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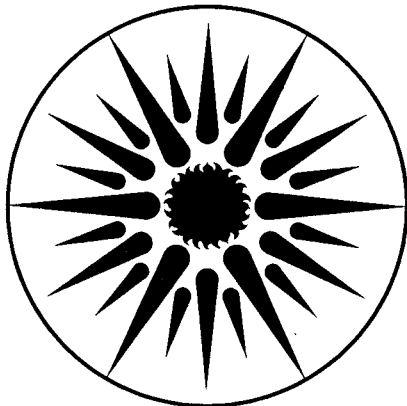
### Concentrations of Indoor Pollutants (CIP) Database User's Manual (Version 4.0)

- M.G. Apte, S.R. Brown, C.A. Corradi, S.P. Felix,  
D.T. Grimsrud, B.V. Smith, G.W. Traynor, and  
A.L. Woods

October 1990

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CONCENTRATIONS OF INDOOR POLLUTANTS (CIP)  
DATABASE USER'S MANUAL  
(Version 4.0)

Indoor Environment Program  
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October 1990

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CONCENTRATION OF INDOOR POLLUTANTS (CIP) DATABASE USER'S MANUAL  
Version 4.0

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## Preface to the CIP Database User Manual, Version 4.0

This is the latest release of the database and the user manual. The user manual is a tutorial and reference for utilizing the CIP Database system. An installation guide is included to cover various hardware configurations. Numerous examples and explanations of the dialogue between the user and the database program are provided. It is hoped that this resource will, along with on-line help and the menu-driven software, make for a quick and easy learning curve.

For the purposes of this manual, it is assumed that the user is acquainted with the goals of the CIP Database, which are: (1) to collect existing measurements of concentrations of indoor air pollutants in a user-oriented database and (2) to provide a repository of references citing measured field results openly accessible to a wide audience of researchers, policy makers, and others interested in the issues of indoor air quality.

The database software, as distinct from the data, is contained in two files, CIP.EXE and PFIL.COM. CIP.EXE is made up of a number of programs written in dBase III command code and compiled using Clipper into a single, executable file. PFIL.COM is a program written in Turbo Pascal that handles the output of summary text files and is called from CIP.EXE.

Version 4.0 of the CIP Database is current through March 1990. It is anticipated that there will be future releases of the database to keep it current.

If you need any assistance or additional information about the database, please feel free to contact us at the address below.

CIP Database Coordinator  
Indoor Environment Program  
Mail Stop 90-3058  
Lawrence Berkeley Laboratory  
Berkeley, CA 94720

## Installation of the Database

It is assumed that you have an IBM PC, XT, or AT, or compatible machine for running the database, with DOS 2.0 or later as the operating system. The computer must have a minimum of 352 Kbytes of memory, a hard disk drive with at least 1 MB of unused storage capacity (1.6 MB will be needed if you have modified V3.1 and choose to merge the bibliographic data), and a 5 1/4" floppy disk drive. The system needs no auxiliary software to execute.

When the database executes, a number of files are open at the same time. Therefore you must tell DOS when you turn on the computer to reserve enough buffers and "file handles" for the database system to use. This is done via the CONFIG.SYS file, which is described in your DOS reference manual. You must have two commands in this file, as follows:

```
files=20  
buffers=15
```

Due to the size of the database, it is necessary to install Version 4.0 of the CIP on a hard disk. The installation function makes it easy to configure the software to whatever installation the user wants, including the full use of directories and pathnames. Copying the relevant files from the supplied disk to the proper destination is essentially the responsibility of the user, with guidelines below.

The first thing to do is to make copies of the supplied diskette. In the rest of this discussion, references to this diskette will refer to the copy. This is extremely important, particularly in installation configurations where floppy diskettes will be used, since the database programs both read and write to the media the database resides on. After you have done this, using either of the DOS commands DISKCOPY or COPY \*.\* , you can decide which configuration you wish to install. If you have more than two physical devices, or drives, you will have options as to the installation you choose. Otherwise there will be one choice that will work for your system.

Before describing the installation process, a brief description of what is on the supplied floppy diskette (CIPSYS1) is in order. The database files are in dBase III format, but the associated indexes are in Clipper format, which is incompatible with dBase III format.

CIPSYS1 contains CIP.EXE, PFIL.COM, the two program files, several databases, scratch files, the installation memory file used by the system, the bibliographic database and the database used for summary data searches.

Version 4.0 of the CIP Database has been packaged in a compact mode so that all the information previously available on CIPSYS1 and CIPSYS2 has been combined and stored on CIPSYS1.



Previous releases of the CIP Database have included a total of seven diskettes. Two of these contained the system program and bibliographic database. The other five diskettes contain summary data used in the summary data search mode (see p. 23). Running Version 4.0 of the CIP Database in the bibliographic search mode requires only diskette CIPSYS1. Since there has been no change to the summary data in Version 4.0, the summary data diskettes have not been included in this release. Diskettes from earlier versions are completely compatible with Version 4.0. If you did not receive an earlier release of the CIP Database, or are unable to locate diskettes CIPSYS3: F01 through F05, you may obtain these from the CIP Database Coordinator.

In the following examples and throughout this manual, user input is indicated by underlined text.

### 1. Running the Installation Function

When you first start the system, you will be asked to enter information the system needs to locate the relevant databases, and to prompt you appropriately if you are using floppy diskettes for storage of some or all of the data.

The data in the CIP Database are split into two main categories, bibliographic and summary. The bibliographic data are contained in a single, large database, BIBLIO1.DBF, which is in dBase III format, and found on the diskette labelled CIPSYS1. The summary data are contained in a number of small text files (one file for each experiment), spread over five floppy diskettes. (These are CIPSYS3: FD01 through FD05, which were distributed with earlier releases of the CIP.)

The installation function prompts for the pathname regarding where to find these two categories of data. In the case of bibliographic data they are assumed to be on a hard disk, so only the drive and pathname are prompted for. For summary data, you will be prompted to indicate whether the summary data will be stored on a hard disk or on floppy disks (copies of the previously distributed CIPSYS3 floppy diskettes). Screen 1 indicates how this procedure appears on the computer terminal. After you have answered the indicated questions, the system checks that BIBLIO1.DBF and the identifier file, FD01, are where you said the bibliographic data and summary data, respectively, would be. If they are not, an error message appears, with the options of re-entry or skipping. It is not generally recommended that you skip the check, although in some situations it might be appropriate. If you load summary data on a hard drive, it is a good idea to be certain you know the directory it is in before starting the installation.

Your final installation choices are subsequently displayed, and options of (A)cccepting, (R)e-entering, or (Q)uitting with no change presented. If you accept or quit, the screen clears and the appropriate message appears. Hit any key to begin using the system. Re-entry simply starts the process over.

Although initial installation is necessary, it is by no means unchangeable. At any time you can enter the installation function from the main menu.

## 2. Installation Choices and Procedures

Before entering the installation function you must select the appropriate routine to unpack the database. If you have not modified your database by adding new bibliographic entries, it is recommended that you create a new directory for Version 4.0 of the CIP Database and later delete the old version. (If you have stored the summary data on your hard disk be careful not to delete summary data files which have the ".STX" extension.) If space on your hard disk is limited, you may overwrite the previous version CIP database files by unpacking Version 4.0 in the old CIP directory. (To do this, follow the procedure under 2.2 below.) In the following instructions assume "A:" is the floppy drive and "C:" is the hard drive.

### 2.1 Writing to a New Directory

There are two options here. The first is to have the programs and data files on CIPSYS1 on the hard disk, and to read the summary data from floppy disk. The other option is to have the entire system on the hard disk. The main difference is the amount of disk space devoted to the system. There is not actually much difference in performance, as the summary text files are merely output, not searched. Of course you will have to insert the proper floppy diskette when outputting a number of summary data sets (the program will automatically prompt for the diskette required), but that step must be compared to devoting about two megabytes of disk storage to this single application.

#### 2.1.1 Summary Data on Floppy Disk

To install the CIP Database with program and data files from CIPSYS1 on the hard disk and the summary data on floppy disk:

1. Insert CIPSYS1 into your floppy drive.
2. Create a new directory on your hard disk.  
C>MD [Directoryname]
3. Move to the new directory.  
C>CD [Directoryname]
4. Now, unpack the database by entering the command:  
C>A:NEWDIR

This will automatically launch the CIP installation procedure. You will have to enter the CIP directory name and the location of the summary data. (See Screen 1.)

### 2.1.2 Summary Data on Hard Disk

To install the CIP Database files and the summary data on the hard disk:

1. Insert CIPSYS3 FD01 into the floppy drive. Enter the commands below. If the summary data are already on your hard disk note the directory where they are located and skip down to step 3.  
A>VERIFY ON  
A>COPY \*.\* C:\[Directoryname]
2. Repeat step 1 for CIPSYS3 FD02 through FD05.
3. Move to the new directory created for Version 4.0 of the CIP: C>CD [Directoryname]
4. Unpack the database by entering the command: C>A:NEWDIR  
This will automatically launch the CIP installation procedure. You will have to enter the CIP directory name and the name of the directory where the summary data is stored. (See Screen 1.)

### 2.2 Writing to a Previous CIP Directory

If you did not modify the database by adding your own bibliographic entries, follow the procedure for an unmodified database. If you added new bibliographic entries to your CIP, then you should use the modified database procedure. In either case, if you wish to store summary data on the hard disk, copy the data from CIPSYS3 onto the hard disk, noting the name of the directory. (See 2.1.2 above.)

#### 2.2.1 Unmodified Database

1. Insert CIPSYS1 into your floppy drive.
2. On your hard disk, move to the directory containing the previous CIP program (Version 3.1).  
C>CD [Directoryname]
3. Unpack the database and launch the installation procedure by entering the command: C>A:NOMOD
4. Select "3 Re-install CIP Database system" from the MAIN MENU.
5. Respond to the questions on the screen as shown in Screen 1.

#### 2.2.2 Modified Database

1. Insert CIPSYS1 into your floppy drive.
2. On your hard disk, move to the directory containing the previous CIP program (Version 3.1).  
C>CD [Directoryname]
2. Enter the command: C>A:MOD
3. Select "5 Install distributed update" from the MAIN MENU. Type Y to proceed.
4. Respond to the questions as shown on Screen 1.
5. For the Bibliographic Merge, enter the path: \MODS.  
(See Screen 2.)

6. If the merge is successful, exit the MAIN MENU by selecting "0" and complete the installation process. If there is insufficient space on your hard disk to complete the bibliographic merge, you will have to exit the installation procedure and clear enough space for the merge. Typing "A:MOD" will restart the merge process. (Since the files have already been unpacked, repeating the procedure takes less time than the initial run.) Note that your modified database (as it was before the merge operation) will be renamed "USERBIB" and saved on your hard disk.

This will restore all of the CIP files for database use, storing them on the hard disk in the existing subdirectory.

#### Screen 1. Installation function.

CIP DATABASE INSTALLATION V4.0

To install the CIP Database on your system, you must indicate where and on what sort of device the bibliographic and summary data are to be found (see the user manual for more information on this subject). To accomplish the installation, please answer the following questions.

If you have copied all the data, both bibliographic and summary, from the floppy disk CIPSYS1 into the same directory as the program files, hit return for each question. (Blank drive/path entries = default).

BIBLIOGRAPHIC data must be installed on hard disk  
Enter drive, and pathname, if applicable, for BIBLIOGRAPHIC data.  
(Here, it is assumed that the data are in a subdirectory "CIPBIB".)  
C:\CIPBIB

Is SUMMARY data on (F)loppy, or (H)ard disk/s? F  
Enter drive, and pathname, if applicable, for SUMMARY data.  
B:  
Insert CIPSYS3/FD01 in drive B:\, hit retn, or S to skip

#### Screen 2. Bibliographic merge.

B I B L I O G R A P H I C M E R G E

This function allows you to merge your own entries into the CIP Database with the new, updated version distributed to all users. If you are installing version 4.0 using the MOD routine, enter "MODS" (without the quotation marks).

Please enter pathname where bibliographic update is stored or blank to abort merge operation \MODS

## Starting Up and Screen Operations

Throughout this manual, we have included examples of what the user sees on the computer screen, with user input underlined. Explanatory comments are given above and below the screen illustration.

You start up the database by entering CIP in the directory where CIP.EXE resides. After several moments, the MAIN MENU will appear as illustrated in Screen 3.

There are a number of conventions regarding screen operations that you should know. They are much the same as dBase III, and are as follows. Note that "^E" means "press Ctrl key and E simultaneously".

### SCREEN OPERATIONS

Key/s pressed	Result
<u>^E</u> or	= cursor moves left or up one field
<u>^X</u> or	= cursor moves right or down one field
<u>^End</u>	= cursor moves to last field on screen
<u>^Home</u>	= cursor moves to first field on screen
<u>^A</u>	= cursor moves left one word
<u>^F</u>	= cursor moves right one word or to end of field
<u>^S</u>	= cursor moves left one character
<u>^D</u>	= cursor moves right one character
<u>^G</u> or Del	= delete character under cursor
Backspace	= delete character to left of cursor
<u>^T</u>	= delete word to right of cursor
<u>^Y</u>	= delete rest of field to right of cursor
Return	= enter contents of field (independent of cursor position)
<u>^W</u>	= enter contents of all displayed fields, as is
Alt D	= halt execution, enter Q to close files, quit to DOS

The following pages describe the use of the bibliographic functions and summary data functions in detail.

Screen 3. Main menu for CIP Database.

Concentrations of Indoor Pollutants Database V4.0 October, 1990

M A I N M E N U

0. Exit
1. Go to bibliographic menu
2. Go to summary data menu
3. Re-install CIP Database system
4. Re-index all databases
5. Install distributed update

Enter F1 at any time for help

select \_

### Using the On-line Help Facility

At any time during the operation of the CIP Database, you can enter function key 1, or F1, and the help facility will appear on the screen. The screen environment from which you entered help is preserved while you are in the help facility, and restored when you exit, so that you are returned to exactly the place where you called for help.

The help facility consists of nearly 50 "screens" of material relevant to operation of the database. Once you have entered the facility you can "page" forward or back through the various screens, go to a specific screen, view the table of contents, print one or more screens, or quit. The help is context sensitive, in that the particular screen that first appears is related to your location when you asked for help. This means that whenever you get stuck, simply enter F1, and the resulting help screen will probably tell you what you need to know in order to proceed.

## Bibliographic Database

### 1. Introduction

The CIP Database contains a bibliography of field measurements of air pollutants in buildings. We have interpreted the term "building" broadly to include residences, schools, offices, and public-access buildings, but we have specifically excluded factories and buildings associated with industrial processing. Because the emphasis of the CIP Database is on field studies, we have also generally excluded citations describing data obtained solely in chamber studies. The references cited are from peer-reviewed journals, final government reports, and conference proceedings.

Below is an overview of the bibliographic functions; a description of the items, or fields, in a single reference; and--for the search and enter functions-- a detailed description of input, output, and an example. Also included are lists of keywords, state and region codes, journal abbreviations, organizations listed in the bibliography, and a brief description of the bibliographic fields.

### 2. Overview of the Bibliography

The bibliographic database supports the following functions:

1. Search the database
2. Print out references
3. Enter new references
4. Edit existing references
5. Enter new bibliographic keywords

You can enter new references at any time by using the enter function and correct any errors or omissions by using the edit function. You can enter new keywords via function 5, but you must, of course, update the actual references to reflect the new keyword. Function 2 allows you to simply print or display a group of references, or the entire bibliographic database.

From a user's perspective, the heart of the database is the search facility. A search request can be either broad or specific, and may contain any number or combination of search parameters. As in all computer search operations, the rules of entry are very specific and must be observed. To reduce the burden of memorizing these rules, you will see relevant help messages displayed at all times during the search and retrieval processes. On-line help is always available, with lists of the keywords and abbreviations used for states and regions. These lists are also included, along with a complete keyword dictionary and a list of abbreviations of the journal names and organizations included in the database.

### 3. Contents of a Reference

Each entry in the bibliography contains the following discrete items, usually called 'fields,' of information (starred items can be searched on):

- \*- Title
- \*- Authors
  - Reference
  - Remarks (associations, special features, symposia, etc.)
- \*- Keywords
- \*- Pollutant(s) measured
- \*- Date of publication
- \*- Country
- \*- State/province
- \*- Geographic region
- \*- Type of building measured
  - Number of buildings monitored
  - Format of the data

Title, authors, reference, date of publication, and keywords are standard bibliographic items. Abstracts, when present, are entered in the summary database. In the bibliographic database we have included additional items, such as geography and data descriptors, to offer some of the information in the abstract in a compact form that can be utilized as search parameters.

**Type of buildings.** Currently, there are citations relating to four building types in the database: residences, schools, office buildings, and other public buildings. Buildings associated with industrial processing, such as factories, warehouses, etc., have not been included. A residence is a broad classification indicating any domicile and includes single family homes, attached and semi-detached homes, apartments, mobile homes, townhouses, etc. Since certain types of residences have received more detailed study, we have included some of these categories as keywords - specifically, mobile homes and apartments.

**Geography.** To enable you to be specific about the location, we have provided three fields detailing geography: country, geographic region (e.g., northeast or southwest), and state/province. We have focused on studies conducted in the United States and Canada. There is no universally accepted grouping of states or provinces of the United States or Canada into regions. Regional divisions of the states and provinces can be proposed by river boundaries, degree days, soil, climate, bureaucratic offices, etc. We have arbitrarily divided the United States into 10 regions and Canada into 4 regions. You should not attach any importance to the name or grouping other than as a convenient search capability. When you request a region during a search, you must use the two-letter codes (see page 35). When the reference is printed out, the entire region name is shown. Similarly, you refer to the states and provinces using the two-letter United States postal codes, which are always available via the on-line help facility.



**Data description.** We have tried to include a description of the data presented and have also listed the specific pollutants and the number of buildings that were monitored when specified in the reference. The pollutants are always entered as codes, but, they are printed out as full words.

#### 4. The Bibliographic Menu

After accessing the database as described above, and choosing the first menu selection, "1. Go to bibliographic menu," the following menu screen will appear.

Screen 4. Bibliographic menu.

```

                                B I B L I O G R A P H I C   M E N U

0. Quit
1. Do bibliographic searches
2. Print out references
3. Enter a new reference
4. Edit references
5. Enter new bibliographic keywords
6. Pack & Re-index bibliographic database

select _
```

You can now select any of the functions from this menu by entering the appropriate number. Below is a description of each function, with an example of the output that you will see.

#### 5. Searching the Bibliographic Database

**Introduction.** You can search the bibliography on any of nine fields: keywords, pollutant type, author's last name, year, building type, country, title, region, or state/province. A search request consists of a field name and a word that you wish to find in that field. After you enter your search requests, the program locates the references in the database that contain all your search requests. The results of the search are printed on the screen, and you can choose to view the records there or send them to your printer. After you have completed a search, you can start a new one, or edit and extend the old search request.

**Entering search words.** Page 30 of the online help facility, illustrated here in Screen 5, describes the search entry procedure and the parameters that can be searched for.

Screen 5. Help screen on searching bibliographic database.

You may enter up to 8 requests/search, or until the string limit is exceeded. You may enter duplicate FIELD requests, each with a different search WORD request.

Fields that can be searched are: pollutant, author, building type, year, country, state/province, region, title, and keyword.

NOTE: For author enter last name only, or last name <space> initials

For state/province you must use the 2 letter US postal codes.

For region you must use the 2 letter codes.

For building type, you can request residence, school, office or public (Omit word "building"). Residences include any domicile. Apartment, Mobile home are keywords.

For year, you must enter a date after 1960 (there are no references before then)

To advance the cursor while entering words, hit carriage return

To enter another search request, answer Y at the "More? Y/N"

As you can see, there are certain restrictions on the entry of search words. States and regions are entered as 2-letter codes. There are only four building types, and you can omit the word "building."

The first input the program requests is whether an (E)xclusive or (I)nclusive search is wanted. When more than one search word is entered, an exclusive search will find only citations that match all of the search words, while an inclusive search will find all citations that match any of the search words.

As you are entering the search words, a shorter help message is kept on the screen. This briefer version contains only the fields that you can search, the actual pollutant codes, the building types, and a reminder that you must enter codes for the states and regions. Below this message, you are prompted to enter a field name and a word to search for in that field in each bibliographic record. You can request more than one word per field, but you must enter each word separately. That is, you may search for keywords 'infiltration' and 'radon progeny,' but you must make each word a separate entry and specify the field name each time. After you have entered a request, the program combines the present request with all previous ones into one long search string. There is a limit, however, on the length of any search string. If you have entered too many requests and exceeded this length, the program will stop accepting new requests and ignore the one that would have caused the limit to be exceeded. In addition, no more than eight requests can be concatenated into one search. For each field that you can search, there are some details that you should know.

A. Pollutant type. There are eight pollutants that we have used as categories for classifying the references. The first four letters of the pollutant name are sufficient for entry, and are capitalized in the following list:

- 1 = RADOn
- 2 = FORMaldehyde
- 3 = ORGANics, excluding formaldehyde
- 4 = NOX, nitrogen oxides
- 5 = CO, carbon monoxide
- 6 = CO<sub>2</sub>, carbon dioxide\*
- 7 = PARTicles, respirable suspended particles (RSP)  
and total suspended particles (TSP)
- 8 = SO<sub>2</sub>, sulfur dioxide\*

Several other pollutants are given as keywords, such as odors and airborne microbes.

B. Year. If you want to find references by year, you will be asked to specify an extra character to indicate the scope of the search. If you want the search limited to the year that you indicated, enter '='. If you want all references before and including that year, enter '<'. If you want references after and including that year, enter '>'. You will be prompted for the character with a message indicating the choices and characters.

C. Keywords. You may select only those words found in the keywords list (see page 34). If you enter a word that is not in the list, an error message will appear, and re-entry prompted for. Enter F1, if necessary, to see the list of keywords.

D. Country. We have included references of studies on houses in the USA and Canada only. Therefore, you can enter only those two countries.

E. Region. You can request a region by entering one of the two-letter codes. The regions are arbitrary, and their sole significance is a convenient means of grouping states and provinces in larger geographical areas.

F. Building type. We have included only four building types - residences, schools, offices, and public. Do not enter the word "type." Remember, if you wish to search for "apartment" or "mobile home," you should enter these words as keywords and not building types.

G. Author's last name. You can request a particular author by entering his or her last name, or last name, space, initials (no periods).

H. Title. An exact match for the entered string is sought for, except that case is ignored.

\*Note that CO<sub>2</sub> and SO<sub>2</sub> are designated by CO2 and SO2 in this database and throughout this manual.

After you have entered the words that indicate your search request, you are asked to verify that your requests are correct and that you do want to search. So, if you have made an error, you can quit here and start again. If you indicate that you wish to search, you will see a message indicating that the program is searching. Screen 5 shows a complete search screen, with the brief search message in the beginning and requests for references with CO2 as a pollutant, in the Mid-Atlantic region (region code = MA), since the year 1980, in residences, with two keywords of 'infiltration' and 'radon progeny.' Note the multiple entry of the field name 'keyword' and the extra prompt for year.

Screen 6. Example of a bibliographic search.

```

Fields : POLLutant, AUTHor, KEYWord, BUILDing (type), YEAR, COUNtry,
        STATE, TITLE ,and REGION

Pollutant : RADOn, FORMALdehyde, ORGANics (other), NOX, CO, CO2, SO2,
           PARTiculates
Building type: RESidence, SCHOOl, OFFIce, or PUBLIC
             (Note that only CAPITALIZED portion of word must be entered)

For country, enter US = United States or Canada: for state, enter
the 2 letter US postal code for the states & provinces:
e.g. FL = Florida

           (E)xclusive or (I)nclusive search? E
In field = POLL           find word = CO2           More? (T/F) t
In field = BUILDING       find word = resi           More? (T/F) t
In field = REGI           find word = MA           More? (T/F) t
In field = YEAR           find word = 1980         More? (T/F) y
In field = AUTHOR         find word = George AC     More? (T/F) n

Enter '<' for references before (& including) date
'=' for references in that year
">" for references after (& including) the date : ≥
                                           More? (T/F) t
In field = KEYW           find word = infiltration More? (T/F) t
In field = KEYWORD       find word = radon progeny More? (T/F) t

--- Check your entries. Do you want to search? (T/F) y

--- Searching, please wait ---

```

Results of searching. Since the program must check each record for your particular combination of search requests, you may have to wait for a short time. When the search is complete, a list of the references found will be displayed, listing bibliographic ID code, whether or not there is an associated summary data set, and the first 40 characters of the first author field.

If more than 18 references are found in a single search, you can use "Page (F)orward, (B)ack" commands to view the one-line descriptors for all the references.

The next step is to choose to see (A)ll, (N)one, or (S)ome of the references. Either (A)ll or (N)one will simply proceed to display, or to the next search, respectively. (S)ome will allow you to choose which references you want to retrieve for output. An input field will appear immediately to the left of each reference, and you can enter "Y" or "N" to choose or not choose that reference, or "Q" to reject that and all following references, or "R" to output that and all following references. Screen 7 illustrates how the results of a search are displayed.

Screen 7. Results of a bibliographic search.

7 references found, 5 with associated summary data

ID code	Summ. data	Authors
BRUN1.83-1	.F.	Bruno RC
COHE2.83-1	.T.	Cohen BL, Kulwicki DR, and
DIAM1.84-1	.F.	Diamond RC, and Grimsrud DT
DOYL1.84-1	.T.	Doyle SM, Nazaroff WW, and
DUM01.84-1	.T.	Dumont RS
FLEI1.83-1	.T.	Fleischer RL, Mogro-Campero A,
GEOR1.83-1	.T.	George AC, and Eng J

Page (F)wd/(B)ack, output (A)ll, (N)one, or (S)ome references \_

Then a screen appears with a message about being careful that the printer is on, hooked up, etc., and a prompt about what mode of output you want. You must decide whether you want (F)ull, or (S)ummary output, and output to the (S)creen, to (F)ile, or to the (P)rinter. You can also (Q)uit the current search, without any output.

If printer output is chosen, the chosen references are printed out without any more intervention needed by you. Entering "Esc" at any time during the print operation will abort it at the top of the next page.

If screen output is chosen, you are given the choice, after each screen-full of output, to continue, quit, or view the (P)revious screenful of output. On the last screen, the user must (Q)uit to continue.

If output is displayed on the screen, two or three summary references, or one full reference, will be displayed at a time. The next screen is an example of a bibliographic reference.

Screen 8. Example of a reference from the database.  
(Only starred items appear in summary mode.)

Record No: 14 Summary data available ID code: GEOR1.83-2

\*George AC, Knutson EO, and Franklin H  
\* Radon & radon daughter measurements in solar buildings  
\*Health Phys., 45:413-420

Date: 8/83

Pollutant: Radon

Country: USA

State: Connecticut, New Hampshire, New Jersey, New Mexico, New York

Region: Rocky Mtn, Mid-Atlantic, New England

Building type: Residences

No. of bldgs: 11

Data format: lognormal distribution

Keyword: air exchange, continuous monitoring, energy efficient homes,  
flux, geographic distribution, grab, integrated, radon  
progeny, soil, ventilation, water

-----

<space>=continue, (P)revious Screen, (Q)uit

WAITING

If file output is chosen, you will be prompted to enter a filename, including, optionally, a device and path. If the file already exists, you will be alerted and given the choice to overwrite the file, or enter a new name. Limited validation is done on the filename, but a non-existent device or directory will cause an execution error. After the choice is checked, the selected references are output to the file in standard ASCII format, exactly as they would be to the printer, except that there is only one file header, and there are no imbedded formfeeds.

Summary Data. After the reference has been displayed, you will be asked if you want to retrieve any available summary data associated with your bibliographic selections. (Note the "Summary data available" at the top of the example screen.) If you do, the program will ask you if you want to see it on the screen or on a printer. You also have the option to not view it at all.

Screen 9. User options at the end of a search.

Another search?

- 1 = NEW search
- 2 = EXTEND present search
- 3 = CHANGE present search words
- 4 = QUIT searching

Enter your choice : 4

Continuations. Next, you will see another menu, shown in Screen 9, that allows you to continue searching but in difference modes. 1) You can begin a completely new search, 2) you can extend the present search by adding new search requests to the ones you have already entered, or 3) you can change one or more of the old search requests.

If you choose to make a new search, you are basically starting the search function again. If you choose to extend the search, the old search words are listed on the screen and you can add new search words. Additionally, you will see that the field name has been shortened to four letters. Instead of seeing "keyword" you will see only "KEYW". The program uses only the first four letters of the field name, but it requires your entire search word to properly search the database. The EXTEND option is useful if you have made a very broad search and wish to narrow it. For example, if you asked for just pollutant = radon and found that there were 90 references, you might want to narrow it further.

If you choose to change the search requests, the old search requests are listed on the screen one at a time so that you can change them. You can also add new requests if you wish. It is similar to a new search, but the initial requests are the ones you previously entered. The search combination will be those words that you have entered this time. Old search words that you have chosen to skip or change are no longer part of the search condition.

Error checking. Except for last name of the authors, and string searches on titles, the program checks to see that your entry is valid. If the program detects an incorrect entry - e.g., an incorrect state or region code, or a keyword that is not in the keyword list, you will see an error message and be prompted for re-entry. Entering a blank at this time will allow re-entry of both search category and word. If you enter F1, an appropriate help screen will appear, e.g., a list of states or keywords.

## 6. Printing References

The bibliographic print function supports screen display, ASCII file output, or printer output of one or more references, given the physical record number, or range of record numbers, of the references. The output mode (which is screen, printer or file) is available in summary or full format.

## 7. Entering References

One of the useful features of a distributed database is the ability to enter your own references. The process and results are exactly like those used at LBL, except that the bibliographic ID code is slightly different, to eliminate the possibility of duplicate ID codes when updating (BERK1.83-1 for LBL, BERK1.83.1 for users).

When you choose to "Enter a New Reference" on the bibliographic menu, some help and a proceed/quit choice are displayed. If you choose to proceed, the screen clears and an entry form for a bibliographic entry appears. Many of the entries are self-apparent, with the following notes. Mixed case is allowed. Many types of input errors are caught, and valid entries asked for. Hitting F1 will bring up information appropriate to the particular field being re-entered. The following are rules for entry. Starred items are validated.

General rules: No hyphenation across lines. Commas must separate items in lists, such as pollutants, authors, keywords, country, state, province, and building types. Lists will be alphabetized during validation.

\*POLLUTANT: To save space, pollutants are entered as numbers, from the list at the top of the screen

AUTHORS: The format is last name, space, initials (if any), comma. Names may be split over two lines, between last name and initials, but no periods are allowed. At least one author is required.

TITLE, REFERENCE, REMARKS, NO. OF BUILDINGS, DATA FORMAT: No specific restrictions, but a non-blank entry is required.

\*KEYWORDS: No hyphenation, multiple-word entries allowed. To add to keyword list, make appropriate choice from bibliographic menu. See paragraph 9 for details.

\*PUBLICATION DATE: Enter month / year, or <blank>/ year if month not known. Future dates and null-dates not allowed.

\*BUILDING TYPE/S: Enter entire word, without "building" (e.g., SCHOOL, OFFICES). Plurals accepted, singular form stored.

\*COUNTRY, STATE/PROVINCE: Enter only postal abbreviations.



GEOGRAPHIC REGIONS: Do not enter. The program will derive geographic regions from entered states/provinces.

REFERENCE CHECKED: For use at LBL; ignore.

SUMMARY DATA: Ignore.

When you are finished with your entry, you are asked if you wish to enter the reference. Check it carefully. If there are mistakes, enter (N)o to start over, or (Y)es, to begin validation. This takes a moment, after which the entered, validated, and alphabetized reference will appear on the screen and you will be asked if you want to continue or stop entry. Screen 10 is a sample of a completed entry screen after error checking has been done. The user's input is underlined but has been changed and formatted by the validation routine. The region codes are also shown at the bottom with the record number and idcode.

Screen 10. Example of a completed entry screen.

```
Enter the numbers corresponding to the pollutants: 1=radon,
2=formaldehyde, 3=other organics, 4=NOX, 5=CO, 6=CO2,
7=Particulates, 8=SO2, 9=all
Pollutant: 1,2,4,5,6,7,8
Authors: Young RA, Berk JV, Brown SR, and Hollowell CD

Title: Energy-conserving retrofits and indoor air quality in
residential housing
Reference: ASHRAE Trans. 88:Part 1 (875-894) Lawrence Berkeley
Lab, Berkeley, CA 94720, Report No.LBL-12847.

Remarks : Presented, DOE/ASHRAE Symposium, Houston, TX, 1/82.
Keywords: energy conservation, infiltration, retrofits,
ventilation, weatherization

Describe data format: 6 tables, 1 histogram
Date of publication (mm/yr): ( 9/81)
Country: USA State(s)/Provinces : NJ,OR
Type of building : Residences No. of Bldgs : 5
Article references checked? (T/F) t Summary data ? y
Regions : NW,MA

Do you want to enter this reference? (Y/N) t

Reference entered as Record 153 IDCODE 1YOUN1.81-1

type s to stop or hit carriage return to continue:
```

## 8. Editing References

Editing a reference is quite similar to entering a new reference, except that the current information about the reference is displayed instead of blanks. Any item can be edited, except geographic region; validation and error trapping are exactly the same.

To edit a reference, you enter all or part of its ID code. Invalid ID codes are rejected and re-entry prompted for. You can scroll around in the database, and delete and un-delete references (if you deleted them during the current editing session). If any references are deleted, the database is "packed" when the bibliographic function is exited, and the references are gone forever. Deletion is not allowed if the summary flag is indicated, so the summary flag must be changed if you truly want to delete the reference.

## 9. Entering New Bibliographic Keywords

This function is entered from the bibliographic menu. You are asked to enter a new keyword. The entry is checked against the list for duplicates. If none appear, the entry is added to the list. Although you can enter the keyword in upper and lower case, case is ignored in searches.

Note that you must, via entry or edit, key a particular reference for the new keyword. Note also that the keyword list in the on-line help facility is NOT automatically updated when new user-entered keywords are entered. You must be careful that new entries are truly new. Plurals and abbreviations of current keywords will be accepted by the system as new keywords.

## 10. Exiting the Bibliographic Function

When you are finished, you must exit from the main menu by selecting option "0". The program then closes the files and returns to the MAIN MENU. The "0" entry at the MAIN MENU will return you to DOS.

## Database of Summary Data

### 1. Introduction

If the user selects "2. Go to Summary Data Menu" from the MAIN MENU, the screen clears and is replaced by the SUMMARY DATA MENU, as shown in Screen 11 below. The summary data feature contains experimental results from selected references in the database. This capability is limited to data compiled from the earlier releases of the CIP and will not be updated in this or future releases, owing to the time involved in compiling such information and its superfluous nature with respect to the main function of the database as a bibliographic reference.

Screen 11. Summary data menu.

```
          S U M M A R Y   D A T A   M E N U

0. Exit
1. Do searches of summary data
2. Retrieve summary data with id codes

      select : :
```

Selecting 0 takes the user back to the main menu. Selecting 1 takes the user into the summary data search function, which is described below.

Selecting 2 takes the user to a function that prints or displays the summary data for a single experiment, given either the bibliographic ID code, or the summary data ID code. These codes are printed out along with the summary data. The reason for both an experiment and a bibliographic ID code is the possibility that more than one experiment may be referenced by a single bibliographic citation, and vice versa.

Summary data for a particular experiment are limited to five pages or fewer, due to space considerations. The stored data are quoted from a peer-reviewed, published article, or final report, and usually consist of the abstract, some part of the introduction, discussion, conclusions, and information relating to site and experimental methodology. A few of the tables of data in the article are stored, and occasionally a plot has been reduced to a table for inclusion in the database.

### 2. Searching the Summary Database

The quantitative search program will retrieve summary data for specific experiments referenced in the bibliographic database, based

upon the requests of the user. The experimental conditions that can be searched for include: pollutant; air sampling method and instruments used for sampling; building type; building substructure; building materials (external and internal); type of energy predominantly used in the building; heater/air conditioning types; fans and vents; numeric ranges, including pollutant concentration, infiltration (ACH), and climate (in degree days); and a miscellaneous category. Each experimental condition will be discussed below in the text.

Throughout the duration of the search, all of the search fields and codes are displayed at the top of the screen. The codes appear between the "<>" symbols (see Screen 12). After you enter your search request(s), the program will search the database and, when finished, display the number of experiments matching your request, and a line of information about each one. You will then have the option of printing or displaying on the screen all, some, or none of them, or leaving the search program.

### Screen 12. Search fields and codes

```

SEARCH ON:

<POLL>utant                <ETYP> Energy Type        <SS>Substructure
<PR> Parameter Range      <ADIS> Air distribution
<ASM> Air Sampling Method <FANS>
<BMAT>ext. Building Materials <INST>rumentation
<INT>terior Building Materials <RGN> Region
<BTYP> Building Type      <MISC>ellaneous

SELECT: <RADON> <FORMA>aldehyde <CO> <CO2> <NO> <NO2> <SO2>
        <PARTI>ulates <ORGAN>ics

SEARCH FIELD | FIND
POLL       | FORMA

```

### 3. Experimental Conditions

To begin a search, enter your first "search field" request. Enter only the code that appears between the "<>" symbols. Each search field is discussed below. After you enter a valid search field, all the search options for that specific field will be displayed, following the prompt "SELECT," as illustrated by Screen 12.

A. Pollutant <POLL>. There are currently nine pollutants that may be searched for in the database. These are <RADON>, <FORMA>ldehyde, <ORGAN>ics, <NO>, <NO2>, <CO>, <CO2>, <SO2>, and <PARTI>ulates. Subscripts are keyed as normal (non-subscript) numbers. If a pollutant name consists of more than five characters, only the first five are entered, as shown for formaldehyde and particulates. The POLLutant field is only used when you are not looking for a concentration range for that

pollutant (see Parameter Range below). Screen 12 illustrates entry of a search request for the pollutant formaldehyde. Searches for other conditions would be similar.

B. Air Sampling Method <ASM>. This is a general field defining the type of air sampling as <GRA>b, <INT>egrated, or <CON>tinuous.

C. Instrumentation <INST>. Currently, the instruments or methods used for pollutant detection or measurement that can be searched for are <GCMS> Gas Chromatography and Mass Spectroscopy, <CHRO>otropic Acid, <PARA>rosaniline, <TENA>x, <TRKE> Track Etch Detectors, and <PERS>onal Monitors.

D. Building Type <BTYP>. The several types of buildings that can be searched for are <RE>sidence, <AP>artment, <MO>bile home, <TO>wn house, <AT>tached garage, <SC>hool, <OF>fice, and <PU>blic.

E. Building Sub-structure <SS>. Sub-structures that can be currently searched for include: <BAS>ement, <CRA>wl space, <SLA>b on concrete, <SUM>p, and <HAL>f basement.

F. Building Materials (exterior) <BMAT>. Building materials refer to the the primary exterior structural component of the building(s) in which pollutant concentrations were measured, not the source of pollutants. These materials are <WO>od frame, <STU>cco, <BR>ick, <CI>inder block, <AD>obe, <ST>one, <PC>poured concrete, and <EX>perimental materials.

G. Building Materials (interior) <INT>. This field refers to the primary interior building materials, including: <VEN>eer paneling, <PLA>ster board, <WO>od, <BR>ick, <ST>one, and <LEA>d paint.

H. Energy Type <ETYP>. This field refers to the predominant type of energy used for heating, cooling, etc., in the building under study. These include <EL>ectricity, natural <GAS>, <OIL>, <WOS> wood space/stove, <KER>osene, and <SO>lar.

I. Air Distribution <ADIS>. This field refers to the type of heaters and/or air conditioners used in the building under study. They include <FA> forced air, <RA>diant, <PRC> per-room combustor, <FP> fireplace, <HP> heat pump, <CAC> central air conditioning, <PRA> per-room air conditioning, and <EVA>porative cooler.

J. <FANS>. This field specifies types of fans and/or vents identified in the building under study. They include <KEX> kitchen exhaust, <BEX> bathroom exhaust, <AEX> attic exhaust, <WF> window fan, <ATV> attic vent, <DRV> dryer vent, and <AHE> air-to-air heat exchanger.

K. REGION <RGN>. Each experiment generally specifies a state or region in which indoor air pollution is being studied. They are as follows (see page 35 for which states are found in each region): <NE> New England, <MA> Mid-Atlantic, <SE> Southeast, <SO>uth, <SW> Southwest, <MC> Mid-Central, <MW> Midwest, <RM> Rocky Mountain, <NW> Northwest, <WE>st, and <AU> for all U.S.; <CM> Canadian

Maritime, <CC> Canadian Central, <CP> Canadian Prairie, <CW> Canadian West, and <AC> for all Canada.

L. Parameter Range <PR>. This field allows you to search for a number of numeric ranges. Currently they include pollutant concentration range, infiltration range <ACH>, and <CLIM>ate range. Infiltration units are assumed to be air changes per hour, and climate range units are assumed to be degree-days (deg. F.). For pollutant concentration ranges, units for radon must be in pCi/Liter, and for particulates,  $\nu\text{g}/\text{m}^3$ . For all other pollutants, however, you are given the option of entering the range in PPM, PPB, or  $\nu\text{g}/\text{m}^3$ . In any case, an indicator of the appropriate unit will appear to the right of the range entry fields, as illustrated below.

An experiment will be found if the lower range and/or the upper range of the experiment falls anywhere within the range you enter. In the following figure all the ranges shown will be found with the search range indicated.

```
Range Entered      [-----]
Example 1.         [-----]
Example 2.         [-----]
Example 3.         [-----]
Example 4.         [-----]
```

The following two screens illustrate typical parameter range searches. With these and subsequent screen illustrations, the upper part of the search screen has been omitted for brevity's sake.

Example 1. Find all experiments where infiltration range falls within 0.1 to 0.5 ach/hr.

Screen 13. Parameter range search request, ACH.

```
SEARCH FIELD | FIND
  PR         | ACH  Lower range = .1 ach/hr
              |      Upper range = .5
```

Example 2. Find all CO ranges between 10 and 100 PPM.

When you choose CO as the PR, a prompt for units will first appear, as illustrated in Screen 14. Select <1> for PPM; the units prompt will disappear and the range entry fields appear as above.

Screen 14. Pollutant range search request, CO.

```
SEARCH FIELD | FIND
  PR         | CO Select Units <1>PPM <2>PPB <3>ug/m3 1
```

M. Miscellaneous <MISC>. Currently, this field serves as a "depository" for other miscellaneous factors that may have an effect on indoor air quality. They include: <EEFB> energy efficient buildings, <UFFI> urea formaldehyde foam insulation, <MSW> municipal surface water, <MWL> municipal surface well, <PWL> private well, and <TBSM> tobacco smoke.

#### 4. Searching for Multiple Experimental Conditions

You may search for up to five experimental conditions in one search. There are two ways in which the search may be conducted. The first is an INclusive search on all requests AFTER the first. This means that the final result will be experiments matching the first request and ANY other subsequent request (up to five total requests). The second type of search is an EXclusive search, which implies that each experiment that is found will match ALL the experimental conditions you have entered.

After entering your first search request, you are asked whether or not you wish to enter more search requests (see Screen 16). If you do, the message in Screen 15 will appear.

Screen 15. Exclusive/inclusive search options.

Do you wish the remaining search to be:  
 <E>xclusive (and) or <I>nclusive (or)

A typical multiple request search might be to find all experiments containing a radon concentration range between 0 and 2 pCi/liter measured in residential buildings, and using a time-integrated sampling technique to measure pollutant concentrations.

Screen 16. Multiple search request.

SEARCH FIELD	FIND
<u>PR</u>	<u>RADON</u> Lower range = <u>0</u> pCi/liter Upper range = <u>2</u> More(Y/N)? <u>Y</u>
<u>ASM</u>	More(Y/N)? <u>Y</u>
<u>BTYP</u>	<u>INT</u> <u>RE</u> More(Y/N)? <u>N</u>

Each time you want to add to the search (up to five requests), answer Y to the "More" query, and when you are finished enter N.

## 5. Error Messages

An incorrect entry under either "search field" or "find" will cause an error message and prompt, as shown in Screen 17. You must either correct the entry or enter a blank.

Screen 17. Response to incorrect entry.

SEARCH FIELD		FIND	
<u>PR</u>		<u>RADON</u>	Lower range = <u>0</u> pCi/liter
			Upper range = <u>2</u> More(Y/N)? <u>Y</u>
<u>ASM</u>		<u>INR</u>	
<hr/>			
WARNING!, invalid ASM entry Please RE-ENTER			

If you enter a blank for either a field, e.g., <PR>, or query, e.g., "CO", you will receive the response illustrated by Screen 18, except that a blank query entry will not give you the fourth choice of beginning the search with previous requests (assuming there are more than one).

Screen 18. Response to blank entry.

BLANK entry encountered:			
SELECT:	(1)BEGIN	a new search	(2)RETURN to the main menu
	(3)RE-ENTER	request	(4)SEARCH with current requests

If you enter 1, the current search will be disregarded and a new search will begin. If you enter 2, you will leave the search routine and go back to the main menu. Entering 3, will allow you to re-enter the current request and continue entering up to five requests. To continue the search, fill in the blank field with a valid entry. Option 4 will allow you to end the search request with the previous entry, and a search will be conducted for all conditions entered up to the field left blank.

## 6. Search Results

If no experiments are found for your search request(s), Screen 19 illustrates what will appear on the screen:

Screen 19. Negative result display.

There were NO experiments found for this search.	
SELECT:	<B>egin again or <R>eturn to the main menu

Response B will start a new search, disregarding the previous requests. Response R will return you to the main menu.



If any experiments are found matching your search request, you will get the following message:

Screen 20. Positive result display.

```
nn Experiment(s) found. Choose one of the following:
<P>rint Experiment(s)      <D>isplay Experiment(s)
<B>egin NEW search        <R>eturn to main menu
```

where "nn" represents the number of experiments found. If you choose to print the experiments, make sure your printer is hooked up and ready to print in order to prevent "stalling" the program and possibly damaging database files. If you want to see the experiments displayed on the screen only and not printed, choose option D. If you choose to print or display the experiments, a list of experiment number, bibliographic ID, and principal author for each experiment found will be displayed on the screen (see Screen 21). You can page forward or back to see this list if it won't all fit on a single screen. You then choose to output (A)ll, (N)one, or (S)ome of the experiments referenced by the list. Choosing (S)ome will cause an input field to appear at the left of each entry in the list in turn, giving you the opportunity to choose or skip the current entry (Y or N), or output the (R)emainder, or (Q)uit, skipping output of the remainder of the list.

Screen 21. Display of experiments found.

<u>Experiment ID</u>	<u>Bibliog. ID</u>	<u>Principal Author</u>
<u>T</u> BE11	BERK1.81-1	BERK JV
<u>F</u> FL11	FLEI1.83-1	FLEISCHER RL
<u>T</u> NA21	NAGD1.83-1	NAGDA NL

Page (F)wd/(B)ack, Print/Display (A)ll, (S)ome, or (N)one of the above S  
(Q)uit printing, print the (R)emainder

After your choices have been made, output proceeds. If you have stored the summary data on floppy disks, you will be prompted when to insert the proper disk. In this case the list of experiments has been re-ordered so that you will need to insert a particular disk only once during the output. If you can't find the disk, you can skip the output of that experiment.

During the screen display of summary data, you are prompted after each screen-full as to whether you want the next screen-full (space), (N)ext experiment, or to (R)eturn to the search mode. An "N" entry will bring up the next experiment, if any, and an "R" entry will skip all further output of summary data for the current search. Screen 22 illustrates the first screen of summary output from a

particular experiment. Some lines have been omitted for the sake of brevity.

Screen 22. Example of screen display of summary data.

BE15FD01 BERK1.79-1

THE EFFECT OF REDUCED VENTILATION ON INDOOR AIR QUALITY AND  
ENERGY USE IN SCHOOLS

J.V. Berk, C.D. Hollowell, C. Lin, and I. Turiel 1979

ABSTRACT

The indoor air quality in an air conditioned California high school has been measured over a variety of ventilation rates ranging from 13.3 cubic feet of outside air per minute for each classroom occupant to approximately 1.5 cfm per occupant. The purpose of this pilot study was to determine the effect of reduced ventilation on indoor air quality and energy use.

BE15 <space> continue, (N)ext experiment, or (R)eturn to search mode

After the experiments are printed or displayed on the screen, you will be asked if you want to retrieve the bibliographic references associated with the experiments you selected. If you do, you will be given the choice of output mode just as during a bibliographic search, followed by the output of the references.

You will then be asked whether or not you want to begin another search. A positive response will begin a new search, and a negative response will take you back to the SUMMARY DATA MENU.

## 7. Searching Strategies

As may be readily apparent, the options for each search field are not mutually exclusive. For example, a building type may be a residence and have an attached garage. Under these circumstances, an experiment examining this type of building would be found if one search requested building type as residence, attached garage, or both. If you wanted the result to contain experiments that examined only residences with attached garages, you would need to do an exclusive search requesting building type twice, once for residence and once for attached garage.

When doing a multiple request search, it will reduce the searching time if you enter the most specific request first, i.e., the one that will produce the fewest experiments. For example, if you wish to find all experiments with a specific radon concentration range using a time-integrated method of measurement, the search will be much faster if you first request the radon concentration range followed by the integrated air sampling method rather than the other way around. All multiple searches requesting a pollutant (using either the PR search field

or the POLL field) and another search field should be done by entering the pollutant request first, followed by any other search field. Due to the manner in which the database file is constructed, this search will be much faster than if, for example, one requested a region first followed by a specific pollutant.

#### **8. Exiting the Summary Data Function**

When you're finished accessing summary data, enter "0" at the SUMMARY DATA MENU and you will be returned to the CIP Database MAIN MENU.

## CIP Keywords

The following keyword definitions are used in choosing keywords for the bibliographic database.

Keywords are determined somewhat differently in the CIP Database than in other bibliographic databases. CIP Database keywords are chosen to indicate significant characteristics of the field experiment. This means that the mere appearance of a keyword in an article does not guarantee its entry in the database, nor that the appearance of a keyword in the database guarantees its appearance in the article. In the former case, the keyword in question might be mentioned in the introduction to an article, and have little to do with the actual research being reported on. In the latter case, the subject area covered by a particular keyword may be present in the article, without the actual keyword appearing there.

Immediately following the keyword are what we consider to be synonyms. These are not synonyms in the usual sense of the word, but rather terms used in the literature that either overlap or can be subsumed under a single keyword. Air exchange rate and infiltration are distinct, yet overlap in usage. We have subsumed them both under infiltration, in order that keyword searches be simpler and more coherent, and to make keywording easier.

When a particular pollutant, or quantifiable characteristic, is mentioned in an article, there must have been actual measurements made of the particular pollutant. The measurement can be either qualitative or quantitative. For example, many articles may refer to questions of the health effects of indoor air quality. For it to be a keyword, however, there must have been some measurement of health effects to an exposed population, or the choice of measurement sites must have been based on a health factor, such as asthma.

Some keywords, such as energy conservation, are more vague, but if noted energy-conserving practices or designs affected the measured level of pollutants, it would be a keyword.

Some non-quantifiable keywords, such as plywood or stoves, may be assumed to be in most homes. Only, however, if their presence was reported to play a definite role in the reported field experiment would they be used as keywords.

Attributes of a monitored pollutant, such as allergen, are keyworded only when specifically discussed in the article.

### Keyword List:

airborne microbes - Microbial content in air, both bacterial and viral, usually on particles.

allergen [irritant] - Any recognized agent that causes allergic reactions, either organic or inorganic. Restricted to studies where health effects of a particular allergen were measured.

apartment - Used if any of the monitored sites were apartments, or if apartments are a focus of the experiment. Includes townhouses and duplexes.

BAP - Benzo[A]pyrene. Only if actually measured or determined to be present.

building materials - Includes all building materials, but only if the effect of particular building materials was a focus of the experiment.

carcinogen - Used to indicate measurement of recognized carcinogens not in the keyword or pollutant list.

chromatography - Measurement technique.

combustion - Used to indicate measurement of pollutants associated with combustion processes, unless covered by a more specific keyword, such as kerosene or gas.

continuous monitoring [real-time monitoring] - A measurement technique that records instantaneous pollutant levels relatively frequently, at least once every hour or so, although sometimes much more frequently.

controlled study - This generally indicates an experiment carried out, at least in part, in a heavily instrumented, unoccupied residence or building; not a chamber study.

diurnal variation - Where attention was paid to diurnal variations of pollutant levels.

electrical - Indicates use of electricity for space heating or cooking, generally where comparisons are being drawn between different energy sources for these purposes.

emission rates - Indicates determination of pollutant emission rates from a particular source, such as a stove or heater. Is different from simply measuring pollutant levels.

energy conservation [energy-efficient building] - Used when a monitored building has attributes of energy-conserving designs or practices, and these attributes are factored into the data analysis.

fireplace - Used when pointed out as a potential pollutant source, or as a factor in ventilation rates, where ventilation rates were measured.

flux - Used to indicate a focus on movement of gas, such as radon, through materials, such as earth or concrete.

gas - Natural gas, the energy source, used when indicated as a factor in pollutant levels.

GCMS - Gas chromatography/mass spectrography, a popular measurement technique, particularly with passive samplers and volatile organic compounds.

geographic distribution - Used when a number of sites are monitored, and their location is related to geographic features, such as power plants, radon sources, urban-rural comparisons, etc.

grab - Monitoring technique where samples of air are "grabbed" from the monitored environment for subsequent measurement.

health effects [epidemiology] - Used to indicate experiments where health effects to an exposed population were measured.

heat exchanger - Air-to-air heat exchanger, when present.

heat pump - Used where pointed out as a potential factor in pollutant levels.

HVAC - Used when HVAC (heating, ventilation, and air conditioning) systems are monitored, and/or modified, for their effect on pollutant levels.

infiltration [air exchange rate, ACH, natural ventilation] - Air exchange rate. The rate of exchange of air between indoors and the ambient environment. Syn.: infiltration, ventilation.

integrated - Monitoring technique where pollutant is adsorbed or collected over a significant time, weeks to months, for subsequent, separate measurement. Usually associated with passive samplers.

kerosene - Energy source, when pointed out as potential pollutant source in space heating.

leakage area - Measure of uncontrolled infiltration through a building shell, usually in square centimeters.

lognormal distribution - Used to indicate a fit of experimental data to a lognormal distribution.

mechanical ventilation - Forced ventilation, such as fans, when present and noted as a factor in the experiment.

mitigation [retrofits] - Modifications to the environment in question to lower pollutant levels, when carried out and evaluated.

mobile homes - As a type of residence, when present and distinguished from other residential types.

modeling - Mathematical schema to connect pollutant levels to characteristics of the monitored environment, when done. Also used to indicate papers where only modeling studies were carried out, and no new field measurements reported. In that case, keywords related to the data would still be entered.

mutagen - Agent recognized to cause mutations, when specifically pointed out.

odors - Many pollutants, particularly volatile organics, have characteristic odors, but used only where actually measured.

offgas [outgassing] - Used where offgassing of pollutants from surfaces or materials is measured.

ozone - O<sub>3</sub>, natural atmospheric component, health hazard at higher concentrations, where measured.

PAH - Polycyclic aromatic hydrocarbons, where pointed out as a class of potential pollutants, and measured.

particle board [chipboard, presswood, masonite] - Any of a number of wood products made of wood particles and binders. When specifically indicated as a pollutant source, particularly where offgassing is measured. Often relevant in mobile home studies.

passive sampler - A type of air-sampling device requiring no power source for operation, when used.

personal monitor [personal exposure] - Refers to use of personal monitors and other devices to measure pollutant levels in the immediate environment of an individual in a variety of macroenvironments, as against the pollutant levels measured in a particular environment. Entered when part of the reported research.

pesticide - Entered when specifically pointed out, and measured.

photocopiers - Entered when determined to be a pollutant source in the research being reported.

plywood - A potential source of formaldehyde and other organics, when focused on, or when offgassing is measured. Often relevant in mobile homes studies.

pollen - Used where pointed out as a class of potential pollutants, and measured.

pressurization - Refers to the fan-pressurization technique of measuring the air-leakage area of a structure, when employed.

radon progeny - Radioactive decay products of radon, when separately measured from radon.

real time - Study using instantaneous or very frequent sampling techniques. (See continuous monitoring.)

review - A review article that generally discusses previously published work for purposes of review and analysis.

risk - Health risk to exposed populations, when measured.

seasonal variation - Correlation of pollutant levels with the time of year, when reported.

sick buildings [tight building syndrome] - Buildings other than residences that have a higher-than-average report rate of symptoms related to indoor air quality. Used when specifically pointed out.

soil - Used when focused on as a pollutant source, usually in radon work.

source strength - Amount of pollutant emitted by a particular source, when measured.

stoves - Common pollutant source. Entered when focused on.

survey - Used to indicate where a number of structures were monitored with the goal of characterizing a region, or a class of structure, or a pollutant source, etc.

Tenax - A particular absorbent material used in passive samplers, when pointed out.

tobacco smoke (ETS) - When pointed out as probable pollutant source, usually via resident questionnaires as either mainstream or sidestream tobacco smoke.

UFFI - Urea formaldehyde foam insulation. When it occurs as a focus of study or source of emission rates of VOCs.

ventilation - Used to indicate focus on effects of ventilation on indoor air quality.

VOC - Volatile organic compounds. Where pointed out as a class of potential pollutants, and measured.

water - When focused on as a potential or determined pollutant source, usually in radon work.

weather data - Data about local weather conditions during field monitoring work, if included.

weatherization - Measures to increase energy efficiency of buildings with regard to space heating, when focused on.

wood - As an energy source for heating, cooking, etc., when focused on, often in comparison to other energy sources.



## Abbreviated Keyword List

airborne microbes	modeling
allergen	mutagen
apartment	odors
BAP	offgas
building materials	ozone
carcinogen	PAH
chromatography	particle board
combustion	passive sampler
continuous monitoring	personal exposure
controlled study	pesticide
diurnal variation	photocopiers
electrical	plywood
emission rates	pollen
energy conservation	pressurization
fireplace	radon progeny
flux	real time
gas	review
GCMS	risk
geographic distribution	seasonal variation
grab	sick building
health effects	soil
heat exchanger	source strength
heat pump	stoves
HVAC	survey
infiltration	Tenax
integrated	tobacco smoke
kerosene	UFFI
leakage area	ventilation
lognormal distribution	VOC
mechanical ventilation	water
mitigation	weather data
mobile homes	weatherization
	wood

## Geographic Codes

### United States Geographic Regions

NE (New England)	Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut
MA (Mid-Atlantic)	New York, New Jersey, Pennsylvania, Maryland, District of Columbia, Delaware
SE (Southeast)	Virginia, North Carolina, South Carolina, Georgia, Florida
SO (South)	Alabama, Mississippi, Tennessee, Kentucky
SW (Southwest)	Texas, Oklahoma, Louisiana, Arkansas
MC (Mid-Central)	Ohio, Michigan, Indiana, Illinois, Wisconsin, West Virginia
MW (Midwest)	Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas
RM (Rocky Mountain)	Montana, Wyoming, Colorado, Utah, New Mexico
NW (Northwest)	Idaho, Oregon, Washington, Alaska
WE (West)	California, Nevada, Arizona, Hawaii

### Canadian Geographic Regions

CM (Maritime)	Prince Edward Island, Nova Scotia, Newfoundland, New Brunswick
CC (Central)	Ontario, Quebec
CP (Prairie)	Manitoba, Saskatchewan, Alberta, Northwest Territories
CW (West)	British Columbia, Yukon Territory

Valid States and Canadian Provinces

AB	Alberta (C)	NC	North Carolina
AK	Alaska	ND	North Dakota
AL	Alabama	NE	Nebraska
AR	Arkansas	NF	Newfoundland (C)
AZ	Arizona	NH	New Hampshire
BC	British Columbia (C)	NJ	New Jersey
CA	California	NM	New Mexico
CO	Colorado	NS	Nova Scotia (C)
CT	Connecticut	NT	Northwest Territories (C)
DC	District of Columbia	NV	Nevada
DE	Delaware	NY	New York
FL	Florida	OH	Ohio
GA	Georgia	OK	Oklahoma
HI	Hawaii	ON	Ontario (C)
IA	Iowa	OR	Oregon
ID	Idaho	PA	Pennsylvania
IL	Illinois	PE	Prince Edward Island (C)
IN	Indiana	PQ	Quebec (C)
KS	Kansas	RI	Rhode Island
KY	Kentucky	SC	South Carolina
LA	Louisiana	SD	South Dakota
MA	Massachusetts	SK	Saskatchewan (C)
MB	Manitoba (C)	TN	Tennessee
MD	Maryland	TX	Texas
ME	Maine	UT	Utah
MI	Michigan	VA	Virginia
MN	Minnesota	VT	Vermont
MO	Missouri	WA	Washington
MS	Mississippi	WI	Wisconsin
MT	Montana	WV	West Virginia
NB	New Brunswick (C)	WY	Wyoming
		YT	Yukon Territory (C)

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