances.
- Flat terrain is assumed.
- Grid system origin is not added to source rectangular coordinates
- Instantaneous sources can use both stable and adiabatic plume rise.
- Grid receptor system is ----------Rectangular

- Print Output Options -

- Print and save data using Detailed processing mode
- Print concentration output units ---------- Micrograms/Cubic Meter

- Receptor Grid System Geometry -

Grid system orientation angle (Degrees) ---------- .0
Receptor X coordinate units ---------- Meters
Y coordinate units ---------- Meters
Z coordinate units ---------- Meters
X origin ---------- .00
Y origin ---------- .00
X Axis of the grid system (Meters)---------- 10000.00,
Y Axis of the grid system (Meters)---------- .00,

- Source Geometry/Emission Strength -

Material or fuel/explosive ---------- TNT (2,4,6-Trinitrotoluene)
Pollutant/species ---------- Carbon Dioxide
Total number of sources ---------- 1

Source Number	Ident	Reference System	Source Type	Emission Type
1	TNT only source	Rectangular	Volume	Instantaneous

Source Number	X Coordinate	Y Coordinate	Z Elevation	Release Height	Emission Strength
1	.0 m	.0 m	.0 m	7.9~ m	5.00000E+02 lb

~ Means the value is defaulted for each hour of met. data.

Source Number	Rect. Expan. Crosswind	Dist. / Vertical/Crosswind	Reference Dist. Vertical/	/Air Entrain-/Dispersion Coeff. ment Coeff.	/Crosswind	Vertical
1	50.00 m	50.00 m	.00 m	.00 m	.640	1.000	1.000

Table 1 (cont.)

- Program Input Data -

- Source Geometry/Emission Strength -

Source Number	Fuel Heat Content	Fuel Burn Rate	Fuel Burn Time	Initial Diameter
1	925.0 ca/g	90718.48 g/s	2.5 s	15.74~ m

~ Means the value is defaulted for each hour of met. data.

- Pollutant/Species Material Characteristics -

Pollutant/species name	Carbon Dioxide
Pollutant/species is	Gaseous
Particle material half-life	infinite
Molecular weight (g/g-mol)	44.0
Density of species (g/cm**3)	.002
Fraction of exhaust cloud constituting pollutant/species	1.28

- Meteorological Data -
([#-#] min-max limits)

Year [1900-2099]	1996
Month [1-12]	1
Day [1-31]	18
Hour (STD) [00-23]	0800
Minute	0
Julian day [1- 1]	18
Surface pressure (mb) [600.0-1100.0]	870.00
Cloud cover (8ths) [0-8]	.00
Cloud ceiling (m) [.0-20000.0]	9999.00
Net radiation index [-2- 4]	2.
Pasquill stability category [A-F]	C
Wind speed reference height (m)	10.00
Surface roughness length (cm) [.00-100.00]	.000
Vertical grad. of pot. temp. (C/m) [-5.000- 5.000]	.0

Table 1 (cont.)

- Program Input Data -

- Meteorological Data -
([#-#] min-max limits)

```
Reference wind speed (  m/s) [  1.0- 50.0]-------------------------  2.000
Minimum (at 2m) wind speed (m/s) ----------------------------------  1.450
Air temperature ( C) [-60.0- 60.0]--------------------------------   20.000
Standard dev. of wind direction angle ( d) [ 1.0000-80.0000]------  16.0000
Standard dev. wind elevation angle ( d) [ 1.0000-50.0000]---------   6.0000
Longitudinal turbulence intensity ( d) [ 1.0000-106.4000]---------  21.2800
Measurement time for std. dev. wind dir. angle ( s) [ 2.5-3600.0]-   600.00
Air humidity (%) (  .0-100.0)---------------------------------------  50.0
Surface mixing layer height ( m) [ 1.0-20000.0]------------------   1200.00
Wind direction (from) (deg) [    .0- 360.0]------------------------   270.0
Wind-direction shear (  d/m) [ -45.0-  45.0]-----------------------     .00
Wind-speed power law exponent [ .000-5.000]------------------------      .2
Wind-speed shear (  m/s) [   .00- 20.00]--------------------------- Compute
```

- Input/Output Files Used -

```
Input save data file name ------------------------------------ EXAMPLE1.INP
Print solution output file name ------------------------------ EXAMPLE1.OUT
Graphics/solution input/output file -------------------------- EXAMPLE1.SOL
```

Table 2
Carbon Dioxide Peak Concentration (Micrograms/Cubic Meter)

```
                              - X Axis  (Meters)  -
                  10000.000
 Y Axis   (Meters)            -       Concentration        -
             ----------------------------------------------------

          .000   6.16226
```

Elapsed run time = 0 hours, 1.17 minutes.

*** end of OBODM ***

Table 1

- Program Input Data -

- Program Models Selected -

- Dosage
- Using final cloud rise ht. for all calc. distances.
- Flat terrain is assumed.
- Grid system origin is not added to source rectangular coordinates
- Instantaneous sources can use both stable and adiabatic plume rise.
- Grid receptor system is ----------Rectangular

- Print Output Options -

- Print and save data using Detailed processing mode
- Print dosage output units ---------- Micrograms Seconds/Cubic Meter

- Receptor Grid System Geometry -

Grid system orientation angle (Degrees) ---------- .0
Receptor X coordinate units ---------- Meters
Y coordinate units ---------- Meters
Z coordinate units ---------- Meters
X origin ---------- .00
Y origin ---------- .00
X Axis of the grid system (Meters)---------- 100.00, 500.00, 1000.00, 1500.00, 2000.00, 2500.00, 3000.00, 3500.00, 4000.00, 4500.00, 5000.00,
Y Axis of the grid system (Meters)---------- -2000.00, -1500.00, -1000.00, -500.00, .00, 500.00, 1000.00, 1500.00, 2000.00,

- Source Geometry/Emission Strength -

Material or fuel/explosive ---------- TNT (2,4,6-Trinitrotoluene)
Pollutant/species ---------- Carbon Dioxide
Total number of sources ---------- 1

Source Number	Ident	Reference System	Source Type	Emission Type
1	TNT only source	Rectangular	Volume	Instantaneous

Source Number	X Coordinate	Y Coordinate	Z Elevation	Release Height	Emission Strength
1	.0 m	.0 m	.0 m	7.9~ m	5.00000E+02 lb

~ Means the value is defaulted for each hour of met. data.

Source Number	Rect. Expan. Crosswind	Dist. / Vertical/Crosswind	Reference Dist. Vertical	/Air Entrain-/Dispersion Coeff. /ment Coeff.	Crosswind	Vertical
1	50.00 m	50.00 m	.00 m	.00 m	.640	1.000	1.000

Table 1 (cont.)

- Program Input Data -

- Source Geometry/Emission Strength -

Source Number	Fuel Heat Content	Fuel Burn Rate	Fuel Burn Time	Initial Diameter
1	925.0 ca/g	90718.48 g/s	2.5 s	15.74~ m

~ Means the value is defaulted for each hour of met. data.

- Pollutant/Species Material Characteristics -

Pollutant/species name	Carbon Dioxide
Pollutant/species is	Gaseous
Particle material half-life	infinite
Molecular weight (g/g-mol)	44.0
Density of species (g/cm**3)	.002
Fraction of exhaust cloud constituting pollutant/species	1.28

- Meteorological Data -
([#-#] min-max limits)

Year [1900-2099]	1996
Month [1-12]	1
Day [1-31]	18
Hour (STD) [00-23]	0800
Minute	0
Julian day [1- 1]	18
Surface pressure (mb) [600.0-1100.0]	870.00
Cloud cover (8ths) [0-8]	.00
Cloud ceiling (m) [.0-20000.0]	9999.00
Net radiation index [-2- 4]	2.
Pasquill stability category [A-F]	C
Wind speed reference height (m)	10.00
Surface roughness length (cm) [.00-100.00]	.000
Vertical grad. of pot. temp. (C/m) [-5.000- 5.000]	.0

Table 1 (cont.)

- Program Input Data -

- Meteorological Data -
([#-#] min-max limits)

```
Reference wind speed (  m/s) [  1.0- 50.0]--------------------------  2.000
Minimum (at 2m) wind speed (m/s) ----------------------------------  1.450
Air temperature ( C) [-60.0- 60.0]--------------------------------   20.000
Standard dev. of wind direction angle ( d) [ 1.0000-80.0000]------  16.0000
Standard dev. wind elevation angle ( d) [ 1.0000-50.0000]---------   6.0000
Longitudinal turbulence intensity ( d) [ 1.0000-106.4000]---------  21.2800
Measurement time for std. dev. wind dir. angle ( s) [ 2.5-3600.0]-   600.00
Air humidity (%) (  .0-100.0)-------------------------------------  50.0
Surface mixing layer height ( m) [ 1.0-20000.0]------------------   1200.00
Wind direction (from) (deg) [    .0- 360.0]------------------------   270.0
Wind-direction shear (  d/m) [ -45.0-  45.0]------------------------     .00
Wind-speed power law exponent [ .000-5.000]-----------------------       .2
Wind-speed shear (  m/s) [   .00- 20.00]--------------------------- Compute
```

- Other Required Data -

```
Quasi-cont. (dosage) integration time inc. (sec) ----------------         C
```

- Input/Output Files Used -

```
Input save data file name ------------------------------------ EXAMPLE1.INP
Output save data file name ----------------------------------- EXAMPLE2.INP
Print solution output file name ------------------------------ EXAMPLE2.OUT
Graphics/solution input/output file -------------------------- EXAMPLE2.SOL
```

Table 2
Carbon Dioxide Dosage (Micrograms Seconds/Cubic Meter)

(Maximum = .15226E+06 at x = 1000.00, Y = .00

Y Axis (Meters)	- X Axis (Meters) - 100.000	500.000	1000.000	1500.000
	- Dosage -			
2000.000	.681469E-17	.249019E-16	.194209E-04	.531031
1500.000	.681469E-17	.334617E-08	.414031	120.101
1000.000	.117762E-15	.118182	511.690	5771.39
500.000	.268459	3993.52	36659.9	58927.9
.000	35332.1	129109.	152260.	127840.
-500.000	.268459	3993.52	36659.9	58927.9
-1000.000	.117762E-15	.118182	511.690	5771.39
-1500.000	.681469E-17	.334617E-08	.414031	120.101
-2000.000	.681469E-17	.249019E-16	.194209E-04	.531031

Y Axis (Meters)	- X Axis (Meters) - 2000.000	2500.000	3000.000	3500.000
	- Dosage -			
2000.000	40.7339	357.933	1186.33	2412.44
1500.000	1237.85	3759.71	6632.48	8970.35
1000.000	14182.3	20169.3	22676.9	22919.4
500.000	61262.2	55260.4	47416.3	40238.4
.000	99771.9	77325.3	60633.0	48542.2
-500.000	61262.2	55260.4	47416.3	40238.4
-1000.000	14182.3	20169.3	22676.9	22919.4
-1500.000	1237.85	3759.71	6632.48	8970.35
-2000.000	40.7339	357.933	1186.33	2412.44

Y Axis (Meters)	- X Axis (Meters) - 4000.000	4500.000	5000.000
	- Dosage -		
2000.000	3781.64	4987.04	5908.01
1500.000	10603.5	11446.9	11706.3
1000.000	22145.6	20722.1	19078.6
500.000	34450.0	29585.8	25575.4
.000	39916.9	33314.4	28199.9
-500.000	34450.0	29585.8	25575.4
-1000.000	22145.6	20722.1	19078.6
-1500.000	10603.5	11446.9	11706.3
-2000.000	3781.64	4987.04	5908.01

Elapsed run time = 0 hours, 1.08 minutes.

*** end of OBODM ***

```
EXAMPLE3

EXAMPLE3
EXAMPLE3
EXAMPLE4

EXAMPLE4
EXAMPLE4
EXAMPLE5

EXAMPLE5
EXAMPLE5
EXAMPLE6

EXAMPLE6
EXAMPLE6
EXAMPLE7

EXAMPLE7
EXAMPLE7
```

(This is the example batch file run (BATCHEXP.FIL) discussed in the tutorial.)

Table 1

- Program Input Data -

- Program Models Selected -

- Concentration
- Using final cloud rise ht. for all calc. distances.
- Flat terrain is assumed.
- Grid system origin is not added to source rectangular coordinates
- Instantaneous sources can use both stable and adiabatic plume rise.
- Grid receptor system is ----------Rectangular

- Print Output Options -

- Print and save data using Detailed processing mode
- Print concentration output units ---------- Micrograms/Cubic Meter

- Receptor Grid System Geometry -

Grid system orientation angle (Degrees) ---------- .0
Receptor X coordinate units ---------- Meters
Y coordinate units ---------- Meters
Z coordinate units ---------- Meters
X origin ---------- .00
Y origin ---------- .00
X Axis of the grid system (Meters)---------- 10000.00,
Y Axis of the grid system (Meters)---------- .00,

- Source Geometry/Emission Strength -

Material or fuel/explosive ---------- TNT (2,4,6-Trinitrotoluene)
Pollutant/species ---------- Carbon Dioxide
Total number of sources ---------- 1

Source Number	Ident	Reference System	Source Type	Emission Type
1	TNT only source	Rectangular	Volume	Instantaneous

Source Number	X Coordinate	Y Coordinate	Z Elevation	Release Height	Emission Strength
1	.0 m	.0 m	.0 m	7.9~ m	5.00000E+02 lb

~ Means the value is defaulted for each hour of met. data.

Source Number	Rect. Expan. Dist. / Crosswind	Vertical/Crosswind	Reference Dist. / Vertical	Air Entrain-/ment Coeff.	Dispersion Coeff. /Crosswind	Vertical
1	50.00 m	50.00 m	.00 m	.00 m	.640	1.000	1.000

Table 1 (cont.)

- Program Input Data -

- Source Geometry/Emission Strength -

Source Number	Fuel Heat Content	Fuel Burn Rate	Fuel Burn Time	Initial Diameter
1	925.0 ca/g	90718.48 g/s	2.5 s	15.74~ m

~ Means the value is defaulted for each hour of met. data.

- Pollutant/Species Material Characteristics -

Pollutant/species name	Carbon Dioxide
Pollutant/species is	Gaseous
Particle material half-life	infinite
Molecular weight (g/g-mol)	44.0
Density of species (g/cm**3)	.002
Fraction of exhaust cloud constituting pollutant/species	1.28

- Meteorological Data -
([#-#] min-max limits)

Year [1900-2099]	1996
Month [1-12]	1
Day [1-31]	18
Hour (STD) [00-23]	0800
Minute	0
Julian day [1- 1]	18
Surface pressure (mb) [600.0-1100.0]	870.00
Cloud cover (8ths) [0-8]	.00
Cloud ceiling (m) [.0-20000.0]	9999.00
Net radiation index [-2- 4]	1.
Pasquill stability category [A-F]	D
Wind speed reference height (m)	10.00
Surface roughness length (cm) [.00-100.00]	.000
Vertical grad. of pot. temp. (C/m) [-5.000- 5.000]	.01

Table 1 (cont.)

- Program Input Data -

- Meteorological Data -
([#-#] min-max limits)

```
Reference wind speed (  m/s) [  1.0- 50.0]--------------------------  2.000
Minimum (at 2m) wind speed (m/s) ----------------------------------  1.450
Air temperature ( C) [-60.0- 60.0]--------------------------------   20.000
Standard dev. of wind direction angle ( d) [ 1.0000-80.0000]------  11.0000
Standard dev. wind elevation angle ( d) [ 1.0000-50.0000]---------   4.0000
Longitudinal turbulence intensity ( d) [ 1.0000-106.4000]---------  14.6300
Measurement time for std. dev. wind dir. angle ( s) [ 2.5-3600.0]-   600.00
Air humidity (%) (  .0-100.0)---------------------------------------  50.0
Surface mixing layer height ( m) [ 1.0-20000.0]------------------    600.00
Wind direction (from) (deg) [    .0- 360.0]------------------------   270.0
Wind-direction shear (  d/m) [ -45.0-  45.0]------------------------     .00
Wind-speed power law exponent [ .000-5.000]-----------------------       .2
Wind-speed shear (  m/s) [   .00- 20.00]--------------------------- Compute
```

- Input/Output Files Used -

```
Input save data file name ----------------------------------- EXAMPLE3.INP
Print solution output file name ----------------------------- EXAMPLE3.OUT
Graphics/solution input/output file -------------------------- EXAMPLE3.SOL
Batch processing input file --------------------------------- BATCHEXP.FIL
```

Table 2
Carbon Dioxide Peak Concentration (Micrograms/Cubic Meter)

Y Axis (Meters)	- X Axis (Meters) - 10000.000 - Concentration -
.000	30.9186

Table 1

- Program Input Data -

- Program Models Selected -

- Concentration
- Using final cloud rise ht. for all calc. distances.
- Flat terrain is assumed.
- Grid system origin is not added to source rectangular coordinates
- Instantaneous sources can use both stable and adiabatic plume rise.
- Grid receptor system is ----------Rectangular

- Print Output Options -

- Print and save data using Detailed processing mode
- Print concentration output units ---------- Micrograms/Cubic Meter

- Receptor Grid System Geometry -

Grid system orientation angle (Degrees) ---------- .0
Receptor X coordinate units ---------- Meters
Y coordinate units ---------- Meters
Z coordinate units ---------- Meters
X origin ---------- .00
Y origin ---------- .00
X Axis of the grid system (Meters)---------- 10000.00,
Y Axis of the grid system (Meters)---------- .00,

- Source Geometry/Emission Strength -

Material or fuel/explosive ---------- TNT (2,4,6-Trinitrotoluene)
Pollutant/species ---------- Carbon Dioxide
Total number of sources ---------- 1

Source Number	Ident	Reference System	Source Type	Emission Type
1	TNT only source	Rectangular	Volume	Instantaneous

Source Number	X Coordinate	Y Coordinate	Z Elevation	Release Height	Emission Strength
1	.0 m	.0 m	.0 m	7.9~ m	5.00000E+02 lb

~ Means the value is defaulted for each hour of met. data.

Source Number	Rect. Expan. Dist. / Crosswind	Vertical/Crosswind	Reference Dist. / Vertical	Air Entrain-/ment Coeff.	Dispersion Coeff. /Crosswind	Vertical
1	50.00 m	50.00 m	.00 m	.00 m	.640	1.000	1.000

Table 1 (cont.)

- Program Input Data -

- Source Geometry/Emission Strength -

Source Number	Fuel Heat Content	Fuel Burn Rate	Fuel Burn Time	Initial Diameter
1	925.0 ca/g	90718.48 g/s	2.5 s	15.74~ m

~ Means the value is defaulted for each hour of met. data.

- Pollutant/Species Material Characteristics -

Pollutant/species name	Carbon Dioxide
Pollutant/species is	Gaseous
Particle material half-life	infinite
Molecular weight (g/g-mol)	44.0
Density of species (g/cm**3)	.002
Fraction of exhaust cloud constituting pollutant/species	1.28

- Meteorological Data -
([#-#] min-max limits)

Year [1900-2099]	1996
Month [1-12]	1
Day [1-31]	18
Hour (STD) [00-23]	0800
Minute	0
Julian day [1- 1]	18
Surface pressure (mb) [600.0-1100.0]	870.00
Cloud cover (8ths) [0-8]	.00
Cloud ceiling (m) [.0-20000.0]	9999.00
Net radiation index [-2- 4]	0.
Pasquill stability category [A-F]	D
Wind speed reference height (m)	10.00
Surface roughness length (cm) [.00-100.00]	.000
Vertical grad. of pot. temp. (C/m) [-5.000- 5.000]	.01

Table 1 (cont.)

- Program Input Data -

- Meteorological Data -
([#-#] min-max limits)

```
Reference wind speed (  m/s) [  1.0- 50.0]--------------------------  2.000
Minimum (at 2m) wind speed (m/s) ----------------------------------  1.337
Air temperature ( C) [-60.0- 60.0]--------------------------------   20.000
Standard dev. of wind direction angle ( d) [ 1.0000-80.0000]------  10.0000
Standard dev. wind elevation angle ( d) [ 1.0000-50.0000]---------   3.5000
Longitudinal turbulence intensity ( d) [ 1.0000-106.4000]---------  13.3000
Measurement time for std. dev. wind dir. angle ( s) [ 2.5-3600.0]-   600.00
Air humidity (%) (  .0-100.0)-------------------------------------  50.0
Surface mixing layer height ( m) [ 1.0-20000.0]------------------    200.00
Wind direction (from) (deg) [    .0- 360.0]------------------------   270.0
Wind-direction shear (  d/m) [ -45.0-  45.0]------------------------     .00
Wind-speed power law exponent [ .000-5.000]-----------------------      .25
Wind-speed shear (  m/s) [   .00- 20.00]--------------------------- Compute
```

- Input/Output Files Used -

```
Input save data file name ----------------------------------- EXAMPLE4.INP
Print solution output file name ----------------------------- EXAMPLE4.OUT
Graphics/solution input/output file -------------------------- EXAMPLE4.SOL
Batch processing input file --------------------------------- BATCHEXP.FIL
```

Table 2
Carbon Dioxide Peak Concentration (Micrograms/Cubic Meter)

Y Axis (Meters)	- X Axis (Meters) - 10000.000 - Concentration -
.000	87.9215

Table 1

- Program Input Data -

- Program Models Selected -

- Concentration
- Using final cloud rise ht. for all calc. distances.
- Flat terrain is assumed.
- Grid system origin is not added to source rectangular coordinates
- Instantaneous sources can use both stable and adiabatic plume rise.
- Grid receptor system is ----------Rectangular

- Print Output Options -

- Print and save data using Detailed processing mode
- Print concentration output units ---------- Micrograms/Cubic Meter

- Receptor Grid System Geometry -

Grid system orientation angle (Degrees) ---------- .0
Receptor X coordinate units ---------- Meters
Y coordinate units ---------- Meters
Z coordinate units ---------- Meters
X origin ---------- .00
Y origin ---------- .00
X Axis of the grid system (Meters)---------- 10000.00,
Y Axis of the grid system (Meters)---------- .00,

- Source Geometry/Emission Strength -

Material or fuel/explosive ---------- TNT (2,4,6-Trinitrotoluene)
Pollutant/species ---------- Carbon Dioxide
Total number of sources ---------- 1

Source Number	Ident	Reference System	Source Type	Emission Type
1	TNT only source	Rectangular	Volume	Instantaneous

Source Number	X Coordinate	Y Coordinate	Z Elevation	Release Height	Emission Strength
1	.0 m	.0 m	.0 m	7.9~ m	5.00000E+02 lb

~ Means the value is defaulted for each hour of met. data.

Source Number	Rect. Expan. Dist. / Crosswind	Vertical/Crosswind	Reference Dist. / Vertical	Air Entrain-/ment Coeff.	Dispersion Coeff. /Crosswind	Vertical
1	50.00 m	50.00 m	.00 m	.00 m	.640	1.000	1.000

Table 1 (cont.)

- Program Input Data -

- Source Geometry/Emission Strength -

Source Number	Fuel Heat Content	Fuel Burn Rate	Fuel Burn Time	Initial Diameter
1	925.0 ca/g	90718.48 g/s	2.5 s	15.74~ m

~ Means the value is defaulted for each hour of met. data.

- Pollutant/Species Material Characteristics -

Pollutant/species name	Carbon Dioxide
Pollutant/species is	Gaseous
Particle material half-life	infinite
Molecular weight (g/g-mol)	44.0
Density of species (g/cm**3)	.002
Fraction of exhaust cloud constituting pollutant/species	1.28

- Meteorological Data -
([#-#] min-max limits)

Year [1900-2099]	1996
Month [1-12]	1
Day [1-31]	18
Hour (STD) [00-23]	0800
Minute	0
Julian day [1- 1]	18
Surface pressure (mb) [600.0-1100.0]	870.00
Cloud cover (8ths) [0-8]	.00
Cloud ceiling (m) [.0-20000.0]	9999.00
Net radiation index [-2- 4]	0.
Pasquill stability category [A-F]	D
Wind speed reference height (m)	10.00
Surface roughness length (cm) [.00-100.00]	.000
Vertical grad. of pot. temp. (C/m) [-5.000- 5.000]	.005

Table 1 (cont.)

- Program Input Data -

- Meteorological Data -
([#-#] min-max limits)

```
Reference wind speed (  m/s) [  1.0- 50.0]--------------------------  4.000
Minimum (at 2m) wind speed (m/s) ----------------------------------  2.899
Air temperature ( C) [-60.0- 60.0]--------------------------------   20.000
Standard dev. of wind direction angle ( d) [ 1.0000-80.0000]------   9.0000
Standard dev. wind elevation angle ( d) [ 1.0000-50.0000]---------   5.0000
Longitudinal turbulence intensity ( d) [ 1.0000-106.4000]---------  11.9700
Measurement time for std. dev. wind dir. angle ( s) [ 2.5-3600.0]-   600.00
Air humidity (%) (  .0-100.0)-------------------------------------  50.0
Surface mixing layer height ( m) [ 1.0-20000.0]------------------    300.00
Wind direction (from) (deg) [    .0- 360.0]------------------------   270.0
Wind-direction shear (  d/m) [ -45.0-  45.0]------------------------     .00
Wind-speed power law exponent [ .000-5.000]-----------------------       .2
Wind-speed shear (  m/s) [   .00- 20.00]--------------------------- Compute
```

- Input/Output Files Used -

```
Input save data file name ------------------------------------ EXAMPLE5.INP
Print solution output file name ------------------------------ EXAMPLE5.OUT
Graphics/solution input/output file -------------------------- EXAMPLE5.SOL
Batch processing input file ---------------------------------- BATCHEXP.FIL
```

Table 2
Carbon Dioxide Peak Concentration (Micrograms/Cubic Meter)

Y Axis (Meters)	- X Axis (Meters) - 10000.000 - Concentration -
.000	74.5082

Table 1

- Program Input Data -

- Program Models Selected -

- Concentration
- Using final cloud rise ht. for all calc. distances.
- Flat terrain is assumed.
- Grid system origin is not added to source rectangular coordinates
- Instantaneous sources can use both stable and adiabatic plume rise.
- Grid receptor system is ----------Rectangular

- Print Output Options -

- Print and save data using Detailed processing mode
- Print concentration output units ---------- Micrograms/Cubic Meter

- Receptor Grid System Geometry -

Grid system orientation angle (Degrees) ---------- .0
Receptor X coordinate units ---------- Meters
Y coordinate units ---------- Meters
Z coordinate units ---------- Meters
X origin ---------- .00
Y origin ---------- .00
X Axis of the grid system (Meters)---------- 10000.00,
Y Axis of the grid system (Meters)---------- .00,

- Source Geometry/Emission Strength -

Material or fuel/explosive ---------- TNT (2,4,6-Trinitrotoluene)
Pollutant/species ---------- Carbon Dioxide
Total number of sources ---------- 1

Source Number	Ident	Reference System	Source Type	Emission Type
1	TNT only source	Rectangular	Volume	Instantaneous

Source Number	X Coordinate	Y Coordinate	Z Elevation	Release Height	Emission Strength
1	.0 m	.0 m	.0 m	7.9~ m	5.00000E+02 lb

~ Means the value is defaulted for each hour of met. data.

Source Number	Rect. Expan. Dist. / Crosswind	Vertical/Crosswind	Reference Dist. / Vertical	Air Entrain-/ment Coeff.	Dispersion Coeff. /Crosswind	Vertical
1	50.00 m	50.00 m	.00 m	.00 m	.640	1.000	1.000

Table 1 (cont.)

- Program Input Data -

- Source Geometry/Emission Strength -

Source Number	Fuel Heat Content	Fuel Burn Rate	Fuel Burn Time	Initial Diameter
1	925.0 ca/g	90718.48 g/s	2.5 s	15.74~ m

~ Means the value is defaulted for each hour of met. data.

- Pollutant/Species Material Characteristics -

Pollutant/species name	Carbon Dioxide
Pollutant/species is	Gaseous
Particle material half-life	infinite
Molecular weight (g/g-mol)	44.0
Density of species (g/cm**3)	.002
Fraction of exhaust cloud constituting pollutant/species	1.28

- Meteorological Data -
([#-#] min-max limits)

Year [1900-2099]	1996
Month [1-12]	1
Day [1-31]	18
Hour (STD) [00-23]	0800
Minute	0
Julian day [1- 1]	18
Surface pressure (mb) [600.0-1100.0]	870.00
Cloud cover (8ths) [0-8]	.00
Cloud ceiling (m) [.0-20000.0]	9999.00
Net radiation index [-2- 4]	0.
Pasquill stability category [A-F]	D
Wind speed reference height (m)	10.00
Surface roughness length (cm) [.00-100.00]	.000
Vertical grad. of pot. temp. (C/m) [-5.000- 5.000]	.0

Table 1 (cont.)

- Program Input Data -

- Meteorological Data -
([#-#] min-max limits)

```
Reference wind speed (  m/s) [  1.0- 50.0]--------------------------  6.000
Minimum (at 2m) wind speed (m/s) ----------------------------------  5.108
Air temperature ( C) [-60.0- 60.0]--------------------------------   20.000
Standard dev. of wind direction angle ( d) [ 1.0000-80.0000]------   8.0000
Standard dev. wind elevation angle ( d) [ 1.0000-50.0000]---------   4.8000
Longitudinal turbulence intensity ( d) [ 1.0000-106.4000]---------  10.6400
Measurement time for std. dev. wind dir. angle ( s) [ 2.5-3600.0]-   600.00
Air humidity (%) (  .0-100.0)-------------------------------------  50.0
Surface mixing layer height ( m) [ 1.0-20000.0]------------------    300.00
Wind direction (from) (deg) [    .0- 360.0]------------------------   270.0
Wind-direction shear (  d/m) [ -45.0-  45.0]------------------------     .00
Wind-speed power law exponent [ .000-5.000]-----------------------       .1
Wind-speed shear (  m/s) [   .00- 20.00]--------------------------- Compute
```

- Input/Output Files Used -

```
Input save data file name ----------------------------------- EXAMPLE6.INP
Print solution output file name ----------------------------- EXAMPLE6.OUT
Graphics/solution input/output file -------------------------- EXAMPLE6.SOL
Batch processing input file --------------------------------- BATCHEXP.FIL
```

Table 2
Carbon Dioxide Peak Concentration (Micrograms/Cubic Meter)

Y Axis (Meters)	- X Axis (Meters) - 10000.000 - Concentration -
.000	93.8983

Table 1

- Program Input Data -

- Program Models Selected -

- Concentration
- Using final cloud rise ht. for all calc. distances.
- Flat terrain is assumed.
- Grid system origin is not added to source rectangular coordinates
- Instantaneous sources can use both stable and adiabatic plume rise.
- Grid receptor system is ----------Rectangular

- Print Output Options -

- Print and save data using Detailed processing mode
- Print concentration output units ---------- Micrograms/Cubic Meter

- Receptor Grid System Geometry -

Grid system orientation angle (Degrees) ---------- .0
Receptor X coordinate units ---------- Meters
Y coordinate units ---------- Meters
Z coordinate units ---------- Meters
X origin ---------- .00
Y origin ---------- .00
X Axis of the grid system (Meters)---------- 10000.00,
Y Axis of the grid system (Meters)---------- .00,

- Source Geometry/Emission Strength -

Material or fuel/explosive ---------- TNT (2,4,6-Trinitrotoluene)
Pollutant/species ---------- Carbon Dioxide
Total number of sources ---------- 1

Source Number	Ident	Reference System	Source Type	Emission Type
1	TNT only source	Rectangular	Volume	Instantaneous

Source Number	X Coordinate	Y Coordinate	Z Elevation	Release Height	Emission Strength
1	.0 m	.0 m	.0 m	7.9~ m	5.00000E+02 lb

~ Means the value is defaulted for each hour of met. data.

Source Number	Rect. Expan. Dist. / Crosswind	Vertical/Crosswind	Reference Dist. / Vertical	Air Entrain-/ment Coeff.	Dispersion Coeff. /Crosswind	Vertical
1	50.00 m	50.00 m	.00 m	.00 m	.640	1.000	1.000

Table 1 (cont.)

- Program Input Data -

- Source Geometry/Emission Strength -

Source Number	Fuel Heat Content	Fuel Burn Rate	Fuel Burn Time	Initial Diameter
1	925.0 ca/g	90718.48 g/s	2.5 s	15.74~ m

~ Means the value is defaulted for each hour of met. data.

- Pollutant/Species Material Characteristics -

Pollutant/species name	Carbon Dioxide
Pollutant/species is	Gaseous
Particle material half-life	infinite
Molecular weight (g/g-mol)	44.0
Density of species (g/cm**3)	.002
Fraction of exhaust cloud constituting pollutant/species	1.28

- Meteorological Data -
([#-#] min-max limits)

Year [1900-2099]	1996
Month [1-12]	1
Day [1-31]	18
Hour (STD) [00-23]	0800
Minute	0
Julian day [1- 1]	18
Surface pressure (mb) [600.0-1100.0]	870.00
Cloud cover (8ths) [0-8]	.00
Cloud ceiling (m) [.0-20000.0]	9999.00
Net radiation index [-2- 4]	0.
Pasquill stability category [A-F]	D
Wind speed reference height (m)	10.00
Surface roughness length (cm) [.00-100.00]	.000
Vertical grad. of pot. temp. (C/m) [-5.000- 5.000]	.0

Table 1 (cont.)

- Program Input Data -

- Meteorological Data -
([#-#] min-max limits)

```
Reference wind speed (  m/s) [  1.0- 50.0]--------------------------  8.000
Minimum (at 2m) wind speed (m/s) ----------------------------------  6.811
Air temperature ( C) [-60.0- 60.0]--------------------------------   20.000
Standard dev. of wind direction angle ( d) [ 1.0000-80.0000]------   7.0000
Standard dev. wind elevation angle ( d) [ 1.0000-50.0000]---------   4.5000
Longitudinal turbulence intensity ( d) [ 1.0000-106.4000]---------   9.3100
Measurement time for std. dev. wind dir. angle ( s) [ 2.5-3600.0]-   600.00
Air humidity (%) (  .0-100.0)-------------------------------------  50.0
Surface mixing layer height ( m) [ 1.0-20000.0]------------------    300.00
Wind direction (from) (deg) [    .0- 360.0]------------------------   270.0
Wind-direction shear (  d/m) [ -45.0-  45.0]------------------------     .00
Wind-speed power law exponent [ .000-5.000]-----------------------       .1
Wind-speed shear (  m/s) [   .00- 20.00]--------------------------- Compute
```

- Input/Output Files Used -

```
Input save data file name ----------------------------------- EXAMPLE7.INP
Print solution output file name ----------------------------- EXAMPLE7.OUT
Graphics/solution input/output file -------------------------- EXAMPLE7.SOL
Batch processing input file --------------------------------- BATCHEXP.FIL
```

Table 2
Carbon Dioxide Peak Concentration (Micrograms/Cubic Meter)

```
                                - X Axis  (Meters)  -
                   10000.000
 Y Axis   (Meters)             -       Concentration        -
             ----------------------------------------------------

          .000   127.982
```

Elapsed run time = 0 hours, .97 minutes.

*** end of OBODM ***

APPENDIX C. REFERENCES

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