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A USER'S GUIDE TO THE MENU-DRIVEN STORET INTERFACE FEBRUARY, 1989

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STORET

Preface

STORET is a national data system that accommodates environmental monitoring data relating to the quality of water within the United States. Since its inception in the early 1960s, STORET has evolved into a powerful and comprehensive system, capable of performing a broad range of analyses, while continuing to serve in its original role as a data repository for EPA, other federal agencies, state and local governments, academic institutions, Canadian agencies, and U.S. Territories. All 50 states have direct access to STORET for both data storage and retrieval, thereby contributing significantly to the timeliness of STORET's data. The system serves as an automated utility for water pollution control agencies attempting to determine the causes and effects of water pollution, measure compliance with water quality standards, gauge the effectiveness of waste treatment plants, and identify trends in ambient water quality.

The STORET family includes several separate but related systems, which are the Water Quality System, the BIOS Field Survey System, and the Daily Flow System. The Water Quality System (WQS) is by far the largest member and most widely known of the three, containing data for over 680,000 sampling sites. Some 11,000 water quality parameters are defined within the Water Quality System. These parameters can be grouped into the general categories of administrative, biological, physical, flow, organic, inorganic, pesticides, and temperatures.

The STORET system runs on a large-scale, third generation IBM computer system at EPA's National Computer Center (NCC) in Research Triangle Park, North Carolina. It is run under the TSO (Time-Sharing Option) terminal command language allowing many users to access the STORET system simultaneously.

This guide describes the menu-driven user interface recently developed to aid users in retrieving and analyzing data residing in the STORET Water Quality System.



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Description of STORET Data

The Water Quality System contains data relating to the quality of surface water and ground water within the United States. These data are the results of field and laboratory analyses performed upon samples gathered from streams, aquifers, lakes, and other bodies of water.

WQS data can be broadly categorized as either station or sample data. Station data describes a specific geographical location where samples are gathered, i.e., a sampling site. Station data includes a unique station identifier, the station's latitude and longitude coordinate, the state and county in which the station exists, a reach number identifying the station's hydrologic location, drainage basin codes, ground water aquifer codes, a textual description of the station's location, etc. Sample data describes the conditions under which samples are gathered, e.g., date, time, depth, as well as the results of the sample analyses. Sample contents that are identified during this analytical process represent observations of various water quality parameters, e.g., pollutants, particulates. Over 11,000 different water quality parameters are defined within STORET. Thus a typical observation represents a measurement of a single parameter at a specific location, at a specific point in time.

Who Uses STORET

The STORET user community consists of a wide variety of individuals and organizations. Federal, state, and local water quality control agencies utilize the WQS to examine the causes and effects of water pollution, to measure compliance with water quality standards, and to determine pollution trends.

Many states utilize the WQS to help comply with the Congressional reporting requirements of PL 92-500 (National Clean Water Act). The U.S. Geological Survey, the U.S. Forest Service, the U.S. Army Corps of Engineers, the Bureau of Reclamation and the Tennessee Valley Authority all utilize STORET's WQS in their water quality monitoring efforts.

The STORET user community includes agencies and organizations which utilize the data standards and procedures established in the EPA Office of Ground Water Protection's Data Management Manual. The User Interface contains a path specifically designed for these users.

STORET User Assistance

The User Interface has a variety of built-in help information that will assist the user with immediate problems related to menus and commands. In addition, you are encouraged to contact the STORET User Assistance Staff for any questions or problems that you might encounter. STORET User Assistance personnel in EPA Headquarters, Washington, D.C. are available by phone from 8 a.m. to 5 p.m., E.S.T. Monday through Friday, to answer any question.



The User Assistance staff and their numbers are:

Joe Sierra (Chief)

Lee Manning

Louis Hoelman

Dan Parker

Elaine Davis

Bill Muldrow

Olof Hansen

Rob Palmer

(800) 424-9067 or (FTS) 382-7220 or (202) 382-7220

For help on Telephone Communications related problems, contact NCC Telecommunications Support at:

(800) 334-0741 or (FTS) 629-4506 or (919) 541-4506

For help on NCC mainframe operations related problems, contact NCC User Support at:

(800) 334-2405 or (FTS) 629-7862 or (919) 541-7862

STORET regional representatives have been assigned for each of the ten EPA regions throughout the country. Their responsibilities include providing assistance to STORET users and they are the first people to contact for help in any area dealing with STORET.

STORET Regional Contacts			
Region	STORET Contact	Location	Telephone
1	Ed Woo	Boston, MA	617-565-3384
			FTS-835-3384
2	Bill Justis	New York, NY	212-264-4753
			FTS-264-4753
3	Charles Kanetsky	Philadelphia, PA	215-597-8176
			FTS-597-8176
4	Thomas Burnett	Atlanta, GA	404-347-2931
			FTS-257-2931
5	Stuart Ross	Chicago, IL	312-353-0299
			FTS-353-0299
6	Carl Young	Dallas, TX	214-655-2289
			FTS-255-2289
7	Norm Crisp	Kansas City, KS	913-236-3884
			FTS-757-3884
8	Dick Sotiros	Denver, CO	303-236-7086
			FTS-776-7086
9	Eric Wilson	San Francisco, CA	415-974-0719
			FTS-454-0719
10	Bill Bogue	Seattle, WA	206-442-1676
			FTS 399-1676



The STORET User Interface

STORET has always been a powerful water quality analysis tool. However, the utility of the system has been hindered somewhat by the STORET retrieval language, which although extremely flexible and versatile, can be difficult for the non-computer professional to master. Users needed to know the keywords and command language not only for STORET, but also for TSO (Time Sharing Option), QUEUE (output utility), and JCL (Job Control Language for batch jobs). As a result, potential users of the system were often discouraged by the complexity of this environment. This meant that STORET was not being used to its full capacity. For this reason, U.S. EPA's Office of Ground Water Protection (OGWP) and the Office of Information Resources Management (OIRM) initiated an effort to identify enhancements that would improve user access to STORET.

To determine the wants and preferences of STORET users regarding access to the system, EPA conducted an user requirements analysis in the fall of 1987. Feedback was obtained from a wide range of users at the EPA, other federal agencies, state and local governments, and academia. The requirements analysis gathered data relating to user characteristics, computing environment, views of the current system, potential enhancements to the system, documentation, and training.

The requirements analysis led to the establishment of the following objectives for a new user interface:

- Facilitate ease of use
- Reduce overall cost and time requirements
- Provide for greater convenience and accuracy
- Encourage wider use of the system

This user input guided the development process of a prototype design. In March of 1988, a national workshop with over 80 attendees evaluated this prototype. The recommendations of the workshop participants resulted in the current interface design.

The new user interface has been developed following the requirement analysis and further input from users. It uses the Interactive System Productivity Facility (ISPF) on EPA's mainframe to provide a menu-driven system having full-screen editing capabilities. The interface will serve as a bridge between the user and the STORET Water Quality System.

This interface, through the use of menus, provides a simple question-and-answer selection process. All user-selected menu entries are translated into the existing STORET retrieval language syntax by the interface. Translated retrieval requests may then be submitted for execution against the Water Quality data base.



Accessing the STORET User Interface

The STORET database and user interface reside on the IBM 3090 mainframe computer maintained by the U.S. EPA at the National Computer Center in Research Triangle Park, North Carolina. Accessing the interface requires that you must first establish communications with the mainframe computer.

Communication with EPA's IBM computer in North Carolina requires a DEC VT100, IBM 3270, or compatible terminal, or a personal computer (PC) that can emulate these terminals. Communications may be through a long distance high-speed link that is directly connected to the mainframe or through a modem connection which is established by dialing over the telephone. Users accessing the interface via a high-speed link simply select the "TSO - NCC" option on the logon menu. Users dialing into the IBM system must select the "IBM 3270 Emulation" option by entering "NCC.TCP" on the dial-in logon menu. Modems with a baud rate of 2400 or higher are preferable, although the slower data transmission rates are acceptable. A more detailed discussion of the dial-in process is explained in Volume 1 of the STORET Handbook (available from STORET user assistance). Whether you are high-speed connected or dial-in, you must possess a valid user ID and account to access the EPA computer. Refer to Section "STORET User Assistance" on page 1 for information on whom to contact for this information. Keep in mind, when logging on, that STORET is only available from TSO.

At this point, the TSO "READY" prompt appears indicating that you are in the TSO environment and that the STORET system is available. To invoke the STORET user interface, "ISPF" must be entered in response to the "READY" prompt.

How the STORET User Interface Works

Having entered ISPF, the ISPF Primary Option Menu will be displayed on the screen. "S" must be entered from the Primary Option Menu to access the STORET interface. The other options on this menu are ISPF functions, e.g., BROWSE, EDIT, SDSF. For more information on ISPF contact NCC user support. The next menu that appears will show the STORET system herald and list of STORET options. The user should specify option 1 to select Water Quality System Functions. The Water Quality System herald and a list of options will then be displayed on the screen. Specifying option 1 again initiates the creation, modification, and submission of STORET retrieval requests.

All information entered after this point is saved as part of a retrieval request having a unique user-assigned name. This is another aspect of the STORET interface that was specifically designed to make using the system as simple and painless as possible. An existing request may be re-used, modified, and saved under a different request name. This preserves the original request, yet eliminates having to re-enter the menu responses that the new request has in common with the existing request. When an existing request is selected for use, the menu responses it contains are re-displayed as they were originally entered. When you wish to change any of the responses from the original request, these values may simply be typed over.



The STORET retrieval process is logically divided into several basic steps:

1. Output format specification
2. Sampling site selection
3. Sampling event selection
4. Parameter selection
5. Special output options
6. Job submission options

The following five output formats are currently available:

STA	Station ID Listing by Agency
INVENT	Data Summary for Unlimited Parameters
RET	Data Listing for up to 50 Specified Parameters
ALLPARM	Data Listing for an Unlimited Number of Parameters
LOC	Station Location Map

One of two paths may be followed through the interface at this point. The general retrieval path provides access to all data within the Water Quality System. The ground water path is specifically tailored to the needs of ground water managers who are working in accordance with the data procedures and standards described in OGWP's Data Management Manual. Note that ground water data not stored in accordance with the conventions established within the OGWP Manual, which includes a large amount of historical data, is available through the general retrieval path.

Once a retrieval request has been completely specified, it may be submitted for execution. Any number of requests may be created, modified, and submitted during a single terminal session.

The processing of retrieval outputs is performed under SDSF (Spool Display and Support Facility), which is accessed via the ISPF Primary Option Menu. Outputs can be viewed on the terminal screen, purged (deleted) from the output queue, or routed to a designated remote printer.

The commands required to progress through the menus are usually displayed on the menus themselves. They may be entered on the command line or through the use of function keys, e.g., PF3 is typically defined to invoke the END command. In general, the END command moves to the preceding menu, while the ENTER key processes the current menu and moves you to the next menu (assuming there are no errors on the current menu). Scrolling menus, which are described in detail in the next section, may require that the ENTER key be pressed twice to progress to the next menu. Detailed help about each prompt and each menu is available at the touch of a key (typically PF1 is defined to invoke the HELP command). In addition, there are look-up menus that provide listings of codes, such as FIPS county or USGS hydrologic unit codes from which the user may select desired items during the retrieval process. Every selection made by the user is checked and verified by the interface. Complete command listings can be found in the "Command Summary" on page 10.

Before accessing the interface, you should attempt to identify for your workstation, the keys (or key combinations) which perform the following IBM 3270 functions: reset, attention, erase eof, tab forward, tab backward, new line, PA1 and PA2 (PA3, if available), and PF1 through PF12 (PF13 through P24, if available). Some keyboards label the Enter key as "Newline" or "Return" and the Attention key as "Break".



Menus

The three basic types of menus utilized in the interface are:

- Choice
- Entry
- Selection

Understanding the difference between the various types of menus will help when using the interface. The cursor will usually be positioned at the menu location where the first entry or selection is to be made. This minimizes time spent repositioning the cursor to the appropriate section of the menu. In all menus, items which require input from the user will have an arrow (= = >) prompt or will have underscores (_____) indicating where data may be entered. A menu item that lacks either an arrow or underscores is protected and cannot be changed. To move from one input menu item to another, use a TAB key, or the arrow or step keys. When user errors are detected, an error message will be displayed and will be accompanied by an audible beep. Messages may appear in two locations on a menu. Short messages appear at the top right corner of the screen and long messages appear immediately below the Command = = = > prompt.

Menus whose contents may not fit on a single screen are scrollable. All scrollable menus have the "ROW x OF y" and "Scroll = = = > CSR" labels in the upper right hand corner. These menus may be scrolled up or down, since their contents may at times exceed the number of lines on the screen. The UP and DOWN commands may be entered on the command line or invoked by function keys, e.g., PF7 for UP, PF8 for DOWN. These commands allow the user to move the screen "window" up or down to display the desired part of the menu contents. The "ROW x OF y" label indicates that row "x" of a menu containing "y" rows is currently the top row displayed on the screen. The letters "CSR" specify that the scrolling is based upon the current position of the cursor. The row on which the cursor lies when the scrolling command is issued, is moved to the top or bottom of the screen depending upon which scrolling command is used. If the cursor is not in the body of the menu, or if it's already positioned at the top or bottom, the complete screen is scrolled. The complete set of valid scrolling commands are described in the section "Scrolling Menu Commands" on page 11.

Choice Menus

Choice menus display a list of options from which a single option may be chosen by entering the appropriate number at the Option prompt. One line descriptions of the options are provided to convey the purpose of each option. The HELP command (or the equivalent PF key) may be entered at the command line to obtain more information about the options.



Title Line	
Command ==>	
Option ==>	
1	Option 1 description
2	Option 2 description
3	Option 3 description
4	Option 4 description
5	Option 5 description
Press ENTER key after selecting desired option.	

Figure 1. Example of a Choice Menu

Entry Menus

Entry menus have various locations on the screen where information may be entered by the user. These locations are identified by the arrow prompt (==>) or a sequence of underscores (___) or both.

Title Line	
Command ==>	
This is a question to be answered? ==> (Yes or No)	
Input field ==> _____	Input field ==> _____
Input field ==> _____	Input field ==> _____
Press ENTER key to continue.	

Figure 2. Example of a Non-scrolling Entry Menu

Scrolling entry menus have a spread-sheet format with input fields displayed in rows and columns. There are a number of editing commands that may be specified in command column (CMD) that precedes each row, e.g., R repeats the row, D deletes the row. The complete set of valid edit commands is described in Section "Command Summary" on page 10 of the Command Summary under Scrolling Entry Menu Edit Commands.



Columns within scrolling entry menus, whose headings contain a question mark (?) or asterisk (*), have a powerful builtin "look-up" feature. When a question mark is entered into a row with a question marked column heading, a selection menu containing all possible values that may be entered in the column is displayed. Column One below has the question mark look-up feature. When part of a value immediately followed by an asterisk is entered into a row with an asterisk column heading, a selection menu containing all possible values that may be entered in the column that begin with the characters preceding the asterisk is displayed (wild card function). Column Two below has the asterisk look-up feature. Entering an asterisk BY ITSELF in a row with an asterisk column heading is equivalent to entering a question mark in a row with a question marked column heading, i.e., all possible values are displayed in the selection menu.

Note that whenever the Enter key is pressed, data validation is performed on each row of a scrolling entry menu as a unit. This means that when you enter a value into any field of a particular row that all required fields within the row must also be entered before the Enter key is pressed. If this is not the case, an error message will be displayed indicating that you have left a required field empty and the cursor will be placed at the beginning of the required field.

Command ==>		Title Line	Row x of y Scroll ==> CSR
CMD	Column One	Column Two	Column Three
===	?=====	=====*	=====
---	---	---	---
---	---	---	---
---	---	---	---
---	---	---	---
---	---	---	---
----- Press ENTER key twice to continue -----			

Figure 3. Example of a Scrolling Entry Menu with Look+up

Selection Menus

Selection menus provide a set of options from which the user selects one or more desired options by typing an "s" in the underscored field that precedes each option description.



```

                                Title Line
Command ==>

----- Option Descriptions -----

  _ Option 1 description
  _ Option 2 description
  _ Option 3 description
  _ Option 4 description

Press ENTER key to continue after selecting desired option(s).

```

Figure 4. Example of a Non-scrolling Selection Menu

Selection menus may also be scrollable. See the discussion of scrolling menus in Section "Menus" on page 6 for a complete description of their features.

```

                                Title Line                                Row x of y
Command ==>                                Scroll ==> CSR

SEL      Column Heading
===      =====
  _ Option 1 description
  _ Option 2 description
  _ Option 3 description
  _ Option 4 description
  _ Option 5 description
  _ Option 6 description
  _ Option 7 description

----- Press ENTER key twice to continue -----

```

Figure 5. Example of a Scrolling Selection Menu

The "Request Selection List" menu is the only scrolling selection menu that allows just ONE option to be selected. The "Request Selection List" menu is displayed when no request name is specified on the "Request Option and Name" menu at the start of the interface.

A small number of menus are hybrid combinations of the three basic types described above, e.g., a choice menu entry that requires you to enter additional information when choosing the entry.



Command Summary

The three different types of commands that may be invoked at any point within the interface from the command line (Command = = = >) are:

- ISPF commands
- SDSF (Spool Display and Support Facility) commands. SDSF allows the user to locate and process requests submitted for execution by the interface.
- TSO commands

Pertinent ISPF, SDSF, and TSO commands are described in the following sections. A complete description of the available ISPF, SDSF, and TSO commands is available through NCC customer support.

Note that the function key definitions for ISPF and SDSF may vary, thus leading to different behavior by the same function key when utilized in the interface and SDSF. SDSF is a commercial system utility that has its own set of function key definitions. For this reason, it has its own interaction conventions and feel.

ISPF Commands

An ISPF command may be entered in one of two ways:

1. By typing the command after the Command = = = > prompt and pressing the ENTER key.
2. By pressing a PF key that has been defined to the desired command.

Remember that pressing a PF function key simply simulates typing the command. Each PF key is equated to a character string. When the PF key is pressed, the processing is the same as if the user actually typed the character string after the Command = = = > prompt and pressed the ENTER key. ISPF does not differentiate between a command entered with a PF key and a command entered by typing at the Command = = = > prompt.

A description of the general ISPF commands and their default PF function key assignments is given below. Listed separately are additional commands available for scrolling menus and scrolling entry edit menus.

HELP (PF1)	Provides information about the menu and the prompts in the menu.
SPLIT (PF2)	Causes screen to split horizontally at cursor position, or changes the location of the screen split.
END (PF3)	Terminates the current operation and returns to the previous menu. If the ISPF primary option menu is displayed, this command terminates ISPF.
RETURN (PF4)	Causes an immediate return to the ISPF primary options menu or to the menu from which a HELP or KEYS command was entered, without displaying intervening menus.
RFIND (PF5)	Searches for the next occurrence of the specified search string.
UP (PF7)	Causes a scroll upwards.
DOWN (PF8)	Causes a scroll downwards.



SWAP (PF9)	Moves the cursor to wherever it was previously positioned on the other logical screen of a split screen pair.
LEFT (PF10)	Causes a scroll to the left.
RIGHT (PF11)	Causes a scroll to the right.
CURSOR (PF12 or TAB)	Moves the cursor to the next input field.
PFSHOW	Displays function keys and commands associated with the keys.
KEYS	Causes an immediate display of a menu that allows the user to view and change the current PF key definitions.
SDSF	This will invoke the Spool Display and Support Facility Primary Option menu at any point in the session. The menu contains a list of commands that allow the user to purge, fetch, route, and view jobs in the output and input queues. The list of commands are given in Section "SDSF Commands" on page 12.
SPLITV	Causes the screen to be split vertically into two logical screens.
TSO	Allows the user to enter a TSO command from any menu. Some commonly used TSO commands are given in Section "TSO Commands" on page 13.
= X	Permits the user to exit the STORET user interface and terminate ISPF. If you are in the middle of creating or modifying a retrieval request, it will be automatically saved before exiting.

Scrolling Menu Commands

The commands described below may be entered after the **COMMAND = = = >** prompt on all scrolling menus.

FIND, F

Searches for a combination of values that were specified in a template (pattern) resembling a menu row.

TOP, FIRST

Moves the cursor to the first line of the scrolling menu.

BOTTOM, LAST

Moves the display to the last line of the scrolling menu.

MIDDLE, M,

Moves the display to the middle line of the scrolling menu.

LOCATE, LOC, L

Moves the display to the specified line, e.g., "Locate 8" moves to the 8th line of the scrolling menu.

SAVE

Saves the current retrieval request.



Scrolling Entry Menu Edit Commands

These commands may be entered in the underscored rows of the command column (with column heading "CMD") on scrolling entry menus.

A (After)

Identifies the line after which copied, moved, or model lines are to be inserted.

B (before)

Identifies the line before which copied, moved, or model lines are to be inserted.

C (copy)

Identifies a line to be copied.

D (delete)

Causes the line to be deleted.

I (insert)

Causes a new line to be inserted after this line.

I < <nnn> >

Inserts < <nnn> > empty lines after this line.

R (repeat)

Causes the line to be repeated and the new copy to be inserted immediately after this line.

R < <nnn> >

Causes the line to be repeated < <nnn> > times after this line.

SDSF Commands

The SDSF commands are shown below. These commands may be entered after entering SDSF from the ISPF Primary Option Menu (option 8).

DA

This command displays information about the user's active jobs, i.e., jobs currently executing.

I

This command displays information about the user's jobs that are in the input queues, i.e., awaiting execution. Entering only the I command means that all the standard input classes are to be listed. Two additional parameters may be entered with this command: H which indicates that only jobs on hold are to be listed or NH which indicates that only jobs that are not on hold are to be listed. The information that is listed includes type of job (TYPE), the job number (JNUM), job execution priority (PRTY), job class (C), position of the job in input queue (POS), job output print routing



(RMT), the time and date the job was submitted (RD TIME, RD DATE), the job room number (RNUM) and the time execution began if the job has already executed (ST TIME).

O

This command displays information about the user's jobs that have already been executed. When the O command is entered, all jobs that are in the output queue will be displayed. The information listed on each job output includes job name (JOBNAME), job number (JNUM), the output class (C), the output form number (FORM), the total print lines for the output (TOT REC), the job status (STATUS = held, canceled or blank), the output device name (DEVICE), and the output print node (NODE). The ISPF scrolling commands (UP, DOWN, LEFT, RIGHT) may be used in this menu since the listing of information displayed on a job may be larger than the terminal screen.

You may display the output of any executed job whose output is in HOLD by typing an "s" in the NP column next to the jobname. You may also change a job output's destination by modifying its DFST value. This allows you to re-direct the printed output from a held job to a specific remote printer or visa-versa. All EPA regions and most state agencies have at least one remote printer. The contacts listed in Section "STORET User Assistance" on page 1 should be consulted for remote printer site numbers in their respective regions.

?

The user may obtain a list of the individual parts of a job output by entering a question mark (?) at the NP column of the desired job. The user may enter "S" in the NP column to display one part of the job output on the screen before it is printed.

ST

This command will display information on all of the user's jobs, i.e., input, active, and output.

PR

This command will display the status of all remote and system printers on the EPA computer.

WHO

This command displays your logon procedure name, user ID, and terminal name.

TSO Commands

These are **operating** level commands similar to DOS on the personal computer. The command "TSO" must be entered first in the command line followed by the appropriate TSO command. Only the commands that may be useful to STORET users are given below:

COPY

Copy a dataset.

DELETE

Delete a dataset.



LIST

List the contents of a dataset.

LISTCAT

List all datasets catalogued to your userid.

LISTDS

List the attributes of a dataset.

RENAME

Rename a dataset.

LOGOFF

End your terminal session.

LOGON

End your current terminal session and begin a new terminal session.

TIME

List the date, time, and other related items.

Accessing Helpful Information

The help information available in the user interface has been separated into several levels, from the general to the very specific, so that the type of information that the user may access is dependent on the type of information that the user needs.

Level 1: General Help

This help is invoked by entering the **HELP** command (or equivalent function key). This will provide the user with a brief description of the menu. If the menu is a scrolling menu, the help will also provide the user with access to all the commands that may be entered here. If the menu warrants it, more specific help may be selected for each individual prompt on the menu.

Level 2: The Look-up Feature

This help is **only** available for scrolling menus. Two types of look-up help are provided on scrolling menus. Menus associated with station selection by aquifer code, state county FIPS codes or names, USGS Hydrologic Unit codes, EPA basin codes, provide a textual description for each code specified on the menu, e.g., the state name is displayed next to the state code. This aids users in confirming that the correct code was entered. The second type of look-up help invokes a selection menu of valid responses, thus allowing users to select desired entries. Columns whose headings contain a question mark (?) or asterisk (*), have the "look-up" menu feature. When a question mark is entered into a row with a question marked column heading, a selection menu containing all possible values that can be entered in the column is displayed. When part of a value immediately followed by an asterisk is entered into a row with an asterisked column heading, a selection menu



containing all possible values that may be entered in the column that begin with the characters preceding the asterisk is displayed (wild card function). Entering an asterisk BY ITSELF in a row with an asterisk column heading is equivalent to entering a question mark in a row with a question marked column heading, i.e., all possible values are displayed in the selection menu.

Level 3: Data Validation

This third level of help is invoked automatically. All user inputs are checked and verified by the interface. When an error is detected, an error message will be displayed on the screen and is usually accompanied by an audible beep. The user may obtain more information about this short error message by entering the HELP command on the command line or by pressing the equivalent function key. By entering HELP again, even more information may be obtained about the error prompt.

Exiting the STORET User Interface

Enter "=X" after the COMMAND == => prompt to exit the interface and terminate ISPF. If you are in the middle of creating or modifying a retrieval request, it will be automatically saved before exiting. This will get you back to the TSO "READY" prompt.

To terminate your terminal session, enter "LOGOFF".

Using a Personal Computer (PC) to Access STORET

Any PC with communication software capable of emulating either a DEC VT100, or an IBM 3270 terminal, e.g., KERMIT, CrossTalk, that is connected to a modem can access the EPA mainframe computer in North Carolina in full-screen mode and use the STORET interface. EPA will provide, at no charge, copies of KERMIT and or ARBITER. Crosstalk and other communication packages with VT100 3270 emulation may be purchased through most commercial software dealers.



STORET Retrievals

This section provides an overview of the Water Quality System (WQS) retrieval process using the menu-driven interface. As explained earlier, one of two retrieval paths may be followed through the interface:

- General Retrieval Path
- OGWP Ground Water Path

The general retrieval path provides access to all data within the Water Quality System. The ground water path is specifically tailored to the needs of ground water managers who are working in accordance with the data procedures and standards described in OGWP's Data Management Manual. The ground water path provides a number of special menus for requesting STORET data based upon ground water sampling and analytical methods. Note that ground water data not stored in accordance with the conventions established within the OGWP Manual, which includes a large amount of historical data, is available through the general retrieval path.

For more specific information about the retrieval process refer to the "Ground Water Data Management with STORET" and the "STORET Handbook - Volume 1", both of which are available through STORET User Assistance.

STORET Output Formats

The formats provided for in the initial phase of the interface are described below.

INVENT

The INVENT format displays a summary listing for all or selected parameters at the selected stations. Information listed for each parameter includes the number of observations, period of record, and several summary statistics. Remark values for a parameter are summarized on separate lines within the listing. This format provides excellent overview for reviewing the parameter coverage of specific monitoring networks or geographical areas.

RET

The RET format displays a tabular listings of actual sample values for up to 50 parameters at the selected stations. These listings show the sampling dates, sampling times, depths, and values of requested parameters. The samples values for each parameter are displayed in a separate column. Ten parameters are displayed on each page, therefore each sample may span five pages.



ALLPARM

The ALLPARM format displays a tabular listing of actual raw data values for all or selected parameters stored at the selected stations. The sample values for each parameter are displayed in a separate row.

This format is useful when there is need to obtain listings of raw data values of more than 50 parameters, as is often the case when working with toxics data. Also, by specifying the parameters of interest, any preferable order of listing can be achieved.

LOC

The LOC format displays a map of the selected station locations which contains a symbol to denote the location of each station along with the applicable state and county boundaries. Other background options are available, e.g., drainage basins, streams. Included with the map is a listing of all stations and their associated descriptive data.

Note that a latitude longitude polygon is required when mapping station locations. If a polygon is not used to select the stations, a special mapping polygon must be supplied.

STA

The STA format displays a listing of all the primary and secondary station codes associated with the specified agency coders). The output is in the form of a list of station identifiers in alphabetical order.

The STA format is used primarily to determine which station IDs have already been assigned by an agency, so that new stations within the agency's network can be assigned unique station IDs. This report is also handy as a reference for determining station IDs for selecting stations when entering a retrieval request.

Using the User Interface

As previously stated, the retrieval process can be broken up into the following six steps:

1. Output Format Specification
2. Station Selection
3. Sample Selection
4. Parameter Selection
5. Special Output Options
6. Job Submission Options



Step 1. Output Format Specification

STA

Produces a listing of all primary and secondary station codes associated with one or more agency codes.

INVENT

Produces a summary of the data for the all or selected parameters at the selected stations.

RET

Produces a tabular listing of actual sample values for up to 50 selected parameters at the selected stations.

ALLPARM

Produces a tabular listing of actual sample values for all or selected parameters at the selected stations.

LOC

Produces a map displaying the locations of selected stations.

For more information on these output formats, refer to "STORET Output Formats" on page 16.

Step 2. Station Selection

Once an output format has been chosen, the station selection herald is displayed. Selecting sample sites is an extremely important step in the retrieval process because it narrows the scope of the retrieval to only those stations desired for the analysis. Effective station selection techniques can save the user time and money by eliminating unneeded data.

The first screen in this process will be a selection menu giving the user several basic ways of defining which of the approximately 680,000 sites available within the WQS are of interest for that particular retrieval. The station selection choices for the general retrieval path are:

- By Agency Codes and Station IDs
- Within States and Counties
- Within Aquifers
- Within Latitude Longitude Polygon or Circle
- Within USGS Hydrologic Units
- Within EPA Drainage Basins
- By Station Type Parameter Attributes
- By EPA Reaches
- Within EPA Ecoregions

The last two station selectors, EPA Reaches and EPA Ecoregions, are not available on the OGWP path.



Selection by Agency Codes and Station IDs

Stations may be selected by their agency code and station number either specifying individual stations or a range of stations. Either primary and or secondary IDs may be used. When a station range is specified, the actual number of stations whose station codes lie within the range is displayed.

Selection by States and Counties

All stations within a specified state or states and certain counties within that state or states may be retrieved. For this specific retrieval, two types of look-up help is available. The user may specify a state by entering either its postal abbreviation, state name or Federal Information Processing Standards (FIPS) code. When one of these three items are entered, the interface will first check to see if the entry is valid. If it is valid, all the remaining values (state name, postal abbreviation, or FIPS code) will be inserted by the interface in the appropriate data fields. Once the state has been entered, a list of names and FIPS codes of the counties in that state may be obtained by entering a question mark ("??") in either of the two County fields. The fields where the question mark may be entered to obtain a look-up menu of codes are identified with a question mark ("??") in the heading for the field. A specific county may be selected from the look-up list by entering a "S" next to the correct county.

Selection by Aquifers

All stations within selected United States Geological Survey ground water aquifers may be retrieved. When the aquifer code is entered, the interface will automatically provide the aquifer name, if the code is valid.

Selection by Latitude/Longitude Polygon or Circle

All stations within a geographical area may be selected. The user may define a latitude longitude window (rectangle or irregular polygon), or search for stations within a radius of a point (circle). The lat long coordinates will be verified to see if they are in the correct format. (In order to retrieve a station by lat long, the correct lat long must have been stored. The latitude and longitude are required in order to store a site in the data base).

Selection by USGS Hydrologic Units

All stations within a U.S. Geologic Survey Hydrologic Unit (HUC) drainage area may be retrieved. The user may use either Region, Sub Region, Accounting or Cataloging Unit code. Once the appropriate numeric code is entered, the system will verify if it is in the correct format and automatically provide the corresponding name.

Selection by EPA Drainage Basins

All stations in one or more EPA basins (Major, Minor, or Sub) may be retrieved. The basin names will be inserted in the data field if the user enters the correct numeric codes.

Selection by Station Type/Parameter Attributes

The user may retrieve stations according to the type of station. Among others, the most commonly used are lake, stream, estuary, or whether the station monitors discharge pipes, aquatic biota or ambient water chemistry conditions. In addition, the user may retrieve stations according to the presence of Water Quality System parameters being sampled at selected sites. Priority pollutants



identified by EPA can also be specified on this menu. The system will validate the station type codes or the parameter type codes to see if they are correct.

Selection by EPA Reaches

All stations located in a polygon window associated with EPA's Reach File are retrieved with this option. Stations may be on or off the reach trace. This capability does not include hydrologic retrieval capabilities of the Reach File.

Selection by EPA Ecoregions

All stations located in an EPA Ecoregion are retrieved with this option. The user may specify most or generally typical part of the Ecoregion.

Station Restriction

The set of stations selected by the above criterion may be further limited by specifying one or more station restrictors. The available station restrictors are:

- restrict to specific agencies or stations (include or exclude)
- restrict to specific states or counties
- restrict to station type parameter attributes
- restrict to specific archive data classes

Restrict by Agency Code and Station IDs

Station retrieval can be limited to only one agency and its stations, or a specified agency can be excluded from the retrieval.

Restrict by States and Counties

Stations selected by natural resource criteria, e.g., drainage basin, may be restricted to only the stations located in certain political areas (states, counties, provinces).

Restrict by Station Type/Parameter Attributes

The same station selection capability is available to further restrict the retrieved number of sample sites.

Restrict by Archive Data Classes

Part of the STORET data base contains archived data. These data can only be retrieved supplying the archive class value. The groundwater well data of USGS are all archived. It is automatically selected if the user specified the OGWP path through the interface.



Station Aggregation

Users may optionally aggregate the data for retrieved stations and thus treat it as though it came from a single station for purposes of analysis. For example, all of the stations in a state can be aggregated by county and the resulting analyses will treat each county's data as a separate station. The following station aggregation options are available:

- State
- County
- EPA Major Basin
- EPA Minor Basin
- EPA Sub-Basin
- EPA Reach
- USGS Hydrologic Region
- USGS Hydrologic Sub-Region
- USGS Hydrologic Accounting Unit
- USGS Hydrologic Cataloging Unit
- User-Defined Station Groups
- Latitude Longitude Cell: Height (Latitude) == > (Seconds)
Width (Longitude) == > (Seconds)
- All Stations

Step 3. Sample Selection

Once stations have been selected, the sample selection herald is displayed. The menus that appear for this step enable the user to restrict the data retrieved to only those samples identified by specific dates, sampling depths, and sampling conditions of interest.

In the general path the user will be asked whether only grab samples and or composite samples should be retrieved. If composite values are requested, the user may specify which composite value types that are to be retrieved, e.g., min, mean, max, variance, precision, standard deviation.

Two additional menus will appear in the OGWP path in this phase of building the retrieval request. The ground water data may be qualified by adding information pertaining to sampler material, methodology, lab vs. field samples, and type of sampler used. These additional screens permit the user to restrict the retrievals to these qualifiers.

If a sample selection option is not specified, the retrieved data will include all sampling events for each selected station. By choosing a sample selection option, the output report can be limited in a number of ways, based on the data stored with the sample. The options are shown below (more than one option may be selected):

Date Ranges

Select samples that were taken on specific days or within specific date ranges.

Time Ranges

Select samples that were taken at a specific time of day or within specific time ranges.



Seasonal Ranges

Select samples that were taken within specific seasons.

Depth Ranges

Select samples that were taken at a specific depth or specific depth ranges (feet or meters).

Depth Type

Select samples associated with specific depth types, e.g., sediment, pore, core.

Aquifers

Select samples that were taken within specific aquifers.

Intensive Surveys

Select samples that were taken during specific intensive surveys by entering the desired intensive survey numbers, i.e., state code, year, sequence number.

Locked Status

Select samples that are locked. STORET samples may be locked by their owners to prevent unauthorized use, e.g., while data validation is being performed. Locked samples cannot be retrieved unless the unlocking key for the contributing agency is specified.

Parameter Content

Select samples that contain one or more specific parameters. This selection criterion may be made more specific by requesting that only samples containing specific parameters whose values fall within specific ranges be retrieved.

Step 4. Parameter Selection

Once samples have been selected, the parameter selection herald is displayed. This step and the menus that appear for this step enable the user to select specific water quality parameters and, optionally, specify special handling options for those parameters.

There are over 11,000 water quality parameters within the Water Quality System. These parameters are grouped into the general categories of radiological, phosphorus, pesticides, flow, biological, bacteriological, solids, nitrogen, oxygen demand, organics, inorganics, dissolved oxygen, metals, and physical. The interface provides a look-up feature for partial parameter number, partial parameter name, group, and CAS number to aid users in identifying desired parameters.



As the parameter codes of interest are entered, the user has the option to specify if special handling for the parameter is desired. The seven special handling options are:

- **Convert Values to Logarithms (Base 10)**
- **Convert Values to Loadings**
- **Change Name Units/Decimal Location**
- **Specify Remark Restrictions**
- **Specify Acceptable Value Ranges**
- **Perform Math Transformations**
- **Specify Alternate Parameters**

Convert Values to Logarithms (Base 10)

This special handling option causes the logarithms of stored values for the specified parameter to be computed before the analysis is performed.

Convert Values to Loadings

This option will cause loadings (lbs/day) to be calculated for the specified parameter. In order for a loading to be computed, the sample must contain a value for one of the following flow parameters: 58, 59, 60, 61, 50050, 50051, 50053, 72033, 72034, and 74020. A flow parameter does not have to be specified as part of the retrieval request, but it must be present in the sample for the loading to be computed.

Change Name/Units/Decimal Location

This option may be used to change the parameter name, units of measure label, and decimal location, i.e., print format used to print values for this parameter. This option should be used in conjunction with performing math transformations. For example, if you desire to see values for a particular parameter displayed in some units other than those in which it is stored, you can perform the conversion by applying the appropriate math transformations. In addition, the units label displayed with the value should also be modified to correspond to the new units. Also, when math transformations are used to change one form of a constituent to another, the parameter name must be modified to reflect this transformation.

Specify Remark Restrictions

This special handling option allows the user to restrict the data to be retrieved to only those with certain remark codes, to request that only remarked data be retrieved, or that only unremarked data be retrieved. Some commonly used remark codes that the user may enter are shown below (All valid remark codes are listed in the STORET Help dataset named STORET.HELP.REMARKS.CODES):

- C** Value calculated.
- J** Estimated value. Value not accurate.
- K** Actual value is known to be less than value given.
- L** Actual value is known to be greater than value given.
- S** Laboratory test.

Specify Acceptable Value Ranges



This special handling option allows the user to restrict the parameters retrieved to those that lie within specific ranges of values or to specific values. If the presence of a parameter or group of parameters is critical for an analysis, this option should be selected.

Perform Math Transformations

This special handling option allows the user to change the values of parameters using mathematical operations. You may add a constant, subtract a constant, multiply by a constant, or divide by a constant, in any combination. In the resulting printed report, an asterisk (*) will be displayed next to the parameter name indicating that some of the values in the column may have been modified at the user's request.

Select Alternate Parameters

At some sampling sites, the same constituent may have been analyzed using different techniques, i.e., for one period of time, one method may have been used while, for another period of time, a different method is used. In STORET, two unique parameter codes are assigned to the same constituent due to the differing sampling technique. This special handling option allows the user to retrieve all occurrences of the same constituent regardless of the sampling technique. You may also select limited special handling options for alternate parameters, as follows:

- Specify Remark Restrictions
- Specify Acceptable Value Ranges
- Perform Math Transformations

Step 5: Special Output Options

This step depends on the output format chosen in step 1. Most output formats have features that may be controlled by the user. These output specific features are described below.

STA

There are no special data analysis features available with this format. The only input, in fact, is the agency code whose primary and secondary station IDs are to be displayed.

INVENT

The inventory format provides three options that effect the printed report, as follows:

- *Gross Summary Only*

This will cause all of the output for individual stations to be suppressed for inventories and have only the "gross" summary printed. The gross summary displays an single inventory of all data retrieved.

- *Print Stations With Sample Data Only*

Only stations for which sample data was retrieved will be displayed, i.e., stations that were selected but contained no sample data that met the retrieval criteria will NOT be displayed.



- *Print All Stations*

All stations, whether they contributed data to the inventory or not will be displayed. Only the station header data will print for stations for which no sample data was retrieved.

RET

There are no special data analysis features available with this format.

ALLPARM

The number of stations printed per page is controllable for the ALLPARM format. One or multiple stations may be printed per page. When multiple stations per page is requested the output is re-formatted and compressed. This option is desirable when there is a small number of observations for a small number of parameters at a large number of sampling locations.

LOC

Many different options are available to control the station location map. The user may select which data should be plotted on the map from a list which includes site locations, boundaries (state and county) of the United States and provinces in Canada, EPA reach trace and reach numbers, and various natural resource defined areas, such as EPA Ecoregions, USGS HUC basins, etc.

A detailed description of the features available for the LOC format is contained in the STORET help dataset named STORET.HELP.PGM.LOC.

If the stations to be mapped were selected by polygon, this polygon may optionally be enlarged to include areas not contributing sampling sites to the map if desired. When utilizing the LOC format to generate a map, the retrieval request must always contain a latitude longitude polygon. If a polygon was not used for station selection, then a latitude longitude polygon must be specified here.

Optionally, the first 300 station locations may be tagged with a identifier that is also printed in an accompanying cross reference. The printed cross reference contains the station IDs, latitude longitude coordinates, and location description of the tagged stations. Up to five maps may be produced when tagging stations to avoid overprinting of any tags.

The user may specify the desired map scale, map projection, plotting symbol, symbol size, latitude longitude reference points, colors, supplementary legend text and map labelling, to be used in the map. A projected border and or rectangular frame may be drawn as desired.

A 10% border is automatically added to all maps. This border contains background information such as county lines and increases the area being plotted 20% in both the north south and east west directions. This overlap ensures that there is sufficient geographic reference information displayed along with the station locations. However, this overlap can cause undesired rescaling of the map if the map size including the overlap exceeds the paper size. This overlap percentage may thus be modified.



Print Control Options

Formats that produce printed reports of sample data have several print control options, as follows:

- Print station header data and sample data only
- Print the station descriptive paragraph and additional station boundary points only
- Print the station header data, sample data, descriptive paragraph, and additional station boundary points

Also, up to five lines of additional report heading may be specified. Typically, the station header data prints on the right side of the page. However, it may be shifted to the left side of the page if desired.

Step 6. Job Submission Options

Job submission parameters are the 1st items specified to complete a retrieval request. Once entered they may be modified by subsequently editing the request or as part of submitting the request for execution. A completed request may be submitted for execution by selecting the second option, "Submit a completed request for execution", on the Request Option and Name menu at the start of the interface.

The job submission parameters to be used when submitting the request for execution are displayed for confirmation. They may be modified for this submission and, optionally, permanently saved in your profile for use in creating jobcards for future requests. The job submission parameters consist of the following:

PRIORITY

This is the priority assigned to the job. PRIORITY 1 indicates that the job is to be executed overnight. PRIORITY 4 is the highest and most expensive priority.

TIME

This is CPU time that the user estimates the job will take to execute.

BIN/ROOM

This is the delivery destination for printed outputs. Users who are not located near a remote printer usually have a BIN ROOM code of Miii meaning mail the output to the address associated with userid iii.

NOTIFY

This indicates whether the userid should receive a notification message when the job has completed execution.

ROUTE

This indicates where the job is to be printed. HOLD is a valid entry to provide the user with the option to look at the output of a completed job on the CRT screen.



JCL ECHO

This indicates the degree to which the user would like the system messages to be included in the printed output.

Request Disposition

When a request has been completed, the request disposition menu is displayed. The request may be saved under its current name or a new name, cancelled, or edited again.

Two datasets are created in the user's dataset directory in the course of using the menu-driven STORET interface. These partitioned datasets have the fully-qualified names:

iiiiiii.STORET.TABLES iiiiiiii.STORET.REQUESTS

where iii represents your userid and iiiiii your account.

The TABLES dataset contains all of your requests in a special encoded format, while the REQUEST dataset contains the STORET keyword forms of your requests. Neither of these datasets should be modified, since any errors introduced in doing so may prove fatal during subsequent processing of the request by the interface.

Retrieval Output Manager

After submitting a request for execution, the Request Option and Name menu is displayed and the process of creating, editing, or submitting a request may begin again. At this point, the user may also choose to view the status of requests already submitted for execution by invoking SDSF. To do this, enter the RETURN command (or equivalent function key) to return to the ISPF Primary Option menu and select SDSF (option 8). When a request is submitted for execution it is assigned a unique job number. The job number should be used within SDSF to query job status, display the job output on the screen, or route the output to a remote printer. A complete description of the SDSF commands that may be specified is contained in Section "SDSF Commands" on page 12.

As previously stated, SDSF is a system utility that is outside of the STORET interface and, for this reason, may behave differently than the interface. For example, the function key definitions within SDSF are quite often different than those within the interface, e.g., pressing PF5 within SDSF may produce different results than when PF5 is pressed within the interface.



STORET Interactive Procedures

The interactive procedures available in this option are described in the following sections.

%BROWSE

This STORET command procedure allows the user to interactively examine selected station locations and parametric data in a variety of output formats. %BROWSE can also produce plots of parametric data versus time on graphics devices that are compatible with Tektronix graphics terminals.

%BLITZ

This STORET command procedure allows the user to interactively retrieve all data, both station location and parametric data, stored for a single STORET station. The procedure prompts for the agency and station IDs, and period of record of interest, and allows for four output formats.

%CONTACTS

This STORET command procedure displays the name, address, and phone for the designated contact person for each STORET agency code.

%COUNTEM

This STORET command procedure allows users to interactively obtain a count of all the stations within STORET which meet a user-specified station type, parameter attribute expression. No station data or parametric data are retrieved by this procedure. Its purpose is only to provide a quick indication of the number of stations that will qualify with respect to station types and or parameter presence, and thus help the user structure a retrieval request that will best provide the user with the desired data.

%STNDESC

This STORET command procedure interactively retrieves station description information from STORET, optionally prints the retrieved information, or creates a dataset containing the header information in fixed-field storage format for use in modifying the station header data.

