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Users' Guide for a Personal-Computer-Based Nuclear Power Plant Fire Data Base

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Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550
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USERS' GUIDE FOR A PERSONAL-COMPUTER-BASED NUCLEAR POWER PLANT FIRE DATA BASE

Wallace T. Wheelis

Date Published: August 1986

Sandia National Laboratories
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ABSTRACT

The Nuclear Power Plant Fire Data Base has been developed for use with an IBM XT (or with a compatible system). Nuclear power plant fire data is located in many diverse references, making it both costly and time-consuming to obtain. The purpose of this Fire Data Base is to collect and to make easily accessible nuclear power plant fire data.

This users' guide discusses in depth the specific features and capabilities of the various options found in the data base. Capabilities include the ability to search several database fields simultaneously to meet user-defined conditions, display basic plant information, and determine the operating experience (in years) for several nuclear power plant locations. Step-by-step examples are included for each option to allow the user to learn how to access the data.

CONTENTS

Section			Page
ACKNOWLEDGMENT			xi
GLOSSARY			xiii
1	INTRODUCTION		1
2	READ ME FIRST		3
3	INSTALLATION PROCEDURES		5
	3.1	How to Install the Data Base and Command Files on Your Computer	5
	3.2	Getting Ready to Use the Fire Data Base	6
		3.2.1 Method 1: dBASE III Diskettes in Drive A	6
		3.2.2 Method 2: dBASE III Installed on a Hard Disk	8
4	KEY WORDS AND TRICKY PHRASES		9
5	SAMPLE FIRE DATA BASE OPERATIONS		13
	5.1	Design of This Section	15
	5.2	Getting Started (Including Display Setup)	17
	5.3	Descriptions and Examples	23
		5.3.1 Main Menu	25
		5.3.2 Fire Event Search Menu	27
		5.3.3 Full Fire Event Data Display	31
		5.3.4 Essential Fire Event Display	43
		5.3.5 Fire Duration/Suppression Time Search	47
		5.3.6 General Search Routine	57
		5.3.7 Chronological Listing of Fire Events	75
		5.3.8 Fire Event Descriptions	85
		5.3.9 Operational Experience Calculations	93
		5.3.10 Basic Plant Information	105
		5.3.11 Modify Display Options	115
		5.3.12 Plant Name/Incident Number Listing	117
6	OVERVIEW OF PROGRAM ARCHITECTURE		121
	6.1	Data Base Files	121
	6.2	Options Available	125
	6.3	Structure of the Options	129
	6.4	Types of Inputs Required	133

CONTENTS (Cont'd)

Section		Page
7	PROGRAM INSIGHTS	137
	REFERENCES	143
	APPENDIX A - Tips for Experienced Users	145
	APPENDIX B - Data Base File Editing and Updating	159
	APPENDIX C - Where to Get the Data Base Diskettes ...	183

LIST OF FIGURES

Figure		Page
1	Fire Data Base Title Page	17
2	Date Validity of Data Base Entries	17
3	Capital Letter Use Prompt	18
4	Capital Letter Use "Try Again Prompt"	18
5	Fire Data Base Program Setup General Information	19
6	Fire Data Base Program Setup Detailed Information.	20
7	Heading Block Time Change Prompt	20
8	Heading Block Time Entry	21
9	Preliminary Information Prompt	21
10	Informational Prompt	21
11	Completion Message Prompt	22
12	Main Menu	25
13	Fire Event Search Menu	28
14	Full Fire Event Data Display Option Flowchart	32
15	Essential Fire Event Display Option Flowchart	44
16	Duration/Suppression Time Search Option Flowchart	48
17	General Search Routine Option Flowchart	58
18	Chronological Fire Event Display Option Flowchart	76
19	Fire Event Description Option Flowchart	86
20	Operational Experience Calculations Option Flowchart	94
21	Basic Plant Information Option Flowchart	106
22	Basic Option Structure of the Data Base	126

LIST OF FIGURES (Cont'd)

Figure		Page
23	Sample Heading Block	127
24	Sample Preliminary Information Display	130
25	Sample Data Entry Prompt Requiring the "Return" ("Enter") Key to be Pressed to Continue	130
26	Sample Data Entry Prompt Requiring a Response to a Yes/No Question	130
27	Sample Informational Prompts	131
28	Sample Completion Message	131
29	Sample Text Entry	134
30	Sample Numerical Entry	135
31	Summary of Questions Asked in the Full Fire Event Data Display Option	149
32	Summary of Questions Asked in the Essential Fire Event Display Option	150
33	Summary of Questions Asked in the Fire Duration/Suppression Time Search Option	151
34	Summary of Questions Asked in the General Search Routine Option	152
35	Summary of Questions Asked in the Chronological Listing of Fire Events Option	153
36	Summary of Questions Asked in the Fire Event Descriptions Option	154
37	Summary of Questions Asked in the Operational Experience Calculations Option	155
38	Summary of Questions Asked in the Basic Plant Information Option	156
39	Summary of Questions Asked in the Setup Option	157
40	Example of DESC Entries for a Fire Event	170
41	Example Three-Unit Site Sharing Code Assignment	177

LIST OF FIGURES (Cont'd)

Figure		Page
42	Example Two-Unit Site Sharing Code Assignment	177
43	Example Single Unit-Site Sharing Code Assignment ..	177

LIST OF TABLES

Table		Page
1	Structure of the FIRE Data Base File	160
2	FIRE Data Base File Field Descriptions	162
3	Structure of the DESC Data Base File	169
4	Structure of the OPEXPER Data Base File	171
5	OPEXPER Data Base File Field Descriptions	172
6	Interpretation of Plant Areas	174
7	OPEXPEX Plant Sharing Code Assignment	175
8	Sharing Code Combinations and Meanings	176
9	Structure of the SUM Data Base File	179
10	SUM Data Base File Field Descriptions	180

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The efforts of many people contributed to the completion of this Fire Data Base Users' Guide and are gratefully acknowledged. Specific mention and thanks must be given to the Albuquerque, NM, office of International Energy Associates Limited (IEAL) and to José Saloio in particular. Without his efforts in gathering, collating, and entering the fire data into the data base structure, the data base could not have been completed.

GLOSSARY

Chronological Listing: A listing of fire events based on their date of occurrence. The events are listed in ascending order, starting at the oldest date and progressing to the youngest (or most current) date.

Choice: When a data entry prompt appears, a response must be given to the question before the program will continue. Several alternatives may be available for you to take at this prompt. The particular alternative that you take is the choice for that question.

Clear: Make present screen contents disappear. Contents are replaced by either a flashing cursor (generally in the upper left corner of the screen) or different text.

Data Base: Data base files (where fire event data are stored) and the software programs necessary to manipulate these data.

Data Base Files: Files that were created using dBASE III and that contain fire event information.

Data Entry Prompt: Questions asked by the program that, once answered, require that the "RETURN" key be pressed to continue. Input information is supplied to the program and ultimately used to search the data base. The answers supply information to the program used to search the data base.

Date of Commercial Operation: The date (declared by the utility) that a nuclear power plant began generating electrical power for sale to consumers. (This definition is similar to that found in NUREG-0020.[7])

Date of Initial Criticality: When a nuclear chain reaction first occurred at a nuclear power plant.

Display: Material on the screen.

Fire Event (Fire Incident): A fire that occurred at a nuclear power plant.

Hard Copy Output: Output of the printer (on paper).

Informational Prompt: A few lines of text displayed on the screen that tell what to expect next. No actions are required when these prompts appear; they will automatically be replaced by data entry prompts.

Operating Experience: The difference (in years) between a user-specified date and the date of initial criticality or, as a second option, the date of commercial operation.

Option(s): The selection of one (or more) of nine program paths that permit the user to look at the data base files in a particular way or to change display format.

Path: Ways that can be used in an option to search the data base (e.g., the data base may be searched by means of a plant name or a plant identification number, in which case there are two paths that can be followed.)

Printer: The device to which you send fire data base information to get a hard copy output.

Program(s): Software computer program(s) written specifically to access the data base files.

"Return": The keyboard key labeled as either "Return" or "Enter".

Screen (or Monitor): The cathode ray tube (CRT) normally used with a personal computer (PC).

USERS' GUIDE FOR A PERSONAL-COMPUTER-BASED NUCLEAR POWER PLANT FIRE DATA BASE

1. INTRODUCTION

Any probabilistic risk assessment (PRA) needs data bases that are both current and easily used to allow different parameter searches of the same information. The Nuclear Power Plant Fire Data Base discussed in this users' guide contains raw fire event data from 1965 through June 1985. This data was obtained from a number of reference sources (i.e., American Nuclear Insurers (ANI) [1], Licensee Event Reports (LERs) [2], Nuclear Power Experience (NPE) [3], Electric Power Research Institute (EPRI) Fire Loss Data [4], and others) and collated into one data base. The data base is designed for use on an IBM XT or an IBM-compatible personal computer (PC) and has been developed around the database management system dBASE III.*

The Nuclear Power Plant Fire Data Base is menu driven and asks supplemental interactive questions of the user that allow the searching of the data base for various specifics of a fire. The data base can search for aspects of a fire such as fire location, mode of plant operation at the time of the fire, detection and suppression means, dollar loss, etc. In addition, other options include the capability to calculate the years of operating experience for all commercial nuclear power plants from any date specified by the user as well as to display general plant information.

Because the Nuclear Power Plant Fire Data Base is built around dBASE III, it has all the inherent capabilities found in dBASE III along with customized software programs specifically developed to access and display the fire event information in the data base. Additions to the data base can be easily accomplished by use of the editing features found in dBASE III.

This users' guide provides information needed to effectively run and access data in the Nuclear Power Plant Fire Data Base. This guide discusses the types of searches available, input requirements, and display output formats used in the data base.

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2. READ ME FIRST

This users' guide can be used in either of two distinct ways, depending on your needs.

If you need to retrieve data from the data base immmediately or if you prefer to learn to use a data base like this by actually running it, keep reading. Sections 3 through 5 will provide you with information on how to get the data base up and running on your computer as well as examples of the types of input questions you will be asked by the data base and the outputs that will be provided.

If you are interested in understanding the general structure of the data base and the purposes of the various options and files, read Sections 6 and 7 before actually using the data base.

It is highly recommended, regardless of which direction you take, that you take a few minutes to read the Glossary (which precedes Section 1) before continuing.

The data base was designed around the basic concept that questions asked of you by the data base should be in plain English. Therefore, when running the program, you should be able to read what is on the screen and follow the prompts provided to obtain the desired outputs.

A few words about the data found in the data base. Like all data bases, the completeness of the fire data is only as good as the sources used in compiling the data base. The most current and available fire data was used in putting this fire data base together, but even so, because of the way fires are reported by different sources, you will find that there is some missing fire event information. In light of this fact, you should be careful when using the data base to ensure that you do not get misleading fire event information, especially if you are using it for statistical purposes. It is recommended that you perform confirmatory searches to verify your results.

3. INSTALLATION PROCEDURES

This section covers the required hardware and software, the steps necessary to install the data base on your computer, and how to get to the point of actually running the program.

The hardware and software used to develop this data base were as follows:

- IBM XT with 640 kilobytes of random access memory RAM (you need a minimum of 256 kilobytes of RAM for dBASE III)
- MS-DOS, Version 2.0
- dBASE III, Version 1.1
- IBM Personal Computer Graphics Printer (for hard-copy output only)

3.1 How to Install the Data Base and Command Files on Your Computer

It is assumed for this step that you have turned your system on, that the disk operating system has been installed (this data base was designed with DOS 2.0), and that on the screen you have this prompt: A>. (Refer to the IBM Disk Operating System Manual, DOS version 2.0, Chapter 2, for instructions on how to get to this point.)

The data base files and command files should be provided to you on three 5-1/4-inch diskettes.

Place one data base file diskette in drive A. (The order in which you select the diskettes is not important.)

Copy all of the files from drive A to your system's hard disk (or an equivalent, such as a Bernoulli Box). Assuming your hard disk is designated as drive C, to copy the files from the diskette, type in the following command at the prompt:

```
COPY A:*.* C:
```

(Use "COPY A:*.* C:\Directory Name" if you are using a subdirectory to store the data.)

After the first diskette has been copied to your hard disk, remove it from drive A. Insert the second diskette into drive A and repeat the previous step. Repeat the procedure for the third diskette. (Note: As a check, when you copy each diskette, your computer should tell you that either 1, 3, or 70 files were copied to your hard disk, depending on the diskette being copied.)

The data base files and command files for the Fire Data Base should now be on your hard disk drive.

3.2 Getting Ready to Use the Fire Data Base

It is assumed before you start this procedure that you have copied the three data base file diskettes to your systems hard disk. If not, follow the procedures given in Section 3.1 above.

It is also assumed that your dBASE III software has been properly configured in accordance with the "Read Me First, dBASE III, version 1.1" section of the dBASE III users' manual. If this has not been done, refer to the above manual to configure your software properly.

Two methods can be used to access the data base files. The first method involves using the dBASE III diskettes in drive A to begin operations in the data base. The second method assumes that dBASE III has been installed on your system's hard disk (or an equivalent). Each method will be discussed. If the first method is used, the Fire Data Base can be used with a number of IBM XTs, requiring that only one copy of dBASE III software be available. If the second method is used, use of the data base on another IBM XT will require de-installing dBASE III from the first XT for use on the second XT (assuming you only have one copy of dBASE III). Use whichever method meets your needs.

3.2.1 Method 1: dBASE III Diskettes in Drive A

(1) With your computer off, insert the dBASE III System Disk 1 into drive A.

(2) Turn on the power for your monitor, disk drives, and printer. (If you did not turn off your computer before performing Step 1, you can reset the system by pressing the "Ctrl", "Alt", and "Del" keys on your keyboard simultaneously.)

(3) When the system prompts you, enter the current date. In a similar manner, enter the correct time of day. Press the "Return" ("Enter") key after each entry.

(4) After completing Step 3, the following message should appear on your monitor:

```
The IBM Personal Computer DOS
Version 2.0 (C)Copyrighted IBM Corp 1981,1982,1983
```

(5) Following this message will be the A> prompt. At the A> prompt, type in the following (either upper or lower case letters):

dbase

Follow this command by pressing the "Return" key. The first portion of dBASE III will now be loaded into your computer. This will take a few seconds.

(6) After the first portion of dBASE III has been loaded, your monitor will display the prompt:

Insert System Disk 2 and press ENTER, or type CTL-C to abort

When this prompt appears, remove the dBASE III System Disk 1 from drive A. Insert the dBASE III System Disk 2 into drive A. Press the "Return" key to load the second portion of dBASE III.

(7) After a short delay, your monitor screen will display a full page of text that describes dBASE III. At the bottom of the screen, you will see a flashing period. This is the dBASE III cursor, called the "dot prompt".

(8) At the dot prompt, ".", type in the following command:

set default to c

(or whichever drive you copied the Fire Data Base and command files to in step 1 of this section.)

Press the "Return" key to continue, and the dot prompt, "." should appear below the command you just typed in.

If you stored the data base files in a subdirectory, type in the additional command:

Set path to \C:, C:Directory Name

This command ensures that dBASE III knows where to look for the data base files and command files that are used in the Fire Data Base. (If you set up a CONFIG.DB file for use with dBASE III, and you defined the default drive as the same one on which the Fire Data Base is stored, you can omit this step.)

(9) The Fire Data Base can now be accessed by typing (at the dot prompt):

do menu

Refer to Sections 4 and 5 for more details on how to use the Fire Data Base.

3.2.2 Method 2: dBASE III Installed on a Hard Disk

(1) It is assumed for this method that dBASE III has been installed on the same hard disk that the Fire Data Base has been copied to (i.e., drive C).

(2) Assuming that your system has been configured so that you can boot from the hard disk, and that the computer is off, turn on the power to your monitor, disk drive, and printer.

(3) When the computer prompts you, enter the current date and time. Press "Return" after each entry. The monitor screen will give you the following messages after you have entered the date and time.

The IBM Personal Computer DOS
Version 2.0 (C)Copyrighted IBM Corp 1981,1982,1983

Below this message you will see the C> prompt.

(4) At the C> prompt, type in the command:

dbase

then press "Return". This will cause dBASE III to be loaded into your computer.

(If dBASE III is located in a subdirectory on your hard disk drive, at the C> prompt type in: CD\Directory Name where dBASE III is located, then type in: dbase.)

(5) After a short delay, your monitor screen will clear and then display almost a full page of text describing the capabilities of dBASE III. At the bottom of the screen, you will see a flashing dot. This is dBASE III's equivalent to a cursor. The flashing dot, ".", is called the dot prompt.

(6) You are now ready to begin operations in the Fire Data Base. At the dot prompt, ".", type in the command:

do menu

If the fire data base files are not in the same directory as dBASE III, type in the following command before you type in "do menu":

RUN CD\Fire Data Base Directory Name

For more details on how to use the Fire Data Base, see Sections 4 and 5.

4. KEY WORDS AND TRICKY PHRASES

A few words and phrases are used repeatedly throughout this guide. These words or phrases have special meanings in the context of this users' guide. It is important to keep these terms in mind while using the data base to ensure that you get the most out of it.

Key Word or Phrase	Meaning
bailout	You can terminate whatever you are doing in a particular data base option. By typing "Q" (for quit) at the appropriate time, you will exit whatever you are doing and go to the next prompt in an option.
cursor located in the lower left corner (LLC) of the screen	This phrase defines the physical location of the cursor as well as letting you know that if you want a printout of what is on the screen, you can get one by pressing the "Shift" and "PrtSc" keys at the same time. In addition, this cursor position tells you that until you press any key, the program is temporarily halted.
data base	Includes the fire event data stored on your disk as well as the software programs used to retrieve this data.
data entry prompt or question	These are the questions you are asked by the data base to define what you want done in each option. You must type in something from the keyboard at one of these prompts to get the program to continue.
fire event specifics	This refers to a total of 29 fields used to describe a fire event.
Incident Number (INO)	This is an internal pointer in the data base that roughly corresponds to the date a fire occurred. INOs are used to move around quickly within the data base.

Key Word or Phrase	Meaning
invalid entry statement	If you make an error in response to a question, you will be told that your entry is not allowed and that you need to make another entry. These statements look like: This is an invalid Site Name! Try Again.
option(s)	An option is one of nine program paths you can select to look at information in the data base.
press any key to continue	To continue program execution, you must press any of the following keys: A through Z 0 through 9 Space Bar Return or Enter Ins or Del Backspace - or - Shifted keys of the above
Press "RETURN" after your entry	This statement, or similar ones, gives you guidance on how to continue program execution. Be careful to press the "Return" key only <u>once</u> at a statement like this. If you press the key more than once, the program will treat it as an input for the next data entry prompt. Be very deliberate in pressing any keys to continue program execution.
program	The software written to access data base files.
site	The location where one or more nuclear reactors are found (e.g., the Turkey Point Site contains two nuclear reactors and their associated systems within its boundaries).

Key Word or Phrase	Meaning
"some word"	Any time you see a word enclosed by quotation marks, you should type in the word as it is shown. DO NOT type the quote marks.
syntax error	If you enter a letter when a number is requested, or vice versa, you will get a statement that says "syntax error". You can then enter the correct value. This is a dBASE III error statement.
unit or plant	These are the names of the nuclear reactors found at a site (e.g., at the Turkey Point site, there are two units, named Turkey Point 3 and Turkey Point 4).

In addition, keep the following two points in mind:

- Any Fire Data Base searches that require you to type in a line of text (like the plant name or the location of a fire) DO NOT require the complete text line to be typed in to perform a search. As long as enough of the term is typed in to make it unique, the program will search for the parameter of interest. Be careful to make it both unique and understandable to you, since some of the outputs will repeat exactly what you typed. Also, if you do not use a truly unique search term, more fire events than you want will be displayed (e.g., when you want to find fire events for Turkey Point 3 and 4, if you type in "TUR" for the plant name you will only get Turkey Point entries. However, if you typed in just "T" for the plant name, you would get fire events for plants that have a "T" anywhere in their names, like Bellefonte, Calvert Cliffs, Catawba, Clinton, etc.).

- All entries must be made in capital letters. If you start getting strange results, make sure that you are in the caps mode.

5. SAMPLE FIRE DATA BASE OPERATIONS

This section is designed to show you how to get around the data base and what to expect when certain options have been selected. You will be provided with example sets of operations for each option in the data base so that you can become familiar and comfortable with how the data base runs. This will allow you to quickly come up to speed on the data base and begin using it for your own searches.

(Each of the option examples is designed to stand alone. That is, you do not have to work through one option before proceeding to the option that follows it.)

5.1 Design of This Section

This section is designed with a twofold purpose. The first is to provide you with a complete set of examples for each of the options found in the data base. This is accomplished by covering in detail the questions that you will be asked by each of the data base options. In addition, you will also be shown how your screen will look (as well as the output screens) for each of these questions so that you will know exactly where you are in a particular option.

The second goal of this section is to provide a road map for getting around the data base options quickly and with a minimum of repetition of material. To meet this goal, this section is structured in a flowchart fashion. You will always start with the Main Menu to get to any option (Section 5.3.1, page 25). From the Main Menu, you will be presented the options that can be selected from this menu and what, in general, they do. Once you decide which option you want to select, you will be directed to the option of interest by page number. Once you have completed all operations in an option, you will be sent back to the Main Menu where you can select another option.

This section is keyed to page numbers for two reasons. The first is that by using this approach, information common to several options does not have to be repeated, thus reducing the size of this guide and the time it will take you to come up to speed on the data base. The second reason is that you do not have to try to interpret the meanings of headings in this guide; the page number defines the route that should be taken. Once you become familiar with the data base these headings will all make sense, but initially, the use of page numbers allows you to get around the data base more quickly and gives you time both to be productive and learn how best to use the Data Base.

Page number statements in this guide will be in one of three forms. If you see a page number statement that says, for instance:

GO TO PAGE XY

go to that page in the guide immediately; otherwise, you will not be able to get around the option you are working in as fast and you run the risk of getting lost.

The second type of page number statement you will see is

RETURN FROM PAGE XY

This statement always appears with a "GO TO PAGE" statement. This statement means that you were in an option that sent you to another section of the guide (because the particular action

you are going to perform is used by more than one option). When you complete that section, you are returned to the option you started from. The "RETURN FROM PAGE" statement ensures that you are returned to the correct location for the option you chose.

The third type of page number statement is for your reference only. These statements refer you to Section 4 (Key Words and Tricky Phrases) for those terms that have special or multiple meanings. These statements look like this:

page XY

These page number statements are used only to provide a page number that you can refer to so as to find out what a particular statement means. If you need to look at a definition, be sure to return to where you were in the option you were working in.

5.2 Getting Started (Including Display Setup)

To begin operations with the data base, it is assumed that you are in dBASE III. (See Section 3, Installation Procedures (page 5), for guidance on how to configure the data base for your computer and how to ensure dBASE III is being used.) If you do nothing, once you have entered dBASE III there will be nearly a screenfull of general information about dBASE III on your monitor. At the bottom of the screen, there will be a dot prompt, ".". At this dot prompt, type in the following line:

"do menu"

Then press the "Return" key on your keyboard.

(This line may be typed in either lower case or upper case letters.)

The screen will clear and the display will be replaced with the title page (Figure 1). DO NOT DO ANYTHING when this display appears. After a short time, the screen will automatically be cleared and replaced with another display.

FIRE DATA BASE for Nuclear Power Plants
prepared by
Sandia National Laboratories
for the
Nuclear Regulatory Commission
September 1985

Figure 1. Fire Data Base Title Page

The second display, illustrated below (Figure 2), is designed to tell you how current the data in the data base are. Currently, the data base is accurate through June 1985. No actions are required during this display because it, too, automatically clears itself after a few moments (the time that the display is on the screen allows you to read the text on the screen in a leisurely fashion).

The data in this data base are valid up through
****
* June 1985 *
****

Figure 2. Date Validity of Data Base Entries

The third display explains that the program responds to capital letter inputs only. If the program has been booted up

with your computer initially off (at least on IBMs), lower case letters are the default letter type (verify what case letters your computer defaults to when booted up). This particular display requires the user to take an action before the program will continue, namely, the "Caps Lock" key should be pressed once, and then any A through Z key should be pressed to get the program to continue. Figure 3 illustrates this prompt.

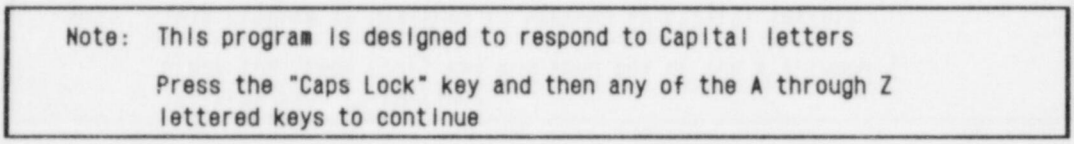


Figure 3. Capital Letter Use Prompt

If you are not in the Caps mode, you will be asked to again follow the procedure to get into the Caps mode. This step is designed to ensure that you start out your data base operations in the correct mode. Figure 4 illustrates this try again prompt.

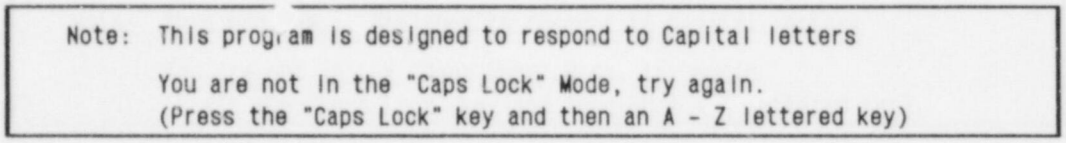


Figure 4. Capital Letter Use "Try Again" Prompt

The four displays mentioned previously appear only when you start using the data base. The only way to see these four displays again is to exit the data base (by pressing the "Esc" key) and then type "DO MENU" to start all over again. All the displays discussed in the rest of this section can appear more than once when using the data base. When they appear is based solely on the direction you want to take when using the data base.

The fifth display is entitled "FIRE DATA BASE PROGRAM SETUP". This display is purely informational and briefly describes the structure of each of the data base options (see Section 6.3). The purpose of this display is to alert you that various modifications can be made to certain screen displays. Figure 5 illustrates this display. To continue program execution, press any key (page 10).

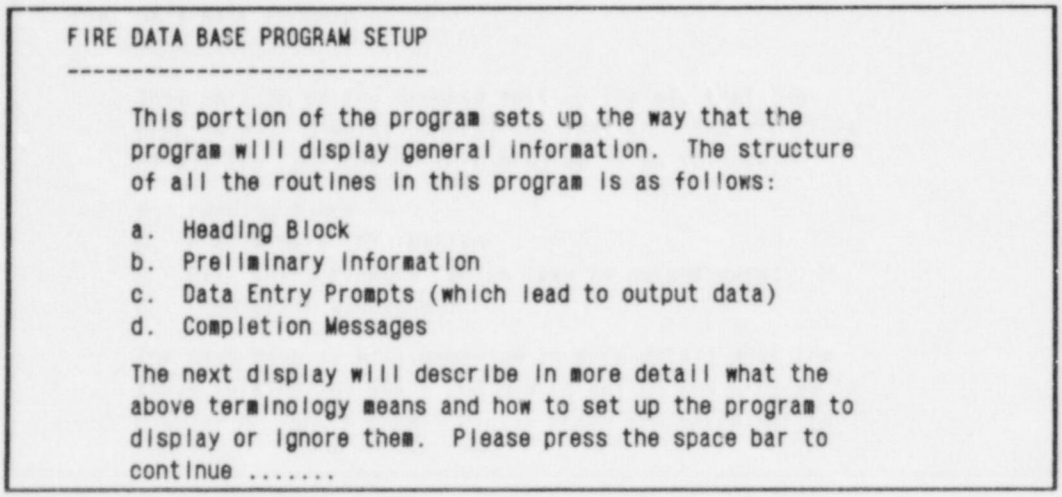


Figure 5. Fire Data Base Program Setup General Information

The next display is illustrated in Figure 6. This display gives a brief description of each of the four parts of an option so that as the program progresses, you will know where you are when using a particular option. (It will also allow you, as you become more familiar with the data base, to delete some of these displays to speed up your access time to the data base.) At the bottom of the screen, interactive questions are asked to determine the type of setup to be used in the data base. Note that your responses to these questions affect all data base options the same way. All the questions you will be asked appear below the asterisk line shown in Figure 6.

a. Heading Block: This is a short heading identifying the program option that you are currently going to be working in. Heading blocks look like:

```
**********************
*    Option Title    *
**********************
```

b. Preliminary Information: After the heading block the screen clears to display a paragraph about what the purpose of the option selected is.

c. Data Entry Prompts: Responses to these prompts are used to search the data base. These prompts always ask a question. Note: Other prompts found in the data base are purely for information (called "Informational Prompts").

d. Completion Messages: When all operations have been completed, a few lines are displayed to tell you that you are done with an option.

You will be asked a series of questions below regarding items a, b, c, and d. If you do not have the item displayed, the program will run faster. However, until you become familiar with the program, it is advisable to keep all displays. (Note: At any time you can change these options from the Main Menu.)

****

Do you want to change the time that Heading Block information is displayed?

(Y for YES, Any key for NO)

Figure 6. Fire Data Base Program Setup Detailed Information

(The brief descriptions of each part of an option will stay on the screen while the interactive questions are being asked at the bottom of the screen.)

The first prompt in this series of questions concerns how long Heading Block information is displayed. There is a built-in default time for Heading Block information to be displayed on the screen. This default time is approximately 20 seconds. This particular prompt asks whether you want to change the default display time (Figure 7). A "Y" response is required for the Heading Block time to be changed.

Do you want to change the time that Heading Block information is displayed?
(Y for YES, Any key for NO)

Figure 7. Heading Block Time Change Prompt

If the response to the Heading Block prompt is "Y", then another prompt will be displayed (Figure 8) asking you to enter a number (greater than 0) that determines how long the Heading Block information is to be displayed. The default number used by the program is 50. The number 10 should be the smallest number you use since the time that this corresponds

to is 2 to 3 seconds, long enough for the Heading Block to be recognized. For values less than 10, the Heading Block will just flash on the screen. (If you enter a number less than 0, the program will assign a default value of 10. If you do not enter a number but rather a letter, you will get a syntax error (page 11) and be asked to reenter a number.)

```
Enter a number greater than 10 (large values = long display time)
(Press return after your entry)  Timing #:
```

Figure 8. Heading Block Time Entry

The next prompt concerns whether Preliminary Information should be displayed (Figure 9). If you want Preliminary Information displayed, press "Y" (see Section 6.3 (page 127) for an example of this information); otherwise, press any key (page 10) and this information will be bypassed (i.e., not appear) in all data base options.

```
Do you want Preliminary Information displayed?
(Y for YES, Any key for NO)
```

Figure 9. Preliminary Information Prompt

The next prompt is shown in Figure 10. You are asked whether you want Informational Prompts displayed. If so (see Section 6.3 for examples of informational prompts), press "Y"; otherwise, press any key for this information to be bypassed in all data base options.

```
Do you want Informational Prompts displayed?
(Y for YES, Any key for NO)
```

Figure 10. Informational Prompt

The last prompt concerns Completion Messages. A "Y" response means the messages will be displayed when all operations have been completed in an option, while pressing any other key means these messages will not be displayed while using the data base. Figure 11 illustrates the form of the Completion Message prompt.

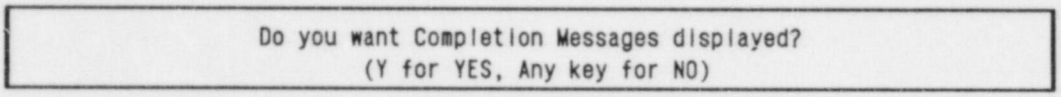


Figure 11. Completion Message Prompt

Once you have responded to the above prompts, the display mode has been setup for all data base options, but you can later decide to modify them. After the last prompt, the screen will clear and the Main Menu will be displayed. You will now begin your actual operations in the data base. The Main Menu is discussed in Section 5.3.1.

5.3 Descriptions and Examples

This section provides examples of how to use each option in the data base. The examples are designed so that if you will follow them step by step, other than changing the information being requested, the option will respond the same way every time you use it. Each of the options is illustrated with a simplified flowchart that shows the paths that are available while in the option. Also included are descriptions and examples of the interactive questions that will be asked as well as sample outputs from the data base. The examples assume that while in the setup mode (see Section 5.2), Preliminary Information, Informational Prompts, and Completion Message questions were answered with a "Y" response. It should be kept in mind that if you gave "No" responses to any of the above questions, the associated screen displays will not appear.

5.3.1 Main Menu

The Main Menu (Figure 12) controls all data base operations. You select data base options directly from this menu or from a secondary menu that allows you to select additional options. From now on, you will determine the option to be executed.

```
                              MAIN MENU
**********************************************************************

        1 - FIRE EVENT SEARCH
        2 - FIRE EVENT DESCRIPTIONS
        3 - OPERATIONAL EXPERIENCE DATA
        4 - BASIC PLANT INFORMATION
        5 - MODIFY PROGRAM DISPLAY OPTIONS

**********************************************************************

        PICK A NUMBER OR TYPE Q TO QUIT:
```

Figure 12. Main Menu

Five different options can be selected from this menu. (If you do not select 1 through 5 or Q, you will get an invalid entry statement, page 10). When an option number is selected, the "Enter" or "Return" key does not need to be pressed to continue program execution. The program will immediately proceed to the option selected. To exit the program, type "Q" and operations in the data base will be terminated. Since you were operating in dBASE III, the screen will clear and the dot prompt, "." will appear, indicating that you are back in dBASE III. If later you decide to return to the data base, you must follow the procedures in Section 5.2 (Getting Started, page 17).

The options that can be called up from the Main Menu are self-explanatory; however, a summary of their uses and capabilities will be presented on the following page. Also, a page number will be provided for each of these options to direct you where to go in this guide for that option.

The options available from the Main Menu are as follows:

1 - Fire Event Search: If 1 is selected, the Fire Event Search Menu is called up. This menu provides access to five options designed to search the data base exclusively for the specifics of a fire event (e.g., date of fire,

location of fire, number of fires occurring at a specific plant, type and cause of fire, detection/suppression means, etc.). GO TO PAGE 27.

2 - Fire Event Descriptions: The written description(s) for fire event(s) is (are) displayed. These descriptions can be found either by the use of an Incident Number or by displaying all descriptions that match a key word or phrase that is used to search the descriptions. GO TO PAGE 85.

3 - Operational Experience Data: The operational experience for either boiling water reactors (BWRs), pressurized water reactors (PWRs), or all commercial U.S. reactors can be calculated. Operational experience can be determined for any of five plant locations (cable spreading room, control room, auxiliary building, reactor building, and turbine building). Cumulative or individual site years of experience can be calculated. GO TO PAGE 93.

4 - Basic Plant Information: This data base option allows you to look at general information concerning nuclear power plants and includes plant name, capacity (electrical), plant location, nuclear vendor, owning utility, and plant milestone dates (such as initial criticality). GO TO PAGE 105.

5 - Modify Program Display Options: This option allows you to change (from within the program) how the Heading Block, Preliminary Information, Informational Prompts, and Completion Messages will appear while using the data base. GO TO PAGE 115.

After you have decided on an option, press the key corresponding to the number of that option and then go to the page indicated for that option. (Be sure to go to the page numbers indicated in this section and subsequent sections to ensure that you are following the correct route.)

5.3.2 Fire Event Search Menu

The Fire Event Search Menu is reached by selecting option 1 in the Main Menu. Before you get to this menu, two other displays tell you where you are and what you can do from the Fire Event Search Menu.

The first display is the Fire Event Search Heading Block shown below.

```
**************************
*                        *
*   FIRE EVENT SEARCH    *
*                        *
**************************
```

After a short delay, this Heading Block will be replaced by the Fire Event Search Preliminary Information display.

```
This portion of the Fire Data Base allows for
searching the data base by several methods.
The options that can be taken in this section
of the data base include:

a. Full Fire Event Data Display - shows the
   specifics of a fire event.
b. Essential Fire Event Display - shows in a
   more concise form the what, when, and where
   of a fire.
c. Chronological Listing of Fire Events -
   provides a list of all fire events.
d. Fire Duration/Suppression Time Search -
   allows the data base to be searched for
   the time a fire burned or was suppressed
   in.
e. General Search Routine - allows up to five
   (5) search parameters to be specified to
   be used to search the data base.

These options are selected from the Fire
Event Search Menu which follows.

Press any key to continue ...
```

To continue, follow the directions of the prompt at the bottom of the screen.

The next display will be the Fire Event Search Menu (Figure 13).

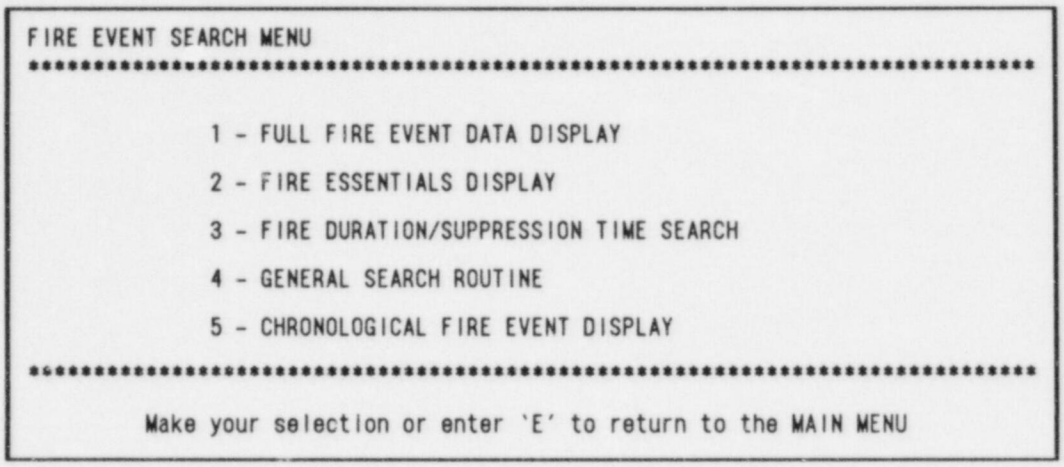


Figure 13. Fire Event Search Menu

This menu allows you to select any one of five possible options. Each of these options is designed to specifically search for or display information that relates to fires at nuclear power plants.

This menu serves as a second-level menu, in that once an option that is part of this menu has been completed, program control is returned first to this menu, not to the Main Menu.

If you have selected this option by mistake, or want to go back to the Main Menu (page 25), type in the letter "E".

When an option number is selected, you do not need to press the "Return" key to continue program execution; it will continue automatically. In addition, if you select other than 1 through 5 or E, you will get an invalid entry statement, page 10.

The options available from this menu and what they do are discussed below.

1 - Full Fire Event Data Display: When this option is selected, as much information as possible concerning a particular fire event will be displayed. In this option, there are 29 separate categories that are displayed for a fire. These categories include but are not limited to plant name, location of the fire, mode of plant operation at the time of the fire, and the reference sources for these data. The description of the fire events can also be displayed. GO TO PAGE 31.

2 - Essential Fire Event Display: This option is similar to option 1, except it is a scaled-down version. Its purpose is to display the who, what, when, and where of a fire. Six categories are displayed for a fire event: plant

name, date of fire, location of fire, probable cause of fire, reactor type, and mode of plant operation at the time of the fire. The description of the fire events can also be displayed. GO TO PAGE 43.

3 - Fire Duration/Suppression Time Search: The data base is searched for fire events that match time ranges specified for either the duration or suppression time of a fire. In addition, fire events can be culled on four additional criteria: (1) reactor type, (2) mode of plant operation, (3) extinguishment method, and (4) detection method. These criteria are "and-ed" with the time. The description of the fire events meeting the specified conditions can also be displayed. GO TO PAGE 47.

4 - General Search Routine: The data base can be searched on up to five different parameters (or one parameter for five different cases) at once. There are 18 different searchable parameters (plant name, date of fire, type of fire, components affected by the fire, etc.). Search parameters can be "and-ed" or "or-ed" in any desired order to search for fire events meeting the specified criteria. The description of the fire events meeting the search criteria can also be displayed. GO TO PAGE 57.

5 - Chronological Fire Event Display: A chronological date listing, as well as an alphabetized listing based on plant names, of fire events can be obtained from this option. The output from this option is in a columnar format and gives the plant name, location of the fire, date of the fire, and the incident number associated with the fire event. GO TO PAGE 75.

Once you have selected an option, press that option number and go to the page given for that option.

5.3.3 Full Fire Event Data Display

The purpose of this option is to display all the information contained in the data base about a specific fire event. In addition, this option allows you to browse through the fire events quickly so you can find fire events that meet certain conditions. This option does not have the capability to actively "search" the data base (as the General Search Routine does) and find fire events that meet specified conditions. However, when used in conjunction with other options (like the Chronological Listing of Fire Events option covered in Section 5.2.7), it allows for quick access to fire event(s) of interest.

The output from this option includes specific data relating to the plant and fire event as well as the fire event description. Each fire event has up to 29 separate entries for it; however, because of the way fire events are reported, usually you will not have output for all 29 of them.

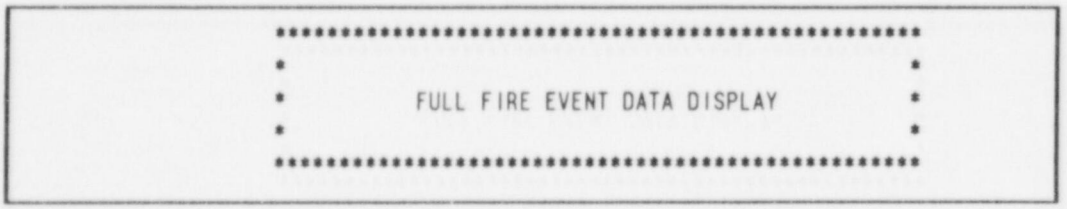
As with most of the other options in this data base, the fire event information can be routed either to your monitor screen or to a printer for a hard copy output.

When using this option, be sure to specify the Incident Number (INO) of a fire event to search the data base. For this reason, it is recommended that you use either the Chronological Fire Event Listing option or the General Search Routine to obtain Incident Numbers and then, if desired, return to this option and get a full printout of the fire event.

Figure 14 is a flowchart showing the major decision points and paths that can be taken when using this option.

This option in the data base is entered from the Fire Event Search Menu.

The Heading Block for this option tells you that you have selected the Full Fire Event Data Display option.



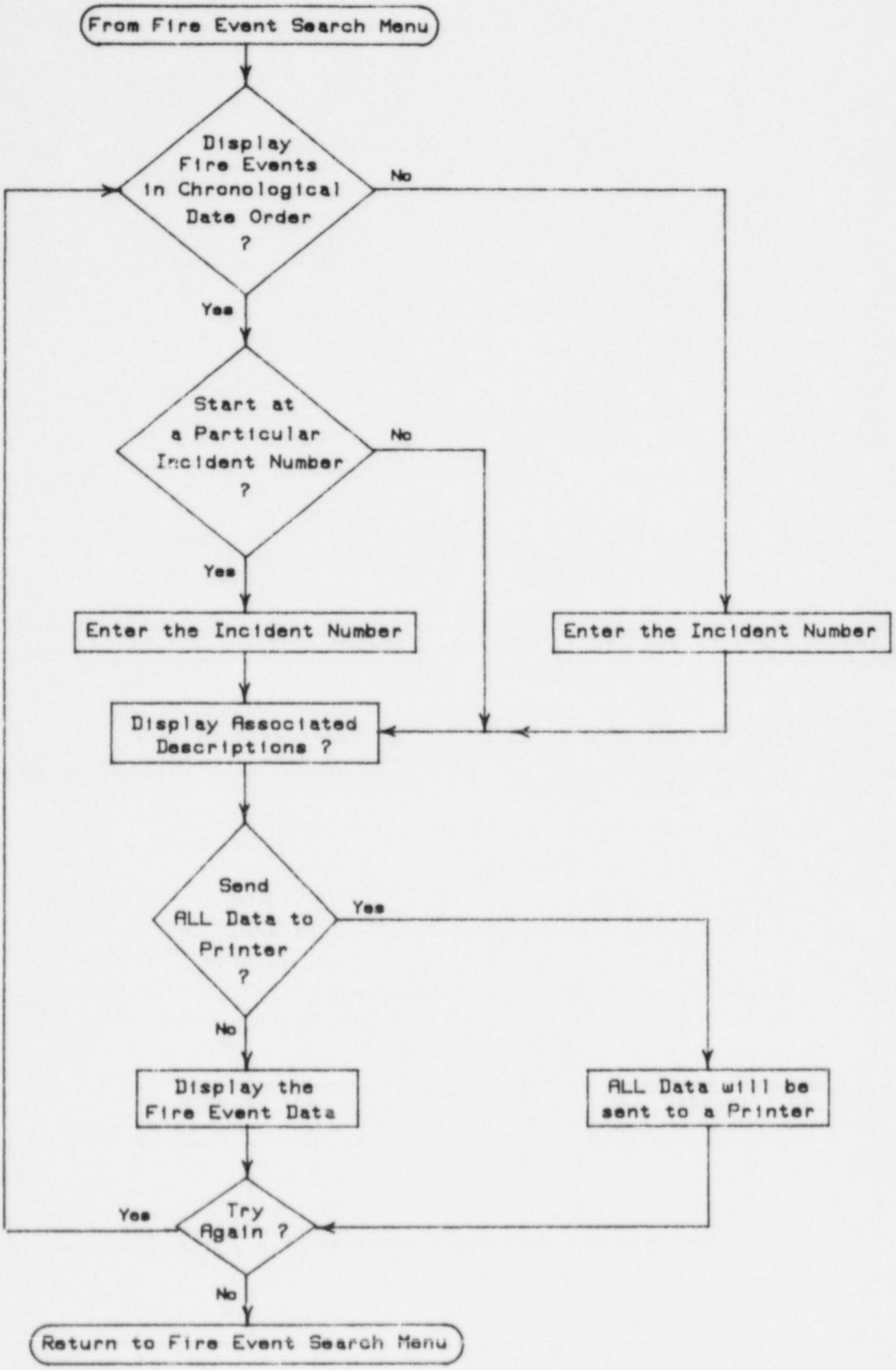


Figure 14. Full Fire Event Data Display Option Flowchart

After a short delay, your display will change to the Preliminary Information display for this option.

```
The following data are based on what is called
an 'Incident Number'.  This number has two
purposes, the first being to relate this data
to the descriptions found in the Fire
Occurrence descriptions, and it also is a
chronological record of when a fire occurred
(i.e., those Incident Numbers with low values
indicate that the associated fires occurred
before those with a high number).

Incident Numbers will be referred to as INOs
for the remainder of this program.

Press any key to continue...
```

This display provides a brief summary of the capabilities this option provides in searching the data base. To continue, follow the directions of the prompt on the screen and press any key (the space bar is recommended; however, any key will work).

The first data entry prompt that is asked of you in this option asks you whether you want to have all of the fire events displayed chronologically. In this case, chronological means that fire events in the data base will be displayed by date of occurrence (from the oldest event (time-wise) to the most current). Do not worry that if you say yes to this question that you will have to see all 354 fire events in the data base before you can get out of this option. As you will discover later in this section, you can bailout (page 9) of this option at any time.

```
Do you want all records to be chronologically displayed?

(Y for YES, Any key for NO)
```

At this point, you can go one of two ways in this option. Each case will be discussed separately. Case 1, which is entered with a "Y" response to the above question and will chronologically display (in date order) fire events, starts below. Case 2, which is entered by pressing any key (page 10) other than "Y", and which is designed to display a specific fire event, starts on page 38.

Case 1: Chronological display, starting at INO 330 and displaying two fire events. The description of these fire events is also desired. The fire event information is to be displayed on your monitor.

In response to the data entry prompt previously discussed, press the letter "Y" to start this case. By giving a "Y" response to the prompt, you have told the option that you want fire events displayed based on when they occurred. Therefore, all the fire events that are displayed will be in ascending date order when you look at the date of occurrence of the fire. After you have made a "Y" response, the screen will automatically clear and be replaced with:

```
Do you want to start at a particular INO?

(Y for YES, Any key for NO)
```

This prompt gives you the option to start at any location in the data base rather than always starting at the first fire event (which is the default starting point) and then going through the data base fire events chronologically. Because this question asks you for an INO, you need to know it to start with. For this example, we want to start at INO 330. To this data entry prompt, type in "Y", indicating that you want to look at fire events that start somewhere other than at the first fire event. When you have done this, the screen will change to:

```
Type in the INO

(Press "Return" after you have typed in the INO)
```

This data entry prompt is asking you to specify the INO you want to start looking at. Type in "330", then press the "Return" key. Leading blanks are not allowed when entering incident numbers. If you enter an INO not found in the data base, you will get an invalid entry statement (page 10). If you enter a letter instead of a number, you will get a syntax error (page 11). If you get either error, you will be given another chance to enter a valid incident number. If you enter a string like "2#$" for an incident number when you really wanted "234", the data base will start at incident number 2. This prompt reminds you that to continue, you must press the "Return" key.

After you have entered the incident number that you want to start at, the screen will clear and the following prompt will appear:

```
Do you also want the corresponding descriptions displayed?

(Y for YES, Any key for NO)
```

Your response to this prompt determines whether the written descriptions for each fire event will be displayed. For this case, it was assumed that you wanted to see the descriptions of the fire events. To get the descriptions to appear as part of the output, type "Y" in response to this prompt. After your response, the display will change and ask one last question before it starts displaying the fire events you want. This data entry prompt is shown below.

```
Do you want the data directly routed to a printer?

(Y for YES, Any key for NO)
```

If you want to browse through the data by having it displayed on the screen, press any key (page 10) other than "Y" in response to this data entry prompt, and the fire events and their associated descriptions will appear on your monitor. Once this prompt has been answered, the first output display will be for the fire event that has the INO 330. The output display screen for this fire incident is shown at the top of the next page.

(If you gave a "Y" response to the above prompt, you are given one additional prompt, as shown below.)

```
How many events do you want printed out?

*** 1 TO 25 ***

Enter the Number:

(Press "RETURN" after you have made your entry)
```

This prompt asks you how many records you want outputted to the printer. The numerical values in this prompt tell you how many events you can print out before you reach the end of the data base. (In this case, up to 25 fire events can be printed.) For this example, you would respond with "2" to get INOs 330 and 331 printed out. When you did this, the screen would clear, and the cursor would be positioned in the upper left corner of the screen. After all the fire events of interest had been printed out, control would be returned to your monitor (Try Again question on page 38).

```
PLANT NAME:  Peach Bottom 2                          CAPACITY: 1065 MWe  INO: 330

PRINCIPAL OWNER UTILITY:  Philadelphia Electric Company
PLANT LOCATION:  NJ, Peach Bottom
NSSS VENDOR:  General Electric                       REACTOR TYPE:  BWR
OPERATING LICENSE ISSUED:  08/08/73
INITIAL CRITICALITY:  09/16/73          DATE OF COMMERCIAL OPERATION:  07/??/74
FIRE LOCATION:  Diesel Generator Building            DATE OF FIRE:  09/07/83
    TIME OF DAY OF FIRE:                FIRE DURATION:
    MODE OF PLANT OPERATION:  Maintenance Outage
    PROBABLE CAUSE OF FIRE:  Component Failure
    TYPE OF FIRE:  Class B
    DETECTED BY:  Plant Personnel
    EXTINGUISHED BY:  De-Energized
    SUPPRESSION EQUIPMENT:  None
    SUPPRESSION AGENT(S):  None
    SUPPRESSION TIME:
    INITIATING COMPONENT:  Engine
    INITIATING COMBUSTIBLE:  Oil
    COMPONENTS AFFECTED BY FIRE:  Engine
    POWER DEGRADATION (%):  0%          FORCED OUTAGE:  0 Days    $ Loss:

REFERENCES:  NPE, LER
```

Notice that the cursor is positioned in the lower left corner (LLC) (page 9) of the screen. Once you press a key to continue (page 10), the display above will be replaced with the description of the fire event (since this was one of the options you selected).

```
INO #:  330

    During surveillance testing of E-3 diesel, operators noted
    output power was swinging and exhaust temperature was high.
    Investigation revealed that there was a fire in the exhaust.
    It was determined that one Elliott turbocharger had failed
    causing a power reduction.  The governor increased the fuel
    flow as a result.  Excess fuel ignited in the exhaust.
```

Notice that the description is keyed to the INO of the fire event. Again you will see the cursor in the lower left corner (LLC) of your screen. To see the next fire event (INO=331), press any key to continue.

The next fire event will now be displayed. This is the fire event with an INO of 331. (You can bailout (page 9) of this search when either the fire event specifics or the description is displayed.)

The fire event with INO 331 is shown on the next page.

```
PLANT NAME:  Surry 1                                CAPACITY:  775 MWe   INO: 331

PRINCIPAL OWNER UTILITY:  Virginia Electric and Power Company
PLANT LOCATION:  VA, Gravel Neck
NSSS VENDOR:  Westinghouse                          REACTOR TYPE:  PWR
OPERATING LICENSE ISSUED:  05/25/72
INITIAL CRITICALITY:  07/01/72          DATE OF COMMERCIAL OPERATION:  12/22/72

FIRE LOCATION:  Control Building                    DATE OF FIRE:  09/09/83
    TIME OF DAY OF FIRE:                        FIRE DURATION:
    MODE OF PLANT OPERATION:  Power Operations (100%)
    PROBABLE CAUSE OF FIRE:  Electrical Failure
    TYPE OF FIRE:  Class C
    DETECTED BY:
    EXTINGUISHED BY:
    SUPPRESSION EQUIPMENT:
    SUPPRESSION AGENT(S):
    SUPPRESSION TIME:
    INITIATING COMPONENT:  Motor
    INITIATING COMBUSTIBLE:
    COMPONENTS AFFECTED BY FIRE:  Motor
    POWER DEGRADATION (%):          FORCED OUTAGE:          $ Loss:

REFERENCES:  LER
```

The cursor will be located in the lower left corner (LLC) (page 9) of the screen. As before, to get the description of this event, press any key (page 10).

```
INO #:  331

    With Unit 1 at full power, while attempting to energize "A"
    control room air conditioning chiller, the local control
    panel caught fire.  The "A" chiller was removed from service
    with the "C" chiller out of service for routine maintenance.
    Service water from a blown condenser zinc plug shorted the
    motor starter contacts at the local chiller control panel.
```

The cursor will be located in the lower left corner (LLC) of the screen.

Remember that if you want both the specifics of a fire event as well as its written description, the first output display you see will be the specifics, while the second screen gives the description.

Once you have read the description for INO 331, or printed the information out, you want to exit this search (i.e., only two fire events (INOs 330,331) were to be looked at). To do this, type in the letter "Q" (i.e., the bailout (page 9) command.) (You will type this letter in the lower left corner of the INO 331 description.)

The screen will then clear and be replaced with a prompt that asks you whether you want to look at a different set of fire events (allowing you to look at only select fire events rather than going sequentially through the data base).

```
Do you want to look at a different set of fire event data?

(Y for YES, Any key for NO)
```

This prompt requires a yes or no response before the program will continue. If you want to look at another set of fire events, press "Y", and the program will take you back to the prompt that asks whether you want to start at a particular INO (the first data entry prompt for Case 1; page 34) and then asks you all the questions that follow it. If you do not want to look at another set of fire event data (which you indicate by pressing any key (page 10) other than "Y"), the option assumes that you are through and will display a Completion Message for this option on your screen.

```
This completes your operations in the
Full Fire Event Data Display Option.

You will now be returned to the Fire
Event Search Menu for further selections.
```

After a short time delay, the Completion Message will be replaced by the Fire Event Search Menu.

GO TO PAGE 27

Case 2: Look at only one fire event, INO 330, and send both the fire event specifics and the description for the fire event to a printer for a hard-copy output.

This case is entered by giving a "No" response to the first question this option asks (Chronologically display the fire events?; page 33). A "No" response is given by pressing any key (page 10). When you have done this, the display will change and ask you for a response to the following question:

```
Do you need a listing of INO's and Plant names?

(Y for YES, Any key for NO)
```

This particular prompt gives you the chance to look at the INOs and their associated plant names in case you need a reminder as to what is available. This response provides you a means of looking at fire events at a specific plant by simply looking for its name in the listing and finding its corresponding INOs.

Assume for this example that you want to find the INO for Peach Bottom 2, where you believe a fire occurred on September 7, 1983.

GO TO PAGE 117

RETURN FROM PAGE 119

The INO for the fire event you are looking for is 330.

The next data entry prompt asks you to enter the INO to be used to search the data base.

```
Which Incident Number do you want displayed?

INO =

(Press "RETURN" after you have typed in the INO)
```

To search the data base, you need to specify the INO for the fire event you want displayed. For this case, INO 330 is the fire event of interest, so you should type in "330" and then press the "Return" key. Do not precede the INO with blank spaces; these are not allowed. Also, if you enter an INO not contained in the data base, you will get an invalid entry statement (page 10). If you type in a letter instead of a number, you will get a syntax error (page 11). This prompt requires you to press the "Return" key to continue.

The next data entry prompt asks whether you want the description of the fire event displayed.

```
Do you also want the corresponding descriptions displayed?

(Y for YES, Any key for NO)
```

For this example, you want the description of the fire event to be included as part of the output. Therefore, give a yes response to this question by typing "Y". The last question you are asked before the data base is searched for the fire event you specified is whether you want the fire event information sent to a printer for a hard-copy output.

```
Do you want the data directly routed to a printer?

(Y for YES, Any key for NO)
```

By typing in a "Y" for this prompt, the fire event specifics, and for this case the associated description of the fire event, will be sent directly to the printer. Then, your screen will clear, the cursor will be positioned in the upper left corner of the screen, and shortly your printer will start printing out the fire event information. The information is identical to what you got for INO 330 in Case 1, except now the fire specifics and the description all appear on one page.

If you had typed a "No" response to the above prompt, the fire event information would have been sent to your monitor, and would be identical, and would have the same control functions as in Case 1 (see page 36 if you want to follow this path.)

The next page illustrates the hard-copy output for this fire event.

```
PLANT NAME: Peach Bottom 2                    CAPACITY: 1065 MWe   INO: 330

PRINCIPAL OWNER UTILITY: Philadelphia Electric Company
PLANT LOCATION: NJ, Peach Bottom
NSSS VENDOR: General Electric                 REACTOR TYPE: BWR
OPERATING LICENSE ISSUED: 08/08/73
INITIAL CRITICALITY: 09/16/73        DATE OF COMMERCIAL OPERATION: 07/??/74

FIRE LOCATION: Diesel Generator Building      DATE OF FIRE: 09/07/83
    TIME OF DAY OF FIRE:              FIRE DURATION:
    MODE OF PLANT OPERATION: Maintenance Outage
    PROBABLE CAUSE OF FIRE: Component Failure
    TYPE OF FIRE: Class B
    DETECTED BY: Plant Personnel
    EXTINGUISHED BY: De-Energized
    SUPPRESSION EQUIPMENT: None
    SUPPRESSION AGENT(S): None
    SUPPRESSION TIME:
    INITIATING COMPONENT: Engine
    INITIATING COMBUSTIBLE: Oil
    COMPONENTS AFFECTED BY FIRE: Engine
    POWER DEGRADATION (%): 0%        FORCED OUTAGE: 0 Days      $ Loss:

REFERENCES: NPE, LER
Event Description:
   During surveillance testing of E-3 diesel, operators noted
   output power was swinging and exhaust temperature was high.
   Investigation revealed that there was a fire in the exhaust.
   It was determined that one Elliott turbocharger had failed
   causing a power reduction. The governor increased the fuel
   flow as a result. Excess fuel ignited in the exhaust.
```

After the fire event and its description have been printed out, your screen will again become active and display the following data entry prompt:

```
Would you like another fire event displayed?

(Y for YES, Any key for NO)
```

If you want another specific fire event displayed, give a "Y" response. The program will then cycle back and ask you whether you need a listing of the plant names and INOs (page 39). You will then be asked all the questions that follow it. A "No" response to this question (signified by pressing any key, page 10) indicates that you have finished with this option. To let you know that you will be returned to the Fire Event Search Menu, this option's Completion Message (shown on the next page) is displayed on your screen for a short time. When this Completion Message clears, it will be replaced with the Fire Event Search Menu, where you can make further data base selections.

This completes your operations in the
Full Fire Event Data Display Option.

You will now be returned to the Fire
Event Search Menu for further selections.

GO TO PAGE 27

5.3.4 Essential Fire Event Display

This option is similar to the Full Fire Event Data Display option discussed in Section 5.3.3. Its primary difference is that it is designed to present only the barest of fire event information.

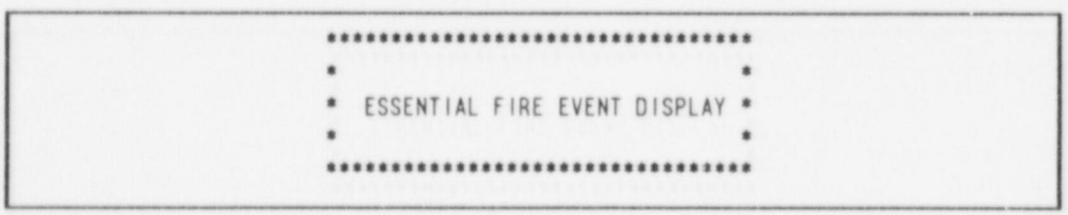
This data base option answers in a brief form the "who," "what," "where," and "when" of a fire. The "who" question is answered by giving the plant name and its location (state, town). The "what" question is answered by giving the cause of the fire and the components affected. The "where" portion of the question is answered by giving the location in the plant where the fire occurred, and the "when" question is answered by giving the date the fire event occurred. Because it may be of interest to know the type of plant where the fire occurred, the type of reactor is also one of the outputs from this option. Notice that the items discussed above cover only about a third of the information displayed in the Full Fire Event Data Display. This option can also display the descriptions of a fire event if desired.

Because this option is similar to the Full Fire Event Data Display option, only information on how you get started in this option and some of the preliminary displays at the start of this option will be discussed. The data entry prompts are identical and perform the same functions as those found in the Full Fire Event Data Display option. Once this option starts asking you questions, you will be referred back to Section 5.3.3.

Figure 15 is the flowchart representation of the major decision points and paths that are available when using this option to search the data base.

You enter this option from the Fire Event Search Menu.

The first display indicating that you are in the Essential Fire Event Display option of the data base, will be the Heading Block for this option.



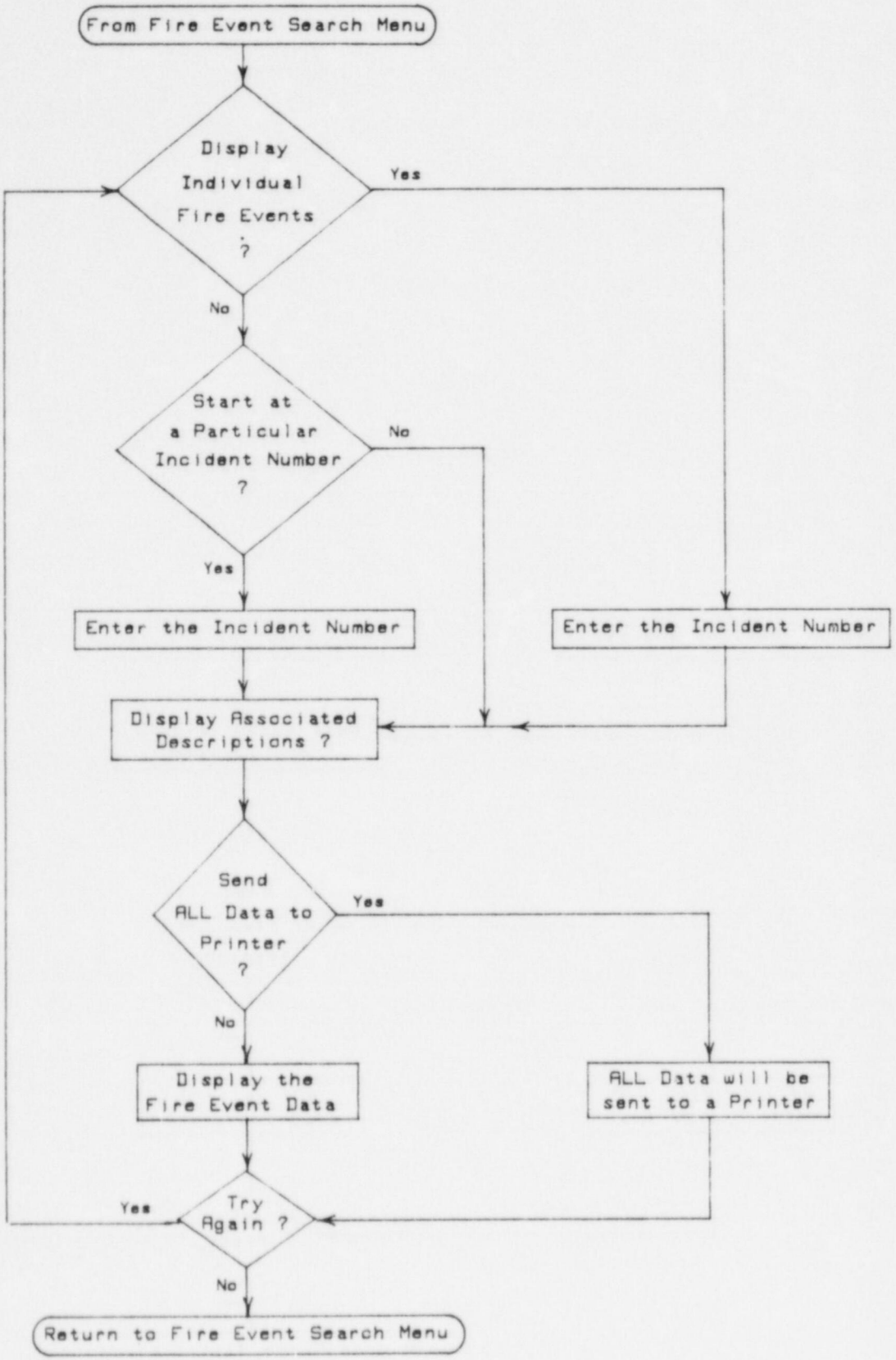


Figure 15. Essential Fire Event Display Option Flowchart

After a short delay, the display will be replaced by the Preliminary Information Display for this option.

```
        This portion of the Fire Data Base presents a quick
        reference on the fires that have occurred at nuclear power
        plants. The intent of this option is to answer in a concise
        form the 'where', 'what', and 'when' for fire events that have
        been recorded.
Press any key to continue...
```

This display summarizes the basic purpose of this option and its capabilities. Follow the direction of the prompt at the bottom of the screen and press any key to continue (page 10).

This option next asks you how you want the data base searched and what fire event information is to be displayed. The first prompt in this option is shown below.

```
Do you want to individually pick the fire event of interest,
or view all of the events in sequence?

Enter "I" for individual, anything else for all events

Your Choice ?
```

This prompt asks you whether you want to search the data base by specific INOs or chronologically (by date). This is equivalent to the first data entry prompt in the Full Fire Event Display option in Section 5.3.3.

To look at a specific fire event, type in "I" for the above prompt. To scan a number of fire events, press any key (page 10) other than "I".

As mentioned at the start of this section, the questions that are asked of you in this option are identical to those asked at this same point in the Full Fire Event Data Display option. Since the questions have already been covered in detail in Section 5.3.3, they will not be presented again here. Refer to Section 5.3.3, starting at page 33, as to how to answer the questions in this option and what they mean.

Although the questions asked for the Essential Fire Event Display and the Full Fire Event Data Display options are the same, because the Essential Fire Event Display is designed to present only the minimum information concerning a fire, the output displays between the two options are different. To give you an idea of the fire specifics and description for this option, look at Case 2 from the Full Fire Event Data Display. In this case, the fire event with the INO 330 was found. The associated description for this event was also

found, and all this data was sent to the printer. In the Essential Fire Event Display the printer output for this fire event will look like:

PLANT NAME: Peach Bottom 2 INO: 331

DATE OF FIRE: 09/07/83

LOCATION OF FIRE: Diesel Generator Building

PROBABLE CAUSE OF FIRE: Component Failure

REACTOR TYPE: BWR

MODE OF PLANT OPERATION: Maintenance Outage

Event Description:

During surveillance testing of E-3 diesel, operators noted output power was swinging and exhaust temperature was high. Investigation revealed that there was a fire in the exhaust. It was determined that one Elliott turbocharger had failed, causing a power reduction. The governor increased the fuel flow as a result. Excess fuel ignited in the exhaust.

Note that in comparison to the printout for the Full Fire Event Data Display option, this version of the fire specifics section has only a few entries. Only those entries that give information about the "who," "what," "where," and "when" of a fire are displayed. As was mentioned previously, the purpose of this option is to give basic fire event information so that the data can be scanned quickly and easily. The descriptive portion of the fire event, however, is no different from the description obtained when using the Full Fire Event Data Display option.

When you have completed all operations with this option (by giving a "No" response to the Try Again prompt) the Completion Message for this option is displayed for a short time.

> This completes your operations with the
> Essential Fire Event Display Option.
>
> You will now be returned to the Fire Event
> Search Menu for further selections.

After a short delay (long enough for you to read the Completion Message), you will be returned to the Fire Event Search Menu.

GO TO PAGE 27

5.3.5 Fire Duration/Suppression Time Search

In this option, you can search the data base for fire durations and suppression times. These times are based on fire event descriptions. Unfortunately, times for many of these events are not reported. Therefore, only a relatively small number of fire events will apparently meet the specified time criteria, but actually a large number of fire events might meet the time criteria were this information reported.

Understanding the definitions of duration and suppression times for a fire is important for adequate use of this option. Suppression time is the interval from the start of fire fighting activities to the fire's extinguishment. The fire duration time is an estimate of the time from the fire's beginning until it was put out. This includes the time it took to detect the fire, to fight it (manually or by actuating an automatic suppression system), and to suppress it. Note, however, that fire duration time may be identical to suppression time because of the way the fires were reported. Therefore, it is highly recommended that the description of a fire event be viewed to help you determine which time was actually reported.

This option does not, in fact, search for specific times, but rather searches for specified ranges of times. The time ranges were somewhat arbitrarily chosen; however, they do correspond to suppression time ranges used in previous PRAs. Because of the time ranges used, each record must be checked to determine whether it is within the time range you specify. This means a longer search time when using this option.

In addition, built into this option are some other limited searching capabilities, so that the data base is not only searched by the time you specify, but by other parameters, too. These parameters narrow down the number of fire events of interest. The other parameters that an event can be matched to are (a) the type of reactor, (b) the mode of plant operation at the time of the fire event, (c) how the fire was detected, and (d) how the fire was extinguished. These parameters are "and-ed" and compared against a particular fire event to determine whether the event meets the specified conditions.

Figure 16 is a flowchart showing the major decision points and paths that can be taken when using this option.

The Fire Duration/Suppression Time Search option is entered from the Fire Event Search menu.

The first display, which tells you that you are in this option, is the Heading Block, shown below.

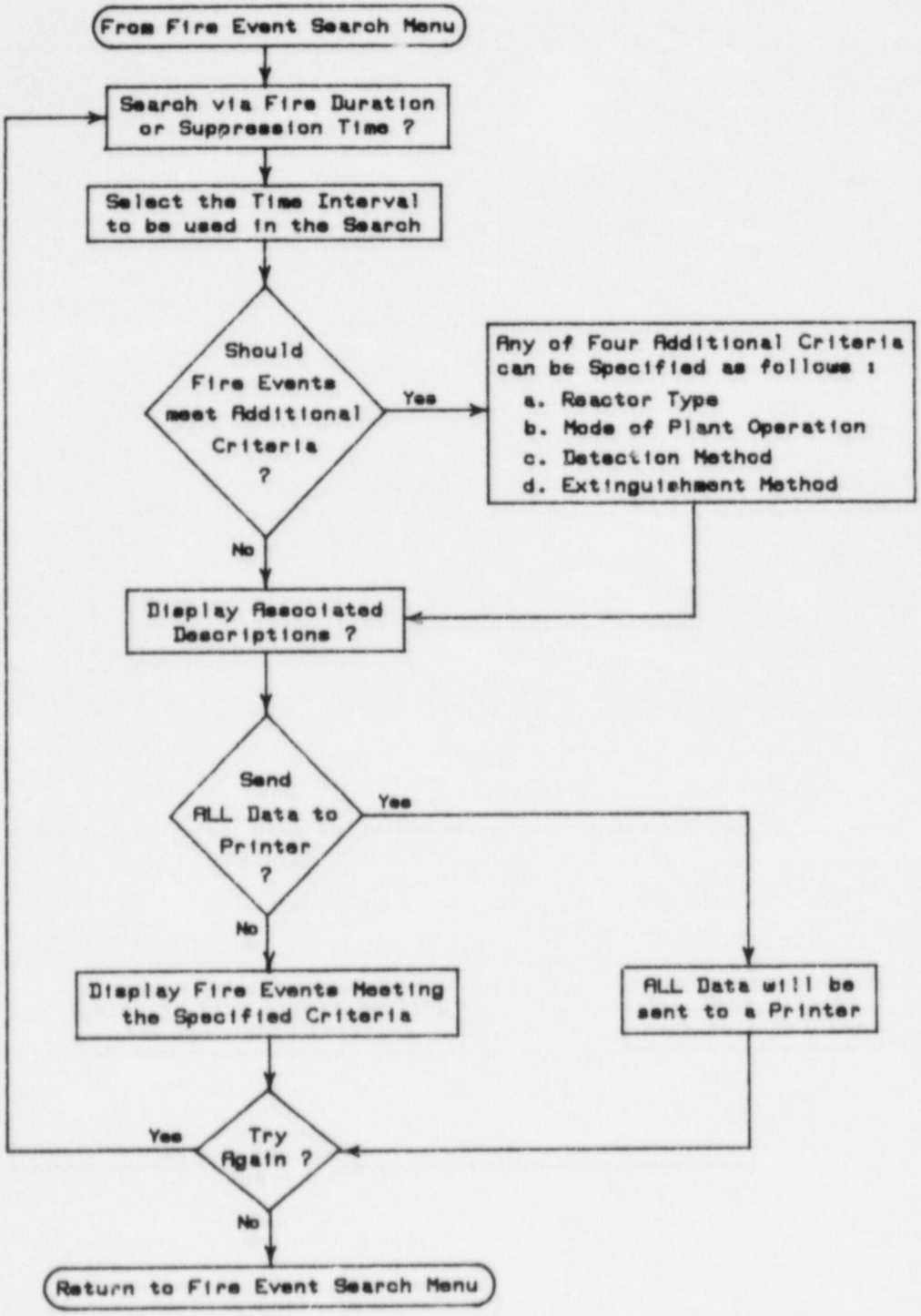
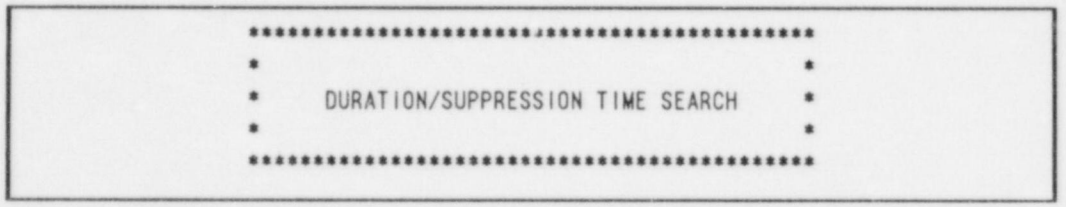
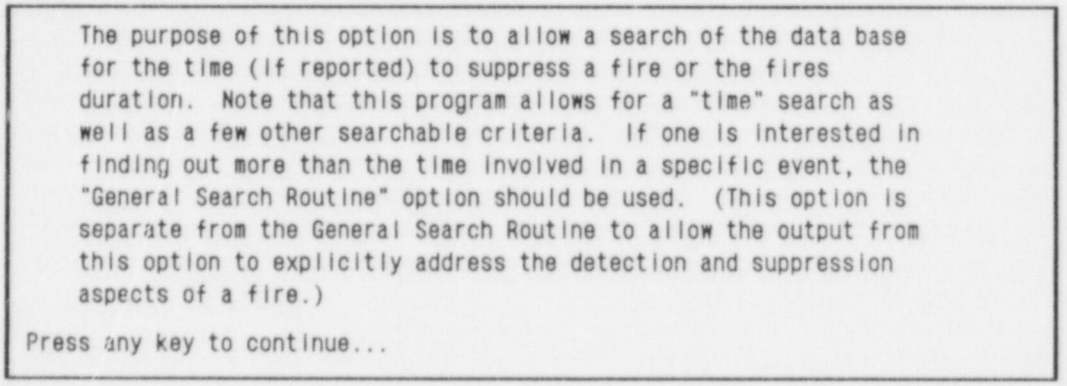


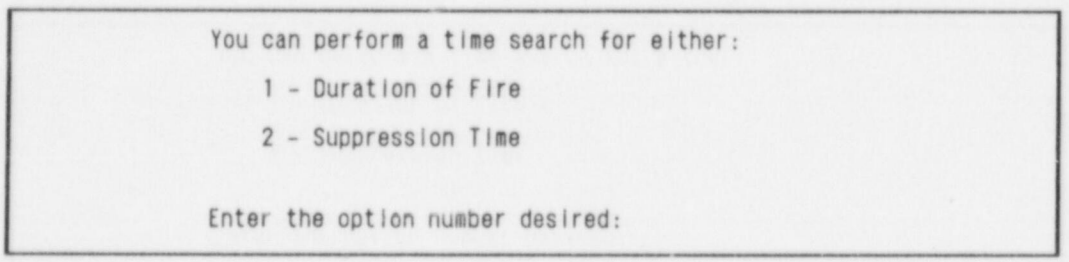
Figure 16. Duration/Suppression Time Search Option Flowchart



After this display automatically clears, the next display provides Preliminary Information for this option.



To continue program execution, follow the prompt on the screen and press any key to continue. The next display asks you to specify which time, either the fire duration or suppression time, will be used to search the data base.



For this example, you want to search the data base for the duration time of the fire, press "1". You do not need to press the "Return" key to continue; the program will do this automatically.

Next, you need to specify the time interval to be used in the search. The allowable time intervals used for both the fire duration or suppression time entries in the data base are shown on the next page.

Search Time Options

The time options that you can search for are as follows:

1 - less than 1 minute
2 - greater than or equal to 1 minute but less than 5 minutes
3 - greater than or equal to 5 minutes but less than 15 minutes
4 - greater than or equal to 15 minutes but less than 30 minutes
5 - greater than or equal to 30 minutes but less than 1 hour
6 - greater than or equal to 1 hour
7 - ALL events with a recorded time

Enter the option number for the time interval you want to search on:

(Press "RETURN" after your entry to continue)

If time option 7 is chosen, all fire events with a recorded duration time or all fire events with a recorded suppression time will be displayed. This allows the total number of events to be counted. (Keep in mind that a large number of fire events do not have any times reported; therefore, the total number will be smaller than the true value.) For this example, assume that the time interval of interest is between 5 and 15 minutes, so you would select option 3. For this data entry prompt (unlike the previous prompt), the " Return " key must be pressed to continue the program. This allows you to make sure you made the correct choice; if not, backspace and type in the correct number before pressing "Return".

Once the time interval (the principal search parameter used by this option) has been specified, an additional question is asked to see whether you want to specify further the fire event data to be displayed. By specifying additional criteria for a fire event, you can reduce the number of fire events of interest that will be displayed.

Do you want the data to meet additional criteria?

(Y for YES, Any key for NO)

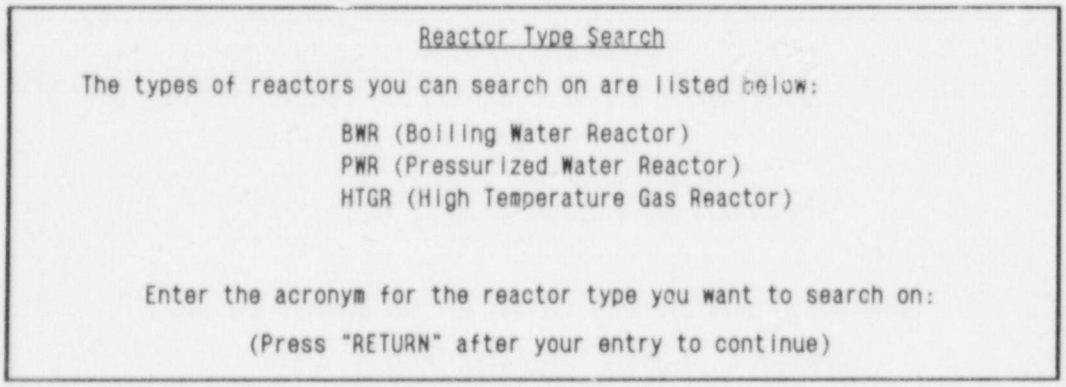
If additional criteria are to be specified for the fire event data (and they are), a "Y" response to the above data entry prompt allows up to four additional criteria to be placed on a fire event before it is displayed. Additional criteria that can be searched on are as follows:

a. Reactor type
b. Mode of plant operation at the time of the fire
c. Method by which the fire was detected
d. Method by which the fire was extinguished

Following a "Y" response, you will be asked in four succeeding screen displays to select from options for each of the four criteria above (in the order shown). An acceptable response is to press the "Return" key to ignore any criterion that you do not wish to add as a principal search parameter. If, for instance, it was important to search the data base only on the basis of reactor type, you would enter the reactor type, press "Return", and then merely press the "Return" key at each of the three following displays.; The data to be displayed would then be for fire events with the time interval and reactor type you specified. The criteria specified are always logically "and-ed" in this option; hence, in the instance just given, for a specific fire event to be displayed, its time interval and reactor type must both exactly match the selected criteria.

For this example, let's assume that in addition to the time interval of 5 to 15 minutes specified previously for the duration of the fire, that we only want to look at BWRs that were operating at power. Detection and extinguishment means for this example are assumed to be of no interest.

The first of the four displays asks you to specify a reactor type to be used in searching the data base.



For our example, you would type in "BWR", then press the "Return" key.

The display for the second criterion, mode of plant operation, lists seven plant-operating states used to search the data base. These states range from the plant's being at power to being under construction. Since we are interested in plants at power operation when the fire occurred, press "4" (for Power Operation), followed by pressing "Return" to continue to the next display.

Mode of Plant Operation Search

The Options you can select for the mode of plant operations are:

1 - Construction
2 - Maintenance Outage
3 - Pre-operational Testing
4 - Power Operation
5 - Hot Shutdown
6 - Cold Shutdown
7 - Refueling Outage

Enter the number of the operational mode you want to search on:

(Press "RETURN" after your entry to continue)

Detection Means

The data base can be searched for the following means employed to detect a fire:

1 - Smoke Detectors
2 - Heat Detectors
3 - Fire Watch
4 - Security Guards
5 - Plant Personnel
6 - Construction Workers
7 - Control Room Observations

Enter the number of the detection method you want to search on:

(Press "RETURN" after your entry to continue)

Because we are not interested in which mode of detection was used, press the "Return" key once (this tells the data base that any means of fire detection is allowable). If you hit the "Return" key more than once, the program will treat it as an entry for the next prompt, so be careful.

The last screen in this series asks you to specify what kind of extinguishment method was used to put out the fire. Since this is not of interest, press the "Return" key once.

Extinguishment Method

The data base can be searched for the following extinguishment methods:

1 - Automatic System
2 - Security Guard
3 - Construction Workers
4 - Self Extinguishing
5 - De-Energized
6 - Offsite Fire Department
7 - Plant Personnel
8 - Plant Fire Brigade
9 - Remove Fuel Source

Enter the number of the option you want to search on:

(Press "RETURN" after your entry to continue)

You have now specified all the additional search criteria that will be used by this option to search the data base.

Only two more questions are asked before the data base is searched. The first asks whether or not, once a fire event has been found, the associated description for that fire event should also be displayed.

```
Do you want the corresponding descriptions displayed?

(Y for YES, Any key for NO)
```

Type a "Y" response to this prompt to see the fire event descriptions.

The second question asks whether or not the fire events (and/or their descriptions) should be routed to a printer rather than to your monitor's screen. If a "Y" response is given, the screen will clear and stay that way until all the fire events meeting the criteria you specified have been printed out. During the printing, the cursor will be located in the upper left corner of the screen and remain there until all the data have been printed. Once printing has been completed, control is returned to your screen. If you do not want the data sent to a printer (assume this is the case for this example), press any key other than "Y" (page 10) to have the data displayed on your screen.

```
Do you want the data directly routed to a printer?

(Y for YES, Any key for NO)
```

With this, the screen will clear and be replaced by the message "Working ....." in the center of your monitor's screen. This message tells you that the data base is being searched. Do not be surprised if, during the search, your screen momentarily clears and the "Working ....." message reappears. This means that a fire event has been found that has the correct time interval but that does not meet the additional conditions you specified. (Remember that fire events with a duration time of from 5 to 15 minutes at BWRs operating at power are being searched for in the data base.) The first event meeting all these criteria is for the Fitzpatrick plant. The output data for this fire event is shown on the next page.

```
PLANT NAME: Fitzpatrick                                    INO: 154

DATE OF FIRE: 04/04/77                    TIME OF DAY OF FIRE:
FIRE DURATION: 00:10
LOCATION OF FIRE: Auxiliary Building
TYPE OF FIRE: Class C

DETECTION SPECIFICS
        FIRE DETECTED BY: Plant Personnel

SUPPRESSION SPECIFICS
        SUPPRESSION TIME: 00:03
        FIRE EXTINGUISHED BY: De-Energized
        EQUIPMENT: None
        SUPPRESSION AGENT(S): None

REFERENCE(S): NPE, EPRI
```

The output is made up of four sections. The first section gives the particulars about the fire (i.e., plant name, fire location, type of fire, etc.). The second section describes how the fire was detected, and the third section provides suppression-relevant data. The final section lists the references/sources for the data.

The cursor will now be located in the lower left corner (LLC) (page 9) of the screen. When you press a key to continue (page 10), the screen will clear and be replaced with the fire event description. Note that the description is keyed to the fire event by its Incident Number (INO). (You can bailout (page 9) of the search when either the fire event specifics or the description is on your screen.)

```
INO #: 154

      A coil failed by fire in the breaker for an HPCI test valve.
      The power was removed from the power board, and the coil was
      replaced. The power was off for 5 min. The failed coil did
      not disable HPCI. An operator removed the power to locate
      the coil failure but could have restored power at any time if
      required.
```

All fire events matching the specified criteria will be displayed in a similar manner until the entire data base has been searched. Then, a summary display showing the number of events matching the specified criteria is displayed for statistical purposes.

```
The total number of events = 2
```

The cursor will be located in the lower left corner (LLC)

The next data entry prompt asks if you would like to try again. With a "Y" response, the program will return to the beginning of the series of displays and questions that began by asking which time (duration or suppression) was to be used for the search (page 49).

```
Do you want to try again?

(Y for YES, Any key for NO)
```

A "No" response will cause the completion message for this option to appear. Let's assume that you don't want to make any more searches in this option. Therefore, to exit this option, press any key other than "Y". The Completion Message for this option looks like:

```
This completes your operations with the
Detection/Suppression Time Search Option.

You will now be returned to the Fire Event
Search Menu for further selections.
```

After a short delay, the Completion Message will automatically clear and be replaced by the Fire Event Search Menu.

GO TO PAGE 27

5.3.6 General Search Routine

This particular option, the most complicated (in terms of software programming) and also the most general-purpose option in the data base, is designed to search the data base for fire events that meet certain specified criteria. Up to five different criteria can be specified, and, in turn, these criteria can be logically "and-ed" or "or-ed" to ensure that only the fire events that meet these conditions are displayed. As such, this option in the data base does searches that you could do in dBASE III; however, it is done in a more user-friendly way (i.e., you respond to a series of questions, rather than having to input a long search string). In addition, all the allowable entries used to search the data base are shown on your screen so that you do not have to refer to this manual to see what is or is not an acceptable entry.

In this option, you can search any of 18 fields in the FIRE data base file (see Section 6.1 for more details about the fields in this data base file). You can search the data base based on plant name, reactor type, mode of plant operation at the time of the fire, fire location, cause of the fire, date of the fire (either a specific date or a range of dates), initiating component and combustible for the fire, and the reactor supplier. In addition, you can search on the principal owner of the plant, fire location, type of fire (i.e., Class A, B, C, or D), fire detection method, extinguishment method, the equipment actually used to extinguish the fire, type of suppression agent (e.g., water, CO_2, Halon), other components affected by the fire, dollar loss due to the fire, and finally, the reference(s) for the above information. As mentioned above, you can search for any one of these criteria or you can have the data base searched for any combination of up to five of these criteria.

The searches in this option can be performed by looking for fire events where all criteria you have specified are met (i.e., all logical "ands"), or for those fire events where at least one of the criteria you specify is met (all logical "ors"). Finally, if you do not want either one of these, you can construct a logical expression using both "ands" and "ors". (Logical "nots" are not included as viable logical operations in this option.)

As in the other options, output from this option can be routed to either the screen or a printer. Several output display options can be selected. Figure 17 is the flowchart representation of the major decision points and paths that can be taken in this option.

The General Search Routine is entered from the Fire Event Search Menu.

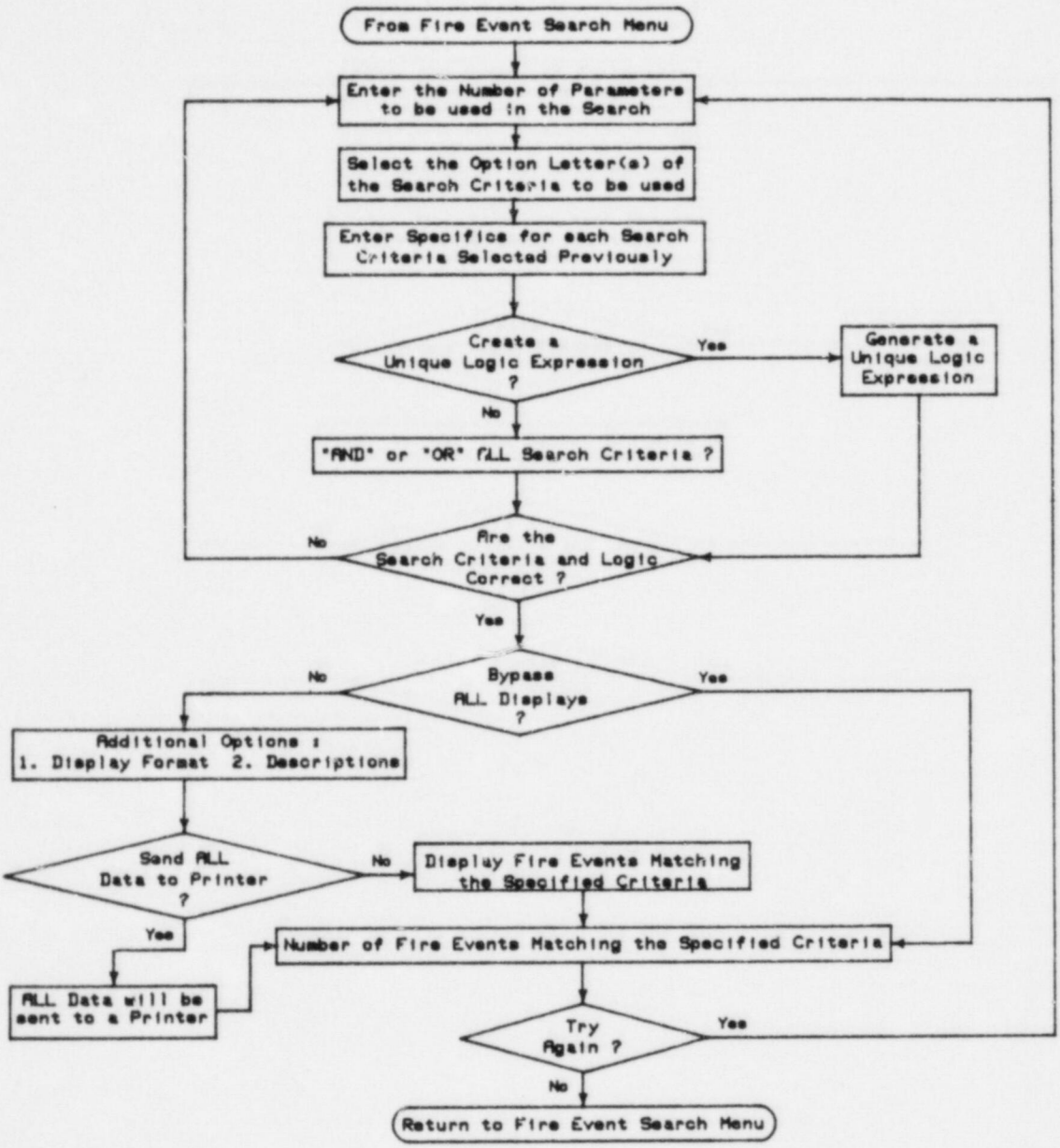
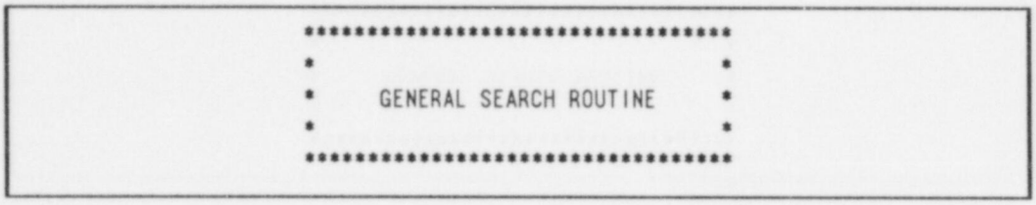


Figure 17. General Search Routine Option Flowchart.

The first display, which tells you that you are in the General Search Routine, is its Heading Block.



The Heading Block will automatically clear and be replaced by the Preliminary Information display for this option.

The purpose of the General Search Routine is to allow for some selected searches of the Fire Data Base to occur. This is similar to what dBASE III does on its own, however a number of typical items of interest have been included in this section. If the options listed do not meet the end users' requirements, they will have to write their own command files to extract the information they desire.

Press any key to continue...

This display serves to remind you of the purpose and capabilities of the General Search Routine. To continue, press any key (page 10) (the space bar is the most convenient).

The next display gives a two-line summary of this option's capabilities. It is included to remind you that you can search on up to five different criteria at once and that you can either "and" or "or" these conditions.

Up to five (5) different criteria can be specified for a search.

Searches can be performed as either 'ands' or as 'ors'

Press any key to continue...

Once again, to continue, press any key (page 10).

From here on, you will be given prompts that will determine exactly how and what criteria will be used to search the data base.

```
You can search on up to five (5) of the following areas at any given time

   A - Plant Name                    J - Owner Utility
   B - Reactor Type                  K - Type of Fire
   C - Mode of Plant Operation       L - Detection Method
   D - Location of Fire              M - Extinguishment Method
   E - Cause of Fire                 N - Equipment Used
   F - Date of Fire                  O - Agents Used
   G - Initiating Component          P - Components Effected
   H - Initiating Combustible        Q - Direct Loss
   I - Reactor Supplier              R - Reference

          Enter the number of areas you want to search on:

                (Press "RETURN" after your entry)
```

The above display shows the general categories (areas) you can select to search the data base. To illustrate how you might perform a search, let's assume that you want to search the data base simultaneously for two different sets of fire events (this will demonstrate the full capability of the option). The conditions to be met are as follows:

a. At Peach Bottom 2, you know that a fire occurred in the Diesel Generator Building and you would like to see the fire event specifics. (This example was chosen so you can compare it to the examples in Sections 5.3.3 and 5.3.4.)

b. You are also interested in seeing whether there were any fires at High Temperature Gas Reactors (HTGRs) while they were at power operation during the period January 1, 1965, to January 1, 1985.

With these two sets of conditions, you can identify five different criteria to use to search the data base. According to the previous discussion, these would fall into the searchable categories shown below.

Plant Name	Peach Bottom 2
Location of Fire	Diesel Generator Building
Reactor Type	HTGR
Mode of Plant Operation	Power operation
Date Of Fire	Those fires occurring between January 1, 1965, and January 1, 1985 (a 20-year time frame).

To begin your search of the data base, first enter the number of different areas to be used in the search. In this case, there are five areas. At the bottom of your screen, you are asked for this number; therefore, press "5" and once you have verified that this is what you really want, press "Return" to continue. If you enter an invalid number or a letter, you

will get an invalid entry statement (page 10) or a syntax error (page 11), respectively.

After you have entered the number of areas with which to search the data base, the prompt at the bottom of the display will be replaced by:

```
Enter your first (1) option
```

Note that the areas that can be used to search the data base will stay on the screen, allowing you to browse through them at your convenience to decide which areas you want to use for a search. For our example, enter the option letters in the order in which you want the areas to be searched on (this will make formulating a logic statement straightforward). The first criteria you want to use to search the data base with is the plant name. This corresponds to "A" in the list; therefore, press the letter "A" to get this as one of the criteria. When you select the option letter for the criterion you want to use to search the data base, you only have to press the appropriate letter, and the next prompt will automatically appear, asking you to enter the next option letter. You do not need to press the "Return" key to get the next prompt. If you enter a letter not shown on the screen, you will get an invalid entry statement (page 10). The next prompt looks like:

```
Enter your second (2) option
```

In response to this prompt, press "D" to indicate that you want to have the fire location as one search criterion. The prompt for the third option letter is similar to the above data entry prompts. For this prompt, press "B" since you want to search the data base for those reactors classified as HTGRs. After you have pressed "B", the fourth data entry prompt will appear on your screen.

You are now requested to enter the fourth criterion to be used to search the data base. At this prompt, press the letter "C". This tells the option that one of the criteria used to search the data base will be the mode of plant operation at the time of the fire.

The final data entry prompt in this series will now appear on your screen. This is the last time you will be able to specify a criterion during this search. In this case, you want to look at fires that have occurred during a specific time interval; therefore, press "F" to make this one of the searchable criteria.

You have now entered all the criteria that will be used to search the data base. However, at this point, all you have done is to identify the general criteria that will be used. The next step is to identify more explicitly the key words or dates that will be used to search the data base. This process is started when the following appears on your screen.

```
You will now be asked for more specific information
about the option(s) you have just selected
```

You do not need to do anything when this display appears. It is merely to remind you that you need to supply more information before the data base can be searched.

The next five displays will ask you for detailed information concerning the criteria to be used to search the data base. These displays will appear in the order you entered the five criteria (i.e., plant name followed by location of the fire, reactor type, mode of plant operation and, finally, date of the fire). This ensures that you can get the logical expression you want later in this option, i.e., you can select criterion C first, then criterion A. (You need not enter the criteria in alphabetical order.) After the above display is automatically cleared (after a short time delay), it will be replaced with a screen showing the searchable plant names in the data base.

```
                    Plant Name Search

          The possible plant name options are as follows:

Arkansas Nuclear One 1     Arkansas Nuclear One 2     Beaver Valley 1
Beaver Valley 2            Bellefonte 1               Bellefonte  2
Big Rock Point             Blue Hills 1               Blue Hills 2
Braidwood 1                Braidwood 2                Browns Ferry 1
Browns Ferry 2             Browns Ferry 3             Brunswick 1
Brunswick 2                Bryon 1                    Bryon 2
Callaway 1                 Calvert Cliffs 1           Calvert Cliffs 2
Carroll County 1           Carroll County 2           Catawba 1
Catawba 2                  Clinton 1                  Clinton 2
Comanche Peak 1            Comanche Peak 2            Cook 1
Cook 2                     Cooper                     Crystal River 3
Davis-Besse 1              Diablo Canyon 1            Diablo Canyon 2
Dresden 1                  Dresden 2                  Dresden 3
Duane Arnold               Farley 1                   Farley 2
Fermi 2                    Fitzpatrick                Fort Calhoun 1

          Is the plant name you want to search on in this group?

                    (Y for YES, Any key for NO)
```

This display lists nuclear power plant names. These are the only names that can be used to search the data base. It will take a little while for this display to be completed because it is getting the plant names from the data base. The prompt at the bottom of the screen is similar to the previous ones in that a "Y" response, indicating that the plant name you want to enter is in the list shown above, causes this prompt to clear automatically and be replaced by a prompt requesting you to type in the name of the plant. The plant names will still be displayed so that you can verify that you have spelled them exactly as shown in the list. If you do not spell them the same way, you will not get the correct fire events. Since the list above does not have the name of the plant we want (Peach Bottom 2), press any key (page 10) to display another set of plant names. Once again, there will be a short delay while the next set of plant names is being displayed. Then, you will again be asked whether the plant name you want to search on is in the new listing.

Plant Name Search

The possible plant name options are as follows:

Fort St. Vrain	Ginna	Grand Gulf 1
Grand Gulf 2	Haddam Neck	Harris 1
Hatch 1	Hatch 2	Hope Creek 1
Humboldt Bay	Indian Point 1	Indian Point 2
Indian Point 3	Kewaunee	La Crosse
LaSalle County Station 1	LaSalle County Station 2	Limerick 1
Limerick 2	Maine Yankee	Marble Hill 1
Marble Hill 2	McGuire 1	McGuire 2
Midland 1	Midland 2	Millstone 1
Millstone 2	Millstone 3	Monticello
Nine Mile Point 1	Nine Mile Point 2	North Anna 1
North Anna 2	Oconee 1	Oconee 2
Oconee 3	Oyster Creek	Palisades
Palo Verde 1	Palo Verde 2	Palo Verde 3
Peach Bottom 1	Peach Bottom 2	Peach Bottom 3

Enter the name of the plant

(Type the name in "caps" and then press "RETURN" to continue)

Peach Bottom 2 is in this new list. Press "Y" and the prompt will change to that shown above. Now, type in the plant name in all capital letters (as for any response to a question from any of the options in this data base). For this example, you should type in "PEACH BOTTOM 2", making sure it is spelled correctly. Then, press "Return" to continue.

(As with other options in this data base, you can type in just enough of the name to make it unique and search the data base,

i.e., if you typed in "PEACH", you would get the same results as when you typed in "PEACH BOTTOM 2".)

All 18 searchable areas in this option have the same kind of data entry procedure as the Plant Name data entry prompt. You will be asked to enter a name, number, or letter and then press the "Return" key. This procedure allows you to make sure you typed in or selected the desired entry before proceeding with the search. If you make an error in entering data, simply backspace and type the correct entry over the incorrect entry.

After you have entered the plant name and pressed the "Return" key, the display will clear and be replaced by the Location of Fire display.

Location of Fire

The following locations can be searched in the data base:

Administration Building	Auxiliary Building	Battery Room
Boiler Room	Cable Riser Area	Cable Spreading Room
Change House	Computer Room	Containment
Control Building	Control Room	Cooling Tower
Diesel Generator Building	Drywell	Fire Pump House
Maintenance Shop	Manhole	Offsite
Other Building	Pump Room	Radwaste Building
Reactor Annulus	Reactor Building	Recombiner Building
Security Building	Service Building	Stack Filter House
Switchgear Room	Temporary Building	TIP Room
Transformer Yard	Turbine Building	Warehouse
Yard		

Type in the location you want to search on
(use all capital letters)

(Press "RETURN" to continue)

This display lists locations that can be used to search the data base. (All locations on this display were identified as locations where fires had occurred at nuclear power plants, based on the reference sources used in compiling this data base.) As in the case of the plant name criteria, the prompt at the bottom of the screen asks you to type in the location you want to use for your search. For this example, you would type in "DIESEL GENERATOR BUILDING" (in capital letters), and after you verified that it matched the spelling in the list above it, you would press the "Return" key to continue.

Reactor Type Search

The types of reactors you can search on are listed below:

BWR (Boiling Water Reactor)
PWR (Pressurized Water Reactor)
HTGR (High Temperature Gas Reactor)

Enter the acronym for the reactor type you want to search on:

(Press "RETURN" after your entry to continue)

The next display asks you to give some more information concerning the third criterion, reactor type. Only three types of reactors can be specified to search the data base, and these are limited to commercial reactors presently found in the United States. For our example, HTGRs are the reactors of interest. Therefore, in response to the prompt at the bottom of the screen, you would type in "HTGR" and then press the "Return" key to continue.

Once again, it is worth noting that you can search the data base using substrings of the data entries you see on your screen. If you specify only a piece of a word or acronym (in this case only the letter "H"), the program will look at the reactor type field in the data base, and if it finds an "H", display it if all other conditions are met. Because the "H" uniquely identifies an HTGR, you could have typed in only "H" and got the same results as entering "HTGR". However, when you use this feature of the program, make sure your entries uniquely define a search parameter if you do not type in the whole description requested by a particular data entry prompt.

Following the Reactor Type display (for our example) will be the Mode Of Plant Operation display.

Mode of Plant Operation Search

The options you can select for the mode of plant operations are:

1 - Construction
2 - Maintenance Outage
3 - Pre-operational Testing
4 - Power Operation
5 - Hot Shutdown
6 - Cold Shutdown
7 - Refueling Outage

Enter the number of the operational mode you want to search on:

(Press "RETURN" after your entry to continue)

From this display, you select the condition of the plant at the time of the fire. This prompt, as contrasted to the three previous ones, requires you only to select a number corresponding to the plant status. Power Operation was initially defined as the mode of plant operation of interest, so press "4" and then the "Return" key to continue.

The last criterion to be used to search the data base is the date of the fire (actually, a range of dates).

Date Options

You have the following options in specifying dates:

1 - Specify a specific date

2 - Specify a range of dates (i.e., the data base will be searched for fire events occurring between two dates)

Enter the date option number that you would like to search on:

Press "RETURN to continue

You are given two choices. If you press "1", you will be asked to specify one date that a fire event will have to match to be displayed (assuming other criteria are met). The other choice, selected by pressing "2", will let you define a range of dates. Since you want to specify a range of dates, press "2" to make this choice. Press the "Return" key to continue.

Date Options

You have chosen the option to search between two specified dates.

Please enter the date of interest in the following form

month/day/year

Example: September 4, 1985 would be entered as 09/04/85

Enter the first date:

The above display verifies that you want to specify a range of dates and also gives you an example of how the dates should be entered: in the form of month/day/year, with month, day, and year each as a two-digit number. You must enter the dates chronologically, older date first. At the prompt that asks for the first date, you would enter 01/01/65 (representing January 1, 1965). Then press the "Return" key to continue.

```
Enter the second date:
```

At the second data entry prompt, enter 01/01/85 (representing January 1, 1985). To continue, press the "Return" key. You have now completely specified all the conditions that will be used in searching the data base. But the search doesn't start yet. You will be asked a few additional questions that determine the output form of the data as well as how the criteria you have specified will be used to determine whether a fire event should be displayed (i.e., the fire event matches your criteria).

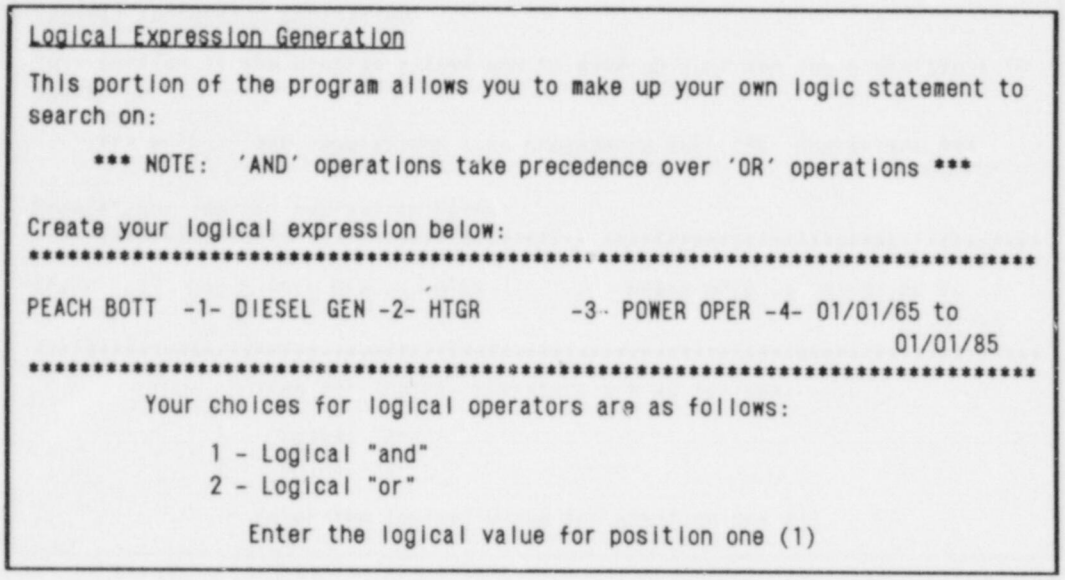
These questions are asked under the heading "Additional Options". The first question allows you to define (using "ands" and "ors") how the conditions you just specified will be used to determine whether a fire event matches the specified criteria.

```
Additional Options:

* Do you want to create your own logic expression?
    (for two or more search criteria)

    Press Y for YES, Any key for NO
```

Since you have five search criteria for this example, and because they do not all pertain to one specific search (i.e., there are really two different searches to be performed, the Peach Bottom case and the HTGR case), you do not want all the conditions you specified to be treated in an "and" fashion or in an "or" fashion. You will want to create your own logic expression, so type in "Y". When you do, the display will be replaced with the following:



Now you can create your own logical expression. In the middle of the screen, between the two lines of asterisks (*), is the expression on which you will be working. It displays the first 10 characters from each of the 5 search criteria you previously specified. The numbers separating these entries tell you which position in the expression you are working on and where you will put either an "and" or an "or". Below this expression you will see the numbers used to enter "ands" or "ors" (1 = "and"; 2 = "or"). The prompt at the bottom of the screen tells you exactly which position you are working on in the expression.

What you want to search for, in words, is as follows:

> Find the fire event where the plant name is Peach Bottom 2 and the fire occurred in the Diesel Generator Building.
>
> or
>
> Find those fire events in which the reactor type was an HTGR, and the reactor was at Power Operation, and fires occurred between January 1, 1965, and January 1, 1985.

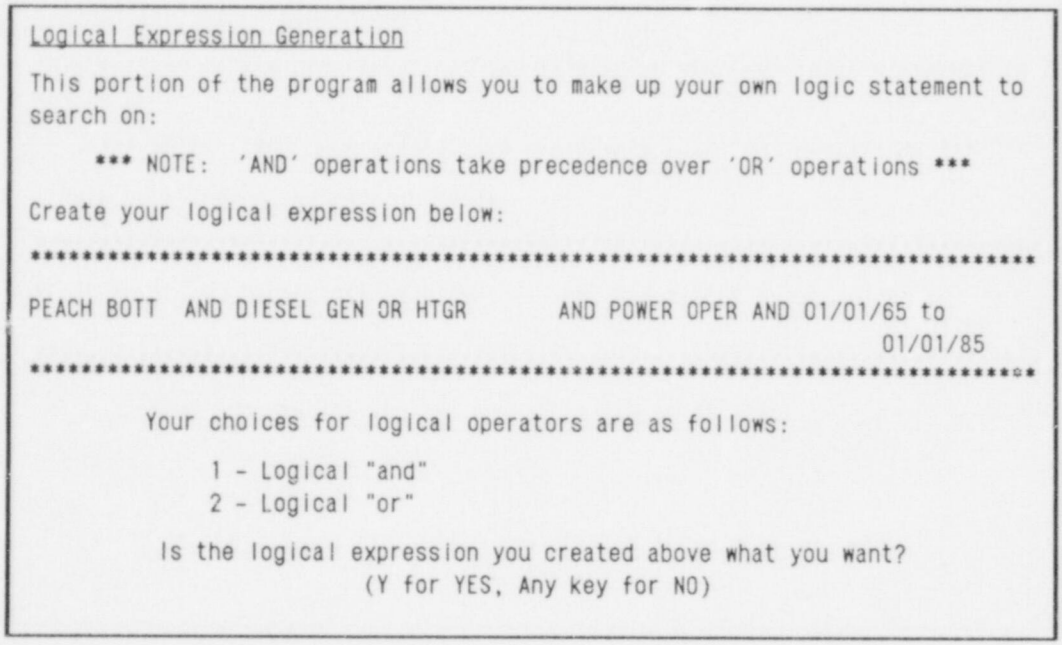
All these terms (except the "ands" and "ors", which you have yet to enter) appear in the expression on the screen.

To make the expression on your screen match the words, you would do the following:

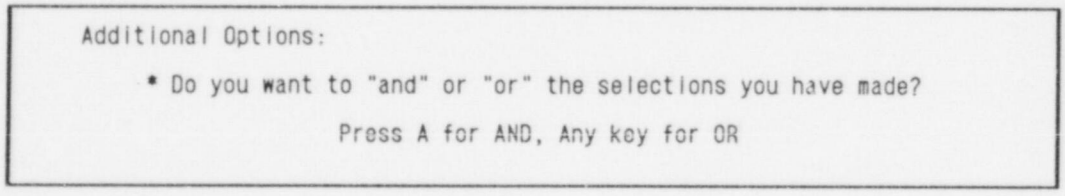
> Position 1 - press "1"
> Position 2 - press "2"
> Position 3 - press "1"
> Position 4 - press "1"

As you perform the above steps, the numbered positions are replaced by the words "AND" or "OR", depending on what logical operation you choose. In this way, you can visually verify that you have created the logical expression you want.

After you have made all your entries, you are asked whether this is the correct expression. If not, you can change it by pressing any key (page 10) other than "Y". All the AND and OR entries in the expression will now be replaced by numbers. You will then be asked to reenter, starting at position 1, your logical operator choices. Follow the procedure covered above to reenter your logical values. However, since the expression on your screen is correct, type "Y" to continue.



(If you did not want to create your own logic expression, and gave a "No" response to the logical expression creation question (page 67), it would be replaced by the question shown below.



This question asks whether you want all of your search criteria "and-ed", in which case a fire event would have to meet all the criteria used in the search before it could be displayed, or have them all "or-ed", in which case a fire event would be displayed if it met any one of the conditions. This question is defaulted to if you have only one criterion that

the data base is being searched for and you give a "Y" response to the logical expression creation question (page 67). If you have two search criteria, this is probably the preferred question to answer. If more than two search criteria are being used, you may need to use the logical expression generation path. To "and" all your search criteria, type in "A". Press any other key (page 10) to "or" the search criteria.)

After you have generated your logic expression, you will be given a chance to verify that the search conditions and the logic to be used to search the data base are correct.

```
Additional Options:

* The Search Criteria and Logic Expression that will be used to search the
  Data Base is shown below.

PEACH BOTTOM 2 .AND. DIESEL GENERATOR BUILDING .OR. HTGR
              .AND. POWER OPERATION .AND. 01/01/65 TO 01/01/85

     Is this the correct expression to be used to search the Data Base?
                    (Y for YES, Any key for NO)
```

Here, you are being asked whether the expression is correct. In this case it is, so press "Y". However, if for some reason you decide that the expression is incorrect (either a search term or a logical operator is incorrect), press any key to be returned to the start of this option and you will be asked for the number of areas you want to use in your search (page 60). This is your last chance before the data base is searched to verify your search parameters and change them if they are wrong.

The next data entry prompt, located in the bottom half of the previous display, asks whether you want to bypass displays that show the fire events. The bypass capability allows you to look at only the number of fire events that matched your criteria, without looking at each fire event. (This capability is useful for obtaining statistical data.) For this example, let's assume you want to look at the fire events on your monitor; therefore, press any key (page 10).

```
* Do you want to bypass all the screen displays for Fire Events matching
  the above Logic Expression and get just the number of events that have
  occurred?

     Press Y to Bypass Screen Displays, Any key to keep them.
```

The next three data entry prompts concern the output display forms.

The first question asks how the output data for the fire events should be displayed. The LONG FORM display (selected by pressing "L") is identical to the output display in the Full Fire Event Data Display option (Section 5.3.3, page 36). The SHORT FORM display (selected by pressing any key) is identical to the output from the Essential Fire Event Display option (Section 5.3.4, page 46). Let's assume you want the LONG FORM display; therefore, press "L". You need not press the "Return" key; the program will automatically continue.

```
Additional Options:
* Do you want the long form printout or the short form printout?

        Press L for LONG FORM, any key for SHORT FORM      L

* Do you want the description of each fire event displayed?

                Press Y for YES, Any key for NO
```

For the second question, if you want the descriptions of the fire events displayed for the fire events meeting the conditions you specified, type in "Y". Let's assume that you are interested in the fire event descriptions. These descriptions will look identical to those shown in Section 5.3.3, page 36.

The final question, before this option actually starts searching the data base, asks whether you want the fire event information sent to the screen or to a printer.

```
* Do you want the data routed directly to the printer?

            Press Y for YES, Any key for NO
```

If you have the information sent to the printer (by typing "Y"), the output will look like either the output from the Full Fire Event Data Display or the Essential Fire Event Display printer outputs shown in Sections 5.3.3 (page 41) and 5.3.4 (page 46), respectively. If you respond "No", all the fire event information will be routed to your screen. In this case, you want the data sent to the screen, so press any key other than "Y".

Since you have now specified all the search criteria and display-formatting information, the data base will be searched for those fire events matching the criteria. During the search, and until a fire event with the correct criteria is found, you will see the message "Working ....." on the screen.

(If you had selected the bypass option (page 70), the message "Working ....." would still appear on your screen; however, every time a fire event was found that matched the criteria

you specified, the message would flash off and then back on. This flashing is normal, and, when you are in the bypass mode, can quickly give you a feel for how many fire events match the criteria you specified.)

For the criteria specified in this example, the first and only matching fire event is shown below.

```
PLANT NAME:  Peach Bottom 2                    CAPACITY:  1065 MWe   INO: 330

PRINCIPAL OWNER UTILITY:  Philadelphia Electric Company
PLANT LOCATION:  NJ, Peach Bottom
NSSS VENDOR:  General Electric                 REACTOR TYPE:  BWR
OPERATING LICENSE ISSUED:  08/08/73
INITIAL CRITICALITY:  09/16/73        DATE OF COMMERCIAL OPERATION:  07/??/74

FIRE LOCATION:  Diesel Generator Building      DATE OF FIRE:  09//07/83
    TIME OF DAY OF FIRE:              FIRE DURATION:
    MODE OF PLANT OPERATION:  Maintenance Outage
    PROBABLE CAUSE OF FIRE:  Component Failure
    TYPE OF FIRE:  Class B
    DETECTED BY:  Plant Personnel
    EXTINGUISHED BY:  De-Energized
    SUPPRESSION EQUIPMENT:  None
    SUPPRESSION AGENT(S):  None
    SUPPRESSION TIME:
    INITIATING COMPONENT:  Engine
    INITIATING COMBUSTIBLE:  Oil
    COMPONENTS AFFECTED BY THE FIRE:  Engine
    POWER DEGRADATION (%):  0%        FORCED OUTAGE:  0 Days      $Loss:

REFERENCES:  NPE, LER
```

The cursor will be located in the lower left corner (LLC) (page 9) of the screen. To continue, and in this case to see the description of the fire event, press any key (page 10). The description for this fire event will then be displayed.

```
INO #:  330

    During surveillance testing of E-3 diesel, operators noted
    output power was swinging and exhaust temperature was high.
    Investigation revealed that there was a fire in the exhaust.
    It was determined that one Elliott turbocharger had failed
    causing a power reduction.  The governor increased the fuel
    flow as a result.  Excess fuel ignited in the exhaust.
```

The output from this search is almost identical to that from Section 5.3.3 (page 36), the principal difference being the way the information was located.

The example used to illustrate the use of the General Search Routine was purposely chosen to limit the amount of output that would be obtained. However, if the data base had been searched on, say, reactor type, and more specifically BWRs, a large number of fire events would have been displayed. After looking at some of the data, you might decide after several fire events that you did not search properly, or that the first few events told you what you wanted to know, etc. To avoid having to restart the program (by pressing the "Esc" key), you can bailout (page 9) of a search whenever the fire event specifics or description is displayed on your screen (when the cursor is in the lower left corner (LLC) of the screen, page 9).

After the entire data base has been searched, and all fire events displayed that match the specified criteria, a summary display will tell you the logical expression you were using to search the data base and the number of fire events that matched these criteria. The primary purpose of this display is to provide you with the number of fire events matching a specified criterion that can then be used with the operating experience calculations of Section 5.3.9 (page 91) to obtain fire frequencies. Note that the logic expression is not always centered. The display format used ensures that descriptions for the various criteria can be written on the screen without taking up too much space. The position of the cursor will be in the lower left corner, indicating that you can get a printout of the display by simultaneously pressing the "Shift" and "PrtSc" keys. If you do not need a hard-copy printout of the display, press any key (page 10) to continue.

The summary display screen for this example looks like:

```
        The number of events matching the specified criteria of:

PEACH BOTTOM 2 .AND. DIESEL GENERATOR BUILDING .OR. HTGR
                .AND. POWER OPERATION .AND. 01/01/65 TO 01/01/85

                              Equals

                                1
```

The cursor will be located in the lower left corner (LLC) of the screen. To continue, press any key (page 10).

If during the course of a search you bailout (page 9), the program will give you a summary display, as above; however, it will not represent all the events in the data base.

(If a search of the data base does not yield any fire events that match the specified criteria, you will get the display shown on the next page instead of the one shown above. This

display shows that no fire events were found to match the specified criteria, but allows you to make another search of the data base.)

```
**********
*  SORRY!  *
**********

No records were found matching
the conditions you specified.

Would you like to try again?

(Y for YES, Any key for NO)
```

Once you decide to continue after the summary screen has been displayed, the program will ask you whether you want to try again:

```
Would you like to try again?

(Y for YES, Any key for NO)
```

If you give a "Y" response to this prompt, you will be taken back to the start of this option and be asked to enter the number of criteria to be used to search the data base (page 60). From this point on, the questions are identical to those presented in this section; however, you may use different search criteria that require different inputs. (For more detail about the 13 searchable criteria not covered in this section, see Appendix B.) The search you perform will be a <u>new</u> search, i.e., when you start back through the questions in this option, there are no default values. If you have finished searching the data base, give a "No" response (by pressing any key other than "Y") to this question.

```
This completes your operations with
the General Search Routine Option.

You will now be returned to the Fire
Event Search Menu for further selections.
```

Shown above is the Completion Message for the General Search Routine. After a short delay, this message will disappear and be replaced by the Fire Event Search Menu.

GO TO PAGE 27

5.3.7 Chronological Listing of Fire Events

The Chronological Listing of Fire Events option in the data base, reached from the Fire Event Search Menu, is provided to allow you to display, in chronological date order or alphabetized plant order, data on fires that have occurred at nuclear power plants. The output from this option is a table showing the date of fire occurrence, the fire event INO, the plant name (if known), and the location of the fire.

Figure 18 is a flowchart of the major paths available when using this option.

The display below is the Heading Block for this option and is the first display you will see.

```
**********************************************
*                                            *
*    CHRONOLOGICAL FIRE EVENT DISPLAY        *
*                                            *
**********************************************
```

After a short delay, the Heading Block automatically clears and is replaced by the Preliminary Information display for this option.

```
This portion of the fire data base provides two listings
of fires that have occurred at nuclear power plants.  One
list orders the fire events by chronological date order.
The other listing orders the fire events Alphabetically
by plant name.

The Incident Number, plant name, date of the fire, and
the location in the plant where the fire occurred are
the output data for each listing.

Press any key to continue...
```

To continue program execution, follow the prompt on the screen and press any key to continue (page 10). The next data entry prompt asks you to specify the type of display: a listing of fire events in chronological date order or a listing of the fire events in alphabetical order based on plant names.

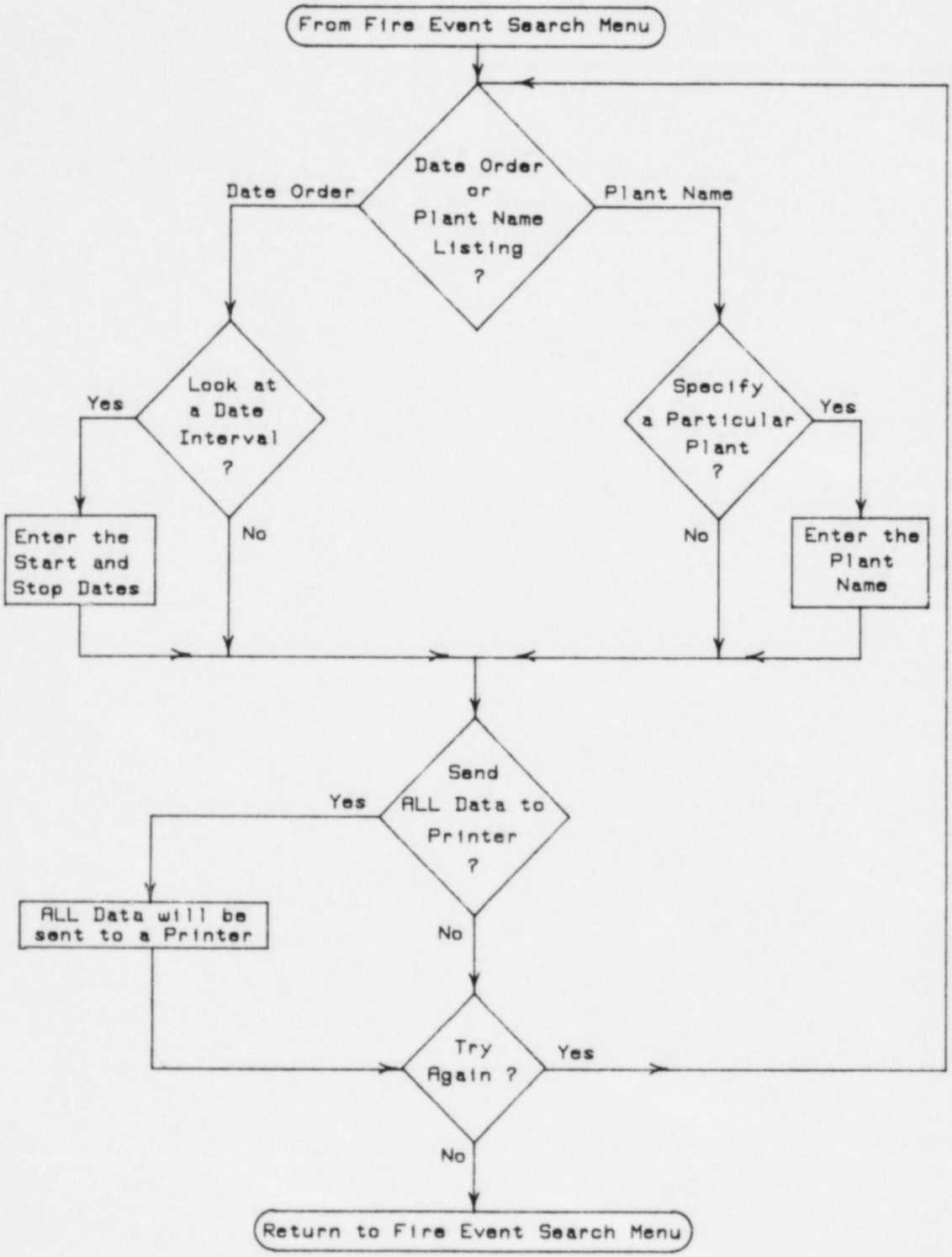


Figure 18. Chronological Fire Event Display Option Flowchart

```
Select the type of display desired

    1 - Chronological Date Order of Fire
    2 - Plant Alphabetized Listing

Enter the number of your choice
```

Depending on your response to this prompt, you can go two different ways in this option. Each case will be covered separately. (Case 1, Chronological Date Listing, starts below; Case 2, Alphabetized Listing, starts on page 81.) When you make your selection, you do not need to press the "Return" key. The program will automatically continue. (If you enter a letter, you will get a syntax error (page 11).)

Case 1: Select "1", Chronological Date Listing.

For this case, fire events will be displayed in chronological date order (i.e., from the oldest to most recent.)

There are two different paths you can follow for this case. You can specify a range of dates for certain fire events and display only those within that range, or you can display all the fire events. For this case, let's consider the date range specification path first and then look at how to display all the fire events.

The first data entry prompt asks whether you want to display a specific range of dates in which fires have occurred. Enter "Y".

```
Do you want to look at a specific range of dates?

(Y for YES, Any key for NO)
```

For this example, assume that those fire events that occurred between 01/01/67 and 01/01/70 are of interest. The next data entry prompt asks you to enter the start and end dates of the time range of interest. Enter the first date and press "Return", then enter the second date. Press "Return" again.

```
Enter the range of dates in the form Month/Day/Year
Example: September 1, 1985 would be entered as 09/01/85

Enter the first date:
```

If you enter either of these dates incorrectly (such as misplacing a "/") you will get an invalid entry statement

(page 10). You will then be asked a final question before the data base is searched.

```
Do you want all data sent directly to the printer?

(Y for YES, Any key for NO)
```

Let's assume you want the fire event information displayed on your monitor screen, so you would press any key (page 10) to indicate this. The display will clear and be replaced with the output screen below. (It takes a while to fill the screen up, since the program has to find the date interval you specified.)

Chronological Listing of Fires that have Occurred at Nuclear Power Plants

INO #	Date	Plant Name	Location
4	04/13/67	Peach Bottom 1	Reactor Building
5	04/29/67		Temporary Building
6	06/06/67		Reactor Building
7	02/07/68	San Onofre 1	Auxiliary Building
8	03/12/68	San Onofre 1	Auxiliary Building
9	08/13/68		Other Building
10	03/31/69	Prairie Island 1	Turbine Building
11	04/03/69		Turbine Building
12	04/29/69		Temporary Building
13	09/17/69		Temporary Building
14	12/30/69		Auxiliary Building

Total number of fire events in the time interval 01/01/67 to 01/01/70
Equals 11

Fire events in the specified date interval are now displayed. At the bottom of the screen is a summary of the number of fire events that occurred in that date interval. If fire events in the specified date interval occupy more than a full screen, the cursor will always be located in the lower left corner (LLC) (page 9) of every full screen.

After you press a key to continue, you will be asked whether you want to see the data again (i.e., display another set of fire events.)

```
Would you like to see the data again?

(Y for YES, Any key for NO)
```

To have <u>all</u> the fire events displayed chronologically, press "Y", and the program will revert to the question that asks which path you want to take (Chronological or Alphabetized

Listing?; page 77). To return to this path select "1". For the first question in this case (Look At a Date Interval?; page 77), press any key (page 10) to indicate that you want all fire events displayed chronologically.

The next data entry prompt asks whether you want to send all the data to a printer (page 78). If you still want the data displayed on your monitor, press any key. The output data for the first screen looks like:

Chronological Listing of Fires that have Occurred at Nuclear Power Plants

INO #	Date	Plant Name	Location
1	02/03/65	Peach Bottom 1	Containment
2	01/18/66		Yard
3	12/27/66		Boiler Room
4	04/13/67	Peach Bottom 1	Reactor Building
5	04/29/67		Temporary Building
6	06/06/67		Reactor Building
7	02/07/68	San Onofre 1	Auxiliary Building
8	03/12/68	San Onofre 1	Auxiliary Building
9	08/13/68		Other Building
10	03/31/69	Prairie Island 1	Turbine Building
11	04/03/69		Turbine Building
12	04/29/69		Temporary Building
13	09/17/69		Temporary Building
14	12/30/69		Auxiliary Building
15	01/15/70	Point Beach 1	Turbine Building
16	01/29/70		Temporary Building

** TO PREVENT LOSING ANY DATA YOU SHOULD PRINT SCREEN CONTENTS NOW **
DO YOU WANT A PRINTOUT? (Y = YES; Any key for NO)

After the first 16 fire event entries are displayed, a prompt appears and allows you to print out sections of the listing, if desired, by pressing the "Shift" and "PrtSc" keys simultaneously. To get a printout of the display, respond to the prompt with a "Y". The prompt will clear, leaving the 16 fire event entries. The display can then be printed out. The cursor will be located in the lower left corner (LLC) (page 9) of the screen. If you do not want a printout, press any key other than "Y". The prompt will disappear and three additional fire events will be displayed. After the third event (or 19 events total) has been displayed, the cursor will be located in the lower left corner (LLC) of the screen. You can now bailout (page 9) if you want to. The above process will repeat itself for every set of 16 fire events displayed.

At the present, the data base contains 354 fire events. All of these will be displayed before the next data entry prompt appears. (If the data had been sent to the printer instead of to the screen (with a "No" response to the printer question (page 78)), the hard-copy output would look exactly like the

sample output previously shown, except that 50 fire events would appear per page rather than the 19 maximum displayed on the screen.)

After all the fire events have been displayed, the cursor will again appear in the lower left corner (LLC) of the screen. The next data entry prompt asks whether you want to see the data again (page 78). (This prompt will appear at the end of the fire event listing regardless of whether the data was displayed on the screen or sent to a printer.)

If a "Y" response is given to this prompt, the program will cycle back to the first data entry prompt for this option (page 77) and proceed as previously discussed. If a "No" response is given to this prompt, a Completion Message appears.

```
This completes your operations with the
Chronological Fire Event Display Option.

You will now be returned to the Fire Event Search
Menu for further selections.
```

After a short time, the program will return you to the Fire Event Search Menu.

GO TO PAGE 27

Case 2: Select "2", Alphabetized Listing.

For this case, fire events will be displayed in alphabetical order based on plant name.

There are two different paths you can follow for this case. You can specify a plant name and display all fire events for that plant, or you can display all the fire events in alphabetical order. For this case, let's first specify a plant name to get a listing of fire events, and then look at what to do to get all the fire events displayed in alphabetical order.

The first data entry prompt for this case asks whether you want to specify a single plant name to be used to search the data base for fire events matching the plant name or whether all fire events should be displayed in alphabetical order.

```
Do you want to look at a specific plant's fire events?

(Y for YES, Any key for NO)
```

Let's assume you want to look at data for fires that have occurred at any of the Peach Bottom plants. Therefore, you would type in "Y". The above prompt will be replaced with one requesting you to type in the plant name of interest.

```
Enter the plant name of interest
Name:

(Press "RETURN" after you have entered the plant name)
```

Type in "PEACH BOTTOM" in response to the above prompt. (You do not need to type in all of a plant name, just enough of it to make it unique, i.e., "PEACH" will get you the same information. Do not type in too little of a name because you will then get more plant names than you want, i.e., typing in "E" would produce fire events for every plant with an "E" in its name.)

After you have entered the plant name, you are asked whether you want to send all the data to a printer.

```
Do you want all data sent directly to the printer?

(Y for YES, Any key for NO)
```

If you want the fire event information displayed on the screen, press any key (page 10) in response to the above prompt. After a short delay, the display will clear and be replaced with the output screen shown on the next page.

Chronological Listing of Fires that have Occurred at Nuclear Power Plants

Plant Name	Date	Location	INO #
Peach Bottom 1	02/03/65	Containment	1
Peach Bottom 1	04/13/67	Reactor Building	4
Peach Bottom 3	04/18/77	Cable Spreading Room	156
Peach Bottom 2	07/29/77	Auxiliary Building	166
Peach Bottom 3	09/15/77	Auxiliary Building	169
Peach Bottom 2	09/07/83	Diesel Generator Building	330

Total Number of Fire Events with Plant Name = PEACH BOTTOM
Equals 6

Fire events that match the specified plant name are now displayed. At the bottom of the display is a summary section to remind you of which name you used to search the data base as well as the number of fire events matching the name. If the list of events fills more than one screen, the cursor will be located in the lower left corner (LLC) (page 9) of every full display.

After all the fire events have been displayed, press any key to continue. You will be asked whether you want to display another set of fire events.

Would you like to see the data again?

(Y for YES, Any key for NO)

Let's assume you do, and this time you want <u>all</u> the fire events alphabetically ordered. Press "Y", and the program will go back to the question asking you which path you want to take (Chronological or Alphabetized Listing?, page 77). To get back to this path, enter "2". For the first question in this case (Look at a Specific Plant?, page 81), press any key (page 10) to indicate that you want <u>all</u> fire events to be displayed.

The next data entry prompt asks you if you want to send all the data to a printer (page 81). Assume you still want the data displayed on your monitor, so you would press any key (page 10). The output data for the first screen that has plant names displayed looks like:

Chronological Listing of Fires that have Occurred at Nuclear Power Plants

Plant Name	Date	Location	INO #
Arkansas Nuclear One	03/20/78	Diesel Generator Building	183
Arkansas Nuclear One	08/16/78	Auxiliary Building	196
Arkansas Nuclear One	11/15/78	Diesel Generator Building	198
Arkansas Nuclear One	07/27/81	Diesel Generator Building	284
Arkansas Nuclear One	04/15/82	Other Building	303
Arkansas Nuclear One	02/22/81	Diesel Generator Building	242
Arkansas Nuclear One	06/30/81	Diesel Generator Building	278
Beaver Valley 1	01/03/72	Containment	42
Beaver Valley 1	10/04/72	Other Building	53
Browns Ferry 1	03/22/75	Cable Spreading Room	100
Browns Ferry 1	05/04/76	Containment	128
Browns Ferry 1	01/21/80	Turbine Building	240
Browns Ferry 1	08/22/81	Other Building	288
Browns Ferry 3	07/17/77	Radwaste Building	165
Browns Ferry 3	07/15/79	Recombiner Building	224
Brunswick 1	05/15/77	Turbine Building	158

** TO PREVENT LOSING ANY DATA YOU SHOULD PRINT SCREEN CONTENTS NOW **
DO YOU WANT A PRINTOUT? (Y = YES; Any key for NO)

(In alphabetizing by plant name, the data base treats blanks as having precedence over letters. Since a number of fire events do not have names associated with them (due to the reference sources used in compiling the data base), these events will be listed before those with a plant name. If you select this display choice, the first several screens will have no plant name entries for this reason.)

From this point on, although the display is slightly different than Case 1, control of the display and the subsequent questions are identical to Case 1 (pages 79 and 80).

GO TO PAGE 27

5.3.8 Fire Event Descriptions

The purpose of this option in the data base is to allow you to look at only the descriptions of fire events. This option is keyed to search by either fire event INO or description-matching key words or phrases. If you perform searches based on INOs, you must get these from another option in the data base. If a key word search is used, you will come to this option directly to perform the search. This option is reached by selecting "2" from the Main Menu.

Figure 19 is a flowchart illustrating the basic flow path used in this option.

The Heading Block for this option is shown below.

```
**************************************
*                                    *
*     FIRE EVENT DESCRIPTIONS        *
*                                    *
**************************************
```

After the Heading Block automatically clears, the Preliminary Information display will appear.

```
The purpose of this option is to provide the user
with a description of a particular fire event.  The
descriptions are keyed to what is called an
Incident Number.  This Incident Number (which will
be referred to as INO) is a number that is used in
the data base nominally for accounting purposes.
However, the INO does correspond roughly to when a
fire occurred.  Those INOs less than 100 occurred
in the 70s while those in the 300 range correspond
to fires that have occurred in the 80s.

The fire event descriptions can also be searched by
entering key words that are used to search the
descriptions.

Press any key to continue...
```

To continue, press any key (page 10). The next data entry prompt will ask you for the method to be used to search the fire event descriptions in the data base.

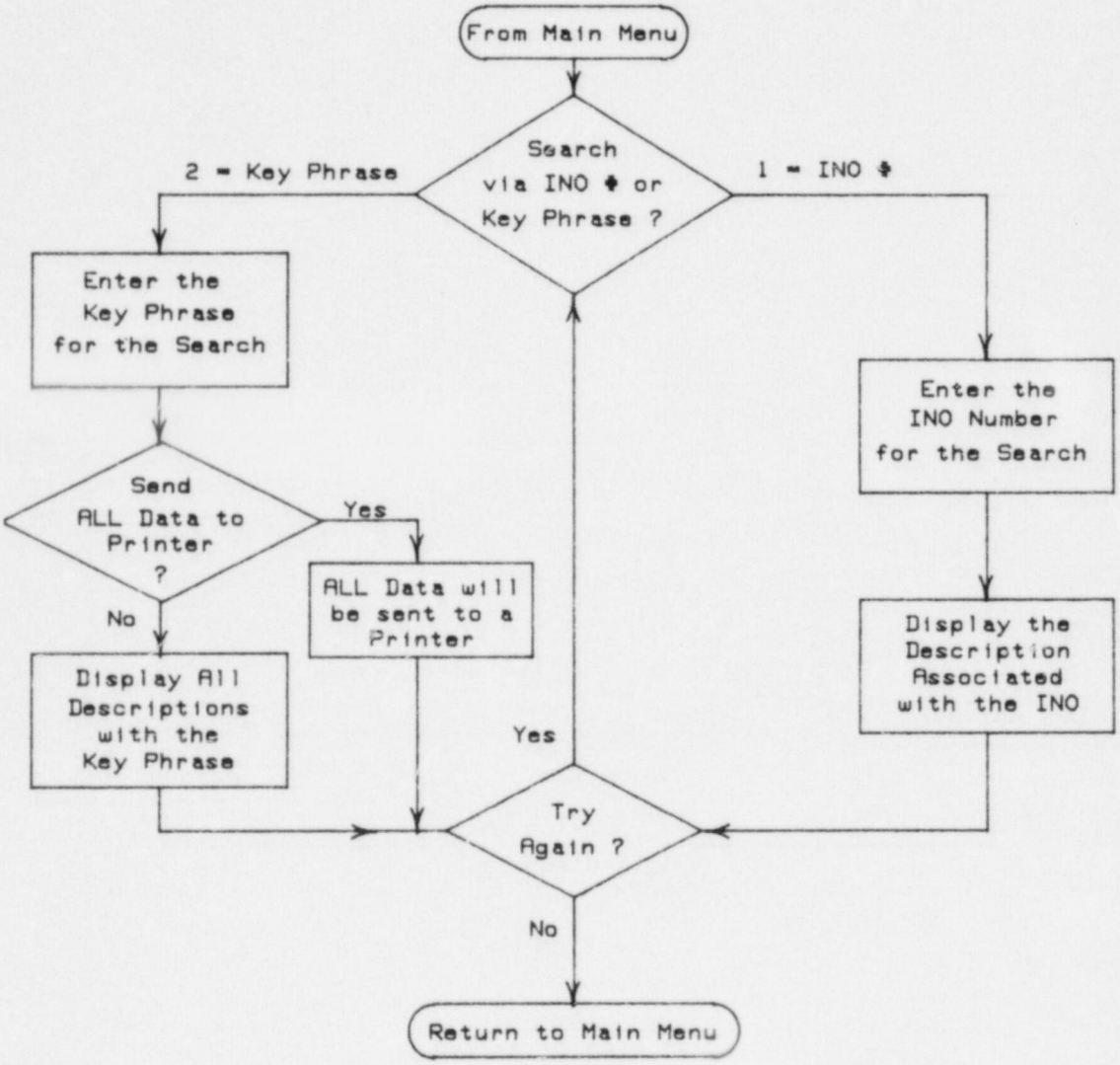


Figure 19. Fire Event Description Option Flowchart

```
You can search the descriptions by either:

    1 - Incident Number (INO)
    2 - Search by key words

Enter the number of your choice:
```

You can search the data base descriptions either by INO (by selecting "1") or by descriptions that match a specified key word or phrase (by selecting "2"). (The INO search method starts below; the Key Word search, on page 90.)

Case 1: Search fire event descriptions by INO.

The first data entry prompt asks whether you need a listing of INOs.

```
Do you need a listing of INOs versus Plant Name?

(Y for YES, Any key for NO)
```

You will want an INO for a particular plant; therefore, the displays are set up to provide this information.

If a "Y" response is given to the above question, a listing of both the INOs and the associated plant name that you specify will be displayed. However, before this happens, as is shown below, an additional question is posed. This prompt allows you to get a listing of plant names before specifying one plant name that may have a number of INOs associated with it.

```
**************************

Do you need a listing of Plant Names before proceeding
with the above question?

(Y for YES, Any key for NO)
```

Assume that you want this listing, so you would press "Y".

GO TO PAGE 117

RETURN FROM PAGE 119

The next data entry prompt asks for the INO to be used to search the data base.

```
Enter the INO of interest

INO =

(Press "RETURN" after you have typed in your selection)
```

For this case, assume that the fire event description to be displayed belongs to Peach Bottom 1 and that the INO for this event is 1. Enter "1" and then press the "Return" key to start searching the data base for this particular description. (If you enter an invalid INO, you will get an invalid entry statement (page 10), or if you enter a letter instead of a number, you will get a syntax error (page 11). In either case, you must reenter a valid INO before the program will continue.) The description for this event looks like:

```
INO #:  1

    At 12:10 an alarm was received indicating a fire within the
    containment vessel. The fire was located in electrical
    cables in the nitrogen space between the outer shell and the
    control rooms. Employees attempted to extinguish the blaze
    with hand CO2 extinguishers but were unsuccessful. The local
    Fire Department was contacted and responded, extinguishing
    the fire. A total of ten tons of CO2 had been used. Dense
    smoke left deposits throughout the containment vessel. 891
    cables and penetration seals were damaged. The cause of the
    blaze is believed to have been sparks from a cutting
    operation in the area above the site of the incident.
```

As in all the other options, the cursor will be located in the lower left corner (LLC) (page 9) of the screen.

The final data entry prompt for this case asks whether you want to make additional searches while in this option.

```
Do you want to try again?

(Y for YES, Any key for NO)
```

If a "Y" response is given to the above question, the program will cycle back to the beginning of the questions asked for this option (Method Used to Search the Descriptions?, page 87). If a "No" response is given, indicating that all options have been completed, the following Completion Message will be displayed.

This completes your operations with the Fire Event Descriptions option.

You will now be returned to the Main Menu for further selections.

After a short delay, the Completion Message will clear and be replaced by the Main Menu.

GO TO PAGE 25

Case 2: Search fire event descriptions via Key Word or Phrase.

For this case, you will specify a key word or phrase that will be used to search all the fire event descriptions and display those descriptions that match the key word or phrase.

The first prompt you will see for this search method asks you to enter the term to be used in the search.

```
Enter the phrase you want to be used for the search

        Phrase:

(Press "RETURN" after you have typed in the phrase)
```

So you can compare the results from this search to those from Case 1, search on the term "12:10" by entering "12:10" in response to the above prompt. You must press the "Return" key to continue. This gives you a chance to make sure you entered the correct search term before proceeding. After you have pressed the "Return" key, another prompt will appear on the screen. This prompt asks you how you want the term just entered to be compared to the entries in the data base. If you want to display only those descriptions that have words or key phrases that exactly match what you entered, press "E". If you want to display all those descriptions that match at least your key word or phrase (i.e., if you enter "FIRE", you may be interested in not only those descriptions that have "FIRE", but also "FIRES"), press any key (page 10).

```
Do you want to search for descriptions that exactly match the
phrase above or that treat the phrase as a root term?

Type in "E" for EXACT MATCH, Any key for ROOT MATCH
```

Finally, you will be asked whether you want all the descriptions that match the specified key phrase sent directly to a printer for a hard-copy output.

```
Do you want the descriptions routed directly to a printer?

(Y for YES, Any key for NO)
```

If you respond with "Y", the screen will clear, the cursor will be located in the upper left corner, and descriptions will be sent to the printer.

However, assume you want to look at the descriptions on your screen, so press any key (page 10).

By using the "12:10" key phrase, the only fire event description you will get will be for INO equal to 1 (i.e., Peach Bottom 1).

The description will be identical to that shown in Case 1 (page 88). The cursor will be located in the lower left corner (LLC) (page 9) of the screen.

From now on, the data entry prompts are identical to those for Case 1 (e.g., Do you want to try again?, (page 88).

GO TO PAGE 88

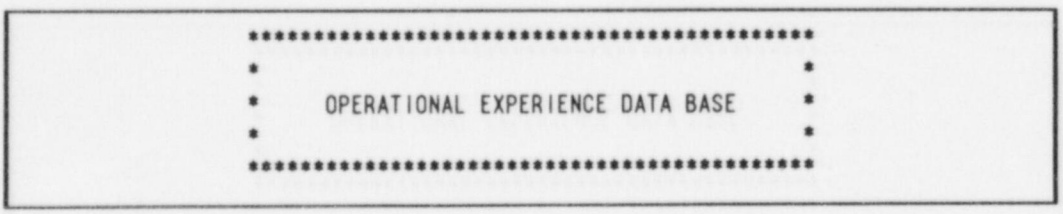
5.3.9 Operational Experience Calculations

The purpose of the Operational Experience Calculations option is to allow you to determine the length of time that nuclear power plants have been operating (based on either initial criticality or commercial power operation) since a specified date. Operating experience can be calculated for five different plant locations (cable spreading room, control room, auxiliary building, reactor building, and turbine building). This option is intended to provide you with the operating experience time values (in years) necessary to determine fire frequencies for various plant locations.

Three paths can be selected in this option. One calculates the operating experience for all commercial nuclear power plants in the United States. The second and third paths calculate the operating experience for BWRs and PWRs respectively, as separate groups. Several display formats can be selected to display this operating experience. You can select either a single, cumulative number representing the operating experience of all plants, or a listing of all site operating experience (in tabular form), or one specific site's operating experience. Because the required inputs for the three paths are nearly identical, only one of the paths will be discussed in this guide. Figure 20 is a flow chart for the Operational Experience Calculation option.

The dates used by this option were obtained from the Nuclear News 1985 worldwide plant listing [5], Nuclear Power '85 [6], and NUREG-0200 [7].

The first display is the Heading Block for this option.



The second display (after a short delay) is the Preliminary Information paragraph for this option.

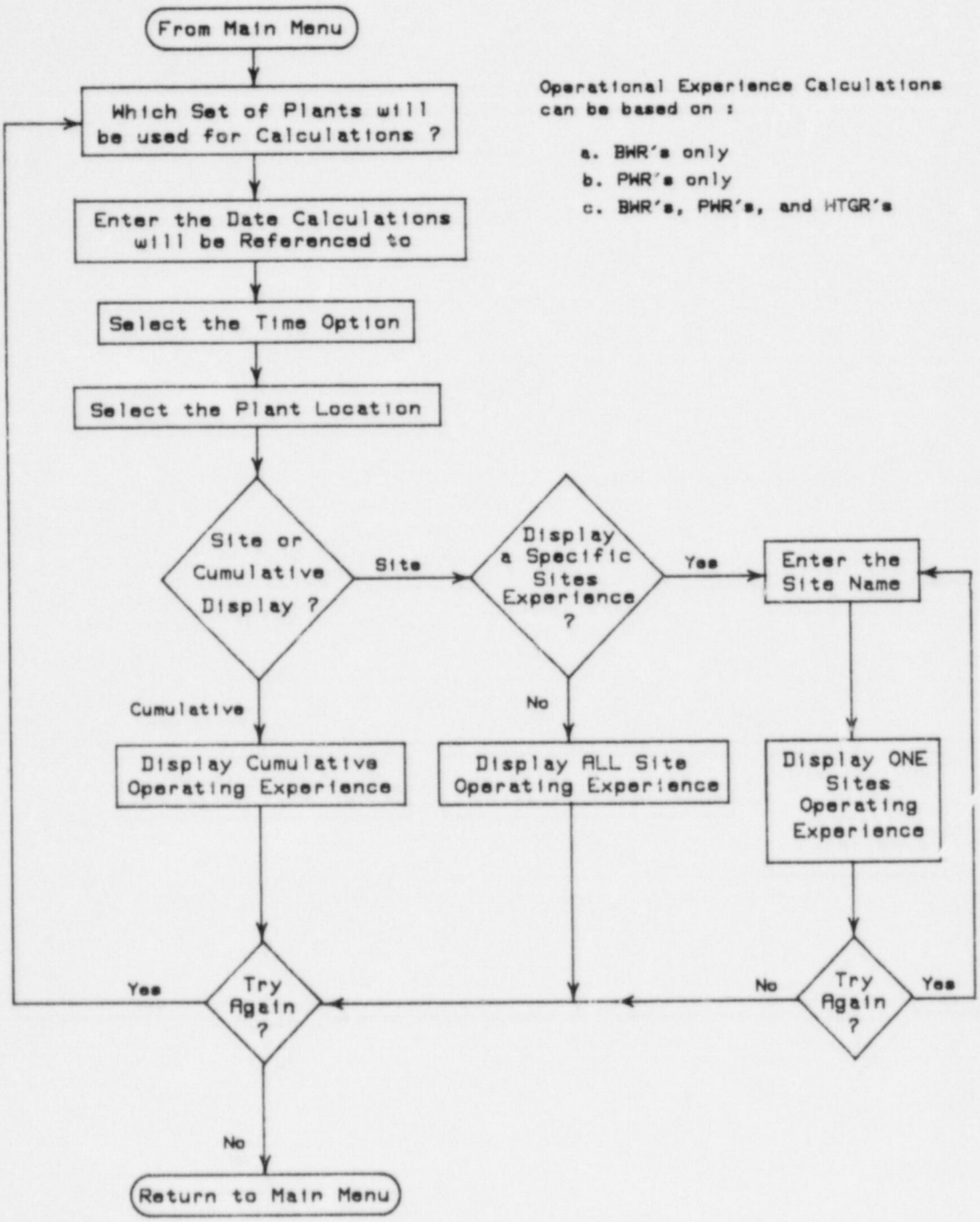
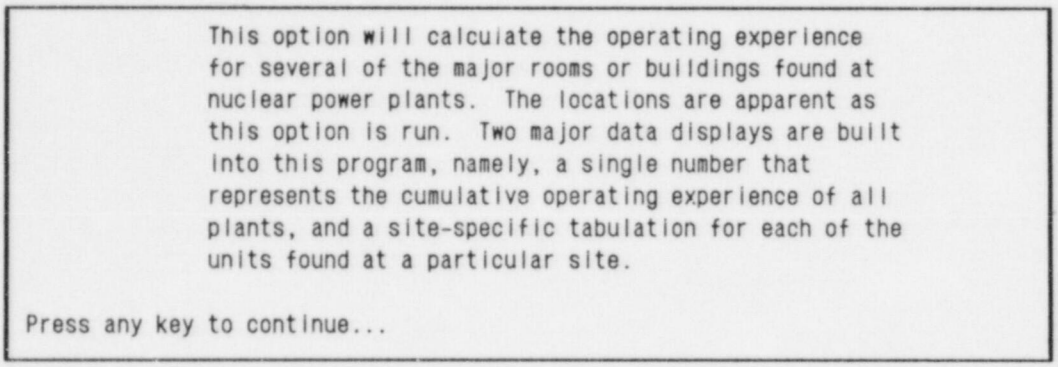
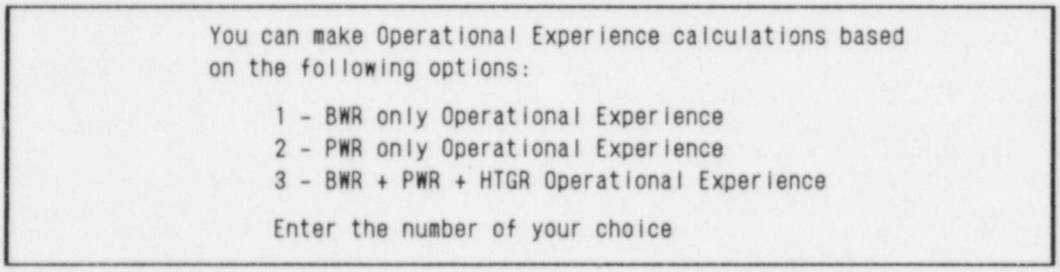


Figure 20. Operational Experience Calculations Option Flowchart

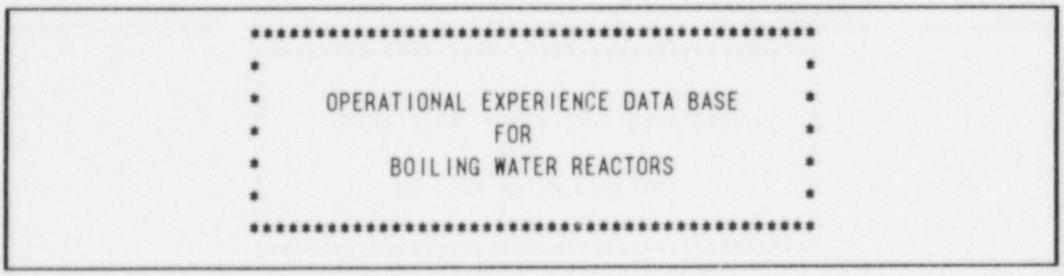


After you press any key (page 10) to continue, the third display will appear.



Now, you must decide which of the three possible paths you will take. If "1" is selected, the operating experience for BWRs only will be calculated. If "2" is selected, only PWR experience will be calculated. If "3" is selected (or any key other than "1" or "2"), operating experience for all commercial nuclear power plants will be calculated. Press the key of your choice to continue. (You can bailout (page 9) of this option if you wish.)

If the operating experience of BWRs through October 1, 1985, is desired, enter number "1" to get to the BWR-only operating experience path. The display will clear and be replaced by the Heading Block for the BWR path. This Heading Block advises you that the BWR path has been selected. As with all Heading Blocks, the display will automatically clear.



The next display asks you to enter the date up to which the operating experience calculations should be made. The date

you specify is the one to which all date calculations are referenced. Any date can be entered; the program logic will automatically account for and calculate the corrrect operational experience value (i.e., you should get no negative operational experience values). The date must be entered in the form of month/day/year, each portion of the date being entered as a two-digit number (i.e., August 17, 1985, would be entered as 08/17/85, not 8/17/85). For this case, the date entered is to be October 1, 1985 (entered as 10/01/85). After you have entered the date, press the "Return" key to continue program execution.

To begin your calculations, enter the DATE that all calculations are being referenced to.

The DATE should be entered in the form

Month/Day/Year

(Example: September 15, 1985 would be entered as 09/15/85)

Enter the DATE:

(If you misplace the position of "/"s in your date entry, you will get an invalid entry statement (page 10). If you enter letters instead of numbers, you will get a syntax error (page 11). You can bailout (page 9) at this point and be returned to the three paths prompt on page 95.)

The next series of questions will determine the plant dates to be used to calculate operational experience values. Either "Initial Criticality" or "Commercial Operation" dates can be used. "Initial Criticality" refers to the date a self-sustaining nuclear chain reaction first occurred in the nuclear reactor at the plant. This date implies that the plant is not too far from generating electricity for commercial purposes, and therefore, the construction phase is essentially complete. "Commercial Operation" is the date the plant first generated electricity and sold it commercially. These two dates were selected since in PRAs it is of interest to know how long a plant has actually been in operation, and both of these dates give an accurate indication of operation.

```
Which time option would you like to calculate?

Your options are:

    1 - Initial Criticality
    2 - Commercial Operation

Enter the option number desired
Make your selection now
```

After you have selected the time option to be used, the display will look like this:

```
Your options are:

    1 - Initial Criticality
    2 - Commercial Operation

You have chosen option number <1>, is that correct?

Enter an [N] for NO, Any key for YES
```

The purpose of this extra step in determining the time option is to allow you to verify that you made the right choice. If the time option you selected is not what you wanted, press "N". This allows you to change the time option number. You will again be asked for the time option number. For this case, assume that time option "1" is selected (Initial Criticality) and no change needs to be made, so you would press any key (page 10) to confirm the entry.

Next, you will be asked to identify the plant location for which operational experience calculations are to be made. The five locations available are shown in the data entry prompt below.

```
Which location do you want to calculate operational experience for?

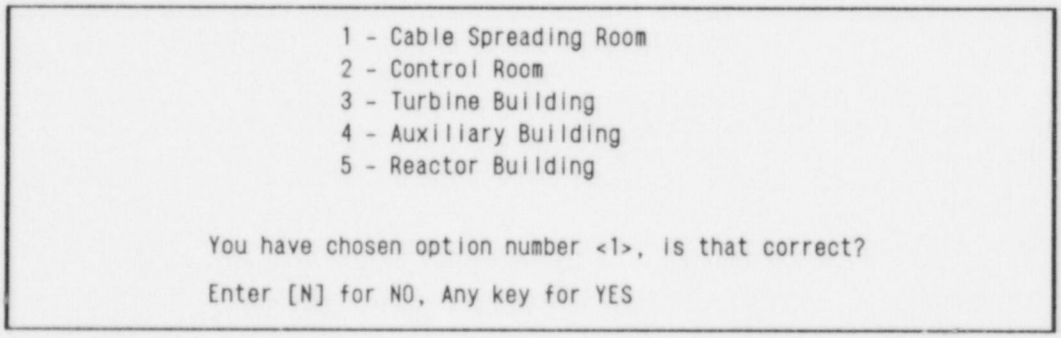
    1 - Cable Spreading Room
    2 - Control Room
    3 - Turbine Building
    4 - Auxiliary Building
    5 - Reactor Building

Enter the option number you desire
Make your selection now
```

The reason specific plant locations are quantified for operational experience calculations is because you need to know

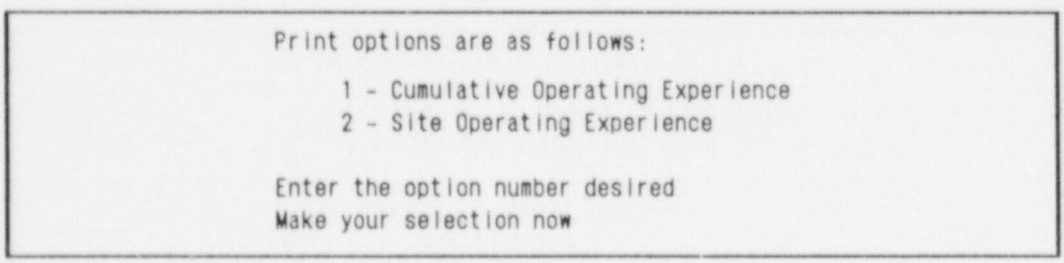
"how many" of a particular location there are at a plant to prevent double counting of these locations. For instance, when determining the operating experience of cable spreading rooms for those sites where there are two plants, it makes a difference whether the plants share the same cable spreading room or have separate cable spreading rooms. If both units share a single cable spreading room, the operating experience is determined by the older plant. If the two plants have separate cable spreading rooms, the operating experience is the sum of the experience for each cable spreading room. The logic of the program calculates the correct operating experience (regardless of how locations are shared).

As with the time option prompt, you can confirm or change the location selection you just made.



Assume that the operating experience of BWR cable spreading rooms is desired. Press "1" and any other key to confirm the correct location for which you want operational experience calculations made.

The next data entry prompt asks what kind of output format you want. The two options available to you are either a Cumulative or a Site operating experience presentation. If the Cumulative option is selected, a single value is returned that represents the operating experience for all the plants (in this case all BWRs) for the specified location (in this case, the cable spreading room). If the Site option is selected, the operating experience data for all the individual units at a site are displayed. This allows you to determine how long a particular plant has been in operation.



Again, a confirmation/change step follows this prompt.

```
                    1 - Cumulative Operating Experience
                    2 - Site Operating Experience

You have selected option number <1>, is that correct?


Enter [N] for NO, Any key for YES
```

There are two possible output paths at this point in the option. For the first path, assume that Cumulative data are desired, while for the second path, Site data are preferred. (Remember that operational experience calculations are to be made for cable spreading rooms, based on the dates the plants were initially critical, with all dates referenced to 10/01/85.)

Case 1: Cumulative Operating Experience Output.

Once you have confirmed that you want a cumulative output, the screen will clear and a "Working" message will be displayed near the middle of the screen.

```
                    Working .....
```

Until all operational experience calculations have been completed, the "Working ....." message will remain. When all calculations have been completed, the display below will appear. In this case, the cumulative operating experience of cable spreading rooms for BWRs is found to be 311.5 years. Notice that the cursor is located in the lower left corner (LLC) (page 9) of the screen.

```
                THE TOTAL OPERATING EXPERIENCE OF

                CABLE SPREADING ROOMS

                        IS

                311.5       YEARS
```

Once the display has been printed out, or the operating experience number recorded elsewhere, press any key to continue. The next display asks you whether another set of calculations is to be made for BWRs. If a "Y" response is given, the program cycles back and asks the previous sequence of questions, beginning with the request for a date to be entered (page 96).

```
Do you want to make another set of calculations
using only BWR plants in the data base?

Enter Y for YES, Any key for NO
```

If "No" is selected, you will again be asked whether you want to make additional operational experience calculations. (This data entry prompt is shown below. Note that this prompt does not mention BWRs but asks whether you want to make any further calculations. If the response is "Y", the program cycles back to where it asks which of the three paths in this option is to be taken (i.e., the first data entry prompt, where you decide whether operational experience values are to be calculated for BWRs, PWRs, or all plants (page 95). If "No" is selected, a completion message is displayed, and this option is exited. The completion message is discussed in Case 2 (page 104).

```
Do you want to make another set of calculations?

Enter Y for YES, Any key for NO
```

Case 2: Site Operational Experience Output.

If this choice is taken, three other paths can be followed.

a. Print Out a Specific Site's Operating Experience--You can display the operating experience of a specific site.

b. Print Out All the Sites--Calculations for all 82 sites are calculated and displayed.

c. Send All Data To the Printer--The operating experience for all 82 sites is sent directly to the printer for a hard-copy output.

The first question you will be asked after choosing and confirming the Site Operating Experience path is shown below.

```
Do you want to select one specific site for display?

(Y for YES, Any key for NO)
```

This data entry prompt asks whether operating experience for only one site is to be calculated. When a "Y" response is given, you are then asked whether you need a listing of the site names contained in the data base.

```
Do you need a listing of site names?

(Y for YES, Any key for NO)
```

This question allows you to verify the site name and its spelling in the data base. If a "Y" response is given to this question, a listing of site names is displayed.

```
    SITE_NAME
    Big Rock Point
    Browns Ferry
    Brunswick
    Clinton
    Cooper
    Dresden
    Duane Arnold
    Fermi
    Fitzpatrick
    Grand Gulf
    Hatch

Press any key to continue...
```

Follow the prompt on your screen and press any key (page 10) to continue viewing site names. (You can also bailout (page 9) of this listing if desired.)

After all site names have been displayed, or if you gave a "No" response to the previous prompt (asking whether you needed a listing of site names), you will be requested to enter the site name for which you want to make an operational experience calculation. As in the other options in the data base, the complete site name need not be entered, only enough of the site name to make it unique. For this case, let's assume that Dresden is the site that is of interest. At the site name data entry prompt, type in "DRES". After the site name has been entered, press the "Return" key to continue. (Note: If you enter a site name that is not part of the Data Base, you will get an invalid entry statement (page 10).)

```
Enter the name of the site of interest

Site Name:

(Press "RETURN" after you have entered the site name)
```

After the site name has been typed in, the screen will clear and be replaced (after a short delay) with the following:

Cable Spreading Room Operating Experience Data (YEARS through 10/01/85)					
SITE NAME	UNIT 1	UNIT 2	UNIT 3	SITE TOTAL	NUMBER
Dresden	19.0	15.7	14.7	26.0	1

The cursor will be located in the lower left corner (LLC) (page 9) of the screen.

After you press any key (page 10) to continue, you can calculate the operating experience for another site, if desired. If you type "Y", the program cycles back and requests another site name.

Cable Spreading Room Operating Experience Data (YEARS through 10/01/85)					
SITE NAME	UNIT 1	UNIT 2	UNIT 3	SITE TOTAL	NUMBER
Dresden	19.0	15.7	14.7	26.0	1

Do you want another specific plant's data?
(Y for YES, Any key for NO)

If a "No" response is given, the display will be replaced by a data entry prompt asking whether you want to try again. This prompt and the results of your response to it have already been covered for Case 1 (page 100).

The second and third paths (namely, having all site operating experience either displayed on the screen or sent to a printer) are very similar. When a "No" response is given to the question of whether you want a specific site's operating experience to be calculated (page 100), the message "Working ..." will appear for a short time on your screen. Then, you will be asked a yes/no question as to whether the site data should be routed to the screen or to the printer.

Do you want all the records sent to the printer?

(Y for YES, Any key for NO)

A "Y" response routes all data to the printer. A "No" response displays all site data as shown below. Note that after each 16 site entries, a prompt occurs at the bottom of the screen. A "Y" response clears the prompt. Press the "Shift" and "PrtSc" keys simultaneously to get a hard-copy output. Once the hard-copy output has been obtained, press any key to continue. (The cursor will be located in the lower left corner (LLC) (page 9) of the screen.) A "No" response clears the prompt, and three more sites are added to

the list. After the three additional sites have been displayed, the cursor will be located in the lower left hand corner (LLC) of the screen (page 9). (You can now continue to view site data or bailout (page 9).)

Cable Spreading Room Operating Experience Data (YEARS through 10/01/85)

SITE NAME	UNIT 1	UNIT 2	UNIT 3	SITE TOTAL	NUMBER
Big Rock Point	23.0	0.0	0.0	23.0	1
Browns Ferry	12.1	11.2	9.1	32.5	3
Brunswick	10.5	9.0	0.0	19.5	2
Clinton	0.0	0.0	0.0	0.0	1
Cooper	11.6	0.0	0.0	11.6	1
Dresden	19.0	15.7	14.7	26.0	1
Duane Arnold	11.5	0.0	0.0	11.5	1
Fermi	0.0	0.0	0.0	0.0	1
Fitzpatrick	10.9	0.0	0.0	10.9	1
Grand Gulf	3.1	0.0	0.0	3.1	2
Hatch	11.1	7.2	0.0	11.1	1
Hope Creek	0.0	0.0	0.0	0.0	1
Humboldt Bay	13.4	0.0	0.0	13.4	1
La Crosse	18.2	0.0	0.0	18.2	1
La Salle	3.3	1.6	0.0	8.1	3
Limerick	0.8	0.0	0.0	0.8	2

** TO PREVENT LOSING ANY DATA YOU SHOULD PRINT SCREEN CONTENTS NOW **
DO YOU WANT A PRINTOUT? (Y = YES; ANY KEY = NO)

(The hard-copy printout looks exactly like above, except that 50 sites are listed per page.)

When all site names have been displayed, a correct total operating experience value is printed out to summarize the values in the table. If you were to add the individual site totals, the sum would be slightly different from the total value. This is due to round-off errors in the individual site totals. Note, too, that the headings for Units 1, 2, and 3 refer to the plants in oldest-to-youngest order. Unit 1 is always the oldest, and Unit 2 the next oldest, and Unit 3 the youngest. The headings do not refer to the usual names of the plants. For example, Turkey Point 3 would have its operating experience tabulated under the Unit 1 heading, Turkey Point 4 under the Unit 2 heading. The total operating experience value will look like the display shown on the next page.

Cable Spreading Room Operating Experience Data (YEARS through 10/01/85)

SITE NAME	UNIT 1	UNIT 2	UNIT 3	SITE TOTAL	NUMBER
Oyster Creek	16.4	0.0	0.0	16.4	1
Peach Bottom	12.0	11.2	0.0	12.0	1
Perry	0.0	0.0	0.0	0.0	1
Pilgrim	13.3	0.0	0.0	13.3	1
Quad Cities	14.0	13.4	0.0	14.0	1
River Bend	0.0	0.0	0.0	0.0	1
Shoreham	0.6	0.0	0.0	0.6	1
Susquehanna	3.1	1.4	0.0	4.5	2
Vermont Yankee	13.5	0.0	0.0	13.5	1
WNP	1.7	0.0	0.0	1.7	1
			Total operating experience =	311.5	

As for all displays, the cursor will be located in the lower left hand corner (LLC) (page 9) of the screen.

After you press a key (page 10) to continue the Try Again prompt will appear. (See Case 1 (page 100) for details of this Try Again prompt)

When all operations have been completed in this option (signified by a "No" response to both Try Again questions), a Completion Message is displayed.

This completes your operations with the
Operational Experience Calculations Option.

You will now be returned to the Main Menu for
further selection.

After the Completion Message clears, control is returned to the Main Menu.

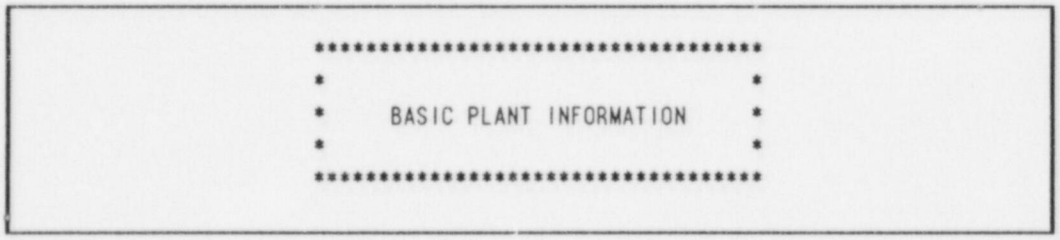
GO TO PAGE 25

5.3.10 Basic Plant Information

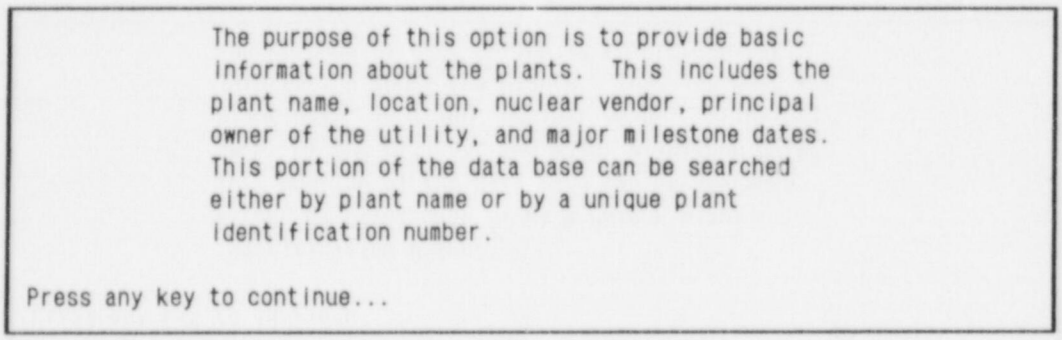
The Basic Plant Information display provides some basic plant information that can be searched for quickly. This portion of the data base performs a function equivalent to that of the American Nuclear Society listing of nuclear power plants in the world.

Searches are accomplished by supplying either the plant name or a plant identification number that identifies the plant of interest. Figure 21 is a flowchart showing the three paths that can be taken with this option. Each of these paths will be discussed separately later in this section.

This option is entered from the Main Menu. The first display that appears when this option has been selected is its Heading Block.



The second display is the Preliminary Information display. To continue program execution when this display is on your screen, press any key (page 10).



The two previous displays appear for whichever path is taken in this option. However, they appear only once: when the option is selected from the Main Menu.

Once option questions begin, multiple searches can be made without the previous screens reappearing.

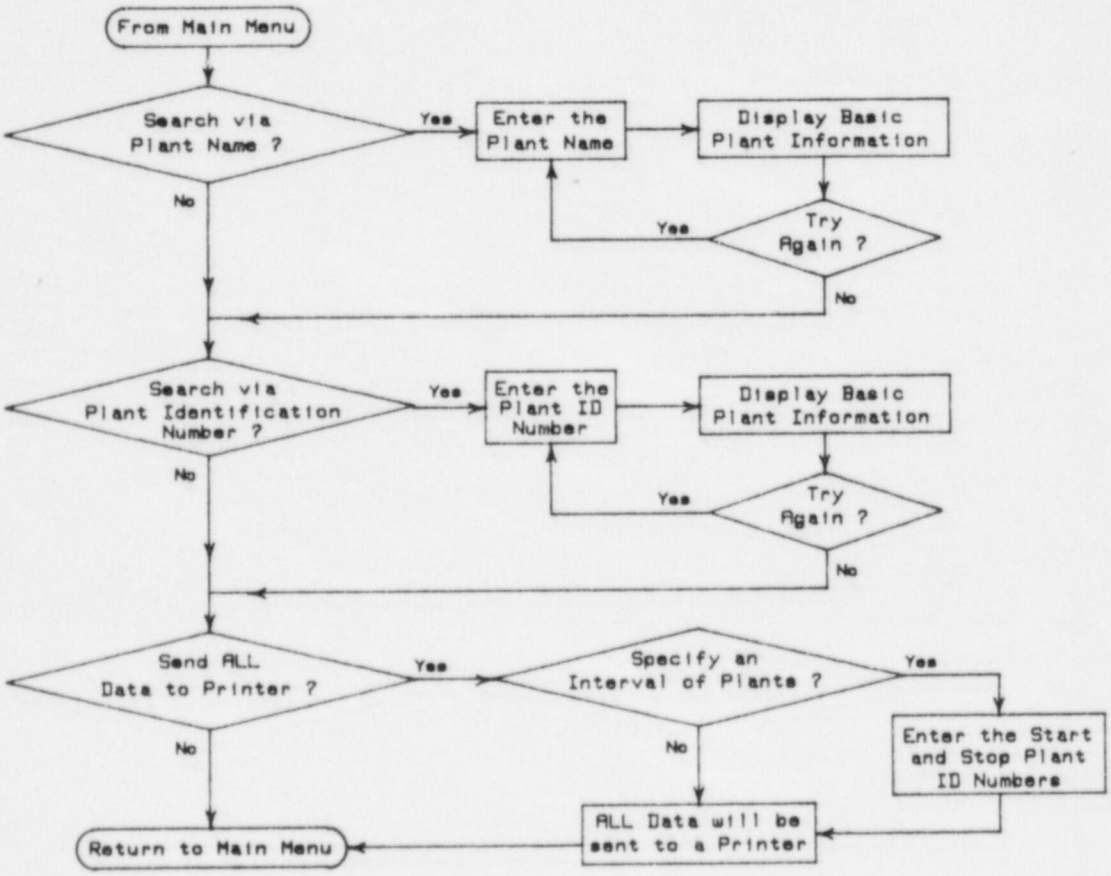


Figure 21. Basic Plant Information Option Flowchart

Case 1: If a search of the data base is to be made using the plant name as the search parameter, the first display, after the Preliminary Information display is shown below. The data entry prompt asks whether the data base will be searched by plant name. Since this is the method to be used in this case, type in "Y".

```
Do you want to search via plant name?

(Y for YES, Any key for NO)
```

The screen will then clear, and the next prompt will ask whether you need a listing of plant names. This allows you to see what and how the names have been entered into the data base (so you can search for plant names actually in the data base) as well as providing a built-in listing of plant names to be referred to at any time.

```
Do you need a listing of plant names?

(Y for YES, Any key for NO)
```

If you give a "Y" response, a partial listing of 20 plant names in the data base will be displayed (shown on the next page). To see more plant names, press any key (page 10) until all the plants have been displayed. The next prompt asks you for the plant name to be used in the search. (If you need to look at all the plant names, follow the steps just presented. However, if you find the plant name of interest (in, say, the second display), when the "Press any key to continue ..." prompt is displayed, you can bailout (page 9) of this listing and go to the next data entry prompt to save time.)

```
    PLANT_UNIT

    Arkansas Nuclear One 1
    Arkansas Nuclear One 2
    Beaver Valley 1
    Beaver Valley 2
    Bellefonte 1
    Bellefonte 2
    Big Rock Point
    Blue Hills 1
    Blue Hills 2
    Braidwood 1
    Braidwood 2
    Browns Ferry 1
    Browns Ferry 2
    Browns Ferry 3
    Brunswick 1
    Brunswick 2
    Bryon 1
    Bryon 2
    Callaway 1
    Calvert Cliffs 1

Press any key to continue...
```

After the plant names have been displayed, or if you gave a "No" response to the previous question, enter the plant name about which you want general information. First enter the name of the plant, then press the "Return" key to continue.

```
                Enter the name of the plant of interest

                        Plant name:

            (Press "RETURN" after you have entered the name)

            (NOTE:  Type your entry in all capital letters)
```

Assume, for this example, that Arkansas Nuclear One 1 is the plant of interest. The complete name of the plant should be entered, as above, and the data for only Arkansas Nuclear One 1 will be displayed. However, if you want information about both Arkansas Nuclear One 1 and 2, type in only enough of the plant's name to make it unique (usually three letters will do).

If you input "ARK" (remember, only capital letters are used for input data) and then press the "Return" key, the following will be output.

```
PLANT NAME:  Arkansas Nuclear One 1

CAPACITY:  836 MWe
LOCATION:  AR, Russellville

PRINCIPAL OPERATING UTILITY:  Arkansas Power and Light Company
MSSS VENDOR:  Babcock and Wilcox

MAJOR MILESTONE DATES;

     OPERATING LICENSE ISSUED:  05/21/74
     INITIAL CRITICALITY:       08/06/74
     COMMERCIAL OPERATION:      12/19/74
     DECOMMISSIONING DATE:        / /
```

The bottom third of the screen is blank, reserved for three lines of text that may give you more information about the plant. Not every plant display will have this area blank. (For instance, when you are given another chance to search by plant name, if you type in the plant name "THREE" (representing Three Mile Island), you will note that the Three Mile Island displays contain text in this area.)

When the basic plant information is displayed, the cursor is in the lower left corner (LLC) (page 9) of the screen.

If a printed output is not needed, press any key to continue (the space bar is a prime candidate). Because the plant name was entered as "ARK", the program will continue to search for plant names that have the sequence of letters "ARK" anywhere in their names. (If you want to see only the information for Arkansas Nuclear One 1, after it has been displayed, you can bailout (page 9) and the program will quit searching.) The next display will be for Arkansas Nuclear One 2. Press the space bar again to search the rest of the data base. No other plant names will be found to match "ARK", so you will be given an additional data entry prompt, which asks whether you want to search the data base again using plant names as the search parameter.

```
Do you want to try again?

(Y for YES, Any key for NO)
```

If "Y" is pressed, the program cycles back, and the prompts discussed previously appear again. If "No" is selected, a different prompt is displayed that is discussed as part of Case 2.

Case 2: Searching the data base using a unique plant identification number is like the plant name search, the difference being that this search is faster. A plant identification number is merely an internal pointer used in the data base.

This path is entered by one of two methods. As mentioned at the conclusion of the Case 1 discussion, if a "No" response is given to the "Try Again" question (page 109), this is the next path available by default. This path is also entered when you give a "No" response to the first question asked in Case 1 (Search via Plant Name? (page 107)).

The first question displayed asks whether the data base should be searched by use of a unique plant identification number.

```
Do you want to search via plant identification numbers?

(Y for YES, Any key for NO)
```

In this case, a "Y" response would be given. The next prompt asks whether you need a listing of plant identification numbers and corresponding plant names. You probably want to respond with a "Y" since there are more than 100 plant names, each with a unique plant identification number.

```
Do you need a listing of the Unique Identification

Numbers for the Plants?

(Y for YES, Any key for NO)
```

When a "Y" response is given, additional information is displayed, along with the above prompt, telling you what to expect to see on the next few displays.

```
Do you need a listing of the Unique Identification

Numbers for the Plants?

(Y for YES, Any key for NO) Y


The next few screens will display
plant identification numbers and names

                                        Please wait ...
```

An example of the plant identification number and plant name listing follows. (As in Case 1, to see all the plant names and identification numbers, follow the prompt on your screen to "Press any key to continue ..." (page 10). However, at this prompt, you can also bailout (page 9) from this listing and go to the next data entry prompt.)

```
PLANTIDNUM PLANT_UNIT
1          Arkansas Nuclear One 1
2          Arkansas Nuclear One 2
3          Beaver Valley 1
4          Beaver Valley 2
5          Bellefonte 1
6          Bellefonte 2
7          Big Rock Point
8          Blue Hills 1
9          Blue Hills 2
10         Braidwood 1
11         Braidwood 2
12         Browns Ferry 1
13         Browns Ferry 2
14         Browns Ferry 3
15         Brunswick 1
16         Brunswick 2
17         Bryon 1
18         Bryon 2
19         Callaway 1
20         Calvert Cliffs 1

Press any key to continue...
```

Next, you are asked to enter the Plant Identification Number to be used to search the data base. This prompt is arrived at if a listing of plant identification numbers has been completed or if a "No" response was given to the previous question.

```
Enter the Plant Identification Number

ID #

(Press return after you have entered the number)
```

If we again use Arkansas Nuclear One 1 as an example, then enter "1" and press the "Return" key. (Note: If you type in a letter instead, you will get a syntax error, page 11.) Almost immediately, the data for Arkansas Nuclear One 1 will be displayed on your monitor. The output will be identical to the Arkansas Nuclear One 1 output for Case 1.

As in Case 1, the cursor will be in the lower left corner of the display. You can get a printout of the display by pressing the "Shift" and "PrtSc" keys simultaneously. Otherwise, to continue, press any key (page 10). After this, you will be asked whether another search of the data base is to be made using plant identification numbers (this prompt is identical to the one for Case 1 on page 109).

A "Y" response will cycle the program back (to page 110) and ask the questions previously discussed to find additional plant information. If a "No" response is given, the program defaults to the next question, which is covered in Case 3.

Case 3: For this case, no search of the data base is performed; rather, all basic plant information is routed to a printer. The purpose of this particular path in the Basic Plant Information option is to allow you to "dump" all plant information to a printer to get hard-copy output. The information for three plants is printed on each sheet of paper. While printing is in process, the screen will be blank, and the cursor will be located in the upper left corner of the screen.

This option is reached either from Case 2, when the Try Again question has been answered with a "No", or when "No" responses have been given to both the questions regarding searching the data base by plant name or by plant identification number (the first question in Cases 1 and 2, pages 107 and 110 respectively).

```
Do you want "all" the data sent to the printer?

(Y for YES, Any key for NO)
```

Because you may not want to print out the information for all of the plants, you are next asked whether you want to print out only a specific set of plant information.

```
Do you want a selected interval of plants printed out?

(Y for YES, Any key for NO)
```

If you only want information for the first three plants in the data base, give a "Y" response to this question. (A "No" response will cause the screen to clear and the information for all the plants will be printed out.) After your "Y" response, the screen will clear and the display replaced by the following data entry prompt.

```
Enter the starting plant number:

(Press "RETURN" after your entry to continue)
```

This prompt asks you to specify the starting and ending plant identification number for the plants you want printed out. In this case, enter the starting plant identification number, which would be "1". Respond in a similar fashion when you are prompted for the ending plant identification number (only

enter "3"). (If you enter numbers that do not correspond to valid plant identification numbers in the data base, you will get an invalid entry statement (page 10), while if you enter a letter instead of a number, you will get a syntax error (page 11)).

After you respond to these prompts, the screen will clear, and the cursor will be located in the upper left corner of the screen. All the basic plant information will be sent to the printer, three plants per page. While printing is taking place, the screen will remain blank. An example of what the data look like when they are all routed to the printer follows.

```
PLANT NAME:  Arkansas Nuclear One 1
CAPACITY:  836 MWe
LOCATION:  AR, Russellville
PRINCIPAL OPERATING UTILITY:  Arkansas Power and Light Company
NSSS VENDOR:  Babcock and Wilcox

MAJOR MILESTONE DATES:

     OPERATING LICENSE ISSUED:  05/21/74
     INITIAL CRITICALITY:       08/06/74
     COMMERCIAL OPERATION:      12/19/74
     DECOMMISSIONING DATE:        / /


PLANT NAME:  Arkansas Nuclear One 2
CAPACITY:  858 MWe
LOCATION:  AR, Russellville
PRINCIPAL OPERATING UTILITY:  Arkansas Power and Light Company
NSSS VENDOR:  Combustion Engineering

MAJOR MILESTONE DATES:

     OPERATING LICENSE ISSUED:  07/18/78
     INITIAL CRITICALITY:       12/05/78
     COMMERCIAL OPERATION:      03/26/80
     DECOMMISSIONING DATE:        / /


PLANT NAME:  Beaver Valley 1
CAPACITY:  833 MWe
LOCATION:  PA, Shippingport
PRINCIPAL OPERATING UTILITY:  Duquesne Light Company
NSSS VENDOR:  Westinghouse

MAJOR MILESTONE DATES:

     OPERATING LICENSE ISSUED:  01/30/76
     INITIAL CRITICALITY:       05/10/76
     COMMERCIAL OPERATION:      12/15/76
     DECOMMISSIONING DATE:        / /
```

When all operations have been completed in the Basic Plant

Information option of the Fire Data Base (as indicated by either a "No" response to the printout question for Case 3 (page 112), or because all data has been printed out), the Completion Message for this option will be displayed. After a short time, this display will clear and you will be returned to the Main Menu (Figure 12) for more selections as desired.

> This completes your operations with the Basic Plant Information Option.
>
> You will now be returned to the Main Menu for further selections.

GO TO PAGE 25

5.3.11 Modify Display Options

This option's purpose is to allow you to modify some of the displays (i.e., Heading Block, Preliminary Information, Informational Prompts, and Completion Messages) found in the data base while you are in the program rather than having to begin the program again.

This option is entered from the Main Menu.

The data entry prompt below asks whether you want two screens shown that tell you the purpose of the four program displays that can be modified.

```
Do you want the two informational screens displayed?

(Y for YES, Any key for NO)
```

To see these displays, press "Y" to get the same displays you saw in Section 5.2 (Getting Started). GO TO PAGE 19 (starting with Figure 5) and follow the directions found there. (You will automatically be returned to the Main Menu, page 25.)

A "No" response to this question (press any key (page 10)) displays only questions relating to the Heading Block, Preliminary Information, Informational Prompts, and Completion Messages. The Heading Block data entry prompt, shown below, illustrates these prompts.

```
Do you want to change the time that Heading Block information is displayed?

(Y for YES, Any key for NO)
```

Your response to these prompts is identical to and will have the same effects as those in Section 5.2 (Getting Started). GO TO PAGE 20 (starting with Figure 7) and follow the directions found there. (You will automatically be returned to the Main Menu, page 25.)

5.3.12 Plant Name/Incident Number Listing

This is not an option in the data base, but it supports the following three options:

1. Full Fire Event Data Display (Section 5.3.3, page 31)
2. Essential Fire Event Display (Section 5.3.4, page 43)
3. Fire Event Descriptions (Section 5.3.8, page 85)

Any of these options can use this portion of the program.

The first prompt will ask whether you need a listing of plant names and INOs, then whether you need a listing of plant names only before proceeding.

```
Do you need a listing of INO's versus Plant Name?

(Y for YES, Any key for NO)

**********

Do you need a listing of Plant Names before proceeding
with the above question?

(Y for YES, Any key for NO)
```

If you need such a listing, which are the plant names that can be used to search the data base, press "Y". The first page of this plant name listing is shown below.

```
PLANT_UNIT
Arkansas Nuclear One 1
Arkansas Nuclear One 2
Beaver Valley 1
Beaver Valley 2
Big Rock Point
Blue Hills 1
Blue Hills 2
Braidwood 1
Braidwood 2
Browns Ferry 1
Browns Ferry 2
Brunswick 1
Brunswick 2
Bryon 1
Bryon 2
Callaway 1
Calvert Cliffs 1

Press any key to continue...
```

To continue, press any key (page 10). Since Peach Bottom is the site of interest, keep pressing keys until it is displayed. When it appears, you have two options. You can either keep pressing a key until all plant names have been displayed (which you might want to do when you first start using the data base) or you can bailout (page 9) at the "Press any key to continue ..." prompt. (You can bailout at any time during this listing.)

After all plant names have been displayed, or after you bailout at some point in the listing, enter the plant name to be used to search the data base and for which you need the INOs.

```
Enter the plant name of interest
Name:
(Press "RETURN" after you have entered the plant name)
```

Since Peach Bottom INOs are of interest, type in "PEACH BOTTOM", and then press the "Return" key to continue. You need to type only enough of the plant name to make it unique (i.e., "PEACH"). After a short delay, the display will clear and be replaced with the display shown below.

Plant Name, Date of Fire, and INO Listing

Plant Name	Date	INO
Peach Bottom 1	02/03/65	1
Peach Bottom 1	04/13/67	4
Peach Bottom 3	04/18/77	156
Peach Bottom 2	07/29/77	166
Peach Bottom 3	09/15/77	169
Peach Bottom 2	09/07/83	330

Total Number of Fire Events with Plant Name = PEACH
Equals 6

At the bottom of this display is the total number of fire events for the plant name entered (handy for statistical purposes). The listing is not all-inclusive because fire events without plant names (they were not available from the sources used to compile the data base) may in fact be for the plant you specified. The cursor will be located in the lower left corner (LLC) (page 9) of the screen.

If it takes more than one screen display for the plant name you entered, after the sixteenth fire event, you will be given the opportunity to print out the screen contents. This prompt appears at the bottom of the display and looks like:

```
** TO PREVENT LOSING ANY DATA YOU SHOULD PRINT SCREEN CONTENTS NOW **
DO YOU WANT A PRINTOUT? (Y = YES; Any key for NO)
```

If you want to get a printout of the screen, first press "Y", then press the "Shift" and "PrtSc" keys simultaneously to get a hard-copy output. The cursor at the conclusion of this printing will be located in the lower hand corner (LLC) (page 9) of the screen.

If you do not want a printout, press any key (page 10) other than "Y" to continue the listing. Three additional fire events will be displayed. The cursor will be located in the lower left corner (LLC) of the screen.

You will always get the summary statement showing the number of fire events associated with the plant name used in the search. You now have the plant names, dates of the fire events, and the associated INOs for the plant of interest. Press any key to continue, and you will be returned to the option you were originally working in.

If you were working in the Full Fire Event Data Display option (Section 5.3.3), GO TO PAGE 39.

If you were working in the Essential Fire Event Data Display option (Section 5.3.4), GO TO PAGE 45.

If you were working in the Fire Event Description option (Section 5.3.8), GO TO page 87.

6. OVERVIEW OF PROGRAM ARCHITECTURE

6.1 Data Base Files

The six data base files used to store nuclear power plant fire event information, FIRE, DESC, SUM, OPEXPER, OPEXBWR, and EXPERPWR, are accessed by software programs to display information meeting user-specified criteria or to make numeric calculations (to determine the operating experience of a nuclear power plant, for instance). A brief summary of the purpose and types of data entries contained in each of these data base files is given below (along with memory requirements given in kilobytes). (This guide does not cover dBASE III editing procedures; refer to the dBASE III User's Guide for this information.)

FIRE - This data base file containing specific, searchable data relating to fire events, is the largest file found in the Fire Data Base, with 354 fire events recorded there. This file contains 31 separate fields. A key word(s) concept is used to search each of these fields (i.e., only certain words are allowable entries for these fields). The 31 entries used in this data base file are as follows (with a brief discussion of what the field means, if not obvious) (350 kilobytes):

1. Incident number (INO): A number assigned to each fire event that, in essence, corresponds to the date the fire occurred (i.e., small numbers correspond to the 1960s time frame while large numbers like 300 correspond to the 1980s). This number is also used as a pointer to the DESC data base file to allow the corresponding description of the fire event to be displayed, if desired.

2. Plant name

3. Location of the plant

4. Principal owners of the plant

5. Capacity: The electrical generating capacity of the plant (MWe).

6. Nuclear steam supply system (NSSS) vendor

7. Type of reactor

8. Date the plant's operating license was issued

9. Date the plant initially went critical: The date the first self-sustaining nuclear chain reaction took place.

10. Date of commercial operation

11. Fire location

12. Date of fire

13. Time of day of fire

14. Fire duration: How long the fire burned, including suppression time.

15. Fire duration flag: Internal flag with a value of 1 to 6 used to speed up searches where fire duration is of interest.

16. Mode of plant operation at the time of the fire

17. Probable cause of the fire

18. Type of fire: Any of the four standard NFPA classifications (e.g., class A refers to paper/trash fires).

19. Fire detection method

20. Fire extinguishment method

21. Suppression system used to extinguish the fire (e.g., automatic Halon systems)

22. Suppression agent used to extinguish the fire (e.g., Halon)

23. Suppression time: Compared to the fire duration field, this entry represents (based on fire event descriptions) the time it actually took to extinguish the fire but not the times it took to detect the fire, get people to the scene, and then extinguish the fire. Because fire duration and suppression times may have been reported as the same, this field may also represent the fire duration. The user should carefully read the available descriptive information to determine whether a true suppression time has been reported.

24. Suppression flag: Similar to item 15, above, except this flag aids in searches where suppression time is of interest.

25. Initiating component: The heat source that actually started the fire by igniting other flammable materials.

26. Initiating combustible: The flammable material that first burned in the fire.

27. Components affected by the fire: The components other than the initiating component that were affected by the fire.

28. Power degradation: The percent reduction in reactor power (if applicable) that was caused by the fire.

29. Forced outage: The number of days that the plant was put out of commission due to the fire.

30. Dollar loss: The monetary loss due to the fire.

31. References: The reference sources from which fire event information was obtained.

DESC - This data base file, containing the written descriptions for the fire events in the FIRE data base file, uses the INO (discussed previously) to find the correct description (100 kilobytes).

SUM - Basic plant information is stored in this data base file: plant name, plant location, principal plant owner, and important plant milestone dates, as well as several lines of text to describe significant plant events, are found in this data base file (50 kilobytes).

OPEXPER - This data base file contains date information and data on how various plant locations are shared among units at a site. It contains information for all commercial nuclear power plants in the United States. The dates in this file include when the plant's operating license was issued, when the plant went critical for the first time, when the plant began commercial power operation, and when the plant was decommissioned (if applicable). How plants share cable spreading rooms, control rooms, auxiliary buildings, reactor buildings, and turbine buildings is also included. ('Shared' in this context means that two or more plants have cable or equipment physically in the same room, rather than being in completely different rooms. For instance, at many two-unit sites, control of both plants is

accomplished from one large "control room". In this case the two plants can be said to "share" the single control room) (15 kilobytes).

OPEXBWR - This data base file is a reduced version of the OPEXPER file. It contains dates and location-sharing information only for BWRs (6 kilobytes).

EXPERPWR - This data base file, which performs a function similar to that of the OPEXPER file, contains information only for PWRs (9 kilobytes).

6.2 Options Available

The Fire Data Base has nine major options from which the user can select various types of output data to process. Each option is designed so that data can be either displayed on your monitor or sent to a printer for a hard-copy output. Figure 22 illustrates the option structure of the program and indicates that the Main Menu controls all program options. Following is a summary of the functions and capabilities of each option.

Basic Plant Information - When this option is selected, general plant information is displayed including plant name, plant location, principal owning utility or consortium, and major milestone dates in the plant's life (such as when its operating license was issued, when it went critical for the first time, and when it began commercial power operation). In addition, a few lines of text are provided to point out specific facts about the plant.

Fire Event Description - This option, whose purpose is to display the written description associated with a particular fire event, was designed to allow fast access to the written description portion of a fire event without having to enter a lot of information to get it. Searches are performed by either INO or by specifying a key word or phrase.

Plant Operating Experience - This option calculates the operating experience (in years) of any commercial nuclear power plant in the United States. You can determine operating experience for BWRs only, for PWRs only, or for BWRs, PWRs, and HTGRs combined. The operating experience for any one of five plant locations can be calculated: the cable spreading room, the control room, the auxiliary building, the reactor building, and the turbine building. The operating experience can be calculated for any date(s) specified by the user and can be displayed in three output forms: a single value, representing the cumulative operating experience for a particular location; a listing of operating experience for all U. S. sites; or the operating experience for a particular site. The output from this option is designed to be used as the time input for calculating fire frequencies for various plant locations.

Full Fire Event Data Display - This option displays, in a fairly concise form, as much information as possible about a particular fire event. The types of information displayed include plant name, type of reactor, location of the fire, type of fire, detection/suppression times and methods used to fight

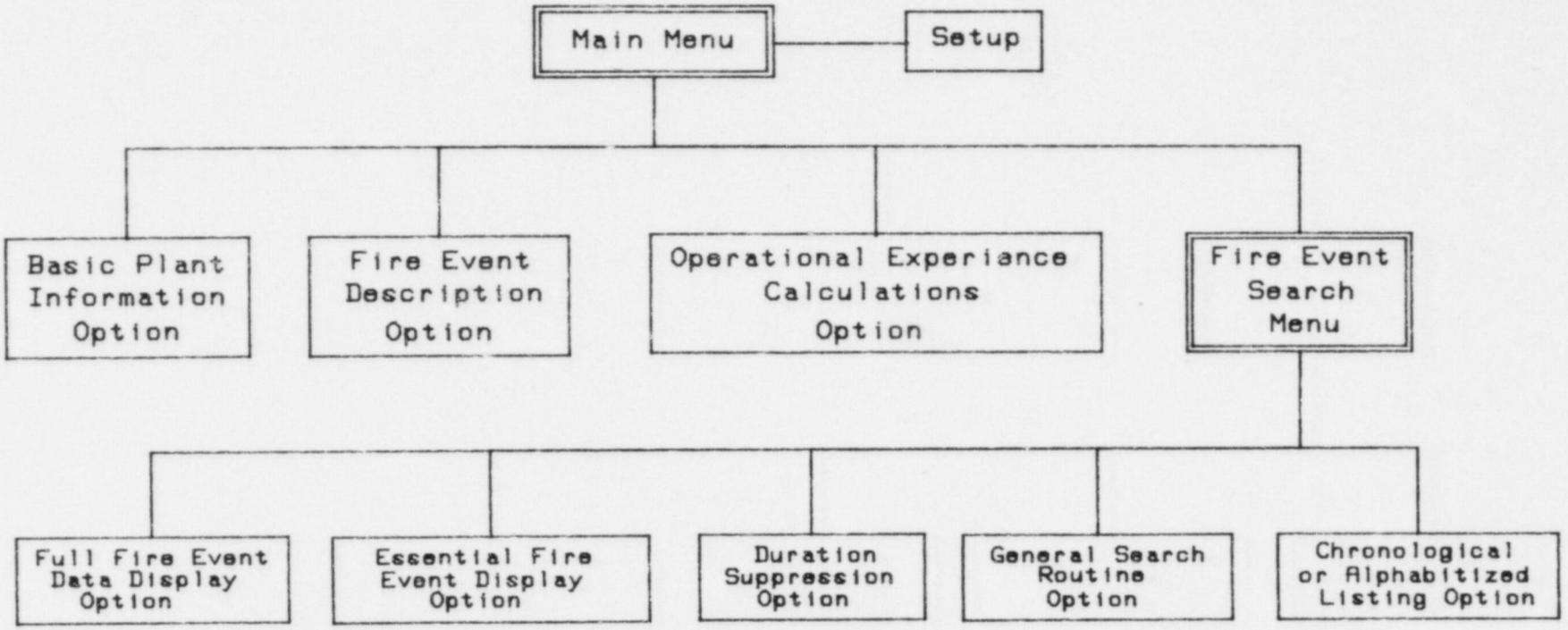


Figure 22. Basic Option Structure of the Data Base

the fire, components affected by the fire, probable cause of the fire, dollar loss due to the fire, reference sources from which the data were obtained, etc. (29 separate items). Because of the differing reporting methods used by reference sources, not all 29 fire-related items may be available. The associated description of the fire event can also be displayed.

Essential Fire Event Display - This option, similar to the Full Fire Event Data Display, displays a much more limited set of data, which includes plant name, NSSS vendor, reactor type, fire location, date of the fire, and its cause. The description for each fire event can also be displayed, if desired. In essence, the purpose of this option is to answer the 'who', 'what', 'when', and 'where' questions concerning a fire.

Fire Duration/Suppression Time Search - The data base can be searched by either fire duration time or suppression time. This option allows some discrimination as to which fire events meeting certain conditions are displayed. The four conditions that are "and-ed" with the user-specified time are type of reactor (i.e., BWR, PWR, and HTGR), mode of plant operation at the time of the fire (e.g., power operation, shutdown, refueling outage, etc.), the means by which the fire was detected, and the method used to suppress the fire. The output from this option includes (where available) plant name, date of fire, duration of fire, detection/suppression-related information (means, time), and reference sources. The description of the event can also be displayed, if desired.

Chronological Fire Event Display - A list of all fire events in the data base is displayed, either chronologically or alphabetically by plant name, when this option is selected. Four items are displayed for each fire event, including the INO, the date of the fire, plant name (if known), and the location of the fire. This option allows the user to scan quickly the dates and plant names for fire events.

General Search Routine - This option allows the data base to be searched on up to five parameters at once, out of a total of 18 (such as plant name, reactor type, date of fire, location of the fire, components affected by the fire, dollar loss, etc.). The user can search on five different parameters or on a single parameter for five different conditions. This option is designed to be more user-friendly and, thus, simpler than dBASE III for this data base application. The conditions specified by the user

can either all be "and-ed" or "or-ed" or the user can create his/her own "ands" and "ors" to search the data base. As fire events are found that match the specified criteria, these events are displayed on your monitor. The associated descriptions for these fire events can also be displayed if desired. In addition, once all the fire events have been found that meet the specified criteria, a summary display shows what criteria were used to search the data base, as well as the number of fire events that meet the criteria. Use of this option with the Plant Operating Experience option provides all the information necessary to determine the fire frequency for a given location.

Setup - This particular option does not access the data base but provides some means of customizing all program options. All program options are designed to (1) indicate which option you have selected, (2) provide a brief explanation of its function (3) ask interactive questions to find the data you want, and (4) tell you when you have finished and where you will be going when you exit the option. The Setup option allows you either to decrease the display time or to eliminate completely items 1, 2, and 4 above. Its purpose is to allow an experienced user to get quickly to input questions and bypass some informational displays for faster accessing of the data base.

In keeping with the goal of modular program structure, each of these options operates independently. Therefore, output data from one option is not required as input for another. In addition each option can operate as a stand-alone program (see Appendix A for hints on how to do this).

6.3 Structure of the Options

The structure of each option in the data base, briefly described in Section 5.2 (pages 17 through 22), is explained in more detail here so that, when using the Setup option, you will know exactly which display options are retained and which have been deleted.

Each of the four parts of the structure of an option can be modified by the Setup option. The four parts referred to in the Setup option are as follows:

Heading Block
Preliminary Information
Data Entry and Informational Prompts
Completion Messages

The four parts of the structure are defined, illustrated, and discussed below.

Heading Block - A short heading displayed at the beginning of any option to allow you to verify that the option you have selected will in fact be performed. Heading Blocks are positioned in the approximate center of the screen, framed by "*" and in capital letters. They are displayed for approximately 20 seconds (the default time) and then replaced by the next display. However the display time can be changed in the Setup option. Figure 23 illustrates the Heading Block for the Full Fire Event Data Display option. Heading Blocks for the other options are similar.



Figure 23. Sample Heading Block

Preliminary Information - This information appears after the Heading Block, discussing in a short paragraph the capabilities of the option selected. Preliminary Information displays, like regular text fields, look like a typewritten page. In the lower left corner of the screen appear the words "Press any key to continue ...". Until you respond to this prompt, Preliminary Information will remain displayed. Figure 24 is an example of a Preliminary Information display.

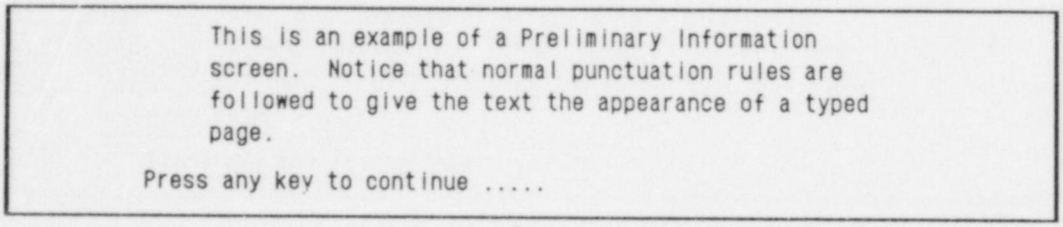


Figure 24. Sample Preliminary Information Display

Data Entry and Informational Prompts - When you get to this point in any of the options, you have reached the heart of the option. The displays that come up are primarily interactive displays that ask you to enter some parameter (whether it be a number, name, or simply pressing a key to continue). Data Entry Prompts are used to supply the input information needed to search the data base files. These prompts cannot be eliminated or bypassed when running the program (nor would one want to because of the unreliable results that would be obtained). Data Entry Prompts can be distinquished from Informational Prompts by the fact that either a specific number or name must be entered and the "Return" or "Enter" key pressed to continue the program, or a response to a yes/no question is required. To illustrate Data Entry Prompts, see Figures 25 and 26. Figure 25 illustrates the first type of Data Entry Prompt (those that require pressing the "Return" key to continue). Figure 26 illustrates the second type of Data Entry Prompt (which requires a response to a yes/no question).

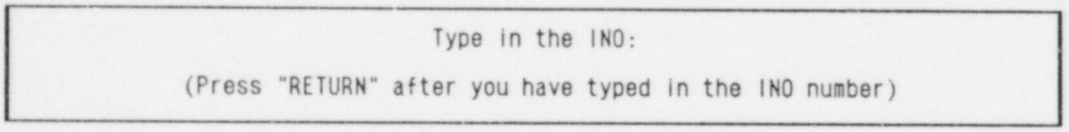


Figure 25. Sample Data Entry Prompt Requiring "Return" ("Enter") Key to be Pressed to Continue

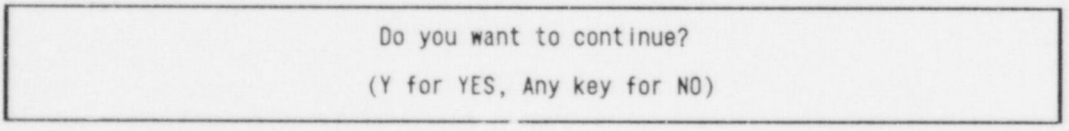


Figure 26. Sample Data Entry Prompt Requiring a Response to a Yes/No Question

For Data Entry Prompts requiring the "Return" key to be pressed to continue, you will be prompted by the display.

Informational Prompts are provided to tell you what the program is doing or to advise you that it should not be interrupted. These prompts do not normally require any response, but rather are displayed for a short time until the next series of prompts. Figure 27 shows two examples of Informational Prompts.

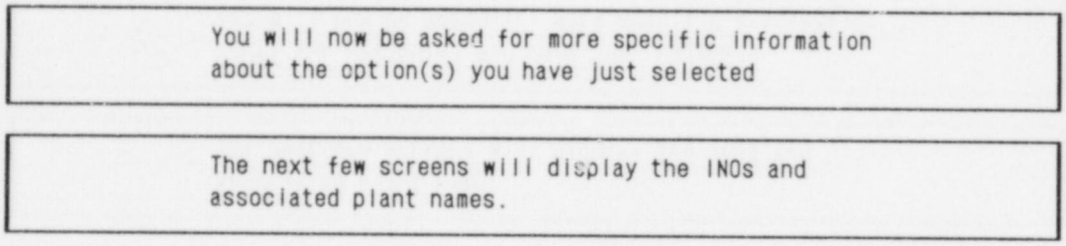


Figure 27. Sample Informational Prompts

Completion Messages - These messages, which appear after all operations with a particular option have been completed, are split into two sections of text, separated by at least one blank line. The upper section identifies the data base option in which you were working; the lower section identifies the menu to which you will be returning (either the Main Menu or the Fire Event Search Menu, depending on which option was selected). Figure 28 shows the Completion Message for the Full Fire Event Data Display.

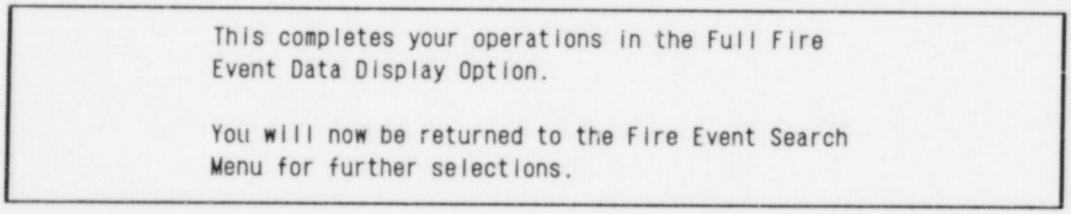


Figure 28. Sample Completion Message

As previously mentioned, each option in the program has the structure outlined above. All of these elements can either be deleted from appearing on your monitor while the program is running or have their display time changed by use of the Setup option (See Section 5.2).

6.4 Types of Input Required

The Fire Data Base was written with three principal goals in mind:

1. The inputs required to access the data base should (as much as possible) be in plain English.

2. The user should be able to interactively enter inputs from the keyboard with a minimum amount of effort.

3. Inputs required to actually search the data base should be made readily available to the user when entering data, so that all viable options are presented to the user, who can simply make a choice and type it in.

For the above reasons there are only four basic types of variable inputs required to run the program. In this context, "variable" means a particular variable name that you must recognize to ensure that you are making the proper choices.

The four variable types used in the data base are as follows:

1. Incident Number (INO) - A unique identification number for each fire event, the INO approximates when a fire occurred. (INO 1 is the first incident in the Fire Data Base and occurred in 1965. The last INO, 354, corresponds to a fire that occurred in 1985.) INOs were assigned to the fire events in ascending date order. The key to INOs is that they uniquely identify a fire event in the data base and provide for a quick way of finding a particular fire event.

2. Plant Identification Number - Used only in the Basic Plant Information option, this number was assigned to each operating plant in the SUM data base file (which is used with the Basic Plant Information option). The plant entries in the SUM data base file are alphabetized, with plant identification numbers assigned so that an increasing numerical value corresponded to the alphabetical listing of the plants. Thus, the plant identification number 1 corresponds to Arkansas Nuclear One, Unit 1, while Plant Identification Number 140 corresponds to Zion 2. Like an INO, the plant identification number uniquely identifies a plant; thus it can be used to locate a particular plant of interest quickly.

3. Text Entries - For some data entry prompts, the user is asked to make a selection from a list

provided and type in the desired choice (See Figure 29). If fire event data are to be searched by reactor type, three entries are searchable: BWR, PWR, and HTGR. Assume that for a search, the reactor type of interest is BWR. To search for this plant type, simply type in "BWR" and then press the "Return" key. The program responds correctly only to capital letters, therefore, all text entries should be in capital letters.

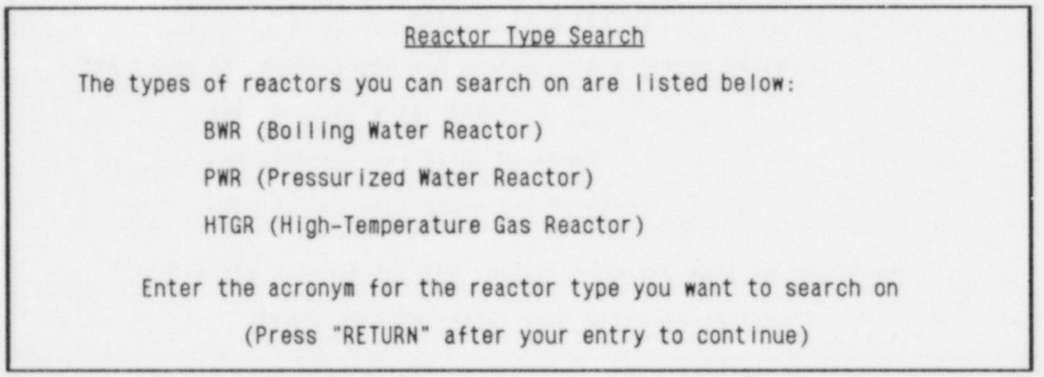


Figure 29. Sample Text Entry

4. Numerical Entries - These entries require that a number be entered that represents a particular item or date. As in the case of Text Entries, these entries must be followed by pressing the "Return" key to continue. Figure 30 is an example of this type of data entry. In this example, the data base will be searched by looking for fire events where the mode of plant operation is important. If it is important that only those plants at power operation during a fire need be identified, press "4" followed by pressing the "Return" key. When a Numerical Entry is required in response to a question from the data base program, you will be given a prompt to press the "Return" key to continue (See Figure 30).

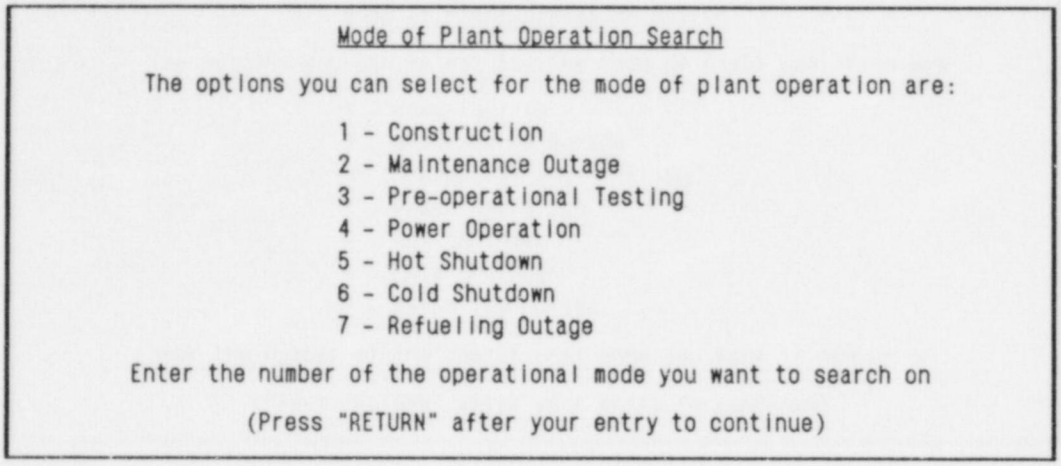


Figure 30. Sample Numerical Entry

Remember: Should you forget a specific variable, you will be able to look at the viable entries for this variable before you are requested to enter your choice. You do not need to memorize any variables or use any type of look-up table; it's all found in the data base.

7. PROGRAM INSIGHTS

This section includes a summary of how the program processes data and what to do if you make an unintended error when entering data. It is not intended to give you all the hints for running the program. The best way to learn how to run the program is to read this section and then try the examples in Section 5.

a. All inputs to the program should be entered in capital letters. (The program will normally prompt you to do this).

b. To terminate all operations with the data base and return to dBASE III, press the "Esc" key. A dot prompt, ".", tells you that you are back in dBASE III.

c. In most cases, a prompt will tell you to press the "Return" key to continue. However, if there is no prompt, and the display does not change, and the disk drive red light is off, press the "Return" key.

d. The program was designed to ask questions in simple English. If you think a moment about the question being asked, you will probably be able to answer it with a viable input.

e. If you enter an invalid choice, you will get an error statement (see below). If you do not want to start the program all over again, respond "N". When the program gives you another error statement, respond with "N" until the error statements clear. Now, make your selections and continue in the program.

```
Syntax error
CASE = 1 ?
Called from- E:FIREOCCUR.PRG
Terminate command file? (Y/N)
```

f. In general, if you get an error statement anywhere in the program, the technique discussed in step e can be used to continue program execution. You may not get the information you want, but at least you will not have to start the program again from the beginning. (If this does not work, give a "Y" response to the syntax statement and at the dot prompt, ".", type "do menu".)

g. For any entry that requires you to type in a string of letters, like a plant name, you can save time by typing in just a few letters instead of the full

string. Be aware, though, that the data base will search for any of these letters in a field. For example, if Turkey Point was the plant of interest and you typed in only "T", you would get not only information on Turkey Point, but on all plants whose names contain a "T". The first three letters of a string are usually enough to make the entry unique.

h. If you are running the program, and an unwanted setup option appears or some desired options do not, the variable values for these options have been inadvertently redefined. To correct this, return to the the Main Menu and select choice 5 to redefine these setup options.

i. When using the Operational Experience Calculations option, for the cumulative operating experience of a particular plant location, it takes several minutes to get the final answer. This would be a good time to get up and go get a cup of coffee.

j. If you decide to have data printed out on your printer, expect it to take some time.

k. If you make an error in entering data, the program will not always tell you that your entry is invalid (until it really starts searching). This is because there is no error-checking function as you enter data in dBASE III. (dBASE III has to search the data base first and validate your input before it recognizes an error.) Therefore, make sure your entries are entered correctly.

l. The examples in this user's guide show you all the possible displays for a particular option. Once you know your way around the data base, you can speed up the time it takes to run a particular option by giving "No" responses to the questions in the setup portion of the data base. These responses will allow you to skip over the Preliminary Information displays, Informational Prompts, and Completion Messages. Shorten the Heading Block display time to 10 to display the questions for each option immediately. You will probably speed up your operations by a factor of 2 or 3 this way. Data base search times remain unchanged; you can simply begin the search sooner.

m. The Heading Block display time can be changed (shortened) while you are in the setup option. The prompt for this time change tells you to enter a number larger than 10. An entry of 10 displays a Heading Block just long enough for you to read it. If you pick a number less than 10 (any number greater than or equal to 1 will work) the Heading Block will flash

on the screen and disappear quickly. (If you enter a negative number (less than 0), the program defaults to 10.) It's recommended you use a value of 10.

n. If an error statement tells you too many files are open, be sure that you followed the dBASE III user's manual in configuring the system (i.e., in CONFIG.SYS, you have set files = 20, buffers = 15). In some options, the data base will be using six or seven command and/or data base files. Be suspicious that CONFIG.SYS may require modifications if you get such an error statement in the Operational Experience Calculation or General Search Routine options.

o. The command and data base files, as presently structured, will not work with dBASE II. It would take some effort to convert this data base to run on dBASE II.

p. The data base has not been tested extensively on other IBM-compatible systems; however, the command files will run as described in this user's guide on a COMPAQ portable (the two floppy-disk drives are not large enough to handle the full data base) or on an IBM PC with an external Bernoulli Box performing the same function as the hard disk drive on an IBM XT.

q. Make sure that you have "SET TALK OFF" in dBASE III, or you will get a column of numbers on each display.

r. When using the General Search Routine, you can enter the search criteria letter values in any order. The output will be displayed in exactly the order you entered the criteria. If you need to make your own logic expression, as long as one of the search criteria was not the date of the fire, the logic expression parameters will be in the same order that you entered them. If you do use the date as one of the search criteria, it will appear at the end of your logic expression. This means that you can search for only one date or date range at a time. To avoid this being a problem, before you choose your criteria, make sure that the date is the last criterion you want to use as a search parameter.

s. When you use dates as one of the search criteria in the General Search Routine and you are looking at a date interval, first enter the date <u>farthest</u> from the present date, then the date closest to the present date. If you should reverse the process, you will exclude some dates from the search.

t. When using the Operational Experience Calculation option, be aware that Initial Criticality and the

Commercial Operation dates may not be the "exact" dates for these events at the plant. Definitions of these dates vary from utility to utility and from state to state. In some cases, the dates were only known by month and year. Because this option requires a day of the month, for these cases the day was assigned as the 15th.

u. The program has some error handling capability to prevent getting error statements that will require you to start again. Obviously, however, not all potential errors that can be entered from the keyboard have been accounted for. If you get one of these errors, get back to the dot prompt, ".", in dBASE III and type in "do menu" to return to where you were.

v. Normally, the "Return" key is used in this data base to confirm an entry and enter data into the program. However, in the Fire Duration/Suppression Time Search option, the "Return" key can also be used to indicate that you do not want any of the choices displayed to be used in a search. Be careful not to press the "Return" key more than once. If you do, it will treat the extra "Return" as a valid entry for the next choice.

w. When dates are entered for an option, some error checking is performed by the program to determine whether the date is "good". The program checks that the "/"s are in the proper place and that there is a total of 8 characters for the date. If the date entry meets these prerequisites, it is considered "good". The error checking function of dBASE III does <u>not</u> look at whether you entered a bogus date (like 01/50/80) or letters in the date field (like 01/2E/8O). In the first case, the program will continue but will give you incorrect operating experience values; in the second case, the program will hang up, and you will have to start again.

x. When you are asked to specify the number of fire events to be sent to the printer, there are two defaults the program will assign if you have given an incorrect value. If you enter a number less than 1, you will get no output and will be asked whether you want to try again. On the other hand, if you enter a number greater than the one in the display, the program will print out fire events from the one you first specified through the last fire event in the data base. This prevents the program from hanging up because it can not find a specific fire event.

y. Any number you are requested to enter for <u>any</u> of the

options must be an integer. If you enter decimal numbers by mistake, the program and dBASE III will recognize only the portion of the number to the left of the decimal point (e.g., if you want to display a fire event with an INO of "220" but enter "2.20" instead, you will get INO 2.) Further, if you enter a mixture of numbers and letters, like "23i" (when you wanted "238"), the data base will treat it as if you had entered "23".

z. The principal sources used to compile the fire Data Base [1-7] were cross-checked against references 8 through 10.

REFERENCES

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10. Nuclear Regulatory Commission, Internal Memo from W. J. Dircks to Commissioner P. Bradford, June 9, 1981.

APPENDIX A

Tips For Experienced Users

This portion of the Users' Guide provides the experienced user (knowledgeable with both dBASE III and the IBM computer) with tips on how to quickly get around the data base. In addition, a summary of the questions you are asked by each option is provided.

Getting around the Data Base by means other than using "do menu"

This section provides the commands to run any option individually. (In addition, if the program gives you an error statement that you can not overcome except by returning to the dBASE dot prompt, ".", you can use these commands to return to where you were without starting all over again with the "do menu" command.)

The data base has a modular design in that each of the options available can operate alone (almost). Before you use any of the options, you must make sure to set up the display options that will be used (i.e., Heading Block, Preliminary Information, Informational Prompts, and Completion Messages. You can do this in one of two ways. The first way, and perhaps the easier, is to type in the command:

"do setup"

When you do this, you will be in the setup portion of the data base (see Section 5.2, pages 17 through 22.) You probably do not want to see all this information; therefore, respond as follows to the questions asked in the setup mode:

Change Heading Block Display Time - "Y"
Enter Display Time - "10"
Display Preliminary Information - press the space bar
Display Informational Prompts - press the space bar
Display Completion Messages - press the space bar

After you have made these entries, you will get the dBASE dot prompt.

The second method to set up the display options is to enter values for the program variables that control these displays. You do this by typing in the following commands (it's assumed you do not want the options displayed; if you do, replace the 0's below with 1's):

"TIMEOUT=10"	(Heading Block Display Time)
"FET=0"	(Preliminary Information)
"MIT=0"	(Informational Prompts)
"FCT=0"	(Completion Messages)

If you are running the program and it "burps", i.e., it cannot find one of these variables, type in the appropriate command listed above and then continue the program. Whichever method you used to enter the display setup, you are now ready to run any of the options.

To run an option, type in the following commands:

Option or Menu Desired	Command
Main Menu (to control all program options) (Note: you don't buy anything this way)	"do menu"
Fire Event Search Menu (to control those options found in this menu)	"do fireoccur"
Full Fire Event Data Display	"do fulldata"
Essential Fire Event Display	"do firess"
Fire Duration/Suppression Time Search	"do detsup"
General Search Routine	"do search"
Chronological Listing of Fire Events	"do chron"
Fire Event Descriptions	"do descript"
Operational Experience Calculations	"do years"
Basic Plant Information	"do basinfo"
Modify Display Options	"do setup"

Note: You can type in the commands above in either lower or upper case letters.

When you get around the data base using the commands above, you will notice two things. First, when you have completed operations in an option, you will get a dBASE dot prompt. Second, when you use the Fire Event Search Menu, if you press "E", you do not get the Main Menu, but rather a dot prompt. This is because the architecture of the data base is like a pyramid, with the Main Menu at the top. When you use the commands above, you are looking at a slice in the pyramid. Anything below this slice can be accessed; anything above can not.

The main advantage to using the commands above is that you can bypass a lot of the displays that although of interest to a novice user, slow down the experienced user. In this way, you get right to the questions asked by an option so that you can start searching the data base quickly.

Error Statements (both data base- and dBASE III-generated)

There are only two types of error statements that you can get when running the program. Neither of these should cause you to go back to the dBASE III dot prompt, i.e., you should be able to enter a new value and continue in the option where you are working. The two types of error statements are as follows:

Invalid Entry: This error statement is generated from the program. In general, when you enter data from the keyboard in response to a data entry prompt, the program looks at the value for the variable you entered and checks it against either the values found in the data base (if character strings) or against a range of allowable values. If there is no match, you get this type of error message on your screen.

This is an invalid Incident Number! Try Again.

Reenter a correct value for the data entry prompt where you are, or you will continue to get this error statement until you do.

Syntax Error: This error statement is generated from dBASE III. In this case, if you enter a number in response to a data entry prompt instead of a letter, you have a mismatch of data types. dBASE III checks for this kind of mismatch, and if it occurs, gives you a syntax error statement.

** SYNTAX ERROR **

When you get a syntax error statement you will be given a chance to enter an acceptable value for the data entry prompt. You will continue to get this error message until you enter a variable of the required data type. (You may get other error statements that reside with dBASE III; however, to date, while running this program, only the syntax error statement has appeared.)

Summary of the Questions Asked in Each Option

This section lists the questions that you will be asked in each option, in the order in which they appear. The questions are given in flowchart form to show their relationships as well as when output data can be expected. (Note: Only the essence of a question is presented in the flowcharts.)

These flowcharts are designed to serve as a condensed reference for each option (see following pages).

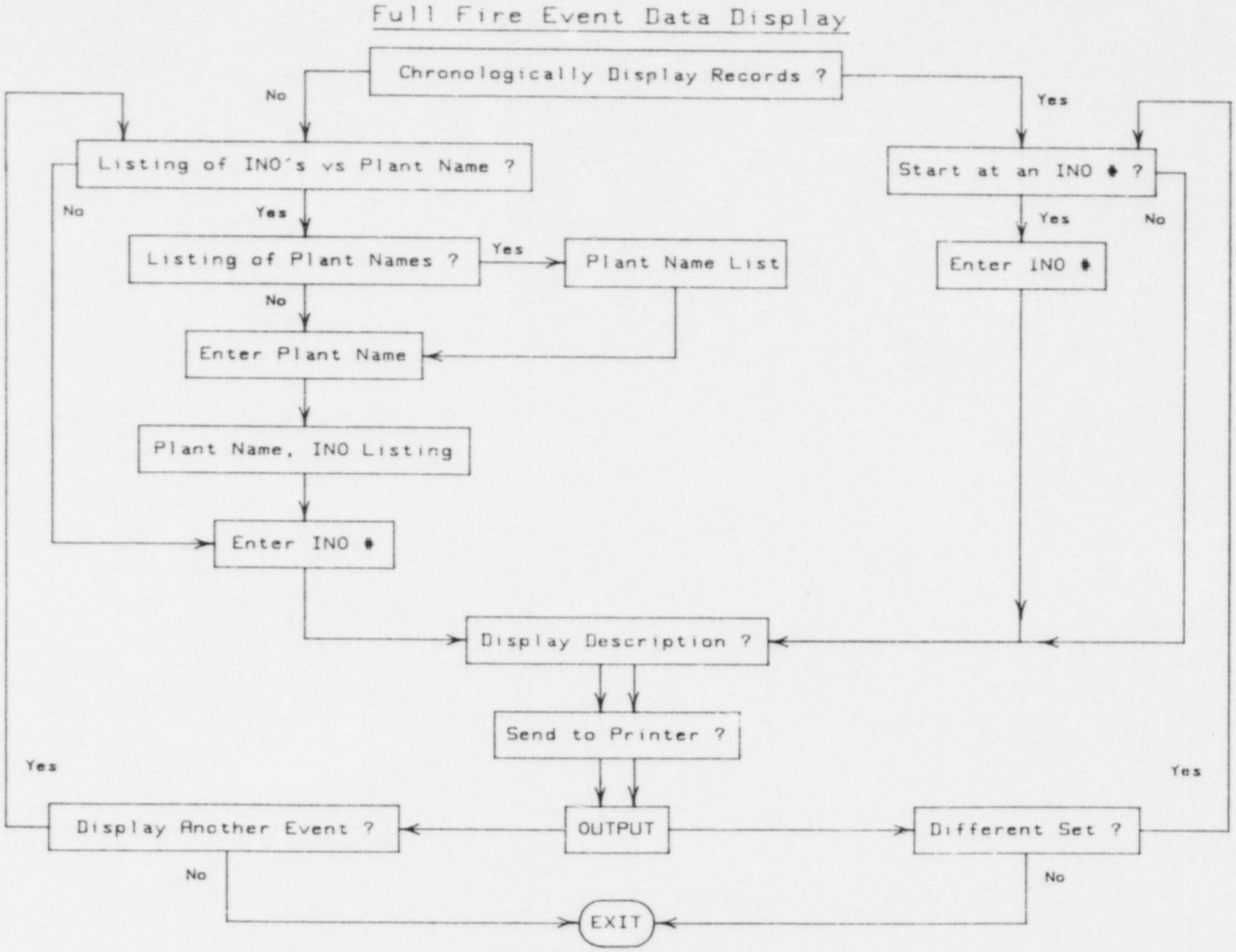


Figure 31. Summary of Questions Asked in the Full Fire Event Data Display Option

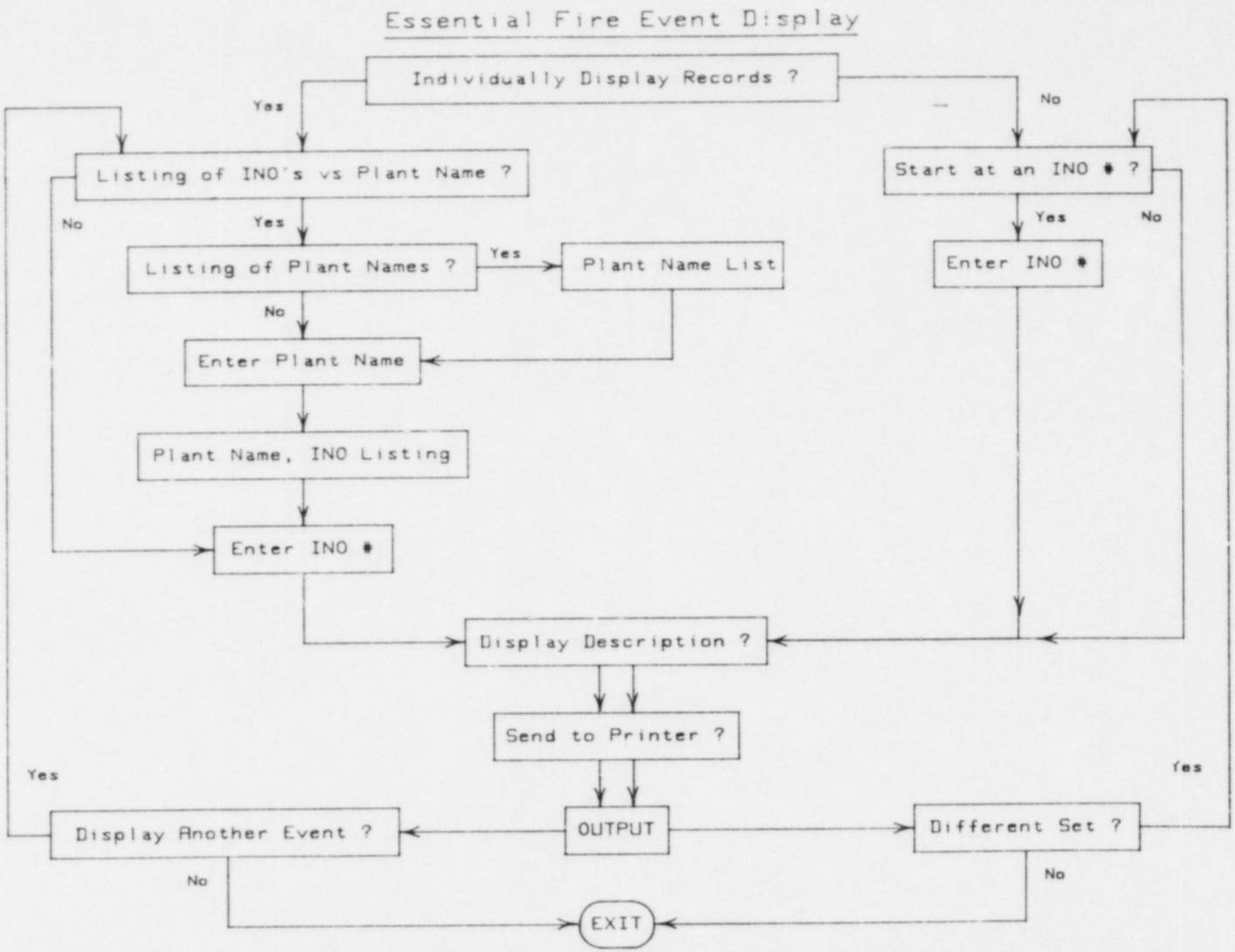


Figure 32. Summary of Questions Asked in the Essential Fire Event Display Option

Fire Duration/Suppression Time Search

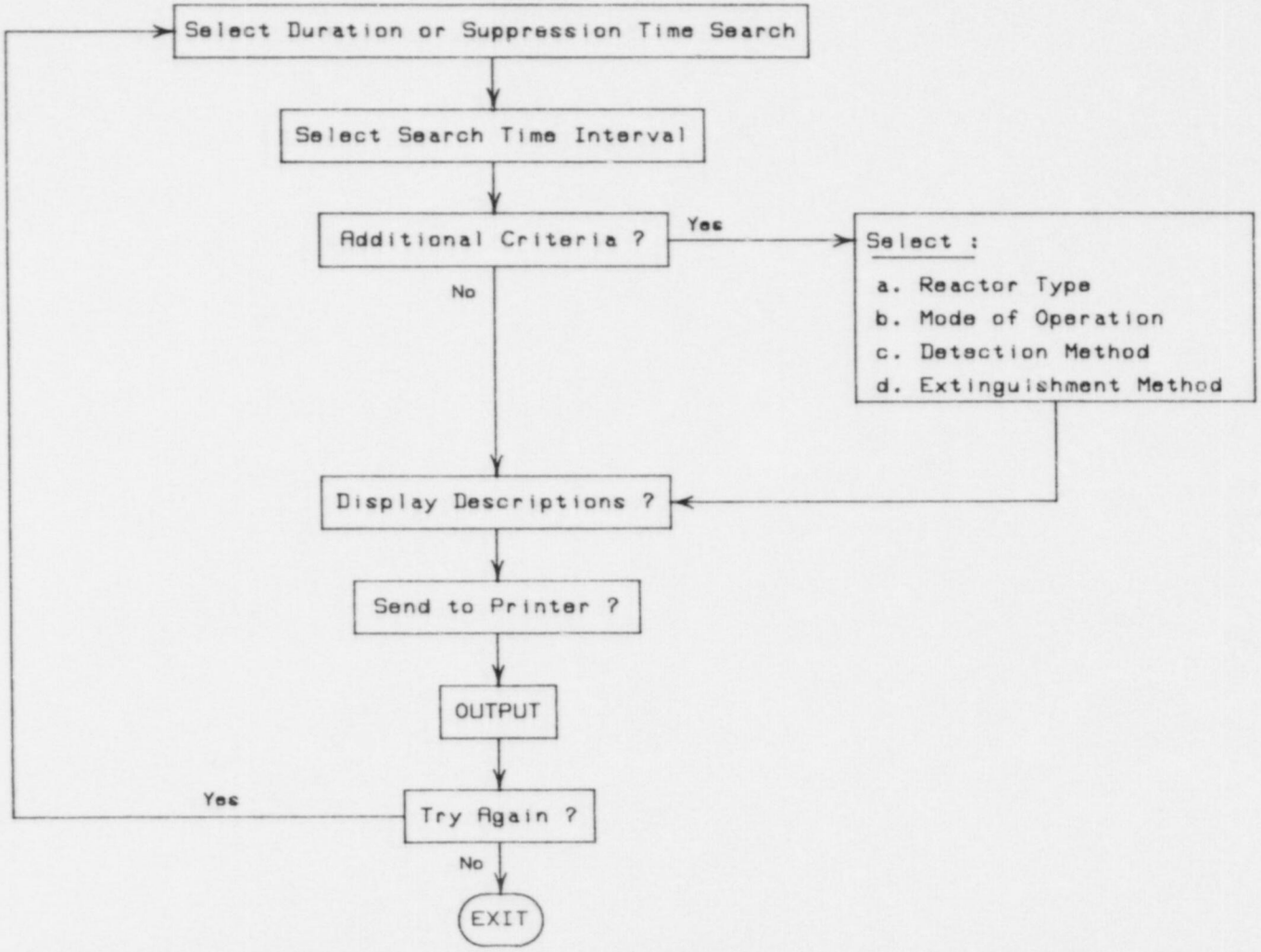


Figure 33. Summary of Questions Asked in the Fire Duration/ Suppression Time Search Option

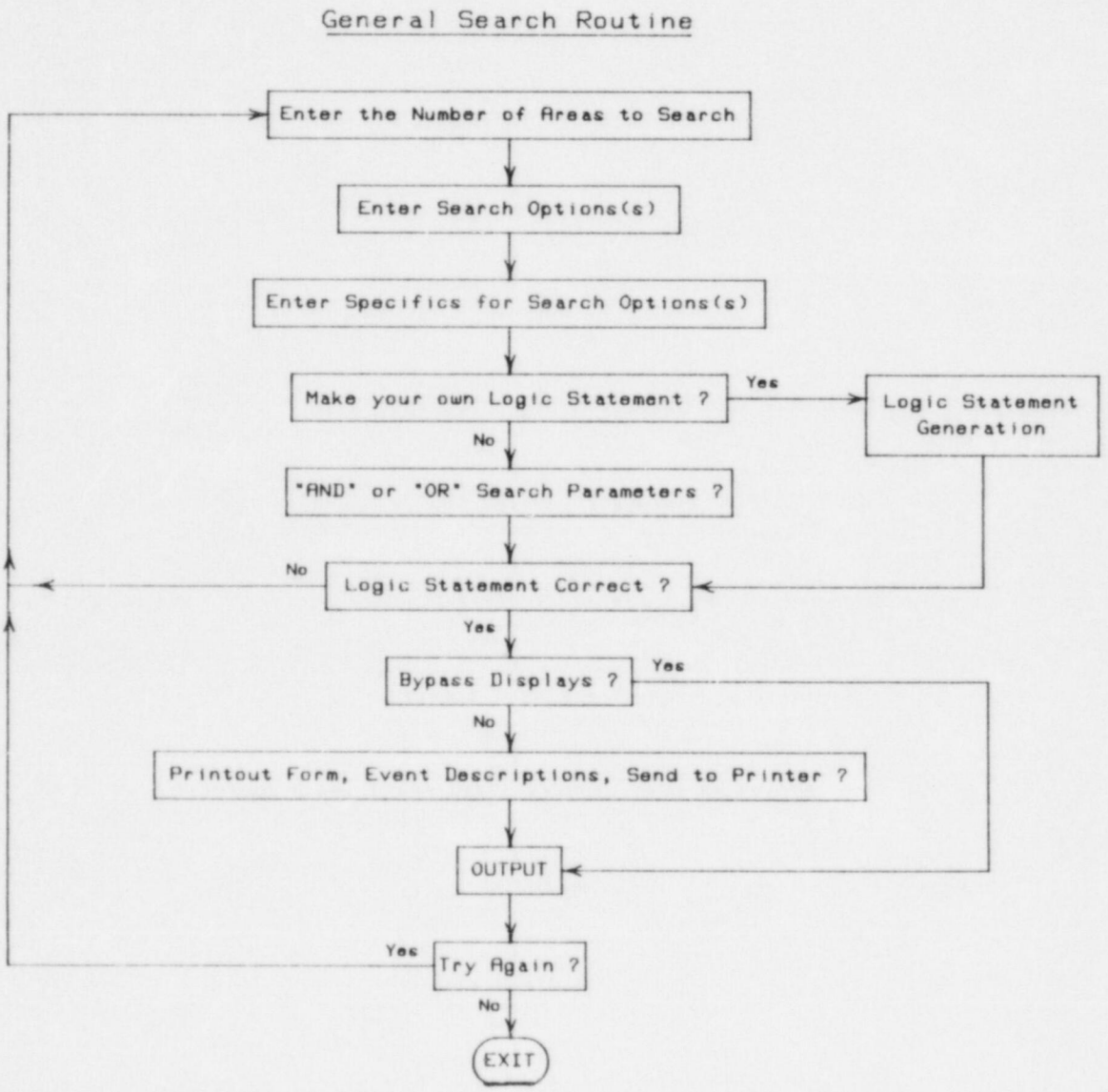


Figure 34. Summary of Questions Asked in the General Search Routine Option

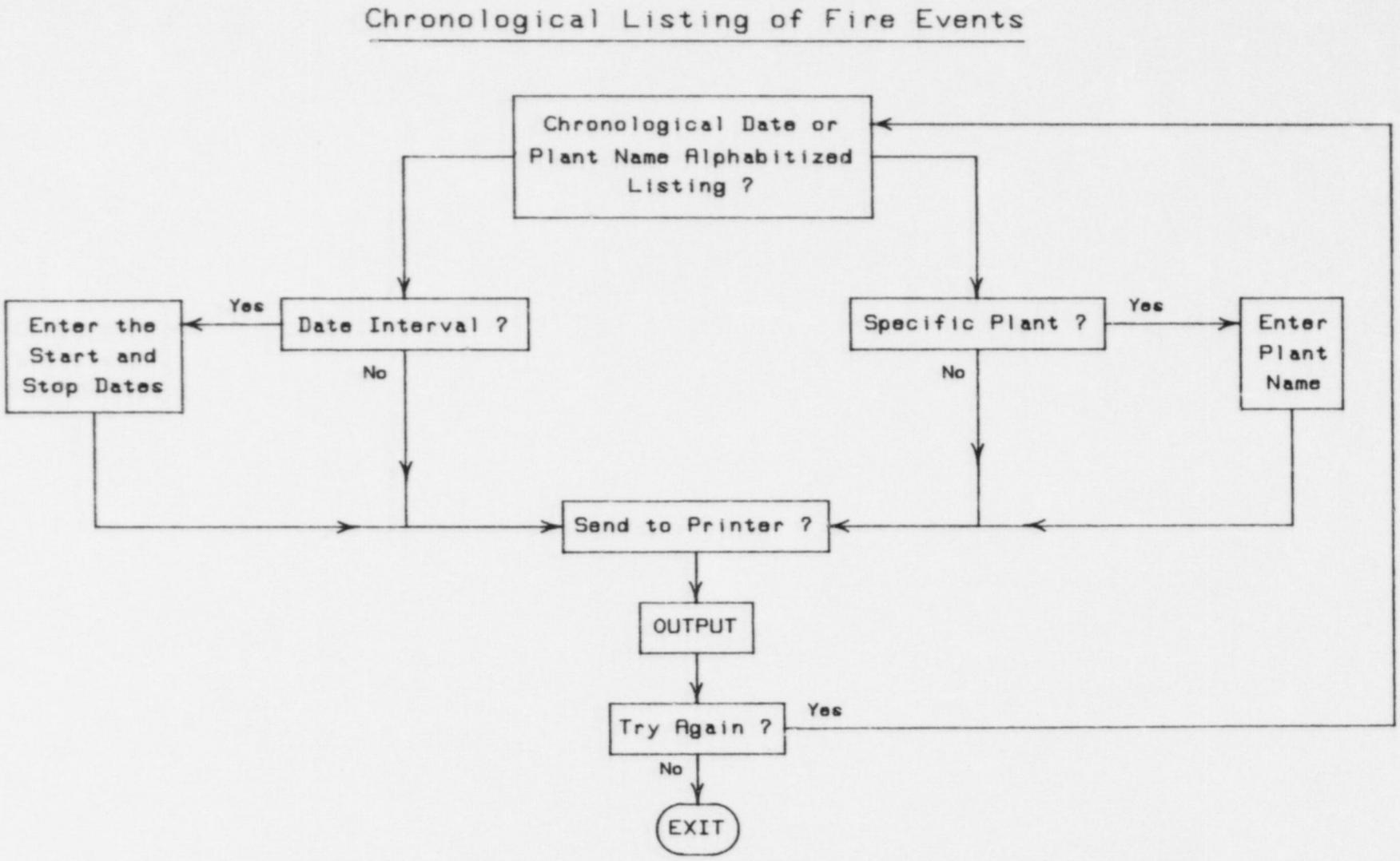


Figure 35. Summary of Questions Asked in the Chronological Listing of Fire Events Option

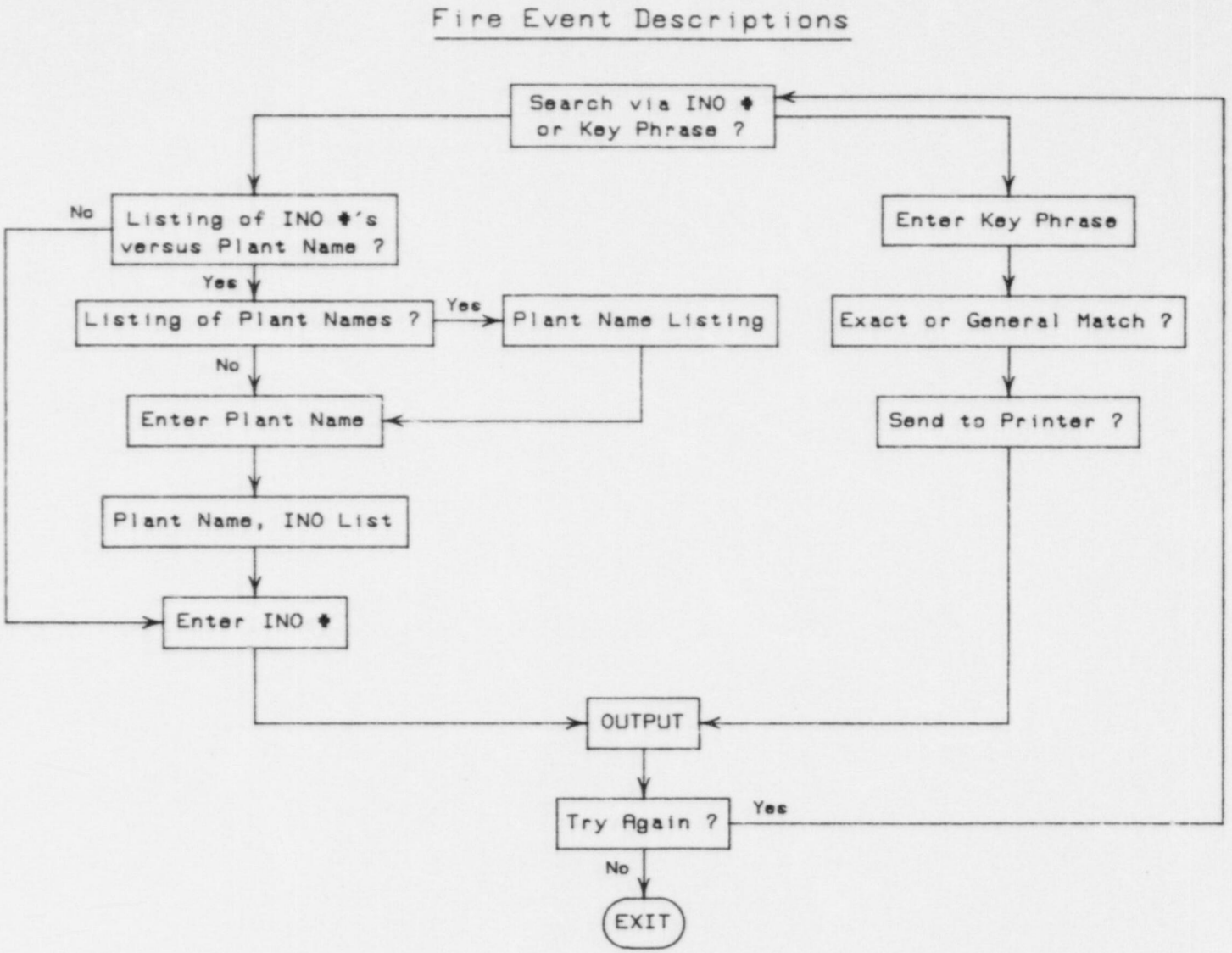


Figure 36. Summary of Questions Asked in the Fire Event Descriptions Option

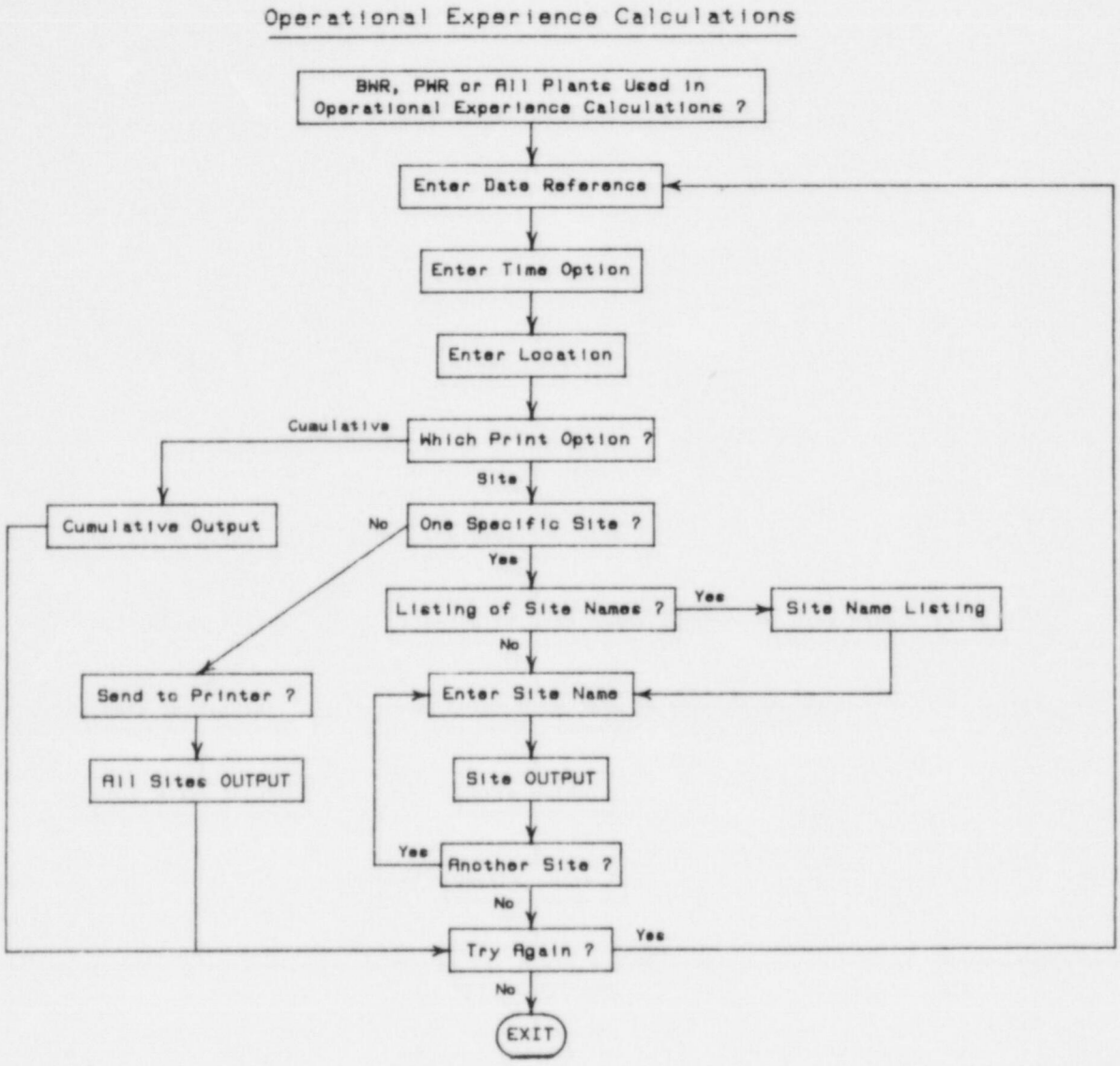


Figure 37. Summary of Questions Asked in the Operational Experience Calculations Option

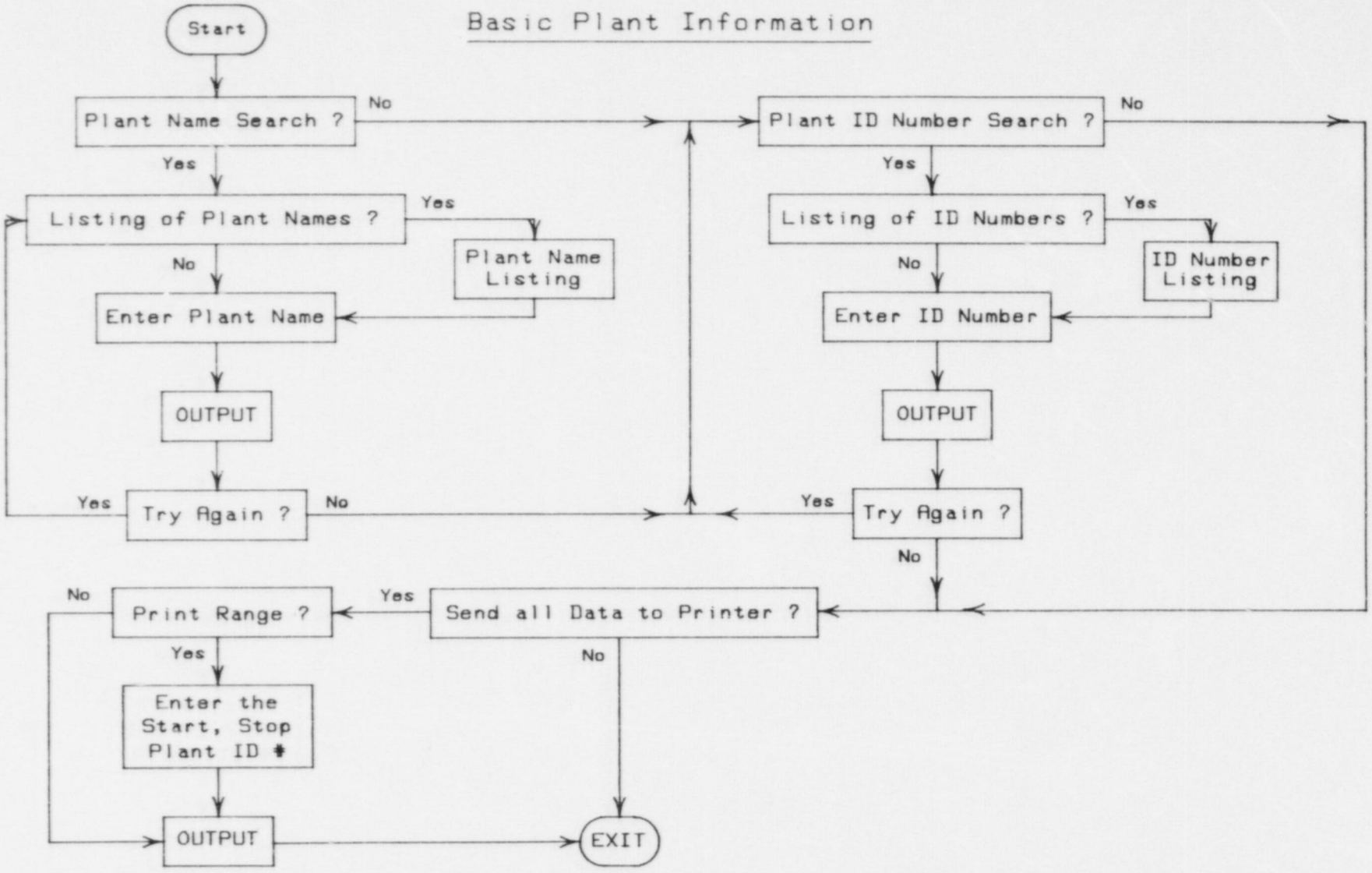


Figure 38. Summary of Questions Asked in the Basic Plant Information Option

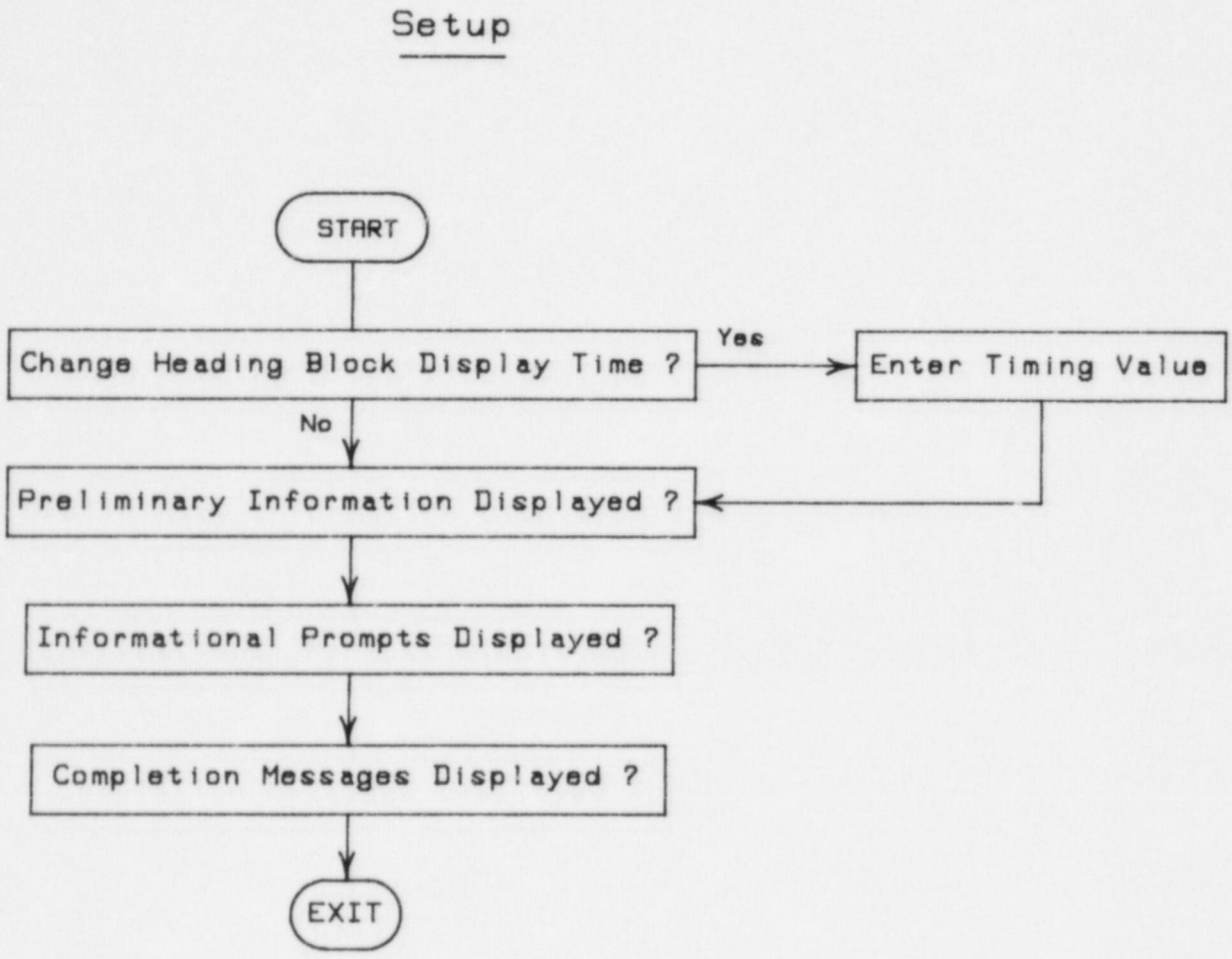


Figure 39. Summary of Questions Asked in the Setup Option

APPENDIX B

Data Base File Editing and Updating

This section assumes a familiarity with the editing features of dBASE III and covers the information necessary to update the data base files. For each data base file used in the data base, the following information will be supplied:

a. A listing showing the structure of the data base file (including field names, lengths, and data types).

b. A summary of the allowable entries presently used for each field in the data base, accompanied by a brief description of what the fields mean.

c. Any additional comments necessary to allow proper modifications to the data base file.

With the above information, you should be able to update the data base files by using the editing features found in dBASE III.

Six data base files are used in the data base. Of these six, four are unique: FIRE, DESC, OPEXPER, and SUM. The other two are subsets of OPEXPER and are called OPEXBWR and PWREXPER. The unique fire data base files will be covered in detail while the remaining two files will be covered briefly.

FIRE Data Base File

This particular data base file contains 31 fields used to describe in a concise manner (usually in only one or two terms) the specifics of a fire. Table 1 shows the structure of the FIRE data base file. One of the fields in FIRE is used to point to the DESC data base file and is called the Incident Number (INO). This number is used throughout the data base to access fire event records and, as such, corresponds to the chronological date of a fire event. There are currently 354 fire events listed in the FIRE data base file. The INO ranges from 1 to 354.

Each field name used in FIRE describes the contents of a particular field (e.g, the field CAUSE refers to the cause of the fire). For each of these fields, a standardized set of entries was used for entering data into the data base file records to ensure that a consistent set of terms could be used to search the data base.

Table 1

Structure of the FIRE Data Base File

Structure for database : E:fire.dbf
Number of data records : 354
Date of last update : 01/01/80

Field	Field Name	Type	Width
1	INCIDENTNO	Character	5
2	STATE_TOWN	Character	35
3	PLANT_UNIT	Character	30
4	CAPACITY	Character	10
5	UTILITYPRN	Character	60
6	REACTORTYP	Character	8
7	REACTORSUP	Character	35
8	OL_ISSUED	Character	10
9	INITIALCRT	Character	10
10	COMMEROPER	Character	10
11	DATE	Date	8
12	TIME	Character	10
13	LOCATION	Character	40
14	DURATION	Character	10
15	DUR_FLAG	Numeric	2
16	MODE_OPER	Character	40
17	CAUSE_FIRE	Character	67
18	TYPE_FIRE	Character	20
19	EXTINGUISH	Character	67
20	DETC_MEANS	Character	67
21	SUPP_TIME	Character	10
22	SUP_FLAG	Numeric	2
23	AGENT_USED	Character	67
24	EQUIP_USED	Character	67
25	INITCOMPON	Character	40
26	INITCOMBUS	Character	40
27	COMPEFFECT	Character	120
28	POWERDEGRA	Character	10
29	FORCEDOUTG	Character	10
30	DIRECTLOSS	Character	15
31	REFERENCE	Character	50
** Total **			976

These standardized sets of entries (if applicable, i.e., the type of reactor is limited to only three (BWR, PWR, HTGR) entries, however plant names are not unique, therefore no standardized set was used) were based on examining the fire events and categorizing the entries from the fire events into a manageable set of entries. A listing of the field names in plain english (it should be obvious which field names from Table 1 apply to this list), as well as a brief description of what is meant by the field, and a listing (if applicable) of the standardized entries for a field is shown in Table 2.

Table 2

Fire Data Base File Field Descriptions

File Field	Description
1	Incident Number - This number is assigned to each fire incident chronologically. Numbers range from 1 to 354. In addition, this number corresponds to a similar number in the description data base. As described above, records from each data base with similar INOs complement each other.
2	State, Town - The state in which the plant is located and the closest town or city.
3	Plant, Unit - The plant name and unit number where the fire occurred.
4	Utility - The principal utility (or group) that operates the plant.
5	Reactor Type - The type of reactor at the plant of interest. Entries for this data element are: BWR (Boiling Water Reactor) PWR (Pressurized Water Reactor) HTGR (High-Temperature Gas Reactor)
6	Reactor Supplier - The nuclear reactor supplier. Entries for this data element are: Westinghouse — General Atomic Combustion Engineering — General Electric Babcock and Wilcox — Allis-Chalmers
7	Capacity - The reactor output, expressed in net megawatts (electric). (For example, 1000 MWe.)
8	Date of Operating License - The date of issue of a reactor operating license.
9	Date of Initial Criticality - The date the nuclear reactor first went critical (a self-sustaining nuclear reaction occurred in the reactor).
10	Date of Commercial Operation - The date the reactor was formally connected to a commercial power grid.

Table 2 (Cont'd)

Fire Data Base File Field Descriptions

File Field	Description
11	Date of Fire - The date of the fire is listed in this field.
12	Time of Fire - The time (in military standard time) the fire occurred.
13	Duration - The duration (hours:minutes) of the fire.
14	Location of Fire - The location, inside or outside the plant, where the fire occurred. Entries for this data element are:

Administration Building
Auxiliary Building
Battery Room
Boiler Room
Cable Riser Area
Cable Spreading Room
Change House
Computer Room
Containment
Control Building
Control Room
Cooling Tower
Diesel Generator Building
Drywell
Fire Pump House
Maintenance Shop
Manhole
Offsite
Other Building
Pump Room
Radwaste Building
Reactor Annulus
Reactor Building
Recombiner Building
Security Building
Service Building
Stack Filter House
Switchgear Room
Temporary Building
TIP Room
Transformer Yard
Turbine Building
Warehouse
Yard

15 Fire Duration Flag - This is a number that corresponds to the time that a fire burned. The values range from 1 to 6 and mean the following:

1 - < 1 minute
2 - ≥ 1 minute but < 5 minutes
3 - ≥ 5 minutes but < 15 minutes
4 - ≥ 15 minutes but < 30 minutes
5 - ≥ 30 minutes but < 1 hour
6 - ≥ 1 hour

Table 2 (Cont'd)

Fire Data Base File Field Descriptions

File Field	Description
16	Mode of Plant Operation - The plant status at the time of the fire. Entries for this data element are: Construction Preoperational Testing Power Operation Maintenance Outage Hot Shutdown Cold Shutdown Refueling Outage
17	Cause of Fire - The cause of the fire. Entries for this data element are: Component Failure Electrical Failure Welding and Cutting Design/Fabrication Error Defective Procedure Arson Personnel Error Spontaneous Combustion Explosion Overheated Material Suspicious Origin Lightning
18	Type of Fire - The type of fire that occurred in reference to NEPA/NFPA Standards is listed here: Class A (ordinary combustibles such as wood or paper) Class B (flammable liquids and gases) Class C (electrical fires) Class D (combustible metals)
19	Extinguished By - The persons, systems, or methods used to extinguish the fire. Entries for this data element are: Automatic System Security Guard Plant Personnel Plant Fire Brigade Offsite Fire Department Construction Workers Self Extinguishing Deenergized Remove Fuel Source
20	Suppression Time - The time (hours:minutes) taken to extinguish the fire once suppression personnel or equipment responded.

Table 2 (Cont'd)

Fire Data Base File Field Descriptions

File Field	Description
21	Suppression Flag - This is a number (an integer value from 1 to 6) that corresponds to the time it took to suppress a fire. The time intervals associated with each of these numbers are identical to the Fire Duration Flag (item 15).
22	Detection Means - The method by which the fire was initially detected: Control Room Observation Construction Workers Fire Watch Heat Detectors Plant Personnel Security Guards Smoke Detectors
23	Agents Used - The extinguishing agents used to suppress the fire: Dry Chemical Foam Gas-Ansul Gas-CO_2 Gas-Halon Gas-Unspecified Water None
24	Equipment Used - The equipment used to extinguish the fire: Automatic Gas System Automatic Deluge System Inside Hose Streams None Outside Hose Streams Portable Extinguishers

Table 2 (Cont'd)

Fire Data Base File Field Descriptions

File Field	Description
25	Initiating Component - The equipment or item that initiated the fire:

Air Conditioner
Battery
Boiler
Bus
Cable
Capacitor
Circuit Breaker
Circuit Switcher
Computer
Construction Equipment
Degreaser
Diode
Engine
Extension Cord
Fan
Filter
Flood Light
Fuse
Generator
Glove Box
Hanger
Heat Exchanger
Hose
Hydrogen Analyzer
Hydrogen Recombiner
Incinerator
Instrumentation
Motor
Motor Control Center
Oxygen Recombiner
Pipe
Pump
Reactor
Reheater
Relay
Resistor
Steam Generator
Tank
Temporary Structure
Torch
Transformer
Turbocharger
Turbine
Valve
Voltage Regulator

26 Initiating Combustibles - The substance that initiated the fire:

Carbon Buildup
Charcoal
Construction Materials
Gasoline
Hydrogen
Insulation
Oil
Propane
Sealant
Solvent
Waste

Table 2 (Cont'd)

Fire Data Base File Field Descriptions

File Field	Description
27	Components Affected - The equipment items affected by the fire: All items listed under "Initiating Components" plus: Building Construction Materials Ductwork Electrical Equipment Hanger None Reactor Internals Rupture Disk Seals Substation Trailer Vessel
28	Power Degradation - The percentage power degradation (represented as X%) of the reactor unit that resulted from the fire. If the reactor was shut down because of the fire, it is represented by the designation SCRAM.
29	Forced Outage - The number of days of outage (represented as X days) caused by the fire.
30	Direct Loss - The dollar value loss incurred because of the fire. Entries are represented as follows: <$5k (less than $5000 damage) $5k to $50k (between $5000 and $50,000 damage) $50k to $100k (between $50,000 and $100,000 damage) $100k to $500k (between $100,000 and $500,000 damage) $500k to $1M (between $500,000 and $1,000,000 damage) >$1M (greater than $1,000,000 damage) $100M (approximately $100,000,000 damage)

Table 2 (Cont'd)

Fire Data Base File Field Descriptions

File Field	Description
31	References - The source material where the fire incident was documented: LPRA (Limerick PRA) LER (Licensee Event Reports) NPE (Nuclear Power Experience) ANI (American Nuclear Insurers) EPRI (EPRI Fire Loss Data) PRE (Power Reactor Events - NUREG/BR-0051) MEMO (NRC Memo from W.J. Dircks to Commissioner Bradford)

Note that the standardized entries from Table 2, as well as those entries specific to a plant (e.g., its name), are displayed as possible inputs when using the General Search Routine and the Fire Duration/Suppression Time Search options in the Fire Data Base. If the standardized entries are changed (i.e., either collapsed into more general terms or new terms are added to the list), the corresponding screens for the General Search Routine should also be modified. Finally, an index file is associated with FIRE. This index file's name is NAMORDER. It is indexed by plant name. When changes or additions are made to FIRE, be sure to re-index NAMORDER (i.e., use the command, "INDEX ON PLANT_UNIT TO NAMORDER").

DESC Data Base File

The DESC data base file contains the written descriptions for the fire events recorded in the FIRE data base file previously discussed. DESC stands for "description." This data base file is designed around the INO of a fire event. There is a one-to-one correspondence between the INO in the DESC and FIRE data base files. The INO in the DESC data base file is the written description of the fire with the same INO in the FIRE data base file. The structure for this file is shown in Table 3. Note that there are only two fields per record in this file. This approach was used to keep the data base as small as possible without limiting one to a specified number of lines that could be used to write about the fire event.

Table 3

Structure of the DESC Data Base File

Structure for database : E:desc.dbf
Number of data records : 1844
Date of last update : 01/01/80

Field	Field Name	Type	Width
1	INO	Character	5
2	TEXT	Character	65
** Total **			71

The Incident Number field has already been discussed in detail. The TEXT field is a line of text that describes the fire event and is entered into this field. The field is 65 characters long so it can be easily written on standard 8-1/2-by 11-inch paper without requiring any fancy software or word processor capabilities to get a good printout.

Because there are only two fields per record does not mean that only one line of text can be used to describe a fire event. The opposite is true. By using more than one record, as many lines of text as are required to describe the fire event can be used. To illustrate this, let's assume that a fire event needs four lines of text to describe it fully. Assume that this is the first fire event in the FIRE data base file; therefore it has an INO of 1 assigned to it. The DESC data base file would start at record #1 since the first description is being entered. Therefore, for record 1 the INO would be 1, and in the TEXT field, up to 65 characters of text (i.e., the first line of the fire event description) would be entered. For record 2, the INO would again be 1; however, the TEXT field would have the second line of the fire event description typed in. The third record in the DESC data base file would again have the INO entered as 1, while the TEXT field would have the third line of text entered. Finally, record 4 would have the INO entered as a 1, and the TEXT field would be the last line of text needed to describe the fire event. Record 5, for example, would have INO 2 entered, and the second fire event in the FIRE data base file would have its first line of text typed into the TEXT field. Figure 40 illustrates what the DESC data base fields would look like in the browse mode for the above example.

INO	TEXT
1	The first line of text for fire event 1
1	The second line of text for fire event 1
1	The third line of text for fire event 1
1	The fourth line of text for fire event 1
2	The first line of text for fire event 2

Figure 40. Example of DESC Entries for a Fire Event

By using the process illustrated in Figure 40 to enter fire event descriptions, the descriptions can be as long as needed. In addition, if later more information is available for the fire event than is provided, it can be added to the existing description by using the "go to record number" and "insert before" commands found in dBASE III.

Finally, an index file is associated with DESC. This index file's name is DESC_INO. It is indexed by INO. When changes or additions are made to DESC, be sure to re-index DESC_INO (i.e., use the command, "INDEX ON INO TO DESC_INO").

OPEXPER Data Base File

The OPEXPER data base file is used to determine the operating experience (in years) of commercial nuclear power plants found in the United States. This data base file is used to calculate the operating experience for all three types of reactors (BWRs, PWRs, HTGRs) and for five locations in the plants. These plant locations include the control room, cable spreading room, auxiliary building, turbine building, and reactor building. The data in this data base file is arranged in terms of sites, not plant names. As plants are currently configured, the maximum number of units at a given site is three. Site data includes those sites in operation, under construction, or proposed. A total of 83 sites are included in this data base file.

There are 27 fields in this data base file. The structure of this data base file is shown in Table 4. Note that although there are 27 fields, a large number of fields have the same root names but slightly different beginnings to designate to which unit the data applies.

Table 4

Structure of the OPEXPER Data Base File

Structure for database : E:opexper.dbf
Number of data records : 83
Date of last update : 01/01/80

Field	Field Name	Type	Width
1	SITE_NAME	Character	25
2	NUM_UNITS	Numeric	1
3	U10L_ISSUE	Date	8
4	U1INITCRIT	Date	8
5	U1COMM_OPS	Date	8
6	U1DECOMMIS	Date	8
7	U2OL_ISSUE	Date	8
8	U2INITCRIT	Date	8
9	U2COMM_OPS	Date	8
10	U2DECOMMIS	Date	8
11	U3OL_ISSUE	Date	8
12	U3INITCRIT	Date	8
13	U3COMM_OPS	Date	8
14	U3DECOMMIS	Date	8
15	NUMBER_CSR	Numeric	1
16	CSRSHARE	Character	4
17	NUMBER_CR	Numeric	1
18	CRSHARE	Character	4
19	NUMTURBLDG	Numeric	1
20	TURBSHARE	Character	4
21	NUMAUXBLDG	Numeric	1
22	AUXSHARE	Character	4
23	NUMRXBLDG	Numeric	1
24	RXSHARE	Character	4
25	UNIT1	Character	4
26	UNIT2	Character	4
27	UNIT3	Character	4
** Total **			160

In simple language, the root terms for each of the fields are given in Table 5. The prefixes U1, U2, and U3 are used to distinguish among Units 1, 2, and 3 at a site.

Table 5

OPEXPER Data Base File Field Descriptions

File Field	Description
1	Site - The name of the reactor site. For instance, the multiunit Browns Ferry site is designated "Browns Ferry."
2	Number of Units - The number of units on a site is given here. For example, for Browns Ferry, this number would be 3.
3, 7, 11	Unit 1 (2) (3) OL issued - The date Unit 1 (2) (3) received an operating license is listed here. If a site had only one unit, entries #7 and #11 would be left blank. The date is presented in the format MM/DD/YY. Where information was lacking as to the specific day of issue, the 15th day of the month was used.
4, 8, 12	Unit 1 (2) (3) Initial Criticality - The date Unit 1 (2) (3) first went critical. If a site had only one unit, entries #8 and #12 would be left blank. Note above (items 3, 7, 11) for date assumptions.
5, 9, 13	Unit 1 (2) (3) Commercial Operation - The date Unit 1 (2) (3) was formally connected to the commercial power grid network. If a site had only two units, entry #13 would be left blank. See fields (3, 7, 11) for date assumptions.
6, 10, 14	Unit 1 (2) (3) Decommissioning Date - The date Unit 1 (2) (3) was removed from commercial power operation (i.e., no longer used to produce power as a light water reactor). If a site had only one unit, entries #10 and #14 would be left blank. See fields (3, 7, 11) for date assumptions.
15, 17, 19, 21, 23	Number of CSR (CR) (TB) (AUX) (RB) On Site - The number of each of these compartments at each site is listed here. For example, if a three-unit site had two turbine buildings (TBs), this number would be 2. CSR = cable spreading room; CR = control room; AUX = auxiliary building; RB = reactor building.

Table 5 (Cont'd)

OPEXPER Data Base File Field Descriptions

File Field	Description
16, 18, 20, 22, 24	Shared CSR (CR) (TB) (AUX) (RB) - This entry is a four-digit code that describes both the number of these compartments at a site and whether and how compartments are shared between units. This code number is the key to a computer program developed to estimate the years of operating experience at each plant or any number of plants.
25, 26, 27	Unit 1 (2) (3) No. - A reference number for each plant is provided here. Plants are listed alphabetically. For example, Arkansas Nuclear One 1 is number 1 and Zion 2 is number 140. A total of 140 operating or near-term operating plants are included in this data base.

Fields 15 through 24 are used to determine the number of locations at a site as well as how these locations are shared.

Table 6 shows how plant locations were combined into a limited number of plant areas. (This information is also applicable to the FIRE Data Base File fire location entries.)

Table 6

Interpretation of Plant Areas

Operating Experience Data Base Heading	General Incidence Data Base Locations
Cable Spreading Room	1. Cable Spreading Room
Control Room	1. Control Room 2. Control Building
Turbine Building	1. Turbine Building
Auxiliary Building	1. Auxiliary Building 2. Battery Room 3. Boiler Room 4. Pump Room 5. Recombiner Building 6. Switchgear Room 7. Maintenance Shop
Reactor Building	1. Containment 2. Drywell 3. Reactor Annulus 4. Reactor Building
Other Area	1. Administration Building 2. Cable Riser Area 3. Change House 4. Computer Room 5. Cooling Tower 6. Diesel Generator Building 7. Fire Pump House 8. Manhole 9. Other Building 10. Radwaste Building 11. Security Building 12. Service Building 13. Stack Filter House 14. Temporary Building 15. TIP (transverse in-core probe) Room 16. Warehouse
Property/Offsite	1. Offsite 2. Transformer Yard 3. Yard

This sharing information is important when calculating operating experience to avoid double counting a location. The code used for the fields with "SHARE" as part of the field name are based on using a binary-type code and using the sums of these to define how a plant is shared. The code is based on assigning a number to each plant at a site. The assignment of plant numbers is shown in Table 7.

Table 7

OPEXPER Plant Sharing Code Assignment

Three Units at a Site	Code No.
Youngest Unit	1
Middle-Aged Unit	2
Oldest Unit	4
Two Units at a Site	
Youngest Unit	1
Oldest Unit	2
One Unit at a Site	
Single Unit	1

These codes are then appropriately used to represent each site and location. The code is a four-digit number, each digit representing one room. (Up to four rooms can be defined as shared or not for each site.) Using the code numbers shown in Table 7, a number is obtained that represents how the room is shared, as well as how the code will be used to calculate the operational experience for a particular location.

Table 8 shows a matrix of the allowable sharing combinations and what each combination of numbers means based on the number of units at a site:

Table 8

Sharing Code Combinations and Meanings

Code number of:	Means the location is shared by:
Three-Unit Site	
1	Only the youngest unit
2	Only the middle-aged unit
3	Both the middle-aged/youngest units
4	Only the oldest unit
5	Both the youngest/oldest units
6	Both the middle-aged/oldest units
7	All three units at the site
Two-Unit Site	
1	Only the youngest unit
2	Only the oldest unit
3	Both the youngest/oldest units
Single-Unit Site	
1	Only the single unit

These codes are used with the corresponding number of units at a site to determine operating experience. The oldest plant at a site (i.e., the plant that first was critical or began commercial operation) is always designated Unit 1 by convention in this data base file. The field names with "SHARE" in them are where these codes are entered. These fields have four positions that each represent a room (e.g., the leftmost decimal position represents the first room at the site, its adjacent neighbor the second room, etc.) The best way to illustrate how these codes are used is by example.

Example 1: Three units at a site. Unit 1 is 20 years old. Unit 2 is 10 years old, and Unit 3 is 5 years old. At the site, there are three rooms that are shared between the units. Room 1 is shared between Units 1 and 2, room 2 has only equipment belonging to Unit 3, and room 3 is shared by Units 2 and 3.

The code for each room is as follows:

Room 1 = 6; Room 2 = 1; Room 3 = 3

The code that would be entered into the appropriate "SHARED" field is shown in Figure 41.

6	1	3	0

Room No. 1 2 3 -

Figure 41. Example Three-Unit Site Sharing Code Assignment

Note that a zero is entered in the code if there are not enough rooms at the site to produce a four-digit code (i.e., if there are only two rooms, two of the four positions in the code will contain a digit; the other two positions will be filled in with zeros.)

Example 2: Two units at the site. Unit 1 is 20 years old and Unit 2 is 10 years old. There is one room of interest shared by the two units.

3	0	0	0

Room No. 1 - - -

Figure 42. Example Two-Unit Site Sharing Code Assignment

For this case, the two-unit code values in Table 8 are used. Since the two units share the same room, the code number used would be 3. Figure 42 shows how the "SHARED" field would look for this case, with zeros used to fill the three empty positions.

Example 3: Single-unit site. There are four rooms of interest in the plant. Figure 43 illustrates the "SHARED" field for this case.

1	1	1	1

Room No. 1 2 3 4

Figure 43. Example Single-Unit Site Sharing Code Assignment

The key to using this code is that the oldest plant is designated Unit 1, while the code numbers in the matrix of Table 8 are used according to the number of units at the site. The

number that represents how a room is shared is obtained by using the numbers assigned to the plant, and if a room is shared, adding these numbers up to get the correct room code. If a room is not shared, the number assigned to that plant is entered as the room code number.

One final note. Only the month and year were available for some of the dates that were used in compiling this data base file. Because the program needs a day of the month to perform time calculations, an arbitrary day of the month (the 15th) was assigned for these dates.

OPEXBWR and EXPERPWR Data Base Files

The OPEXBWR data base file contains information only for BWRs while the EXPERPWR data base file contains information only for PWRs. The purpose, structure, and fields found in these two files are identical to those of the OPEXPER Data Base file. Therefore, go to pages 166 through 174 to read how to edit these two data base files.

These two data base files were created for use in the data base because they take up a relatively small amount of memory (15 kilobytes), and they reduce the programming necessary to distinguish between plant types in the OPEXPER data base file (thus increasing the time needed to search the data base).

** One word of caution: If you edit the OPEXPER data base file, be sure to edit the corresponding entry in the OPEXBWR or EXPERPWR data base file, as appropriate. If you do not, you will get erroneous operating experience values. **

SUM Data Base File

The SUM data base file is designed to display general plant information about all plants (including those plants proposed, under construction, in operation, or decommissioned.) The structure of this file is shown in Table 9.

Table 9

Structure of the SUM Data Base File

Structure for database : E:sum.dbf
Number of data records : 140
Date of last update : 01/01/80

Field	Field Name	Type	Width
1	PLANTIDNUM	Character	4
2	STATE_TOWN	Character	35
3	PLANT_UNIT	Character	24
4	CAPACITY	Character	10
5	UTILITYPRN	Character	60
6	REACTORTYP	Character	8
7	REACTORSUP	Character	35
8	SHARED	Character	10
9	OL_ISSUED	Date	8
10	INIT_CRIT	Date	8
11	COMM_OPER	Date	8
12	DECOM_DATE	Date	8
13	TEXT1	Character	65
14	TEXT2	Character	65
15	TEXT3	Character	65
** Total **			414

The field names, as seen from the structure, are self-explanatory; however, they are summarized in Table 10 to prevent any misunderstandings.

Table 10

SUM Data Base File Fields Descriptions

File Field	Description
1	Plant Identification Number - A reference number used to search the data base. Plants are assigned identification numbers in alphabetical order. For example, Arkansas Nuclear One 1 has the number 1 assigned to it. Arkansas Nuclear One 2 is assigned the identification number 2, etc.
2	State, Town - The state in which the plant is located and the closest town or city.
3	Plant, Unit - The plant name and unit number.
4	Capacity - The reactor output expressed in net megawatts (electrical). (For example, 1000 MW_e)
5	Utility Principal - The principal utility (or group) that operates the plant.
6	Reactor Type - The type of reactor at the plant of interest. Entries for this data element are: BWR (Boiling Water Reactor) PWR (Pressurized Water Reactor) HTGR (High Temperature Gas Reactor)
7	Reactor Supplier - The nuclear reactor supplier. Entries for this data element are: Westinghouse Combustion Engineering Babcock and Wilcox General Atomic General Electric Allis-Chalmers
8	Shared - Identifies any rooms or locations shared between units at a site.
9	Operating License Issued - The date the plant was issued an operating license.
10	Initial Criticality - The date the nuclear reactor first went critical (a self-sustaining nuclear reaction occurred in the reactor).
11	Commercial Operation - The date that the plant was formally connected to a commercial power grid.

Table 10 (Cont'd)

SUM Data Base File Fields Descriptions

File Field	Description
12	Decommissioning Date - The date the plant was removed from commercial operation and no longer used for power generation.
13, 14, 15	Text 1 (2) (3) - Lines of text used to describe any significant facts concerning a plant.

This data base file is used for informational purposes only, it is not designed to be used to make any calculations. For consistency and to keep the file as current as possible, if you edit any other data base file that has the same fields found in the SUM data base file, make the same changes in this data base file.

APPENDIX C

Where to Get the Data Base Diskettes

Copies of this Code, FIREDATA, can be obtained from:

Radiation Shielding Information Center
Oak Ridge National Laboratory
P. O. Box X
Oak Ridge, TX 37831
(615)574-6176

DISTRIBUTION:

U.S. Government Printing Office
Receiving Branch (Attn: NRC Stock)
8610 Cherry Lane
Laurel, MD 20707
(200 copies for RP)

U.S. Nuclear Regulatory Commission
Electrical Engineering Branch
Attn: A. Datta (5)
Mail Stop NL 5650
Washington, DC 20555

Impell Corporation
Attn: Collin A. Lewis
350 Lennon Lane
Walnut Creek, CA 94598

Professional Loss Control, Inc.
Attn: Kenneth Dungan
P.O. Box 446
Oak Ridge, TN 37830

Electric Power Research Institute
Nuclear Power Division
Attn: Joseph Matte III
3412 Hillview Avenue
Palo Alto, CA 94304

Risk Management
Tennessee Valley Authority
Attn: Ralph Thompson
5N 79A Lookout Place
Chattanooga, TN 37402-2801

ANI
Exchange Building, Suite 245
Attn: Dotti Sherman, Library
270 Farmington Avenue
Farmington, CT 06032

Underwriters Laboratories
Attn: Leon Przybyla
333 Pfingston Road
Northbrook, IL 60062

M&M Protection Consultants
Attn: Stan Chingo
222 South Riverside Plaza
Chicago, IL 60606

Impell Corporation
Attn: John E. Echternacht
350 Lennon Lane
Walnut Creek, CA 94598

Lawrence Livermore Laboratory
Attn: Harry K. Hasegawa
P.O. Box 5505 L-442
Livermore, CA 94550

Clinch River Breeder Reactor Plant
CRBRP Project
Attn: Larry W. Clark
P.O. Box U
Oak Ridge, TN 37830

Patton Fire Suppression Systems, Inc.
Attn: Richard Patton
4740 Myrtle Avenue, Suite B
Sacramento, CA 95841

Electricite De France
Thermal Production Headquarters
Attn: Jean-Pierre Berthet
EDF-DSRE-6, Rue Ampere
BP 114
93203 Saint Denis Cedex 1
FRANCE

Factory Mutual Research Corporation
Attn: Jeff Newman
1151 Boston-Providence Hwy.
Norwood, MA 02062

Florida Power Corporation
Attn: L. R. Perkins
System Fire Protection Coordinator
6115 Park Blvd.
Pinellas Park, FL 33565

American Electric Power Service Co.
Attn: Jack D. Grier
Fire Protection and HVAC Section
1 Riverside Plaza
P.O. Box 16631
Columbus, OH 43216-6631

Commonwealth Edison
Attn: Tom Grey
72 W. Adams Street
Room 1248
Chicago, IL 60603

Grinell Fire Protection Co.
Attn: Joe Priest
10 Dorrance Street
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The Nuclear Power Plant Fire Data Base has been developed for use with an IBM XT (or with a compatible system). Nuclear power plant fire data is located in many diverse references, making it both costly and time-consuming to obtain. The purpose of this Fire Data Base is to collect and to make easily accessible nuclear power plant fire data.

This users' guide discusses in depth the specific features and capabilities of the various options found in the data base. Capabilities include the ability to search several database fields simultaneously to meet user-defined conditions, display basic plant information, and determine the operating experience (in years) for several nuclear power plant locations. Step-by-step examples are included for each option to allow the user to learn how to access the data.

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